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Trends and Outlook

Paul A. Murphy

Southern Forest Experiment Station

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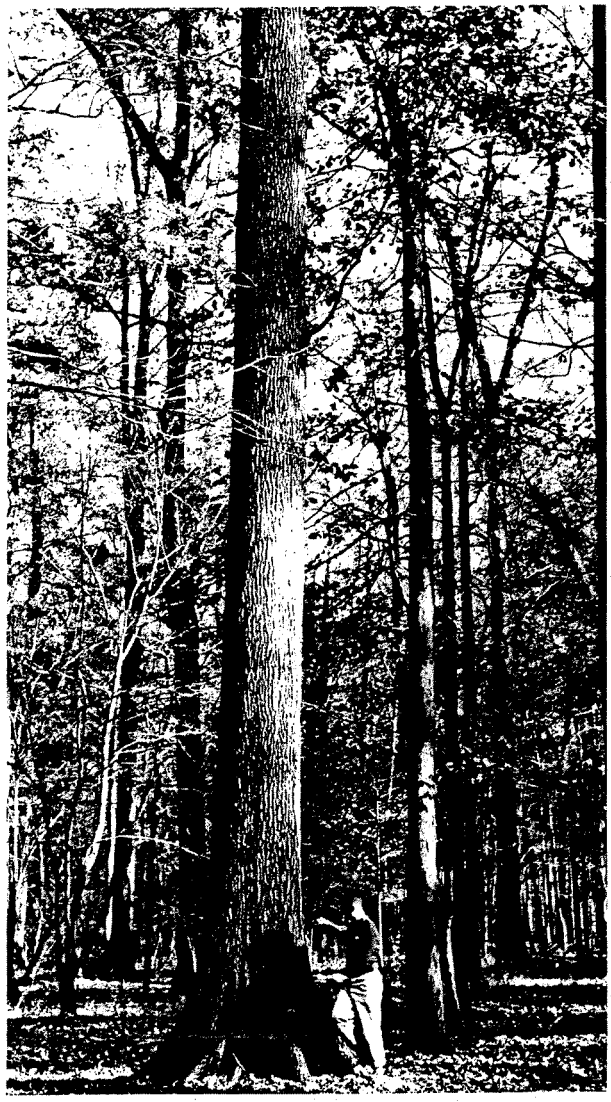
MISSISSIPPI FORESTS



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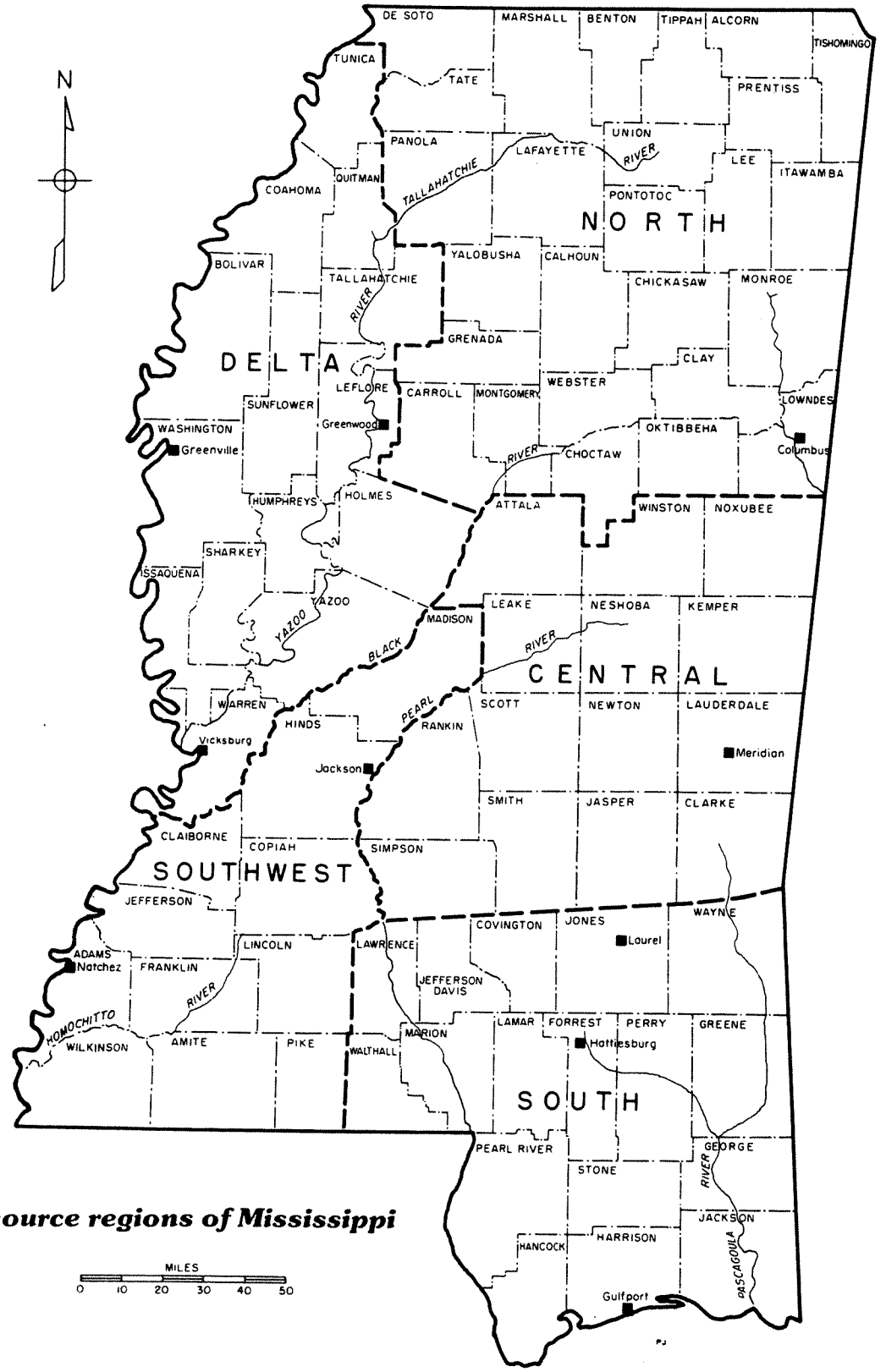


Figure 1.–

Forest resource regions of Mississippi

HIGHLIGHTS

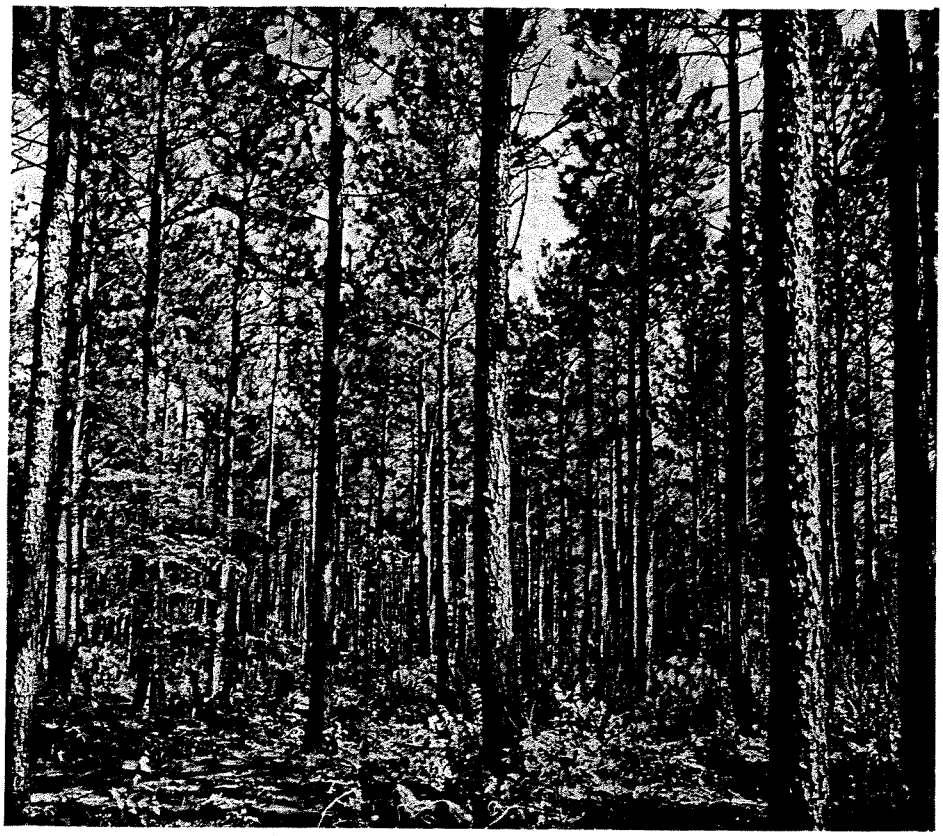
Presented here are the principal findings of a new forest survey of Mississippi. It is dated 1977, the year field work was completed, but estimates of growth and removals and output for industrial forest products were compiled for 1976. Findings are compared with the previous comprehensive survey of 1967 to help clarify trends in forest area and timber resources.

While the report does not include an analysis of other resources, it is recognized that timber is but one of the many benefits yielded by forests. Recreation, watershed protection, range, and many other uses of the forest make an important contribution to the life and economy of Mississippi's citizens.

The area of forest land in Mississippi declined during the past decade. Although the change was small, significant shifts in land use occurred within survey regions. In all sections of the State, most of the loss in woodland acreage is due to clearing for agriculture.

The softwood inventory in sound, well-formed trees increased 30 percent, and hardwoods gained 17 percent. This increase in volume rose in all parts of the State.

As expected, the smallest gains in timber resources occurred in south Mississippi, where the forest sustained heavy losses during Hurricane Camille in 1969. And the impact of Camille continues: mortality in the forests is high on the lower Coastal Plain.



Softwood volume up. ***Softwood inventory in sound, well-formed trees increased in all parts of the State. Total increase over the state was 30 percent since the previous survey.***

Timber growth exceeded removals in 1976, despite the doubling in softwood harvest since 1966. However, an imbalance between growth and removals of softwood sawtimber may be developing in south and central Mississippi. In both of these regions, the net growth of pine sawtimber barely equalled removals in 1976 because of the increased harvest.

Although the timber inventory has grown since 1967, problems remain. Many pine sites are being usurped by low value and cull trees. Many stands, both pine and hardwood, need attention. Improving the timber resources takes on a special importance in view of the increased timber harvest in the central and southern sections of the State. If resource improvement is to keep pace with industrial development, the continued strengthening of forestry efforts is essential—not only in these two regions but throughout the State.

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FOREST AREA

In the search for resources to support industrial expansion in Mississippi, it is logical to turn to the forests. The area occupied by forests exceeds the combined acreage in all other land uses. The proportion of land in forest, however, varies considerably from one region of the State to the other (fig. 1). The Delta, with its highly developed farm economy, is the least timbered—about one acre in four. South Mississippi, where seven acres in every ten are forest, is the most heavily timbered region.

