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Forest Resources of Alabama

Victor A. Rudis, James F. Rosson, Jr., and John F. Kelly

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HIGHLIGHTS

The 1982 survey of Alabama's timberland presented in this report covers many items related to the forest resources of the State. The appendix contains standard statistical tables, definitions, and estimates of sampling errors upon which the survey is based. Trend data and other information are presented throughout the text. Listed below are a few of the more important highlights. More detailed discussions and analyses are presented in the sections that follow. Data are reported for January 1, 1982. Comparisons, unless otherwise noted, are made between surveys taken in 1972 and 1982.

- From 1972 to 1982, total timberland has changed only slightly; 605,000 acres diverted to nontimber uses have been offset by 932,000 acres that reverted back to timberland.
- Forest industry landholdings have increased 6 percent; public landholdings have increased 14 percent. No significant change has occurred in non-industrial private landholdings.
- Important shifts in forest types have been noted. Oak-hickory forest type has increased 23 percent; while losses have occurred among loblolly-shortleaf (8 percent), oak-pine (7 percent), and bottomland forest types (4 percent). Longleaf-slash forest type has not changed.
- Timber volume has increased 13 percent, mostly due to increases in hardwood volume. Growing-stock volume has increased by 7 percent, softwoods by 3 percent, and hardwoods by 13 percent. Sawtimber volume has increased by 12 percent, softwoods by 5 percent, and hardwoods by 27 percent.
- Cull volume, the sound-wood volume of trees classed as rough or rotten, has increased 57 percent. Softwood cull volume has increased 171 percent while hardwood cull volume has increased 42 percent.
- Loblolly, shortleaf, longleaf, and slash pines comprise the major softwoods, with 45, 18, 10, and 8 percent of the softwood growing-stock volume, respectively. Between 1972 and 1982, decreases in pine growing-stock volume have occurred in shortleaf (19 percent) and longleaf (6 percent), while increases have occurred in loblolly (7 percent) and slash (22 percent).
- Oaks, gums, hickories, and yellow-poplar account for the major hardwood species, with 42, 26, 10, and 7 percent of the hardwood growing-stock volume, respectively. Hardwood growing-stock volume has increased substantially between 1972 and 1982, notably in select oaks (11 percent), other oaks (18 percent), sweetgum (13 percent), and yellow-poplar (30 percent).
- Alabama's timberland is maturing. Increases have occurred in the number of 8- to 14-inch diameter trees, while declines have occurred in smaller diameter trees. Stand basal area has shifted toward greater representation by hardwoods and cull trees. Losses due to mortality have increased significantly.
- Net annual growth of growing stock for the 1972-1982 survey period has averaged 986 million cubic feet, annual removals 855 million cubic feet, annual mortality 205 million cubic feet, and annual cull increment 68 million cubic feet.
- Growing-stock volume has increased at an annual rate of 132 million cubic feet between 1972 and 1982. Annual softwood growing-stock volume has increased 6 million cubic feet while annual hardwood growing-stock volume increased 126 million cubic feet.
- Sawtimber volume has increased 625 million board feet annually. Softwood sawtimber volume has increased on an annual basis by 229 million board feet while hardwood sawtimber volume increased 396 million board feet.

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- Net annual growth of growing stock between 1972 and 1982 has been 46 cubic feet per acre, down 18 percent from that reported for the 1963-1972 survey period.
- Annual mortality of softwood sawtimber between 1972 and 1982 has been 334 million board feet, more than double that reported for the 1963 - 1972 survey period. Hardwood sawtimber mortality has been 252 million board feet annually, a 92 percent increase.
- Nontimber resources associated with Alabama's timberland are presented. Detailed data are provided on timberland area and volume related to water, soils, livestock, wildlife, and outdoor recreation resources.
- Timberland near water sources (water bodies ⅛ acre or larger, or water courses 40 feet or more in width) comprises 11 percent of the total acreage and 18 percent of the State's hardwood saw-log volume.
- Timberland with slopes greater than 20 percent represents 15 percent of the total acreage and 21 percent of the State's hardwood saw-log volume.
- Timberland more than one-half mile from roads constitutes less than 10 percent of the State's timberland area. Remote areas, timberland one mile or more from roads, are found chiefly in bottomlands and are concentrated in the southwestern part of the State.

INTRODUCTION

This report describes the principal findings of a survey of Alabama's forest resources conducted between August 1980 and December 1982. Data are reported for January 1, 1982. Fieldwork has been conducted by the Forest Inventory and Analysis Unit of the U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station (Southern Forest Survey). Cooperative asistance has been provided by personnel of the Alabama Forestry Commission and by interested forest industries in the State.

Prior surveys were conducted for 1935 (Cruikshank 1940a, 1940b; Southern Forest Survey 1938; Spillers 1939, 1940), 1953 (Southern Forest Survey 1953), 1963 (Sternitzke 1963), and 1972 (Murphy 1973).

For the purposes of analysis, the State is divided into 6 forest survey units: Southwest-South, Southwest-North, Southeast, West Central, North Central, and North (fig. 1).

Timberland is a dominant feature of Alabama's landscape—all of the State's 67 counties are covered with 26 percent or more of timberland. Timberland is less extensive in the blackland prairie region between Sumter and Bullock counties, extreme northern counties, and scattered counties throughout the Southeast Unit (fig. 2).

HISTORY[1]

Alabama traditionally has been a rural society in which agriculture, timber, and other extensive land uses have dominated the economy. The forest economy experienced a boom in lumber production in the late 1800s. Large lumber companies, many of which had migrated south from the states bordering the Great Lakes, purchased thousands of acres of pine timberland, often enough to supply their mills for as long as 20 years. As the land was cut over, many firms closed down and some of the larger firms moved west. Smaller, portable saw mills were established to take advantage of the available second growth timber. By the 1920s the lumber boom was over. Production by the pulp and paper industry was in its infancy.

The kraft process, which opened resinous southern pines to the paper industry, offered enormous potential to the South. With the new process, the pulp and paper industry grew rapidly. Because of its reliance on smaller timber, the pulp and paper industry was often criticized for destroying forests before they were mature, especially since people still had vivid memories of the large trees consumed during the lumber boom.

The pulp and paper industry developed during the 1930s, 40s, and 50s. Today it has become a leading landowner and manager of timberland, and a significant contributor to local economies. Early industrial sites were in the coastal areas, but inland locations along major rivers are used today as well.

Of the major manufacturing industries in Alabama, the pulp and paper industry ranks second only to the primary metals industry. The lumber and wood products group, while smaller in size, is a major industry in Alabama as elsewhere in the South. The total timber industry (pulp and lumber combined) probably now ranks as the largest manufacturing industry in the State (Flick and Bowers 1980).

[1] Adapted from Flick and Kelly (1978).

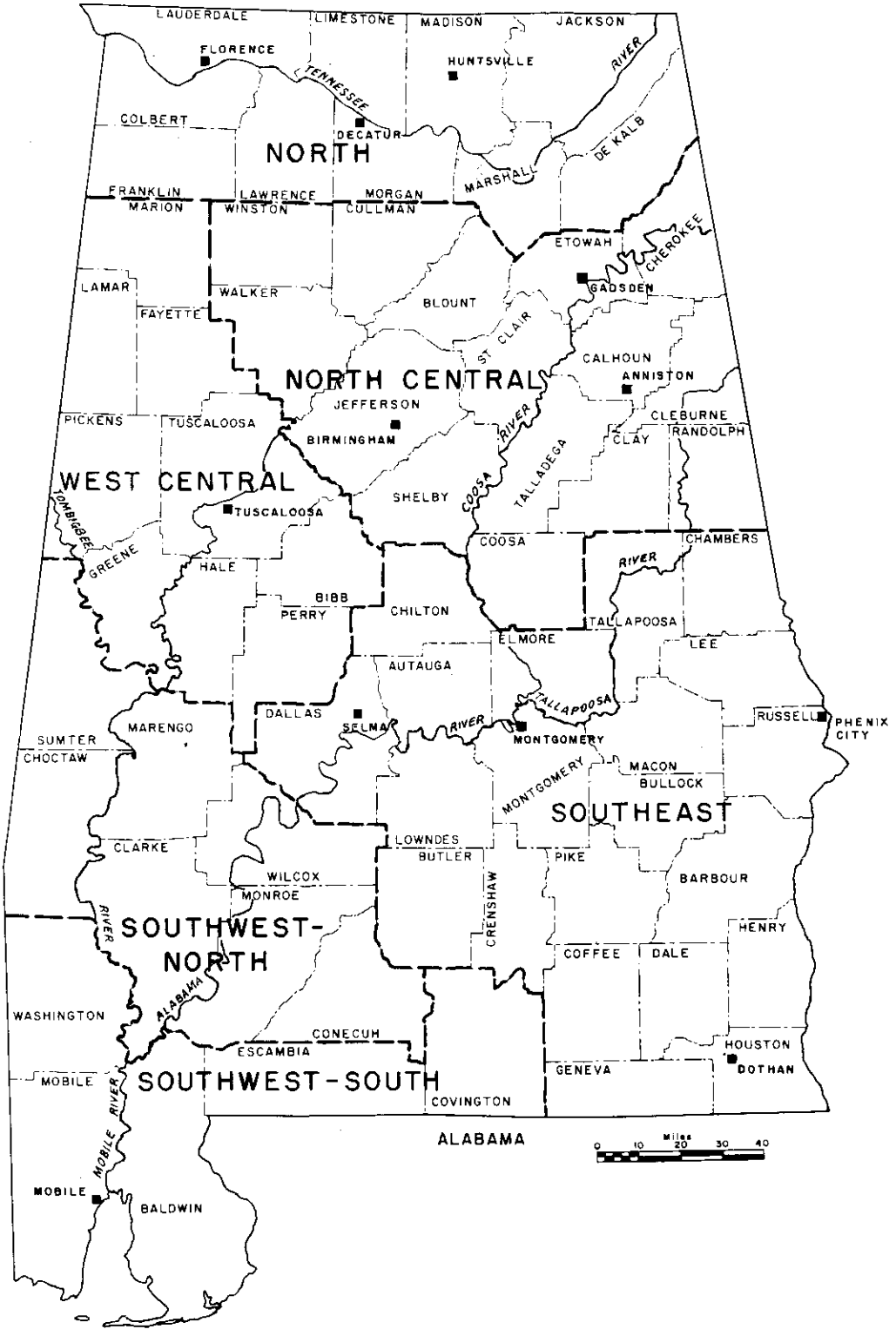


Figure 1.—*Forest survey units in Alabama.*

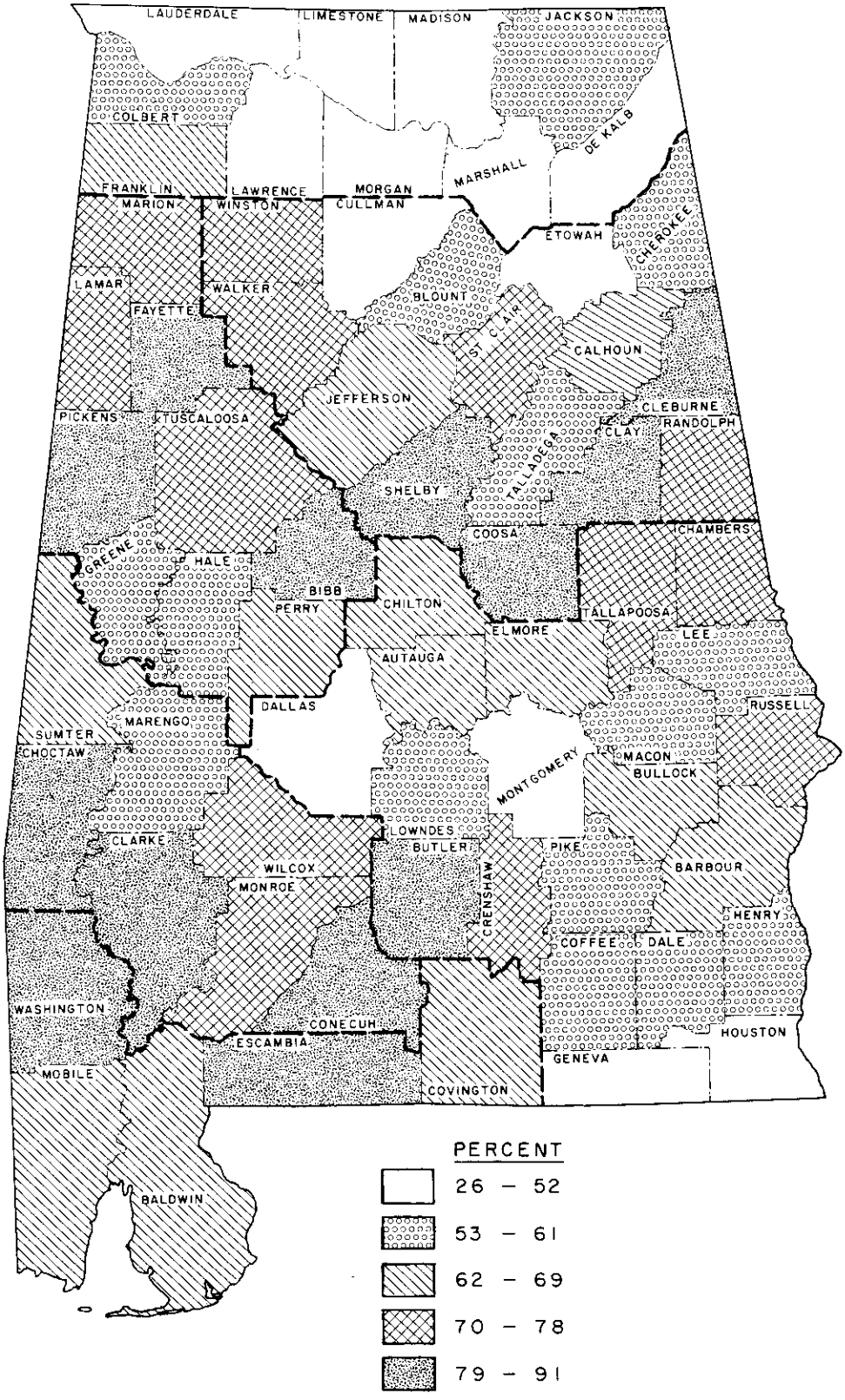


Figure 2.—*Percent timberland area in Alabama counties, 1982.*

FOREST AREA

Area Changes

Forest area in Alabama totals 21,700,000 acres. Of this amount, 66,000 acres are reserved for nontimber uses, an increase of 49,000 acres reserved since the 1972 inventory. Part of this increase (13,000 acres) consists of the 1975 transfer of the Sipsey Area of the Bankhead National Forest (Lawrence and Winston counties) from timberland to designated wilderness.

The current timberland acreage represents a 16 percent increase since the initial 1935 inventory and a 2 percent increase since the 1972 inventory. Four of the six survey units, Southwest-South, Southwest-North, West Central and North, account for the increase in timberland since 1972. Though the statistics have depicted a net increase in timberland, land use changes from forest to nonforest and from nonforest to forest are constantly occurring (table I). Shifts to nonforest are attributed to conversion to agriculture, residential development, urban expansion, highways, etc. During the 1972-1982 period, 274,000 forested acres have been diverted to agriculture. More importantly, 331,000 acres have been permanently withdrawn for other land uses. These losses of timberland have been offset by 774,000 acres of agricultural land and 158,000 acres of other land that reverted back to forest use. Agronomic factors will likely divert additional marginal farmland to timberland in the future.

Six counties have lost more than 20,000 acres each with Lee County showing the greatest loss, 40,000 acres. Fourteen counties have gained more than 20,000 acres of timberland with Bullock County gaining the most, 35,000 acres (fig.3).

Forest Ownership

Most timberland in Alabama is privately owned. Of the total timberland, 21 percent is owned by forest industry, 74 percent is owned by farmers and other private owners, and 5 percent is publicly owned.

The 4,458,000 acres owned by forest industry represents a 9 percent increase since the 1963 inventory and a 6 percent increase since the 1972 inventory. Forest industry's timberland acquisition rate is expected to decline as large tracts become scarce. Much of the timberland owned by forest industries is concentrated in the western and southern parts of the State (fig. 4).

Alabama's non-industrial private landowners hold 16,040,000 acres. The acreage has declined by 4 percent since the 1963 survey but represents no significant change since the 1972 survey. The majority of non-industrial private timberland is found in the northern and eastern portions of the State (fig. 5).

Public timberland amounts to 1,160,000 acres. Of the public timberland, roughly 70 percent is held by the U.S. Forest Service. Other public agencies with timberland are the Tennessee Valley Authority, U.S. Department of Interior, Bureau of Land Management, Corps of Engineers, State of Alabama, and county and municipal governments. The current acreage represents an increase of 16 percent since the 1963 inventory and a 14 percent increase since the 1972 inventory. Public landholdings are found in scattered locations throughout the State.

Forest Type

The oak-hickory forest type occupies the largest acreage in Alabama, followed by loblolly-shortleaf, oak-pine, oak-gum-cypress, and long-

Table I.—*Changes in timberland by forest survey units, Alabama, 1972-1982*

Forest survey units	Total area[1]	Timberland	Net change	Additions from:			Diversions to:		
				Total	Agriculture	Other[2]	Total	Agriculture	Other[2]
	thousand acres								
Southwest-South	3,851.5	2,858.2	+ 70.8	107.2	35.7	71.5	36.4	12.1	24.2
Southwest-North	4,400.6	3,382.5	+ 3.9	62.5	62.5	...	58.6	44.1	14.5
Southeast	9,112.3	5,415.8	+ 67.4	258.5	230.5	28.0	191.1	96.9	94.2
West Central	4,409.6	3,272.1	+106.3	169.2	148.8	20.4	62.9	26.6	36.3
North Central	6,620.8	4,542.6	+ 6.7	177.7	140.1	37.6	171.0	63.0	108.0
North	4,634.9	2,187.7	+ 70.7	156.0	155.8	0.1	85.3	31.6	53.7
All units	33,029.8	21,658.8	+325.6	931.0	773.5	157.6	605.2	274.3	330.9

[1] United States Department of Commerce, Bureau of the Census, Area Measurement Reports, GE-20, No. 2, 1965. (Data as of April 1, 1960).

[2] Includes urban, industrial, highway, noncommercial forest, water, rights-of-way, and other land uses.

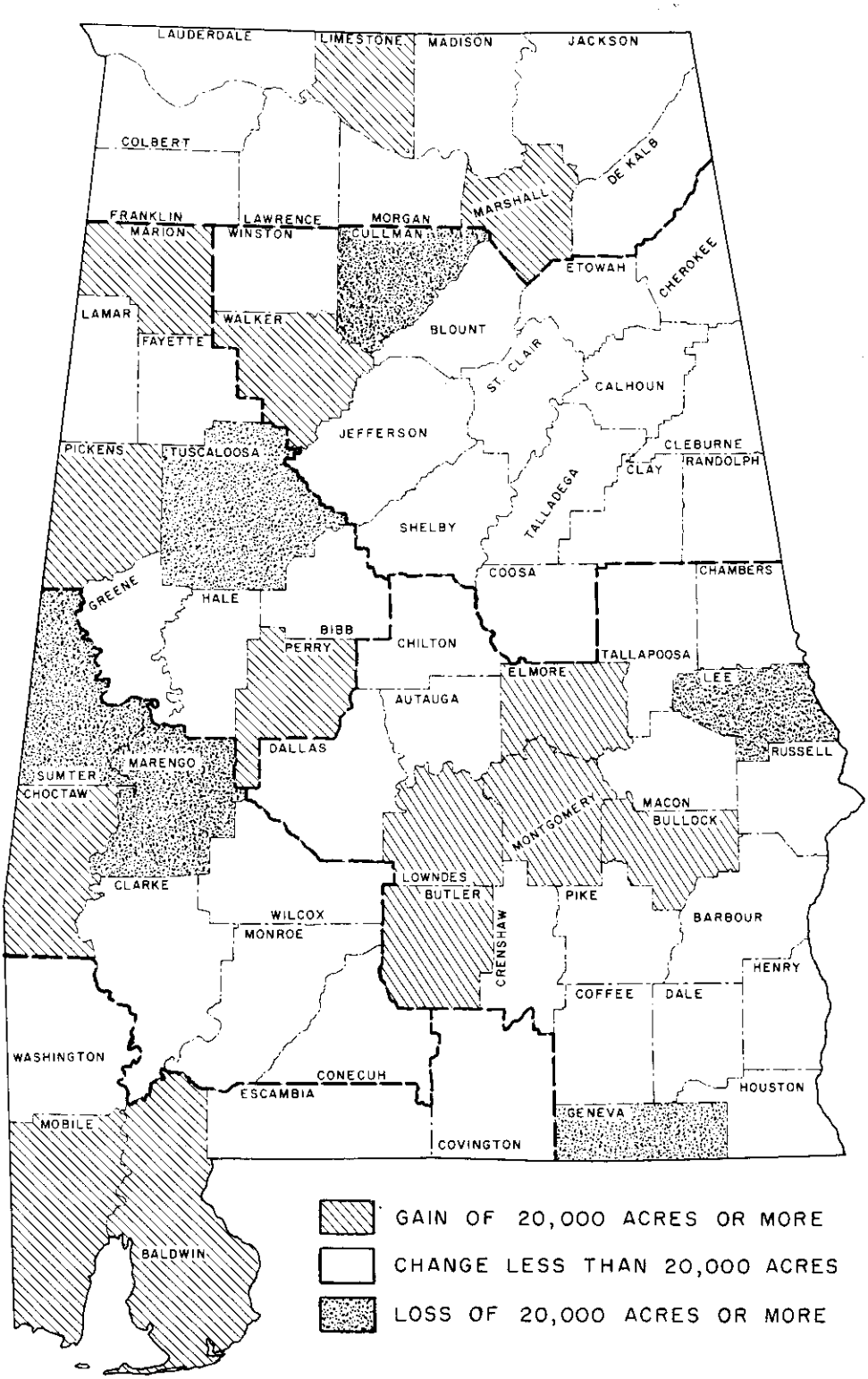


Figure 3.—*Alabama counties with gains and losses in timberland from 1972 to 1982.*

