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FOREST RESOURCES OF SOUTHEAST ALABAMA

by

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A Progress Report by

THE SOUTHERN FOREST SURVEY

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FOREWORD

The nation-wide Forest Survey, being conducted by the United States Forest Service, was authorized by the McSweeney-McNary Forest Research Act of 1928. Its five-fold object is: (1) to make an inventory of the present supply of timber and other forest products, (2) to ascertain the rate at which this supply is being increased through growth, (3) to determine the rate at which this supply is being diminished through industrial and local use, windfall, fire, and disease, (4) to determine the present requirement and the probable future trend in the requirement for timber and other forest products, and (5) to correlate these findings with existing and anticipated economic conditions, in order that policies may be formulated for the effective use of land suitable for forest production.

This release is based on a field survey made April 6 to July 13, 1935, and two field canvasses of forest industrial plants to determine forest drain, the last of which was made during May and June 1938. It should be regarded only as a progress report since it contains Forest Survey data that will be included in complete reports to be published later, and that, although considered reliable, are subject to correction or amplification as the work of computation proceeds. Item 4 above, which is being studied on a national basis, is not discussed in this report.

In the interpretation of these survey data, it must be noted that, owing to the sampling method used in collecting them, the greater the number of samples in any given classification the more accurate are the data for that classification. Hence classes that are of infrequent occurrence and relatively small in quantity generally cannot be determined with as high a degree of accuracy as classes that occur more frequently and in substantially greater quantities. Small tabular items are to be taken as showing, not the exact magnitude of the classes involved, but their relative magnitude in comparison with those of other classes.

In the South, the Forest Survey functions as an activity of the Southern Forest Experiment Station with headquarters at New Orleans, La.

Assisting Staff

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Note: Assistance in the preparation of these materials was furnished by the personnel of Work Projects Administration Official Project 65-2-64-74.

FOREST RESOURCES OF SOUTHEAST ALABAMA

General Description

Southeast Alabama (Forest Survey Unit Alabama No. 3) has long been one of the principal agricultural areas of the deep South. Since its forests, however, are almost as extensive as its fields, a recent study has been made of the forest resources and wood-products industries of this area to determine how important they are and how their usefulness may be increased. The area, which includes 21 counties with an aggregate of 9 million acres in the southeast part of the State, extends from the Florida boundary line northward to about the middle of the State, and from the Georgia line westward to the west side of Dallas County (see map, fig. 1). Approximately 47 percent of the land (table 1) is forested with various southern pines, hardwoods, and cypress. More than three-fourths of the total population of 709,000 (1930 Census) is classed as rural; whereas less than one-fourth of the population is urban, residing in Montgomery (the largest city and State Capitol), Selma, Dothan, Phoenix City, and other towns of 2,500 or more.

Over four-fifths of the area lies in the Coastal Plain; the remainder, the northernmost part, is in the Piedmont. The principal soils of the Coastal Plain are grey-to-yellow sandy loams and sands, but the Black Belt Prairies, a fairly level area which runs east and west through Bullock, Macon, Montgomery, Lowndes, and Dallas Counties and occupies about one-tenth of the entire area, have black or brown friable soil underlain by whitish limestone material. In the Piedmont portion of the area, which includes Chambers, Tallapoosa, and parts of Lee, Elmore, and Chilton Counties, the soils are dominantly brownish-red clay loams and gray sandy-loams, developed largely from crystalline rocks.

Well drained by rivers that ultimately enter the Gulf of Mexico, southeast Alabama is gently rolling, with elevations ranging from about 100 feet above sea level along the Florida line to 800 feet in the Piedmont. On the Alabama River from Montgomery southwestward to Mobile (outside this area), and on the Chattahoochee River from Phoenix southward, shipping facilities by barge and flatboats are available. The Louisville & Nashville, the Southern, the Seaboard Air Line, the Atlantic Coast Line, the Central of Georgia, the Western Railway of Alabama, and other railroads provide excellent rail transportation, while a network of improved highways and country roads gives accessibility to all parts of the area.

Among the many natural resources, water power is one of the most important in the upper part of the unit, where large hydroelectric plants are located on both the Coosa and Tallapoosa Rivers.

With an average annual rainfall of 50 to 60 inches per year, and a growing season of about 8 months, the three important sources of employment in this area are agriculture, forest industries, and textile mills. The first provides work for more than half of the gainfully employed throughout the section, while the last is largely centered in Elmore, Tallapoosa, and Montgomery Counties, each of which has over 50,000 spindles. The 1935 Census of Agriculture reports that farmers worked for pay away from their own farms more than 1½ million man-days, and it is believed that a large number of these farmers find part-time work in forest industries. Although agriculture broadly defined includes both

farming and forestry, in this report agriculture is used to mean farming, and forestry to mean timber growing and utilization.

Table 1. - Land area classified according to land use, 1935

Land	Area	Proportion of total area
	Acres	Percent
Forest:		
Productive	4,292,900	47.2
Nonproductive	10,900	0.1
Total forest	4,303,800	47.3
Nonforest:		
Agriculture:		
In cultivation:		
Old cropland	3,467,000	38.1
New cropland	67,900	.7
Out of cultivation:		
Idle	269,300	3.0
Abandoned	306,800	3.4
Pasture	448,100	4.9
Total agriculture	4,559,100	50.1
Other nonforest	235,300	2.6
Total nonforest	4,794,400	52.7
Total	9,098,200	100.0

According to the Census of Agriculture approximately 71 percent of the total land area was in farms, of which there were 82,000 with a total area, including woodlands, of 6½ million acres. These woodlands aggregated slightly less than 2½ million acres (37 percent of the total farm area) and were the source of many important forest products either used on the farm or sold. Figure 2 shows the proportion of each county "available for crops" (including cropland and plowable pasture). Practically all the area not "available for crops" is farm woodland or other forest land.

Cotton and corn are the most important agricultural crops, but in southeast Alabama the corn yields are relatively poor — about 10 bushels per acre — as compared with the average of about 19 for the entire United States. The cotton yields per acre are about 1/3 of a bale, which is approximately the average for the entire cotton belt.

Between 1924 and 1934, according to the Census of Agriculture, the cropland area decreased about 3 percent. In this period, the acreage in cotton, the chief cash crop in this unit, declined 41 percent, a loss of over ½ million acres. At the same time the sale price of cotton decreased from over 46 million dollars in 1924 to less than 19 million dollars in 1934 — a decrease of more than 27 million dollars! Preliminary figures for 1938 indicate that the value of the cotton experienced a further decline to 14 million dollar

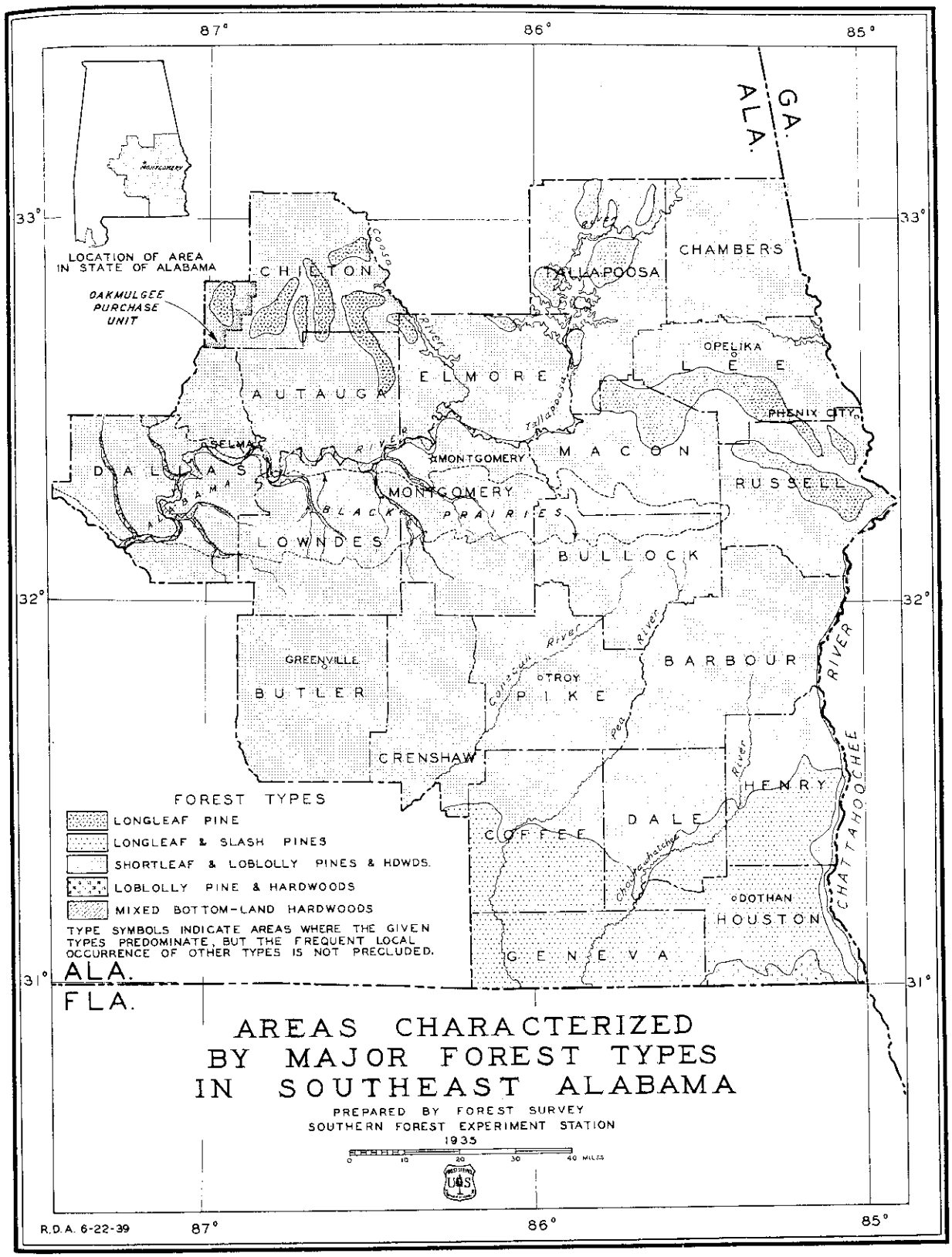


FIGURE 1.—FOREST TYPE MAP.

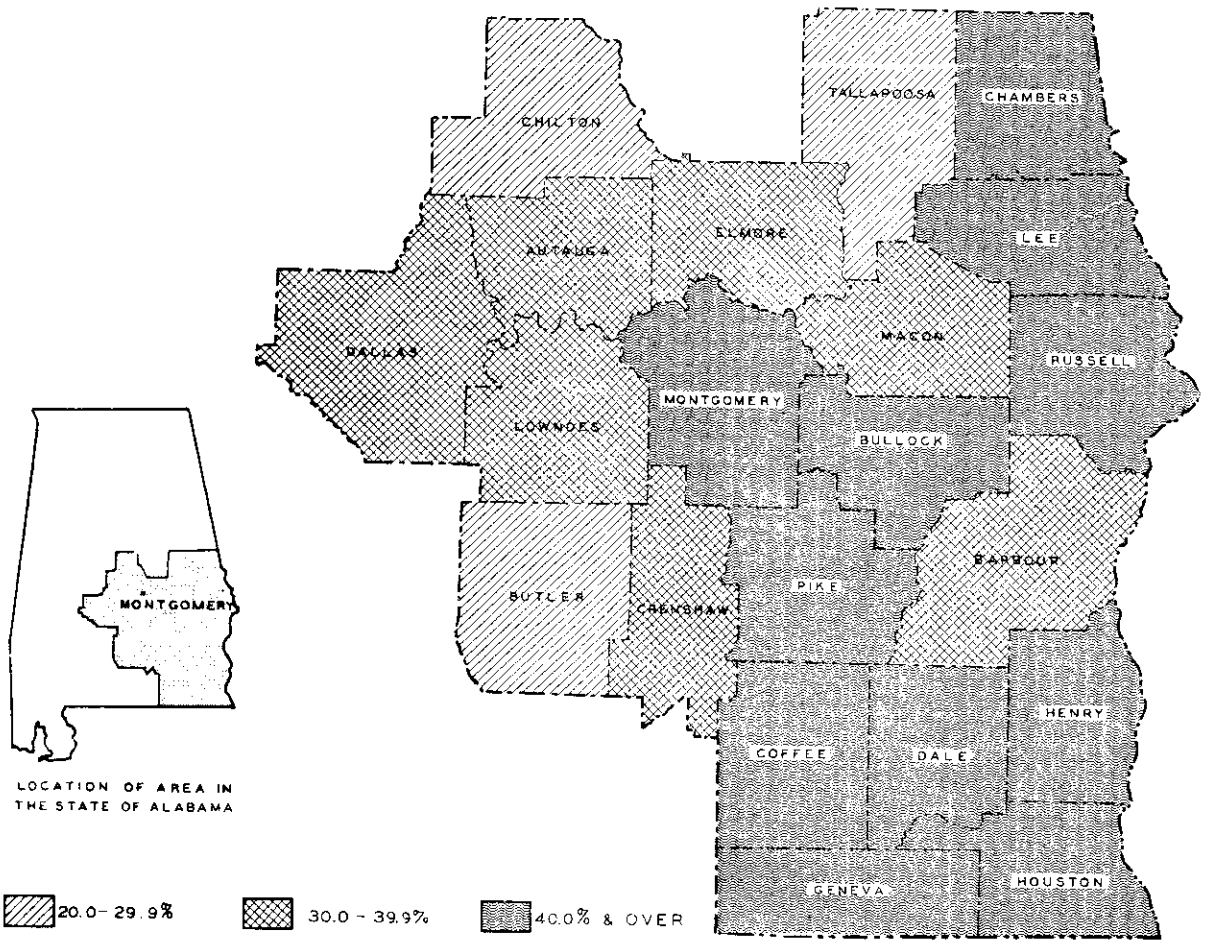


FIGURE 2. — PROPORTION OF COUNTY IN LAND AVAILABLE FOR CROPS (CENSUS OF AGRICULTURE, 1935).