Forest Area Decreases

In all, 16.7 million acres are under some kind of forest cover, comprising 55 percent of the total land area. At the time of the previous statewide forest survey in 1967, forest acreage totaled 16.9 million. Most of the decrease stems from farmers clearing forest land to increase their pasture and crop acreage. Of the acreage devoted to crops, most of it was planted to soybeans. Clearing of timberland for agriculture occurred throughout the State between surveys, but it was greatest in north Mississippi. In the Delta, the modest loss in acreage since the late sixties suggests that the remaining woodlands may not be readily amenable to agriculture conversion.

Although additions to commercial forest land[1] since 1967 amounted to 1.4 million acres, they were not enough to offset losses to other uses (table I). This decline in forest area—some 20,000 acres annually—is likely to continue. Some additions to

[1] Technical terms are defined on pages 16-18.

Forest area on decline. *Although area occupied by forests exceeds the combined acreage in all other land uses, Mississippi has lost 200,000 acres of forest land to other uses since 1967. More forest management efforts are needed on remaining forest lands to keep pace with growing demands for forest products.*

woodlands will come from acreage that is eroding or is in other ways submarginal for farming. At the same time, diversions to agriculture, urbanization, and other uses will continue to expand.

Individual Ownership Predominates

Development of the timber resource depends to a great extent upon decisions of thousands of landowners. In Mississippi today, 90 percent of the commercial forest land is privately owned. The amount in public ownership, mostly National Forests, did not change materially during the past decade.

Private nonindustrial landowners presently hold 11.8 million forest acres. Farmers alone own about 4.9 million. All together, these holdings encompass two-thirds of the total growing stock found on commercial timberland in Mississippi.

The nearly 3 million acres held by the forest products industry represents a gain of some 20 percent since 1967. In addition, the industry's stewardship now extends to nearly 300,000 acres of forest land that is under long-term lease from farmers and other private owners. Leasing of surface rights enables owners to retain title and mineral rights, while lessees assume responsibilities for managing the timber. These arrangements help provide wood-using firms with an important supplementary timber supply and landowners with a dependable source of periodic income.

Hardwood Types Predominate

Forests predominately of longleaf and slash pine characterize the lower Coastal Plain and comprise 1.1 million of Mississippi's 16.5 million acres of commercial forest land. Extending north from the coastal region, loblolly and shortleaf pine cover 4.2 million acres.

Hardwood forests dominate the remaining acreage, some two-thirds of the total. About 3.5 million acres of uplands are occupied by oak, hickory, and other hardwoods in mixture with various pines. In the Delta and along rivers and streams throughout the State are stands of bottom land hardwoods that also total 3.5 million acres. Upland hardwood forests, largely concentrated in a zone bordering the eastern edge of the Mississippi River alluvial plain, total 4.2 million acres.

Table I. *Change in commercial forest land, 1967 to 1977*

Resource region	Net change	Additions from:			Diversions to:		
		Total	Nonforest	Noncommercial forest	Total	Agriculture	Other
	Thousand acres						
Delta	− 12.4	254.0	253.8	0.2	266.4	213.1	53.3
North	− 85.7	544.1	543.7	.4	629.8	423.2	206.6
Central	− 91.5	258.0	258.0	...	349.5	275.0	74.5
South	−195.1	157.2	157.2	...	352.3	255.1	97.2
Southwest	− 2.9	212.2	211.1	1.1	215.1	182.0	33.1
All regions	**−387.6**	**1,425.5**	**1,423.8**	**1.7**	**1,813.1**	**1,348.4**	**464.7**

TIMBER VOLUME

Mississippi forests contain nearly 20 billion cubic feet of timber. The inventory includes volume found in all kinds of trees, including those too rough and rotten to meet merchantability standards, as well as dead ones considered salvable. Volume in growing stock, that is, trees presently or prospectively suitable for sawtimber, totals more than 17 billion cubic feet. This is an increase of 24 percent since 1967.

Softwoods Have Gained

Softwood growing stock volume currently stands at 8.9 billion cubic feet, almost all southern pine. Loblolly pine comprises over half the softwood inventory, followed by shortleaf (fig. 2). Both species are common throughout the State except in the Delta region. Longleaf and slash pines are confined to the southern part of the State.

The current volume represents a 30-percent gain over the 1967 inventory (table II). North Mississippi led with a 78-percent increase. This region had been heavily depleted of timber by the 1940's, but reduced cutting and increased fire protection set the stage in subsequent decades for responsive growth. Too, extensive tree planting has been done in this region to establish protective cover on highly erodible soils,

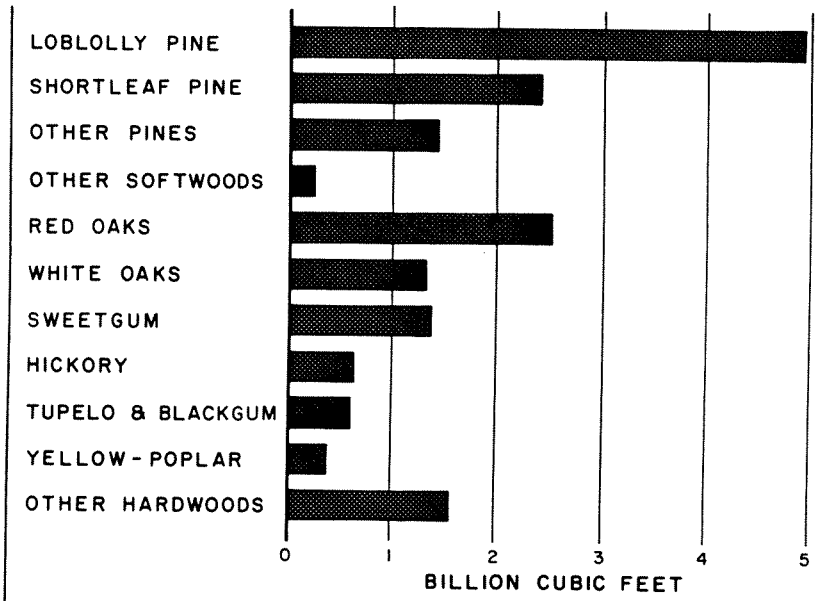


Figure 2. — Growing stock by species

especially in the Yazoo and Little Tallahatchie drainage systems. Although wildfire, overgrazing, and clearing have reduced the acreage, these plantings are still a contributing factor to inventory gains. The forests are not heavily stocked in this region. Inventory trends, therefore, are likely to continue but at a more moderate pace.

The South region has a higher proportion of its timber inventory in softwood than any other region in Mississippi. This preponderance of softwood, plus the region's proximity to a high concentration of primary manufacturing facilities, make it an important contributor to Mississippi's timber economy. Because of heavy use and the damage caused by Hurricane Camille, the region's softwood inventory has increased only 8 percent since 1967.

The Central and Southwest regions gained 32 and 30 percent, respectively, in softwood volume. These two areas have much higher average volumes per acre than the rest of the State. The southern part of the Central region is an important timber contributor to the same industries that draw from the South region.

Softwood volume in the Delta is overshadowed by the hardwood inventory. Softwoods comprise only 7 percent of the timber volume.

As shown in fig. 3, softwood gains took place across the range of diameters, but the greatest increases were in trees from 10 to 14 inches in diameter. The gains in these sizes are encouraging.

Table II. ***Growing stock volume in 1977 and change since 1967***

Resource region	Softwood		Hardwood	
	Volume	Change[1]	Volume	Change[1]
	Million cubic feet	*Percent*	*Million cubic feet*	*Percent*
Delta	105.5	+35	1,452.0	+21
North	1,741.8	+78	2,147.2	+18
Central	2,823.8	+32	1,830.3	+14
South	2,359.3	+ 8	1,256.5	+ 5
Southwest	1,898.7	+30	1,618.6	+28
All regions	**8,929.1**	**+30**	**8,304.6**	**+17**

[1] Based on current measurement standards.

These classes are not only harvested for pulpwood and small saw logs, but also are the reservoir from which larger timber in the future must come.

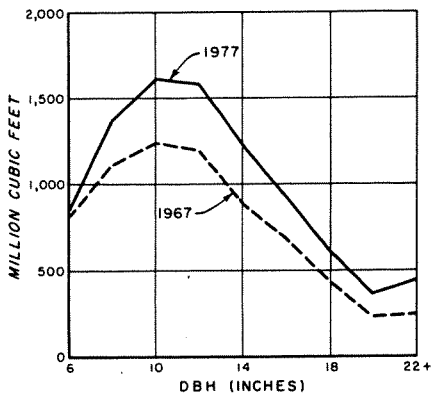


Figure 3.—Softwood growing stock by tree diameter, 1967 and 1977

Approximately three-fourths of the growing stock volume is in sawtimber-sized trees, which are at least nine inches in diameter. The sawtimber portion of the inventory totals 35.4 billion board feet, which represents a 37-percent increase over the 1967 inventory (table III). Regional trends followed those of growing stock.

Hardwoods Increase Moderately

Hardwood growing stock currently totals 8.3 billion cubic feet. Red oaks comprise 30 percent of the inventory, and sweetgum and white oaks are next with almost equal volumes (fig. 2). Select oak species, however, comprise only about one-third of the total oak volume.

The hardwood component gained 17 percent over the inventory of 1967 (table II), but the situation varies among regions. Reduction of land clearing has resulted in a 21-percent increase in hardwood inventory in the Delta. However, the more productive sites have been cleared for agriculture, and much of this volume is confined to more inaccessible sites of lower quality. Fragmentation of Delta forests into isolated pieces has rendered management of this hardwood inventory more difficult. The Southwest had the biggest in-

Industry on the rise. *Amount of roundwood cut into pulpwood and other forest products in 1976 was about three-fourths greater than the comparable harvest reported a decade earlier. In 1976, softwood sawtimber growth in south and central Mississippi barely equalled removals.*

Table III. *Sawtimber volume in 1977 and change since 1967*

Resource region	Softwood		Hardwood	
	Volume	Change[1]	Volume	Change[1]
	Million board feet	*Percent*	*Million board feet*	*Percent*
Delta	344.3	+28	5.538.9	+27
North	5.677.9	+93	5.827.5	+27
Central	11.565.6	+48	5.074.9	+14
South	8.986.7	+ 4	3.504.8	+ 2
Southwest	8.795.5	+43	5.325.5	+31
All regions	**35,370.0**	**+37**	**25,271.6**	**+21**

[1] Based on current measurement standards.

North Mississippi leads. *The North region of the state led all other regions in softwood volume increase since the last survey, with a 78-percent gain. One reason was the extensive tree planting that established protective cover on highly erodible soils.*

crease in growing stock volume; the South region, the least.

Distribution of the volume increase in hardwood was relatively uniform throughout the various size classes (fig. 4). The combined 1976 production of hardwood veneer and saw logs was only marginally greater than the 1966 output. Consequently, removals from the upper diameters have not increased greatly. The big increase in hardwood roundwood production has been in pulpwood. In contrast to saw and veneer logs, these removals can take place across a wide range of size classes.

Hardwood sawtimber volume increased 21 percent since 1967 (table III). Regional trends for sawtimber volumes followed those for growing stock.