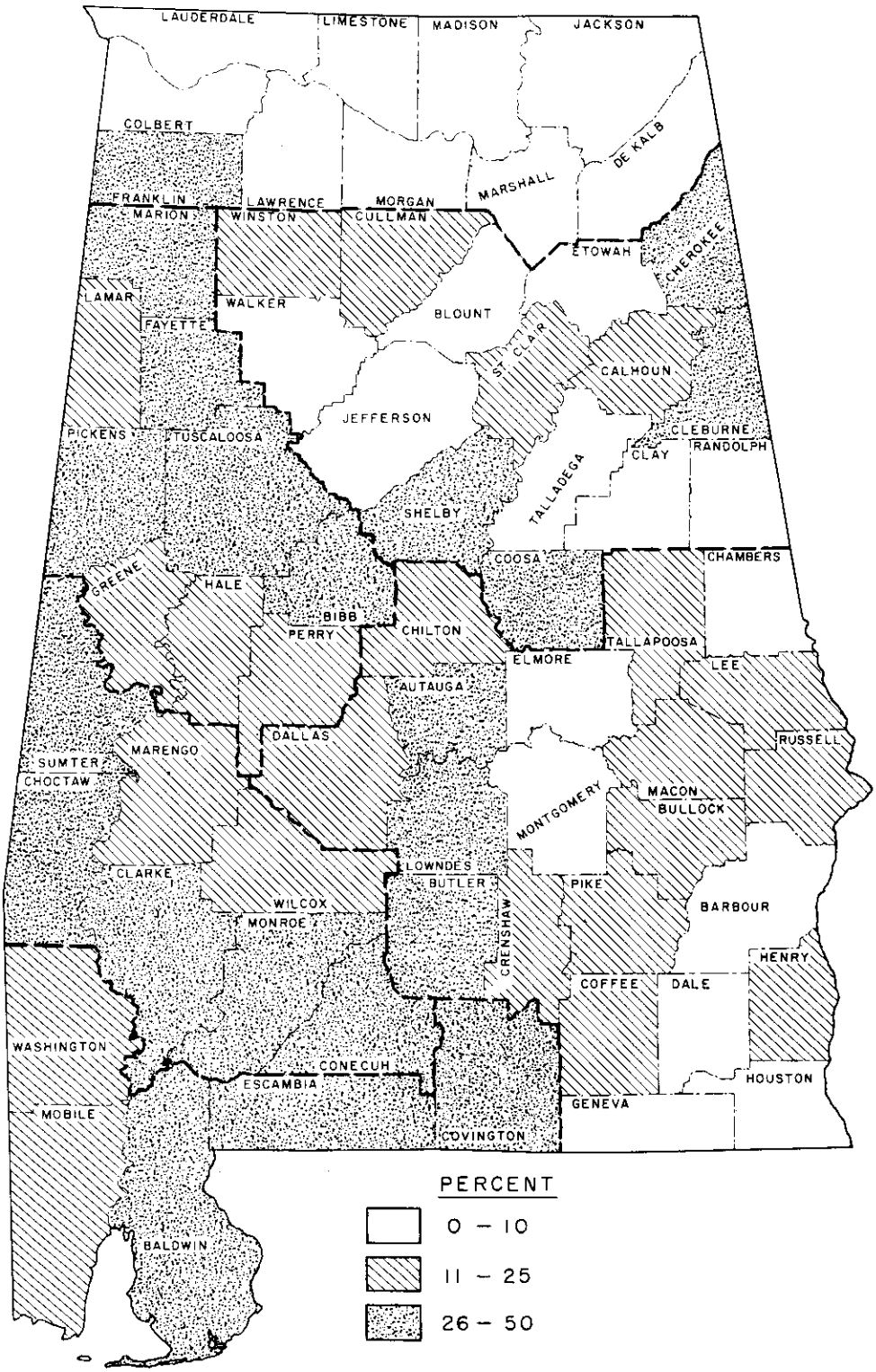


Figure 4.—*Percent timberland held by forest industries, 1982.*

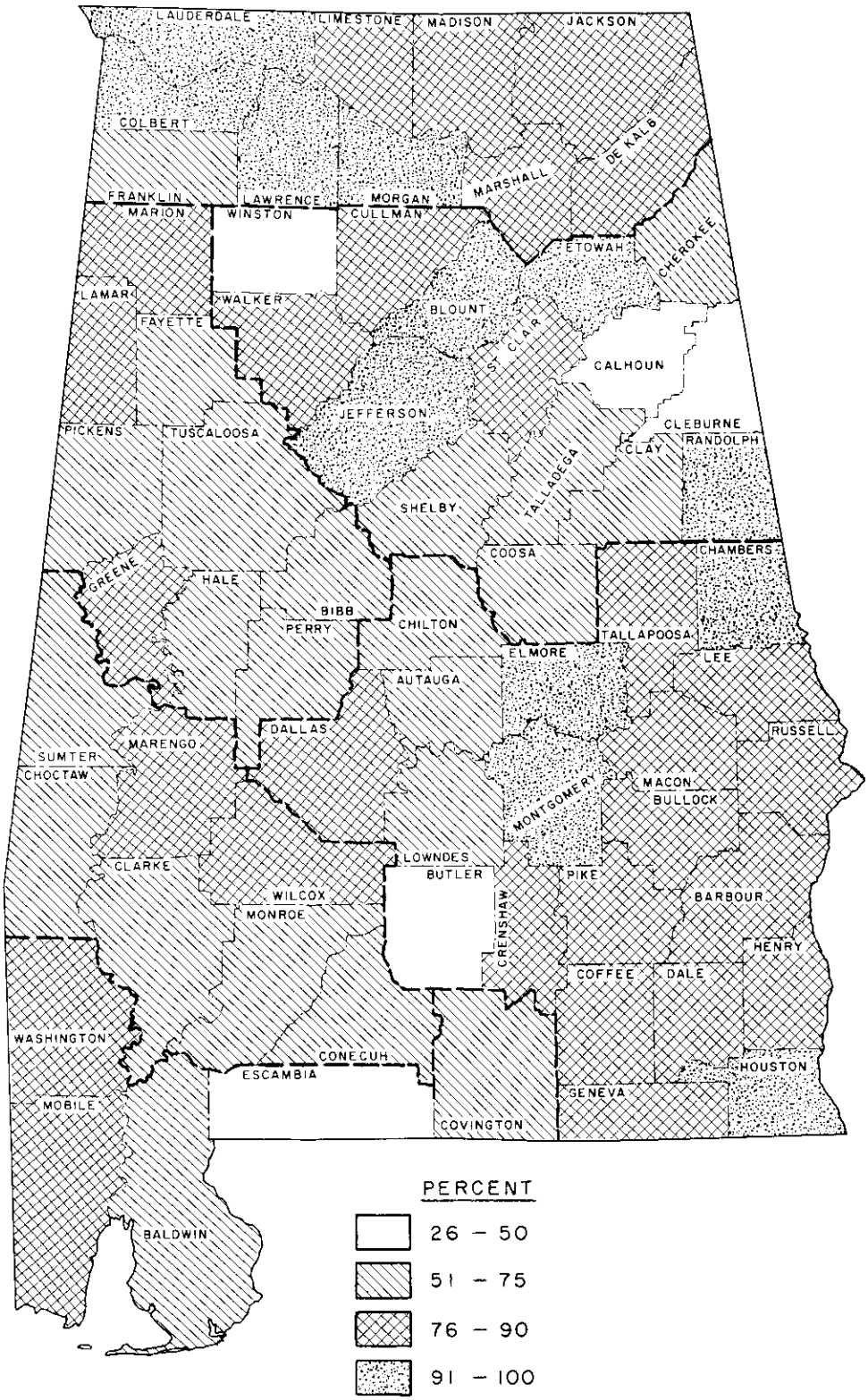


Figure 5.—*Percent timberland held by non-industrial private landowners, 1982.*

Table II.—*Area of timberland by forest types and forest survey units, Alabama, 1982*[1]

Forest survey units	All types	Longleaf-slash	Loblolly-shortleaf	Oak-pine	Oak-hickory	Oak-gum-cypress	Elm-ash-cottonwood	Nontyped[2]
	thousand acres							
Southwest-South	2,858.2	1,053.9	281.2	622.4	402.4	480.2	6.0	12.1
Southwest-North	3,392.5	113.9	1,098.3	753.0	860.1	545.8	11.3	...
Southeast	5,415.9	173.9	1,703.7	1,088.6	1,813.1	595.5	23.0	17.8
West Central	3,272.1	51.1	1,004.4	749.8	969.4	480.3	17.1	...
North Central	4,542.6	89.8	1,384.9	1,009.5	1,908.5	133.1	11.0	6.3
North	2,187.7	...	381.1	339.6	1,322.8	138.7	5.6	...
All units	21,658.8	1,482.7	5,853.7	4,562.9	7,275.8	2,373.5	74.0	36.2

[1] Totals may not add due to rounding.

[2] No live trees 1.0 inches diameter or larger at breast height.

leaf-slash (table II). In the 1972 survey, the loblolly-shortleaf type was the most common. The oak-hickory type has increased by 1,400,000 acres or 23 percent since the last inventory. Loblolly-shortleaf type has declined 526,000 acres (8 percent), the oak-pine type declined 364,000 acres (7 percent), and the bottomland forest types, oak-gum-cypress and elm-ash-cottonwood, have declined 92,000 acres (4 percent). Longleaf-slash has remained unchanged.

There has been a shift in the acreage from pine to oak-hickory. One reason for the shift appears to be the lack of investment in the re-establishment of pines after harvest on private timberland. Unless measures are taken to reverse this trend, more forest type acreage will shift.

Shifts in forest type may have been due also to minor shifts in species composition and stocking levels. Forest types are discrete categories for what is in nature a continuum, a continuous range of species groups. Stands that were very close to a classification boundary during the last survey might have changed very little and have been classed in 1982 into another forest type. Such a small change in species occupancy could be interpreted mistakenly as a very dramatic shift in acreage.

Interesting shifts can be noted in the acreage of upland forest types among ownership classes between 1972 and 1982. National Forests have increased by 22,000 acres in loblolly-shortleaf pine, by 40,000 acres in oak-pine and by 8,000 acres in oak-hickory. Forest industry land has increased by 133,000 acres in loblolly-shortleaf, has declined 141,000 acres in oak-pine, and has increased by 174,000 acres in oak-hickory. In contrast, on private land there has been a decrease of 650,000 and 355,000 acres in loblolly-shortleaf and oak-pine, respectively, and an increase of 1,200,000 acres in oak-hickory.

In the acreage of bottomland forest types, there has been a shift toward public and forest industry ownership from non-industrial private ownership. Between 1972 and 1982, public landholdings of bottomland forests have increased by 66,000 acres to 115,000 acres. During the same period, forest industry increased its share by 69,000 acres to 455,000 acres. The acreage of non-industrial private landowner classes, down 226,000 acres to 1,878,000 acres, has resulted in an overall decline in the acreage of bottomland forest types.

Statewide, there has been a loss of 92,000 acres (4 percent) of bottomland forest types since the 1972 inventory. However, it appears that the rate of loss has slowed significantly since the 1950s and that the total statewide acreage of bottomland forest types has stabilized at around 2,400,000 acres. The total figures, however, mask significant losses and gains in individual counties (fig. 6). Five counties have accounted for a 115,000-acre loss, balanced by a total gain of 100,000 acres in five other counties. These gains may have been from marginal agricultural land cleared for crops during the years of high market prices, and then allowed to revert during times of depressed farm prices.

TIMBER VOLUME

Currently, there are 25,400 million cubic feet of timber on timberland in Alabama, a 13 percent increase since 1972. There are 21,700 million cubic feet of growing stock, a 7 percent increase. Of the total growing stock, 13,900 million cubic feet are in sawtimber trees and 7,800 million cubic feet in poletimber trees. The volume in sawtimber trees has increased 12 percent, while that in poletimber trees has remained the same.

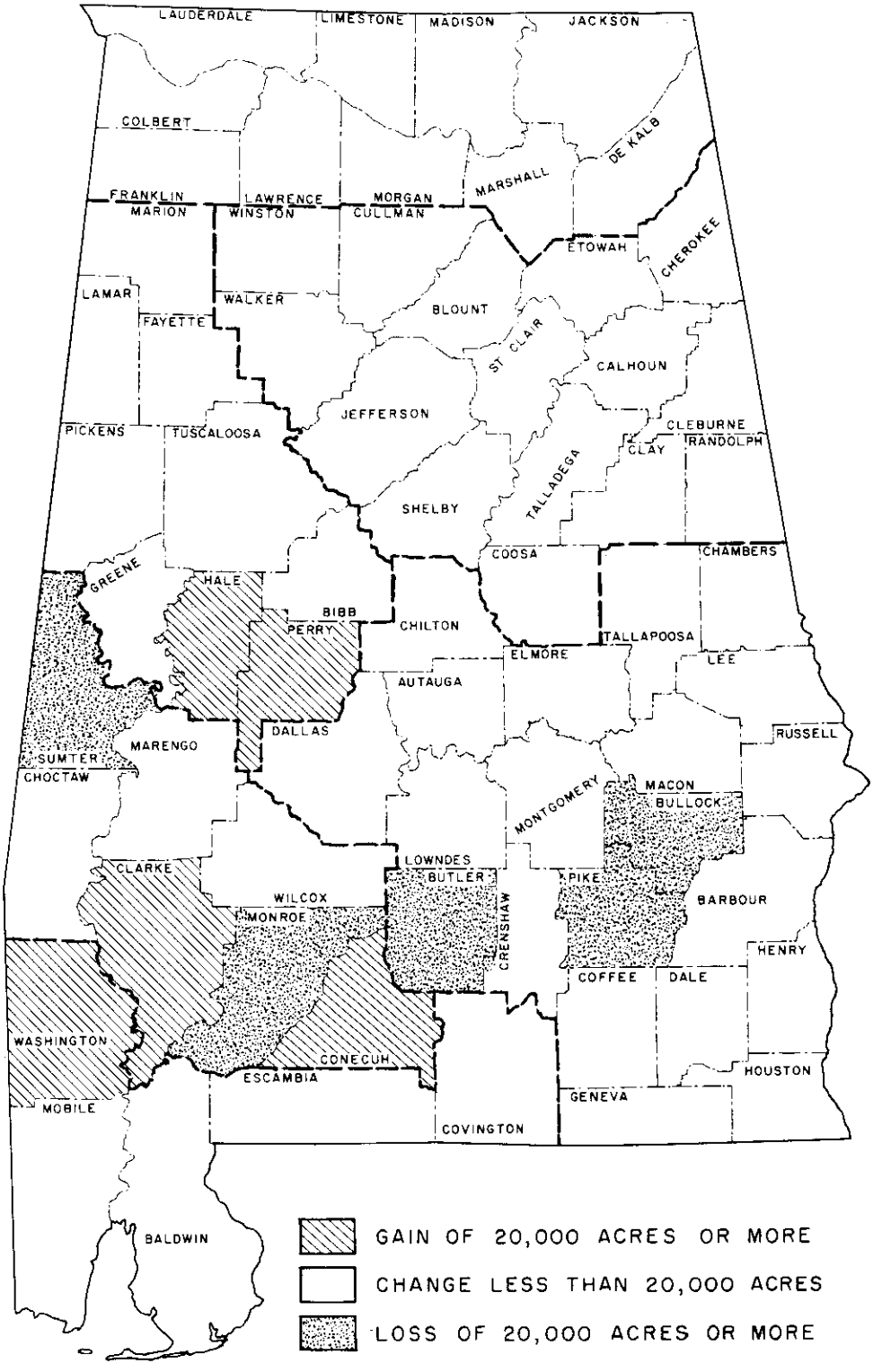


Figure 6.—*Alabama counties with gains and losses in bottomland forest types from 1972 to 1982.*

A total of 3,500 million cubic feet of sound wood is in cull trees (rough and rotten trees), a 57 percent increase since 1972. This represents a 171 percent increase in the volume of softwood cull trees and a 42 percent increase in the volume of hardwood cull trees (fig. 7).

Sawtimber volume has increased by 13 percent to 72,000 million board feet since 1972. Softwood sawtimber volume has increased only 5 percent to 44,500 million board feet, while hardwood sawtimber volume has increased 27 percent to 27,100 million board feet.

Regionally, substantial gains in both softwood and hardwood growing-stock volume have occurred in the West Central, North Central, and North units since 1972 (table III). Marginal changes in growing-stock volume have occurred in the Southeast, Southwest-South and Southwest-North units. These changes were evident also in sawtimber volume (table IV). Of particular interest are the 23 percent increase in hardwood sawtimber volume in the Southeast and the 14 percent decrease in softwood sawtimber volume in the Southwest-South.

Softwood Volume

The 11,600 million cubic feet of softwood growing-stock volume in 1982 represents only a 3 percent increase over the 11,300 million cubic feet in the 1972 survey. This increase has been greatest in small sawtimber, the 8- to 12-inch diameter classes (fig. 8). Substantial increases in volume were reported for the two previous surveys (30 percent between 1963 and 1972, and 28 percent between 1953 and 1963) but heavy drain by forest industry in the southern part of the State has reduced this trend considerably. The loss of volume in the Southwest-North, Southwest-South, and Southeast units is cause for concern because several large capacity mills are coming on-line. These mills will be drawing upon the already strained forest resource of that portion of the State.

Twenty-four percent of the softwood growing-stock volume is in forest industry ownership, 69 percent in non-industrial private ownership, and 7 percent in the public domain. Softwood volume has declined on forest industry-owned land by 170 million cubic feet (6 percent). Both non-industrial private and public ownerships have increased their softwood volume, 420 million

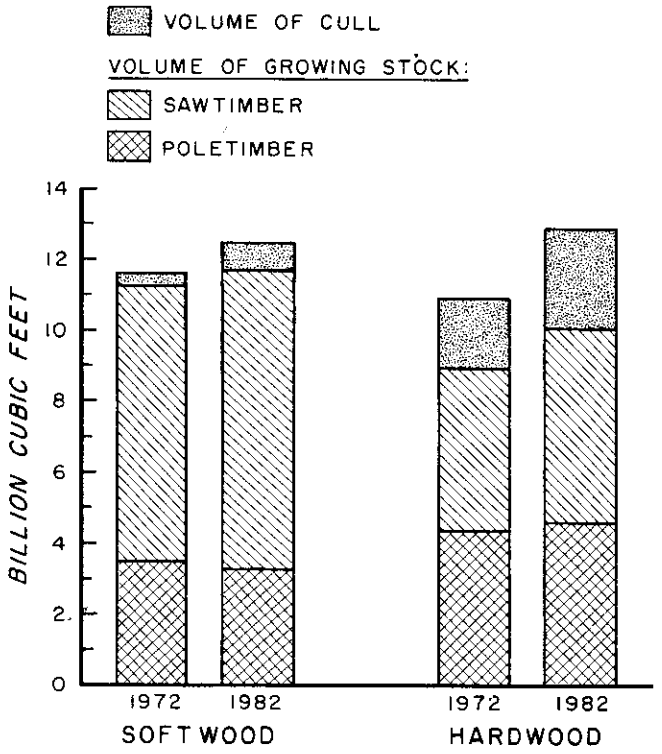


Figure 7.—*Volume of timber by species group and class of timber, 1972 and 1982.*

Table III.—*Changes in growing-stock volume by forest survey units, Alabama, 1972-1982*[1]

Forest survey units	Softwood		Hardwood	
	Volume	Change	Volume	Change
	million cubic feet	*percent*	*million cubic feet*	*percent*
Southwest-South	1,673.3	- 2.9	922.5	2.9
Southwest-North	2,213.2	- 1.2	1,688.1	1.3
Southeast	2,670.1	- 5.5	2,334.6	10.0
West Central	1,987.8	17.5	1,843.3	24.5
North Central	2,442.3	6.8	1,730.8	19.0
North	669.0	29.9	1,531.2	17.0
All units	11,655.7	3.3	10,050.5	12.6

[1] Totals may not add due to rounding.

Table IV.—*Changes in sawtimber volume by forest survey units, Alabama, 1972-1982*[1]

Forest survey units	Softwood		Hardwood	
	Volume	Change	Volume	Change
	million board feet[2]	*percent*	*million board feet*[2]	*percent*
Southwest-South	6,208.9	-14.1	2,196.9	- 2.2
Southwest-North	10,128.8	2.8	4,800.6	4.8
Southeast	10,399.9	- 2.5	5,850.1	23.2
West Central	7,492.9	26.4	5,299.2	55.0
North Central	8,138.2	13.7	4,201.9	33.4
North	2,130.0	46.5	4,721.1	52.6
All units	44,498.6	5.2	27,069.8	27.5

[1] Totals may not add due to rounding.
[2] International ¼-inch rule.

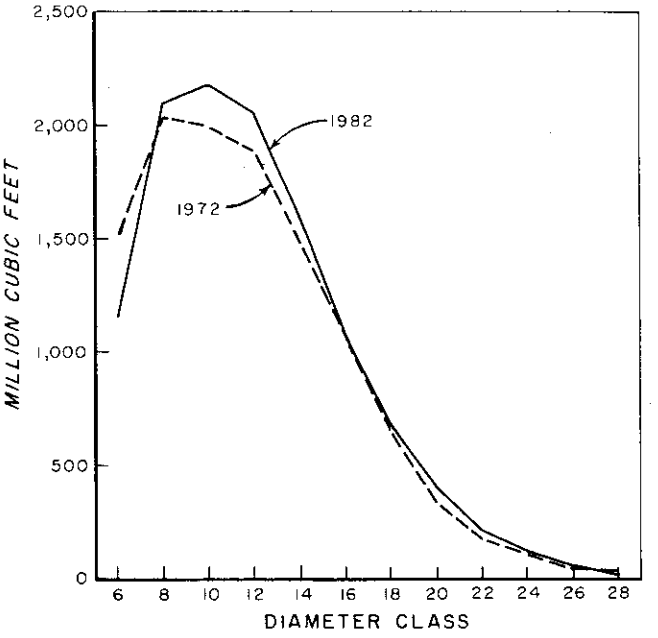


Figure 8.—*Softwood growing stock volume by diameter class, 1972 and 1982.*

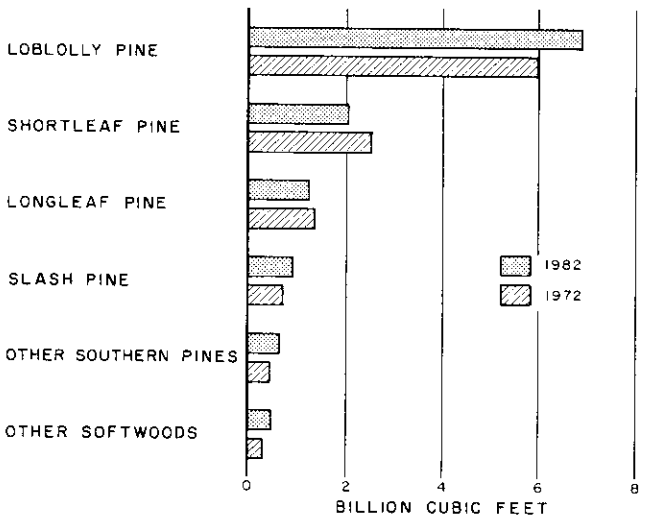


Figure 9.—*Softwood growing stock volume by species, 1972 and 1982.*

cubic feet (5 percent) and 130 million cubic feet (18 percent), respectively.

In terms of sawtimber volume, the 44,500 million board feet of softwood sawtimber is distributed similar to softwood growing-stock volume among ownership classes; 24 percent in forest industry ownership, 68 percent in non-industrial private ownership and 8 percent in public ownership. Since 1972, softwood sawtimber volume has declined by 1,500 million board feet (13 percent) on forest industry land, but has increased by 3,000 million board feet (11 percent) on non-industrial private land, and by 700 million board feet (23 percent) on public land.

Of the total softwood growing stock, 6,400 million cubic feet or 45 percent of the total is in loblolly pine (fig. 9). Although this represents a 400 million cubic foot increase (7 percent) statewide, 95 percent of this increase is in the West Central and North Central. The Southwest-North has increased slightly while both the Southwest-South and Southeast report losses.

Presently, shortleaf pine comprises 18 percent of the softwood volume. Statewide there has been a 500 million cubic foot decline since 1972. All of the inventory units have reported losses, the most notable being 161 million and 160 million cubic feet in the Southeast and North Central units, respectively. Probable causes for the decline in shortleaf volume are (1) preference for loblolly over shortleaf in regeneration due to the faster growth rate of loblolly on good pine sites and (2) problems with littleleaf disease. Harvested shortleaf stands are being replaced with loblolly or are receiving no treatment which allows hardwoods to predominate.

Longleaf pine, the third principal conifer in the State, is 10 percent of the softwood growing-stock volume. Statewide, there has been a loss of 72 million cubic feet. All the inventory units reported losses in volume except the North Cen-

tral where longleaf growth and development traditionally has been poorest.

