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FOREST RESOURCES OF WEST CENTRAL 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 May 22, 1935, to July 13, 1935, and three field canvasses of forest industrial plants to determine forest drain, the last of which was made during May 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 presentation of these survey data, it should 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.

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FOREST RESOURCES OF WEST CENTRAL ALABAMA

General Description

Lying west of Birmingham and north of Demopolis, West Central Alabama (Forest Survey Unit Alabama No. 4) includes almost 4½ million acres within the following 9 counties: Bibb, Fayette, Greene, Hale, Lamar, Marion, Perry, Pickens, and Tuscaloosa (map, fig. 1). This distinctly rural area includes only one incorporated city or town with a population of 2,500 people or more (Tuscaloosa, 1930 population 20,700). Of the total population (245,000 in 1930), about 66 percent live on farms, 26 percent in non-farm homes in rural areas, and 8 percent in Tuscaloosa. There are only 36 people per square mile, as compared with 52 for the entire State. Agriculture, the manufacture of forest products, and mining are the principal sources of employment. 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.

Settled soon after 1800, this area, which was developed upon a cotton economy, received one calamitous setback during the War between the States and another during the boll-weevil epidemic. Moreover, erosion has so impoverished the light soils that many of the upland farmers cannot now compete successfully with the tillers of the more fertile cotton acres in the bottom lands. For this reason, the possibilities of supplementing the present sources of employment should be studied; and in this connection an account of the forest resource and the wood-products industries, based upon a recent study made by the Forest Survey, may be useful, especially when it is considered that more than 6 acres out of every 10 are in forests (table 1) and that there are more than 10 acres of forest for every acre planted to cotton.

Most of this unit is in the Coastal Plain with its gently rolling hills, although the northeast part (about 15 percent of the area) extends up into the Cumberland Plateau and into the Valley and Ridge Province, where some of the steep ridges reach elevations of more than 500 feet above sea level.

According to the Bureau of Agricultural Chemistry and Engineering, this area is dominated by gray to yellow, sandy and fine-sandy loams, with some fine sands. In the northeast part, grayish-yellow to reddish, fine-sandy and silt loams, developed from sandstones and shales, are found together with some brownish-red to red, silt and clay loams, developed from limestone. The southwest part—about one-seventh of the area, including parts of Perry, Hale, and Greene Counties—is in the Black Prairie; much of this fairly level area has black (or brown) friable soil underlain by whitish material high in lime.

Excellent freight-transportation facilities are available on the Black Warrior River, which flows from Birmingham southward across the unit towards Mobile and the Gulf of Mexico. The Tombigbee River (which forms the southwest boundary of this area) here has a shallow channel suitable for rafts and flatboats throughout its length in the unit. About five main highways, mostly paved, which radiate from Tuscaloosa to the boundaries of the area, are supplemented by many country roads. Several railroad lines, including the Southern, the Mobile and Ohio, and the St. Louis and San Francisco, serve the area.

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

Land	Area	Proportion of total area
	- - - Acres - - -	- - - Percent - - -
Productive forest	2,711,700	61.8
Nonforest:		
Agriculture:		
In cultivation:		
Old cropland	1,155,100	26.3
New cropland	42,700	1.0
Out of cultivation:		
Idle	121,500	2.8
Abandoned	76,300	1.7
Pasture	234,000	5.3
Total agriculture	1,629,600	37.1
Other nonforest	49,100	1.1
Total nonforest	1,678,700	38.2
Total forest and nonforest	4,390,400	100.0

Although no large hydroelectric plants are located in the area, within 150 miles of Tuscaloosa are several large water-power developments, including those of the TVA at Muscle Shoals and Pickwick Landing, both on the Tennessee River.

Coal, the most important mineral resource, is mined in Bibb, Fayette, Marion, and Tuscaloosa Counties. Over a million tons were mined in 1934, almost half of which came from Bibb County; more than 2,000 people were employed at the mines in the unit.

Agriculture gives employment to over two-thirds of the gainfully employed workers. According to the 1935 Census of Agriculture, the total area in farms, including farm woodland, was 2,613,000 acres, or almost 60 percent of the entire area; the woodland on farms covered 1,330,000 acres. Cotton is the principal cash crop, although in 1934 it was harvested on only 256,000 acres, as compared with 407,000 acres of corn. From 1924 to 1934 the cotton acreage was reduced 70,000 acres, or about 22 percent, and this reduction caused a drop in employment of about 900,000 man-days of work in cotton cultivation and harvesting. Although the yield of cotton per acre increased during this period, the value of the cotton declined from about 11 million dollars to less than $6\frac{1}{2}$ million dollars; and the preliminary estimate by the U.S.D.A. for 1938 shows a probable decline to $4\frac{1}{2}$ million dollars. Yields of cotton are about two-fifths bale per acre—slightly above the average for the United States; but yields of corn are about 13 bushels per acre—far below the National average.

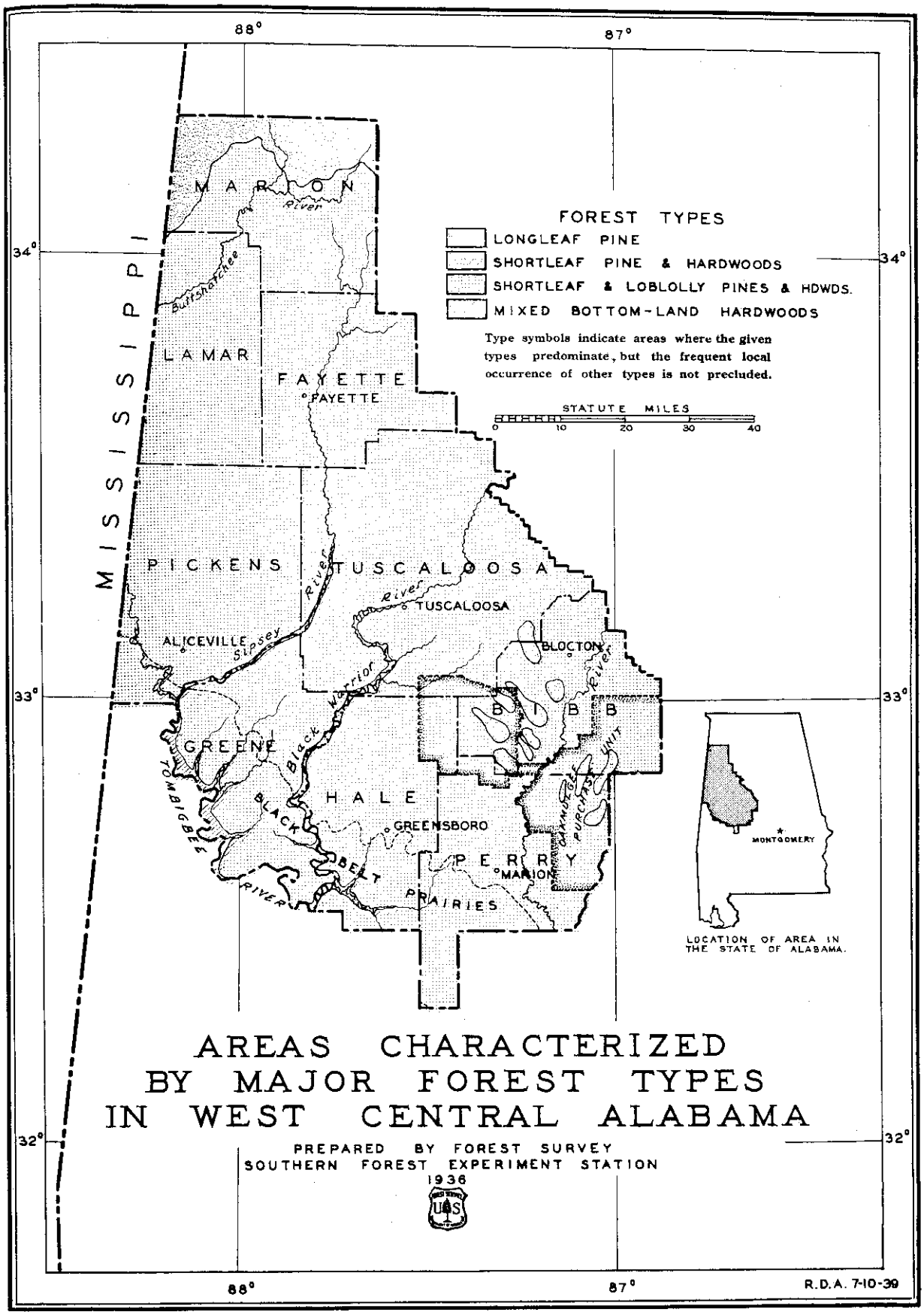


FIGURE 1.— FOREST TYPE MAP.

Some of the counties are more highly developed for agriculture than others. According to the 1935 Census of Agriculture, Greene, Hale, and Perry Counties, parts of which are in the Black Prairies, have at least 30 percent of their land "available for crops" (i.e., in cropland and plowable pasture); Marion, Lamar, Fayette, and Pickens, in the northern part of the area, have 20 to 29 percent; and Tuscaloosa and Bibb Counties, in the mountainous, eastern part of the unit, have less than 20 percent. Most of the land not available for crops is in some stage of forest cover.

A recent study of land ownership in this area made by the Bureau of Agricultural Economics of the U.S.D.A., in cooperation with the Works Progress Administration of Alabama, shows that the land is held in about 20,000 ownerships, only 14 percent of which are 260 acres or more. These larger ownerships, however, include almost two-thirds of the total land area, as shown in the following tabulation:

Size of ownership	Percent of the number	Percent of the area
Less than 100 acres	54	13
100 - 259 acres	32	25
260 - 499 acres	9	17
500 - 999 acres	3	13
1,000 acres and over	2	32
	100	100

In the Black Prairies of this area, the proportion of land in ownerships of 260 acres or more is much greater than in the remainder of the unit.

This study shows also that 70 percent of the area is owned by local residents; 22 percent by residents of other counties in Alabama; 6 percent by non-residents of the State; and 2 percent by the public or by owners whose residence is unknown.