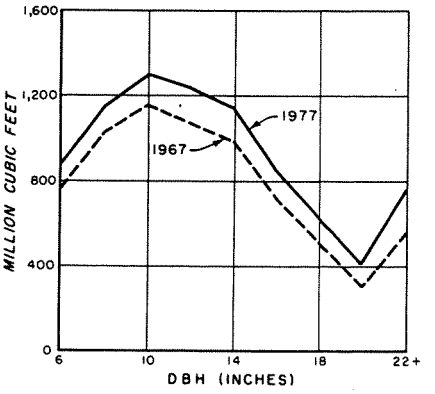


Figure 4.—Hardwood growing stock by tree diameter, 1967 and 1977

Over one-half of the hardwood inventory in Mississippi is on upland sites that vary widely in capacity to grow quality sawtimber. Of these uplands, the most productive are the Brown Loam Bluffs and adjoining loessal uplands. The remainder of the inventory is in bottom lands, of which one-quarter is found in the Delta region.

GROWTH AND REMOVALS

Growth Is Mainly Pine

Yearly timber losses ascribed to forest fires, insect pests, tree diseases, and other natural causes exceed 120 million cubic feet. The loss, equivalent to 12 percent of the net growth of growing stock, is greater for hardwoods than for softwoods. It is noteworthy that some 45 percent of all softwood mortality is concentrated in southern Mississippi, presumably because of trees damaged or otherwise weakened by Hurricane Camille in 1969. After allowance is made for mortality, net annual growth in Mississippi amounts to 589 million cubic feet of softwood growing stock and 424 million of hardwood. This means that the net growth averages 6 percent, or about 61 cubic feet per acre of commercial forest.

For sawtimber alone, growth totals 2,706 million board feet of softwood and 1,589 million of hardwood. Virtually all of the softwood growth is southern pine, mainly loblolly. More than half of the hardwood growth is oak. The more valuable red and white oaks—cherrybark, Shumard, northern red, white, swamp chestnut, swamp white, and chinkapin—make up about one-third of all oak sawtimber growth. Among the numerous other hardwood species in Mississippi, sweetgum accounts for the biggest share of sawtimber growth.

Growth Imbalance Is Developing

In 1976, timber removals from Mississippi forests totaled 492 million cubic feet of softwood and 241 million of hardwood. All together, softwoods made up 67 percent of the removals, although they comprise only 52 percent of the growing stock inventory. About 80 percent of the total removals consisted of roundwood harvested for processing into lumber, pulp, and veneer. The amount of roundwood cut into these products in 1976 was some three-fourths greater than the comparable harvest reported a decade earlier.

Hurricane damage in South. *Extensive damage of timber by Hurricane Camille in 1969 is partly responsible for the region not showing a larger increase in softwood volume since the last survey.*

Included in the timber removals from growing stock is an estimated 3,379 million board feet of sawtimber volume. Primary wood-using industries are largely dependent for their needs upon trees of sawtimber size, that is, softwoods at least 9 inches in diameter and hardwoods 11 inches and larger. For the State as a whole, hardwood sawtimber growth exceeded annual removals by 53 percent (fig. 5). But for softwood sawtimber, growth exceeded removals by only 15 percent; at the time of the prior survey, softwood sawtimber growth in Mississippi was nearly double annual removals.

An imbalance between softwood growth and removals may be developing, especially in south and central Mississippi. In 1976, softwood sawtimber growth in both of these regions barely equalled removals. Pine sawtimber, however, continues to grow faster than it is being harvested in the Southwest and in the North regions.

Aside from geographic variation between growth and removals, differences also exist among the major ownership classes. Hardwood sawtimber growth exceeded removals by about 50 percent for each of the three major ownership groups—public, forest industry, and nonindustrial private. But striking differences emerge with respect to softwood. On public land, mainly National Forests, softwood sawtimber growth was about two-thirds greater than removals, and a growth surplus of more than 20 percent occurred in 1976 on private, nonindustrial ownerships. By contrast, pine sawtimber removals exceeded growth by nearly 30 percent on industrial holdings. Moreover, the magnitude of overcut on industry lands varies by region. In both central and southwest Mississippi, harvest exceeded growth by more than 60 percent; in the South region, it was 30 percent. A substantial surplus on industrial forests occurred only in north Mississippi, where growth was more than twice the removals.

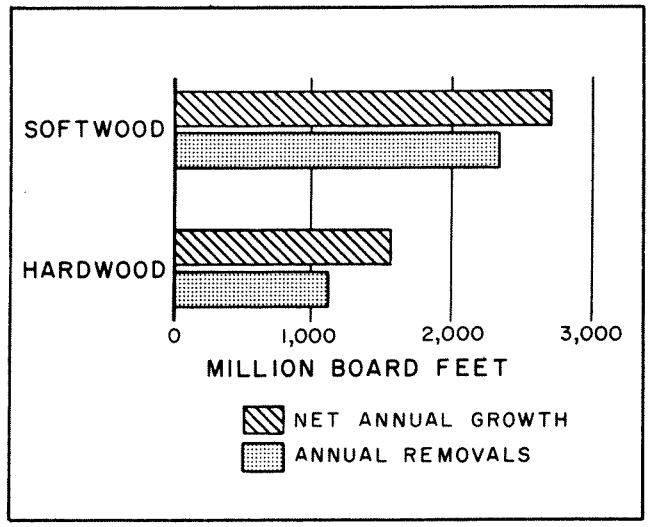


Figure 5.—Sawtimber growth and cut, 1976

MANAGEMENT OPPORTUNITIES

Forest industry development has proceeded at a rapid pace in recent years, spurred to a great extent by gains in the softwood inventory. But this increase in pine volume has moderated since 1967, and it is unlikely that a mere continuation of recent trends can sustain future growth in forest-based industries. In order to provide an adequate timber supply for the future, management practices and investments must be intensified now.

Many Pine Stands Require Treatment

Oak-hickory stands growing on sites better suited to pine represent one of the more difficult resource problems in Mississippi. Removal of such hardwood usually requires expensive site preparation. Large owners and forest industry can assume the heavy financial costs involved in rehabilitating these stands, but the small landowner cannot. Since little merchantable material can be harvested, little cash flow is generated in the removal of the overburden. That further compounds the problem for the small landowner. Most sites would have to be regenerated by planting or seeding, and any large-scale effort to reforest these stands might tax the State's ability to produce seedlings.

Despite these problems, this resource condition affects a considerable acreage, and conversion of even a portion of it would substantially increase the pine resource base. Many of these sites could be highly productive, and their reclamation should take precedence over sites whose treatment costs may be lower but whose productive potential is less.

Oak-pine forests occupy more than three million acres. Although these forests are predominantly hardwood, they contain a pine component which ranges from 25 to 49 percent of the stand. Some have such an insufficient pine stocking that the stand would best be cut and a pine stand established. In contrast to oak-hickory, many of these stands have a pine seed source, so natural regeneration can be used. About 40 percent of the oak-pine has an adequate pine seed source.

Other oak-pine stands have enough pine stocking for a manageable stand. In these, the primary treatment consists of freeing the pines by eliminating the competing hardwoods. Here again, financial problems are encountered by small landowners.

Another 5 million acres support pine cover types that vary widely in stocking. An overriding concern regarding these stands is that provisions be made for regeneration to pine when harvest cuts are made. Even though these areas

can be seeded artificially, the use of natural regeneration systems can lower costs, and every acre restocked this way frees planting stock or seeds for areas that must be regenerated artificially. Since proceeds from timber harvest are available, the problem of financing is less than for other practices.

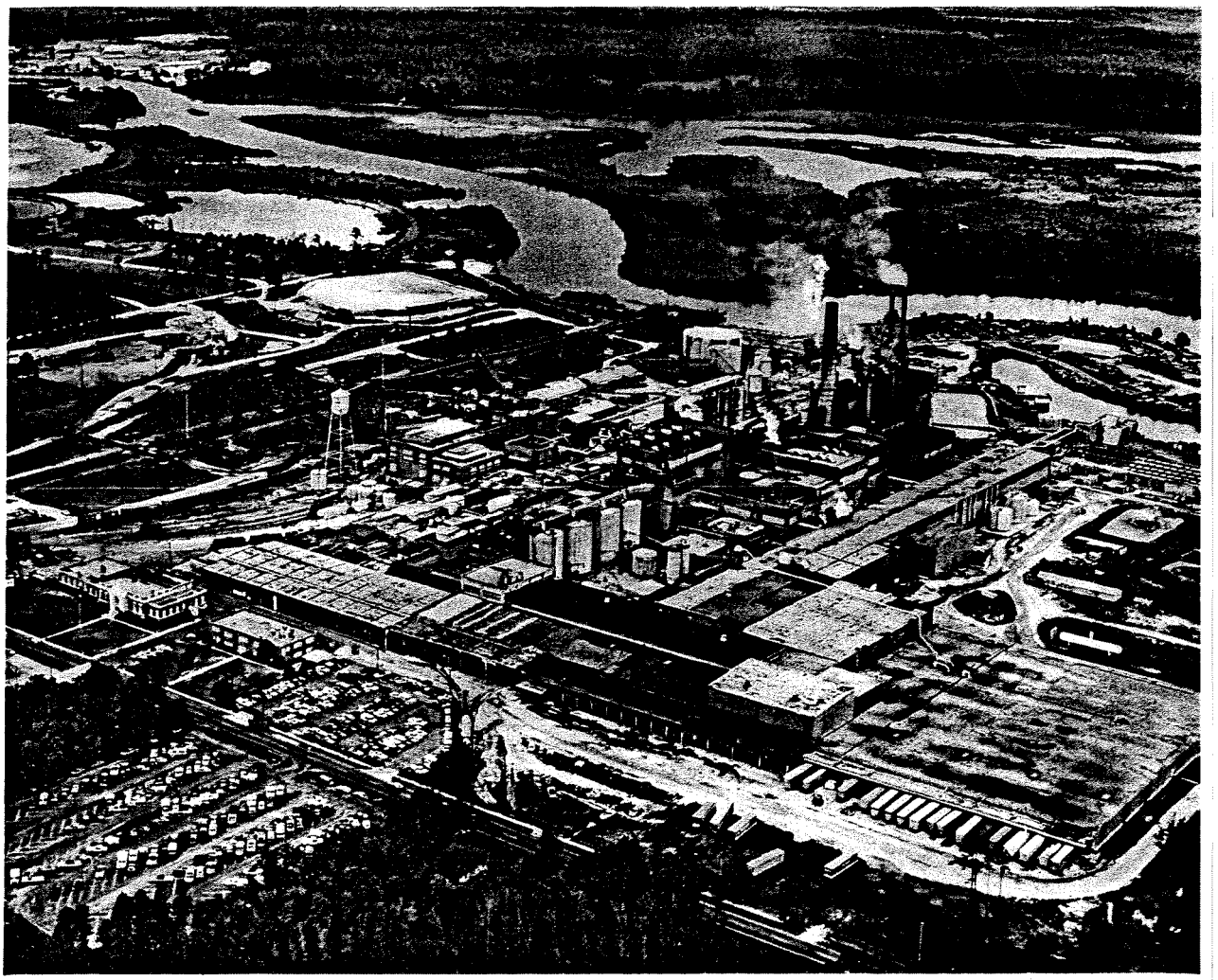
Hardwood Sites Need Attention

Some 5 million acres in Mississippi are quality hardwood sites. These include not only the bottom lands in the Delta and those adjacent to other river systems, but also areas contained in the loessal uplands that border the eastern boundary of the Mississippi River Alluvial Valley.