A 93 million cubic foot decrease in longleaf pine volume is reported along the southern third of Alabama, the prime area of longleaf occurrence. The decrease may be due to several causes prevalent during the 1940s, 50s, and 60s —the establishment period of these stands. These are: (1) fire exclusion, which favored competing species; (2) overcutting of longleaf pine followed by too frequent burning, which left vast expanses without a seed tree; and (3) brown spot needle blight which kept seedlings in the grass stage until they died (Barrett 1980). Today, limited volume growth and poor survival of planted longleaf (usually identified with poor nursery stock and planting techniques) during early years of stand development contributes to management preferences for other pines. In the past, stand regeneration efforts favored slash pine over longleaf. Currently, loblolly is favored over longleaf.

An increase in slash pine volume is reported in every survey unit where slash pine occurs. The regenerated forests of the 1950s (the period in which slash gained acceptance as a replacement for longleaf pine) are attaining poletimber and sawtimber-size classes. Slash pine volume has increased by 160 million cubic feet since the 1972 survey and makes up 8 percent of the softwood volume in the State. Its chief commercial importance is in the Southwest-South which contains 651 million cubic feet out of 891 million cubic feet of slash pine statewide. The increase in slash pine compensates for the loss in longleaf pine in that inventory unit.

Hardwood Volume

The total 10,100 million cubic feet of hardwood growing-stock volume represents a 13 percent increase over the 1972 inventory. Hardwood growing-stock volume increases are the greatest in the 8- to 14-inch diameter classes (fig. 10). The oaks, hickories, gums, and yellow-poplar together account for 8,600 million cubic feet, or 85 percent of Alabama's hardwood growing-stock volume (fig. 11). Select red and white oak volume has increased 11 percent to 1,200 million cubic feet, while other red and white oak volume has increased 18 percent to 3,000 million cubic feet. Sweetgum volume has increased 13 percent to 1,600 million cubic feet. Yellow-poplar growing-stock volume has increased 30 percent

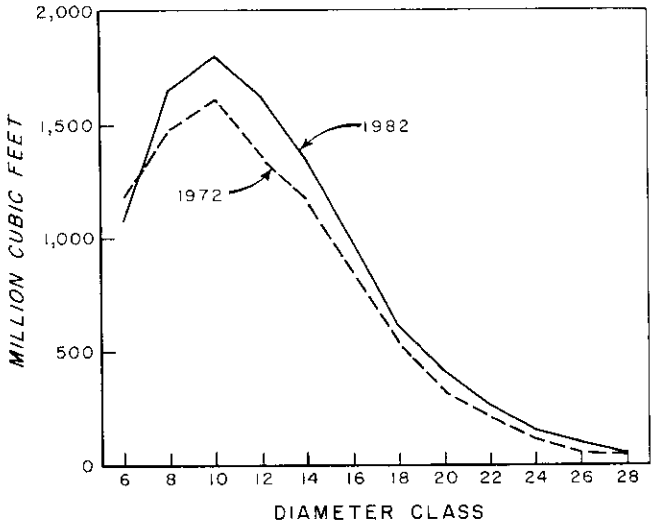


Figure 10.—*Hardwood growing stock volume by diameter class, 1972 and 1982.*

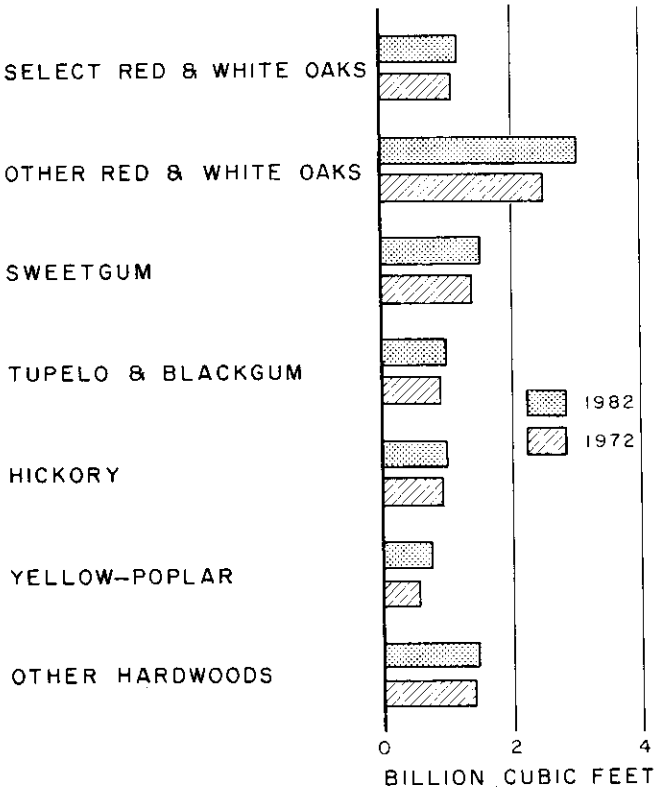


Figure 11.—*Hardwood growing stock volume by species, 1972 and 1982.*

Table V.—*Volume of hardwood sawtimber in Alabama by log grade and year of survey*

Year	All grades	Grade 1	Grade 2	Grades 3 & 4
	million board feet[1]			
1963	18,295.0	1,192.3	2,960.5	14,142.4
1972	21,233.7	1,832.2	3,162.7	16,238.8
1982	27,069.8	2,939.1	5,632.0	18,499.7

[1] International ¼-inch rule.

to 700 million cubic feet. Small changes have occurred with other hardwood species.

Overall, 17 percent of the total hardwood growing-stock volume is on forest industry land, 77 percent on non-industrial private land, and 6 percent on public land. Forest industry land has increased hardwood growing-stock volume by 90 million cubic feet (6 percent), while non-industrial private land increased by 800 million cubic feet (18 percent) since 1972. Public land has increased by 200 million cubic feet (51 percent).

The distribution of 27,100 million board feet of hardwood sawtimber is similar to that of hardwood growing-stock volume among ownership classes: 18 percent in forest industry ownership, 76 percent in non-industrial private ownership, and 6 percent in public ownership. Since 1972, hardwood sawtimber volume has increased by 800 million board feet (20 percent) on forest industry land, by 4,300 million board feet (27 percent) on non-industrial private land, and by 700 million board feet (74 percent) on public land.

Approximately 30 percent of the hardwood growing-stock volume is in bottomland forest types and 47 percent in upland oak-hickory. The remaining 23 percent of the growing-stock volume is interspersed throughout the loblolly-shortleaf, longleaf-slash and oak-pine forest types. The hardwood growing-stock volume in pine and oak-pine forest types, 2,300 million cubic feet, is likely to be an under-utilized portion of the total hardwood volume due to its exclusion from pine harvest and management activities. Even high quality hardwoods are seldom used as lumber because they are scattered so thinly through pine stands (Barrett 1980). It has been uneconomical for the hardwood lumber and veneer industry to seek out such trees, and they are often left as slash, chipped for pulpwood, or used as fuel.

Fifty-four percent of the hardwood volume is in sawtimber trees. The volume drops off rapidly above the 18-inch diameter class. Only 16 percent (1,600 million cubic feet) of the total growing-stock is in trees 17 inches and larger. Of this amount, 34 percent (554 million cubic feet) is in the less desirable white and red oak species. Only 18 percent (291 million cubic feet) is in select white and red oaks.

Between 1963 and 1972, the volume of grade 1 and grade 2 hardwood sawtimber increased 20 percent (table V). The 72 percent increase between 1972 and 1982 can be attributed to trees reaching the larger required diameters.

STAND STRUCTURE

The number of pine and hardwood growing-stock trees in the 2- to 6-inch-diameter classes has declined since 1972, while gains are reported for the 12-inch and larger diameter classes (fig. 12). Reversions to timberland and timber re-

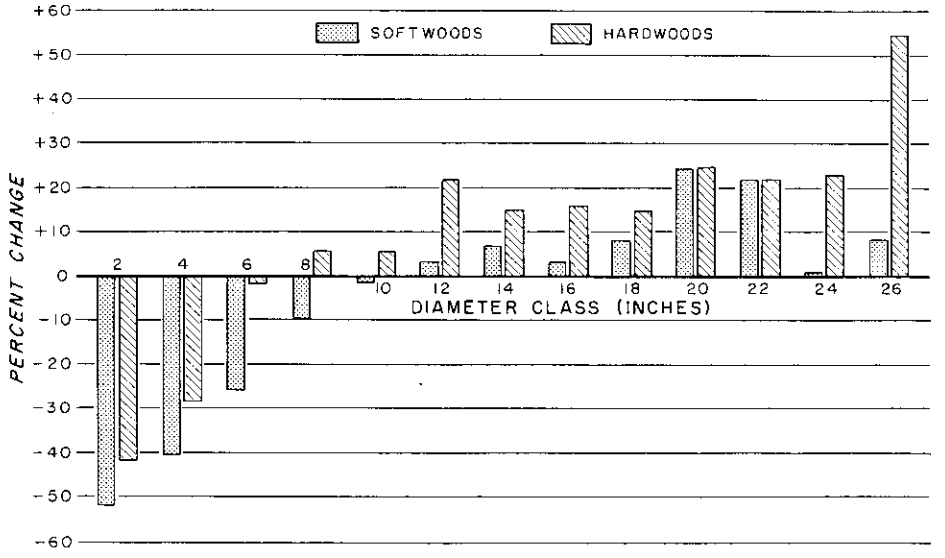


Figure 12.—*Percent change in number of growing stock trees between 1972 and 1982 surveys.*

generation efforts add to the number of small trees. However, the majority of Alabama's timberland is at a more advanced stage of growth; large trees are replacing the more numerous small trees.

The number of softwood growing-stock trees has declined. During the 1972-1982 period, most of the decline has been in 2- to 8-inch diameter class trees. This decline is consistent with the projected ingrowth of southern pine throughout the South (Boyce and Knight 1979). Increases have occurred chiefly in the 18- to 22-inch diameter class trees. Since 1963, softwoods in the 18-inch diameter class or larger have increased 63 percent to 23 million trees, while in the 2- to 8-inch diameter class trees, an 11 percent decline to 3,297 million trees has occurred.

The number of hardwood poletimber trees has increased substantially since the 1972 survey. Increases have also occurred in the larger size classes. This is a reversal of substantial declines noted between the 1952-1963 and 1963-1972 survey periods. Alabama has the potential to increase production of high quality hardwoods as many trees are moving into the sawtimber size class.

GROWTH, REMOVALS, AND MORTALITY

There has been considerable change in Alabama's growing-stock inventory between the 1972 and 1982 surveys. Improvements in estimating this change have also been made. To better understand this change and trends between survey periods, it is first necessary to examine the factors contributing to change: growth, removals, and mortality.

Gross growth includes five components: (1) survivor growth, the growth on growing-stock trees present in the initial inventory that survive to the end of the period; (2) ingrowth, the volume of trees that grow into growing-stock size during the period; (3) growth on ingrowth, the net volume increase on trees after growing into growing-stock size during the period; (4) growth on removals, the net volume increase on growing-stock trees that were felled or removed during the period, and (5) growth on mortality, the net volume increase on growing-stock trees prior to death by natural means such as fire, insects, disease, or weather. Cull increment is the volume of growing-stock trees that becomes rough or rotten trees during the period. Net growth is gross growth minus mortality and cull increment[2]. Net change is net growth minus removals.

There are three principal sources of information on timber removals: (1) field surveys of timberland, (2) canvasses of industries regarding the amount of timber received or produced, and (3) records of severance taxes paid on timber products removed. Field surveys provide species and ownership information, industry canvasses supply detailed estimates on roundwood production and utilization of plant by-products, and severance tax records furnish general estimates of timber cut by product type. Each source, however, yields a different estimate of removals.

To provide consistency among estimates of growth, removals, and mortality, annual removals for the current survey are estimated entirely from field survey data[3]. The three major components are all periodic averages. It should be noted that methods for estimating growth have been improved and that these changes may affect the validity of comparisons between surveys at the regional and county level.

Components of annual change are presented in table VI. Statewide, annual gross growth has been 1,260 million cubic feet between 1972 and 1982—a negligible change since the last survey. Net growth has been 986 million cubic feet, a decline of 17 percent. Net growth for sawtimber has been 4,000 million board feet, a decline of 5 percent.

Since the 1972 survey, the net increase in Alabama's growing-stock volume has been 132 million cubic feet annually; net growth exceeded removals by 15 percent. The net increase in sawtimber volume has been 625 million board feet

[2]In prior surveys, cull increment was thought to be negligible. With the large increase in cull volume recorded for 1982 (fig. 7), growth loss due to cull increment is significant and is noted.

[3]The 1972 survey estimated annual removals for industrial products from an industry canvass using information covering the calendar year prior to the survey. This estimate did not take into account the upward trend in roundwood production (Bertelson 1972) and other changes in economic conditions that affected industrial removals during the survey period. Then as now, other removals (e.g. from land-clearing operations) were determined from field studies. Total removals were allocated to subgroups (e.g. ownership class, species, etc.) in proportion to field survey data, as in the 1982 survey.

Table VI.—*Components of annual change in the volume of growing-stock and sawtimber by species group, 1972-1982*[1]

Component	Growing stock			Sawtimber		
	Total	Softwood	Hardwood	Total	Softwood	Hardwood
	million cubic feet			*million board feet*[2]		
Gross growth	1,259.5	787.9	471.6	4,693.2	3,263.3	1,429.9
Mortality	-204.9	-121.3	-83.6	-585.8	-334.3	-251.5
Cull increment	-68.3	-24.8	-43.5	-104.4	-27.2	-77.1
Net growth	986.3	641.8	344.5	4,003.1	2,901.8	1,101.3
Removals						
Cut	-796.3	-599.8	-196.5	-3,211.3	-2,558.2	-653.1
Land clearing	-58.5	-36.4	-22.1	-167.3	-114.7	-52.6
Net change[3]	131.5 (±30.6)	5.6 (±5.0)	125.9 (±30.5)	624.5 (±135.5)	228.9 (±81.5)	395.6 (±108.0)

[1] Totals may not add due to rounding.

[2] International ¼-inch rule.

[3] Estimates of net change are listed with one standard error (in parentheses).

annually, or 18 percent greater than removals. For the 1963-1972 period, net increases were 61 percent greater than removals for growing stock and 47 percent greater than removals for sawtimber.

A net increase of 6 million cubic feet per year since 1972 is reported for softwood growing-stock volume, a negligible change. Hardwood growing-stock volume has increased 126 million cubic feet annually, or 58 percent greater than removals.

Softwood sawtimber volume has increased by 229 million board feet annually since 1972, a small increase amounting to 9 percent of annual sawtimber removals. By contrast, hardwood sawtimber volume has increased 396 million board feet annually, or 56 percent greater than annual removals.

The growth-to-removals ratio is a measure of the balance between stand growth and yield for a period of years.

Growing-stock growth-to-removals ratios for the 1972-1982 period have been greatest on National forest land (2.20), followed by other public land (1.75), non-industrial private land (1.19), and forest industry land (0.96). For sawtimber, respective ratios have been 2.01, 2.15, 1.23, and 0.95. The major differences can be attributed to extensive cutting of softwoods on private land.

In 1963, net annual growth statewide had been 45 cubic feet per acre. By 1972, growth increased to 56 cubic feet per acre. Today, net annual growth is 46 cubic feet per acre, an important decline. Increasing stocking levels alone would boost the annual increment substantially. Fifty-eight percent of Alabama's timberland is less than fully stocked with growing-stock trees.

To establish or predict a principal cause for declining stand growth in Alabama is not possible without further study. Environmental factors such as a climatic shift or acid rain may be involved. During the past 25 years, there have been substantial and sustained decreases in the growth of certain tree species (Johnson et al. 1981). Changes in diameter distribution and species composition also affect growth. As forests mature, net growth of growing stock declines as trees die or become rough or rotten. Growth slows as trees attain larger diameters and as softwoods are replaced by slower growing hardwoods.

Mortality for the 1972-1982 period has accounted for a loss of 205 million cubic feet annually, up 98 percent annually since the 1963-1972 survey period. The annual mortality of sawtimber trees has been 586 million board feet, more than twice the amount on an annual basis since the 1963-1972 survey period. Annual softwood sawtimber mortality has been up 139 percent since the 1963-1972 survey period. Hardwood sawtimber mortality has been up 92 percent. Principal causes of mortality in pole-size and larger trees have been disease, insects, and weather; and in saplings and seedlings, suppression. More than 75 percent of the softwood mortality has been associated with insects and disease. Roughly half of the hardwood mortality has been associated with disease.

Pine stands were planted extensively for soil conservation purposes in the South during the 1950s. Today, most are in the sawtimber stand size class; many are now overstocked and prone to bark beetle attack, fusiform rust, and wind damage. The sharp increase in softwood mortality noted above may be associated with the relative abundance of these stands in Alabama.

Table VII.—*Average basal area per acre of live trees by class of timber, 1972 and 1982*[1]

Species group and size class	Tree class 1982			Tree class 1972		
	All trees	Growing stock	Rough and rotten	All trees	Growing stock	Rough and rotten
	square feet per acre					
Softwoods:						
Sapling and seedling	5.1	4.1	1.0	8.2	7.6	0.5
Poletimber	9.7	8.9	0.7	11.7	11.3	0.4
Sawtimber	15.5	14.4	1.1	15.0	14.4	0.6
All softwoods	30.3	27.4	2.8	34.9	33.3	1.5
Hardwoods:						
Sapling and seedling	13.4	7.5	5.9	18.0	13.1	4.9
Poletimber	17.7	12.9	4.7	17.0	13.1	3.9
Sawtimber	16.0	11.0	4.9	14.1	9.7	4.3
All hardwoods	47.1	31.4	15.5	49.1	35.9	13.1
All trees	77.3	58.8	18.4	84.0	69.3	14.8

[1] Totals may not add due to rounding.

MANAGEMENT OPPORTUNITIES

The potential productivity[4] of the average acre in Alabama appears to have increased. In 1972, the potential productivity of timberland was 89 cubic feet per acre per year. Today, potential productivity is 99 cubic feet per acre per year. For the 1963-1972 survey period, Alabama's timberland was producing 56 cubic feet per acre per year, an average of 63 percent of potential. With net annual growth at .46 cubic feet per acre per year for the 1972-1982 survey period, Alabama's forests are producing only 46 percent of potential, a decline of 17 percent. There continues to be ample opportunity to improve the productivity of Alabama's forests.

Current Forest Conditions

The stocking of growing-stock trees is less than optimum in many stands. There are 4,800,000 acres which are understocked, i.e. less than 60 percent stocked with growing-stock trees. In 1972, 2,700,000 acres were understocked.

The area of cull stands, stands more than 60 percent stocked with cull trees, has increased to 1,700,000 acres, more than quadruple the 1972 estimate of 300,000 acres.

Statewide, 24 percent of all basal area is in cull trees (table VII). In 1972, only 18 percent was in cull trees. The largest increases in cull stocking have been in two forest types, loblolly-shortleaf pine and oak-hickory.

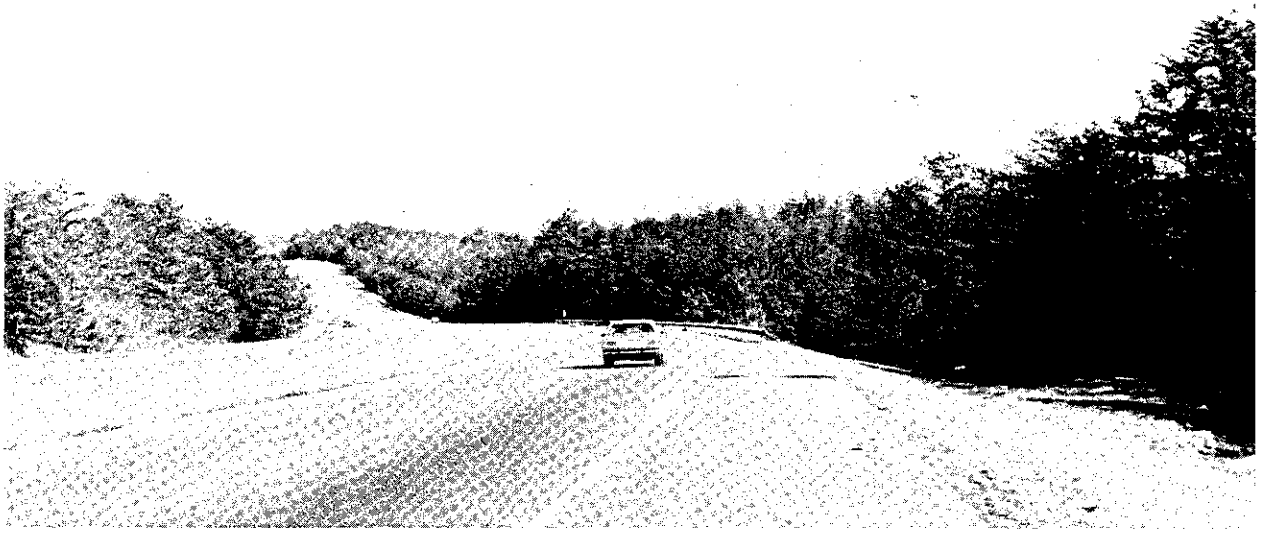
There are limited differences in the average stocking of cull trees among ownerships. National forests and forest industry lands contain the lowest cull stocking with 22 percent and 21 percent, respectively, of all basal area. Other public lands support the largest relative amount of cull trees, averaging 27 percent of all basal area. Non-industrial private land averages 25 percent basal area in rough and rotten trees.

Pine Stands

There are two principal pine forest types in Alabama: longleaf-slash, covering 1,500,000 acres, and loblolly-shortleaf, covering 5,900,000 acres. Softwood growing stock accounts for 69 percent of the basal area of these forest types, down only slightly from 71 percent in 1972. The remaining 31 percent of basal area in these forest types is mostly composed of hardwood trees. This amount of hardwood basal area on pine forest types suggests that pine stocking in many pine stands can be increased through hardwood control.

The establishment of pine plantations is a common intensive management practice in the South. During the 1963-1972 period a total of 600,000 acres of plantations (more than 40 percent artificially regenerated) were established in Alabama, most of them pine. The comparable estimate for the 1972-1982 period was 1,300,000 acres, a 217 percent increase.

[4]Potential productivity is based on the classification of timberland by site class. Site class represents the annual cubic foot volume per acre expected from fully stocked natural stands of species appropriate to the site.



Despite this increase in artificial regeneration, the number of small softwood trees has declined dramatically as Alabama's forests have matured and landowners failed to regenerate all pine stands after harvesting timber. The regeneration of pine stands after harvest represents a significant opportunity to increase productivity.

Growing space on pine sites, those classified physiographically as being suited to the growth of pine trees, is increasingly occupied by hardwoods and rough and rotten trees. Type conversion continues to represent an opportunity to increase timber productivity on pine sites. Pine sites comprise 18,100,000 acres, 84 percent of Alabama's timberland area. Pine forest types, however, occupy only 7,300,000 or 40 percent of these acres. The remainder of these pine sites support either the oak-pine type (4,400,000 acres) or the oak-hickory type (6,400,000 acres). While the feasibility of type conversion to pine from oak-pine and oak-hickory stands depends on specific stand conditions, associated costs, and ownership objectives, type conversion can be an efficient method of increasing timber production.