According to the forest survey made in 1935, there were 576,100 acres o idle and abandoned cropland, a large part of which probably will revert to for ests unless: (1) the prices of cotton and corn increase substantially; (2) th acreage in some new crop such as tung oil is expanded; (3) the cattle industry is developed further. Also some areas now in cultivation for cotton probably will be abandoned and will revert to forests, for in growing cotton many parts of southeast Alabama apparently cannot compete successfully with the more fer- tile areas of the Mississippi Valley or the West.

The Forest Survey obtained a fairly accurate record of the well-marked and destructive stages of erosion. Ignoring the milder degrees of erosion, th field men recorded the following forms: (1) sheet erosion, where the soil is washing off from a generally smooth surface; (2) shoestring erosion, where the soil surface is cut into, and a system of small, branching gullies a few inches to 2 ft. deep is formed; and (3) gully erosion, where the soil surface is being destroyed by deep gully systems. As shown in table 2, some erosion i found on 39 percent of the abandoned cropland, 26 percent of the idle cropland 20 percent of the cultivated land, and on 19 percent of the pasture, but on on 12 percent of the forests. It should be pointed out also that in many of the places where accelerated erosion is occurring in the forest, there is heavy ru off from the field above or the forest has grown up on a critically eroded are

on which it has not yet checked the washing away of the soil. Once erosion has reached a critical stage, it usually continues after cultivation is abandoned until a grass, weed, or tree growth is well established either through natural processes or with the assistance of artificial run-off controls such as terraces and check dams.

Table 2. - Correlation of land use with erosion, 1935

Land use	Type of erosion				Total
	None or arrested	Sheet	Shoe-string	Gully	
	Acres				
Forest	3,799,900	212,000	128,800	163,100	4,303,800
Cropland in cultivation	2,824,400	424,100	219,200	67,200	3,534,900
Idle Cropland	198,200	33,700	28,800	8,600	269,300
Abandoned cropland	185,900	40,200	49,100	31,600	306,800
Pasture	362,200	38,500	28,200	19,200	448,100
Total	7,370,600	748,500	454,100	289,700	8,862,900
Percent of total	83.2	8.4	5.1	3.3	100.0

A study of land ownership of 20 of the 21 counties in this unit (Russell County is excluded) made in 1935 by the Bureau of Agricultural Economics, in cooperation with the Works Progress Administration of Alabama, shows that the land is held in about 39,000 ownerships. More than 83 percent of the holdings are less than 260 acres each, but the small percentage of large holdings (17 percent) includes almost two-thirds of the total land area.

Ownerships	Percent of the number	Percent of the area
Less than 100 acres	52	13
100 - 259 acres	31	25
260 - 499 acres	10	17
500 - 999 acres	5	15
1,000 acres and more	2	30
	100	100

In the Black Belt Prairies, the holdings are larger than the average; here four-fifths of the area is in ownerships of 260 acres or more.

In the 20 counties studied, 77 percent of the area was owned by residents of the same county; 12 percent, by residents of other counties in Alabama; 8 percent, by non-residents of the State; and 3 percent, by the public or by owners whose residence is unknown. Also noteworthy is the fact that farmers own most of the area (wood-using industries own only 3 percent of the total), as shown by the following summary of the proportion of the land owned by different business groups:

Business group	Percent of area owned
Farmers	66
Merchants	4
Professional men	3
Administrators and executors	3
Banks and mortgage companies	6
Wood-using industries	3
Mining, power, and railroad companies	1
Farming companies	1
All other businesses	5
Business unknown	7
Governmental agencies (publicly owned land)	1
Total	100

Forest Description

Loblolly pine, which makes up about one-third of all the forest volume, is the principal species of the area, but shortleaf pine and many hardwoods, especially gums, oaks, and yellow poplar, are also well represented (fig. 3). According to the various species present, the forest stands are classified in four major forest type-groups. The pine type-group has a composition by cubic volume (including bark) of 86 percent pine and 14 percent hardwood; the pine-hardwood type-group, 43 percent pine and 57 percent hardwood; the upland hardwoods, 8 percent pine and 92 percent hardwood, chiefly oaks, gums, hickories, and yellow poplar; and the bottom-land hardwood type-group is 4 percent pine and 96 percent hardwood, chiefly gums and red oaks.

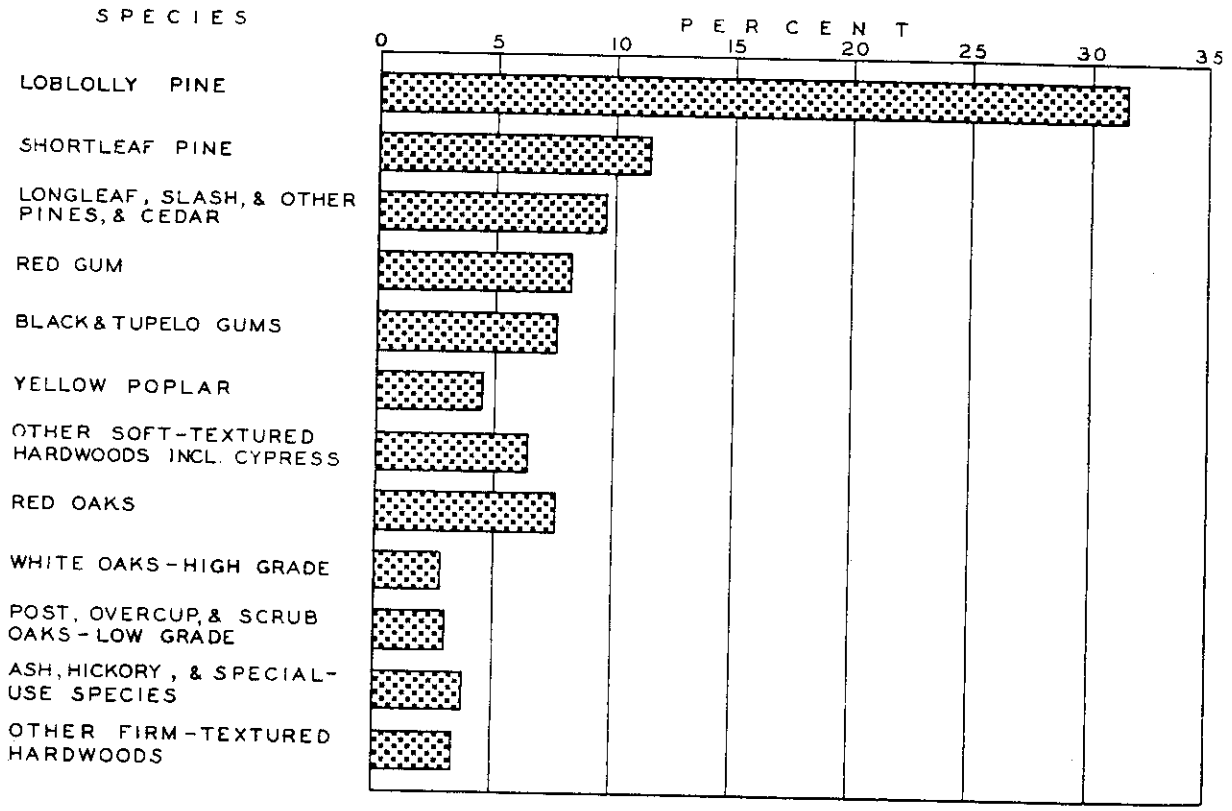


FIGURE 3.- PROPORTION OF TOTAL CUBIC VOLUME IN THE VARIOUS SPECIES.

The prevalence of certain characteristic forest types over large areas is shown in figure 1, although within the broad ranges delineated, occur many small intermingled areas of other types, as well as tracts of cleared land. With the exception of the bottom-land hardwood types, which are confined almost entirely to the river bottoms, branch heads, and swamps, practically all the forest area is in the rolling uplands. As shown in table 3, the pine type-group makes up 52 percent of the entire forest area; the remainder is well distributed among the other three type-groups.

Table 3. - Forest area[1/] classified according to forest condition and forest type-group, 1935

Forest condition	Forest type-group				Total all types	Proportion of total
	Pine	Pine-hardwood	Upland hardwood	Bottom-land hardwood[2/]		
	Acres					Percent
Old growth:						
Uncut	27,400	22,600	10,100	57,000	117,100	2.7
Partly cut	99,900	61,700	71,100	140,500	373,200	8.7
Total	127,300	84,300	81,200	197,500	490,300	11.4
Second growth:						
Sawlog size:						
Uncut	689,400	210,000	80,400	161,600	1,141,400	26.6
Partly cut	431,700	205,300	85.900	124,900	847,800	19.7
Under sawlog size	762,700	302,900	242,000	179,500	1,487,100	34.7
Reproduction[3/]	204,500	52,300	44,500	25,000	326,300	7.6
Total	2,088,300	770,500	452,800	491,000	3,802,600	88.6
Total all conditions	2,215,600	854,800	534,000	688,500	4,292,900	100.0
Percent of total forest area	51.6	19.9	12.4	16.1	100.0	

1/ Does not include 10,900 acres of nonproductive forest land.
2/ Includes 19,500 acres of cypress type.
3/ Includes 84,300 acres of clear-cut condition.

After many decades of forest utilization, only 11 percent of the present forest area can now be classed as "old growth," having the large, old, high-quality trees that are characteristic of the original growth. While most of the old growth is in relatively small, widely-scattered patches, a few large blocks remain. More than half the old growth is in the hardwood types. If less than 10 percent of the sawlog-size trees — pines and cypress at least 9.0 inches d.b.h. (diameter at breast height) and hardwoods at least 13.0 inches — has been cut from the stands, they are classed as "uncut." Uncut old-growth

stands have an average volume of 10,400 board feet per acre (lumber tally, based on the International $\frac{1}{4}$-inch rule) in the pine type-group. The "partly cut" old-growth stands, which have an area over three times that of the uncut, have had 10 percent or more of their sawlog-size trees removed but are still characteristically old-growth. The pine type-group in this condition now has an average volume of 4,500 board feet per acre.

Upon much of the old cut-over land and in many of the fields that were abandoned years ago, the Survey found "second-growth" stands, which, although far from perfect, are remarkable in extent and development. That this second growth was not purposely grown by man, but happened to develop through natural means (often in spite of man's misuse) to the extent that it now occupies over 3 3/4 million acres, or 89 percent of the forest area, is indeed worthy of note. Uncut second-growth sawlog-size stands, which occupy almost $1\frac{1}{4}$ million acres, average, all types combined, about 3,800 board feet per acre; the partly cut stands, occupying over 750,000 acres, average about 2,700 board feet and have a minimum of 400 board feet.

"Under-sawlog-size" second-growth stands occupy $1\frac{1}{2}$ million acres, and although they contain an average of less than 300 board feet per acre in a few trees of saw-timber size, they have over 3 cords per acre of growing-stock material, including that in the associated smaller trees 5.0 inches d.b.h. and larger. The youngest forest stands, i.e., the "reproduction," which consists chiefly of seedlings and sprouts less than 1.0 inch d.b.h., occupy over 250,000 acres.

