



Alabama's Forests, 2020

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All photos were taken by Andrew J. Hartsell.

Cover Photos

Front cover: top left, bumble bee; top right, Little Tallapoosa River, Randolph county; center left, forest edge; bottom left, the South's forests provide cover for a variety of fruits and berries that can be used as food by both man and animals; bottom right, forestry and agriculture are often managed together on the same site. Back cover: top left, this great blue heron has found a home in one of Alabama's many waterways; top right, fall colors at Cheaha State Park; center right, a white oak ablaze with color in autumn; bottom left, a stream runs through a northern Alabama forest; bottom right, Alabama is host to an abundance of wildflowers.

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Two pine trees before a sunrise in Alabama.



FOREWORD

The U.S. Department of Agriculture Forest Service, Southern Research Station's (SRS) Forest Inventory and Analysis (FIA) research work unit and cooperating State forestry agencies conduct annual forest inventories of resources in the 13 Southern States (Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia), the Commonwealth of Puerto Rico, and the U.S. Virgin Islands. In order to provide more frequent and nationally consistent information on America's forest resources, all research stations and their respective FIA work units conduct annual surveys with a common sample design. These surveys are mandated by law through the Agricultural Research Extension and Education Reform Act of 1998 (Farm Bill).

The primary objective in conducting these inventories is to gather the multi-resource information needed to formulate sound forest policies, provide information for economic development, develop forest programs, and provide a scientific basis to monitor forest ecosystems. These data are used to provide an overview of forest resources that may include, but is not limited to, forest area, forest ownership, forest type, stand structure, timber volume, growth, removals, mortality, management activity, down woody material, and invasive species. The information presented is applicable at the State and survey unit level; although it provides the background for more intensive studies of critical situations, it is not designed to reflect resource conditions at small scales.

More information about Forest Service resource inventories is available in *Forest Resource Inventories: An Overview* (U.S. Department of Agriculture Forest Service 1992). More detailed information about sampling methodologies used in the annual FIA inventories can be

found in *The Enhanced Forest Inventory and Analysis Program-National Sampling Design and Estimation Procedures* (Bechtold and Patterson 2005).

Data tables included in FIA reports are designed to provide an array of forest resource estimates, but additional tables can be obtained at <https://www.fia.fs.usda.gov/tools-data/index.php>. Additional information about the FIA program can be obtained at <https://www.fs.usda.gov/srsfia/>.

Additional information about any aspect of this or other FIA surveys may be obtained from:

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The bright plumage of this male cardinal is a common site in Alabama's forests.

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HIGHLIGHTS

Area

- In 2020, the total land area for Alabama was 33.5 million acres.
- Since 1936, Alabama's timberland has increased 22 percent.
- In 2020, loblolly-shortleaf was the predominate forest type in Alabama and accounted for 38 percent or 9.0 million acres of forest.
- In 2020, Southern yellow-pine plantations occupied 6.6 million acres or 29 percent of the State's forest lands.
- Private landowners owned 93 percent of all forests statewide.

Volume

- Alabama's timberlands contained 21.6 billion cubic feet of all-live softwood species and 21.9 billion cubic feet of all-live hardwood species.
- Since 1972, all-live softwood volume on forest land increased 98 percent, while hardwood volume rose 107 percent.

Species

- In 2020, loblolly pine was the predominant softwood species statewide, and accounted for over 17 billion cubic feet or 81 percent of Alabama's all-live softwood volume.
- In 2020, red oaks, sweetgum, yellow-poplar, white oaks, and hickory species were the most frequently occurring hardwood species.

Growth and Removals

- In 2020, over 1.6 billion cubic feet of all-live softwood grew each year on Alabama timberlands, a 41-percent increase over the 2010 estimate.
- In 2020, 1.8 times more softwood all-live volume grew each year than was removed.
- In 2020, 695 million cubic feet of hardwood grew each year, while 313 million cubic feet was removed.
- Two species, loblolly pine and shortleaf pine, accounted for 92 percent of total softwood growth in 2020.

Timber Product Output

- In 2020, total volume harvested and delivered for forest products across the State (including residential fuelwood) from all sources totaled 1.1 billion cubic feet (41.3 million green tons).
- Pulpwood was the leading product in the State in 2020. Eleven pulpmills in the State accounted for 46 percent of the 1.1 billion cubic feet total product output.
- Alabama's saw-log output increased from 317.1 million cubic feet in 2015 to 456.7 million cubic feet in 2020.
- Land use removals (land clearing or set aside forest land), or removal volume attributed to land use change which accounted for <1 percent of total removals for each year surveyed through 2015–2020.



A creek runs through a forest in Madison county, Alabama.



FOREST AREA

Trends in Forest Area

The total land area for Alabama in 2020 was 33.5 million acres (table 1). Almost 68 percent, 23.1 million acres of this land area was classified as forested by Forest Inventory and Analysis (FIA). Forest land was composed of two components, as listed from largest to smallest, timberland (23 million acres) and reserved (92,200 acres). The Southeast survey unit accounted for over one-quarter (27 percent) of the forest land in the State, while the North Central unit was second in total forested area, which contained >4.4 million acres (19 percent) of the State’s forests. All other survey units each accounted for 9 to 16 percent of Alabama’s forested acreage (fig. 1).