Hardwood Stands

Although hardwood forest types are extensive and occupy 9,700,000 acres, hardwood sites (those classified physiographically as being better suited to the growth of hardwoods) account for only 16 percent (3,500,000 acres) of the resource. Most of these sites are bottomlands (2,600,000 acres), although upland hardwood sites occupy 900,000 acres.

The principal forest type on bottomlands is oak-gum-cypress. Of the total basal area in the oak-gum-cypress forest type, 29 percent is in rough and rotten trees, compared to only 22 percent in 1972. Much of the increase in cull tree basal area appears to be in the smaller diameter trees. Improvement cuttings, fuelwood cuttings, and timber-stand improvement operations which remove rough and rotten trees are obvious ways to improve the timber quality of these bottomlands.

Much of the growing space on the 7,300,000 acres of the oak-hickory forest type is occupied by cull trees as well. Thirty percent of the basal area of these stands is in rough and rotten trees. Reducing the occurrence of cull trees would improve productivity. The more intensive type conversion treatment maximizes productivity, but requires large investments and might adversely affect wildlife and other nontimber values.

Mixed Stands

The oak-pine forest type occupies almost 4,400,000 acres of pine sites. Fully one-quarter of the growing space in these stands is occupied by rough and rotten trees. The average oak-pine stand has 37 percent of its basal area in softwood growing stock.

Although productivity for most of these stands can be increased to full potential by stand conversion, this treatment may not be economically attractive for many landowners. Where stand conversion is not feasible, pine production can be increased by reducing low value hardwoods and cull trees.

RESOURCE OUTLOOK

The acreage of timberland can be expected to

remain near recent levels or decline modestly. Slight increases have occurred recently mainly as a result of adjustments in land devoted to agriculture. The interchange of land between forest and agricultural uses can be expected to continue, but competition with non-agricultural uses resulting from demographic pressures will likely cause some permanent decline in timberland acreage.

Alabama's forests are continuing to mature with character changing according to predictable ecological succession patterns. These changes include the presence of fewer small diameter trees and more growing space devoted to hardwoods and to large diameter trees. Also, as the basal area is increasingly dominated by mature hardwoods, more cull trees can be expected. The climax forest type , oak-hickory for most of the State, can be expected to increase as the forests mature, while the oak-pine type continues to diminish.

Timber harvesting and forest management activities will also affect the character of Alabama's forests. Although some owners do regenerate pine stands after harvest, the failure to regenerate many pine stands tends to decrease the growing space occupied by pine growing stock. During the past 10 years softwood growing-stock basal area has declined from 40 to 35 percent of all live tree basal area. This trend can be expected to continue as the forests mature and if harvested areas are not regenerated.

On bottomland sites, the amount of growing space occupied by rough and rotten trees will also increase as the forest matures. Increased hardwood utilization and widespread application of improvement cuttings and other management techniques have the potential of increasing the quality of the timber on these sites.

For the near future, a surplus of growth over removals can be expected to continue. The surplus growth will contribute to the increase in growing-stock volume. This increasing volume of growing-stock inventory will likely continue to promote the growth of forest industry in Alabama. An attendant increase in the intensive management of pine stands can be expected.

TIMBER PRODUCTS OUTPUT

Information on the output of timber products presented here is derived from severance tax data supplied by the Alabama Forestry Commission and from other sources where noted.

Timber harvested in Alabama for calendar years 1972 through 1981 has amounted to 7,500 million cubic feet. Pulpwood has been the major product, accounting for 57 percent of the total, while saw logs and veneer logs have comprised 41 percent. The remaining 2 percent have consisted of poles. Three-fourths of all the timber harvested, 5,500 million cubic feet, has been softwoods (table VIII).

Trends in saw-log and veneer-log production are presented in figure 13. Pole production has vacillated widely from year-to-year, but appears to be stablizing around one million pieces annually (fig. 14).

An annual canvass of pulp mills by the Forest Inventory and Analysis Unit has furnished data on trends in the relative mix of roundwood, residues, and species produced between survey periods. For calendar year 1981, production of

Alabama's pulpwood was 8.6 million cords or 698 million cubic feet. Residues for calendar year 1972 accounted for 22 percent of total production, while for 1981 the amount was 26 percent. Softwood roundwood rose 18 percent in 1981 compared with 1972, while the contribution from softwood residues rose 46 percent. Comparable figures for hardwood roundwood and residues were 15 percent and 88 percent respectively. Both roundwood and residues production have fluctuated with changing economic conditions in the past 10 years (fig. 15).

NONTIMBER RESOURCES

Alabama's timberland contains an abundance of timber resources, but not all timberland is dedicated exclusively to timber production. Some of the other benefits of timberland include maintenance of water supplies and water quality, reduction of soil erosion, supply of forage for livestock, support of wildlife populations, and areas for outdoor recreation activities. These other benefits, nontimber resources, impinge upon timber resources and are examined where possible in terms of timberland area and volume of saw logs. Differences in the volume of growing stock generally are reduced when comparing timberland with varied levels of nontimber resources.

Water and Soils

Forests play an important role in enhancing water-related benefits while minimizing water's destructive effects. Soil losses are greater in watersheds dominated by nonforest uses (Patric et al. 1984). Fully-stocked forest stands intercept most of the precipitation that otherwise can be destructive as surface runoff. Much of the intercepted precipitation aids in recharging underground water supplies.

Water quality is affected by timber management activities. To encourage silvicultural practices that limit water pollution, Alabama has promoted the use of sound, economically feasible forestry practices, known as "Best Management Practices". These practices include specific guidelines regarding the location, construction, and maintenance of permanent roads, trails, and water crossings; the location of temporary access roads and landings; and operations such as seeding, wildfire control, and prescribed fire management (Alabama Water Improvement Commission (AWIC) 1981). Streamside management zones, those forest lands immediately adjacent to water, are to be managed with attention to protecting water quality values (AWIC 1981).

While all of Alabama's timberland helps maintain water quality, 2,400,000 acres (11 percent) are found within 900 feet of water bodies ⅛ acre or larger or water courses 40 feet or more in width. On a per-acre basis, saw-log volume averages 630 cubic feet near these large water bodies, compared with 540 cubic feet elsewhere. The timber is mostly hardwoods, comprising 18 percent of Alabama's hardwood saw-log volume and 10 percent of the softwood saw-log volume (table IX).

The width of streamside management zones varies principally with local soils, topography, and climate. Alabama's eight major land resource areas reflect these attributes at a regional

Table VIII.—*Volume of timber products, Alabama, calendar years 1972 to 1981*[1]

Product	Standard units	Volume in standard units			Volume in cubic feet		
		All species	Softwood	Hardwood	All species	Softwood	Hardwood
					million cubic feet		
Saw logs and veneer logs	Million board feet[2]	18,006.4	13,999.0	4,007.4	3,052.2	2,367.3	684.9
Pulpwood	Thousand cords	52,940.0	37,218.0	15,722.0	4,272.4	3,014.6	1,257.8
Poles	Thousand pieces	10,471.0	10,471.0	...	148.7	148.7	...
All products[3]					7,473.3	5,530.6	1,942.7

[1] Figures based on severance tax estimates.
[2] International ¼ inch rule.
[3] Excluded are wood chip residues, ties, pilings, and stumpwood.

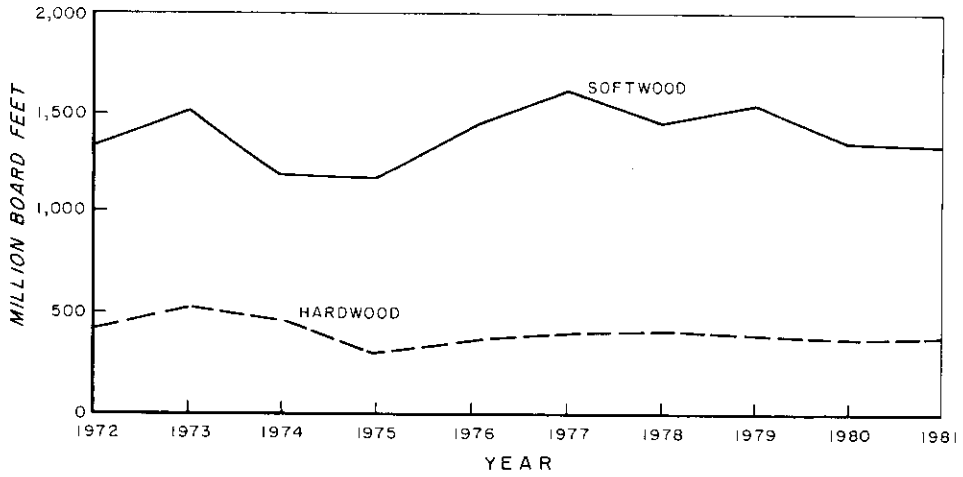


Figure 13.—*Saw-log and veneer-log production, Alabama, calendar years 1972–1981.*

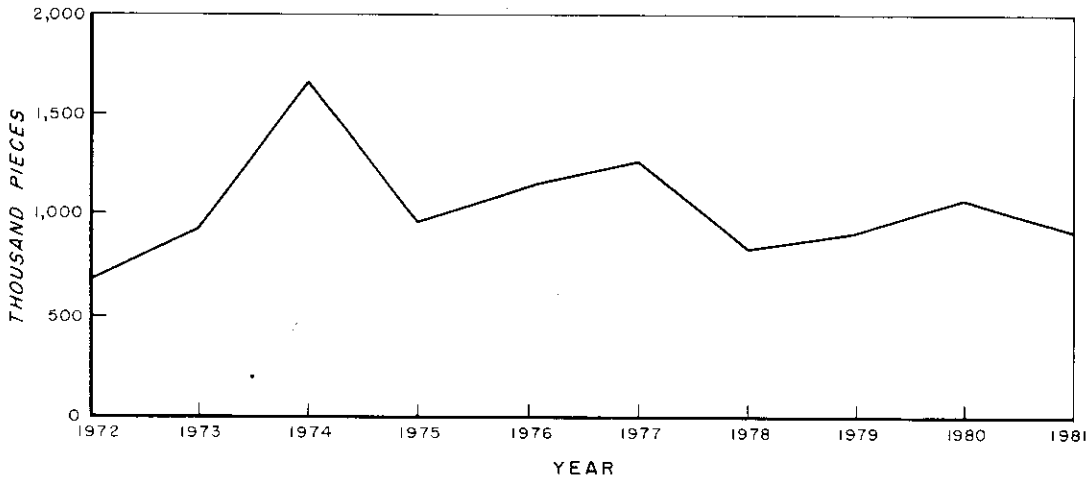
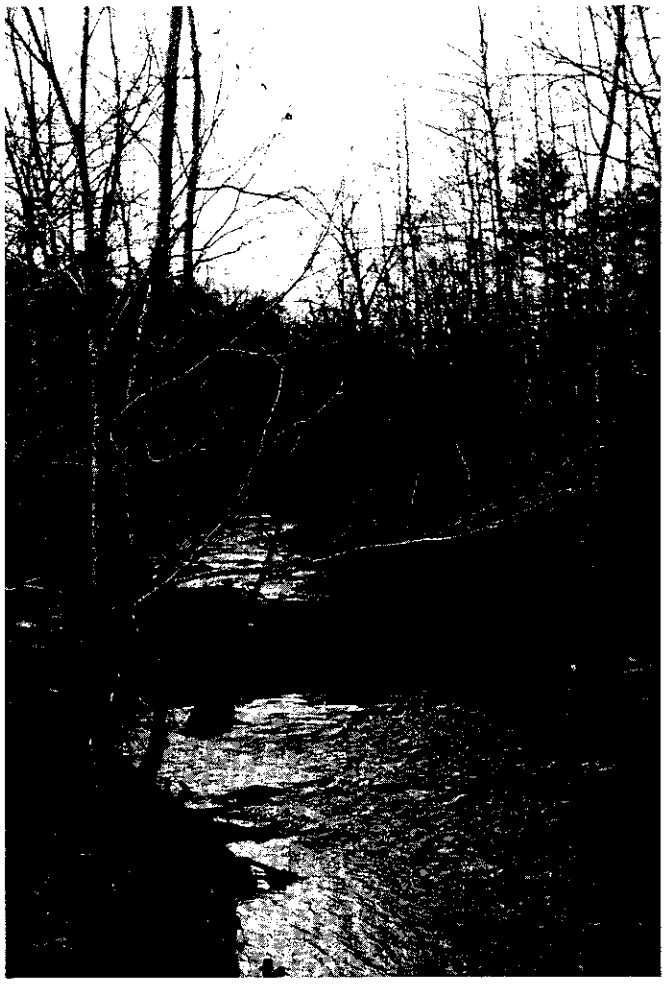


Figure 14.—*Pole production, Alabama, calendar years 1972-1981.*

Table IX.—*Area of timberland and saw-log volume by distance to permanent water sources, Alabama, 1982*[1]

Distance	Area	Volume per acre	Volume		
			Total	Softwood	Hardwood
feet	*thousand acres*	*cubic feet*	*million cubic feet*		
0-100	477.7	684	326.6	111.5	215.2
101-200	294.6	672	198.0	81.3	116.7
201-300	274.7	586	161.0	84.6	76.5
301-400	211.2	610	128.9	72.4	56.5
401-500	228.5	643	147.0	74.9	72.1
501-600	221.0	663	146.5	78.3	68.3
601-700	193.1	544	105.0	67.3	37.8
701-800	222.2	528	117.4	54.3	63.0
801-900	323.1	659	212.9	122.3	90.6
901 or more	19,263.6	544	10,478.7	6,767.1	3,711.6
All distances	21,709.6	554	12,022.1	7,514.0	4,508.1

[1]Totals may not add due to rounding, 1980 Census.



scale (fig. 16). Potential soil erosion rates that result from logging operations have been calculated for each of these areas (AWIC 1981). The most erodable areas corresponding to forest survey units are the North and North Central units.

Steep terrain, together with soil erosion and water quality considerations, plays a role in the availability of timber. Logging may not be feasible in areas with steep terrain, as the cultural practices recommended to reduce the impact of harvesting on scenic as well as other multiresource values are too costly. Timberland with slopes greater than 20 percent represents 15 percent of the total acreage. Most of this acreage is contained in the northern half of the State. The majority of timberland with slopes greater than 20 percent is of the oak-hickory forest type, comprising 21 percent of the State's hardwood saw-log volume, and 12 percent of the softwood saw-log volume (table X).

Livestock

Traditionally, farmers have depended upon nearby forests for fuel, fence posts, and other construction materials. They have also used for-

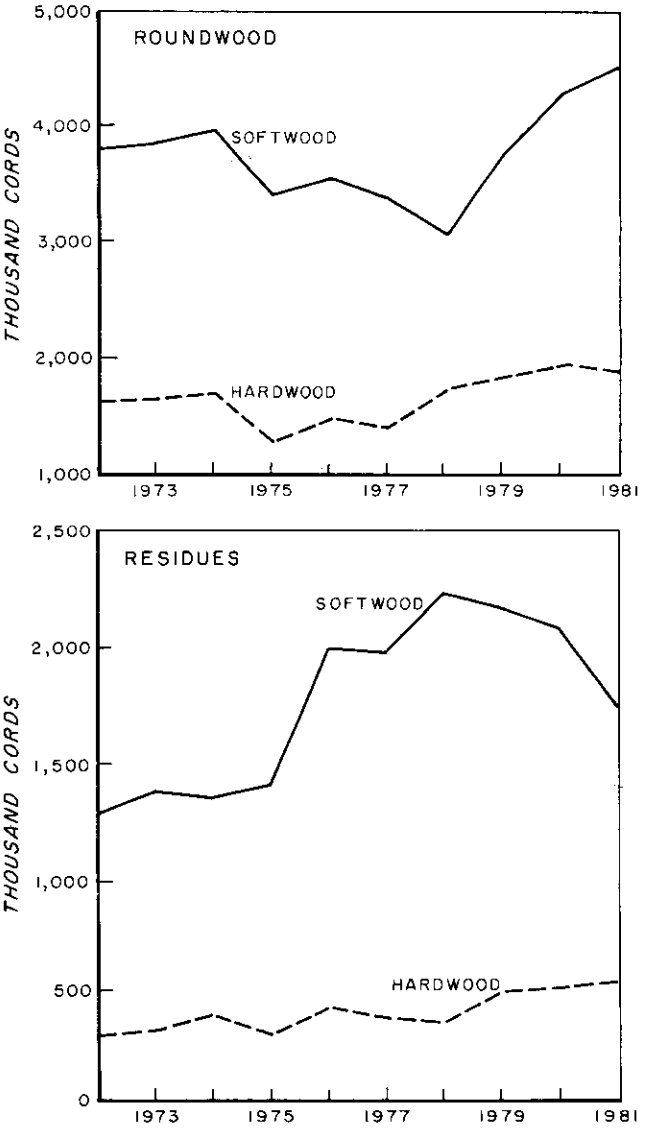


Figure 15.—*Pulpwood production, Alabama, calendar years 1972-1981.*

ests as grazing areas for livestock. Such forests are also important seasonally as shelter for these animals. Occasional use of forests by grazing animals benefits older stands by reducing understory competition and providing natural fertilizer. Soil compaction, physical damage to tree boles, and lack of regeneration are problems in forests grazed too frequently.

The current survey notes evidence of livestock use on 8 percent of Alabama's total timberland. This estimate is a minimum, as livestock use is reported only for sample areas where artifacts are observed. Artifacts include the sighting of cattle or other livestock, livestock tracks, dung, and trails. More timberland may exist which is used by livestock on which no artifacts are observed. A slightly greater saw-log volume per acre exists on timberland with evidence of livestock use than without such evidence (table XI).

Table X.—*Area of timberland and saw-log volume by slope classes, Alabama, 1982*[1]

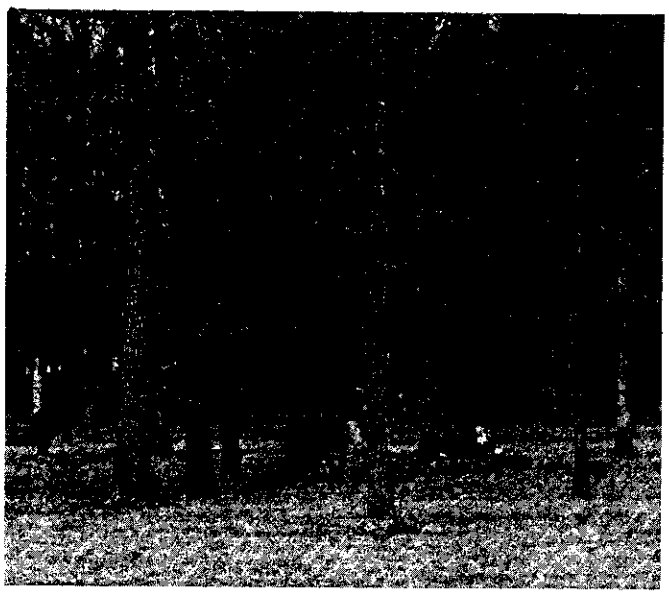
Slope	Area	Volume per acre	Volume		
			Total	Softwood	Hardwood
percent	*thousand acres*	*cubic feet*	*million cubic feet*		
0-5	9,281.1	605	5,611.9	3,367.1	2,244.8
6-10	4,655.8	457	2,127.6	1,569.3	558.3
11-20	4,550.8	546	2,484.2	1,708.9	775.2
21-33	2,305.7	545	1,256.4	695.4	561.0
34-50	749.1	593	444.4	153.1	291.3
51 or more	167.0	585	97.7	20.2	77.5
All slopes	21,709.6	554	12,022.1	7,514.0	4,508.1

[1] Totals may not add due to rounding, 1980 Census.

Table XI.—*Area of timberland and saw-log volume by evidence of livestock use, Alabama, 1982*[1]

Evidence of livestock use	Area	Volume per acre	Volume		
			Total	Softwood	Hardwood
	thousand acres	*cubic feet*	*million cubic feet*		
Livestock sighted	600.8	645	387.6	230.4	157.2
Artifacts observed[2]	1,143.9	580	663.9	395.7	268.2
No evidence	19,964.9	549	10,970.6	6,887.9	4,082.7
Total	21,709.6	554	12,022.1	7,514.0	4,508.1

[1] Totals may not add due to rounding, 1980 Census.
[2] Artifacts include tracks, dung, and trails.



Wildlife

Game and other wildlife depend upon forests as sources of food and shelter. While deer, quail, and squirrels survive in many forest and non-forest conditions and types, abundant populations are found in forested areas where preferred foods and shelter are plentiful. Due to the dynamic nature of wildlife populations, wildlife resources associated with forested areas are difficult to quantify. Information is provided below on a few survey measures which help describe wildlife habitat attributes of timberland.

Mast such as acorns comprises the major portion of many wildlife diets during the fall and winter months. Acorn production varies by tree species and by diameter class. For example, the

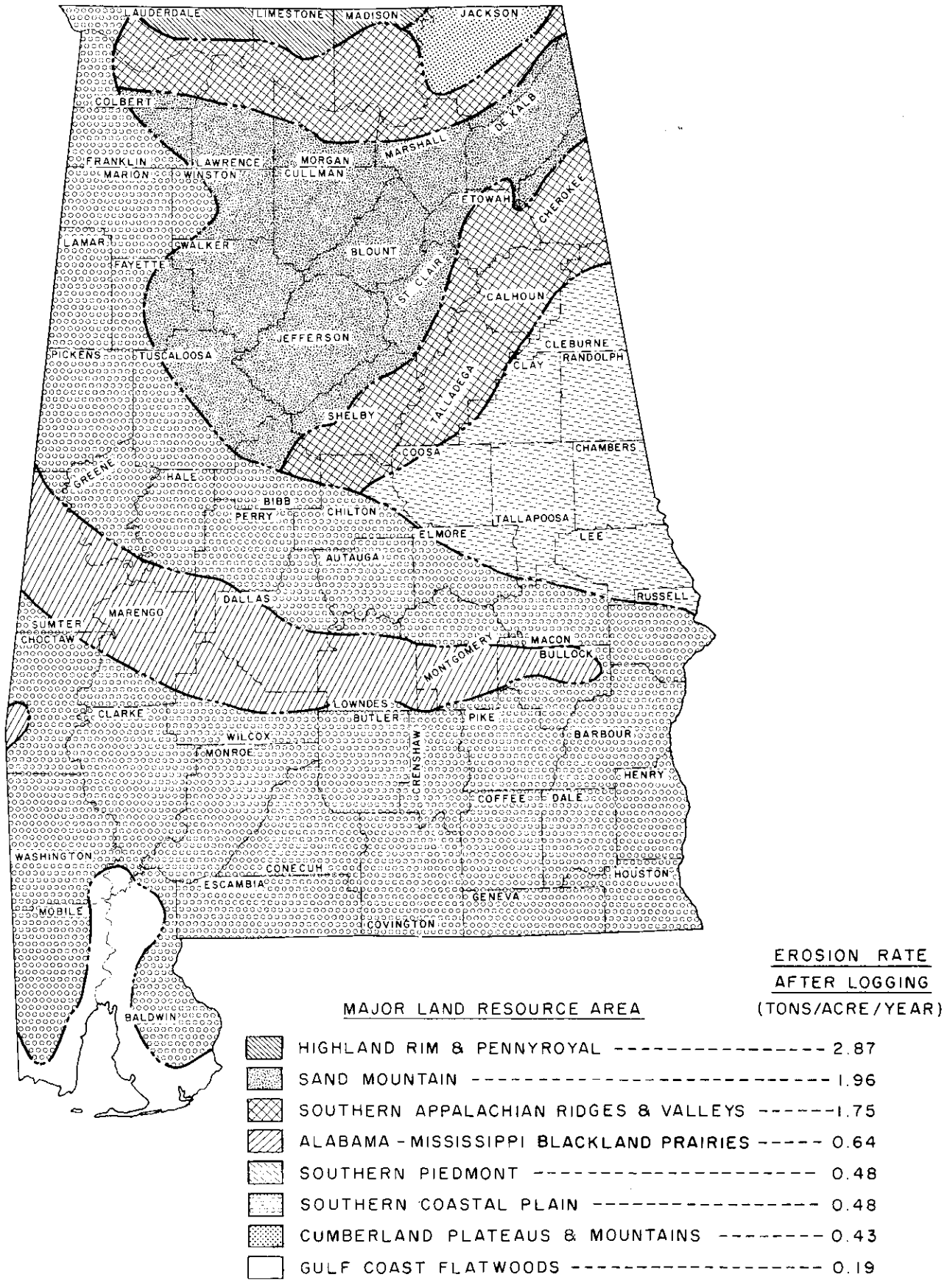


Figure 16.—*Alabama's major land resource areas (AWIC 1981).*

average air-dry yield of southern red oak is 7 pounds for 26 inch diameter class trees, compared with 1 pound for 12 inch diameter class trees. White oak, on the other hand, yields 4 pounds for 26 inch diameter class trees, and 2 pounds for 12 inch diameter class trees (Byrd and Holbrook 1974). Few oaks produce acorns until they reach sawtimber size. Information on oak diameter distributions detailed by species is presented in table XII. Water oak, white oak, Southern red oak, and post oak together comprise 62 percent of the State's oak trees. Regionally, the abundance of oak sawtimber trees on a per acre basis is largest in the North unit (table XIII). While more detailed examination of the data is needed to assess total production, acorn yield per acre is greatest in the North unit and smallest in the Southwest-South unit.