To appraise the condition of the timber resource, forest land in Mississippi was classified according to the amount of desirable trees present. A desirable tree is growing stock that is vigorous, has no defects that would seriously limit its use, and contains no pathogens that would cause death or serious degrade before rotation age. Growing stock not classed as "desirable" is called "acceptable".

Some 233,000 acres of hardwood sites are at least medium stocked with desirable trees. In these stands, management should focus on removals of less preferred stems. On some acres, no special treatment is necessary.

Forest economy has grown. *Forest industry has developed at rapid pace because of gains in softwood industry.*



But on the rest, cull tree removal and thinning acceptable trees can free growing space and promote increased occupancy of the desirables. Chances are that some timber removed from these stands in cultural operations will be salable growing stock, and enough cash proceeds will be generated to pay for treatment.

Stands that are poorly stocked with desirable trees but at least medium stocked with growing stock total 3 million acres. A portion of the acceptable tree inventory must be included with the desirable to have enough stocking in crop trees. Rehabilitation of these acres will take longer, and remedial measures must be taken to improve them. These stands, by themselves, will not evolve into better ones. Stand improvement should be aimed at removing culls and lower quality growing stock to make growing space available for favored stems. Cultural operations in some stands might yield enough revenue to cover costs. In others, the removed material may not be merchantable because of size or quality. In this instance, cash outlays would be required.

The remaining acreage of hardwood sites is poorly stocked with growing stock trees and is the least tractable to treatment. While some can be nursed back to good condition, others have such little growing stock that the chances for improvement are nil. Establishment of a new stand is the only alternative. Unfortunately, it may be an expensive operation that involves removal of existing vegetation. Many stands will have less desirable species, and promoting the preferred ones will be a formidable task. Rehabilitation will take a long time.

Outlook

Many changes have occurred in the timber resources of Mississippi since 1967. Forest area declined 2 percent, and the timber inventory increased—17 percent for hardwoods and 30 percent for softwoods—during a period of expansion in the forest products industries. But what about the future?

The moderate decline in forest area seems destined to continue for the near future. Urban expansion, rights-of-way, agriculture, and other land uses will continue to claim forest land. These losses will be partially offset by reversions to forest.

The hardwood inventory is expected to increase in the future. Measures aimed at improving the hardwood resource should be concentrated on the better hardwood sites in the bottom lands and loessal areas.

The prospect for softwood varies by region. Northern Mississippi has registered large gains in softwood volume, and it is likely that increases will continue. The South and part of the Central region are areas of high industrial activity, and possible gains there may be moderated by increases in timber harvests. It is especially important that the pine resource be augmented by timber stand improvement, prompt regeneration following harvest, and type conversion.

Only by improving the resource now can Mississippi forests fully provide for an expanding timber economy in the years ahead.

APPENDIX

Survey Methods

The data on forest acreage and timber volume were secured by a sampling method involving a forest-nonforest classification on aerial photographs and on-the-ground measurements of trees at sample locations. The sample locations were at the intersections of a grid of lines spaced 3 miles apart. In Mississippi, 140,945 photographic classifications were made and 8,020 ground sample locations were visited.

The initial estimates of forest area that were obtained with the aerial photographs were adjusted on the basis of the ground check.

A cluster of 10 variable-radius plots were installed at each ground sample location. Each sample tree on the variable-radius plots represented 3.75 square feet of basal area per acre. Trees less than 5.0 inches in diameter were tallied on fixed-radius plots around the plot centers. Together, these samples provided most of the information for the new inventory.

The plots established by the prior survey were remeasured to determine the elements of change and were the basis for estimating growth, mortality, removals, and changes in land use.

A special study was made to determine product output. It consisted of a canvass of all primary wood-using plants active in Mississippi during 1976. Out-of-state firms known to use Mississippi roundwood were also contacted. Additionally, fuelwood and other domestic uses were determined from an area sample.

Reliability of the Data

Reliability of the estimates may be affected by two types of errors. The first stems from the use of a sample to estimate the whole and from variability of the items being sampled. This is termed sampling error; it is susceptible to a mathematical evaluation of the probability of error. The second type—often referred to as reporting or estimating error—derives from mistakes in measurement, judgment, or recording, and from limitations of method or equipment. Its effects cannot be appraised mathematically, but the Forest Service attempts to hold it to a minimum by proper training and good supervision, and by emphasis on careful work.

Statistical analysis of the data indicates a sampling error of plus or minus 0.3 percent for the estimate of total commercial forest area, 1.4 percent for total cubic volume, and 1.9 percent for total board-foot volume. As these totals are broken down by forest type, species, tree diameter, and other subdivisions, the possibility of error increases and is greatest for the smallest items. The order of this increase is suggested in the following tabulation, which shows the sampling error to which the timber volume and area estimates are liable, two chances out of three:

Sampling errors for commercial forest area, growing-stock and sawtimber volumes, Mississippi, 1977

Commercial forest area	Sampling error[1]	Cubic volume[2]	Sampling error[1]	Board-foot volume[3]	Sampling error[1]
Thousand acres	*Percent*	*Million cubic feet*	*Percent*	*Million board feet*	*Percent*
16,504.3	0.3	...	...	...	...
1,485.3	1.0	17,233.7	1.4	60,641.6	1.9
371.3	2.0	8,444.5	2.0	54,729.0	2.0
165.0	3.0	3,753.1	3.0	24,324.0	3.0
92.8	4.0	2,111.1	4.0	13,682.3	4.0
59.4	5.0	1,351.1	5.0	8,756.6	5.0
14.8	10.0	337.8	10.0	2,189.2	10.0
6.6	15.0	150.1	15.0	973.0	15.0
3.7	20.0	84.4	20.0	547.3	20.0
2.4	25.0	54.0	25.0	350.3	25.0

[1] By random-sampling formula. [2] Growing-stock volume on commercial forest land. [3] Sawtimber volume on commercial forest land.

The sampling error to which the estimates of growth, mortality, and removals are liable, on a probability of two chances out of three, are:

Net annual growth and timber removals sampling error, Mississippi, 1976

Net annual growth				Annual removals			
Cubic volume	Sampling error[1]	Board-foot volume	Sampling error[1]	Cubic volume	Sampling error[1]	Board-foot volume	Sampling error[1]
Million cubic feet	Percent	Million board feet	Percent	Million cubic feet	Percent	Million board feet	Percent
1,013.2	1.5	...	...	733.5	1.6	...	...
569.9	2.0	4,295.0	2.2	469.4	2.0	3,378.7	2.3
253.3	3.0	2,309.8	3.0	208.6	3.0	1,985.9	3.0
142.5	4.0	1,299.2	4.0	117.4	4.0	1,117.1	4.0
91.2	5.0	831.5	5.0	75.1	5.0	714.9	5.0
22.8	10.0	207.9	10.0	18.8	10.0	178.7	10.0
10.1	15.0	92.4	15.0	8.3	15.0	79.4	15.0
5.7	20.0	52.0	20.0	4.7	20.0	44.7	20.0
3.6	25.0	33.3	25.0	3.0	25.0	28.6	25.0

[1] By random-sampling formula.

DEFINITIONS OF TERMS

Forest Land Class

Forest land. Land at least 16.7 percent stocked by forest trees of any size, or formerly having such tree cover and not currently developed for nonforest use.

Commercial forest land. Forest land that is producing or is capable of producing crops of industrial wood and not withdrawn from timber utilization.

Nonstocked land. Commercial forest land less than 16.7 percent stocked with growing-stock trees.

Productive-reserved forest land. Productive public forest land withdrawn from timber utilization through statute or administrative regulation.

Unproductive forest land. Forest land incapable of yielding crops of industrial wood because of adverse site conditions.

Tree Species

Commercial species. Tree species currently or prospectively suitable for industrial wood products; excludes so-called weed species such as blackjack oak and blue beech.

Hardwoods. Dicotyledonous trees, usually broad-leaved and deciduous.

Softwoods. Coniferous trees, usually evergreen, having needle or scale-like leaves.

Forest Type

Longleaf-slash pine. Forests in which longleaf or slash pine, singly or in combination, comprise a plurality of the stocking. Common associates include other southern pines, oak, and gum.

Loblolly-shortleaf pine. Forests in which southern pine and eastern redcedar except longleaf or slash pine, singly or in combination, comprise a plurality of the stocking. Common associates include oak, hickory, and gum.

Oak-pine. Forests in which hardwoods (usually upland oaks) comprise a plurality of the stocking but in which softwoods, except cypress, comprise 25-50 percent of the stocking. Common associates include gum, hickory, and yellow-poplar.

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

Oak-gum-cypress. Bottom land forests in which tupelo, blackgum, sweetgum, oaks, or southern cypress, singly or in combination, comprise a plurality of the stocking except where pines comprise 25-50 percent, in which case the stand would be classified oak-pine. Common associates include cottonwood, willow, ash, elm, hackberry, and maple.

Elm-ash-cottonwood. Forests in which elm, ash, or cottonwood, singly or in combination, comprise a plurality of the stocking. Common associates include willow, sycamore, beech, and maple.

Class of Timber

Growing stock trees. Sawtimber trees, poletimber trees, saplings, and seedlings; that is, all live trees except rough and rotten trees.

Desirable trees. Growing-stock trees that have no serious defects to limit present or prospective use, are of relatively high vigor, and contain no pathogens that may result in death or serious deterioration before rotation age. They comprise the type of trees that forest managers aim to grow; that is, the trees favored in silvicultural operations.

Acceptable trees. Trees meeting the specifications for growing stock but not qualifying as desirable trees.

Sawtimber trees. Live trees of commercial species, 9.0 inches and larger in dbh for softwoods and 11.0 inches and larger for hardwoods, and containing at least one 12-foot saw log.

Poletimber trees. Live trees of commercial species 5.0 to 9.0 inches in dbh for softwoods and 5.0 to 11.0 inches for hardwoods, and of good form and vigor.

Saplings. Live trees of commercial species, 1.0 inch to 5.0 inches in dbh and of good form and vigor.

Rough and rotten trees. Live trees that are unmerchantable for saw logs now or prospectively because of defect, rot, or species.

Salvable dead trees. Standing or down dead trees that are considered currently or potentially merchantable.

Stand-Size Class

Sawtimber stands. Stands at least 16.7 percent stocked with growing-stock trees, with half or more of this stocking in sawtimber or poletimber trees, and with sawtimber stocking at least equal to poletimber stocking.

Poletimber stands. Stands at least 16.7 percent stocked with growing-stock trees, with half or more of this stocking in sawtimber or poletimber trees, and with poletimber stocking exceeding that of sawtimber stocking.

Sapling-seedling stands. Stands at least 16.7 percent stocked with growing-stock trees, with more than half of this stocking in saplings or seedlings.