Areas showing less than 80 seedlings per acre are classed as "clear-cut" and comprise approximately 84,000 acres. Since these tracts have scattered seed trees, it is believed that many of them ultimately will be reforested if fires are controlled. Most of the seedling areas have the same species composition as the adjacent stands, but the more prolific seeders tend to capture the site. Thus in the last three decades the loblolly and shortleaf pines have increased their range and representation at the expense of the longleaf pine.

The classification of the areas dominated by loblolly or shortleaf pines according to site index — a measure of the productivity of the forest areas, based upon the average height in feet of average dominant trees at the age of 50 years — is as follows:

Site index in feet	Areas dominated by: Loblolly pine Percent	Shortleaf pine Percent
90 or better	23	3
80	37	11
70	28	37
60	12	37
50 or less	-	12
Total	100	100

The proportion of good pine sites in this area is greater than the average of the other Forest Survey units of Alabama.

Figure 4, based on almost $2\frac{1}{2}$ million acres in the pine and pine-hardwood type-groups (excluding longleaf and slash pine types), gives for the existing stand the proportion of the area occupied by each 10-year age-class and the cubic feet of wood per acre in the respective age-classes. These volumes are compared with those for weighted-average sites in similar age-classes in the most heavily stocked 10 percent of the stands (i.e., the "well-stocked" stands). The area and volume per acre of the forest is diagrammed from data based on field determinations of the age-classes. Approximately 26 percent of the forest area is occupied by stands 0 to 20 years old; 38 percent, by stands 21 to 40 years old; 23 percent, by stands 41 to 60 years old; and only 13 percent, by stands more than 60 years old. The average gross volume per acre for the prevailing forest increases from almost nothing for the youngest age-class to almost 1,000 cubic feet for the 31- to 40-year age-class. The age-classes of 41-50 years and of 51-60 years show little increase over that of 31-40 years because of poor stocking, largely the result of partial cutting. The age-classes of 71 years and over average 1,500 cubic feet per acre. The prevailing forest stands are so poorly stocked that their volumes are less than half those found in well-stocked stands of corresponding ages and on the weighted average of similar sites, as indicated by the dotted line. At 40 years the volume of the most heavily stocked 10 percent of the stands has 2,200 cubic feet per acre and at 70 years, over 3,000.

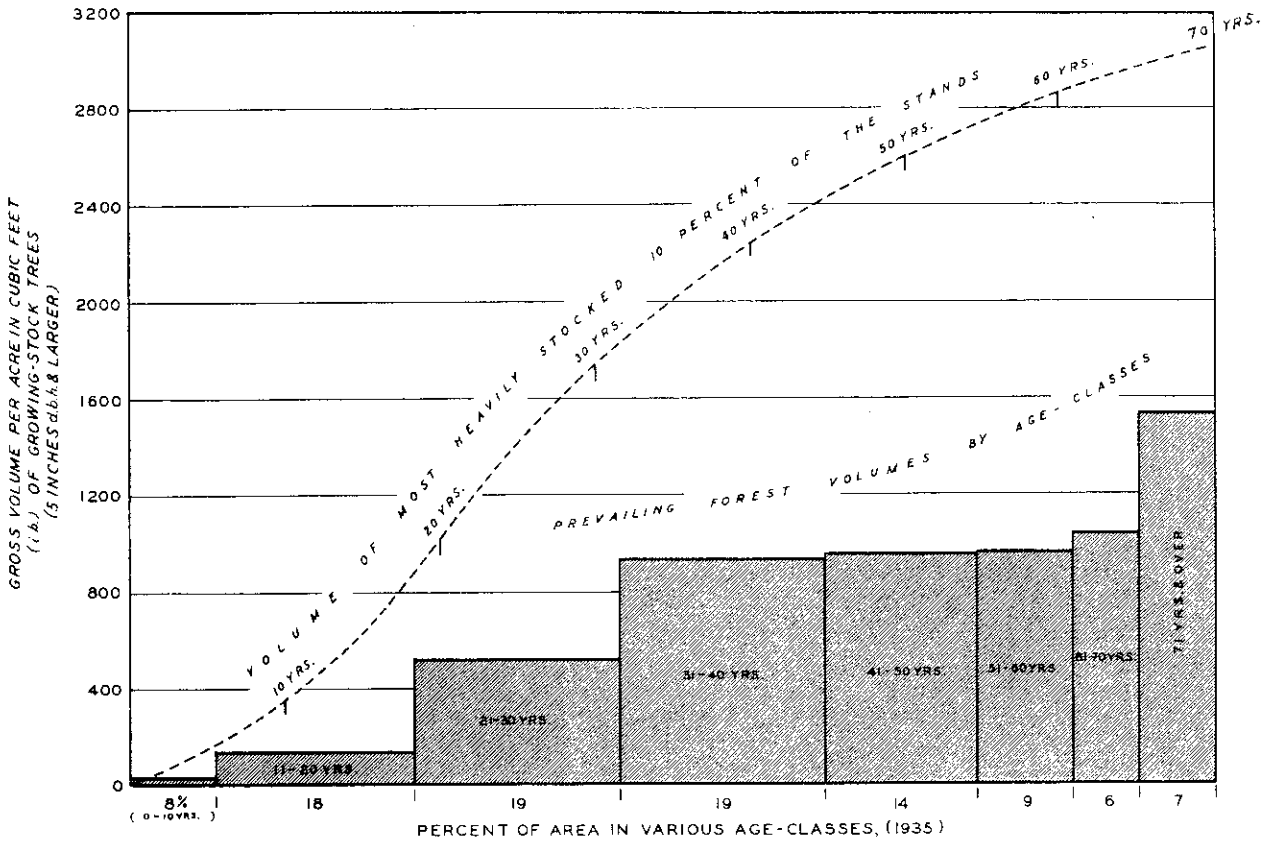


FIGURE 4 - PREVAILING VOLUMES, BY AGE-CLASSES, COMPARED WITH THOSE IN WELL-STOCKED STANDS (BASED ON PINE AND PINE-HARDWOOD TYPE-AREAS * OF 2,459,900 ACRES).

*EXCLUDING 810,500 ACRES IN THE LONGLEAF AND SLASH PINE TYPES.

A similar chart for the hardwood stands was not made, but an examination of sample plots indicates that the hardwood stands also are poorly stocked.

The stand diagrams in figure 5 show the number of trees by 2-inch classes (the 2-inch class includes trees 1.0 to 2.9 inches; the 4-inch class, those 3.0 to 4.9 inches; and so on) for the four important species-groups. These diagrams show a preponderant number of small trees, especially in the 2-, 4-, 6-, and 8-inch classes, and a relative scarcity of medium-sized and large trees. If all (or the greater part) of the small trees could be counted upon to grow into the larger size-classes and thus add to their very deficient stocking, an excellent future forest would be assured. Protection from fire is essential, however, if the smaller trees are to contribute all their potential value in building up the larger and more valuable size-classes.

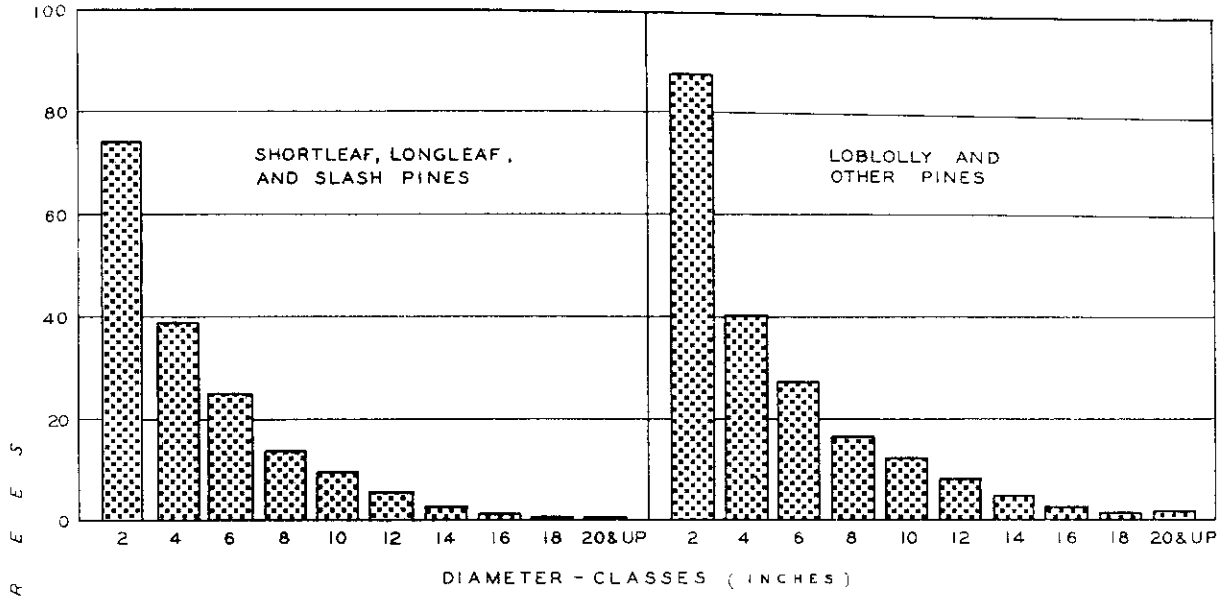
Only 3 percent of the $4\frac{1}{4}$ million acres of forest land is in public ownership; 56 percent is in farm woodlands; and 41 percent is in privately owned industrial forests (i.e., in forests owned by sawmill companies, pulpmill companies, etc.) or in investment forests. A study of the forest practices on privately owned non-farm forest land recently made by the Division of State and Private Forestry of Region 8 of the Forest Service discloses that for 15 properties investigated in this Unit, aggregating 266,000 acres, approximately 64 percent of the forest land is "handled under good forestry practices for continuous forest crops"; 34 percent under practices that are "poor" but that leave the land productive; and only 2 percent is in "lands not left productive." Most of the properties included in this study were large; it is believed that the forestry practices on the smaller properties (generally farmer-owned) are not as good on the average.

Estimates of Timber Volume

Saw-timber volume

The saw-timber inventory includes only living trees of those species having commercial value. Such trees must be at least 9.0 in. d.b.h. in pines and cypress, and at least 13.0 in. d.b.h. in hardwoods; also they must have at least 50 percent of their volume sound, or have a sound butt log at least 12 ft. long. Although the top-diameter limit varies with the quality of the stem, no pine logs less than $5\frac{1}{2}$ in. in diameter, inside bark, at the small end, and no hardwood logs less than $8\frac{1}{2}$ in. are included; the top-diameters actually used averaged larger than these minima. All figures are net, as necessary deductions have been made for cull because of fire scar, rot, crook, limbiness, etc., as well as for loss in manufacture due to sweep and hidden defects.

Using the International $\frac{1}{4}$-inch rule, which closely approximates green lumber tally, the total volume is 9,714 million board feet; or, according to the Doyle rule, which is used locally (although it gives an understatement because of the large preponderance of small trees in the stand), the total volume is 6,279 million board feet. Approximately 61 percent of the total saw-timber volume is pine, using the lumber tally as a basis, and the greater part of the pine volume is loblolly (table 4). Hardwoods make up 39 percent of the total saw-timber volume, the principal species being gums, oaks, and yellow poplar.