Additional information furnished by this same study was the proportion of the land owned by different business groups, which is summarized as follows:

Business group	Percent of area owned	Business group	Percent of area owned
Farmers	56	Wood-using industries	5
Merchants	4	Mining, power, and railroad companies	7
Professional men	3	All other businesses, including farming companies	8
Administrators and executors	6	Governmental agencies (publicly owned land)	1
Banks and mortgage companies	3	Unknown	5
Real-estate agencies	2	Total	100

Soil erosion is occurring almost everywhere in the unit, but the Survey field men recorded only the following well-marked and destructive forms: (1) sheet erosion, in which the soil is washing off from a generally smooth surface; (2) shoestring erosion, in which the soil surface is cut into and a system of small, branching gullies a few inches to 2 feet deep is formed; and (3) gully erosion, in which the soil surface is being destroyed by systems of deep gullies. In one or more of the three forms, marked erosion is found on 10 percent of the cropland in cultivation, 20 percent of the idle cropland, 21 percent of the abandoned cropland, 10 percent of the pasture, and 14 percent of the forest land, which includes many old gullied fields with only a partial stocking of trees (table 2). The forest is usually located on the steeper slopes, which are more susceptible to erosion than gentle slopes. Also, accelerated erosion is often found in newly established forests, which only recently had been abandoned fields. When a grass- or tree-growth becomes well established, erosion is generally checked unless there is considerable drainage through the area from open fields higher up the slope.

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

Land use	Type of erosion				Total
	None or arrested	Sheet	Shoestring	Gully	
	Acres				
Forest	2,342,100	201,200	67,300	101,100	2,711,700
Cropland in cultivation	1,080,000	73,300	40,300	4,200	1,197,800
Idle cropland	96,900	15,600	7,400	1,600	121,500
Abandoned cropland	60,500	5,000	7,500	3,300	76,300
Pasture	210,200	8,200	7,400	8,200	234,000
Total	3,789,700	303,300	129,900	118,400	4,341,300
Percent of total	87.3	7.0	3.0	2.7	100.0

Description of the Forest

More than four-fifths of the entire forest area is in the rolling uplands, the remainder being in river bottoms, branch heads, and swamps. Loblolly and shortleaf pines, the principal forest species (fig. 2), are found alone or with hardwoods throughout the area. The prevalence of certain characteristic forest types over large areas is shown on the map (fig. 1), although within the broad ranges there delineated many small intermingled areas of other types occur as well as areas of cleared land.

As shown by table 3, the pine and the pine-hardwood type-groups combined cover 70 percent of the forest area, while the remainder is fairly evenly

divided between the upland and the bottom-land hardwood type-groups. The first three of these type-groups are located mainly in the rolling uplands, whereas the fourth is confined to the river bottoms, branch heads, and swamps. Based upon cubic volume, the pine type-group is 86 percent pine and 14 percent hardwood; the pine-hardwood type-group is 44 percent pine and 56 percent hardwood, mainly oaks, gums, and hickories; the upland hardwood type-group is 10 percent pine and 90 percent hardwood, chiefly oaks, hickories, and gums; and the bottom-land hardwood type-group is only 3 percent pine and 97 percent hardwood, chiefly gums, oaks, yellow poplar, and hickories.

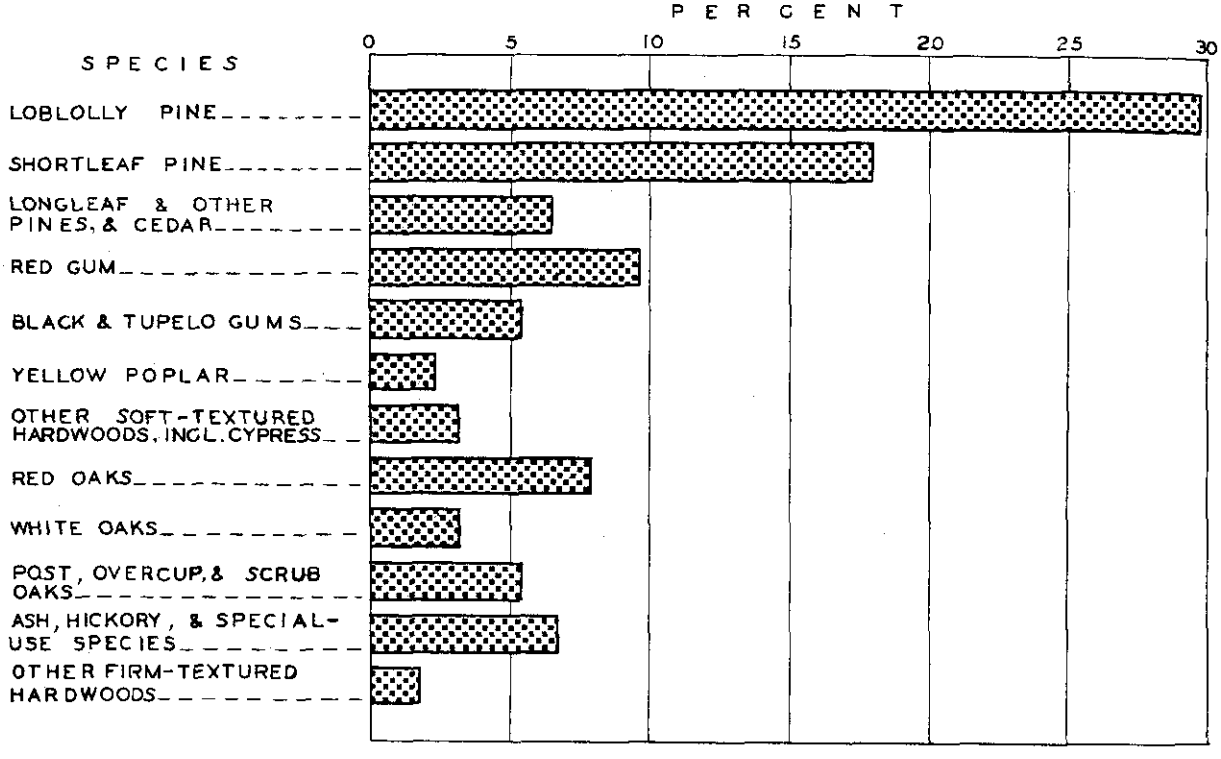


FIGURE 2.— PROPORTION OF THE VARIOUS SPECIES, BASED UPON CUBIC VOLUME.

Less than one-tenth of the entire forest area is classed as old growth, with large, old, high-quality, saw-timber trees. Most of the old growth is in the hardwood types; and, for all types combined, by far the greater part of the old growth is partly cut, with 10 percent or more of the sawlog-size trees[1/] removed. Old-growth uncut stands, which usually occur in small scattered tracts, have an average volume per acre of 7,300 board feet (lumber tally), whereas the old-growth partly cut stands average 3,700 board feet.

1/ Sawlog-size pines are at least 9.0 in. d.b.h. and hardwoods, 13.0 in.

Table 3. - Forest area 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		
	Acres					Percent
Old growth:						
Uncut	22,200	17,300	14,700	18,100	72,300	2.7
Partly cut	33,700	32,000	46,000	79,600	191,300	7.0
Total	55,900	49,300	60,700	97,700	263,600	9.7
Second growth:						
Sawlog size:						
Uncut	440,000	147,000	66,500	114,900	768,400	28.3
Partly cut	198,700	104,200	43,500	41,900	388,300	14.3
Under sawlog size	437,600	386,700	222,500	128,900	1,175,700	43.4
Reproduction 1/	50,000	25,400	32,900	7,400	115,700	4.3
Total	1,126,300	663,300	365,400	293,100	2,448,100	90.3
Total all conditions	1,182,200	712,600	426,100	390,800	2,711,700	100.0
Percent of total forest area	43.6	26.3	15.7	14.4	100.0	

1/ Includes 16,400 acres of clear-cut condition.

It is noteworthy that the second-growth stands, having grown up naturally over the old fields or above the stumps of previous forests, now make up 90 percent of the entire forest area. Almost half the second growth is classed as sawlog size; here the uncut stands average 3,400 board feet per acre and the partly cut, 2,100 board feet with a minimum of 400. Second-growth stands that have not reached saw-timber size but are made up chiefly of saplings (i.e., pines less than 9.0 in. d.b.h. and hardwoods less than 13.0 in.) are equally extensive, but they have only a small saw-timber volume per acre, and this in a few sawlog-size trees. Including all usable material in trees 5.0 in. d.b.h. and larger, these stands have an average volume per acre of about 4 cords, including bark. The small remaining area of second growth is in the reproduction condition, in which the principal forest stands are seedlings and sprouts. Usually when fields are abandoned, or the forest is cut over, natural reproduction is quick to establish itself. In general, the reproduction has the same species composition as the adjacent stands, although the more prolific seeders and the more fire-resistant species tend to take over the area.

The site index, or productive capacity, of the forest land is measured by the height in feet attained by average dominant trees at 50 years of age. Approximately 27 percent of the areas dominated by loblolly pine has a site index of 90 or over, which is indicative of the better sites; 34 percent, 80; 23 percent, 70; and 16 percent, 60 or less. Of the areas dominated by shortleaf pine, 6 percent has a site index of 80 or over; 25 percent, 70; 49 percent, 60; and 20 percent, 50 or less. These proportions compare favorably with those of other Survey units in the pine-hardwood region east of the Mississippi.

Figure 3 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 different age-classes. These data are based upon the pine and pine-hardwood type area of 1,741,300 acres (153,500 acres in the longleaf-pine types not included). Approximately 38 percent of the forest area is occupied by stands not over 30 years old; 45 percent, by stands 31 to 60 years old; and only 17 percent, by stands at least 61 years old.