Forest trees furnish essential needs for a variety of wildlife. For example, large trees of 21 inches or more in diameter supply important nesting and perching areas for large-bodied birds of prey (e.g. bald eagle, barred owl), and foraging areas for several warbler species. Large trees are at least twice as abundant in the oak-gum-cypress forest type than in any other forest type. By contrast, pine forest types of longleaf-slash and loblolly-shortleaf contain the smallest number of large trees (table XIV). Short rotation pine management undoubtedly contributes to this difference. With a mandated responsibility for maintaining wildlife and other multiresource values, public agencies have a greater density of large trees (152 trees per 100 acres) on timberland than private owners (84 trees per 100 acres).

Dead and partly dead trees provide feeding and nesting areas for woodpeckers and nesting areas for some mammal species. Several species of invertebrates and fungi also rely upon the decay of trees for their existence.

Rotten trees, live trees of commercial species

Table XII.—*Number of oak trees on timberland by species and diameter classes, Alabama, 1982*

Species	All classes	Diameter class (inches at breast height) 1.0–4.9	5.0–10.9	11.0–14.9	15.0–20.9	21.0+
			thousand trees			
White oak group:						
White	378,864	286,886	69,443	14,890	6,361	1,284
Durand	1,191	1,105	...	...	57	29
Overcup	18,887	12,303	5,302	618	419	246
Bur	443	...	237	180	26	...
Swamp chestnut	16,178	10,826	3,743	1,117	387	105
Chinkapin	32,462	25,774	4,878	1,123	592	95
Chestnut	174,930	122,601	40,172	7,876	3,721	560
Post	355,179	289,819	54,876	7,991	2,209	284
Total	978,134	749,314	178,651	33,795	13,772	2,603
Red oak group:						
Scarlet	58,419	33,515	18,042	4,697	1,935	230
Southern red	348,263	261,248	68,182	13,092	4,949	792
Cherrybark	20,813	13,563	4,176	1,677	1,002	395
Laurel	201,909	172,530	23,490	3,809	1,571	510
Water	668,723	566,562	81,042	13,695	5,668	1,757
Nuttall	1,006	572	76	266	84	8
Pin	30	...	...	...	30	...
Willow	97,396	77,225	14,109	3,331	1,847	884
Northern red	47,695	33,303	9,620	2,483	2,006	283
Shumard	9,970	6,891	1,751	870	349	109
Black	164,821	128,658	26,816	6,559	2,443	345
Turkey[1]	73,277	68,654	4,346	220	57	...
Blackjack[1]	111,212	88,274	20,885	1,820	215	19
Live[1]	8,869	8,311	406	81	41	31
Bluejack[1]	29,687	28,591	1,096	...	...	...
Total	1,842,090	1,487,897	274,037	52,600	22,197	5,363
All oaks	2,820,224	2,237,211	452,688	86,395	35,969	7,966

[1] Noncommercial species.

but with reduced value primarily due to rot, are found in hardwood forest types (oak-pine, oak-hickory, oak-gum-cypress, and elm-ash-cottonwood) at densities of 1,039 trees per 100 acres, compared with 585 trees per 100 acres in pine forest types (longleaf-slash and loblolly-shortleaf). More intensive management of pine stands likely contributes to the lower density of rotten trees in pine than in hardwood forest types. Most rotten trees are hardwoods. Of all trees greater than 5 inches in diameter, rotten trees are more common in oak-hickory and oak-gum-cypress forest types than in other forest types (table XV).

Salvable dead trees, dead trees with merchantable timber volume, are concentrated in loblolly-shortleaf and oak-pine forest types in the 6 and 8 inch diameter classes (table XVI). Abundant densities of large salvable dead trees are common in more mature oak-gum-cypress stands.

Management of forests for timber products has favored the removal of dead and dying trees where feasible to reduce the spread of disease agents and to increase economic returns. With added requirements to yield suitable wildlife habitats, public timberland contains a greater density of rotten trees (443 trees per 100 acres) than private timberland (330 trees per 100 acres). Salvable dead trees are also more common on public timberland (291 trees per 100 acres) than on private timberland (146 trees per 100 acres).

Recreation

Alabama's forests provide opportunities for a number of outdoor recreation uses. Among the uses closely associated with timberland are dispersed activities, such as hunting and camping. The potential use of timberland, or its recreation value, depends upon its location, access, and environmental setting, among other attributes.

Hunting.—A 1980 inventory of recreation facilities indicated that 3,500,000 acres are owned or leased by hunting clubs or by public agencies for small and big game hunting (Department of

Table XIII.—*Number of oak sawtimber trees on timberland by species and forest survey units, Alabama 1982*

Species	All units	Southwest-South	Southwest-North	Southeast	West Central	North Central	North
				trees per 1000 acres			
White oak group:							
White	1,040	163	676	591	986	1,581	2,822
Durand	4	...	...	7	...	...	...
Overcup	59	52	172	22	85	...	69
Bur	10	38	29	...	...	...	...
Swamp Chestnut	74	11	169	117	87	19	...
Chinkapin	84	...	3	...	...	51	718
Chestnut	561	...	...	56	555	1,383	1,716
Post	484	194	342	398	515	684	831
Total	2,316	458	1,391	1,191	2,228	3,718	6,156
Red oak group:							
Scarlet	317	...	52	36	223	675	1,233
Southern red	870	523	760	783	1,147	856	1,317
Cherrybark	142	24	257	87	276	62	218
Laurel	272	478	475	395	123	82	...
Water	975	838	1,277	1,487	1,346	255	362
Nuttall	17	44	49	...	...	...	31
Pin	1	...	...	...	...	...	14
Willow	280	132	358	337	383	53	525
Northern red	220	...	72	54	125	297	1,134
Shumard	61	...	83	43	126	17	150
Black	432	12	31	130	397	912	1,399
Turkey[1]	13	60	...	4	25	...	...
Blackjack[1]	95	24	50	75	142	200	17
Live[1]	7	23	...	16	...	...	...
Total	3,702	2,158	3,464	3,447	4,313	3,409	6,400
All oaks	6,018	2,616	4,855	4,638	6,541	7,127	12,556

[1]Noncommercial species.

Table XIV.—*Number of large diameter live trees on timberland by diameter classes and forest types, Alabama, 1982*

Forest type	Total	Diameter class (inches at breast height) 21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0 and larger
	trees per 100 acres					
Longleaf-slash	22	15	3	2	2	...
Loblolly-shortleaf	46	27	11	4	2	3
Oak-pine	75	39	20	8	3	5
Oak-hickory	91	45	23	11	5	7
Oak-gum-cypress	242	110	58	34	16	24
Elm-ash-cottonwood	63	46	...	16	...	...
All types	87	44	22	11	5	7

Table XV.—*Number of rotten trees on timberland by diameter classes and forest types, Alabama, 1982*

Forest type	All classes	Diameter class (inches at breast height) 1.0-4.9	5.0-8.9	9.0-12.9	13.0-16.9	17.0-20.9-	21.0 and larger
	trees per 100 acres						
Longleaf-slash	272	188	50	17	12	2	4
Loblolly-shortleaf	664	460	103	59	25	12	6
Oak-pine	814	478	182	67	48	23	17
Oak-hickory	1,187	668	250	118	92	35	24
Oak-gum-cypress	746	372	260	225	83	46	31
Elm-ash-cottonwood	1,061	710	154	110	...	65	22
All types	885	506	183	95	58	25	17

Conservation and Natural Resources (DCNR) 1980). Not all of the acreage is timberland, however. A conservative estimate of the amount of timberland this represents is 2,300,000 acres or 11 percent statewide[5]. Regionally, small and big game hunting areas are widely distributed, with the largest concentration in the southwestern part of the State (fig. 17).

Shortages of hunting land exist in Alabama, particularly land available to the general public. More than half of the hunting land is controlled by hunting clubs and open only to members or their guests. Regionally, shortages are greatest in the northern part of the State (DCNR 1980).

Camping.—A smaller percentage of the land area is devoted to camping, but its influence on timber supply is nevertheless important. Unlike forested areas used for hunting activities, those used for camping are not often compatible with timber management. Timber harvesting is limited to partial cuttings, or else the forests are taken out of production to provide shade and other amenities for campers. In addition, adjacent timberland is usually considered an attraction for camping in a given area. Such timberland is used directly for hunting, hiking, and aesthetic enjoyment, and indirectly as areas which maintain water quality values for fishing, boating, and other water-based activities.

Camping facilities are classified as developed (electricity or sewage hook-ups at some sites and toilet facilities nearby), semi-primitive (facilities nearby), and primitive (no toilet facilities available). Other camp facilities include areas used

[5]Timberland in Alabama is 67 percent of the total area of the State. Because many small and big game species in Alabama depend upon forested habitat, an assumption is made that at least 67 percent of the 3,500,000 acres of hunting land is timberland. Private lands not owned or leased by public agencies or private groups for hunting on a regular basis are not included in this amount.

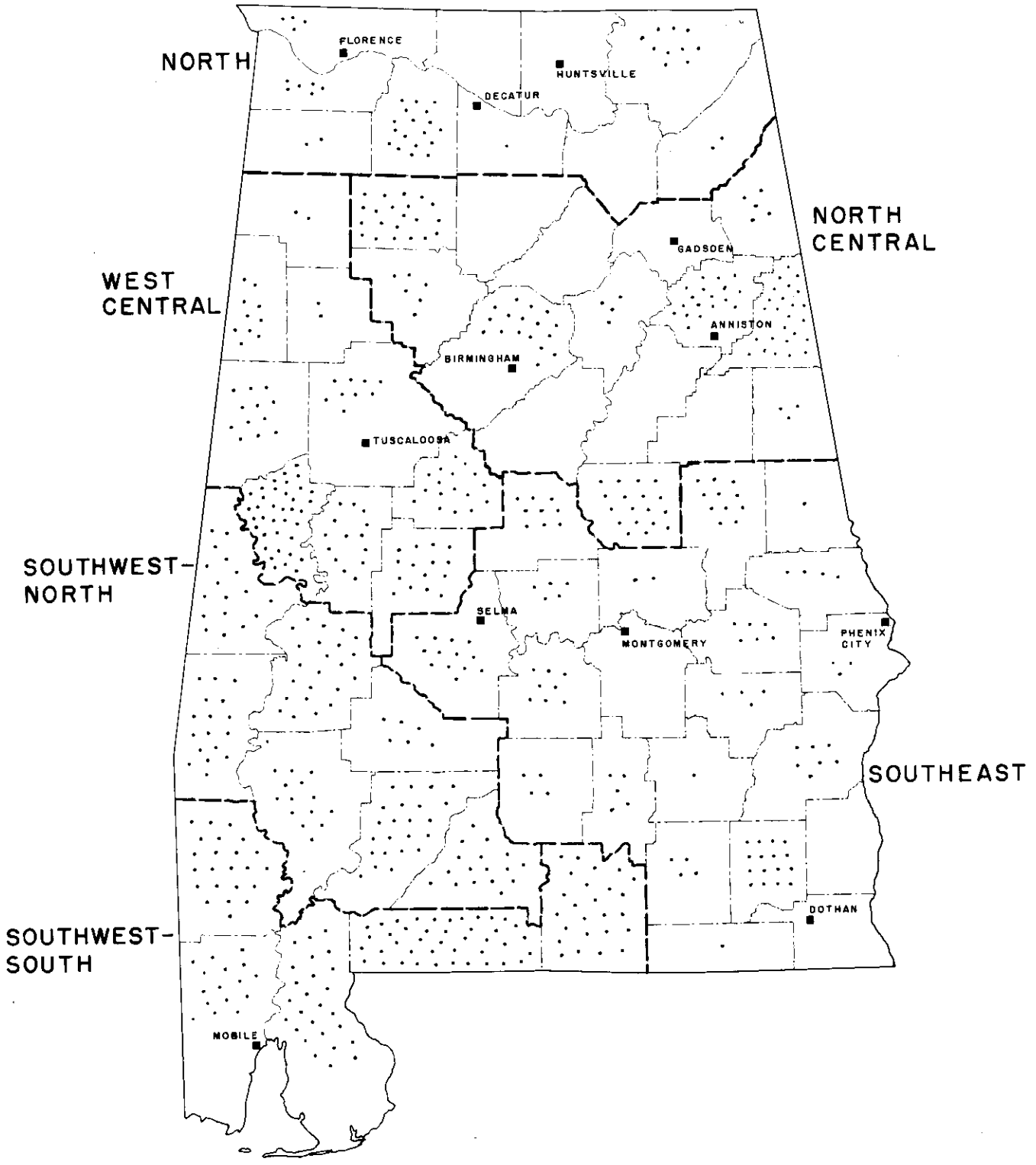


Figure 17.—*Areas designated for hunting big and small game, 1979. Each dot represents 5,000 acres.*

Table XVI.—*Number of salvable dead trees on timberland by diameter classes and forest types, Alabama, 1982*

Forest type	All classes	Diameter class (inches at breast height) 5.0-8.9	9.0-12.9	13.0-16.9	17.0-20.9-	21.0 and larger
	trees per 100 acres					
Longleaf-slash	140	96	31	8	5	...
Loblolly-shortleaf	184	160	17	5	1	...
Oak-pine	184	140	30	8	4	1
Oak-hickory	135	106	20	7	2	...
Oak-gum-cypress	95	41	31	15	3	5
Elm-ash-cottonwood	...	...	...	...	...	...
All types	154	119	23	7	2	1

for day use and group camping activities (e.g. Boy Scout camps, church camps, etc.). Land leased or owned for camping activities comprises 19,000 acres (DCNR 1980) with developed, semi-primitive, and primitive campsites occurring on 4,600, 2,500, and 3,700 acres respectively. Day use and group facilities comprise the remaining 8,200 acres. The supply of camping facilities varies by survey unit and type of facility (fig. 18).

As an alternative investment, timberland owners should consider the need for camping facilities. Currently a surplus of developed campsites exists, particularly in the central part of the State. Primitive sites, however, are in short supply, especially in the Southwest-South and North Central survey units. Other camping facilities are expected to be needed by 1990 as Alabama's population increases (DCNR 1980).

Location.—The location of a forest in relation to populated areas is a key factor in assessing its potential for outdoor recreation use. Most of Alabama's population is concentrated in the North and North Central units (fig. 19). By contrast, much of Alabama's timberland is located in less populated counties.

Projections of Alabama's population to 1990 indicate that the major growth is expected in the north, central, and extreme southwestern portions of the State (fig. 20). Many of the counties with extensive growth are areas where population concentrations are already large. These counties are likely to experience an increased need for timberland areas that provide for recreation activities and facilities.

Access.—While the potential for use is limited by the proximity of timberland to populated areas, much of the timberland is physically accessible. Signs restricting access are found upon entering only 15 percent of the timberland. Three-fourths of the timberland is within ¼ mile of a road (fig. 21). However, most of these roads are gravel or dirt, and only 27 percent are paved. Access may also be restricted by private landowners who control 95 percent of Alabama's timberland (21 percent forest industry land, 74 percent non-industrial private land). Upon entering timberland, more than one-half is fenced.

In future surveys, trends in access are likely to be important in gauging the effectiveness of programs that promote public access to private timberland.

Environmental Setting.—The type of outdoor recreation experience one has is governed, to a large extent, on the environmental setting. In this study the environmental setting is defined as the "neighborhood", or land uses surrounding timberland. Such land uses are: water areas, urban or built-up land, agricultural land, auto

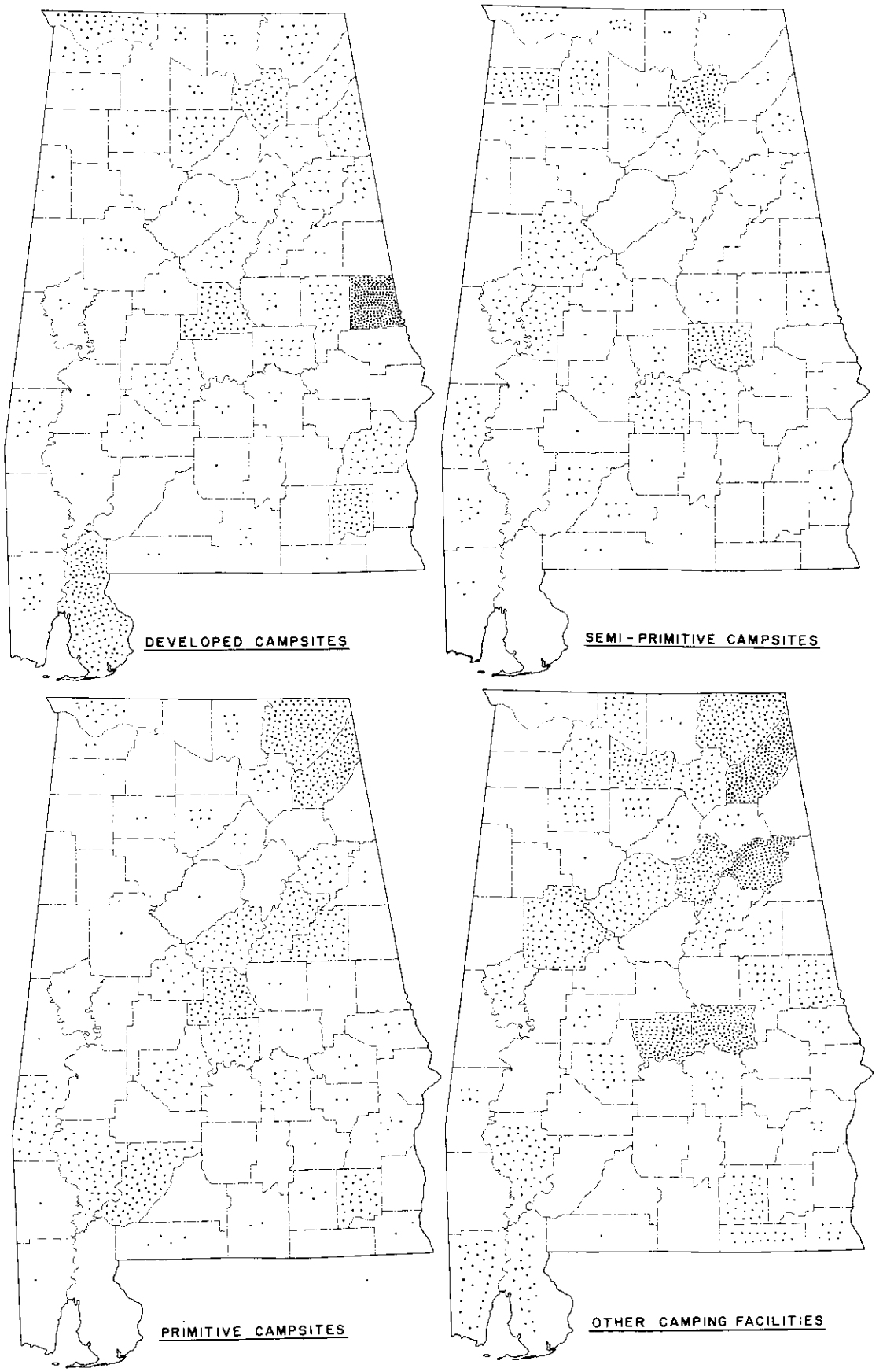


Figure 18.—*Acres of camping facilities, 1979. Each dot represents 5 acres.*

transportation (the presence of roads), and adjacent forest land (tract size). For outdoor recreation activities, water areas are prime attractions. For this reason, timberland near water areas (mentioned earlier, table IX) is a valuable recreation resource.

Due to economic forces governing land development, most timberland is distant from urban areas. Nevertheless, 7 percent of the timberland is within ½ mile of urban or built-up land. Saw-log volume is comparable to that found elsewhere (table XVII).

Agricultural land is by far the dominant land use of land adjacent to timberland. Fully two-thirds of the timberland is within ½ mile of agricultural land. On a per acre basis, saw-log volume averages 530 cubic feet compared with 600 cubic feet elsewhere (table XVIII).

Timberland distant from auto transportation, i.e. remote areas, is rare in Alabama. Less than 10 percent is farther than ½ mile from a road. Furthermore, much of the remote timberland important for recreation activities is limited in variety and distribution. The remote areas are found chiefly in bottomlands—i.e. oak-gum-cypress and elm-ash-cottonwood forest types (table XIX). Timberland 1 mile or more from roads comprises 4 percent of the total and is concentrated in the southwestern part of the State (fig. 22). These factors may limit its recreation value to those residents interested in a more primitive experience in other forest types.

Forest tract size is an important indicator of the opportunity of recreationists to experience self-sufficiency. A sense of "wilderness" is easier to accomplish in large forest tracts. Other forest values are tied to tract size as well. Water quality and soil retention are easier to maintain if most of the area is forested. Rare and endangered species, such as black bears, depend upon extensive and unbroken tracts of land (Lowman 1975). Some game species, such as squirrels, are more abundant in large forest tracts.

Forest tract size is estimated as the extent of contiguous forest area. Boundaries are defined as nonforest areas greater than 120 feet wide. Powerline and pipeline rights-of-way are not considered limiting. Tracts 50 acres or less often cannot yield a profitable return of timber.

In Alabama 17 percent of the timberland is in tracts more than 5,000 acres in size. Most large tracts of timberland occur in extensively forested counties with low population densities. Tracts 50 acres or less constitute 4 percent of the total. Saw-log volume is greatest on large tracts of timberland (table XX).