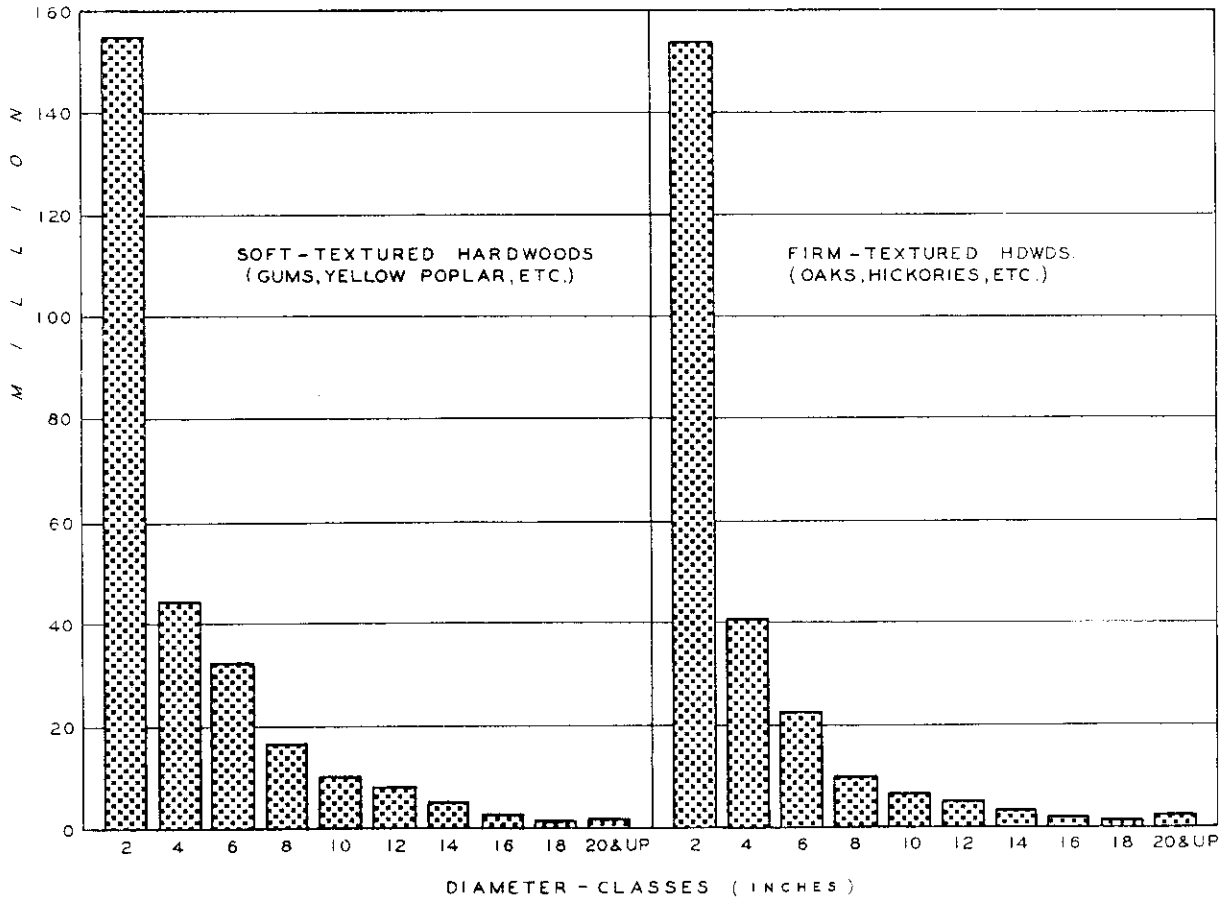


FIGURE 5.— STAND DIAGRAMS OF SOUND TREES.

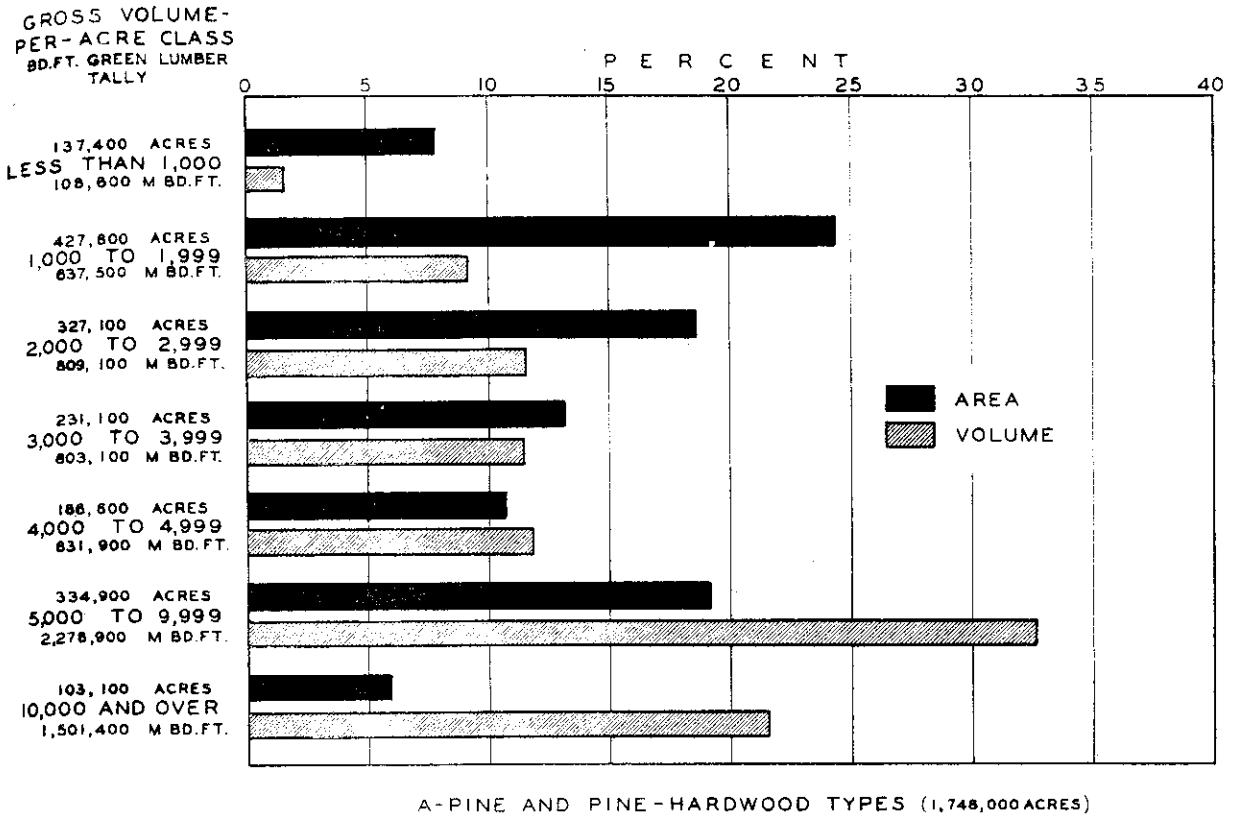
Approximately half the white-oak volume listed is in the more valuable species such as forked-leaf white oak, while the other half is chiefly post oak. For all pine and hardwood species combined, almost three-fourths of the saw-timber volume is in second-growth stands.

Table 4. - Net board-foot volume (green lumber tally, based on International $\frac{1}{4}$-inch rule) in the various forest conditions, 1935

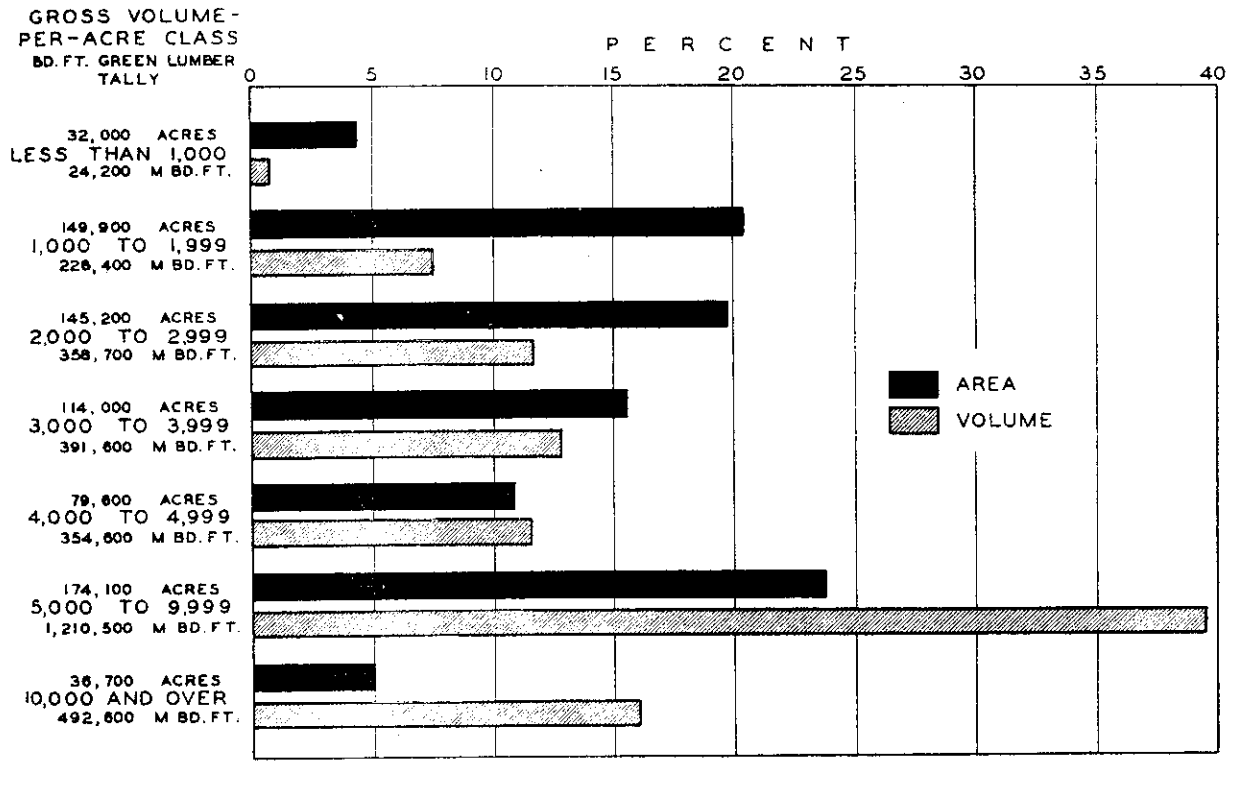
Tree species-group	Old growth		Second growth		Total	Proportion of total
	Uncut	Partly cut	Sawlog size	Under sawlog size[1]		
	Thousand board feet					Percent
Pines:						
Loblolly pine	283,100	209,200	2,943,600	134,100	3,570,000	36.7
Shortleaf pine	73,800	105,300	949,800	55,300	1,184,200	12.2
Longleaf and slash pines	58,500	273,400	494,700	94,300	920,900	9.5
Other pines[2]	29,900	69,800	130,800	10,100	240,600	2.5
Total pines	445,300	657,700	4,518,900	293,800	5,915,700	60.9
Hardwoods:						
Red gum	100,700	137,800	486,800	16,500	714,800	7.7
Black and tupelo gums	68,000	127,400	234,700	17,600	447,700	4.6
Yellow poplar	32,100	74,300	373,700	8,500	488,600	5.0
Other soft-textured hardwoods[3]	83,900	149,000	211,100	14,600	458,600	4.7
Red oaks	90,600	233,000	403,500	33,200	760,300	7.9
White oaks	42,400	122,900	160,900	18,200	344,400	3.5
Other firm-textured hardwoods[4]	70,900	210,400	249,200	26,400	556,900	5.7
Total hardwoods	488,600	1,054,800	2,119,900	135,000	3,798,300	39.1
Total all species	933,900	1,712,500	6,638,800	428,800	9,714,000	100.0
Percent of total	9.6	17.6	68.3	4.5	100.0	

1/ Includes 24,800 M board feet in the reproduction and clear-cut conditions.
2/ Includes cedar.
3/ Basswood, bay, box elder, cottonwood, cypress, magnolia, maple, willow, etc.
4/ Ash, beech, birch, elm, hackberry, hickory, sycamore, etc.

Figure 6, which indicates the proportional area and gross volume per acre of saw-timber stands, classified according to volume of saw timber per acre, shows that most of the stands in the sawlog-size conditions have volumes that greatly exceed the minimum per acre required for logging.



A-PINE AND PINE-HARDWOOD TYPES (1,748,000 ACRES)



B- UPLAND-HARDWOOD AND BOTTOM LAND-HARDWOOD TYPES (731,500 ACRES)

FIGURE 6. — PROPORTIONAL AREA AND VOLUME OF THE SAWLOG-SIZE CONDITIONS, CLASSIFIED ACCORDING TO VOLUME OF SAW TIMBER PER ACRE.

Considering the pine and pine-hardwood type-groups combined (chart A), about one-third of the saw-timber area but only one-tenth of the volume is in stands of less than 2,000 board feet per acre; it follows that about two-thirds of the area and nine-tenths of the volume are in stands having at least 2,000 board feet per acre. For the upland hardwood and bottom-land hardwood types combined (chart B), about three-fourths of the saw-timber area and over nine-tenths of the saw-timber volume are in stands having 2,000 board feet or more per acre. Although some error is possible in the interpretation of the first class (less than 1,000 board feet), owing to the fact that the data were taken on $\frac{1}{4}$-acre plots, the combined figures for the first two classes show a reasonably accurate picture.