The proportion of land area in forests for Alabama’s 67 counties ranged from 27 to 90 percent. Thirty counties had >75 percent of their land area in forests (fig. 2). Only one county, Limestone, had <30 percent of its land area in forested conditions. All other counties had over one-third of their land base covered in forests. In 2020, the counties with the densest concentrations of forests were Clarke and Choctaw, both had just over 90 percent of their area in forests. A general statewide

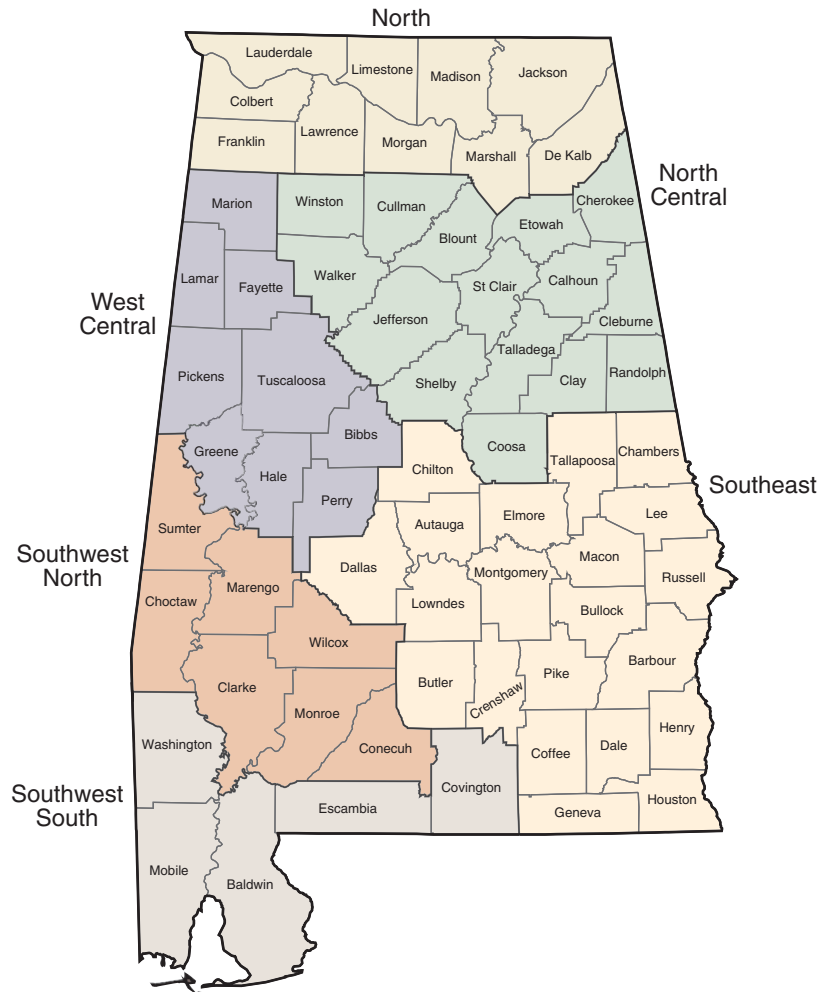


Figure 1—Forest survey regions in Alabama.

Table 1—Area by survey unit and land status, Alabama, 2020

Unit	Total area	All forest	Unreserved			Reserved			Nonforest land	Census water
			Total	Timberland	Unproductive	Total	Pro-productive	Unproductive		
<i>thousand acres</i>										
Southwest-South	4,337.0	2,808.3	2,806.8	2,801.0	5.8	1.4	1.4	0.0	990.3	538.4
Southwest-North	4,392.9	3,726.9	3,721.0	3,721.0	0.0	5.9	5.9	0.0	631.7	34.3
Southeast	9,161.3	6,431.2	6,431.2	6,431.2	0.0	0.0	0.0	0.0	2,571.2	158.9
West Central	4,420.4	3,521.7	3,515.5	3,515.5	0.0	6.2	6.2	0.0	858.5	40.2
North Central	6,608.2	4,379.8	4,357.8	4,357.8	0.0	21.9	21.9	0.0	2,039.2	189.3
North	4,628.9	2,226.1	2,169.3	2,169.3	0.0	56.7	56.7	0.0	2,256.6	146.2
All survey units	33,548.7	23,093.9	23,001.7	22,995.9	5.8	92.2	92.2	0.0	9,347.5	1,107.3

Numbers in rows and columns may not sum to totals due to rounding.
0.0 = no sample for the cell or a value of > 0.0 but < 0.05.

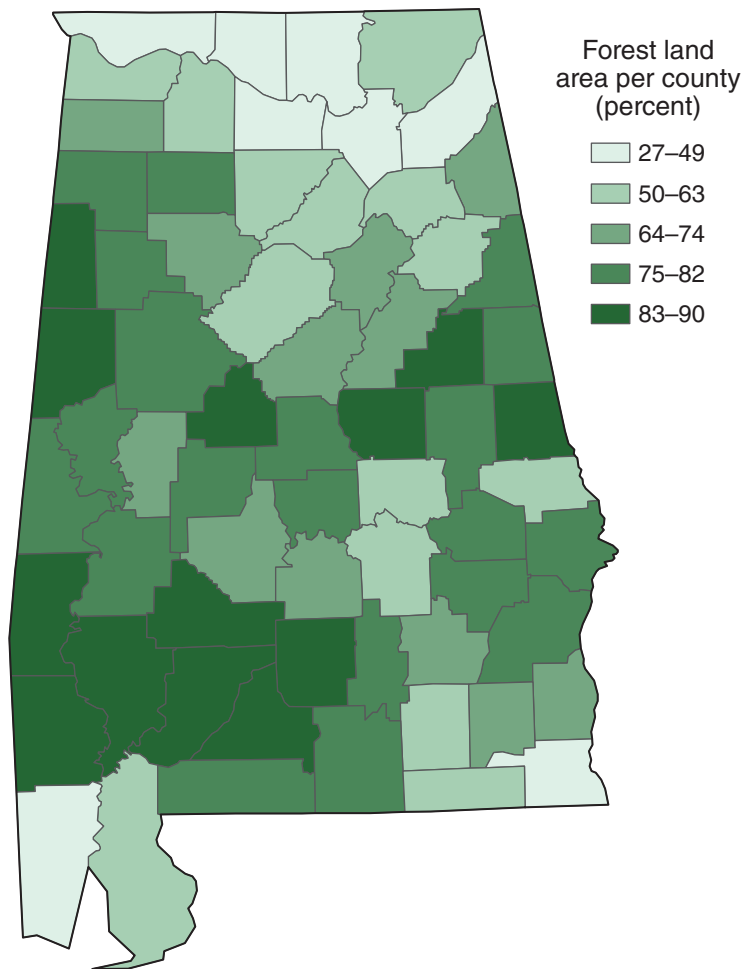


Figure 2—Percent of county in forest land, Alabama, 2020.

trend exists where the densest counties lie in the southwest, and the least dense in the north-northeast. Three exceptions are Mobile and Baldwin Counties in the southwest, and Jackson County in the northeast. Mobile and Baldwin counties lie along the Gulf of Mexico and therefore contain coastlines and developed areas associated with coasts. Jackson County is on the southern tip of the Appalachian Mountain range, and the topography, soils, and other characteristics of this mountain range impact land use.