Table XVII.—*Area of timberland and saw-log volume by distances to urban or built-up land, Alabama, 1982*[1]

Distance	Area	Volume per acre	Volume		
			Total	Softwood	Hardwood
feet	*thousand acres*	*cubic feet*	*million cubic feet*		
33-500	339.0	482	163.3	119.7	43.6
501-1,000	349.2	516	180.3	117.9	62.4
1,001-1,500	238.9	374	89.3	49.8	39.5
1,501-2,000	332.3	500	166.0	97.4	68.6
2,001-2,500	260.6	662	172.5	104.8	67.7
2,501-3,000	168.7	636	107.3	54.4	53.0
3,001-3,500	141.0	452	63.7	35.0	28.7
3,501-4,000	153.3	442	67.8	26.1	41.6
4,001-4,500	303.7	503	152.7	112.6	40.1
4,501 or more	19,422.9	559	10,859.2	6,796.3	4,062.9
All distances	21,709.6	554	12,022.1	7,514.0	4,508.1

[1] Totals may not add due to rounding, 1980 Census.

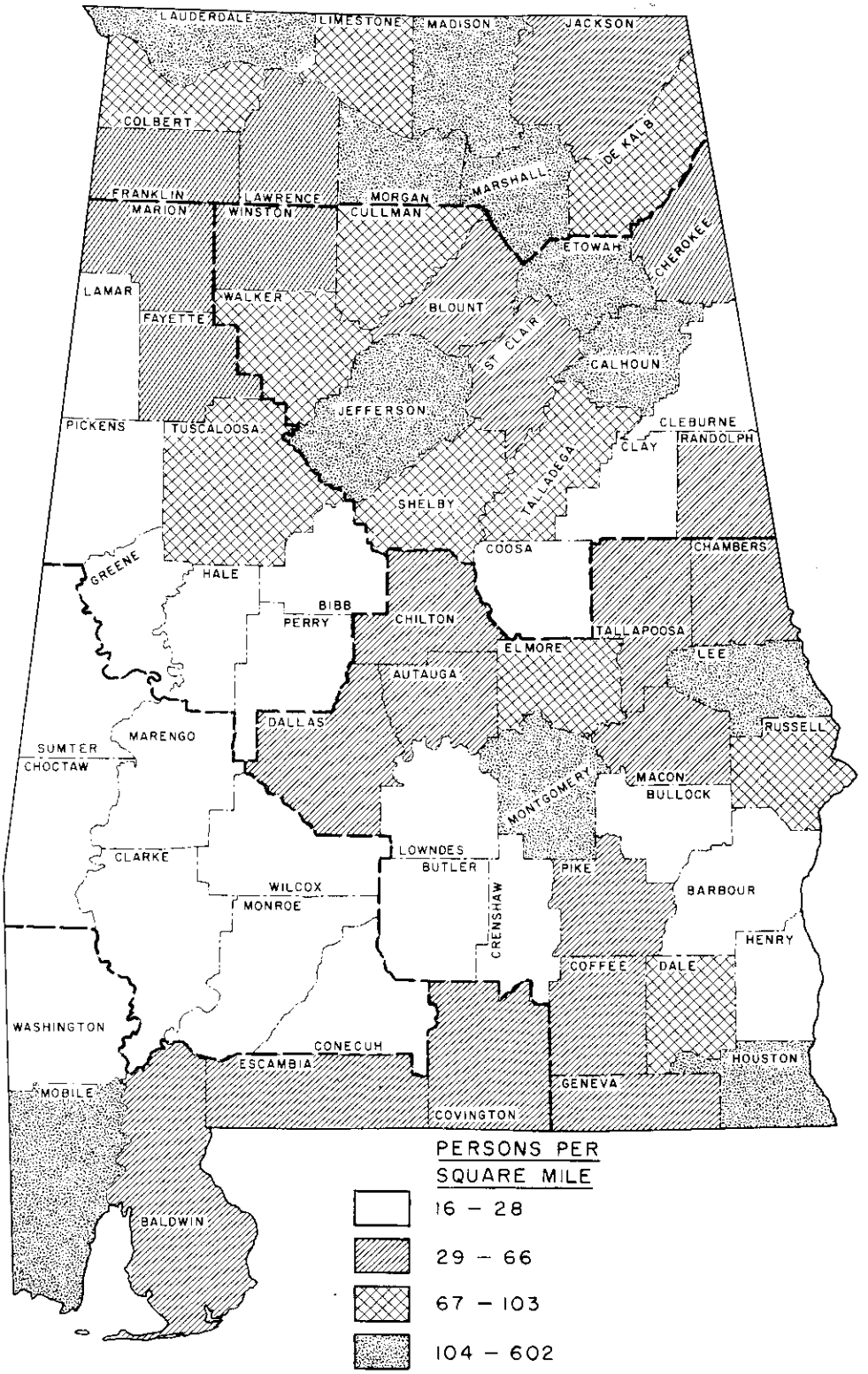


Figure 19.—*Population density, 1980.*

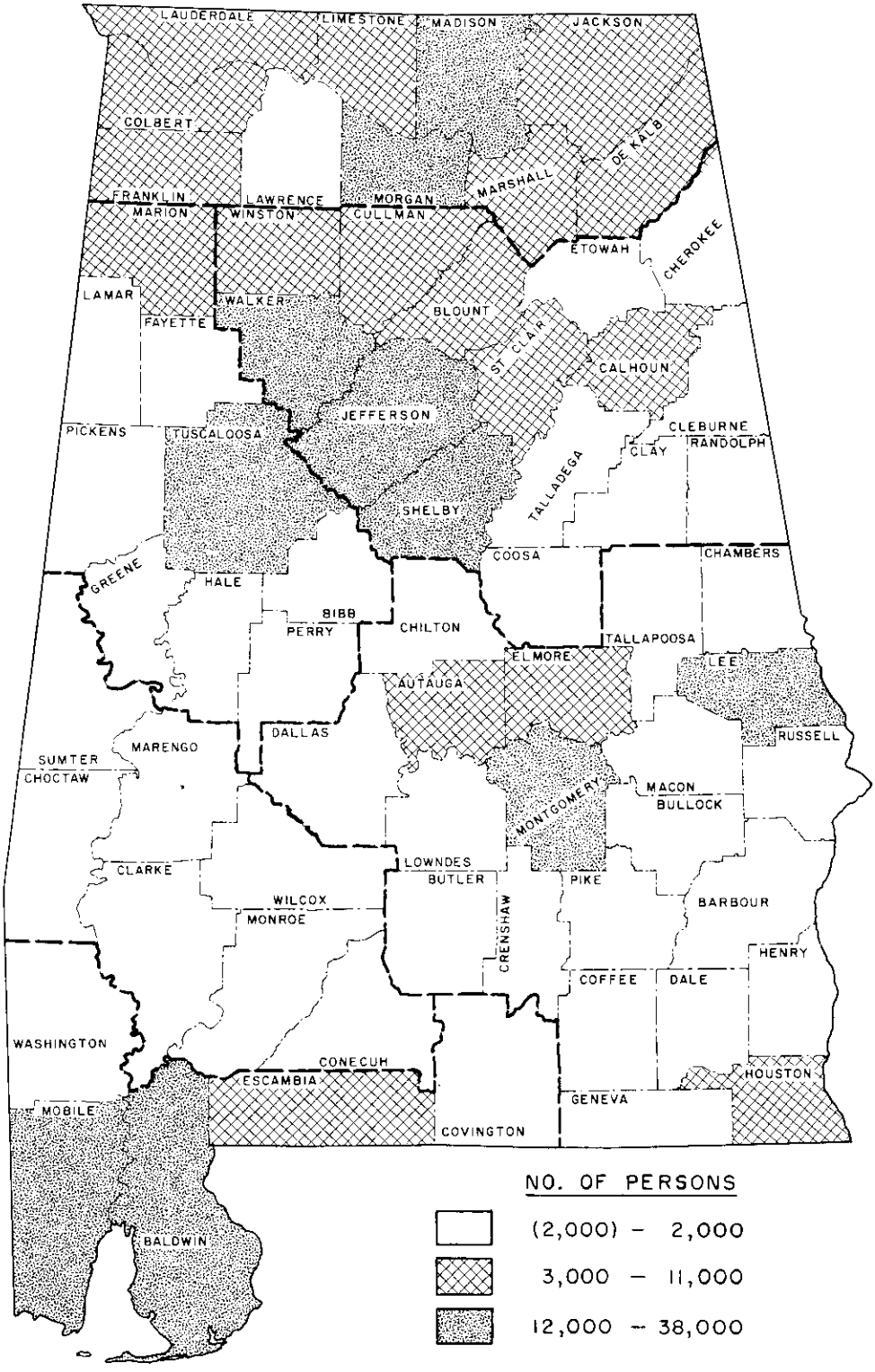


Figure 20.—*Projected increase (decrease) in Alabama county populations, 1980-1990 (Office of State Planning and Federal Programs, 1978).*

Table XVIII.—*Area of timberland and saw-log volume by distances to agriculture land, Alabama, 1982*[1]

Distance	Area	Volume per acre	Volume		
			Total	Softwood	Hardwood
feet	*thousand acres*	*cubic feet*	*million cubic feet*		
0-500	5,706.3	549	3,130.5	1,803.1	1,327.4
501-1,000	3,299.6	505	1,666.9	1,031.7	635.2
1,001-1,500	2,165.1	527	1,141.7	655.6	486.2
1,501-2,000	1,680.9	560	941.2	599.7	341.4
2,001-2,500	1,395.2	494	689.0	443.3	245.8
2,501-3,000	984.8	680	669.4	417.5	251.7
3,001-3,500	797.5	553	441.4	312.5	128.9
3,501-4,000	683.2	524	358.2	241.1	117.1
4,001-4,500	637.3	537	342.5	226.3	116.2
4,501 or more	4,359.6	606	2,641.5	1,783.2	858.3
All distances	21,709.6	554	12,022.1	7,514.0	4,508.1

[1] Totals may not add due to rounding, 1980 Census.

Table XIX.—*Area of timberland by forest types and distances to a road, Alabama, 1982*[1]

Forest type	Area	Total	Distance to roads (miles)			
			0-0.2	0.3-0.5	0.6-0.9	1.0 or greater
	million acres	*percent*				
Longleaf-slash	1.48	100.0	75.8	15.7	3.6	4.9
Loblolly-shortleaf	5.85	100.0	74.0	18.3	5.6	2.1
Oak-pine	4.56	100.0	72.4	19.2	4.8	3.5
Oak-hickory	7.28	100.0	72.3	19.1	6.5	2.1
Oak-gum-cypress	2.37	100.0	54.1	26.0	9.5	10.5
Elm-ash-cottonwood	.07	100.0	76.4	...	...	23.6
Nontyped[2]	.03	100.0	66.9	33.1	...	...
Total	21.66	100.0	71.0	19.4	6.0	3.6

[1] Totals may not add due to rounding.
[2] No live trees 1.0 inches diameter or larger at breast height.

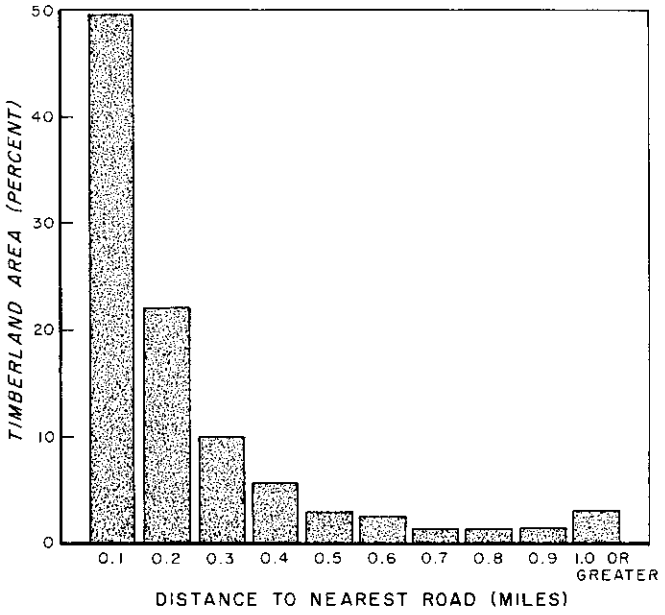


Figure 21.—*Percent timberland area vs. distance to nearest road, Alabama, 1982.*

Trends in Supply

At the present time there is a lack of specific information regarding nontimber resource supply trends on timberland at the statewide level. Public and some private-for-profit nontimber resources are managed at the local level by a variety of specialists. Probably many nontimber resources are left unmanaged. Management activities and government programs that promote the production of timber, water, range, wildlife, or dispersed recreation resources should be weighed against the effect they have upon each other.

Management of wildlife and dispersed recreation resources on timberland traditionally has been centered around game species production. With the growing awareness of the need for nongame species, research has been underway to characterize habitats needed by these species. Of particular concern are habitats of endangered and threatened wildlife species.

The red-cockaded woodpecker, one of the more extensively studied endangered species, depends upon relatively pure stands of old-growth southern pine for its nesting habitat. Alabama's red-cockaded woodpecker habitat was estimated from the 1972 survey data at 180,000 acres (6 percent of the State's pine sawtimber stands) (Lennartz et al. 1983). Trends in pine sawtimber acreage provide a gross approximation of trends in red-cockaded woodpecker habitat (Lennartz et al. 1983). In Alabama, pine sawtimber acreage has increased from 2,878,000 acres in 1972 to 3,010,000 acres in 1982, an increase of 5 percent.

Efforts to limit species extinctions and provide for other nontimber resources have had a noticeable effect on public timberland acquisition. Productive-reserved forest land, that which has been designated for nontimber uses by public statute, has tripled in size between 1972 and 1982 from 17,000 acres to 66,000 acres. During the same period, public ownership of timberland has increased 140,000 acres. Half of the recent acquisitions by public agencies have been bottomlands.

Between 1953 and 1972 the rate of timberland acquisition by public agencies had averaged 2,000 acres per year. By contrast, the rate between 1972 and 1982 has averaged 14,000 acres per year. While this rate cannot continue indefinitely, public acquisition of some additional timberland and conversion of selected timberland to productive-reserved status are planned for the near future.

Recognizing a growing need for dispersed recreation resources, the Alabama Legislature passed a law, effective January 1, 1982, which reduces the liability of landowners who voluntarily open lands for public access. The law seeks "to encourage owners of land to allow noncommercial public recreational use of land which would not otherwise be open to the public

Table XX.—*Area of timberland and saw-log volume by sizes of forest tract, Alabama, 1982*[1]

Size of forest tract	Area	Volume per acre	Volume		
			Total	Softwood	Hardwood
acres	*thousand acres*	*cubic feet*	*million cubic feet*		
1-10	145.2	457	66.3	33.7	32.6
11-50	713.8	582	415.4	234.0	181.4
51-100	936.6	488	457.0	284.6	172.4
101-500	3,626.3	512	1,856.6	1,080.0	776.6
501-2,500	8,236.9	538	4,428.2	2,919.0	1,509.2
2,501-5,000	4,419.9	559	2,472.7	1,590.5	882.2
More than 5,000	3,630.9	641	2,325.9	1,372.2	953.8
All sizes	21,709.6	554	12,022.1	7,514.0	4,508.1

[1]Totals may not add due to rounding, 1980 Census.

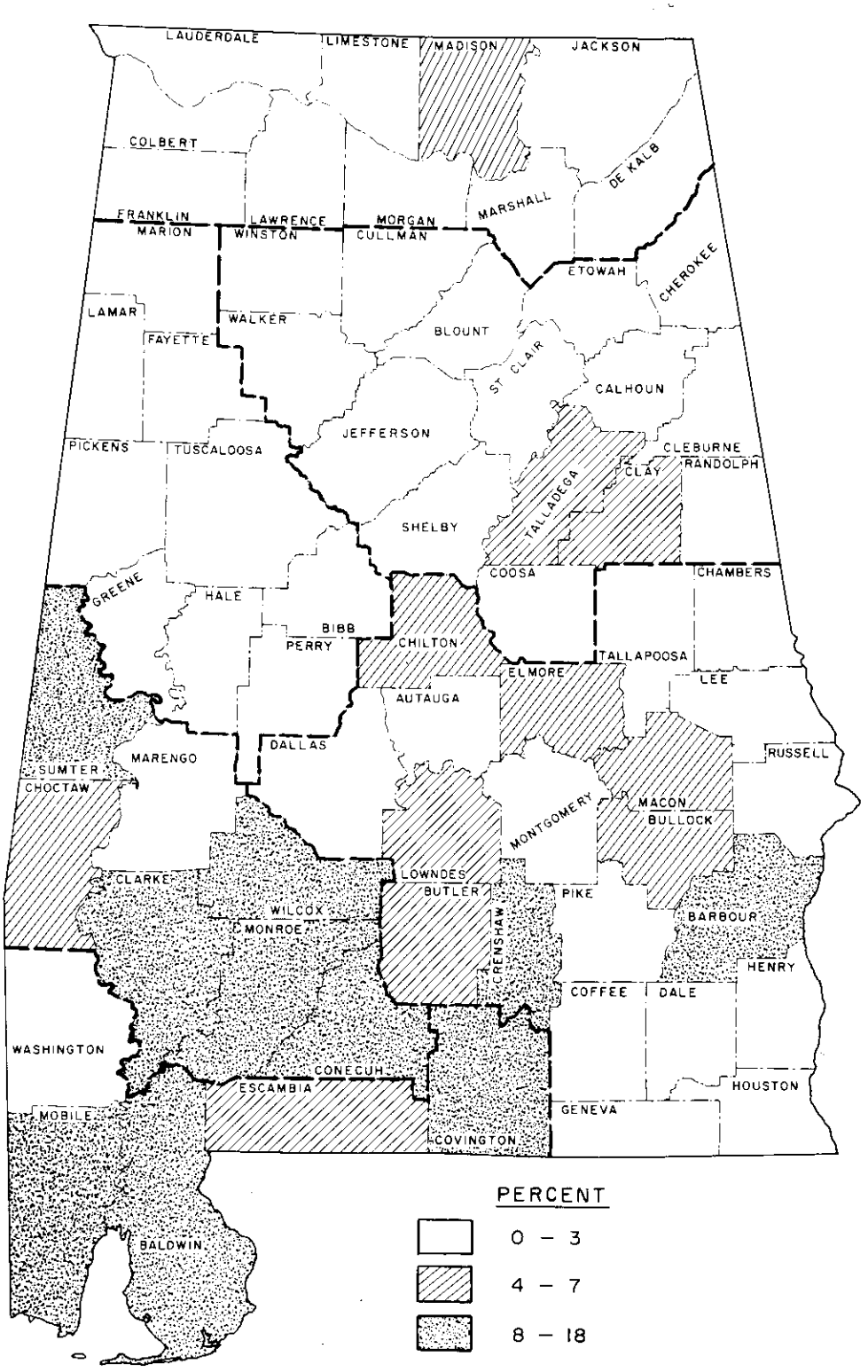


Figure 22.—*Percent timberland area 1 mile or more from a road, 1982.*

(Alabama Statutes, Article 2, Section 35-15-20 to 35-15-28)." This "limited liability law" should have some impact on the availability of privately-owned timberland for recreation uses.

With the opening of the Tennessee-Tombigbee Waterway scheduled for 1985, some change is expected in the development of private and public forest resources in western Alabama. Additions to the Sipsey Wilderness (Lawrence and Winston counties) and establishment of the Cheaha Wilderness (Clay and Cleburne counties) should alleviate some of the need for nontimber resources near populated areas in northern Alabama.

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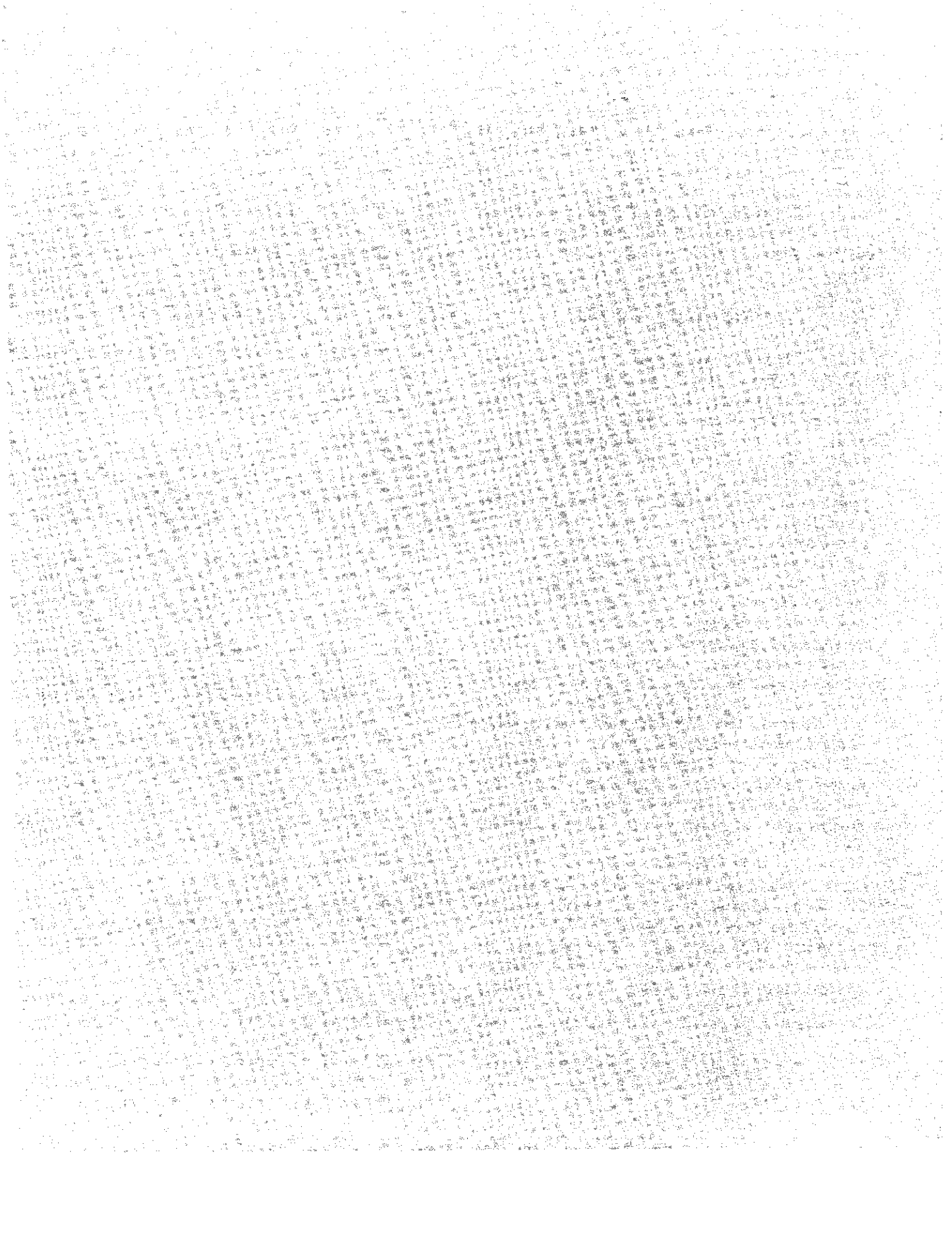

APPENDIX

Survey Methods

The data on forest acreage and timber volume in this report 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 perpendicular grid lines spaced 3 miles apart. In Alabama, 151,671 photographic classifications were made and 5,723 ground 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.

Baseline information from U.S. Census data of area in land and water by county were used in computing forest area and volume from sample classifications. Periodically, U.S. Census data are revised. Unless otherwise noted, timber-related estimates in this report were based on U.S. Census data for 1960. Where consistency between surveys was not at issue, i.e. examination of previously not-measured nontimber attributes, U. S. Census data for 1980 were used and noted in the report.