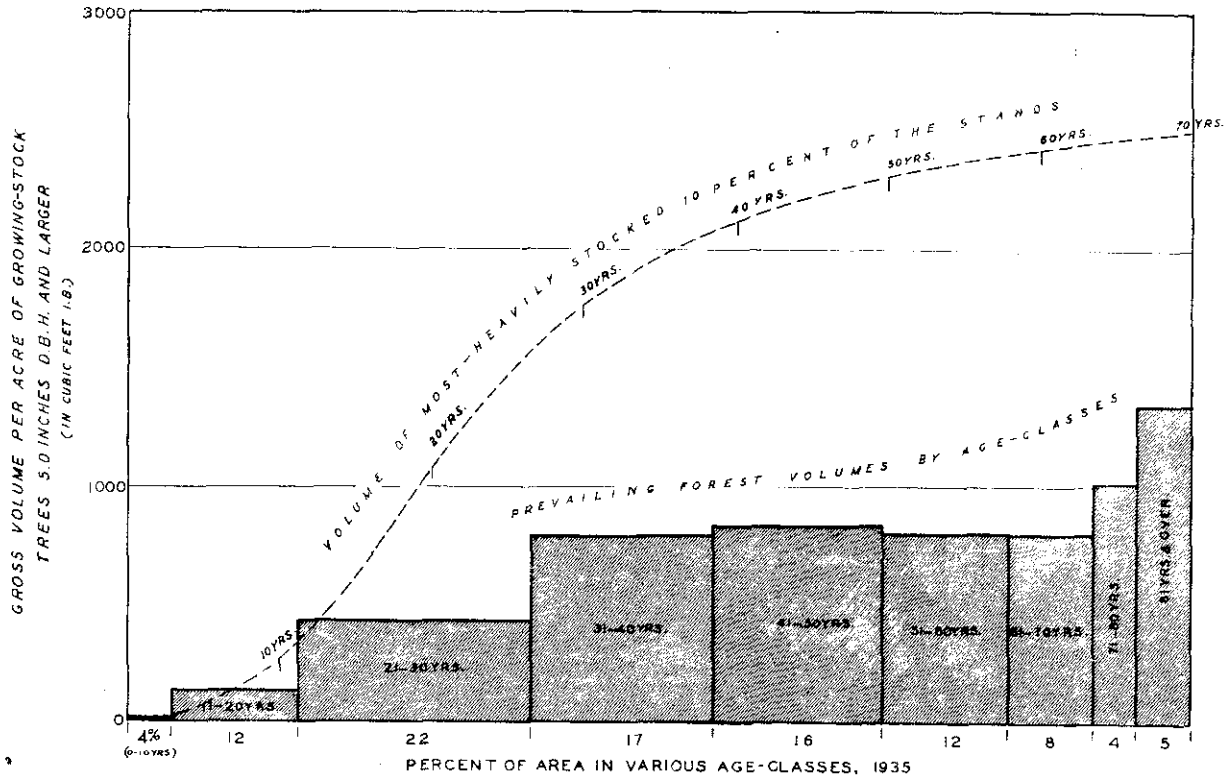


FIGURE 3.— PREVAILING VOLUMES, BY AGE-CLASSES, COMPARED WITH THOSE IN WELL-STOCKED STANDS (BASED ON PINE AND PINE-HARDWOOD TYPE-AREAS OF 1,741,300 ACRES).

* EXCLUDING 153,500 ACRES IN THE LONGLEAF-PINE TYPES.

The average gross volume (bark omitted) ranges from practically nothing for the youngest stands to about 800 cubic feet per acre for the stands 31 to 70 years old, and to over 1,300 cubic feet per acre for the oldest stands. The average density of the stocking is far below the potential timber-growing capacity of the land. To arrive at some measure of the deficiency, the aver-

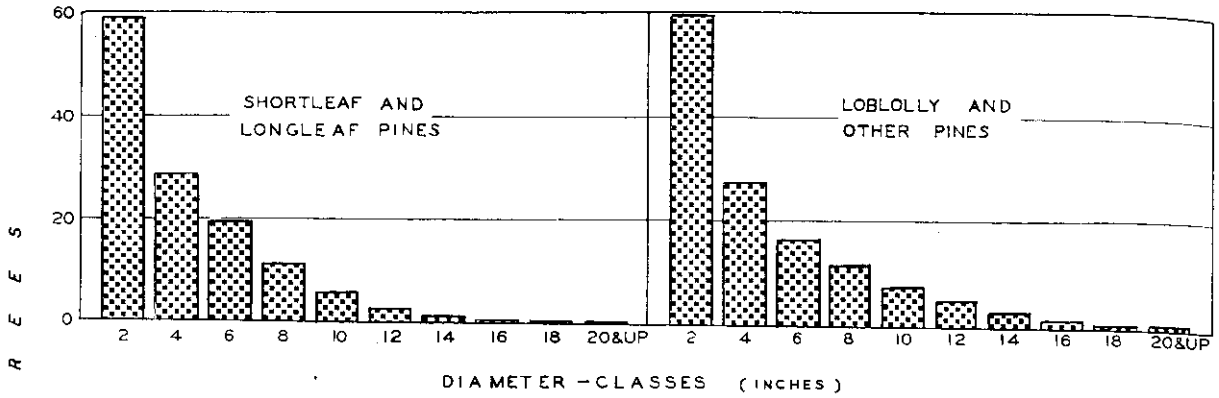
age stocking is compared with that on the average of the most-heavily stocked 10 percent of the stands having the same weighted site indexes. This comparison, which is shown in figure 3, indicates that the forest land is capable of maintaining over twice the volume of timber it now supports and indicates a striking opportunity for building up the growing stock, without which full use of the soil and optimum harvests cannot be expected.

Figure 4, which presents the number of trees in each diameter-class for four main species-groups, shows that most of the sound trees are in the 2- and 4-inch diameter-classes.2/ The soft-textured hardwoods, generally considered suitable for pulping, include gums, yellow poplar, sweet bay, red maple, cypress, and willow. The firm-textured hardwoods include oaks, hickories, elms, ash, and other hardwoods not generally pulped at present but which in the future may be found suitable. Numerically, the hardwoods have greater representation than the pines, although considering only the trees in the 6-inch and larger classes, the forest stands of the entire area are about evenly divided between the pines and hardwoods.

The relatively plentiful trees of the 2- and 4-inch classes are forest recruits of the future, since it is from them the growing stock may be built up. Protection from fire is essential if the smaller trees are to contribute their full potential value in ultimately building up the larger and more valuable size-classes. The stands are *not* well balanced, however, in that there is too small a proportion of large trees (18-inch class and larger) in which the greatest commercial values are found. Instead of the present practice of logging all merchantable trees, a system of selective cutting should be used in which the amount needed for the cutting is made from trees of as many sizes as is economically possible. Some of the largest and best trees, as long as they are growing rapidly, should be saved to build up the large-tree component of the stands.

Of the 2-3/4 million acres of forest land, 1,330,000 acres are in farm woodlands, 1,132,000 in non-farm private ownerships, and only 250,000 in public ownership. A recent study of forestry practices in the non-farm private forests, made by the Division of State and Private Forestry of Region 8 of the Forest Service, shows that for the 43 properties examined, aggregating 623,000 acres in this unit, about 24 percent is handled under "good" practices for continuous forest crops; 73 percent is handled under practices that are "poor" but that leave the land productive; and only 3 percent is in "lands not left productive." Less than one-fourth of the total forest area is included in this study, however, and most of the properties examined are large; probably the remaining three-fourths of the forest is not in such good condition, as indicated by the dearth of large trees and the surplus of small ones.

2/ The 2-inch class includes trees 1.0 to 2.9 in. d.b.h.; the 4-inch class, 3.0 to 4.9 in. d.b.h.; and so on.



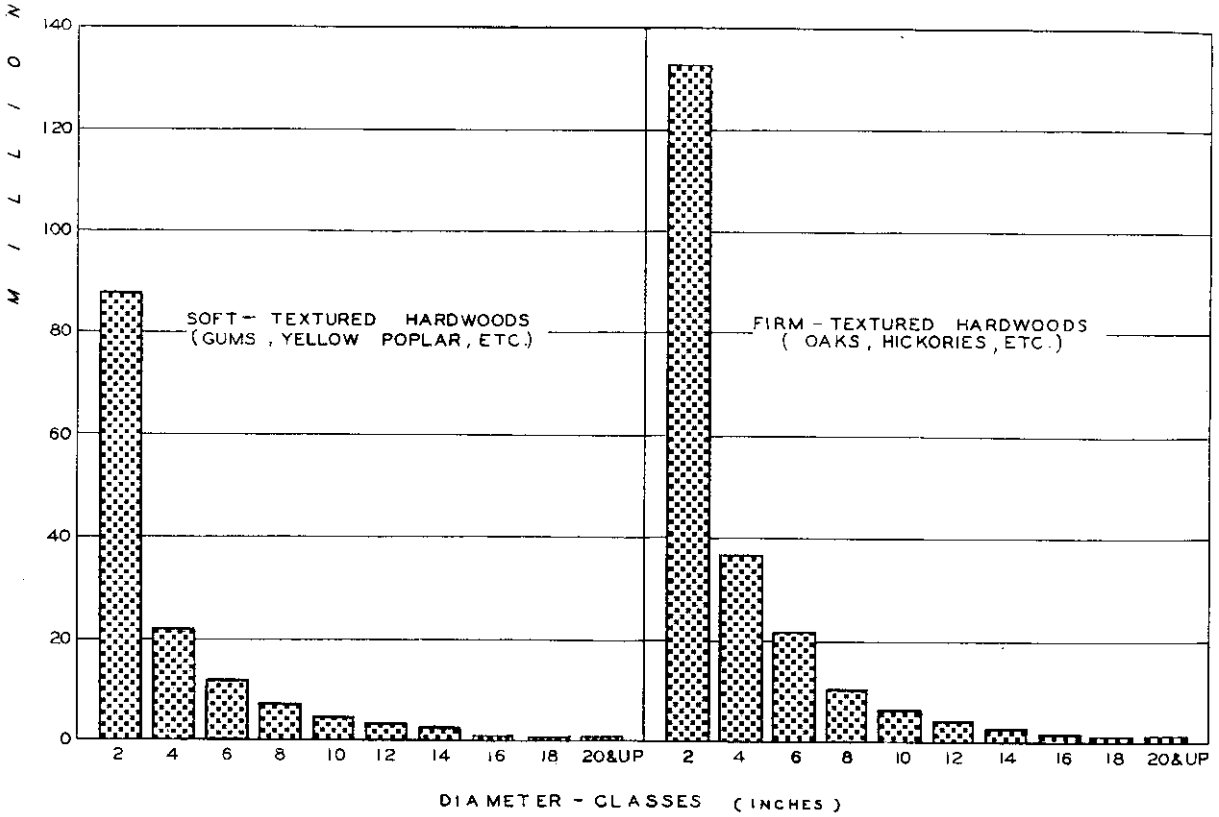


FIGURE 4.— STAND DIAGRAMS OF SOUND TREES.