In Alabama, the total area of timberland has increased steadily since 1936. In fact, the State's timberland base has grown almost 22 percent since the initial survey. The majority of the additional acreage was added between 1936 and 1963. Since 1963, total timberland area

has never fluctuated by >1.6 million acres. The 2020 estimate of timberland in the State was 23.0 million acres (fig. 3).

Since 1963, total forest land area has remained stable, while the area of planted stands has increased substantially. During the 1972 survey, planted stands were first identified as a separate classification and accounted for 1.7 million acres or 8 percent of Alabama's timberland base. In 2020, one-third of Alabama's timberland area was in plantations. These stands occupied 7.4 million acres or 32 percent of timberland statewide.

Forest-type Group

The increased prominence of planted pine forests in Alabama has impacted forest type distribution in the State. Many of the State's natural stands have been converted to planted stands, particularly natural pine and oak-pine. Additionally, many lands that were under agriculture have been planted in pines and converted to forests. The area of natural loblolly pine forests has decreased over 42 percent since 1972, while the area of oak-pine stands dropped 47 percent over the same period (fig. 4). Conversely, the area of planted loblolly pine forests has increased more than sixfold over the last 50 years. Oak-hickory forests have increased as well. In 1972, there were 5.7 million acres of oak-hickory forests across the State. As of 2020, there were almost 7 million acres of oak-hickory forests across the State, a 19-percent increase from 1972.

The loss in oak-gum-cypress forests and gain in elm-ash-cottonwood types are linked. Changes in FIA methodology and definitions often confound long-term analysis. Earlier surveys typed almost all bottomland types as oak-gum-cypress. The 2020 survey typed many of these stands as elm-ash-cottonwood. Therefore, it is often best to combine data for these two types when considering bottomland forest types. In 1972, these two types combined represented 2.5 million acres of Alabama's forests. In 2020, they accounted for 2.8 million acres. Thus, there was little overall change in area for Alabama's bottomland forests.

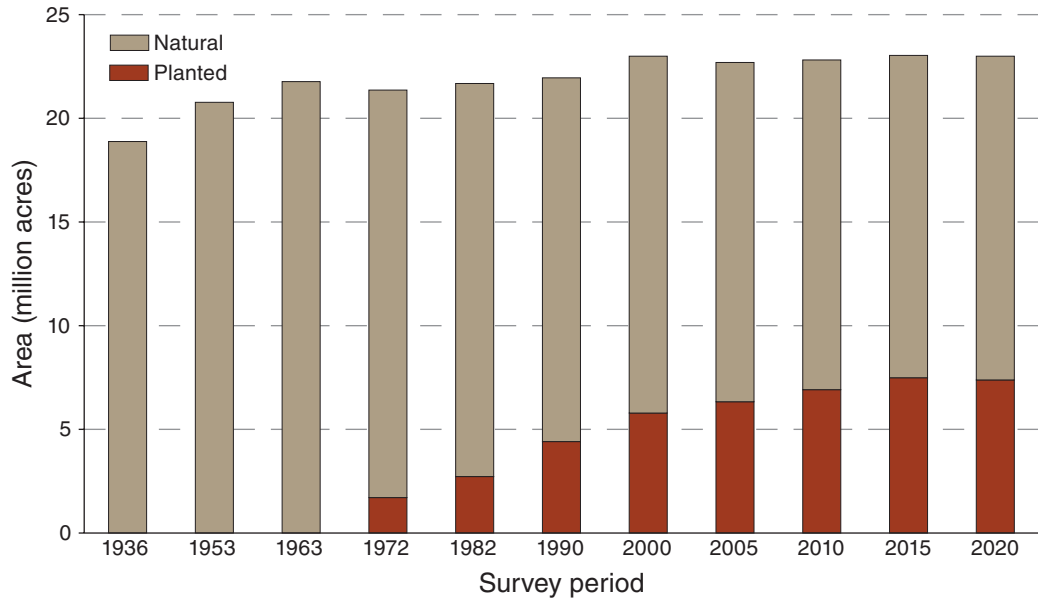


Figure 3—Area of Alabama timberland by survey period and stand origin.