Nonstocked areas. Commercial forest lands less than 16.7 percent stocked with growing-stock trees.

Stocking

Stocking is a measure of the extent to which the growth potential of the site is utilized by trees or preempted by vegetative cover. Stocking is determined by comparing the stand density in terms of number of trees or basal area with a specified standard. Full stocking is assumed to range from 100 to 133 percent of the stocking standard.

The tabulation below shows the density standard in terms of trees per acre, by size class, required for full stocking:

Dbh (inches)	Number of trees
Seedlings	600
2	560
4	460
6	340
8	240
10	155
12	115
14	90
16	72
18	60
20	51
22	42
24	36
26	31
28	27
30	24

Volume

Volume of sawtimber. Net volume of the saw-log portion of live sawtimber trees in board feet of the International rule, ¼ inch kerf.

Volume of growing stock. Volume of sound wood in the bole of sawtimber and poletimber trees from stump to a minimum 4.0-inch top outside bark or to the point where the central stem breaks into limbs.

Volume of timber. The volume of sound wood in the bole of growing stock, rough, rotten, and salvable dead trees 5.0 inches and larger in d.b.h. from stump to a minimum 4.0-inch top outside bark or to the point where the central stem breaks into limbs.

Area Condition Class

A classification of commercial forest land based upon stocking by desirable trees and other conditions affecting current and prospective timber growth.

Class 10. Areas 100 percent or more stocked with desirable trees and not overstocked.

Class 20. Areas 100 percent or more stocked with desirable trees and overstocked with all live trees.

Class 30. Areas 60 to 100 percent stocked with desirable trees and with less than 30 percent of the area controlled by other trees, inhibiting vegetation, slash, or nonstockable conditions.

Class 40. Areas 60 to 100 percent stocked with desirable trees and with 30 percent or more of the area controlled by other trees, or conditions that ordinarily prevent occupancy by desirable trees.

Class 50. Areas less than 60 percent stocked with desirable trees, but with 100 percent or more stocking of growing-stock trees.

Class 60. Areas less than 60 percent stocked with desirable trees, but with 60 to 100 percent stocking of growing-stock trees.

Class 70. Areas less than 60 percent stocked with desirable trees and with less than 60 percent stocking of growing-stock trees.

Miscellaneous Definitions

Basal area. The area in square feet of the cross section at breast height of a single tree or of all the trees in a stand, usually expressed as square feet per acre.

Dbh (Diameter breast high). Tree diameter in inches, outside bark, measured at 4½ feet above ground.

Diameter classes. The 2-inch diameter classes extend from 1.0 inch below to 9.0 inch above the stated midpoint. Thus, the 12-inch class includes trees 11.0 inches through 12.9 inches dbh.

Site classes. A classification of forest land in terms of inherent capacity to grow crops of industrial wood.

Log grades. A classification of logs based on external characteristics as indicators of quality or value.

Gross growth. Annual increase in net volume of trees in the absence of cutting and mortality.

Net annual growth. The increase in volume of a specified size class for a specific year. Components of net annual growth include the increment in net volume of trees at the beginning of the specific year surviving to its end plus volume of trees reaching the size class during the year minus the volume of trees that died during the year minus the net volume of trees that become rough or rotten during the year.

Mortality. Number or sound-wood volume of live trees dying from natural causes during a specified period.

Timber removals. The net volume of growing-stock trees removed from the inventory by harvesting, cultural operations such as timber-stand improvement, land clearing, or changes in land use.

Timber products. Roundwood products and plant byproducts. Timber products output includes roundwood products cut from growing stock on commercial forest land; from other sources, such as cull trees, salvable dead trees, limbs, and saplings; from trees on noncommercial and nonforest lands; and from plant byproducts.

Roundwood products. Logs, bolts, and other round sections cut from trees for industrial or consumer uses. Included are saw logs, veneer logs and bolts, cooperage logs and bolts, pulpwood, fuelwood, piling, poles and posts, hewn ties, mine timbers, and various other round, split, or hewn products.

Logging residues. The unused portions of trees cut or killed by logging.

Plant byproducts. Wood products, such as pulp chips, obtained incidental to manufacture of other products.

Plant residues. Wood materials from manufacturing plants not utilized for some product. Included are slabs, edgings, trimmings, miscuts, sawdust, shavings, veneer cores and clippings, and pulp screening.

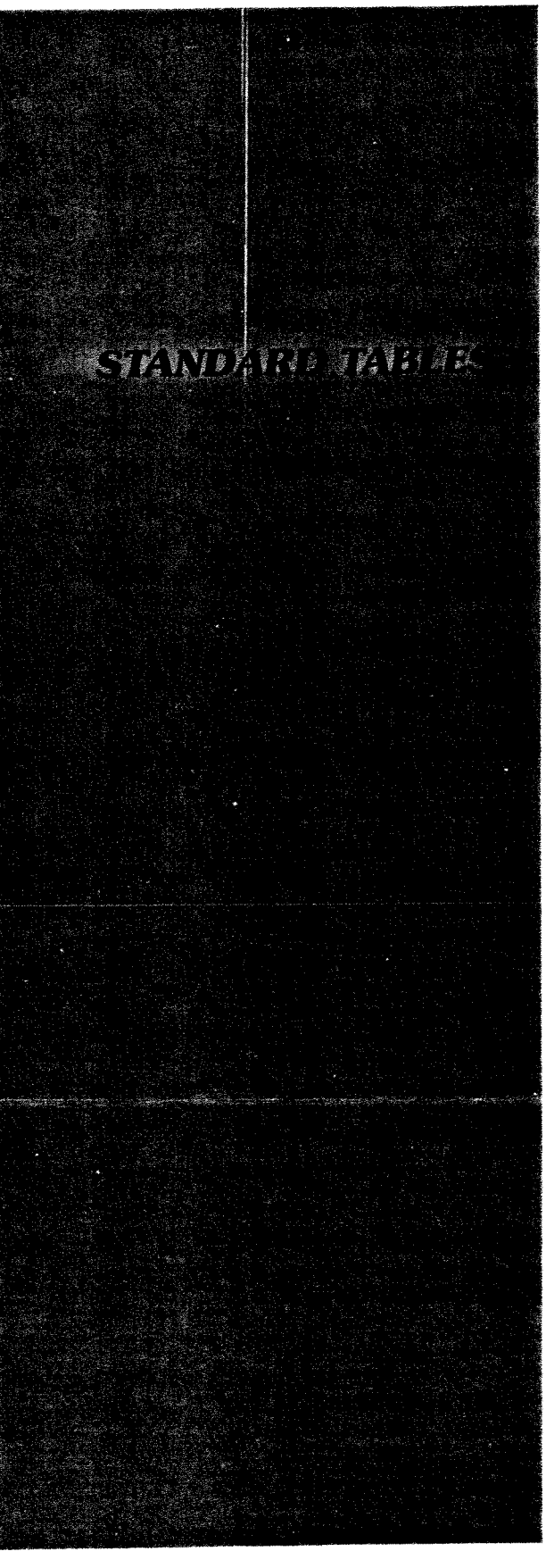


Table 1. *Area by land classes, Mississippi, 1977*

Land class	Area
	Thousand acres
Forest:	
Commercial	16,504.3
Productive-reserved	211.3
Unproductive	...
Total forest	**16,715.6**
Nonforest:	
Cropland[1]	8,189.0
Other[2]	5,404.4
Total nonforest	**13,593.4**
All land[3]	**30,309.0**

[1] Census of Agriculture.
[2] Includes pasture and range, industrial and urban areas, other nonforest land, and 157,475 acres, classed as water by Forest Survey standards, but defined by the Bureau of the Census as land.
[3] United States Bureau of the Census.

Table 2. *Area of commercial forest land by ownership classes, Mississippi, 1977*

Ownership class	Area
	Thousand acres
Public:	
National forest	1,122.0
Bureau of Land Management	.5
Indian	13.7
Other federal	79.7
State	94.6
County and municipal	365.9
Total public	**1,676.4**
Private:	
Forest industry[1]	2,996.1
Farmer	4,896.3
Miscellaneous private:	
Individual	6,466.4
Corporate	469.1
Total private	**14,827.9**
All ownerships	**16,504.3**

[1] Not including 299.7 thousand acres of farmer-owned and miscellaneous private lands leased to forest industry.

Table 3. *Area of commercial forest land by stand-size and ownership classes, Mississippi, 1977*

Stand-size class	All ownerships	National forest	Other public	Forest industry	Farmer and misc. private
	Thousand acres				
Sawtimber	7,421.7	765.9	339.0	1,211.9	5,104.9
Poletimber	4,806.7	136.6	104.0	757.0	3,809.1
Sapling and seedling	4,121.0	219.5	111.4	996.2	2,793.9
Nonstocked areas	154.9	...	...	31.0	123.9
All classes	**16,504.3**	**1,122.0**	**554.4**	**2,996.1**	**11,831.8**

Table 4. *Area of commercial forest land by stand-volume and ownership classes, Mississippi, 1977*

Stand-volume per acre[1]	All ownerships	National forest	Other public	Forest industry	Farmer and misc. private
	Thousand acres				
Less than 1,500 fbm	6,032.0	219.4	138.3	1,249.1	4,425.2
1,500 to 5,000 fbm	6,013.7	277.9	155.6	916.3	4,663.9
More than 5,000 fbm	4,458.6	624.7	260.5	830.7	2,742.7
All classes	**16,504.3**	**1,122.0**	**554.4**	**2,996.1**	**11,831.8**

[1] International ¼-inch rule.