A cluster of 5 variable-radius plots were installed at each ground sample location. Trees selected for measurement were delineated with a basal-area factor of 37.5 square feet per acre. Each sample tree on the variable-radius plots represented 7.5 square feet of basal area per acre. Trees less than 5.0 inches in diameter were tallied on fixed-radius plots (7.1 feet radius, or approximately 1/275 acre) around 3 plot centers. Together, these samples provided most of the information for the new inventory. Trees on a random subsample of plots were measured in detail to obtain data for calculating timber volumes.

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.

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 methods or equipment. Its effects cannot be appraised mathematically, but the Forest Inventory and Analysis Unit at-

tempts to hold it to a minimum by proper training, good supervision, and emphasis on careful work.

Sampling errors given below are based on one standard deviation. That is, the chances are two out of three that if a 100 percent survey had been taken, the results would have been within the limits indicated.

Sampling errors for estimates of total timberland area, volume, net annual growth (1972-1982), and annual removals (1972-1982) are as follows:

Item	*Total*	*Unit*	*Percent sampling error*
Timberland area	21,658.8	Thousand acres	0.3
Growing stock			
Volume	21,706.2	Million cubic feet	1.4
Net annual growth	986.3	Million cubic feet	2.0
Annual removals	854.8	Million cubic feet	3.0
Sawtimber			
Volume	71,568.4	Million board feet	1.8
Net annual growth	4,003.1	Million board feet	2.2
Annual removals	3,378.6	Million board feet	3.4

Data smaller than State totals have larger sampling errors. The smaller the region examined, the larger the sampling error. In addition, as 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 estimates are liable, two chances out of three:

Sampling error[1]	Timberland area	Growing stock			Sawtimber		
		Volume	Net annual growth	Annual removals	Volume	Net annual growth	Annual removals
percent	*thousand acres*	*million cubic feet*			*million board feet*[2]		
1.0	1,943.3	...	...	...	...	...	...
2.0	487.3	10,636.0	986.3	...	57,970.4	...	...
3.0	216.6	4,727.1	438.4	854.8	25,764.6	2,211.9	...
4.0	121.8	2,659.0	246.6	480.8	14,492.6	1,244.2	2,441.0
5.0	78.0	1,701.8	157.8	307.7	9,275.3	796.3	1,562.3
10.0	19.5	425.4	39.5	76.9	2,318.8	199.1	390.6
15.0	8.7	189.1	17.5	34.2	1,030.6	88.5	173.6
20.0	4.9	106.4	9.9	19.2	579.7	49.8	97.6
25.0	3.1	68.1	6.3	12.3	371.0	31.9	62.5

[1]By random sampling formula.
[2]International ¼-inch rule.

Definition of Terms

Forest Land Classes

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 non-forest uses. Classification is based on a 1 acre area. Forest land is divided into commercial categories: timberland, deferred timberland; and non-commercial categories: productive-reserved forest land, unproductive forest land.

Timberland.—Forest land that is producing, or is capable of producing, crops of industrial wood and not withdrawn from timber utilization. Timberland is synonymous with "commercial forest land" in prior reports.

Deferred Timberland.—National forest land that meets productivity standards for timberland but is under study for possible inclusion in the wilderness system.

Productive-Reserved Forest Land.—Productive public forest land withdrawn from timber utilization through statute or administrative regulations.

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

Tree Classes

Commercial Species.—Tree species currently or prospectively suitable for industrial wood products. Excluded are non-commercial species such as blackjack oak and blue beech.

Noncommercial Species.—Tree species of typical small size, poor form, or inferior quality which normally do not develop into trees suitable for industrial wood products.

Growing-Stock Trees.—Live trees of commercial species classified as sawtimber, poletimber, sapling, and seedlings. Rough and rotten trees are excluded.

Rough Trees.—Live trees of commercial species that are unmerchantable for saw logs currently or potentially because of roughness or poor form. Also included are all live trees of non-commercial species.

Rotten Trees.—Live trees of commercial species that are unmerchantable for saw logs currently or potentially because of rot.

Cull Trees.—Rough and rotten trees.

Salvable Dead Trees.—Standing or down dead trees that are considered merchantable.

Forest Types

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 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.—Bottomland forest 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.

Nontyped.—Timberland currently unoccupied with live trees 1.0 inches dbh or larger, e.g. very recent clearcut areas.

Classes of Timber

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

Softwoods.—Coniferous trees, usually evergreen, having needle or scalelike leaves.

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

Poletimber Trees.—Live trees of commercial species of good form and vigor, 5.0 to 8.9 inches in dbh for softwoods and 5.0 to 10.9 inches dbh for hardwoods.

Saplings.—Live trees of commercial species of

good form and vigor, 1.0 inch to 4.9 inches in dbh.

Seedlings.—Live trees of commercial species of good form and vigor which are less than 1.0 inch in dbh.

Rough, Rotten, and Salvable Dead Trees.—See "tree classes."

Stand-Size Classes

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

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

Volume

Volume of Cull.—The volume of sound wood in the bole of rough and rotten trees.

Volume of Growing Stock.—Volume of sound wood in the bole of sawtimber and poletimber trees from a 1 foot stump to a minimum 4.0-inch top outside bark or to the point where the central stem breaks into limbs.

Volume of Saw Log.—Net volume of the saw-log portion of live sawtimber trees in cubic feet.

Volume of Sawtimber.—Net volume of the saw-log portion of live sawtimber trees in board feet of the International rule (¼ inch kerf). Net volume equals gross volume less deductions for rot, sweep, and other defects that affect use for lumber.

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 dbh from stump to a minimum 4.0-inch top outside bark, or to the point where the central stem breaks into limbs.

Miscellaneous Definitions

Agricultural Land.—Agricultural land is land used primarily for the production of crops or livestock. Included in proximity (nontimber) estimates are areas 10 acres or more in size such as cropland and pasture, nurseries, vineyards, orchards, confined feeding areas, or horse farms.

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 in square feet per acre.

Cull Increment.—The net volume in growing-stock trees that become rough or rotten trees during a specified period.

Dbh (Diameter at Breast Height).—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 0.9 inches above the stated midpoint. Thus, the 12-inch class includes trees 11.0 inches through 12.9 inches dbh.

Gross Growth.—Increase in net volume of trees in the absence of cutting and mortality during a specified period.

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

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

Net Growth.—The periodic increase in volume of a specified size class. Components of net growth include the average increment in net volume of trees at the beginning of the period surviving to its end plus the volume of trees reaching the size class during the period minus the volume of trees that died during the period minus the net volume of trees that become rough or rotten during the period.

Permanent Water Sources.— Bodies of water or water courses present throughout the year. Included in proximity (nontimber) estimates are bodies of water ⅛ acre in size or larger, or water cources 40 feet or more in width.

Saw-Log Portion.—That part of the bole of a sawtimber tree between a 1 foot stump and the sawlog top.

Saw-Log Top.—The point on the bole of a sawtimber tree above which a saw log cannot be produced. The minimum saw-log top is 7.0 inches diameter outside bark (dob) for softwoods and 9.0 inches dob for hardwoods.

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

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

Upper-Stem Portion.—That part of the main stem or fork of a sawtimber tree above the sawlog top to a diameter outside bark of 4.0 inches or to the point where the main stem or fork breaks into limbs.

Urban or Built-Up Land.—Urban or built-up land is land comprised of areas of intensive human use with much of the land covered by man-made structures. Included in proximity (nontimber) estimates are areas 10 acres or more in size, such as towns, villages, strip developments along highways, power and communication facilities, industrial complexes, and institutions.

Species List

Scientific and common names of species that occur in the Midsouth states.[1]

Commercial Species

Genus	Species	Common Name
Softwoods		
Abies	*balsamea*	balsam fir
	fraseri	Fraser fir
Chamaecyparis	*thyoides*	Atlantic white-cedar
Juniperus	*silicicola*	southern redcedar
	virginiana	eastern redcedar
Picea	*mariana*	black spruce
	rubens	red spruce
Pinus	*clausa*	sand pine
	echinata	shortleaf pine
	elliottii	slash pine
	glabra	spruce pine
	palustris	longleaf pine
	ponderosa	ponderosa pine
	pungens	Table Mountain pine
	rigida	pitch pine
	serotina	pond pine
	strobus	eastern white pine
	taeda	loblolly pine
	virginiana	Virginia pine
Taxodium	*distichum* var. *distichum*	baldcypress
	distichum var. *nutans*	pondcypress
Thuja	*occidentalis*	northern white-cedar
Tsuga	*canadensis*	eastern hemlock
	caroliniana	Carolina hemlock
Hardwoods		
Acer	*barbatum*	Florida maple
	negundo	boxelder
	nigrum	black maple
	rubrum	red maple
	saccharinum	silver maple
	saccharum	sugar maple
Aesculus	*glabra*	Ohio buckeye
	octandra	yellow buckeye
Betula	*alleghaniensis*	yellow birch
	lenta	sweet birch
	nigra	river birch
	populifolia	gray birch
Carya	sp.	hickory
	aquatica	water hickory
	illinoensis	pecan
Castanea	*dentata*	American chestnut
	pumila	Allegheny chinkapin
Catalpa	sp.	catalpa
Celtis	*laevigata*	sugarberry
	occidentalis	hackberry
Cornus	*florida*	flowering dogwood

Diospyros	*virginiana*	common persimmon
Fagus	*grandifolia*	American beech
Fraxinus	*americana*	white ash
	nigra	black ash
	pennsylvania	green ash
	profunda	pumpkin ash
	qradrangulata	blue ash
Gleditsia	*aquatica*	water locust
	triacanthos	honey locust
Gymnocladus	*dioicus*	Kentucky coffeetree
Halesia	*carolina*	Carolina silverbell
Ilex	*opaca*	American holly
Juglans	*cinerea*	butternut
	nigra	black walnut
Liquidambar	*styraciflua*	sweetgum
Liriodendron	*tulipifera*	yellow-poplar
Maclura	*pomifera*	Osage-orange
Magnolia	*acuminata*	cucumbertree
	grandiflora	southern magnolia
	virginiana	sweetbay
Morus	*rubra*	red mulberry
Nyssa	*aquatica*	water tupelo
	ogeche	Ogeechee tupelo
	sylvatica var. *sylvatica*	black tupelo, blackgum
	sylvatica var. *biflora*	swamp tupelo
Persea	*borbonia*	redbay
Platanus	*occidentalis*	American sycamore
Populus	sp.	cottonwood
Prunus	*serotina*	black cherry
Quercus	*alba*	white oak
	bicolor	swamp white oak
	coccinea	scarlet oak
	durandii	Durand oak
	falcata var. *falcata*	southern red oak
	falcata var. *pagodifolia*	cherrybark oak
	imbricaria	shingle oak
	laurifolia	laurel oak
	lyrata	overcup oak
	macrocarpa	bur oak
	michauxii	swamp chestnut oak
	muehlenbergii	chinkapin oak
	nigra	water oak
	nuttallii	Nuttall oak
	palustris	pin oak
	phellos	willow oak
	prinus	chestnut oak
	rubra	northern red oak
	shumardii	Shumard oak
	stellata var. *stellata*	post oak
	stellata var. *paludosa*	Delta post oak
	velutina	black oak
Robinia	*pseudoacacia*	black locust
Salix	sp.	willow
Sassafras	*albidum*	sassafras
Tilia	*americana*	American basswood
	heterophylla	white basswood
Ulmus	*alata*	winged elm
	americana	American elm
	crassifolia	cedar elm
	pumila	Siberian elm
	rubra	slippery elm
	serotina	September elm
	thomassii	rock elm

Noncommercial Species

Genus	Species	Common Name
Amelanchier	sp.	serviceberry
Aesculus	sp.	buckeye
Ailanthus	*altissima*	ailanthus, tree-of-heaven
Bumelia	sp.	chittamwood, gum bumelia
Carpinus	*caroliniana*	bluebeech, American hornbeam
Cercis	*canadensis*	eastern redbud
Cotinus	*obovatus*	smoketree
Crataegus	sp.	hawthorn
Magnolia	*macrophylla*	bigleaf magnolia
Malus	sp.	apple
Melia	*azedarach*	chinaberry
Morus	*alba*	white mulberry
Ostrya	*virginiana*	eastern hophornbeam, ironwood
Oxydendrum	*arboreum*	sourwood
Planera	*aquatica*	water-elm
Prosopis	sp.	mesquite
Prunus	sp.	plums, cherries
Quercus	*incana*	bluejack oak
	laevis	turkey oak
	marilandica	blackjack oak
	virginiana	live oak
Vaccinium	*arboreum*	sparkleberry

[1]Names according to: Little, Elbert L., Jr. *Checklist of United States Trees (Native and Naturalized).* 1978. U.S. Dep. Agr. Handbook No. 541, 375 p.

Standard Tables

Table 1.—*Area by land classes, Alabama, 1982*

Land class	*Area*
	thousand acres
Forest	
Commercial:	
Timberland	21,658.8
Deferred timberland	...
Non-commercial:	
Productive-reserved[1]	66.1
Unproductive	...
Total forest	21,724.9
Nonforest	
Cropland[2]	5,630.1
Other[3]	5,190.4
Total nonforest	10,820.5
All land[4]	32,545.4

[1]Based on a complete census of forest land-holding public agencies as of January 1, 1982.
[2]United States Department of Commerce, Bureau of the Census, 1978 census of agriculture, Volume 1: State and county data.
[3]Includes pasture range, swampland, industrial, urban and other nonforest land, and areas classes as water by Forest Survey Standards, but defined by the Bureau of the Census as land.
[4]United States Department of Commerce, Bureau of the Census, Area Measurement Reports, GE-20, No. 2, 1965. (Data as of April 1, 1960).

Table 2.—*Area of timberland by ownership classes, Alabama, 1982*[1]

Ownership class	*Area*
	thousand acres
Public:	
National forest	688.6
Other federal	261.7
State	147.4
County	62.5
Total public	1,160.2
Private:	
Forest industry[2]	4,458.0
Farmer	5,880.4
Miscellaneous private:	
Individual	8,342.9
Corporate	1,817.1
Total private	20,498.5
All ownerships	21,658.8

[1]Totals may not add due to rounding.
[2]Not including 677,000 acres of farmer-owned and miscellaneous private lands leased to forest industry.

Table 3.—*Area of timberland by stand size and ownership classes, Alabama, 1982*[1]

Stand size class	All ownerships	National forest	Other public	Forest industry	Farmer	Miscellaneous private
	thousand acres					
Sawtimber	7,617.7	376.5	219.7	1,449.6	2,222.5	3,349.4
Poletimber stands	6,948.8	171.2	128.7	1,275.6	2,035.7	3,337.5
Sapling and seedling	6,723.3	140.9	111.6	1,662.5	1,547.5	3,260.9
Nonstocked areas	369.0	0.0	11.6	70.3	74.8	212.3
All classes	21,658.8	688.6	471.7	4,458.0	5,880.4	10,160.0

[1] Totals may not add due to rounding.

Table 4.—*Area of timberland by stand volume and ownership classes, Alabama, 1982*[1]

Stand volume per acre[2]	All ownerships	National forest	Other public	Forest industry	Farmer	Miscellaneous private
board feet[2]	*thousand acres*					
Less than 1,500	9,186.8	209.1	139.8	2,175.8	2,232.3	4,429.7
1,500 to 5,000	7,163.5	193.6	183.4	1,033.7	2,245.3	3,507.5
More than 5,000	5,308.4	285.9	148.5	1,248.5	1,402.8	2,222.8
All classes	21,658.8	688.6	471.7	4,458.0	5,880.4	10,160.0

[1] Totals may not add due to rounding.
[2] International 1/4-inch rule.

Table 5.—*Area of timberland by percent growing-stock trees and cull trees, Alabama 1982*[1]

Growing-stock trees	Total	Cull trees, percent stocking						
		0-10	10-20	20-30	30-40	40-50	50-60	60+
percent stocking	*thousand acres*							
0-10	168.7	47.3	10.9	11.4	6.0	5.8	11.5	75.8
10-20	320.3	53.2	34.9	11.0	47.4	27.3	40.9	105.6
20-30	435.1	81.2	24.6	34.7	64.5	53.7	69.9	106.6
30-40	795.8	35.5	53.0	125.3	103.4	135.0	88.2	255.4
40-50	1,252.5	64.3	122.3	156.8	239.6	228.3	156.8	284.4
50-60	1,798.3	137.1	178.9	288.0	301.7	284.1	297.1	311.5
60-70	2,428.7	238.2	362.3	421.7	476.7	421.9	243.0	265.1
70-80	2,651.6	333.2	421.3	731.0	488.1	307.6	208.7	161.6
80-90	2,808.7	488.5	611.1	605.4	491.0	388.5	137.3	87.0
90-100	2,577.3	542.5	652.3	546.5	521.8	228.5	80.1	5.7
100-110	2,259.8	683.4	699.1	479.6	252.9	117.2	27.5	...
110-120	1,561.5	652.4	473.4	288.0	129.8	17.9	...	...
120-130	1,161.2	579.1	357.4	130.2	94.5	...	...	...
130-140	764.5	478.3	191.9	94.2	...	...	...	...
140-150	425.8	359.4	66.5	...	...	...	...	...
150-160	163.1	140.2	22.9	...	...	...	...	...
160+	85.8	85.8	...	...	...	...	...	...
Total	21,658.8	4,999.5	4,282.6	3,923.9	3,217.4	2,215.8	1,361.0	1,658.6

[1] Totals may not add due to rounding.

Table 6.—*Average basal area of live trees on timberland by ownership and timber classes, Alabama, 1982*[1]

Owner and timber classes	All species	Softwood			Hardwood		
		Sapling & seedling	Poletimber	Sawtimber	Sapling & seedling	Poletimber	Sawtimber
	square feet per acre						
National forest:							
Growing stock	69.2	4.0	10.0	26.5	7.2	11.5	10.0
Rough & rotten	20.0	1.4	.9	1.0	7.5	5.1	4.1
Total	89.2	5.4	10.8	27.5	14.8	16.7	14.1
Other public:							
Growing stock	62.3	2.2	5.3	14.6	8.6	15.7	15.8
Rough & rotten	22.6	.5	.1	1.3	7.1	6.0	7.7
Total	84.9	2.7	5.4	15.9	15.7	21.6	23.5
Forest industry:							
Growing stock	59.2	5.6	11.7	15.5	7.1	9.8	9.4
Rough & rotten	15.6	1.1	1.0	1.0	5.0	3.7	3.6
Total	74.8	6.7	12.7	16.5	12.2	13.6	12.9
Farmer:							
Growing stock	60.1	2.9	7.2	13.4	7.7	15.6	13.2
Rough & rotten	20.0	.8	.7	1.2	6.3	5.3	5.7
Total	80.1	3.7	7.9	14.6	14.1	20.9	18.9
Miscellaneous private:							
Growing stock	57.1	4.1	8.8	13.6	7.4	12.7	10.3
Rough & rotten	18.4	1.1	.7	1.0	5.8	4.8	5.0
Total	75.6	5.2	9.5	14.6	13.3	17.5	15.3
All owners:							
Growing stock	58.8	4.1	8.9	14.4	7.5	12.9	11.0
Rough & rotten	18.4	1.0	.7	1.1	5.9	4.7	4.9
Total	77.3	5.1	9.7	15.5	13.4	17.7	16.0

[1] Totals may not add due to rounding.

Table 7.—*Area of timberland by site and ownership classes, Alabama, 1982*[1]

Site class	All ownerships	National forest	Other public	Forest industry	Farmer	Miscellaneous private
	thousand acres					
165 ft³ or more	974.3	22.8	22.9	157.7	305.7	465.2
120 to 165 ft³	3,785.4	69.9	87.5	979.3	1,036.3	1,612.4
85 to 120 ft³	8,468.7	246.7	160.5	1,694.0	2,377.4	3,990.1
50 to 85 ft³	7,263.8	274.9	175.3	1,420.6	1,912.9	3,480.1
Less than 50 ft³	1,166.5	74.3	25.4	206.5	248.1	612.2
All classes	21,658.8	688.6	471.7	4,458.0	5,880.4	10,160.0

[1]Totals may not add due to rounding.

Table 8.—*Area of timberland by forest types and ownership classes, Alabama, 1982*[1]

Type	All ownerships	National forest	Other public	Forest industry	Farmer	Miscellaneous private
	thousand acres					
Longleaf-slash	1,482.7	94.7	34.3	551.9	181.5	620.4
Loblolly-shortleaf	5,853.7	183.7	70.3	1,527.6	1,303.3	2,768.7
Oak-pine	4,562.9	224.6	106.8	924.6	1,153.4	2,153.5
Oak-hickory	7,275.8	179.5	151.6	987.1	2,320.8	3,636.7
Oak-gum-cypress	2,373.5	6.2	103.1	449.5	863.3	951.5
Elm-ash-cottonwood	74.0	...	5.6	5.3	52.1	11.0
Nontyped[2]	36.2	...	...	12.0	6.0	18.3
All types	21,658.8	688.6	471.7	4,458.0	5,880.4	10,160.0

[1]Totals may not add due to rounding.
[2]No live trees 1.0 inches diameter or larger at breast height.

Table 9.—*Area of noncommercial forest land by forest types, Alabama, 1982*[1]

Type	All areas	Productive reserved areas	Unproductive areas
	thousand acres		
Longleaf-slash pine	7.9	7.9	...
Loblolly-shortleaf pine	15.9	15.9	...
Oak-pine	18.5	18.5	...
Oak-hickory	19.2	19.2	...
Oak-gum-cypress	4.6	4.6	...
All types	66.1	66.1	...

[1]Based on a complete census of forest land-holding public agencies as of January 1, 1982.