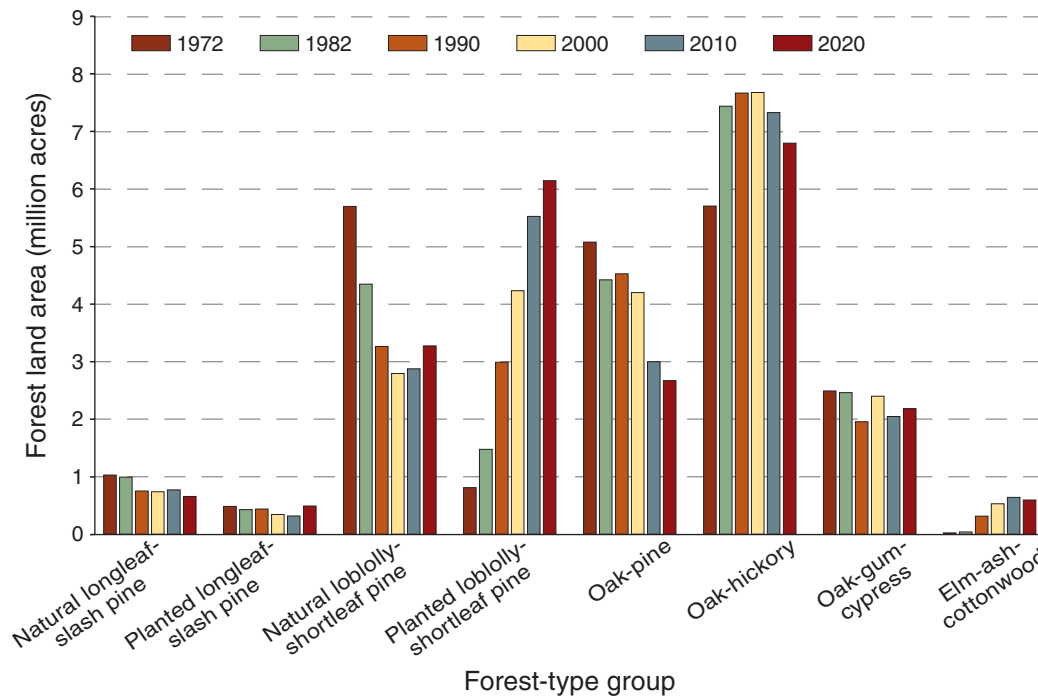


Figure 4—Area of Alabama forest land by survey period and forest-type group.



OWNERSHIP

Private landowners, which include both forest industry and nonindustrial private entities, have always owned Alabama's forests. In 1972, 95 percent of the State's forests were classified as being privately owned (fig. 5). In 2020, that estimate decreased slightly to 93 percent (fig. 6). However, forest ownership patterns have changed over this time period. Hartsell and Conner (2013) reported previously that traditional forest companies, defined as companies with wood processing facilities, continued to divest timberland. Meanwhile, other corporate owners, including Timber Investment Management Organizations (TIMOs) and Real Estate Investment Trusts (REITs), have acquired these lands

simultaneously. In 1972, forest industry owned almost 20 percent of Alabama's forests. In 2020, traditional forest industry owned only 11 percent of Alabama's forests.

Stand Size and Age

A State with an active forest products sector and intensive pine plantation management is likely to have considerable forest acreage that is the same age as the typical rotation length for forest management. By looking at the stand age distribution of planted pine forest land acreage, we can see this more clearly (fig. 7). Multiple features are evident in figure 7. First, the overall distribution of the curves shifted to the right over time such that the peak of the curve moved from 1–5 years old in 2000 to 11–15 through 21–25 years in 2020. Next is the relatively abrupt drop for all survey years in acreage >25 years old that indicates the typical age at which plantations were harvested and replanted. Finally, we see that the acreage in all stands older than 21 years in age have increased across the State. This fact is illustrated by a second peak in the overall curve between 61 and 75 years. However, figure 7 depicts all forest types in the State. Differences in hardwood and softwood forest types and stand origins were difficult to discern with figure 7.

Planted softwood stands were getting older across the State (fig. 8). In 2010, the 11–15 age cohort had the most acreage, and the number of acres decreased significantly after that. There has been a shift in 2020 to the 16–20 year age group, with a more rounded peak and less drop-off. Thus, planted softwood stands were growing older. First, we can speculate that the 2020 plantation acreage largely originated in the 1980s through the mid-1990s. Second, while total planted acreage remained stable, acres that were clearcut and presumably replanted have decreased in recent years, possibly in response to changes in ownership and weakened markets (Brandeis and others 2012). Forest industry divestiture of their lands and their acquisition by TIMOs and REITs have been long documented (Hartsell and Conner 2013). As opposed to previous forest industry owners, non-mill owning TIMOs and REITs

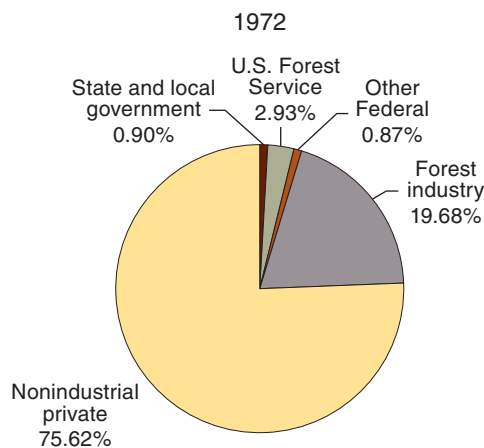


Figure 5—Alabama forest land proportioned by ownership group, 1972.

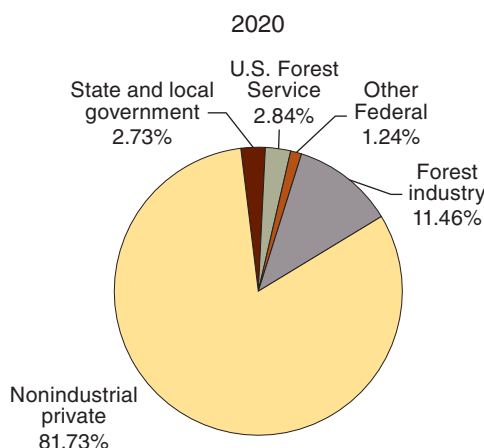


Figure 6—Alabama forest land proportioned by ownership group, 2020.