Volume Estimates

Saw-timber volumes

In 1935 this Survey unit had a net volume of saw timber of about 5 billion board feet, lumber tally (table 4). According to the Doyle rule, which is in general use in the South, the saw-timber volume is not much over 3 billion board feet, but because of the large volume in small logs in this unit, the Doyle rule underruns lumber tally by an average of 43 percent for the pine, and 29 percent for the hardwoods. Pines included in this estimate are at least 9.0 in. d.b.h., and hardwoods, 13.0 in.; and all trees have 50 percent or more of their gross volume in sound material, or contain a sound butt log at least

Table 4. - Net board-foot volume (lumber tally, based on International ¼-inch rule) in the various forest conditions, 1935

Species-group	Old growth		Second growth			Total	Proportion of total
	Uncut	Partly cut	Sawlog size: Uncut	Sawlog size: Partly cut	Under sawlog size[1]		
	Thousand board feet						Percent
Pines:							
Loblolly	146,600	108,200	1,244,400	274,500	88,400	1,862,100	37.2
Shortleaf	62,100	49,000	413,500	188,300	88,700	801,600	16.0
Longleaf	80,900	37,200	106,200	26,200	27,300	277,800	5.6
Others[2]	14,900	8,900	84,300	18,800	5,700	132,600	2.7
Total pines	304,500	203,300	1,848,400	507,800	210,100	3,074,100	61.5
Hardwoods:							
Red gum	52,400	118,000	211,400	87,800	24,200	493,800	9.9
Black and tupelo gums	29,800	77,800	90,100	30,600	17,100	245,400	4.9
Yellow poplar	16,100	23,200	86,900	25,900	8,100	160,200	3.2
Other soft-textured hdwds.[3]	10,700	44,600	41,100	12,800	6,300	115,500	2.3
Red oaks	36,200	81,000	136,500	71,300	41,900	366,900	7.4
White oaks[4]	37,300	71,200	74,800	34,900	19,400	237,600	4.8
Other firm-textured hdwds.[5]	37,900	89,900	90,400	48,900	34,500	301,600	6.0
Total hardwoods	220,400	505,700	731,200	312,200	151,500	1,921,000	38.5
Total all species	524,900	709,000	2,579,600	820,000	361,600	4,995,100	100.0
Percent of total	10.5	14.2	51.7	16.4	7.2	100.0	

1/ Includes 6,500 M board feet in residual trees in the reproduction and clear-cut conditions.
2/ Includes a small amount of cedar.
3/ Includes sweet bay, red maple, cypress, and willow.
4/ Includes about 65,600 M board feet in low-grade white oaks, such as post oak.
5/ Includes hickories, elms, ash, beech, birch, pecan, and sycamore.

12 ft. long. Top diameters vary with the present usable limits, but no pine logs less than 5.5 in. in diameter, inside bark, and no hardwood logs less than 8.5 in. are included; the top diameters actually used averaged larger than these minima. All figures are net, deductions having been made for portions of the tree which cannot be manufactured into lumber on account of fire scars, rot, crooks, limbiness, bad knots, etc., as well as for loss in manufacture due to sweep and hidden defects.

Pines (loblolly pine has more volume than all other pines combined) make up slightly less than two-thirds of the saw-timber volume; hardwoods more than one-third. For all species combined, the sawlog-size second growth (uncut and partly cut conditions combined) includes more than two-thirds of all the saw-timber volume.

Of importance to the forest-products industries is the fact that the material at hand is in small trees; 47 percent of the pine saw-timber volume is found in trees 9.0 to 12.9 in. d.b.h., and 64 percent of the hardwood volume is in trees 13.0 to 18.9 in. d.b.h. (table 5).

Table 5. - Diameter distribution of net board-foot volume (lumber tally) 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: Uncut	Sawlog size: Partly cut	Under sawlog size[1]		
	Thousand board feet						Percent
Pines:							
10 - 12	36,400	58,000	878,200	302,500	175,300	1,450,400	47.2
14 - 16	64,900	80,500	600,200	131,200	30,700	907,500	29.5
18 - 20	83,500	37,900	242,200	56,500	4,100	424,200	13.8
22 and over	119,700	26,900	127,800	17,600	-	292,000	9.5
Total pines	304,500	203,300	1,848,400	507,800	210,100	3,074,100	100.0
Hardwoods:							
14 - 18	101,900	235,400	540,000	232,000	123,100	1,232,400[2]	64.2
20 - 28	80,700	235,000	180,700	77,800	25,100	599,300	31.2
30 and over	37,800	35,300	10,500	2,400	3,300	89,300	4.6
Total hardwoods	220,400	505,700	731,200	312,200	151,500	1,921,000	100.0

1/ Includes 6,500 M board feet in residual trees in the reproduction and clear-cut conditions.
2/ Includes 4,600 M board feet of cypress in the 10- and 12-inch classes.

As shown by table 6, which is based on the supplemental volume-table study, more than half of the loblolly and shortleaf pine saw timber is in trees classes as "limby" or "rough," many of which are not suitable for high-grade lumber. The old growth, it will be seen, is much better in lumber quality than second growth, which often occurs in old-field stands.

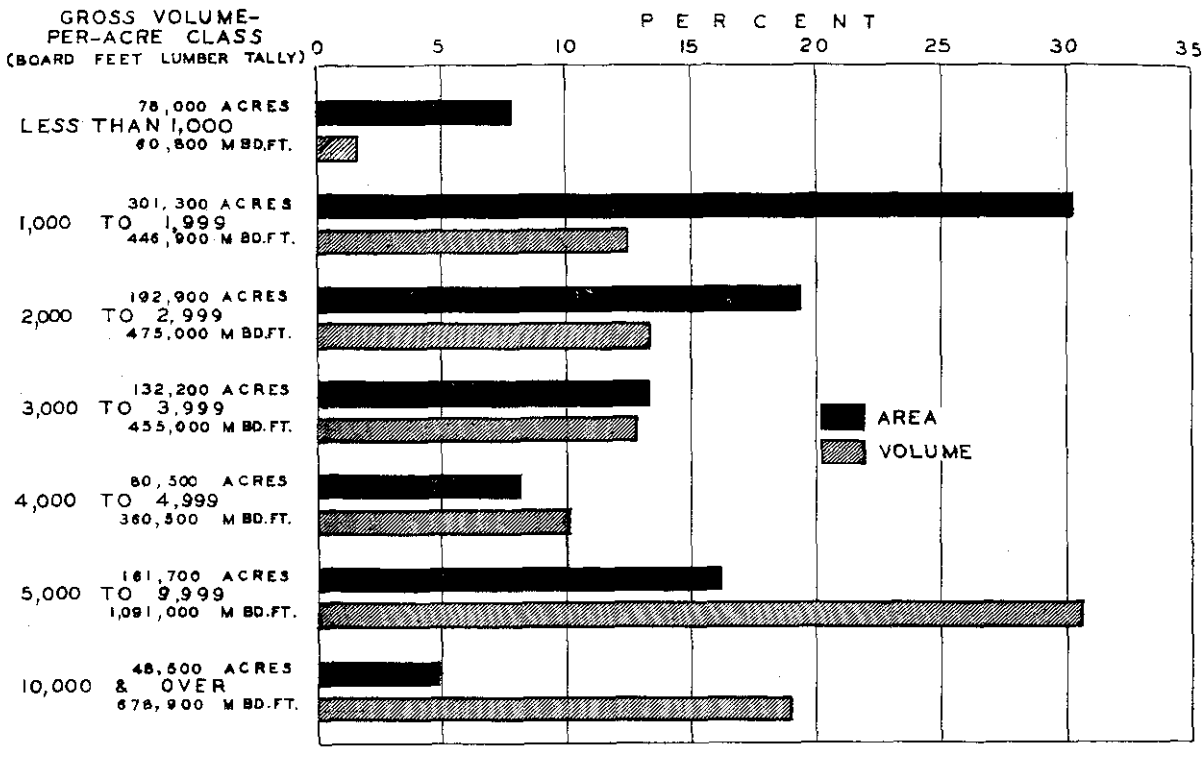
Table 6. - Classification of pines according to tree grade

Species and stand condition	Tree grade[1/]			Total
	Smooth	Limby	Rough	
	Percent of volume			
Loblolly pine:				
Old growth	91	9	-	100
Second growth	28	52	20	100
Weighted average	36	47	17	100
Shortleaf pine:				
Old growth	97	3	-	100
Second growth	54	41	5	100
Weighted average	59	36	5	100
Loblolly and shortleaf pines:				
Old growth	93	7	-	100
Second growth	36	49	15	100
Weighted average	44	43	13	100

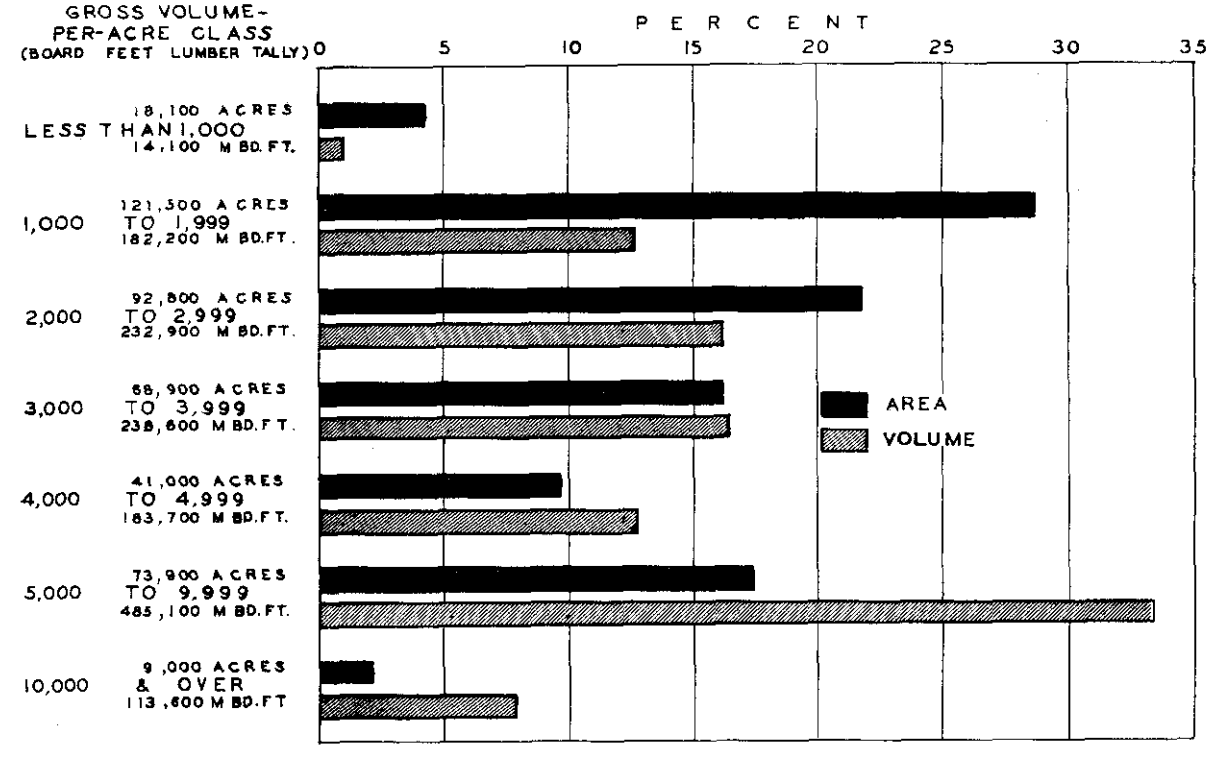
1/ Smooth trees have at least 20 ft. of clear length and at least 50 percent of their total usable length practically free of limbs and indications of knots; for limby trees, these figures are 12 ft. and 30 to 49 percent, respectively; while rough trees have less than 12 ft. of clear length, or less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