Table 5. *Area of commercial forest land by stocking classes based on selected stand components, Mississippi, 1977*

Stocking percentage	Stocking classified in terms of					
	All trees	Growing-stock trees			Rough and rotten trees	Inhibiting vegetation
		Total	Desirable	Acceptable		
	Thousand acres					
160 or more	7.0	...	...	...	...	...
150 to 160	49.5	45.5	5.8	18.3	...	...
140 to 150	302.8	75.2	...	4.3	...	...
130 to 140	724.4	236.0	11.6	24.3	...	...
120 to 130	1.624.4	435.9	17.5	52.5	...	...
110 to 120	2.804.6	983.2	11.9	207.5	8.9	...
100 to 110	3.547.3	1.792.8	85.4	501.8	...	5.7
90 to 100	3.149.9	2.347.1	68.2	888.5	4.9	...
80 to 90	2.084.2	2.746.4	172.7	1.646.4	24.6	...
70 to 80	1.091.4	2.467.8	374.4	2.170.0	42.4	...
60 to 70	558.7	2.058.3	622.7	2.589.5	178.7	...
50 to 60	251.3	1.421.1	779.2	2.287.9	437.3	12.2
40 to 50	123.9	909.9	1.124.0	2.243.2	1.113.9	18.1
30 to 40	75.7	502.9	1.467.4	1.674.3	2.225.8	12.4
20 to 30	48.3	250.2	1.910.1	1.124.0	3.505.1	55.0
10 to 20	32.8	167.8	2.974.5	622.3	4.553.4	243.6
Less than 10	28.1	64.2	6.878.9	449.5	4.409.3	16.157.3
All areas	16,504.3	16,504.3	16,504.3	16,504.3	16,504.3	16,504.3

Table 6. *Area of commercial forest land by area-condition and ownership classes, Mississippi, 1977*

Area-condition class	All ownerships	National forest	Other public	Forest industry	Farmer and misc. private
	Thousand acres				
10	101.7	...	...	67.7	34.0
20	30.5	...	...	11.1	19.4
30	332.6	40.9	27.7	79.0	185.0
40	905.4	90.7	21.9	306.7	486.1
50	2.632.9	249.5	69.9	550.9	1.762.6
60	9.185.1	625.9	345.4	1.498.8	6.715.0
70	3.316.1	115.0	89.5	481.9	2.629.7
All classes	16,504.3	1,122.0	554.4	2,996.1	11,831.8

Table 7. *Area of commercial forest land by site and ownership classes, Mississippi, 1977*

Site class	All ownerships	National forest	Other public	Forest industry	Farmer and misc. private
	Thousand acres				
165 cu. ft. or more	507.8	15.0	18.8	137.1	336.9
120 to 165 cu. ft.	2,542.6	205.4	94.4	440.5	1,802.3
85 to 120 cu. ft.	8,230.2	613.1	281.3	1,462.4	5,873.4
50 to 85 cu. ft.	4,877.8	277.1	131.5	885.7	3,583.5
Less than 50 cu. ft.	345.9	11.4	28.4	70.4	235.7
All classes	**16,504.3**	**1,122.0**	**554.4**	**2,996.1**	**11,831.8**

Table 8. *Area of commercial forest land by forest types and ownership classes, Mississippi, 1977*

Forest type	All ownerships	National forest	Other public	Forest industry	Farmer and misc. private
	Thousand acres				
Longleaf-slash pine	1,051.5	204.6	89.7	307.8	449.4
Loblolly-shortleaf pine	4,250.2	402.2	131.8	890.2	2,826.0
Oak-pine	3,451.5	251.4	106.4	628.3	2,465.4
Oak-hickory	4,239.6	137.9	73.9	525.1	3,502.7
Oak-gum-cypress	3,274.1	125.9	113.4	583.7	2,451.1
Elm-ash-cottonwood	237.4	...	39.2	61.0	137.2
All types	**16,504.3**	**1,122.0**	**554.4**	**2,996.1**	**11,831.8**

Table 9. *Area of noncommercial forest land by forest types, Mississippi, 1977*

Forest type	All areas	Productive-reserved areas	Unproductive areas
	Thousand acres		
Longleaf-slash pine	6.2	6.2	...
Loblolly-shortleaf pine	21.0	21.0	...
Oak-pine	40.0	40.0	...
Oak-hickory	108.7	108.7	...
Oak-gum-cypress	35.4	35.4	...
All types	**211.3**	**211.3**	...

Table 10. *Number of growing-stock trees on commercial forest land by species and diameter classes, Mississippi, 1977*

Species	Diameter class (inches at breast height)										
	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0 and larger
	Thousand trees										
Softwood:											
Longleaf pine	49.930	13.510	11.591	10.112	8.179	4.006	1.593	675	209	55	...
Slash pine	79.745	34.355	23.282	12.023	4.857	3.007	1.501	542	127	51	...
Shortleaf pine	268.231	107.248	71.570	42.415	27.612	12.209	4.830	1.618	564	165	...
Loblolly pine	444.846	169.918	113.379	67.010	40.366	23.710	14.624	8.003	4.045	3.683	108
Spruce pine	7.811	2.321	1.260	1.050	1.016	664	696	363	274	167	...
Cypress	9.578	2.864	1.714	1.563	899	771	678	510	250	251	78
Other softwoods	8.119	3.303	3.035	754	758	126	59	64	12	8	...
Total	**868,260**	**333,519**	**225,831**	**134,927**	**83,687**	**44,493**	**23,981**	**11,775**	**5,481**	**4,380**	**186**
Hardwood:											
Select white oaks[1]	69.338	24.931	15.719	10.390	6.869	4.802	3.336	1.660	844	721	66
Select red oaks[2]	33.695	10.970	7.095	5.208	3.574	2.426	1.633	1.127	675	885	102
Other white oaks	73.245	28.816	18.001	12.532	5.711	4.623	1.686	843	464	493	76
Other red oaks	209.117	79.417	49.963	31.698	19.235	12.481	7.122	4.261	2.388	2.256	296
Pecan	8.161	2.852	1.418	1.009	805	769	314	378	243	341	32
Other hickories	53.553	19.913	11.449	8.686	6.074	3.562	1.970	977	447	465	10
Sweetgum	198.779	103.210	48.394	23.334	11.003	6.824	3.056	1.477	739	701	41
Tupelo and blackgum	69.339	24.890	17.675	11.571	6.893	4.497	2.098	931	474	310	...
Hard maple	780	302	182	107	82	54	38	15	...	...	...
Soft maple	20.743	12.278	4.863	1.755	1.067	455	168	93	33	31	...
Beech	5.335	1.305	834	985	696	520	341	229	187	218	20
Ash	25.235	11.103	5.554	3.649	2.078	1.175	779	465	194	218	20
Cottonwood	4.125	733	846	565	463	373	256	213	134	409	133
Basswood	1.079	203	317	249	146	45	17	45	19	38	...
Yellow-poplar	24.947	7.937	4.161	4.569	2.993	2.202	1.374	838	349	490	34
Black walnut	402	...	167	80	...	86	46	12	11	...	...
Black cherry	6.577	2.972	2.241	501	315	325	162	37	9	15	...
Willow	5.361	1.103	1.422	1.008	549	358	384	238	151	140	8
Magnolia (*magnolia* spp.)	22.235	10.430	5.581	2.946	1.643	894	453	205	49	34	...
American elm	13.295	4.481	3.278	2.011	1.704	610	527	282	165	210	27
Other elms	17.932	8.786	3.957	2.731	1.112	801	217	109	88	119	12
Hackberry	22.917	8.314	6.021	3.567	1.759	1.439	927	418	242	230	...
Sycamore	6.775	1.897	1.446	871	904	625	444	226	154	169	39
Other hardwoods	44.571	30.514	7.511	3.169	1.535	905	483	301	74	74	5
Total	**937,536**	**397,357**	**218,095**	**133,191**	**77,210**	**50,851**	**27,831**	**15,380**	**8,133**	**8,567**	**921**
All species	**1,805,796**	**730,876**	**443,926**	**268,118**	**160,897**	**95,344**	**51,812**	**27,155**	**13,614**	**12,947**	**1,107**

[1] Includes white, swamp chestnut, chinkapin, Durand, and swamp white oaks.
[2] Includes cherrybark, Shumard, and northern red oaks.

Table 11. *Volume of timber on commercial forest land by class of timber and by soft woods and hardwoods, Mississippi, 1977*

Class of timber	All species	Softwood	Hardwoo
	Million cubic feet		
Sawtimber trees:			
Saw-log portion	10.241.2	6.043.0	4.198.2
Upper-stem portion	1.463.6	681.3	782.3
Total	**11,704.8**	**6,724.3**	**4,980.5**
Poletimber trees	5,528.9	2,204.8	3,324.1
All growing stock	**17,233.7**	**8,929.1**	**8,304.6**
Rough trees	1,775.9	198.0	1,577.9
Rotten trees	528.5	27.0	501.5
Salvable dead trees	14.1	8.9	5.2
All timber	**19,552.2**	**9,163.0**	**10,389.2**

Table 12. *Volume of growing stock and sawtimber on commercial forest land by own ership classes and by softwoods and hardwoods, Mississippi, 1977*

Ownership class	Growing stock			Sawtimber		
	All species	Softwood	Hardwood	All species	Softwood	Hardwoo
	Million cubic feet			*Million board feet*		
National forest	1,754.6	1,252.7	501.9	8,018.2	6,363.4	1,654.8
Other public	741.3	375.8	365.5	3,015.7	1,739.4	1,276.3
Forest industry	3,004.4	1,725.5	1,278.9	10,682.8	6,392.2	4,290.6
Farmer and misc. private	11,733.4	5,575.1	6,158.3	38,924.9	20,875.0	18,049.9
All ownerships	**17,233.7**	**8,929.1**	**8,304.6**	**60,641.6**	**35,370.0**	**25,271.6**

Table 13. *Volume of growing stock on commercial forest land by species and diameter classes, Mississippi, 1977*

Species	Diameter class (inches at breast height)										
	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0 and larger
	Million cubic feet										
Softwood:											
Longleaf pine	635.0	38.4	77.7	132.8	166.3	114.3	58.6	30.8	11.9	4.2	...
Slash pine	631.1	75.3	132.8	141.6	97.2	86.4	58.6	28.0	7.2	4.0	...
Shortleaf pine	2,391.6	266.5	441.1	505.5	520.3	332.2	188.6	85.4	37.2	14.8	...
Loblolly pine	4,915.3	428.6	695.3	793.7	748.7	645.3	559.8	410.9	265.2	347.1	20.7
Spruce pine	149.5	6.1	7.2	13.2	21.1	20.5	26.7	20.2	18.6	15.9	...
Cypress	162.8	5.4	8.6	16.1	15.2	20.4	26.2	25.0	14.8	17.2	13.9
Other softwoods	43.8	7.1	14.7	6.0	9.4	2.1	1.6	2.4	.3	.2	...
Total	**8,929.1**	**827.4**	**1,377.4**	**1,608.9**	**1,578.2**	**1,221.2**	**920.1**	**602.7**	**355.2**	**403.4**	**34.6**
Hardwood:											
Select white oaks	741.9	60.8	83.9	104.2	112.2	111.3	104.0	69.6	41.3	46.9	7.7
Select red oaks	456.6	27.6	43.0	55.8	59.4	55.9	52.4	44.5	35.1	70.4	12.5
Other white oaks	548.0	61.0	83.7	107.8	77.8	87.3	41.2	28.7	19.6	33.8	7.1
Other red oaks	2,024.1	191.3	279.7	307.7	301.6	264.4	203.3	166.1	111.8	157.1	41.1
Pecan	112.3	7.3	6.8	9.5	11.7	15.0	9.7	13.4	11.4	22.9	4.6
Other hickories	509.7	39.2	58.3	84.6	94.3	79.9	57.6	40.7	22.2	31.0	1.9
Sweetgum	1,360.9	210.2	256.0	239.3	192.8	174.5	110.3	68.9	42.5	59.2	7.2
Tupelo and blackgum	599.2	54.3	90.3	109.6	111.2	98.3	59.4	34.4	22.2	19.5	...
Hard maple	6.8	.5	1.2	1.1	1.6	1.1	.9	.4	...	...	...
Soft maple	104.9	30.7	24.6	15.7	14.5	8.7	4.1	3.4	1.7	1.5	...
Beech	82.7	2.3	3.6	9.4	10.2	10.5	10.3	8.7	10.3	15.4	2.0
Ash	212.5	27.0	29.7	35.8	31.2	25.1	21.8	18.1	8.5	12.8	2.5
Cottonwood	126.0	1.0	4.8	6.0	7.9	10.2	8.8	10.2	9.1	42.0	26.0
Basswood	15.6	.7	1.9	2.3	3.0	.9	.5	1.9	1.1	3.3	...
Yellow-poplar	369.8	20.1	26.2	50.1	55.3	58.0	50.7	39.1	24.0	41.7	4.6
Black walnut	5.8	...	.7	.9	...	1.8	1.4	.4	.6	...	...
Black cherry	43.7	7.0	12.6	4.5	4.8	7.3	5.2	1.3	.3	.7	...
Willow	88.0	2.0	7.3	10.5	9.4	10.9	15.3	12.9	8.5	10.6	.6
Magnolia (*magnolia* spp.)	156.4	26.7	31.9	28.7	26.3	18.3	12.6	7.8	2.3	1.8	...
American elm	127.9	10.0	17.2	18.5	24.8	12.1	13.7	8.5	7.5	12.9	2.7
Other elms	126.7	19.5	22.5	25.6	17.3	17.4	6.9	4.4	3.5	8.7	.9
Hackberry	189.9	20.0	27.5	30.3	22.4	28.3	23.5	14.2	10.7	13.0	...
Sycamore	117.1	5.0	10.2	11.3	18.4	16.2	16.2	11.9	8.9	12.9	6.1
Other hardwoods	178.1	49.8	30.9	26.4	22.1	18.0	13.1	10.6	3.5	3.5	.2
Total	**8,304.6**	**874.0**	**1,154.5**	**1,295.6**	**1,230.2**	**1,131.4**	**842.9**	**620.1**	**406.6**	**621.6**	**127.7**
All species	**17,233.7**	**1,701.4**	**2,531.9**	**2,904.5**	**2,808.4**	**2,352.6**	**1,763.0**	**1,222.8**	**761.8**	**1,025.0**	**162.3**