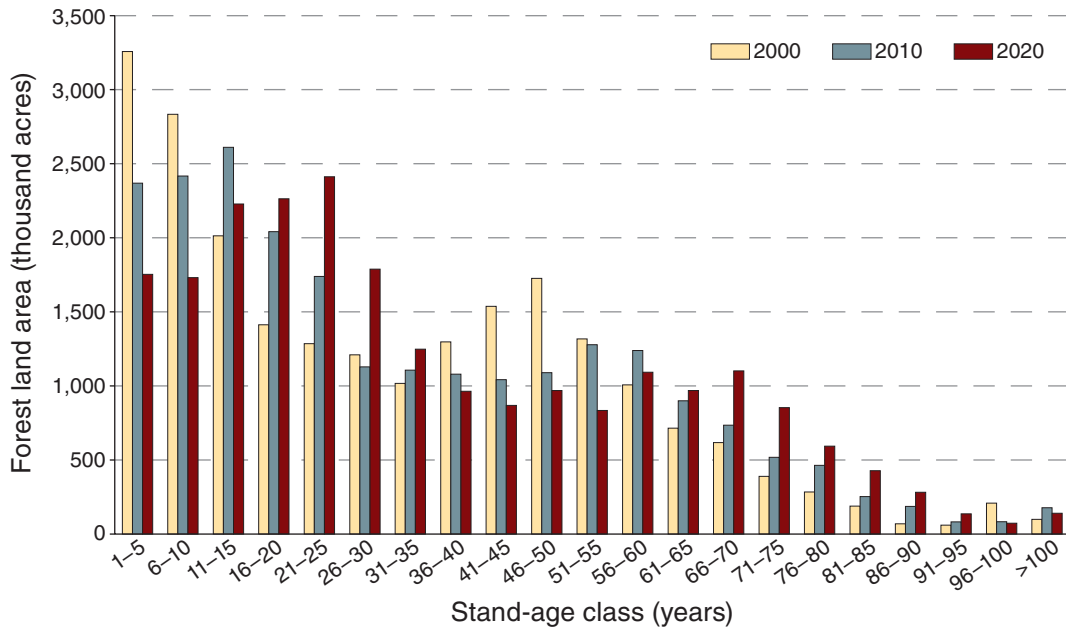


Figure 7—Area of Alabama forest land by stand-age class and survey period.

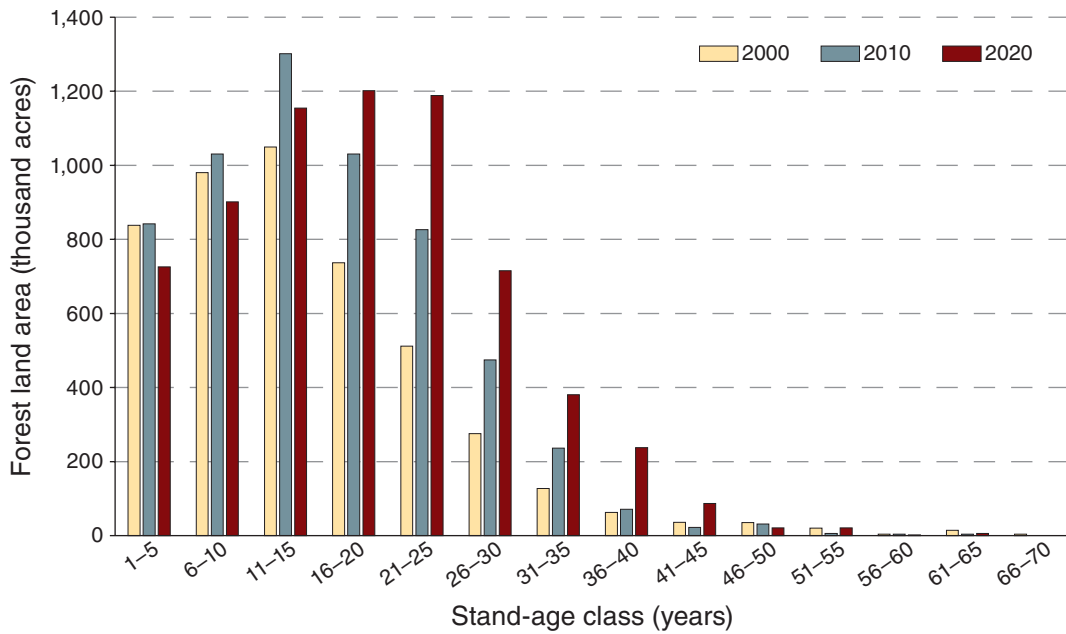


Figure 8—Area of planted softwood forests by stand-age class and survey period, Alabama.



are not obligated to harvest regularly in order to supply their wood processing facilities; therefore, they can refrain from harvesting until timber products markets are favorable to them. Because of the weakened markets between 2007 and approximately 2011, Alabama's pine plantations have been tended and continue to age and accumulate volume despite the economic downturn. In comparing figures 7 and 8, it becomes evident that a large portion of the increase in overall area in 16- to 30-year-old stands is the result of pine plantations.

Looking back at the entire range of stand size distribution on forest land (fig. 7), there was a secondary peak in the 56–75 year old categories. A cohort of forest acres appears to be aging together as they move through time. As illustrated in figures 7 and 8, many acres of planted pine timberland over 40 years old are not evident. Figure 9 illustrates hardwood

forest stand-age classes, which are mainly natural regenerated forests or planted forests that have aged into a natural-appearing mix of conifers and hardwoods. The forests were established in the early 1950s, about 65 years ago. Forest area in Alabama increased 10 percent over 1935–36, according to Wheeler's (1953) report. He further stated that softwood acreage increased 6 percent, while hardwood forests rose 19 percent. For most of the survey regions over a 10-year period, Sternitzke (1963) reported commercial forest land gains of 5–8 percent. Both reports stated that many of these new forests were established on idled or abandoned cropland. The 2020 forest area increases for the older age classes can be attributed to many of these early reforestation efforts. Therefore, what we have seen was another example of how the forests reflect the history of social and economic change in the State of Alabama.