Since all except less than 3 percent of the entire forest has been cut over at least once, practically all of it may be considered accessible, especially to modern logging equipment. Figure 5, which indicates the proportional area and gross volume of saw-timber stands, classified according to volume of saw timber per acre, shows that almost two-thirds of the area in the sawlog-size conditions has at least 2,000 board feet per acre. It is possible that the data shown for the first class (less than 1,000 board feet) is subject to error, owing to the fact that the data were taken on $\frac{1}{4}$-acre plots; the combined figures for the first two classes, however, are relatively more accurate. Stands with high volumes per acre generally are the most attractive economically, for the logging costs per M board feet are less in the heavy stands, all other factors being equal.

Approximately 62 percent of the area of the sawlog-size stands of the pine and pine-hardwood types (chart A) and 86 percent of their saw-timber volume are in stands that have at least 2,000 board feet per acre; while stands that have less than 2,000 board feet per acre consequently occupy 38 percent of the area and make up only 14 percent of the volume. Approximately 67 percent of the area of the sawlog-size stands of the hardwood types (chart B) and 86 percent of their saw-timber volume are in stands that have at least 2,000 board feet per acre, leaving 33 percent of the area and 14 percent of the volume in stands with less than this amount.



A-PINE AND PINE-HARDWOOD TYPES (995,100 ACRES)



B-UPLAND HARDWOOD AND BOTTOM-LAND HARDWOOD TYPES (425,200 ACRES)

FIGURE 5. - PROPORTIONAL AREA AND VOLUME OF THE SAWLOG-SIZE CONDITIONS, CLASSIFIED ACCORDING TO VOLUME OF SAW TIMBER PER ACRE.

Cordwood volume

In the forests of west central Alabama, there was in 1935 a total net usable volume of 32½ million standard cords (4 x 4 x 8 ft.) of wood, bark included (table 7). This volume includes all the sound material from the following sources:

1. The merchantable stems of sawlog-size trees (same material as that previously shown as saw timber).

2. That portion of saw-timber trees not suited for sawlogs but usable as cordwood. This includes the upper stems of all species to a variable top-diameter limit (but not less than 4 in.), and the limbs of hardwoods and cypress to a 4-inch minimum.

3. Sound trees under sawlog size at least 5.0 in. d.b.h., in which the entire stem of all species is included to a variable top-diameter (but not less than 4 in.).

4. The estimated sound material in cull trees, which includes all scrub oaks.

Sound trees of sawlog size contain 48 percent of the cordwood volume; sound trees under sawlog size, 31 percent; and cull trees, 21 percent. More than three-fifths of the cordwood volume from all sources is in hardwoods; less than two-fifths is in pines. Pulping species (i.e., the pines and the soft-textured hardwoods, chiefly gums and yellow poplar) contain 22 million cords, while the firm-textured hardwoods (i.e., oaks, hickories, etc.) contain 10½ million cords. It is likely that, in the future, pulp and paper manufacturers will utilize some of the firm-textured species not now extensively pulped.

At the present time the principal uses for the 21 million cords of material not suited for sawlogs are for fuel, pulpwood, and miscellaneous farm use, including fence posts. For pulp and paper making in this unit, only pines are used at the present time; while for fuel and fence posts both pines and hardwoods are used.

With 21 percent of the cordwood volume in cull trees—the highest proportion in any Forest Survey unit in Alabama and caused largely by the accumulation of hardwoods—rapid utilization of these undesirable trees is needed to make available more room for the growth of desirable trees and for the establishment of the seedlings necessary to build up the growing stock. In addition, a large volume should be salvaged, wherever economically possible, by thinning over-dense stands and by utilizing tops and limbs of trees cut for sawlogs.

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

Species-group	Sawlog portion of saw-timber trees	Upper stems of saw-timber trees	Sound trees under sawlog size	Sound and rotten cull trees	Total all classes
	Cords (bark included)				
Pines	7,034,600	1,195,400	3,883,500	692,600	12,806,100
Hardwoods:					
Soft-textured	2,480,600	1,347,500	2,725,100	2,743,600	9,296,800
Firm-textured	2,233,900	1,232,100	3,478,400	3,557,400	10,501,800
Total hardwoods	4,714,500	2,579,600	6,203,500	6,301,000	19,798,600
Total all species	11,749,100	3,775,000	10,087,000	6,993,600	32,604,700

Figure 6 shows the net cordwood volumes of sound trees (culls omitted) by species-group, diameter-class, and type of material. Under-sawlog-size trees make up less than one-third of the pine volume but almost half the hardwood volume.

Cull trees and the upper stems and usable limbs of sawlog-size hardwoods are not considered part of the growing-stock volume of 23 million cords, which is made up of 13 million cords in sound trees of sawlog size, including the tops of sawlog-size pines, and 10 million cords in sound trees over 5.0 in. d.b.h. and under sawlog size. Average volumes per acre in cords of growing-stock material (computed by dividing the volume in any forest condition or type by the corresponding forest area) are shown in table 8. The weighted average per acre for all forest conditions and type-groups is 8½ cords.

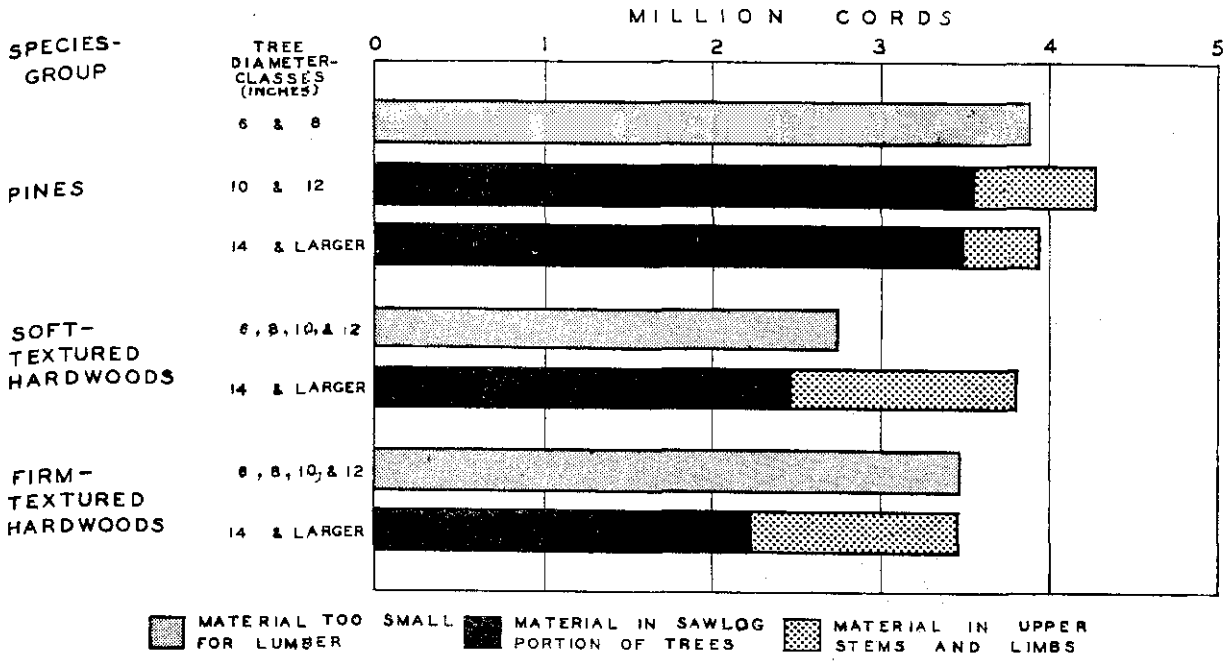


FIGURE 6. - CORDWOOD VOLUMES OF SOFT-TEXTURED AND FIRM-TEXTURED SPECIES BY SIZE-CLASSES, SOUND TREES ONLY.

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	24.8	11.9	15.1	9.2	3.6	9.3
Pine-hardwood	22.4	12.3	13.2	9.6	3.9	7.3
Upland hardwood	14.3	11.4	9.1	9.4	3.1	5.8
Bottom-land hardwood	19.3	15.1	14.5	12.8	4.7	11.2
All types (weighted average)	20.7	13.2	14.1	9.7	3.7	8.5

[1] Includes areas of reproduction and clear-cut forest conditions.

Poles and piles

Over 8½ million trees (table 9) are suitable for conversion into poles (according to the specifications of the American Standards Association) or piles. Most of these trees have been included in the saw-timber (and all in the cordwood) inventory previously shown. Since it is difficult to judge pole and pile material in standing trees, the estimate of the number of pieces of the various lengths may be conservative, but that of the relative proportions of pieces of various lengths may be considered fairly accurate. About two-thirds of the pieces are in pine trees less than 11.0 in. d.b.h. outside bark, and a like proportion in 20- and 25-foot lengths, which are used principally in rural telephone or power lines.