Although lumber and veneer producers in this area usually consider pines less than 13 in. d.b.h. and hardwoods less than 19 in. d.b.h. as somewhat undesirable for manufacturing purposes, over one-third of the pine saw-timber volume and over half of the hardwood saw-timber volume are in trees below these minimum sizes (table 5).

Table 5. - Diameter distribution of net board-foot volume (green lumber tally, based on International $\frac{1}{4}$-inch rule) in the various forest conditions, 1935

Species-groups and diameter-classes (in inches)	Old growth		Second growth		Total	Proportion of total
	Uncut	Partly cut	Sawlog size	Under sawlog size[1]		
	Thousand board feet					Percent
Pines:						
10 - 12	39,600	110,100	1,970,100	204,300	2,324,100	39.3
14 - 16	88,300	195,800	1,524,000	67,500	1,875,600	31.7
18 - 20	121,400	150,800	674,300	16,100	962,600	16.3
22 and over	196,000	201,000	350,500	5,900	753,400	12.7
Total pines	445,300	657,700	4,518,900	293,800	5,915,700	100.0
Hardwoods:						
2/14 - 18	187,500	456,700	1,453,500	110,800	2,208,500	58.2
20 - 28	219,000	523,100	632,500	24,200	1,398,800	36.8
30 and over	82,100	75,000	33,900	-	191,000	5.0
Total hardwoods	488,600	1,054,800	2,119,900	135,000	3,798,300	100.0

1/ Includes 24,800 M board feet in the reproduction and clear-cut conditions.
2/ Includes 21,700 M board feet of cypress in the 10- and 12-inch classes.

Having developed in open stands, many of the saw-timber trees are of relatively low quality. The Forest Survey, in a supplemental study, classified the pine trees, according to the appearance of their stems, as "smooth," "limby," and "rough." As shown by table 6, more than half the loblolly and shortleaf pine saw-timber volume is in limby and rough trees. The old-growth trees are much better suited for lumber than the second growth, which is characterized by old-field stands.

Table 6. - Classification of pines according to grade of trees of saw-timber quality

Species and stand condition	Tree grade[1/]			Total
	Smooth	Limby	Rough	
	Percent of volume			
Loblolly pine:				
Old growth	94	6	-	100
Second growth	31	51	18	100
Weighted average	40	45	15	100
Shortleaf pine:				
Old growth	98	2	-	100
Second growth	49	40	11	100
Weighted average	56	34	10	100
Loblolly and Shortleaf pines:				
Old growth	95	5	-	100
Second growth	36	48	16	100
Weighted average	44	42	14	100

1/ Smooth trees have 20 ft. or more of clear length and at least 50 percent of their total usable length practically free of limbs and indications of knots; limby trees have at least 12 ft. of clear length and 30 to 49 percent of their total usable length practically free of limbs and indications of knots; rough trees have less than 12 ft. of clear length, or less than 30 percent of their total usable length practically free of limbs and knots.

Cordwood Volume

The entire usable volume of wood in all live trees 5.0 in. d.b.h. and larger, sawlog-size trees included, is over 54 million standard cords (4 x 4 x 8 ft.), including bark (table 7). Almost three-fourths of this is in pulping species, while one-fourth is in species usually considered non-pulping. Of the 40 million cords in pulping species, almost 22 million are in pine; and the remainder is in soft-textured hardwoods such as gum, yellow poplar, maple, magnolia, bay, and cypress. Oak, hickory, ash, elm, and beech which are mostly firm textured, are usually considered "nonpulping," although in the future some of these may be considered as a source of pulp. All the volumes mentioned herein are net, since necessary deductions have been made for unusable volumes.

In table 7, four sources of cordwood material are shown. Volumes in the first column include the sawlog portion of saw-timber trees shown in cords — this is the material given in the preceding section in board feet — and make up 41 percent of the usable cordwood from all sources. The second column includes the material above the sawlogs in saw-timber trees to a usable top, the minimum allowable top diameter never being less than 4 in. In pines the upper stems only are considered usable, while in hardwoods and cypress both the

upper stems and larger limbs are included; combined they contain 14 percent of the total cordwood volume. In "sound trees under sawlog size," the full stems only (without limbs) are included up to a variable minimum top diameter but never less than 4 in.; this makes up 29 percent of the volume from all sources. "Cull trees" include the usable portions of cull trees and all scrub oaks; volume in such trees, most of which are hardwoods, is almost 9 million cords, or 16 percent of the total usable cordwood material.

Table 7. - Net cordwood volume in various classes of sound material, 1935

Species-group	Sound trees sawlog size		Sound trees under sawlog size	Cull trees[1]	Total all classes
	Sawlog material	Upper stems			
	Cords (bark included)				
Pines	13,068,800	2,574,800	4,930,200	1,199,900	21,773,700
Hardwoods:					
Soft-textured	5,254,600	2,823,100	6,327,900	3,786,600	18,192,200
Firm-textured	4,026,400	2,276,500	4,190,400	3,714,000	14,207,300
Total hardwoods	9,281,000	5,099,600	10,518,300	7,500,600	32,399,500
Total all species	22,349,800	7,674,400	15,448,500	8,700,500	54,173,200

1/ Includes all scrub oaks.

Approximately two-thirds of the net cordwood volume of sound trees, cull trees omitted, is in sawlog-size trees (fig. 7).

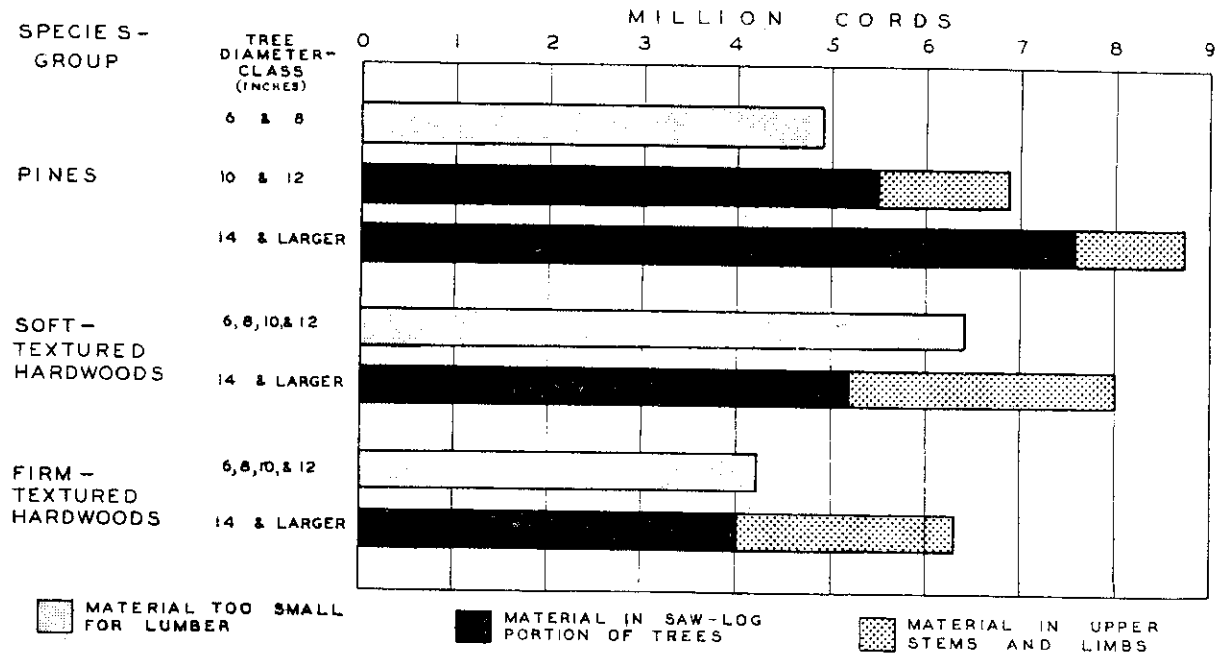


FIGURE 7.—CORDWOOD VOLUMES BY SIZE CLASSES, SOUND TREES ONLY.

Of the 54 million cords in the total cordwood volume, about 40 million are in the volume that constitutes the growing stock; the remaining 14 million cords are in cull trees and in the upper stems and limbs of sawlog-size hardwoods and cypress that are not included in the growing stock. The average cordwood volumes of growing stock per acre (as computed by dividing the total volumes by the corresponding forest areas) vary greatly with the forest condition and type-group, as shown in table 8.

Table 8. - Average volumes of cordwood per acre in growing-stock trees, 1935

Forest type-group	Old growth		Second growth			All conditions[1/]
	Uncut	Partly cut	Sawlog size: Uncut	Sawlog size: Partly cut	Under sawlog size	
	Cords (bark included)					
Pine	27.5	12.6	14.8	10.0	3.0	8.5
Pine-hardwood	30.8	16.9	16.1	11.9	3.4	10.1
Upland hardwood	13.3	12.2	12.2	9.3	2.4	6.3
Bottom-land hardwood	21.6	17.1	17.6	14.1	6.8	13.7
Weighted averages, all types	24.0	14.9	15.3	11.0	3.4	9.4

1/ Includes areas of reproduction and clear-cut conditions.

Poles and piles

Almost 12 million pine trees in southeast Alabama are suitable for conversion into poles and piles (table 9). Although these trees are included in previous volume estimates, the premium in stumpage price usually paid for trees suitable for poles and piles justifies a separate inventory. While it is difficult to judge accurately whether or not standing trees will meet the exacting specifications of the American Standards Association for poles, the present estimate of poles and piles is believed to be conservative and probably is under the actual number on the area. Three-fourths of the poles and piles are in loblolly and shortleaf pines; the remainder is in round or turpentined longleaf and slash pines. Over four-fifths of the pieces are in trees less than 13.0 in. d.b.h., outside bark; also, most of the pieces are 20 and 25 ft. long and are too short for many commercial uses. A growing tendency to use shorter poles is noted in rural areas, however, especially since the establishment of activities such as the Rural Electrification Agency and the Tennessee Valley Authority.

Table 9. - Total number of pine poles and piles, classified according to length, 1935

Species	Pole and pile length (feet)			Total	Proportion of total
	20 and 25	30 and 35	40 and over		
	- - - - Thousand pieces - - - -				Percent
Loblolly and shortleaf pines[1/]	6,201	1,839	766	8,806	74.9
Round longleaf and slash pines	1,671	556	153	2,380	20.3
Turpentined longleaf and slash pines	378	166	18	562	4.8
Total all species	8,250	2,561	937	11,748	100.0
Percent of total	70.2	21.8	8.0	100.0	

1/ Includes a few other pines and also cedars.

Forest Increment

Net annual increment is defined as the difference between the growing-stock volume at the beginning and the end of any year, before the commodity drain for the same year is deducted. It is the volume added by growth to the individual trees, plus the merchantable volume newly created by small trees developing into merchantable sizes, and minus mortality. For trees cut during the year, only their growth until the time of their removal is included. Neither the volume in cull trees nor that in the upper stems and limbs of saw-log-size hardwoods and cypress is considered growing-stock material.

For the saw-timber part of the growing stock, the total growth in 1935 amounted to 641 million board feet (lumber tally); the mortality, 90 million board feet; and the resulting net increment, 551 million board feet. A large part of the mortality is caused either directly or indirectly by fires; if these and the resulting mortality were reduced, there would be a corresponding increase in the net increment. Approximately nine-tenths of the net increment of saw-timber material occurs in second-growth stands, and about two-thirds of it is pine (table 10).

For all growing-stock material, including trees to a minimum of 5.0 in. d.b.h. as well as those of saw-timber size, the net increment in 1935 amounted to 142 million cubic feet of wood without bark (table 10), or 2 million cords of wood with bark (table 11). Fifty-nine percent of the net cubic-foot increment for all growing-stock material was in pine and 41 percent was in hardwoods. Probably more than half the net hardwood increment was in soft-textured species.

Table 10. - Net increment in the various forest conditions, 1935

Forest condition	Saw-timber material			All growing-stock material		
	Pine component	Hardwood component 1/	Total	Pine component	Hardwood component 1/	Total
	-- Thousand board feet (Green lumber tally) --			- Thousand cubic feet (Inside bark) -		
Old growth	19,800	38,900	58,700	4,310	9,740	14,050
Second growth:						
Sawlog size	251,500	126,300	377,800	50,360	33,460	83,820
Under sawlog size	84,500	29,000	113,500	28,810	14,620	43,430
Reproduction and clear-cut	1,200	200	1,400	340	360	700
Total all conditions	357,000	194,400	551,400	83,820	58,180	142,000

1/ Includes cypress.