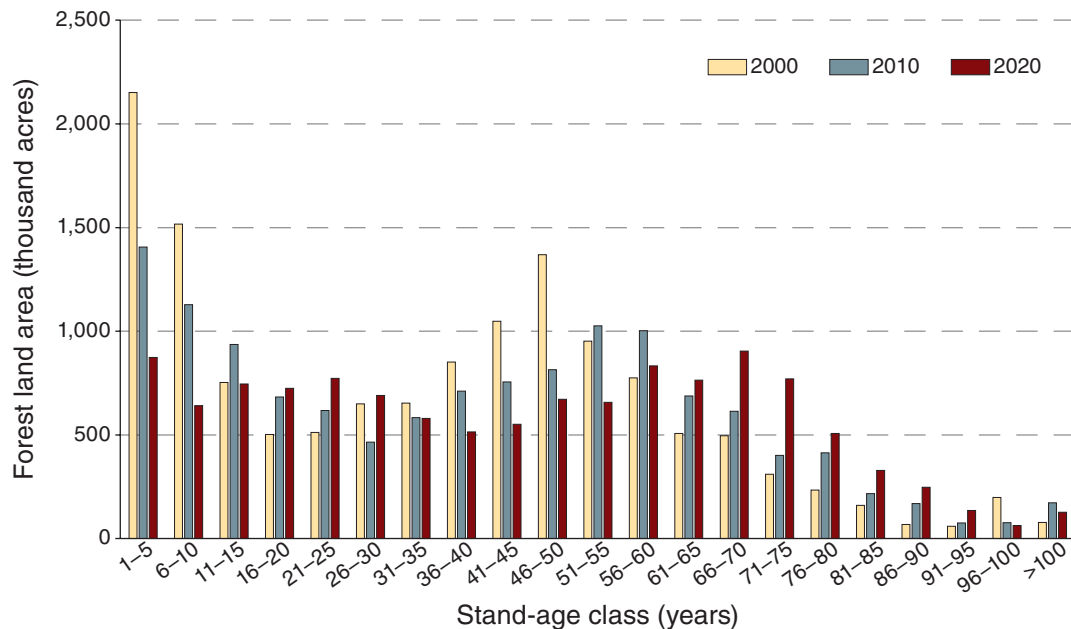


Figure 9—Area of hardwood forests by stand-age class and survey period, Alabama.



STANDING INVENTORY

In 2020, estimates of Alabama’s all-live volume revealed long-term increases in both hardwood and softwood species. All-live volume is a measure that includes all tree species and size classes on all forest lands, commercial or not.

The 2020 estimate of all-live softwood volume for Alabama was 21.7 billion cubic feet, a 98-percent increase since 1972 (fig. 10). Softwood volume fell during the 1990 survey; however, it has steadily risen since 1990 and was at the highest level ever recorded in 2020.

Total all-live hardwood volume has increased for each survey in Alabama. Hardwood volume increased dramatically in 2000, gaining 31 percent over the 1990 estimate. After 2000, increases in hardwood volume leveled out for 10 years. Statewide hardwood volume increased 6 percent between 2000 and 2010, less than the 17-percent increase between 2010 and 2020. The 2020 estimate of all-live hardwood volume for the State was 21.6 billion cubic feet, a 107-percent gain over the 1972 estimate (fig. 10).

Artificial regeneration was one of the drivers behind the increase in softwood volume. Since 1972, all-live softwood volume in planted stands has increased 1,208 percent, while softwood volume from natural stands increased over 7 percent during the same period. A decrease in softwood volume in natural stands occurred between the 1982 and 1990



A gray squirrel resting on a hardwood tree.

inventories. The 1990 estimate of softwood volume in natural stands dropped 14 percent over the 8-year period. In natural stands, the volume of softwood has remained fairly stable since 1990, with 10.9 billion cubic feet estimated in 2020. In 1972, only 7 percent of the total all-live softwood volume was found in planted stands. In 2020, total all-live softwood volume was 50 percent (fig. 11).

Eighty percent of all-live volume occurred on nonindustrial private forests (NIPF), while 4 percent was found on forests owned by the U.S. Forest Service. A majority of this volume (69 percent) was concentrated in two forest-type groups, loblolly-shortleaf and oak-hickory,

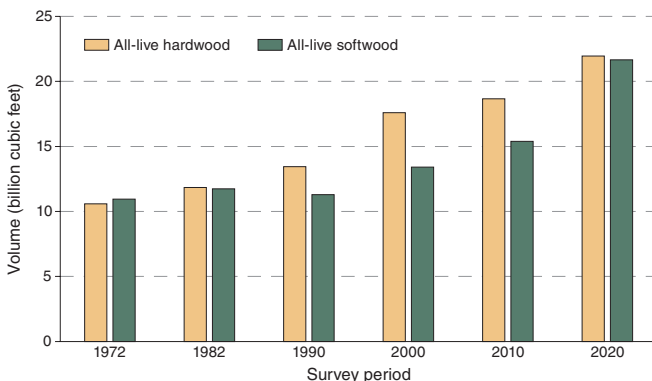


Figure 10—Total all-live volume of softwoods and hardwoods on forest land by survey period, Alabama.

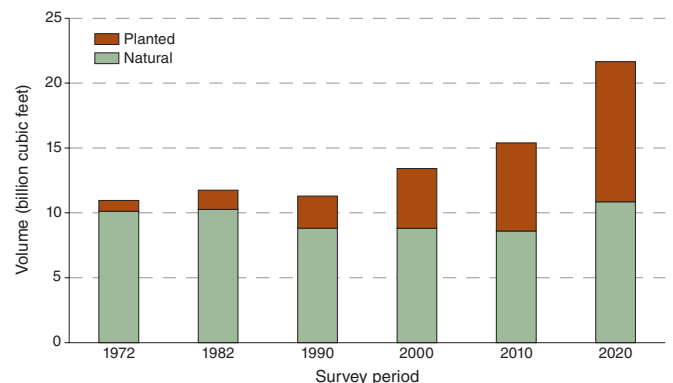


Figure 11—Total all-live volume of softwoods on forest land by survey period and stand origin, Alabama.



Standing Inventory

as these two forest types contain 42 percent and 27 percent of the State's all-live volume, respectively (table 2).

The volume of all-live softwood in the middle diameter classes has increased significantly over the past four surveys. Between the 1990 and 2020 inventories, volume in the 8- and 10-inch diameter classes rose 85 and 96 percent, respectively. Plantations of pine are directly responsible for this increase in volume for softwood species <14 inches in diameter. In 2020, softwood volume for every diameter class was at its highest recorded level (fig. 12).