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

D.B.H. of trees (outside bark)	Pole or pile lengths (feet)						Total	Proportion of total
	20	25	30	35	40	45 and over		
Inches	Thousand pieces							Percent
7.0 - 8.9	1,973	463	227	-	-	-	2,663	30.6
9.0 - 10.9	1,301	791	634	233	122	16	3,097	35.7
11.0 - 12.9	397	443	499	257	151	125	1,872	21.5
13.0 - 14.9	56	135	243	167	82	92	775	8.9
15.0 - 18.9	-	7	101	95	39	43	285	3.3
Total	3,727	1,839	1,704	752	394	276	8,692	100.0
Percent of total	42.8	21.2	19.6	8.7	4.5	3.2	100.0	

Forest Increment

In 1935 the forest increment for the saw-timber material amounted to about 310 million board feet, lumber tally (table 10), or to almost 1¼ million cords, including bark, for all growing-stock material. Forest increment, as used in this report, means the difference between the net volumes of growing-stock trees standing on the area at the beginning and the end of a year, before deducting the total commodity drain for the year. Net board-foot increment is made up of (a) the growth on sawlog-size trees, (b) the total board-foot volume of trees becoming sawlog size during the year, and (c) appropriate deductions for mortality. Cordwood increment represents (a) the growth on the sound stems of pines 5.0 in. d.b.h. and over, on under-sawlog-size hardwoods 5.0 to 12.9 in. d.b.h., and on the sawlog portion of hardwoods 13.0 in. d.b.h. and larger; (b) the total volume in pines and hardwoods that become 5.0 in. or larger during the year; and (c) deductions for mortality. Material in cull trees and in the upper stems and usable limbs of sawlog-size hardwoods is excluded from calculations of cordwood increment.

Table 10. - Net increment in board feet and cubic feet in the various forest conditions, 1935

Forest condition	Saw-timber material			All growing-stock material		
	Pine	Hardwood	Total	Pine	Hardwood	Total
	Thousand board feet (lumber tally)			Thousand cubic feet (inside bark)		
Old growth	8,300	19,300	27,600	1,810	5,200	7,010
Second growth:						
Sawlog size	145,700	57,400	203,100	29,270	17,300	46,570
Under sawlog size[1/]	60,400	18,400	78,800	22,480	12,280	34,760
Total all conditions	214,400	95,100	309,500	53,560	34,780	88,340

1/ Includes 500 M board feet or 220 M cubic feet in the reproduction and clear-cut conditions.

Second-growth stands produce 91 percent of the net saw-timber increment; old growth, only 9 percent. In all the forest conditions combined, more than two-thirds of the net saw-timber increment is pine, whereas the hardwoods produce less than one-third.

Net increment expressed in standard cords (4 x 4 x 8 ft.), including bark, is given in table 11; this is the same material as that given in cubic feet in table 10. It is believed that the hardwood net increment, expressed in cords, is about evenly divided between the soft-textured and firm-textured hardwoods.

Table 11. - Net increment in cords in the various forest conditions, 1935

Forest condition	Pine	Hardwood	Total	Proportion of total
	Cords			Percent
Old growth	23,400	77,600	101,000	8.1
Second-growth, sawlog size	385,000	264,900	649,900	52.2
Second-growth, under sawlog size[1/]	302,700	192,300	495,000	39.7
Total	711,100	534,800	1,245,900	100.0

1/ Includes 2,900 cords in residual trees in the reproduction and clear-cut conditions.

The average net increment per acre during 1935, assuming that the stands were not influenced by cutting, is shown in table 12. For saw timber, the average is 117 board feet per acre; for all growing-stock material (saw timber and trees too small for sawlogs combined), slightly less than ½ cord per acre. These averages are about the same as those for the entire State of Alabama. In this unit the greatest growth per acre occurs in the uncut second-growth sawlog-size stands, where the annual saw-timber increment is 203 board feet per acre and the over-all increment is 2/3 cord.

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

Forest condition	Pine component			Hardwood component			Total per acre, all species		
	Bd.ft.	Cu.ft.	Cords	Bd.ft.	Cu.ft.	Cords	Bd.ft.	Cu.ft.	Cords
Old growth									
Uncut	79	15.3	.20	78	19.0	.28	157	34.3	.48
Partly cut	18	4.4	.06	73	20.4	.30	91	24.8	.36
Second growth:									
Sawlog size:									
Uncut	149	29.8	.39	54	16.8	.26	203	46.6	.65
Partly cut	91	18.2	.24	45	12.0	.18	136	30.2	.42
Under sawlog size	51	19.2	.26	16	10.5	.16	67	29.7	.42
Reproduction and clear-cut	3	1.3	.02	1	0.5	.01	4	1.8	.03
Weighted averages	81	20.2	.27	36	13.0	.20	117	33.2	.47

Forest Industries

In 1937, approximately 356 sawmills in this area (table 13 and fig. 7) produced 266 million board feet of lumber, mostly pine. Over nine-tenths of the sawmills were classed as "small," for their individual capacities were less than 20 M board feet per 10-hour day; their average annual production per mill was less than 500,000 board feet, because many of them were operated only part of the time, usually between crops. Because of their mobility, rather than their operating efficiency, these small mills, generally powered by portable steam engines or tractors, are well adapted to cutting small tracts of timber. Their operators, being in such a transient business, are seldom interested in making any attempt to leave the cut-over forest in condition for a second cut at an early date. Destructive logging practices, however, are often encouraged also by landowners, who refuse to sell their timber except on a clear-cut logging basis.

Twelve of the mills, which were of "medium" size, i.e., with sawing capacities of 20 to 39 M board feet per 10-hour day, had an average production for 1937 of almost 4 million board feet. Also, there were 3 "large" sawmills (i.e., with a daily capacity of over 40 M board feet each) that had an average annual production of almost 17 million board feet per mill.

Table 13. - Number and size of sawmills and amount of lumber cut,[1/] 1937

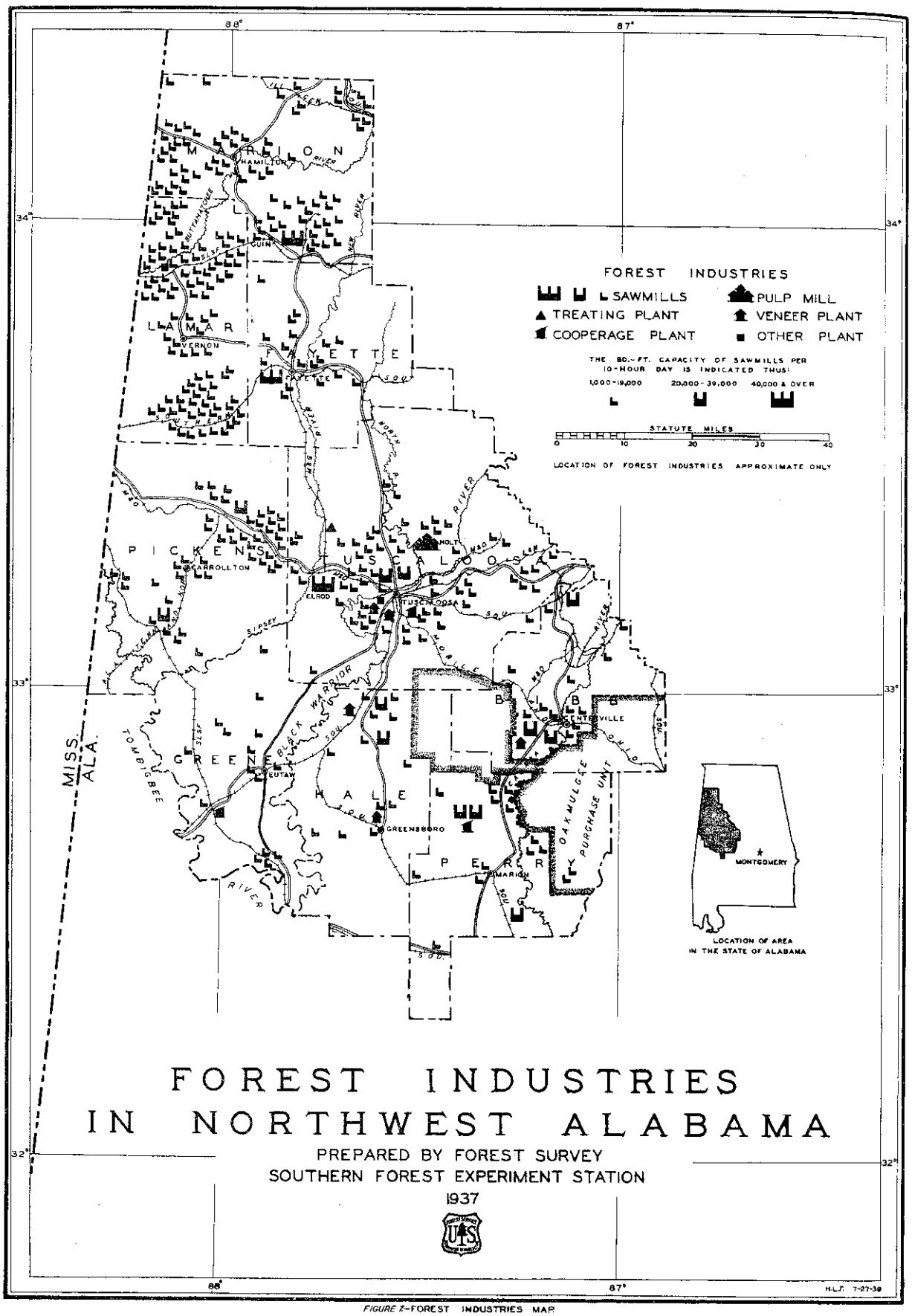
Daily rated capacity 10 hrs.	Lumber cut			Number of mills
	Pine	Hardwood	Total	
M bd. ft.	- - - - M bd. ft. lumber tally - - - -			
1 - 19 (small)	153,900	13,800	167,700	341
20 - 39 (medium sized)	38,000	9,300	47,300	12
40 + (large)	43,600	7,000	50,600	3
Total	235,500	30,100	265,600	356

1/ From stands both within and without this area.

More lumber is manufactured in Tuscaloosa County (note concentration and size of mills, fig. 7) than in any of the other counties in this unit; a relatively small amount is produced in Greene and Perry Counties, both of which lie partly within the Black Prairie.

In 1937, important wood-products plants, other than sawmills, included 5 veneer mills, 3 cooperage plants, 2 small-dimension plants, 1 pulp mill, and 1 treating plant. About 9 million board feet were cut into veneers of the type used for furniture, packages, and boxes; red gum, black gum, and yellow poplar were the principal species used. Most of the 5,800 cords of material cut into cooperage stock was used for "tight" barrels and only a small portion for "slack" barrels; oaks, gums, pines, yellow poplar, and cottonwood were the species used. Approximately 460,000 cords of fuel wood were used, obtained both on and off farms; and about 1 million fence posts were produced, chiefly for local farm use.