Table 11. - Net increment in cords classified according to forest condition, 1935

Forest condition	Pine	Hardwood 1/	Total
	------ Cords (including bark) ------		
Old growth	55,700	144,600	200,300
Second growth:			
Sawlog size	661,400	510,600	1,172,000
Under sawlog size	393,500	229,800	623,300
Reproduction and clear-cut	4,500	5,600	10,100
Total all conditions	1,115,100	890,600	2,005,700

1/ Includes cypress.

In 1935, the average net increment per acre for the entire forest area (i.e., including the reproduction and clear-cut areas), assuming that the stands had not been influenced by cutting, was 131 board feet of saw-timber material, or 0.48 cord of all growing-stock material (table 12); these averages are slightly higher than the comparable figures for the State. The largest increments per acre occurred in the uncut sawlog-size second-growth stands.

Table 12. - Average net increment per acre in the various forest conditions, uninfluenced by cutting, 1935

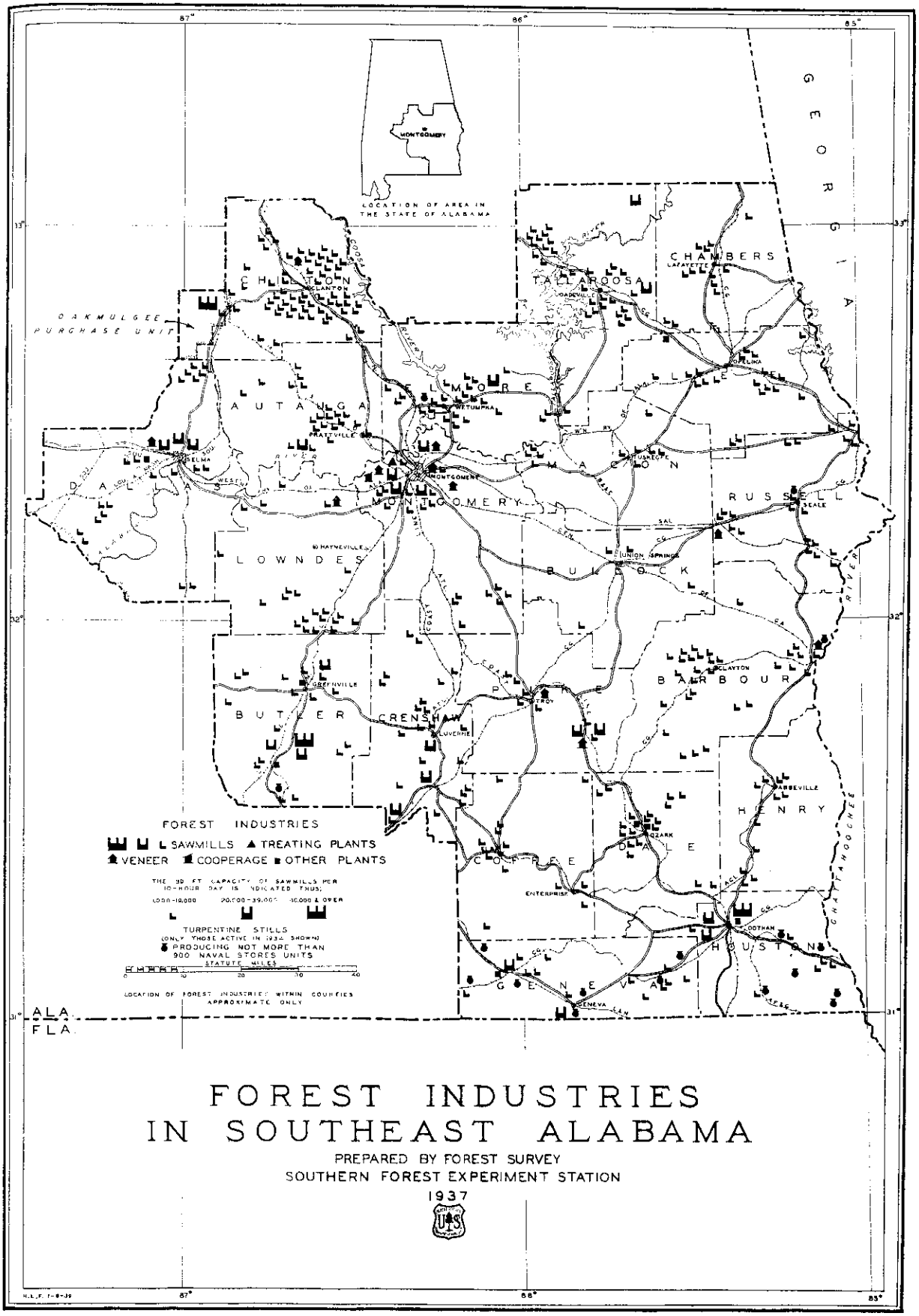
Forest condition	Pine component			Hardwood component 1/			Total per acre all species		
	Bd.ft.	Cu.ft.	Cords	Bd.ft.	Cu.ft.	Cords	Bd.ft.	Cu.ft.	Cords
Old growth:									
Uncut	58	9.4	0.12	100	28.7	0.42	158	38.1	0.54
Partly cut	38	9.2	0.12	75	17.5	.26	113	26.7	0.38
Second growth:									
Sawlog size:									
Uncut	165	33.8	0.45	68	19.3	0.29	233	53.1	0.74
Partly cut	85	15.8	0.21	59	13.9	0.21	144	29.7	0.42
Under sawlog size	57	19.9	0.27	20	10.0	0.16	77	29.9	0.43
Reproduction and clear-cut	3	1.0	0.01	1	1.1	0.02	4	2.1	0.03
Weighted averages	85	20.2	0.26	46	13.7	0.22	131	33.9	0.48

1/ Includes cypress.

Forest Industries

Southeast Alabama was settled early in the nineteenth century at a time when there were no important markets for its forest products. Agricultural development was rapid and, with the exception of that in Butler and a few other counties, much of the original forest was cut and burned to provide cropland. Although transportation facilities by railroad and steamboat were available before 1860, only a relatively few sawmills were located here before the World War. Within the last three decades, however, a large number of small sawmills have come into this area, and largely because of their great activity a peak of lumber production probably was reached about 1925.

In 1937 southeast Alabama produced 431 million board feet of lumber, about 25 percent of the total production for the State. That year the area contained 421 sawmills, of which 396 had a cutting capacity of less than 20,000 board feet per 10-hour day (fig. 8 and table 13). Powered by tractors, small steam engines, stationary motors, or old automobile engines, these "peckerwood" outfits are extremely mobile and when market conditions are favorable they come and go like swarms of locusts. In Lee County, for example, there were in 1929 about 35 small sawmills, in 1930 less than half of these remained, and in 1937 there were about 21. Generally several small sawmills scattered through the woods are operated in connection with one concentration yard and planing mill. The chief product is pine "roofers" -- 1-inch, air-dried, surfaced boards, generally taken as log run and grading principally No. 2 common. While the amount of lumber cut in 1937 by these small sawmills varied greatly, their average production was 750,000 board feet and their total production was 296 million board feet, or 69 percent of all the lumber produced that year in southeast Alabama.



FOREST INDUSTRIES IN SOUTHEAST ALABAMA

PREPARED BY FOREST SURVEY
SOUTHERN FOREST EXPERIMENT STATION
1937

FIGURE 8 — FOREST INDUSTRIES MAP

Table 13. - Number and size of sawmills and amount of lumber produced, 1937

Daily (10-hours) rated capacity	Number of sawmills	Lumber produced,1/ 1937		
		Pine	Hardwood and cypress	Total
Thousand board feet		-Thousand board feet (lumber tally)-		
1 - 19 (small)	396	280,000	16,000	296,000
20 - 39 (medium-sized)	22	30,500	69,900	100,400
40+ (large)	3	31,700	2,700	34,400
Total	421	342,200	88,600	430,800

1/ From stands both within and without this area.

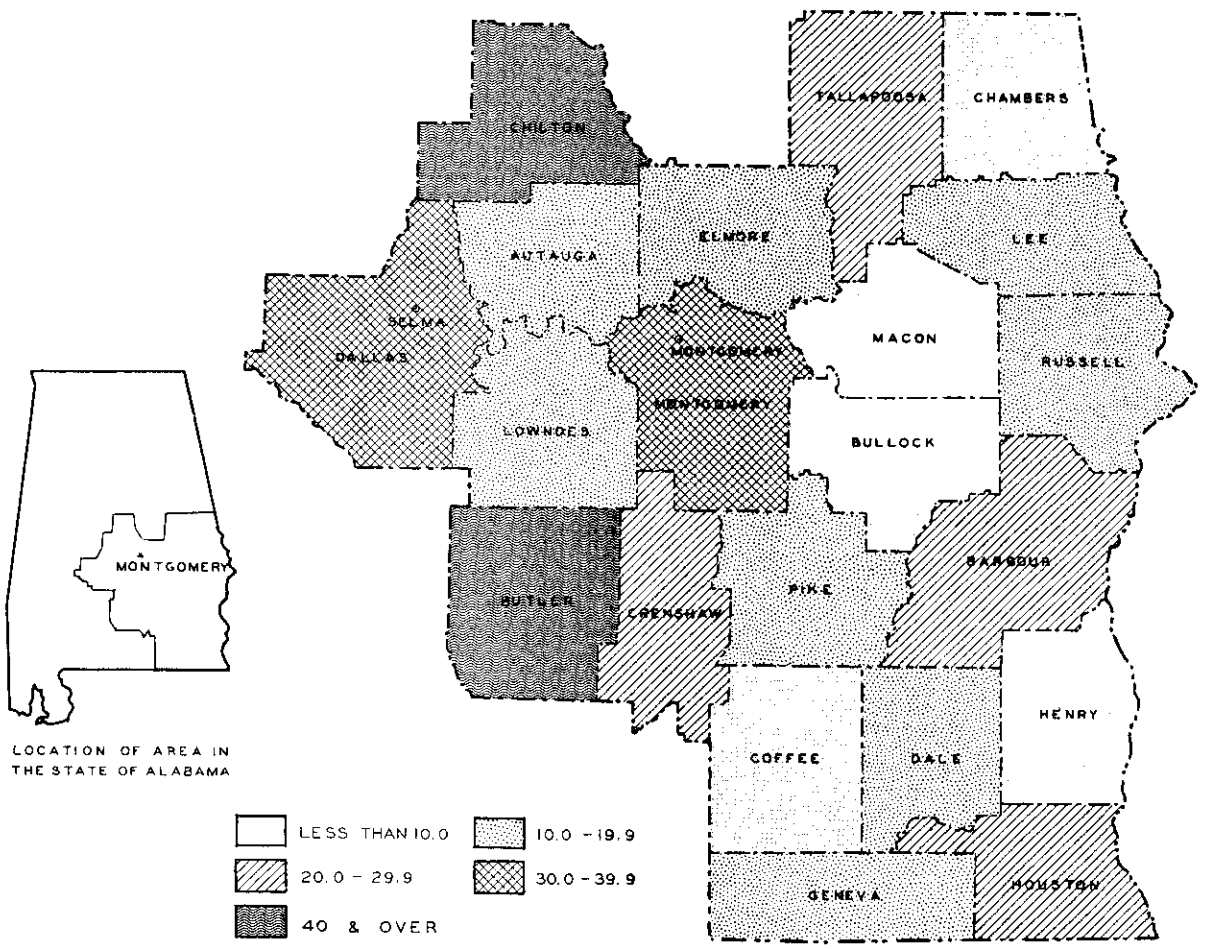


FIGURE 9. - LUMBER PRODUCTION IN MILLION BOARD FEET, BY COUNTIES, 1937.

With an average annual cut per mill of almost 5 million board feet of lumber, the 22 medium-sized sawmills (i.e., mills with a daily rated capacity of 20,000-39,000 board feet) had a total production in 1937 of over 100 million board feet, of which more than two-thirds was hardwood. These mills, which are relatively stationary, produce a variety of lumber items. Only three sawmills have an individual capacity of at least 40,000 board feet per day, but in 1937 these three produced a total of more than 34 million board feet.

As shown by figure 9, the lumber industry in both Butler and Chilton Counties produced 40 million board feet or more in 1937, whereas Bullock, Chambers, Coffee, Henry, and Macon Counties each produced less than 10 million.