All-live hardwood volume of Alabama's forests has risen as well. However, unlike softwood volume, which peaked in the 7- to 14-inch diameter classes, hardwood volume has been increasing over all diameter classes for the last 40 years. This increase is proportional to tree size. For example, the 2020 hardwood volume estimate in the 12-inch diameter class was

64 percent higher than the 1972 estimate. The 2020 inventory volumes in the 16-, 20-, and 24-inch classes were 140, 250, and 396 percent greater, respectively, than the corresponding 1972 estimates (fig. 13).

At the time of the 2020 inventory, all-live softwood volume was distributed unevenly across the State. It was greatest in the southwest portion of the State and lowest in the northern counties. Clarke, Washington, Baldwin, and Choctaw Counties had the most all-live softwood volume. Limestone and Lauderdale Counties had the least amount of all-live softwood volume (fig. 14).

Hardwoods occurred throughout the State. All-live hardwood volume increased slightly from east to west and south to north; however, these trends were small. Jackson and Tuscaloosa Counties had the highest all-live hardwood volume. Coffee and Escambia Counties had the lowest amount of all-live hardwood volume (fig. 15).

Table 2—Net¹ volume of live trees on forest land by forest-type and ownership group, Alabama, 2020

Forest-type group	Ownership group					
	All ownerships	U.S. Forest Service	Other Federal	State and local government	Forest industry	Nonindustrial private
	<i>million cubic feet</i>					
White-red-jack pine	55.6	36.2	0.0	0.0	0.0	19.5
Longleaf-slash pine	1,928.9	331.1	13.6	83.8	195.1	1,305.5
Loblolly-shortleaf pine	18,147.8	385.6	182.7	366.9	2,795.5	14,417.1
Other eastern softwoods	48.3	0.0	0.0	0.0	0.0	48.3
Oak-pine	4,627.4	404.5	91.4	169.4	392.7	3,569.3
Oak-hickory	12,152.1	515.3	185.9	480.9	668.9	10,301.0
Oak-gum-cypress	5,461.4	75.9	216.2	410.7	430.7	4,327.9
Elm-ash-cottonwood	1152.08	0.0	56.45	3.79	9.71	1,082.1
Other hardwoods	1.6	0.0	0.0	0.0	0.0	1.6
Exotic hardwoods	24.0	0.0	0.0	0.0	0.6	23.4
Nonstocked	6.2	0.0	0.0	0.0	0.3	5.9
Total	43,605.4	1,748.6	746.3	1,515.6	4,493.3	35,101.6

Numbers in rows and columns may not sum to totals due to rounding.

0.0 = no sample for the cell or a value of > 0.0 but < 0.05.

¹Excludes rotten, missing, and form cull defects volume.

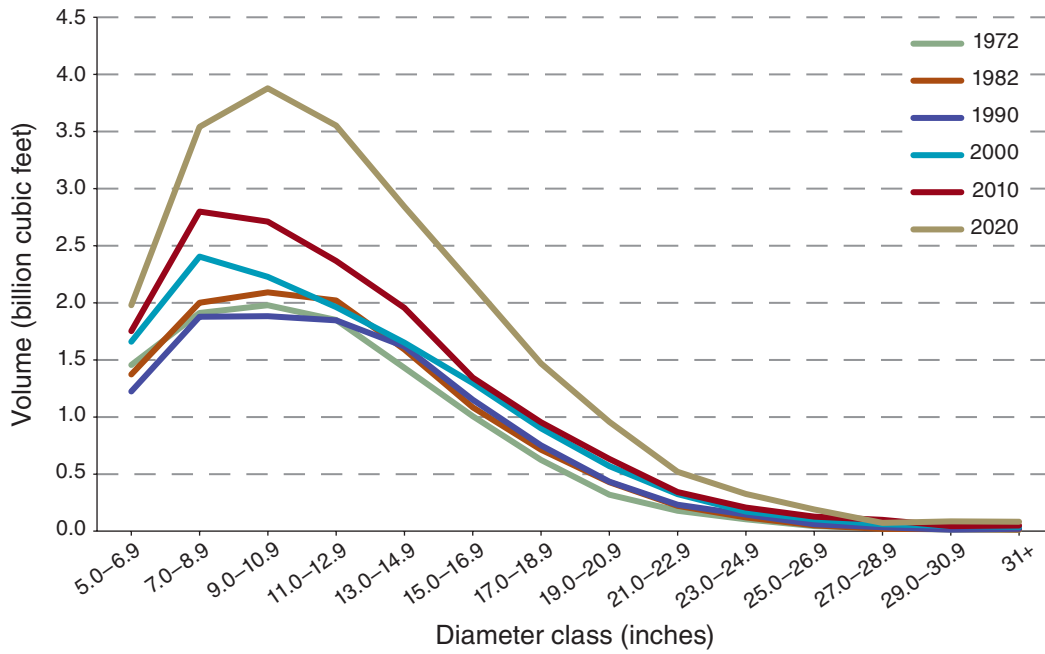


Figure 12—Total all-live volume of softwoods on forest land by diameter class and survey period, Alabama.