Cutting, hauling, and manufacturing forest products (table 14) provided in this unit in 1937 almost 2 million man-days of employment, about half of which was furnished by sawmills. Because most of the sawmills and other wood-products plants operate only a part of the year, it is impossible to estimate accurately the number of people who earn their living in forest-products industries, but it is probable that 13,000 or more received full- or part-time employment. The Census of Agriculture for 1935 shows that farmers of this area in 1934 obtained about 632,000 man-days of part-time employment for pay away from their own farms, much of which, it is believed, was in connection with the forest industries.



FOREST INDUSTRIES IN NORTHWEST ALABAMA

PREPARED BY FOREST SURVEY
SOUTHERN FOREST EXPERIMENT STATION
1937

H.L.F. 7-27-39

FIGURE 7—FOREST INDUSTRIES MAR

Table 14. - Wood-products employment, 1937

Industry or commodity	Employment		
	In woods	At plant	Total
	- - Thousand man-days (10 hours each) - -		
Sawmills:			
Small	191	317	508
Medium sized	81	98	179
Large	51	121	172
Total sawmills	323	536	859
Fuel	548	-	548
Veneer	15	60	75
Cross ties	69	-	69
Miscellaneous manufacturing (including pulpwood)	128	189	317
Fence posts	17	-	17
Total	1,100	785	1,885

Commodity Drain from the Growing Stock

Commodity drain, which should not be confused with the lumber cut, includes logs for mills outside as well as inside the area and the usable material wasted in logging. Not included in the commodity drain are materials from dead trees, cull trees, and the upper stems and limbs of sawlog-size hardwoods. The commodity drain from sawlog-size trees of the growing stock amounted to 380 million board feet in 1937 (table 15). The commodity drain from the total growing stock (i.e., trees 5.0 in. d.b.h. and larger, saw-timber and other material combined) amounted to over 1 million cords, or over 83 million cubic feet of wood, inside bark.

About 58 percent of the drain from the total growing stock, expressed in cubic feet, was for lumber; 17 percent, for fuel wood; 6 percent, for cross ties; and 19 percent for all other commodities, including pulpwood. In table 15, the commodity drain for industrial and domestic uses from the entire sound-tree growing stock is allocated to the commodities for which the trees were cut, but since only one pulp mill was cutting in this area in 1937, separate figures for pulpwood are not shown. More than three-fourths of the commodity drain from saw-timber material came from the pine component of the growing stock; less than one-fourth from the hardwood.

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

Reason for drain	From saw-timber material			From all growing-stock material	
	Pines	Hardwoods	Total		
	M bd.ft. (lumber tally)			Cords[1]	M cu.ft.[2]
Lumber	230,100	44,700	274,800	634,300	48,580
Fuel	15,600	5,600	21,200	201,100	14,340
Veneer	300	10,400	10,700	20,300	1,560
Cross ties	11,300	18,200	29,500	64,300	4,930
Cooperage	1,300	2,900	4,200	8,800	680
Miscellaneous manufacturing (including pulpwood)	20,400	1,300	21,700	88,300	6,700
Poles and piles	7,300	100	7,400	28,100	2,140
Fence posts	200	600	800	5,100	350
Miscellaneous farm use[3]	6,100	3,900	10,000	58,100	4,120
Total	292,600	87,700	380,300	1,108,400	83,400

1/ Bark included.
2/ Bark not included.
3/ Including land clearing.

Comparison of Growth and Drain

After making additions for growth and deductions for (a) mortality losses due to fire, windfall, rot, and insects, and (b) commodity drain, for 1935, 1936, and 1937, the entire growing-stock volume was found to have increased 54 million cubic feet. As shown by table 16 and figure 8, the greatest net increase occurred in 1935 and the least in 1937. For the 3-year period, the saw-timber part of the growing stock was reduced 46 million board feet. It may seem paradoxical that the entire growing stock in cubic feet showed a gain while the saw-timber growing stock showed a loss, but it must be remembered that the entire growing stock includes a relatively large number of trees less than 9.0 in d.b.h. and that, although these trees make up a considerable part of the growth, only relatively few of them are used. During this period, net increment per year for the saw-timber part of the growing stock remained practically constant; whereas, largely because of greater activity in forest-product industries, the commodity drain from the saw-timber material increased over 54 percent.

In 1937, the combined mortality and commodity drain against saw-timber growing stock amounted to 422 million board feet, which was over 68 million board feet more than the growth for that year (fig. 9). The pine component of the saw-timber growing stock decreased, while the hardwood component increased. It is to be noted also that the saw-timber stands are deteriorating in quality, owing to the common practice of taking out the larger and more valuable trees, and leaving the smaller and poorer ones. For this reason, in

hardwood stands the proportion of species at present considered valuable is declining, owing to the taking of the ash, forked-leaf white oak, and other highly desired species and leaving post oak, scrub oak, and other less desirable ones.

Table 16. - Balance between net increment and commodity drain, 1935, 1936, and 1937

Item	Saw-timber material			All growing stock (trees 5.0 in. d.b.h. & larger)		
	Pine	Hardwood	Total	Pine	Hardwood	Total
	Thousand board feet (lumber tally)			Thousand cubic feet (inside bark)		
Growing stock, Jan. 1, 1935	3,074,100	1,921,000	4,995,100	919,200	714,800	1,634,000
Growth	241,900	108,800	350,700	62,720	40,770	103,490
Mortality	27,500	13,700	41,200	9,160	5,990	15,150
Net increment	214,400	95,100	309,500	53,560	34,780	88,340
Commodity drain	171,400	74,800	246,200	38,880	17,760	56,640
Net change in growing stock, 1935	+43,000	+20,300	+63,300	+14,680	+17,020	+31,700
Growing stock, Jan. 1, 1936	3,117,100	1,941,300	5,058,400	933,880	731,820	1,665,700
Growth	243,500	109,600	353,100	65,000	41,620	106,620
Mortality	28,000	14,000	42,000	9,330	6,150	15,480
Net increment	215,500	95,600	311,100	55,670	35,470	91,140
Commodity drain	276,900	74,400	351,300	60,220	17,630	77,850
Net change in growing stock, 1936	-61,400	+21,200	-40,200	-4,550	+17,840	+13,290
Growing stock, Jan. 1, 1937	3,055,700	1,962,500	5,018,200	929,330	749,660	1,678,990
Growth	243,300	110,200	353,500	65,600	42,270	107,870
Mortality	27,600	14,200	41,800	9,330	6,320	15,650
Net increment	215,700	96,000	311,700	56,270	35,950	92,220
Commodity drain	292,600	87,700	380,300	63,770	19,630	83,400
Net change in growing stock, 1937	-76,900	+8,300	-68,600	-7,500	+16,320	+8,820
Growing stock, Jan. 1, 1938	2,978,800	1,970,800	4,949,600	921,830	765,980	1,687,810

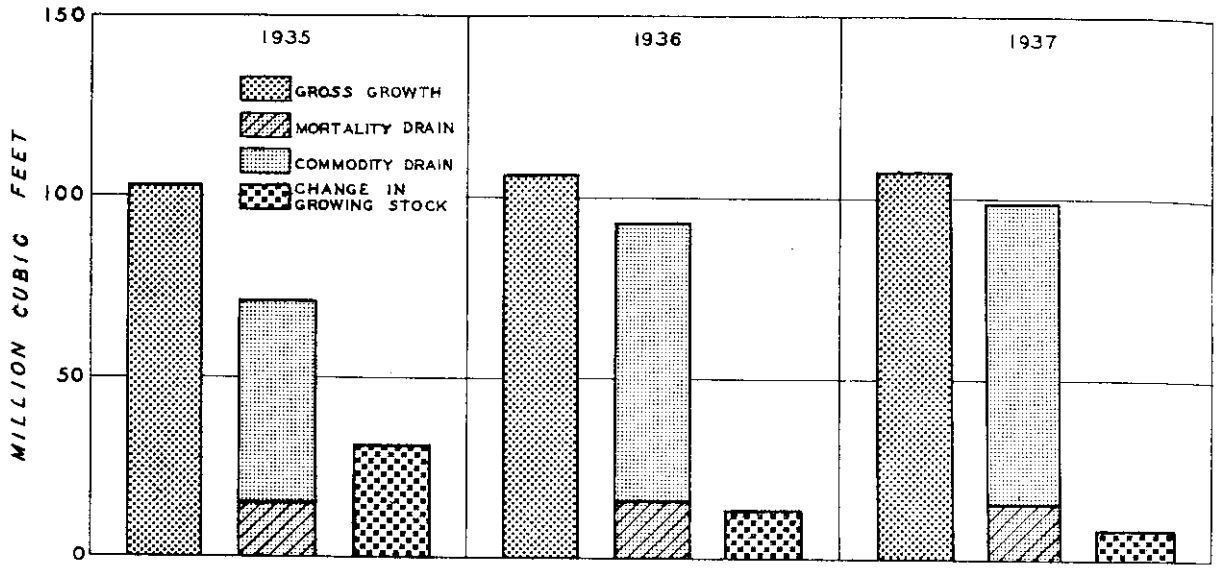


FIGURE 8.—COMPARISON OF GROWTH AND DRAIN FOR THE ENTIRE GROWING STOCK.