In 1937, in addition to the 421 sawmills in the area, there were 11 veneer mills, 8 handle- and dimension-stock plants, 1 cooperage-stock mill, 1 wood-treating plant, and about 17 naval-stores stills. (In addition, there are some shingle mills, mostly small and cutting principally for local use; these are not shown on the industry map.) Most of the veneer produced was for packaging and was made from red and black gums, yellow poplar, pine, and magnolia. The handle plants used ash, white oak, and hickory; and the dimension plants used dogwood, ash, hickory, and hackberry. The naval-stores stills produced almost 5,000 barrels of turpentine and about 16,000 barrels of rosin (valued at about one-quarter million dollars) from the gum of living longleaf and slash pines. Approximately 1,209,000 cords of fuel wood and 3 million fence posts were produced, mostly for use on the farms of the area.

Table 14. - Wood-products employment, 1937

Industry or commodity	Employment		
	In woods	At plants	Total
	- Thousand man-days (10 hours each) -		
Sawmills:			
Small	340	555	895
Medium	126	193	319
Large	37	73	110
Total sawmills	503	821	1,324
Fuel wood	1,408	-	1,408
Gum naval stores	89	5	94
Pulpwood[1/]	103	-	103
Veneer and cooperage	22	43	65
Cross ties, poles, and piles	53	-	53
Miscellaneous manufacturing[2/]	11	24	35
Fence posts	49	-	49
Total all industries	2,238	893	3,131

1/ All the pulpwood produced in the unit is shipped to mills outside.
2/ Includes treating plants and shuttle, handle, dimension, and shingle plants.

All forest industries combined provided 3 million days of work (10 hours each) in 1937. Slightly less than half of this labor was devoted to the cutting and hauling of fuel wood and fence posts, mainly for farm use (table 14). It is difficult to estimate accurately how many people were employed in the forest-products plants and in the woods, for most of the industries operated only part-time, but excluding the labor involved in producing fuel wood and fence posts, it is roughly estimated that between 15,000 and 20,000 people had full or part-time employment in the woods and mills.

Commodity Drain from the Growing Stock

In 1937, the net increment was 558 million board feet, lumber tally, after deducting mortality, while for the same year, as shown by table 15, the commodity drain from saw-timber material for industrial and domestic use, amounted to 570 million board feet. This commodity drain also includes logs cut for mills outside the area and the saw-timber material wasted in logging. More than three-fourths of the commodity drain from saw-timber material comes from pine; less than one-fourth, from the hardwoods and cypress. Lumber, which makes up 75 percent of the total commodity drain from saw-timber material, is by far the biggest single item; but other important items of drain are fuel wood (10 percent), cross ties (4 percent), and pulpwood (4 percent).

Table 15. - Commodity drain from the sound-tree growing stock, 1937

Reason for drain	From saw-timber material			From all growing-stock material	
	Pine	Hardwood	Total		
	-- Thousand board feet (lumber tally) --			Cords[1]	Thousand cu.ft.[2]
Lumber	345,800	81,900	427,700	995,600	76,230
Fuel wood[3]	42,500	14,400	56,900	523,400	37,460
Pulpwood	22,200	-	22,200	95,400	7,220
Veneer and cooperage	3,000	12,200	15,200	29,800	2,290
Cross ties	17,100	4,400	21,500	51,600	3,950
Miscellaneous manufacturing	400	1,200	1,600	4,900	360
Poles and piles	1,500	-	1,500	5,600	430
Fence posts	100	1,500	1,600	24,900	1,730
Miscellaneous farm use	13,600	8,000	21,600	119,300	8,490
Total	446,200	123,600[4]	569,800	1,850,500	138,160

1/ Outside bark, or bark included.
2/ Inside bark, or bark not included.
3/ Material cut on farms makes up over half the fuel-wood drain.
4/ Includes cypress.

In 1937, the total commodity drain from the sound-tree growing stock amounted to almost 2 million cords of wood, including the bark, or 138 million cubic feet of wood, excluding the bark. This total commodity drain includes drain of saw-timber material, upper stems of sawlog-size pines, and small trees below sawlog size but not less than 5.0 in. d.b.h. It also includes growing stock cut for plants outside the area and the material wasted in woods operations. Of the total commodity drain expressed in cords, lumber makes up 54 percent; fuel wood, 28 percent; miscellaneous farm use, 6 percent; pulpwood, 5 percent; and all other commodities, 7 percent. The total commodity drain, allocated to the commodities for which the trees were cut, is shown in table 15.

Comparison of Increment and Drain

For a 3-year period, Jan. 1, 1935 - Dec. 31, 1937, after making additions for growth and deductions for mortality and commodity drains, the growing stock volume in cubic feet of sound trees 5.0 in. d.b.h. and over was found to have increased about 2 percent (table 16). As shown graphically in figure 10, while the gross growth increased gradually from 1935 to 1937, the drain increased more rapidly than the growth, so that in 1937 the two were approaching a balance. Practically all the increase in drain for the 3 years occurred in industrial and domestic use. Although during 1937 "incomes" (increment) and "withdrawals" (drain) were nearly equal, this condition is not permanent, for drain for such products as lumber, pulpwood, cross ties, etc. easily may be increased to the point at which drain exceeds growth. Mortality drain, i.e., the loss due to fire, insects, wind, etc., makes up about one-fifth the total drain. Much of this mortality is preventable through fire protection and improvement cuttings, and it is apparent that a reduction in mortality would bring about a more favorable relationship between growth and drain. This would provide more material for industrial and commercial use and for building up the growing stock.

In 1935 and 1936, saw-timber growth exceeded the drain against it (table 17 and fig. 11), but during 1937 the rapidly increasing drain exceeded the growth by approximately 12 million board feet. If only one-seventh of the mortality had been prevented in 1937, the growth would have balanced the drain.

It should be remembered when dealing with growth and drain in southeast Alabama that, for 1935, 1936, and 1937 each amounts to not more than 7 percent of the growing stock, and that normal fluctuations in the growth and drain would change the growing stock very little. For the entire 3-year period ending Jan. 1, 1938, the saw-timber component of the growing stock increased approximately 2 percent.

Although the volume of the saw-timber growing stock increased slightly in the past 3 years, its quality has been lowered steadily (a) by woods burning, which increases the number of cull and defective trees, and (b) by the practice of cutting only the larger, good trees and leaving the poorer trees to accumulate. In the hardwood stands, deterioration of quality has been accelerated by cutting only the more valuable species, such as forked-leaf white oak, yellow poplar, and ash, and by leaving in the growing stock a steadily increasing proportion of the less valuable species, among which are black gum, post oak, bay, and elm.

Table 16. - Comparison of growth and drain for the entire growing stock for 1935, 1936, and 1937

Item	Pine	Hardwood[1/]	Total
	- - - Thousand cubic feet (i.b.) - - -		
Net growing stock, Jan. 1, 1935	1,563,250	1,303,600	2,866,850
Growth, 1935	100,660	71,920	172,580
Mortality, 1935	16,840	13,740	30,580
Net increment, 1935	83,820	58,180	142,000
Commodity drain, 1935	83,450	27,550	111,000
Net change in growing stock, 1935	+370	+30,630	+31,000
Net growing stock, Jan. 1, 1936	1,563,620	1,334,230	2,897,850
Growth, 1936	103,590	73,150	176,740
Mortality, 1936	16,890	14,070	30,960
Net increment, 1936	86,700	59,080	145,780
Commodity drain, 1936	92,200	32,120	124,320
Net change in growing stock, 1936	-5,500	+26,960	+21,460
Net growing stock, Jan. 1, 1937	1,558,120	1,361,190	2,919,310
Growth, 1937	104,480	74,240	178,720
Mortality, 1937	16,950	14,380	31,330
Net increment, 1937	87,530	59,860	147,390
Commodity drain, 1937	104,750	33,410	138,160
Net change in growing stock, 1937	-17,220	+26,450	+9,230
Net growing stock, Jan. 1, 1938	1,540,900	1,387,640	2,928,540

1/ Includes cypress.

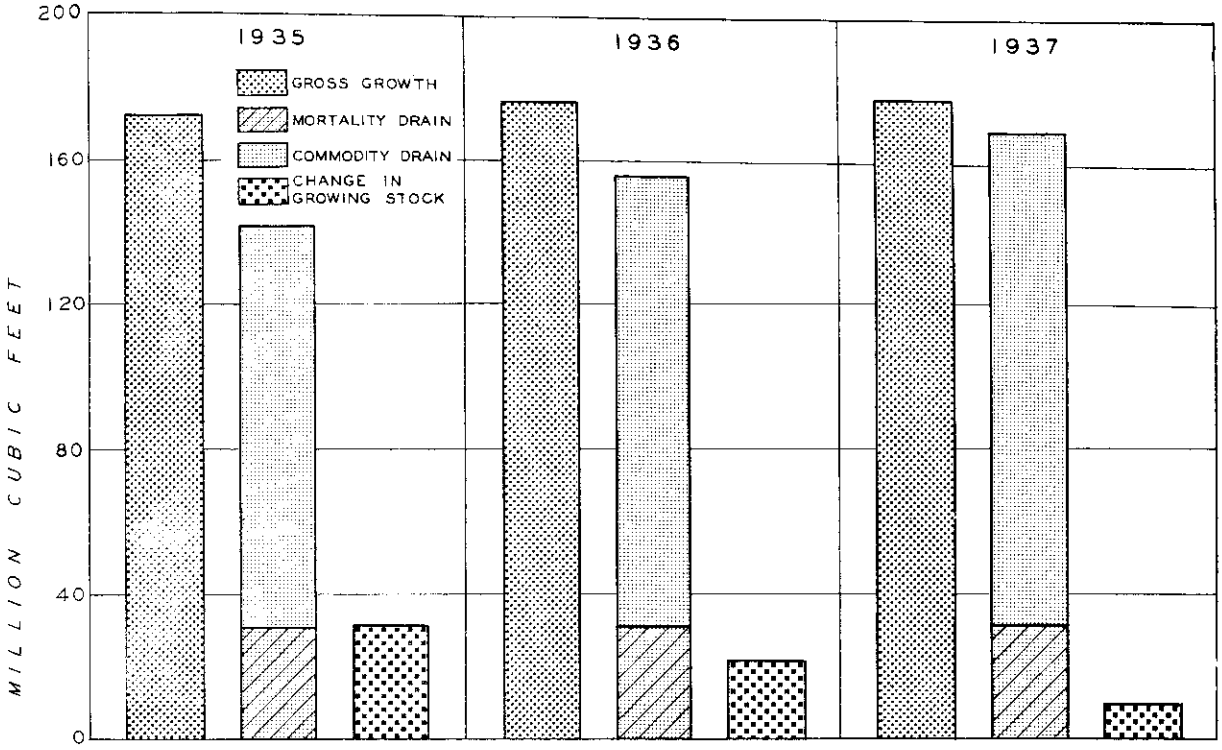


FIGURE 10.—COMPARISON OF GROWTH AND DRAIN FOR THE ENTIRE GROWING STOCK.