Table 10.—*Number of growing-stock trees on timberland by species and diameter classes, Alabama, 1982*[1]

Species	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
	Diameter class (inches at breast height)										
	thousand trees										
Softwood:											
Longleaf pine	97,153	27,463	25,452	18,238	12,298	7,639	4,144	1,430	379	110	...
Slash pine	106,679	52,400	26,764	13,101	8,342	3,547	1,314	721	301	189	...
Shortleaf pine	227,165	92,611	63,585	35,763	20,697	9,577	3,126	1,258	445	105	...
Loblolly pine	589,397	236,600	153,494	83,998	51,576	30,666	16,430	8,829	4,402	3,255	148
Virginia pine	92,026	42,937	26,938	13,304	6,174	1,890	627	134	22	...	...
Spruce pine	13,797	3,971	3,485	2,089	1,581	1,045	829	471	170	155	...
Redcedar	15,670	8,224	4,548	2,107	537	153	61	23	17	...	...
Hemlock	1,125	646	108	330	...	41	...	...	...	...	...
Cypress	7,648	2,060	1,429	1,566	1,037	522	339	173	219	297	6
Total	1,150,659	466,911	305,803	170,495	102,241	55,080	26,870	13,039	5,955	4,111	154
Hardwood:											
Select white oaks[2]	88,622	32,093	20,080	15,211	9,836	4,638	3,133	1,836	915	829	52
Select red oaks[3]	20,256	5,874	4,334	3,338	2,199	1,596	1,065	970	389	427	63
Other white oaks	90,753	38,656	21,175	15,270	7,616	3,765	1,962	1,090	633	565	22
Other red oaks	246,926	98,940	60,733	36,770	21,429	13,239	7,812	3,648	1,960	2,269	127
Pecan	214	214	...	...	...	...	...	...	...	...	...
Water hickory	1,265	455	466	178	...	125	...	...	...	42	...
Other hickories	117,232	45,743	29,652	18,981	11,324	6,260	3,045	1,214	542	472	...
Persimmon	7,401	4,621	1,905	416	347	47	64	...	...	...	...
Hard maple	4,099	2,183	748	720	170	208	70	...	...	...	...
Soft maple	29,930	16,299	7,151	3,230	1,785	710	332	282	80	62	...
Boxelder	984	457	137	85	227	49	30	...	...	...	...
Beech	6,097	1,832	1,505	436	831	599	409	185	62	238	...
Sweetgum	232,097	113,130	63,352	29,779	14,206	6,549	2,565	1,207	735	560	15
Blackgum	61,178	22,883	14,854	12,942	5,833	2,922	1,176	309	186	73	...
Other gums	42,491	14,021	11,450	6,026	4,152	3,439	2,115	681	414	185	8
White ash	7,142	3,242	1,183	1,214	464	640	257	21	61	60	...
Other ashes	17,605	7,854	2,695	2,492	1,772	1,126	1,068	225	206	167	...
Sycamore	3,988	1,459	799	426	107	498	183	277	102	112	26
Cottonwood	619	406	...	...	50	83	34	...	...	47	...
Basswood	3,223	1,603	778	248	277	145	130	25	18	...	...
Yellow-poplar	55,133	18,591	11,493	7,845	6,279	5,097	2,675	1,546	818	754	35
Magnolia	5,391	2,414	929	1,166	357	393	35	46	37	15	...
Sweetbay	36,212	15,662	10,099	5,154	2,561	1,728	673	185	83	68	...
Willow	1,906	768	510	392	51	133	35	...	...	17	...
Black walnut	1,216	627	321	...	74	135	32	29	...	...	...
Black cherry	5,053	2,708	1,371	808	165	...	...	...	...	...	...
American elm	5,359	1,589	1,507	815	576	243	344	177	79	30	...
Other elms	15,715	7,570	4,122	1,555	1,684	284	161	232	67	40	...
River birch	5,340	2,523	844	628	792	260	123	55	70	45	...
Hackberry	12,099	4,032	3,120	1,814	1,591	682	395	172	98	195	...
Black locust	1,137	589	255	167	126	...	...	...	...	...	...
Other locusts	880	608	122	84	66	...	...	...	...	...	...
Sassafras	1,420	1,297	...	91	...	...	32	...	...	...	...
Dogwood	31,561	28,966	2,096	499	...	...	...	...	...	...	...
Holly	3,660	2,238	905	417	62	38	...	...	...	...	...
Other hardwoods	2,130	999	611	254	171	...	67	28	...	...	...
Total	1,166,332	503,144	281,303	169,447	97,181	55,628	30,021	14,438	7,552	7,271	347
Total all species	2,316,992	970,055	587,106	339,943	199,422	110,708	56,890	27,477	13,508	11,383	500

[1]Totals may not add due to rounding.
[2]Includes white, swamp chestnut, chinkapin, Durand, and bur oaks.
[3]Includes cherrybark, Shumard, and northern red oaks.

Table 11.—*Volume of timber on timberland by classes of timber and by softwoods and hardwoods, Alabama, 1982*[1]

Class of timber	All species	Softwood	Hardwood
	million cubic feet		
Sawtimber trees:			
Saw-log portion	11,990.9	7,505.4	4,485.5
Upper-stem portion	1,930.2	891.9	1,038.3
Total	13,921.1	8,397.3	5,523.8
Poletimber trees	7,785.1	3,258.4	4,526.7
All growing stock	21,706.2	11,655.7	10,050.5
Rough trees	2,660.8	615.2	2,045.6
Rotten trees	802.9	76.8	726.1
Salvable dead trees	237.0	150.6	86.4
All timber	25,406.9	12,498.4	12,908.5

[1]Totals may not add due to rounding.

Table 12.—*Volume of growing stock and sawtimber on timberland by ownership classes, and by softwoods and hardwoods, Alabama, 1982*[1]

	Growing-stock			Sawtimber		
Ownership class	All species	Softwood	Hardwood	All species	Softwood	Hardwood
	million cubic feet			*million board feet*		
National forest	903.3	619.3	290.0	3,518.2	2,751.7	766.5
Other public	519.3	220.9	298.4	1,901.4	1,014.6	886.8
Forest industry	4,490.0	2,798.1	1,691.9	15,331.3	10,461.2	4,870.1
Farmer	6,109.9	2,838.5	3,271.4	19,966.1	11,296.3	8,669.7
Miscellaneous private	9,677.6	5,178.9	4,498.8	30,851.4	18,974.9	11,876.5
All ownerships	21,706.2	11,655.7	10,050.5	71,568.4	44,498.6	27,069.8

[1]Totals may not add due to rounding.

Table 13.—*Volume of growing stock on timberland by species and diameter classes, Alabama, 1982*[1]

Species	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–larger
	Diameter class (inches at breast height)										
	million cubic feet										
Softwood:											
Longleaf pine	1,208.7	69.1	182.6	239.0	246.8	213.9	155.8	68.9	23.3	9.3	...
Slash pine	891.0	105.2	200.8	181.2	177.3	104.2	50.6	36.4	18.6	16.8	...
Shortleaf pine	2,051.1	229.6	433.0	462.9	417.2	280.1	123.3	65.0	30.7	9.3	...
Loblolly pine	6,400.4	601.9	1,037.8	1,052.7	1,046.0	895.1	655.6	474.9	303.4	306.6	26.5
Virginia pine	674.7	132.4	190.2	161.2	113.2	47.4	22.9	6.2	1.3	...	...
Spruce pine	212.1	6.2	23.3	25.9	33.8	33.4	33.8	26.2	12.0	17.4	...
Redcedar	66.3	12.4	18.4	17.8	8.5	4.2	3.0	1.0	1.0	...	...
Hemlock	6.8	1.2	0.9	3.7	...	1.1	...	...	...	...	...
Cypress	144.6	3.5	9.9	21.7	20.8	14.5	14.9	9.6	15.7	29.6	4.3
Total	11,655.7	1,161.5	2,096.9	2,166.1	2,063.7	1,593.8	1,059.9	688.2	405.9	389.1	30.7
Hardwood:											
Select white oaks[2]	886.3	60.8	115.0	158.4	153.4	112.1	98.0	74.9	48.1	58.3	7.2
Select red oaks[3]	296.6	11.5	31.6	36.3	37.2	39.6	36.5	42.2	20.1	32.7	9.0
Other white oaks	709.1	78.8	117.3	145.6	113.0	80.2	57.7	40.8	31.5	40.9	3.3
Other red oaks	2,319.1	221.2	362.0	400.1	349.7	302.8	246.2	147.9	101.6	169.5	18.2
Pecan	1.3	1.3	...	...	...	...	...	...	...	...	...
Water hickory	12.0	1.2	2.0	2.0	...	3.1	...	...	...	3.7	...
Other hickories	984.6	91.5	169.0	190.7	179.1	142.7	97.2	49.0	29.9	35.5	...
Persimmon	34.5	11.4	10.7	3.6	5.5	1.2	2.1	...	...	...	...
Hard maple	26.8	6.8	4.3	6.3	2.4	4.6	2.4	...	...	...	...
Soft maple	178.5	36.3	38.9	29.9	26.0	16.2	10.8	11.4	4.4	4.8	...
Boxelder	7.0	0.8	0.7	0.6	3.4	0.6	0.8	...	...	...	...
Beech	79.9	5.2	6.8	4.1	11.5	12.8	12.0	7.5	2.9	16.9	...
Sweetgum	1,638.6	222.9	372.0	345.3	270.1	178.6	95.1	60.0	44.9	47.1	2.5
Blackgum	512.5	51.4	89.9	141.3	95.0	69.5	37.2	13.2	9.3	5.7	...
Other gums	469.8	31.0	74.2	69.2	74.1	83.6	70.5	27.6	23.5	15.0	1.1
White ash	67.2	7.2	7.5	12.3	7.6	15.6	7.9	1.1	3.4	4.6	...
Other ashes	188.4	20.5	16.6	26.7	29.2	26.9	35.1	9.7	11.2	12.6	...
Sycamore	68.0	6.9	5.5	5.2	1.9	11.7	5.3	12.3	5.6	10.0	3.7
Cottonwood	9.8	1.2	...	...	1.1	2.4	1.3	...	...	3.8	...
Basswood	24.3	4.1	4.0	2.2	4.7	3.0	4.4	0.9	1.1	...	...
Yellow-poplar	737.9	53.2	74.2	87.9	115.7	133.9	91.5	69.2	45.3	61.7	5.4
Magnolia	45.1	4.9	5.7	11.8	6.3	9.2	1.1	2.5	2.1	1.5	...
Sweetbay	275.6	37.9	64.7	53.9	39.7	40.4	21.7	7.9	4.5	5.0	...
Willow	14.8	2.3	2.5	3.9	1.0	2.8	1.1	...	...	1.2	...
Black walnut	7.6	1.2	1.7	...	1.0	2.1	0.6	1.1	...	...	...
Black cherry	23.7	6.3	7.2	7.3	2.8	...	...	...	...	...	...
American elm	58.9	4.9	8.1	7.7	8.2	6.0	11.0	6.9	3.9	2.2	...
Other elms	109.8	19.6	21.5	15.2	26.9	6.1	4.3	9.6	3.4	3.2	...
River birch	51.3	7.2	5.7	7.3	12.3	5.9	3.9	1.8	3.5	3.6	...
Hackberry	121.3	8.8	18.2	16.5	24.9	14.9	12.1	7.5	5.1	13.4	...
Black locust	5.8	1.0	1.7	1.3	1.7	...	...	...	...	...	...
Other locusts	4.1	1.7	0.9	0.6	0.9	...	...	...	...	...	...
Sassafras	4.9	3.1	...	0.7	...	...	1.1	...	...	...	...
Dogwood	49.0	39.1	6.8	3.1	...	...	...	...	...	...	...
Holly	14.0	3.6	4.6	3.8	0.9	1.0	...	...	...	...	...
Other hardwoods	12.4	2.6	1.9	2.8	2.0	...	2.0	1.1	...	...	...
Total	10,050.5	1,069.6	1,653.4	1,803.8	1,609.1	1,329.3	970.9	606.1	405.3	552.9	50.2
All species	21,706.2	2,231.0	3,750.3	3,969.8	3,672.8	2,923.1	2,030.8	1,294.3	811.2	942.0	80.9

[1]Totals may not add due to rounding.
[2]Includes white, swamp chestnut, chinkapin, Durand, and bur oaks.
[3]Includes cherrybark, Shumard, and northern red oaks.

Table 14.—*Volume of sawtimber on timberland by species and diameter classes, Alabama, 1982*[1]

Species	All classes	Diameter class (inches at breast height) 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-larger
	million board feet								
Softwood:									
Longleaf pine	5,078.2	1,064.1	1,320.1	1,219.4	894.6	394.6	131.0	54.4	...
Slash pine	3,053.5	816.2	963.9	584.5	287.8	203.2	101.5	96.4	...
Shortleaf pine	7,180.2	1,960.8	2,187.4	1,633.7	736.5	402.4	199.2	60.2	...
Loblolly pine	25,768.8	4,311.8	5,460.9	5,109.8	3,928.7	2,952.5	1,915.6	1,914.8	174.7
Virginia pine	1,478.9	507.4	548.4	253.2	132.8	32.2	4.8	...	...
Spruce pine	1,034.4	98.4	180.4	199.6	204.3	163.3	75.5	113.0	...
Redcedar	139.5	53.1	33.4	22.7	18.9	5.7	5.7	...	...
Hemlock	21.0	15.5	...	5.5	...	...	...	...	...
Cypress	743.9	101.2	107.9	80.1	89.6	59.0	98.5	181.6	26.1
Total	44,498.6	8,928.5	10,802.4	9,108.6	6,293.3	4,212.9	2,531.8	2,420.3	200.8
Hardwood:									
Select white oaks[2]	2,729.3	...	595.4	572.6	545.6	416.2	267.9	300.9	30.6
Select red oaks[3]	1,085.6	...	137.0	203.7	204.7	233.1	111.1	165.1	30.9
Other white oaks	1,832.1	...	456.6	415.6	329.1	236.2	177.4	206.9	10.3
Other red oaks	6,607.1	...	1,409.0	1,533.3	1,343.1	818.8	549.2	872.5	81.3
Water hickory	35.3	...	...	15.2	...	...	...	20.1	...
Other hickories	2,694.9	...	780.3	744.3	532.3	266.4	173.1	198.5	...
Persimmon	36.9	...	19.7	6.0	11.2	...	...	...	...
Hard maple	49.8	...	11.0	24.7	14.1	...	...	...	...
Soft maple	360.9	...	99.5	82.7	59.0	67.1	24.6	28.0	...
Boxelder	20.2	...	13.2	3.0	3.9	...	...	...	...
Beech	328.7	...	46.0	66.9	62.1	40.6	16.1	96.9	...
Sweetgum	3,326.1	...	1,127.3	940.9	516.8	313.4	214.4	204.0	9.2
Blackgum	1,057.3	...	362.2	342.8	199.6	70.5	50.5	31.6	...
Other gums	1,373.9	...	268.3	388.4	366.4	151.6	121.9	71.2	6.1
White ash	205.5	...	30.8	80.1	43.7	6.5	18.2	26.2	...
Other ashes	582.5	...	110.9	133.8	171.7	49.2	61.1	55.8	...
Sycamore	259.1	...	8.4	55.2	27.1	63.1	30.6	55.7	18.9
Cottonwood	40.9	...	4.0	11.7	5.5	...	...	19.7	...
Basswood	71.7	...	21.8	15.1	24.2	4.9	5.7	...	...
Yellow-poplar	2,641.1	...	492.4	684.4	483.0	380.1	245.2	328.5	27.6
Magnolia	115.1	...	25.1	49.6	7.1	15.5	10.9	6.9	...
Sweetbay	530.9	...	135.0	192.6	113.6	41.3	23.8	24.6	...
Willow	29.7	...	4.7	11.7	5.8	...	...	7.4	...
Black walnut	23.9	...	4.1	10.3	3.0	6.4	...	...	...
Black cherry	12.4	...	12.4	...	...	...	...	...	...
American elm	190.8	...	28.2	30.0	58.6	37.0	23.9	13.1	...
Other elms	249.1	...	108.4	29.1	20.0	54.1	18.6	18.9	...
River birch	151.2	...	51.5	29.1	19.5	10.6	20.5	20.0	...
Hackberry	383.5	...	96.2	69.1	67.4	42.9	29.3	78.6	...
Black locust	7.5	...	7.5	...	...	...	...	...	...
Other locusts	2.9	...	2.9	...	...	...	...	...	...
Sassafras	6.5	...	...	...	...	...	...	...	...
Holly	6.2	...	0.8	5.4	...	...	...	...	...
Other hardwoods	21.4	...	5.3	0.0	10.2	5.9	...	...	...
Total	27,069.8	...	6,476.0	6,747.4	5,255.0	3,331.4	2,194.0	2,851.1	214.9
All species	71,568.4	8,928.5	17,278.4	15,855.9	11,548.3	7,544.3	4,725.9	5,271.4	415.7

[1]Totals may not add due to rounding.
[2]Includes white, swamp chestnut, chinkapin, Durand, and bur oaks.
[3]Includes cherrybark, Shumard, and northern red oaks.

Table 15.—*Volume of sawtimber on timberland by species and log grades, Alabama, 1982*[1]

Species	All grades	Grade 1	Grade 2	Grade 3	Grade 4
	million board feet				
Softwood:					
Yellow pines	43,594.1	7,515.9	7,540.2	28,538.0	...
Cypress	743.9	410.6	123.4	209.9	...
Other softwoods	160.6	108.3	...	52.3	...
Total	44,498.6	8,034.8	7,663.6	28,800.3	...
Hardwood:					
Select white and red oaks[2]	3,796.6	670.6	1,069.3	1,469.7	587.1
Other white and red oaks	8,457.5	707.9	1,514.4	3,466.1	2,769.1
Hickory and pecan	2,730.2	275.1	599.5	1,314.9	540.6
Hard maple	49.8	...	13.3	11.0	25.5
Sweetgum	3,326.1	328.5	704.5	1,641.9	651.2
Tupelo and blackgum	2,431.1	324.6	663.2	1,286.1	157.2
Ash, walnut and black cherry	811.9	160.5	273.2	329.9	48.3
Yellow-poplar	2,641.1	203.1	356.4	1,062.0	1,019.5
Other hardwoods	2,825.5	268.8	438.3	1,233.0	885.5
Total	27,069.8	2,939.1	5,632.0	11,814.6	6,684.1
All species	71,568.4	10,973.9	13,295.6	40,614.8	6,684.1

[1]Totals may not add due to rounding.
[2]Includes white, swamp chestnut, chinkapin, Durand, bur, cherrybark, Shumard, and northern red oaks.

Table 16.—*Periodic net annual growth and removals of growing stock on timberland by species, Alabama, 1972-1982*[1]

Species	Periodic net annual growth	Periodic annual removals
	million cubic feet	
Yellow pines	636.3	631.9
Cypress	3.7	3.2
Other softwoods	1.8	1.2
Total softwoods	641.8	636.2
Select white and red oaks[2]	49.4	29.9
Other white and red oaks	127.2	81.3
Hickory and pecan	28.0	23.3
Hard maple	1.2	0.6
Sweetgum	65.7	36.3
Tupelo and blackgum	19.7	11.0
Ash, walnut and black cherry	6.3	4.2
Yellow-poplar	28.7	11.7
Other hardwoods	18.3	20.3
Total hardwoods	344.5	218.6
All species	986.3	854.8

[1]Totals may not add due to rounding.
[2]Includes white, swamp chestnut, chinkapin, Durand, bur, cherrybark, Shumard, and northern red oaks.

Table 17.—*Periodic net annual growth and removals of growing stock on timberland by species group and ownership classes, Alabama, 1972-1982*[1]

Ownership class	Periodic net annual growth			Periodic annual removals		
	All species	Softwood	Hardwood	All species	Softwood	Hardwood
	million cubic feet					
National forest	32.4	21.8	10.6	14.7	11.5	3.3
Other public	15.2	8.6	6.6	8.7	6.0	2.7
Forest industry	209.8	154.5	55.3	218.3	170.5	47.9
Farmer	268.2	152.5	115.7	211.5	143.1	68.4
Miscellaneous private	460.8	304.5	156.3	401.4	305.2	96.3
All ownerships	986.3	641.8	344.5	854.8	636.2	218.6

[1]Totals may not add due to rounding.

Table 18.—*Periodic net annual growth and removals of sawtimber on timberland by species, Alabama, 1972-1982*[1]

Species	Periodic net annual growth	Periodic annual removals
	million board feet	
Yellow pines	2,878.5	2,651.9
Cypress	20.1	18.6
Other softwoods	3.1	2.3
Total softwoods	2,901.8	2,672.9
Select white and red oaks[2]	170.1	113.7
Other white and red oaks	409.2	259.3
Hickory and pecan	97.5	73.7
Hard maple	1.9	1.8
Sweetgum	141.1	103.3
Tupelo and blackgum	52.6	37.8
Ash, walnut and black cherry	23.7	11.4
Yellow-poplar	143.0	45.4
Other hardwoods	62.4	59.4
Total hardwoods	1,101.3	705.7
All species	4,003.1	3,378.6

[1]Totals may not add due to rounding.
[2]Includes white, swamp chestnut, chinkapin, Durand, bur, cherrybark, Shumard, and northern red oaks.

Table 19.—*Periodic net annual growth and removals of sawtimber on timberland by ownership classes and by softwoods and hardwoods, Alabama, 1972-1982*[1]

Ownership class	Periodic net annual growth			Periodic annual removals		
	All species	Softwood	Hardwood	All species	Softwood	Hardwood
	million board feet					
National forest	139.4	109.0	30.4	69.2	54.7	14.5
Other public	75.0	51.4	23.6	34.9	28.6	6.3
Forest industry	831.8	660.8	171.0	879.4	737.5	141.9
Farmer	1,129.1	732.2	396.8	818.0	591.7	226.4
Miscellaneous private	1,827.8	1,348.3	479.5	1,577.1	1,260.4	316.8
All ownerships	4,003.1	2,901.8	1,101.3	3,378.6	2,672.9	705.7

[1]Totals may not add due to rounding.

Table 20.—*Periodic annual mortality of growing stock and sawtimber on timberland by species, Alabama, 1972–1982*[1]

Species	Growing stock	Sawtimber
	million cubic feet	*million board feet*
Yellow pine	119.4	329.1
Cypress	0.7	3.5
Other softwoods	1.2	1.7
Total softwoods	121.3	334.3
Select white and red oaks[2]	4.5	18.5
Other white and red oaks	24.2	79.7
Hickory and pecan	6.4	23.1
Hard maple	...	...
Sweetgum	13.1	36.5
Tupelo and blackgum	6.7	23.9
Ash, walnut and black cherry	3.7	10.7
Yellow-poplar	3.3	8.6
Other hardwoods	21.4	50.4
Total hardwoods	83.6	251.5
All species	204.9	585.8

[1]Totals may not add due to rounding.
[2]Includes white, swamp chestnut, chinkapin, Durand, bur, cherrybark, Shumard, and northern red oaks.

Table 21.—*Periodic annual mortality of growing stock and sawtimber on timberland by ownership classes and by softwoods and hardwoods, Alabama, 1972–1982*[1]

Ownership class	Growing stock			Sawtimber		
	All species	Softwood	Hardwood	All species	Softwood	Hardwood
	million cubic feet			*million board feet*		
National forest	5.6	4.5	1.1	19.3	16.5	2.8
Other public	6.8	2.6	4.2	24.7	10.1	14.7
Forest industry	43.1	27.7	15.4	137.8	85.8	52.0
Farmer	58.5	27.5	30.9	169.0	77.4	91.6
Miscellaneous private	90.9	59.0	32.0	234.9	144.5	90.5
All ownerships	204.9	121.3	83.6	585.8	334.3	251.5

[1]Totals may not add due to rounding.

Table 22.—*Periodic annual mortality of growing stock and sawtimber on timberland by causes of death and by softwoods and hardwoods, Alabama, 1972–1982*[1]

Cause of death	Growing stock			Sawtimber		
	All species	Softwood	Hardwood	All species	Softwood	Hardwood
	million cubic feet			*million board feet*		
Bark beetles	31.9	31.9	...	95.5	95.5	...
Other insects	17.2	14.3	2.9	43.1	36.4	6.7
Disease	83.3	45.8	37.5	236.3	120.0	116.3
Fire	3.1	1.1	2.1	8.0	2.8	5.1
Beaver	6.9	0.3	6.5	20.2	1.9	18.3
Other animals	0.3	0.2	0.1	1.0	1.0	...
Weather	42.5	14.2	28.3	144.1	54.0	90.0
Hurricane	8.9	5.5	3.5	30.1	17.7	12.4
Suppression	8.1	6.4	1.7	2.2	1.4	0.8
Other	2.7	1.7	1.0	5.4	3.5	1.9
All causes	204.9	121.3	83.6	585.8	334.3	251.5

[1]Totals may not add due to rounding.

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This report presents the principal findings of the fifth forest survey of Alabama (1982) and changes that have occurred since earlier surveys. Topics examined include the status and trends in forest area and timber volume by forest type, ownership, species, stand structure, growth, removals, mortality, management opportunities and timber products output. Nontimber resources associated with timberland—water, soils, livestock, wildlife, and outdoor recreation—are also discussed.

Additional keywords: forest productivity, forest inventory, multiresource inventories.