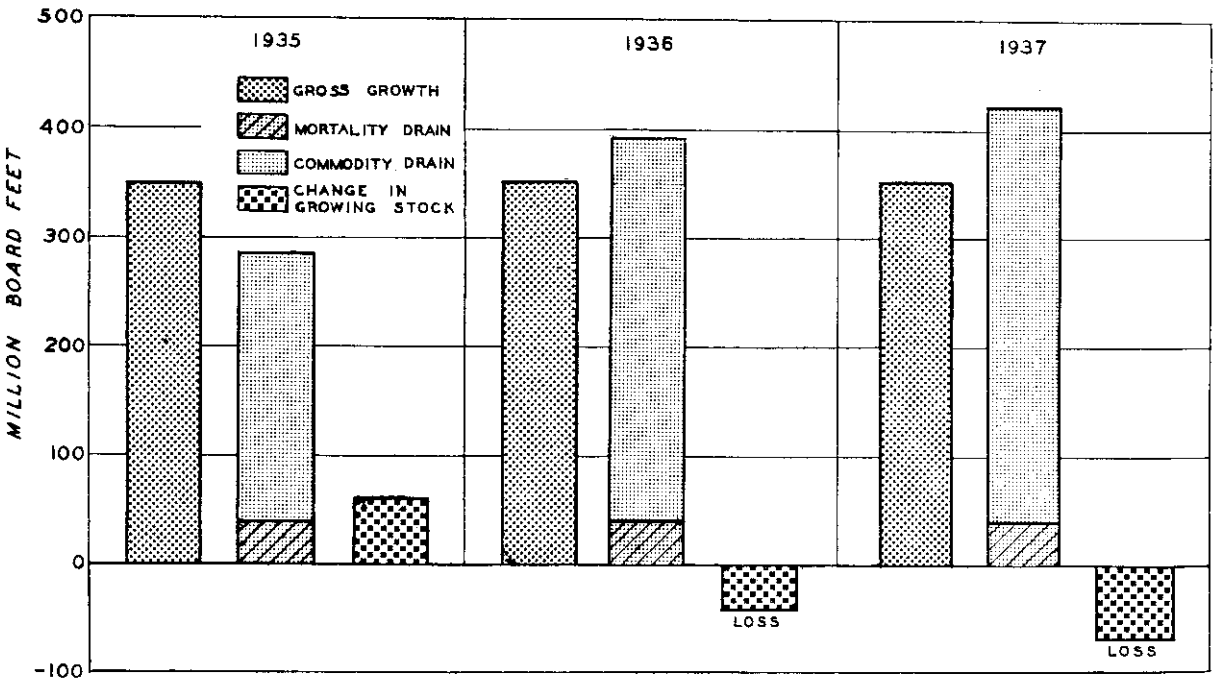


FIGURE 9.—COMPARISON OF GROWTH AND DRAIN FOR THE SAW-TIMBER COMPONENT OF THE GROWING STOCK.

As previously pointed out in this report, the stands of west central Alabama are so poorly stocked that the growth is only a fraction of the productive capacity of the sites. Growing stock can be increased by good forest management, but time is required before its effects are reflected in increased growth. Mortality drain, however, can be reduced promptly by fire protection, thinning, and other good forest practices; this would allow correspondingly greater amounts of material for use or for increasing the growing stock.

The trend of commodity drain on the entire growing stock and on its saw-timber component, as evidenced in 1935, 1936, and 1937, is decidedly upwards in both pines and hardwoods. Unless the growing stock of saw timber is increased by good forest management, the latter may be reduced eventually to such a small part of the stand that it will be inadequate to furnish existing industries with the class of material they require.

It should be noted, however, that in 1935, 1936, and 1937, neither the annual growth nor drain amounted to one-tenth of the growing stock, and that such fluctuations in growth and drain cause very little change in the growing stock. For the entire 3-year period ending Dec. 31, 1937, the saw-timber component of the growing stock decreased approximately 1 percent, and the entire growing stock increased slightly over 3 percent.

Summary and Conclusions

This Forest Survey unit in which the people depend for most of their livelihood upon products from field, forest, and mines, has never enjoyed a rich agricultural development like that of the Tennessee Valley in Alabama, nor has it experienced an industrial expansion such as the Birmingham or Mobile areas. The Census of 1935 indicates that only 18 percent of its $4\frac{1}{2}$ million acres is in "cropland harvested," as compared with 22 percent of the entire State; also, there are only 36 people per square mile, as compared with 52 for the State as a whole.

The ability of cotton, the chief cash crop, to continue to support most of the people seems to be decreasing. From 1924 to 1934, according to the Census, the area in cotton declined about 22 percent, and the value of the crop shrank over 40 percent, or $4\frac{1}{2}$ million dollars. This shrinkage in cotton growing involved a loss of about 900,000 days of employment in the cotton fields; and the loss in gainful work for truck drivers, railroad men, and other shippers, for workers in the manufacturing plants, and for others dependent upon the cotton income, is also serious. Preliminary figures for 1938 show a further drastic reduction in the value of the cotton crop.

It is doubtful whether cotton ever can become the "king" it once was in this area, for many of the sloping, eroded, upland fields cannot grow cotton again successfully. Opportunities for gainful employment have dwindled so drastically that the Special Census of Unemployment taken in October 1937 revealed that there were in this unit 14,000 people either unemployed and wanting work, or on relief, and 9,000 employed part time and wanting more work. These 23,000 either totally or partly idle workers make up almost one-tenth of the total population, or about one-fifth of the gainfully employed workers.

In the urgent search for sources of employment in productive enterprises, the expansion of the forest and wood-products industries must be considered. The forest of 2-3/4 million acres, which occupies an average of 6 acres out of every 10, contains 10 times as many acres as the cotton fields. Within the next decade, the forest area may expand still more, for the Survey found 197,800 acres of idle and abandoned cropland, much of which will revert to forests unless the price of cotton greatly increases. In addition, 44,500 acres now in cultivation, but being seriously eroded, may be thrown out of cultivation because of competition, loss in fertility, or as the result of crop-control programs; this area also may revert to forests.

Loblolly, shortleaf, and longleaf pines, gums, and oaks are the principal species, and pine and pine-hardwood are the most prevalent forest type-groups. Approximately 90 percent of the forest area is classed as second growth; only 10 percent remains as old growth. Mainly due to the common occurrence of fire, most of the stands are poorly stocked, especially in large trees; the 2- and 4-inch diameter-classes contain more trees than all others combined. Also, most of the stands are young—over four-fifths of the pine and pine-hardwood area is in stands less than 61 years old. The productive capacity of the forest soils is good, as shown by the large proportion of areas with site indexes of 70 and over, but so poorly stocked are the stands that their volumes per acre are less than half of what good management, including sustained protection from fires, could produce. Uncontrolled forest fires prevent the development of well-stocked stands, and every year fires injure or destroy some of the large trees and kill the small ones that are needed to build up the growing stock.

The inventory of saw-timber material in the growing stock shows about 5 billion board feet, mostly in second-growth pines. Forty-seven percent of the pine saw-timber volume is in trees less than 13.0 in. d.b.h. and probably more than half is in limby or rough trees. Over four-fifths of the total saw-timber volume, pines and hardwoods together, is in stands that have at least 2,000 board feet per acre.

Considering all sound usable material in live trees 5.0 in. d.b.h. and over, including those of sawlog size, the net usable volume is $32\frac{1}{2}$ million cords; this includes 7 million cords in cull trees, of which 90 percent is in hardwoods.

In 1937 the growth amounted to 354 million board feet, but mortality approximated 42 million, leaving a net increment of 312 million board feet before cutting. Most of the saw-timber increment was in the second-growth pine stands. For all growing-stock material in trees 5.0 in. d.b.h. and larger, the net increment was $1\frac{1}{4}$ million cords, bark included.

Forest industries include about 356 sawmills, 5 veneer mills, 3 cooperage plants, 2 small-dimension plants, 1 pulp mill, and 1 treating plant. In 1937 the commodity drain for industrial and domestic use from saw-timber material in sawlog-size trees was 380 million board feet, or over 68 million more than the net increment. Records for the 3 years beginning Jan. 1, 1935 indicate that, whereas the net increment remained constant, the commodity drain increased annually. All of the over-cutting occurred in pine; and, although hardwood showed a volume increase, it suffered a loss in quality, owing to the removal of trees of the most valuable species. As long as the saw-timber

drain is greater than its growth, the growing stock will continue to shrink in volume; and, if the drain continues to increase in accordance with indicated trends, this shrinkage shortly will become serious. If the forest is to continue to meet the needs of expanding use, steps must be taken to increase the net increment by building up the growing stock through fire protection and other good-management practices.

Suggestions for improvement

Greater markets for timber stumpage are needed to establish prices that will encourage the landowners to protect and develop their forest resources. Small woodland owners have especial difficulty in finding profitable wood outlets and usually must depend upon transient small sawmills, whose lumber product, with the present crude methods of manufacturing, usually brings such low prices that stumpage returns are meagre. Markets for low-grade material, such as pulpwood and fuel wood, are needed in order that forest owners may salvage (a) the tree stems above the sawlogs and (b) the small trees that should be thinned out of dense stands.

For many years it has been the practice in this unit to cut the pines and leave the hardwoods. Where pine seed trees are left and the site conditions are favorable for pine, the cut-over forest usually comes back with a good representation of pines. In many places, however, especially on the poorer pine sites, the pine has been cut so clean that the proportion of hardwoods increases, sometimes completely excluding the pines. One of the most difficult problems which must be solved before the stands can be improved greatly is how to remove and utilize the hardwoods now considered undesirable. Approximately one-fifth of all the usable material (expressed in cords) in this unit is in cull hardwoods, some of which may be utilized profitably; encouragement should be given to the development of markets for them. Their utilization for small-dimension stock, pulp, paper, rayon, plastics, and other products should be studied; while cull trees should be used for fuel, fence posts, and similar products to a much larger extent than is now the practice.

Many of the cull hardwoods have such large bushy tops (often with limbs almost down to the ground) that they prevent the development of pines and desirable hardwoods. Where no market for low-grade products is either existent or anticipated, the landowner may wish to consider girdling these "wolf" trees, so that better trees may develop.

The forest resources should be made to contribute to the public welfare much more than they do now, when half the growing stock is missing. When the growing stock is built up—and this can be done by fire protection, thinning, improvement cutting, and selective logging—the annual growth of the forest can be increased enough to supply perpetually the raw materials for the present industries, as well as for many new and expanded ones.

Since the general public is responsible for most of the fires that are carelessly or wilfully set, increased financial assistance and other means of help should be extended to the landowners. Further expansion of the fire-protection work under the Clarke-McNary Act, involving the cooperation of landowners and of State and Federal Governments, is recommended as a means of getting coordinated action. Possibly this work can be undertaken on a county-wide basis.

With good fire protection, it is believed that natural reforestation will be successful on two-thirds of the abandoned fields. It may be expedient, however, to reforest artificially by planting the remaining one-third, if a prompt establishment of forest cover is desired.

Whether or not good forest management is practiced in west central Alabama will depend largely upon how convinced are the 20,000 different landowners that it is to their direct advantage to do so. These owners have widely varying financial limitations, and many of them have no idea of the extent of their forest resources or of the possible financial returns from managing them. Therefore, a widespread acceptance of good forestry practices, such as fire protection, stand improvement, economical utilization and planting, will require time and a well-organized education and extension program, which to be successful must reach not only all forest landowners, tenants, and wood consumers, but also the general public. Consequently, public aid, both State and Federal, should be given to this extension work, for the entire population will benefit from the highly developed forest resources and from the stable and expanded industries (with their greater payrolls for forest workers) that will result therefrom.