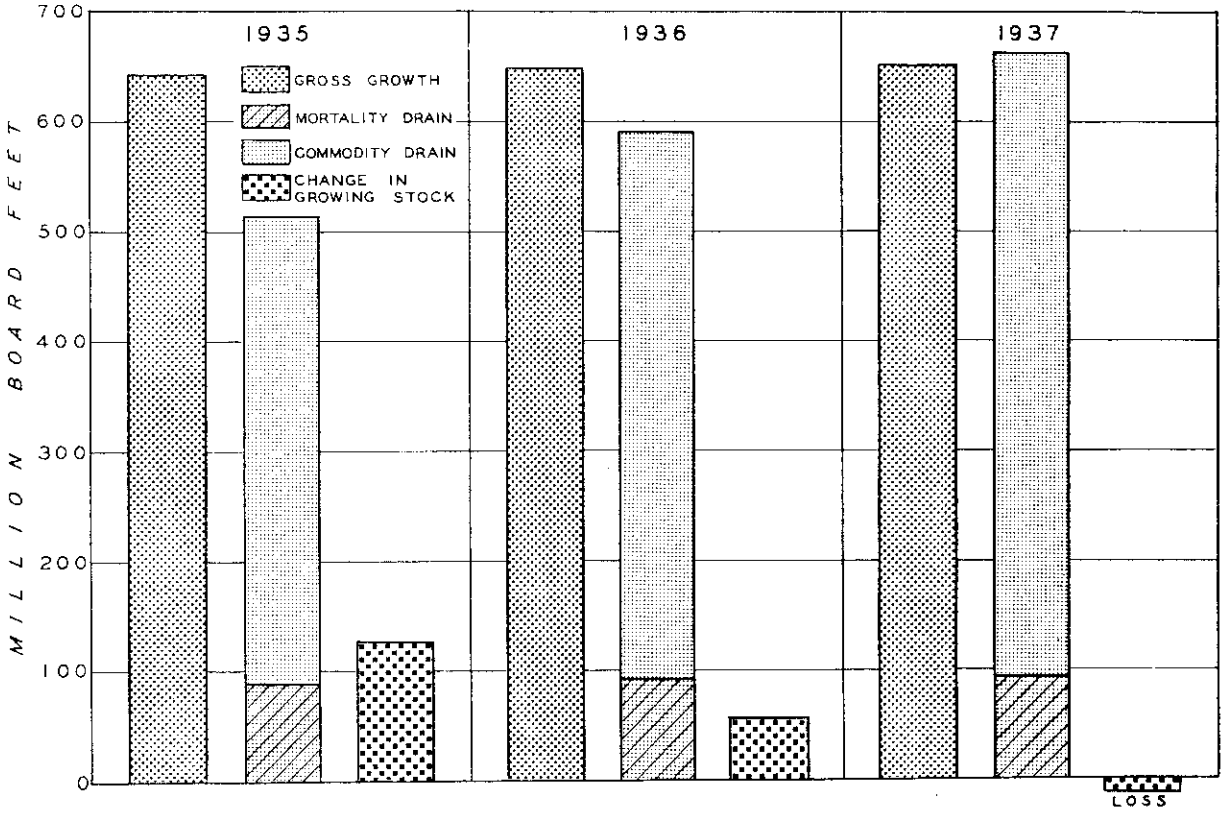


FIGURE 11.—COMPARISON OF GROWTH AND DRAIN FOR THE SAW-TIMBER COMPONENT OF THE GROWING STOCK.

Table 17. - Comparison of growth and drain for the saw-timber component of the growing stock for 1935, 1936, and 1937

Item	Saw-timber part of the growing stock		
	Pine	Hardwood[1/]	Total
	Thousand board feet (lumber tally) [2/]		
Net growing stock, Jan. 1, 1935	5,915,700	3,798,300	9,714,000
Growth, 1935	413,800	227,300	641,100
Mortality, 1935	56,800	32,900	89,700
Net increment, 1935	357,000	194,400	551,400
Commodity drain, 1935	335,100	89,200	424,300
Net change in growing stock, 1935	+21,900	+105,200	+127,100
Net growing stock, Jan. 1, 1936	5,937,600	3,903,500	9,841,100
Growth, 1936	418,400	230,400	648,800
Mortality, 1936	58,200	34,000	92,200
Net increment, 1936	360,200	196,400	556,600
Commodity drain, 1936	383,900	115,400	499,300
Net change in growing stock, 1936	-23,700	+81,000	+57,300
Net growing stock, Jan. 1, 1937	5,913,900	3,984,500	9,898,400
Growth, 1937	418,200	233,400	651,600
Mortality, 1937	59,100	34,900	94,000
Net increment, 1937	359,100	198,500	557,600
Commodity drain, 1937	446,200	123,600	569,300
Net change in growing stock, 1937	-87,100	+74,900	-12,200
Net growing stock, Jan. 1, 1938	5,826,800	4,059,400	9,886,200

1/ Includes cypress.
2/ Based on International $\frac{1}{4}$-inch rule.

Summary of the Forest Situation

Forests are valuable to the extent that they enrich the lives of people. The Forest Survey data are given by this report in such a way as to enable the reader to evaluate for himself the importance of the forest and to evolve plans of action to make this resource contribute more fully to the public welfare.

Southeast Alabama, one of the oldest agricultural areas of the South, presents a rolling surface with light soils, often severely eroded. Since cotton, the principal cash crop, no longer can be depended upon to give adequate economic support, new industries and greater sources of income are urgently needed. Over $4\frac{1}{4}$ million acres, or almost half the total area of 9 million acres, is classed as forest land. Only 3 percent of the forest area is in public ownership, while 56 percent is in farm woodlands and 41 percent is in privately owned non-farm forests.

Loblolly, shortleaf, longleaf, and other pines, and gums, oaks, and yellow poplar are the principal species; pine and pine-hardwood are the most prevalent forest type-groups. Sawlog-size second-growth stands cover almost half the forest area; under-sawlog-size second-growth stands make up two-thirds of the remainder. Old growth occupies only 11 percent; reproduction and clear-cut conditions combined, less than 8 percent.

Site quality, or the timber-producing capacity of the soils, averages medium to good, and the proportion of the better sites is higher than the average for similar forest types in other Forest Survey units of Alabama. The forest stands are so poorly stocked, however, owing to the prevalence of fire and to cutting, that the volumes per acre of the average forest stand are only one-third to one-half of the volume that could be expected under better care and management, as shown by the volumes found on the most heavily stocked 10 percent of the stands (fig. 4).

Most of the stands are young, i.e., less than 50 years old, and most of the trees are in the 2-, 4-, 6-, and 8-inch diameter-classes.

The forest inventory showed almost 10 billion board feet, lumber tally, of saw-timber material, mostly second growth. Much of this, however, was in trees less than 15 in. d.b.h. and in trees that were limby and rough. For the pine and pine-hardwood types, almost nine-tenths of the volume in saw-timber stands stood at the rate of 2,000 board feet or more per acre.

Considering all usable material, both saw timber and non-saw timber, in trees 5 in. d.b.h. and larger, the inventory was over 54 million cords, of which 22 million were in pines, 18 million in pulping hardwoods, and 14 million in nonpulping hardwoods.

Usable material in sound and rotten cull trees amounted to almost 9 million cords. Approximately half the net cordwood volume of sound trees (culls omitted) was in trees 13.0 in. d.b.h. and larger. Although only three-fourths of the total usable cordwood volume was included in the growing stock, the entire forest area, all conditions combined, had an average volume per acre of 9.4 cords of growing-stock material. Included in the inventory figures are almost 12 million pine trees suitable for conversion into poles and piles.

Many forest industries, including 421 sawmills, 11 veneer mills, and 10 other wood-products plants (mostly small), were found in southeast Alabama in 1937. Second only to agriculture, the forest-products industries both in the woods and in the mills provided 3 million man-days of employment. Lumber, fuel wood, and pulpwood were the most important items of commodity drain for industrial and domestic use. No pulp mill is located within southeast Alabama, but pulp mills in adjacent sections of Alabama and Florida draw pulpwood from many parts of this area. According to one authority,1/ wood economically accessible to a pulp mill includes "timber within 40 miles of a pulp or paper mill, or, within 12 miles of a railroad (allowing pulpwood rates) and not over approximately 200 miles from the mill, and within 12 miles of water transportation to a mill."

From Jan. 1, 1935, to Dec. 31, 1937, the volume of the growing stock in trees 5.0 inches d.b.h. and larger experienced a slight increase since growth exceeded drain. In 1937, the growth and drain for all species combined were almost equal; while pines showed a decrease, hardwoods increased.

In 1937, the saw-timber component of the growing stock, all species combined, was reduced 12 million board feet because drain exceeded growth. If the mortality drain had been reduced and the growth had been increased by fire protection and stand-improvement cuttings, this loss might not have occurred. For the 3-year period ending Dec. 31, 1937, the saw-timber growing-stock volume increased slightly.

So poorly stocked are the forest stands that fire protection and other good forest-management practices undoubtedly would increase the growth, but it will be some time before growing stock can be developed sufficiently to utilize fully the high productivity possible under the conditions of climate and forest soils found here. Although forest growth and drain are now approximately equal forest industries in southeast Alabama could be expanded as and if steps are taken to increase the annual increment. Any expansion of the uses of forest raw materials, however, should be adjusted to the increased growth expected, the material in cull trees, that salvaged from thinnings, and that saved through the reduction of fire losses.

Measures Necessary to Improve the Situation

With only 3 percent of the forest in public ownership and with about 39,000 different private owners, many of whom neglect their forests and are not skilled in even the elements of good forest management, the problem of getting good forestry practices adopted throughout the area is difficult but not impossible. Today, in traveling through southeast Alabama, one is impressed with the large number of newly terraced fields, the wide use of cover and soil-building crops, and the developing cattle and dairy industries. All these recent improvements owe their existence largely to publicly directed extension work. Forestry and agriculture, with much in common, can be taught by approximately the same methods.

1/ Earl Porter, Southern Pine Forestry Notes, No. 54, March 1939. Dept. of Conservation, Southern Pine Ass'n., New Orleans, La.

Making personal contacts with individual forest owners, setting up of demonstration areas, and sample marking not only will build up a consciousness and appreciation of good forestry practice and its possibilities but will train individual owners in fire protection, thinning, improvement cutting, selective logging, careful utilization, and other steps necessary for sound forest management. If forestry-extension agencies first concentrate upon the larger properties (17 percent of the number of ownerships), the area involved will be almost two-thirds of the total. It is fundamental, however, that the general public, including tenants and urban residents, be taught the desirability of protecting and developing the forest.

Increased effort is needed in the prevention and suppression of forest fires, which damage the forest in two principal ways: (1) They cause a loss in actual volume and reduce the grade or quality of the timber not killed; and (2) they prevent the survival and development of many young trees which are badly needed to augment the stocking of the stands. Only a small part of southeast Alabama has organized fire protection. For prompt and effective results, it is essential that protection be extended to the entire area, possibly on a county-wide basis. As many forest fires in this area are either wilfully or carelessly set by the general public, a proportionate part of the costs of protection should be borne by the public.

Many trees, especially those in old field-stands, have grown in such open stands that they are limby, rough, and consequently of low quality for many uses. Also many trees are growing in stands so crowded that growth has stagnated, while fire-scars and other defects have placed still other trees in the class of culls. Stand-improvement cuttings are recommended for these stands, therefore, wherever the returns from products obtained in thinnings and the cutting of undesirable trees will pay at least the cost of the improvement measures.

In place of the present practice of cutting only the highest-quality trees, a system of selective logging should be adopted; the slow-growing and undesirable trees, as well as some of the best trees, should be removed, leaving the stand in a healthy, rapidly growing condition. Cuts, which should be gaged to the growth of the stands, should be as light and as frequent as economic conditions permit. After making several selective cuttings, an appreciable increase in both the volume and quality of the growth may be expected.

Effort should be made to secure for the landowners and forest-products manufacturers the full and most economic use of the trees cut. All usable parts of the tree should be converted into the product for which they are best suited. This involves integrated utilization, which means that the trees removed in any cutting are converted into sawlogs, poles and piles, cooperage and veneer stock, pulpwood, etc., depending upon which forest product yields the greatest stumpage returns. This would eliminate the cutting of saw-timber trees into fuel wood and would limit utilization for this purpose to the nearly 9 million cords in cull trees, which should be removed to improve the stands.

More forest industries that can use the low-grade raw materials of the old-field second-growth stands of southeast Alabama are sorely needed. A pulp mill, for which ample supplies of low-quality material are in sight, not only could use much of the material now without a market, but also could aid materially in furnishing rural labor a much-needed opportunity for full or part-time employment. The special Unemployment Census taken in Nov. 1937 disclosed that

in this Survey unit there were 36,000 people either unemployed and wanting work, or on relief, and 35,000 partially employed and wanting more work.

If greater market demand for the forest products of this unit in the future can be anticipated, it may be expedient to plant abandoned fields and clear-cut forest areas that are so large or so far removed from seed trees that natural seeding from adjoining forests will be slow if not impossible. Of the total areas of idle or abandoned farm land and clear-cut forest land, which together amount to about 660,000 acres, it is roughly estimated that about 160,000 acres may justify artificial reforestation, while the remaining 500,000 acres can be expected to reforest naturally, if given fire protection.

Although the drain for industrial and domestic use and for mortality already approximates the growth, as previously brought out in this report, the present growth represents only a fraction of the potentialities of the sites, owing largely to the poorly stocked condition of the stands. In the long run, the forest-products industries must be kept within a sound pattern of sustained yield, in which the cut over a period of years may equal but not exceed the growth; but with a widespread adoption of good forest-management practices, the growth can be increased to a point probably double what it is at present. Then, enriched by greater supplies of raw materials for new and expanded industries on a permanent basis, the forests of southeast Alabama will help provide the people of this area with a better living and with greater security than they now enjoy.