Table 14. *Volume of sawtimber on commercial forest land by species and diameter classes, Mississippi, 1977*

Species	Diameter class (inches at breast height)								
	All classes	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0 and larger
	Million board feet								
Softwood:									
Longleaf pine	2,737.3	608.3	883.6	635.4	334.2	180.0	71.6	24.2	...
Slash pine	2,161.7	590.2	507.8	488.5	341.8	167.7	42.0	23.7	...
Shortleaf pine	8,609.7	2,175.8	2,681.6	1,826.8	1,099.7	505.5	226.4	93.9	...
Loblolly pine	20,256.2	3,383.7	3,807.5	3,573.1	3,210.1	2,417.8	1,584.0	2,151.3	128.7
Spruce pine	739.6	53.9	103.3	112.3	147.3	120.5	108.3	94.0	...
Cypress	766.8	59.1	66.8	105.0	141.0	134.3	81.9	93.5	85.2
Other softwoods	98.7	22.6	42.8	9.9	7.4	12.9	1.4	1.7	...
Total	**35,370.0**	**6,893.6**	**8,093.4**	**6,751.0**	**5,281.5**	**3,538.7**	**2,115.6**	**2,482.3**	**213.9**
Hardwood:									
Select white oaks	2,598.1	..	510.6	562.5	561.0	393.7	240.0	282.4	47.9
Select red oaks	1,740.2	..	242.5	276.4	277.6	244.4	199.5	417.4	82.4
Other white oaks	1,519.1	..	339.8	446.0	214.1	153.9	111.8	205.4	48.1
Other red oaks	6,356.7	..	1,268.8	1,272.9	1,062.9	923.8	631.7	925.3	271.3
Pecan	492.1	..	50.5	71.9	52.0	74.7	62.8	151.8	28.4
Other hickories	1,662.9	..	396.5	403.1	310.3	230.1	126.4	183.1	13.4
Sweetgum	3,179.0	..	756.9	842.9	579.0	366.7	236.8	347.6	49.1
Tupelo and blackgum	1,591.9	..	438.1	452.2	297.4	176.8	117.9	109.5	...
Hard maple	18.0	..	6.4	5.2	4.5	1.9	...	...	...
Soft maple	162.3	..	65.2	44.0	19.7	17.6	7.5	8.3	...
Beech	384.3	..	50.7	55.3	58.2	52.2	61.3	92.9	13.7
Ash	562.6	..	123.8	109.5	109.2	96.0	43.0	67.4	13.7
Cottonwood	642.3	..	27.2	47.5	44.0	48.3	51.0	251.1	173.2
Basswood	54.0	..	12.9	4.3	3.3	10.0	5.3	18.2	...
Yellow-poplar	1,427.9	..	229.2	287.0	273.2	221.5	139.3	246.7	31.0
Black walnut	22.0	..	...	9.6	7.9	2.2	2.3	...	...
Black cherry	93.6	..	17.7	36.5	25.5	8.1	.9	4.9	...
Willow	351.6	..	33.8	52.1	83.6	70.8	47.4	59.5	4.4
Magnolia (*magnolia* spp.)	307.4	..	96.9	81.7	64.0	40.7	13.9	10.2	...
American elm	424.8	..	110.1	59.2	74.4	44.2	42.2	78.6	16.1
Other elms	302.9	..	80.8	86.3	38.3	23.3	21.1	47.7	5.4
Hackberry	558.4	..	92.5	130.2	125.6	78.3	57.1	74.7	...
Sycamore	461.8	..	75.1	74.3	87.9	63.8	50.6	74.7	35.4
Other hardwoods	357.7	..	97.0	90.3	69.2	60.4	19.5	20.2	1.1
Total	**25,271.6**	**...**	**5,123.0**	**5,500.9**	**4,442.8**	**3,403.4**	**2,289.3**	**3,677.6**	**834.6**
All species	**60,641.6**	**6,893.6**	**13,216.4**	**12,251.9**	**9,724.3**	**6,942.1**	**4,404.9**	**6,159.9**	**1,048.5**

Table 15. *Volume of sawtimber on commercial forest land by species and log grade, Mississippi, 1977*

Species	All grades	Grade 1	Grade 2	Grade 3	Grade 4
	Million board feet				
Softwood:					
Yellow pines	34,504.5	2,703.3	4,378.1	27,423.1	...
Cypress	766.8	114.3	149.0	503.5	...
Other softwoods	98.7	96.1	.2	2.4	...
Total	35,370.0	2,913.7	4,527.3	27,929.0	...
Hardwood:					
Select white and red oaks	4,338.3	505.2	845.5	1,914.3	1,073.3
Other white and red oaks	7,875.8	489.5	948.5	3,230.2	3,207.6
Hickory	2,155.0	234.2	400.6	1,006.2	514.0
Hard maple	18.0	...	1.5	13.1	3.4
Sweetgum	3,179.0	275.2	523.0	1,534.1	846.7
Tupelo and blackgum	1,591.9	110.7	340.4	905.5	235.3
Ash, walnut, and black cherry	678.2	84.0	145.1	349.7	99.4
Yellow-poplar	1,427.9	113.3	227.3	623.7	463.6
Other hardwoods	4,007.5	419.1	614.7	1,864.9	1,108.8
Total	25,271.6	2,231.2	4,046.6	11,441.7	7,552.1
All species	60,641.6	5,144.9	8,573.9	39,370.7	7,552.1

Table 16. *Annual growth and removals of growing stock on commercial forest land by species, Mississippi, 1976*

Species	Net annual growth	Annual removals
	Million cubic feet	
Softwood:		
Yellow pines	580.9	484.3
Cypress	5.2	4.1
Other softwoods	3.4	4.0
Total	589.5	492.4
Hardwood:		
Select white and red oaks	64.3	33.0
Other white and red oaks	143.6	86.5
Hickory	24.4	21.3
Hard maple	.6	.5
Sweetgum	71.7	34.3
Tupelo and blackgum	19.1	16.2
Ash, walnut, and black cherry	13.5	7.0
Yellow-poplar	19.0	6.3
Other hardwoods	67.5	36.0
Total	423.7	241.1
All species	1,013.2	733.5

Table 17. *Annual growth and removals of growing stock on commercial forest land by ownership classes and by softwoods and hardwoods, Mississippi, 1976*

Ownership class	Net annual growth			Annual removals		
	All species	Softwood	Hardwood	All species	Softwood	Hardwood
	Million cubic feet					
National forest	78.5	56.6	21.9	30.8	27.5	3.3
Other public	33.3	18.6	14.7	38.9	20.5	18.4
Forest industry	185.6	122.3	63.3	164.4	123.1	41.3
Farmer and misc. private	715.8	392.0	323.8	499.4	321.3	178.1
All ownerships	1,013.2	589.5	423.7	733.5	492.4	241.1

Table 18. *Annual growth and removals of sawtimber on commercial forest land by species, Mississippi, 1976*

Species	Net annual growth	Annual removals
	Million board feet	
Softwood:		
Yellow pines	2,670.2	2,312.5
Cypress	28.6	21.5
Other softwoods	6.8	8.6
Total	2,705.6	2,342.6
Hardwood:		
Select white and red oaks	277.3	168.2
Other white and red oaks	567.8	366.0
Hickory	96.6	98.3
Hard maple	1.1	2.1
Sweetgum	184.8	121.7
Tupelo and blackgum	64.0	65.7
Ash, walnut, and black cherry	46.8	26.5
Yellow-poplar	108.7	31.8
Other hardwoods	242.3	155.8
Total	1,589.4	1,036.1
All species	**4,295.0**	**3,378.7**

Table 19. *Annual growth and removals of sawtimber on commercial forest land by ownership classes and by softwoods and hardwoods, Mississippi, 1976*

Ownership class	Net annual growth			Annual removals		
	All species	Softwood	Hardwood	All species	Softwood	Hardwood
	Million board feet					
National forest	398.8	321.2	77.6	167.8	154.1	13.7
Other public	184.4	119.1	65.3	191.8	110.5	81.3
Forest industry	770.4	497.6	272.8	819.2	635.8	183.4
Farmer and misc. private	2,941.4	1,767.7	1,173.7	2,199.9	1,442.2	757.7
All ownerships	**4,295.0**	**2,705.6**	**1,589.4**	**3,378.7**	**2,342.6**	**1,036.1**

Table 20. *Mortality of growing stock and sawtimber on commercial forest land by species, Mississippi, 1976*

Species	Growing stock	Sawtimber
	Million cubic feet	*Million board feet*
Softwood:		
Yellow pines	55.0	169.2
Cypress	.3	1.5
Other softwoods	.7	1.7
Total	56.0	172.4
Hardwood:		
Select white and red oaks	3.0	11.8
Other white and red oaks	15.3	49.5
Hickory	4.1	15.3
Sweetgum	9.9	22.7
Tupelo and blackgum	4.7	17.7
Ash, walnut, and black cherry	2.7	6.8
Yellow-poplar	1.3	4.0
Other hardwoods	24.7	78.2
Total	65.7	206.0
All species	121.7	378.4

Table 21. *Mortality of growing stock and sawtimber on commercial forest land by ownership classes and by softwoods and hardwoods, Mississippi, 1976*

Ownership class	Growing stock			Sawtimber		
	All species	Softwood	Hardwood	All species	Softwood	Hardwood
	Million cubic feet			*Million board feet*		
National forest	9.1	6.5	2.6	29.7	22.9	6.8
Other public	5.5	2.3	3.2	18.3	7.1	11.2
Forest industry	24.9	12.4	12.5	87.0	42.6	44.4
Farmer and misc. private	82.2	34.8	47.4	243.4	99.8	143.6
All ownerships	121.7	56.0	65.7	378.4	172.4	206.0

Table 22. *Mortality of growing stock and sawtimber on commercial forest land by causes and by softwoods and hardwoods, Mississippi, 1976*

Cause of death	Growing stock			Sawtimber		
	All species	Softwood	Hardwood	All species	Softwood	Hardwood
	Million cubic feet			*Million board feet*		
Fire	1.6	1.0	.6	3.1	2.4	.7
Insects	10.3	9.7	.6	32.1	30.9	1.2
Disease	26.5	11.0	15.5	73.3	29.4	43.9
Other	67.6	28.6	39.0	223.7	93.2	130.5
Unknown	15.7	5.7	10.0	46.2	16.5	29.7
All causes	121.7	56.0	65.7	378.4	172.4	206.0

Table 23. *Total output of timber products by product, by type of material used, and by softwoods and hardwoods, Mississippi, 1976*

Product and species group	Standard units	Total output		Roundwood products		Plant byproducts	
		Number	M ft³	Number	M ft³	Number	M ft³
Saw logs:							
Softwood	M fbm[1]	1,245,381	205,499	1,185,980	200,549	59,401	4,950
Hardwood	M fbm[1]	509,499	87,073	509,499	87,073	...	...
Total	M fbm[1]	**1,754,880**	**292,572**	**1,695,479**	**287,622**	**59,401**	**4,950**
Veneer logs and bolts:							
Softwood	M fbm	458,470	71,705	458,470	71,705	...	...
Hardwood	M fbm	17,895	3,003	17,895	3,003	...	...
Total	M fbm	**476,365**	**74,708**	**476,365**	**74,708**	...	...
Pulpwood:							
Softwood	Std cd[2]	3,679,524	298,042	2,274,924	184,269	1,404,600	113,773
Hardwood	Std cd[2]	1,662,755	133,020	1,281,155	102,492	381,600	30,528
Total	Std cd[2]	**5,342,279**	**431,062**	**3,556,079**	**286,761**	**1,786,200**	**144,301**
Cooperage:							
Softwood	M fbm	...	...	...	...	...	...
Hardwood	M fbm	1,574	227	1,574	227	...	...
Total	M fbm	**1,574**	**227**	**1,574**	**227**	...	...
Piling:							
Softwood	M lin ft	10,770	7,709	10,770	7,709	...	...
Hardwood	M lin ft	...	...	...	...	...	...
Total	M lin ft	**10,770**	**7,709**	**10,770**	**7,709**	...	...
Poles:							
Softwood	M pieces	839	9,771	839	9,771	...	..
Hardwood	M pieces	...	...	...	...	...	...
Total	M pieces	**839**	**9,771**	**839**	**9,771**	...	...
Commercial posts (round and split):							
Softwood	M pieces	2,298	1,500	1,952	1,123	346	377
Hardwood	M pieces	5	3	5	3	...	...
Total	M pieces	**2,303**	**1,503**	**1,957**	**1,126**	**346**	**377**
Other:[3]							
Softwood	M ft³	11,482	11,482	7,156	7,156	4,326	4,326
Hardwood	M ft³	4,911	4,911	2,335	2,335	2,576	2,576
Total	M ft³	**16,393**	**16,393**	**9,491**	**9,491**	**6,902**	**6,902**
Total industrial products:							
Softwood	---	...	...	...	482,282	...	123,426
Hardwood	---	...	...	...	195,133	...	33,104
Total	---	...	...	...	**677,415**	...	**156,530**
Noncommercial posts (round and split):							
Softwood	M pieces	1,747	1,118	1,747	1,118	...	..
Hardwood	M pieces	1,111	706	1,111	706	...	..
Total	M pieces	**2,858**	**1,824**	**2,858**	**1,824**	...	..
Fuelwood:							
Softwood	Std cd	374,137	28,061	8,044	604	366,093	27,457
Hardwood	Std cd	521,140	39,085	318,260	23,869	202,880	15,216
Total	Std cd	**895,277**	**67,146**	**326,304**	**24,473**	**568,973**	**42,673**
All products:							
Softwood	---	...	...	...	484,004	...	150,883
Hardwood	---	...	...	...	219,708	...	48,329
Total	---	...	...	...	**703,712**	...	**199,20**

[1] International ¼-inch rule.
[2] Rough wood basis (for example, chips converted to equivalent standard cords).
[3] Includes furniture stock, handlestock, cooperage, and other minor industrial products. Additionally, byproducts include material used for livestock bedding, mulch, etc.
[4] Includes plant byproducts used for industrial and domestic fuel.

Table 24. *Output of roundwood products by source and by softwoods and hardwoods, Mississippi, 1976*

Product and species group	All sources	Growing-stock trees[1]			Rough and rotten trees[1]	Salvable dead trees[1]	Other sources[2]
		Total	Sawtimber	Poletimber			
	Thousand cubic feet						
Industrial products:							
Saw logs:							
Softwood	200.549	197.806	197.182	624	449	221	2.073
Hardwood	87.073	85.035	82.924	2.111	1.597	...	441
Total	287,622	282,841	280,106	2,735	2,046	221	2,514
Veneer logs and bolts:							
Softwood	71.705	70.249	70.249	...	436	...	1.020
Hardwood	3.003	2.951	2.951	...	39	...	13
Total	74,708	73,200	73,200	...	475	...	1,033
Pulpwood:							
Softwood	184.269	173.092	133.639	39.453	1.186	124	9.867
Hardwood	102.492	90.173	61.436	28.737	4.187	171	7.961
Total	286,761	263,265	195,075	68,190	5,373	295	17,828
Misc. industrial products:							
Cooperage:							
Softwood	...	...	...	...	...	...	...
Hardwood	227	224	224	...	2	...	1
Total	227	224	224	...	2	...	1
Piling:							
Softwood	7.709	7.676	7.676	...	...	...	33
Hardwood	...	...	...	...	...	...	...
Total	7,709	7,676	7,676	...	...	...	33
Poles:							
Softwood	9.771	9.698	8.577	1.121	...	...	73
Hardwood	...	...	...	...	...	...	...
Total	9,771	9,698	8,577	1,121	...	...	73
Commercial posts (round and split):							
Softwood	1.123	1.023	...	1.023	...	...	100
Hardwood	3	3	...	3	...	...	...
Total	1,126	1,026	...	1,026	...	...	100
Other:							
Softwood	7.156	6.719	5.052	1.667	43	4	390
Hardwood	2.335	2.186	1.796	390	51	2	96
Total	9,491	8,905	6,848	2,057	94	6	486
All misc. industrial products:							
Softwood	25.759	25.116	21.305	3.811	43	4	596
Hardwood	2.565	2.413	2.020	393	53	2	97
Total	28,324	27,529	23,325	4,204	96	6	693
All industrial products:							
Softwood	482.282	466.263	422.375	43.888	2.114	349	13.556
Hardwood	195.133	180.572	149.331	31.241	5.876	173	8.512
Total	677,415	646,835	571,706	75,129	7,990	522	22,068
Noncommercial posts (round and split):							
Softwood	1.118	1.042	68	974	...	...	76
Hardwood	706	658	44	614	...	...	48
Total	1,824	1,700	112	1,588	...	...	124
Fuelwood:							
Softwood	604	509	311	198	32	14	49
Hardwood	23.869	20.120	12.287	7.833	1.234	553	1.962
Total	24,473	20,629	12,598	8,031	1,266	567	2,011
All products:							
Softwood	484.004	467.814	422.754	45.060	2.146	363	13.681
Hardwood	219.708	201.350	161.662	39.688	7.110	726	10.522
Total	703,712	669,164	584,416	84,748	9,256	1,089	24,203

[1] On commercial forest land.
[2] Includes noncommercial forest land, nonforest land such as fence rows, trees less than 5.0 inches in diameter, and treetops and limbs.

Table 25. *Timber removals from growing stock on commercial forest land by items and by softwoods and hardwoods, Mississippi, 1976*

Item	All species	Softwood	Hardwood
	Thousand cubic feet		
Roundwood products:			
Saw logs	282.841	197.806	85.035
Veneer logs and bolts	73.200	70.249	2.951
Pulpwood	263.265	173.092	90.173
Piling	7.676	7.676	...
Poles	9.698	9.698	...
Posts	2.726	2.065	661
Other	9.129	6.719	2.410
Fuelwood	20.629	509	20.120
All products	**669,164**	**467,814**	**201,350**
Logging residues	40.367	20.354	20.013
Other removals	63.092	24.060	39.032
Total removals	**772,623**	**512,228**	**260,395**

Table 26. *Timber removals from live sawtimber on commercial forest land by items and by softwoods and hardwoods, Mississippi, 1976*

Item	All species	Softwood	Hardwood
	Thousand board feet		
Roundwood products:			
Saw logs	1.670.449	1.171.246	499.203
Veneer logs and bolts	467.447	450.085	17.362
Pulpwood	842.043	547.796	294.247
Piling	45.525	45.525	...
Poles	49.569	49.569	...
Posts	552	339	213
Other	31.954	20.863	11.091
Fuelwood	61.625	1.553	60.072
All products	**3,169,164**	**2,286,976**	**882,188**
Logging residues	119.366	42.690	76.676
Other removals	263.343	104.717	158.626
Total removals	**3,551,873**	**2,434,383**	**1,117,490**

Table 27. *Volume of plant residues by industrial source and type of residue and by softwoods and hardwoods, Mississippi, 1976*

Species group and type	All industries	Lumber	Veneer and plywood	Othe
	Thousand cubic feet			
Softwood:				
Coarse[1]	3.003	652	1.952	39
Fine[2]	6.806	4.699	450	1.65
Total	**9,809**	**5,351**	**2,402**	**2,05**
Hardwood:				
Coarse	1.993	1.901	...	9
Fine	7.769	7.591	15	16
Total	**9,762**	**9,492**	**15**	**25**
All species:				
Coarse	4.996	2.553	1.952	49
Fine	14.575	12.290	465	1.82
All types	**19,571**	**14,843**	**2,417**	**2,31**

[1] Unused material suitable for chipping, such as slabs, edgings, and veneer cores.
[2] Unused material not suitable for chipping, such as sawdust and shavings.

Murphy, Paul A.

1978. Mississippi Forests—Trends and Outlook. U.S. Dep. Agric. For. Serv. Resour. Bull. SO-67, 32 p.

Softwood inventory in sound, well-formed trees increased 30 percent since the previous survey, and hardwoods gained 17 percent. This increase in volume rose in all parts of the State, but the extent of increase varied widely by region. Timber growth exceeded removals in 1976, despite the doubling in softwood harvest since 1966. An imbalance between growth and removals of softwood sawtimber may be developing in south and central Mississippi.