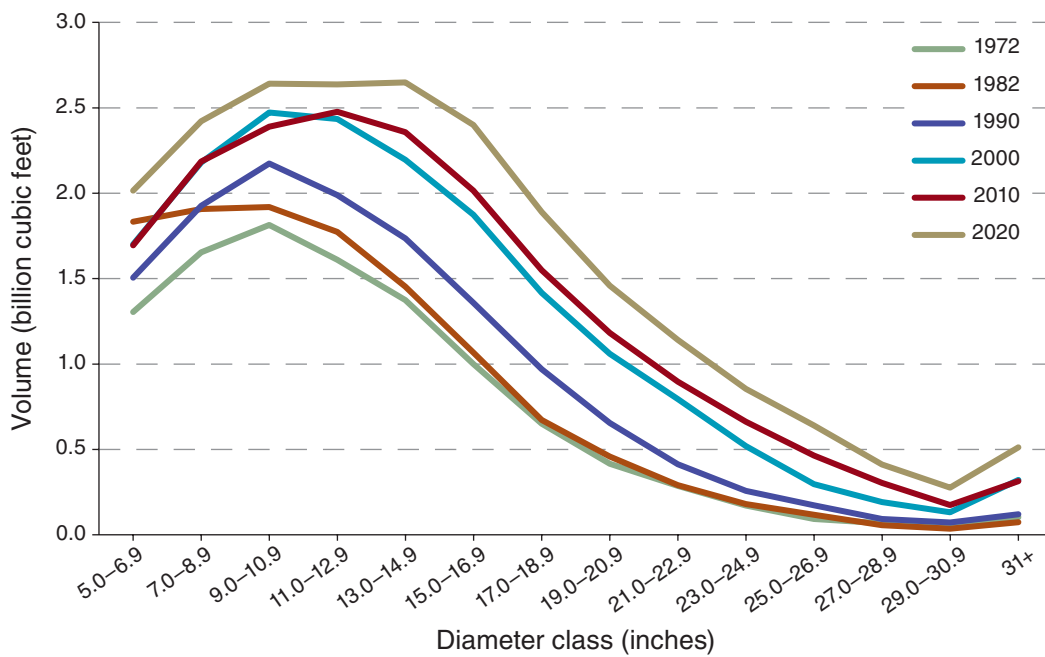


Figure 13—Total all-live volume of hardwoods on forest land by diameter class and survey period, Alabama.



Alabama's landscape is a mosaic of forests and agriculture.

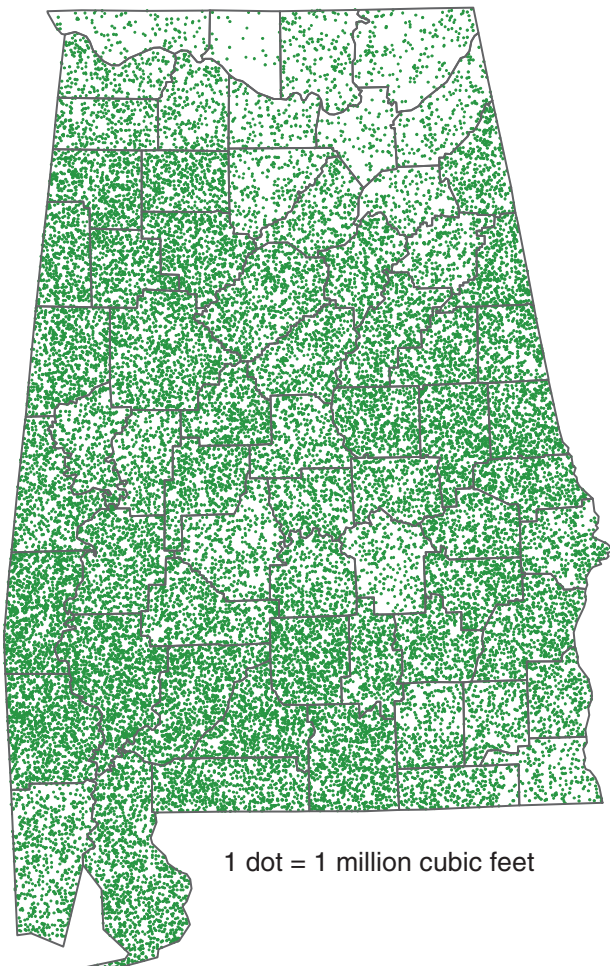


Figure 14—All-live softwood volume, Alabama, 2020. Each dot represents 1 million cubic feet of live-tree volume. See methods section for map methodology.

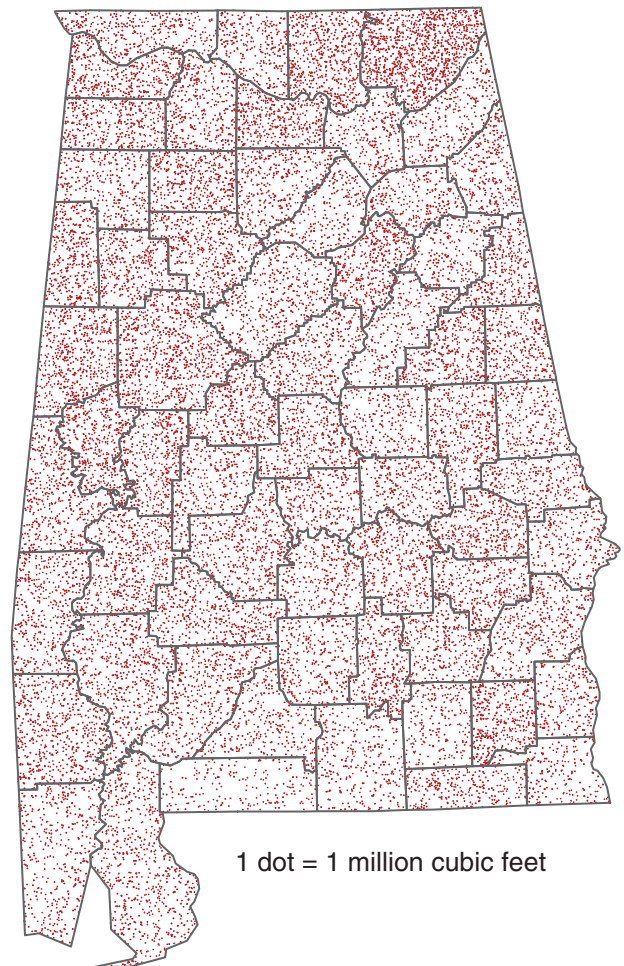


Figure 15—All-live hardwood volume, Alabama, 2020. Each dot represents 1 million cubic feet of live-tree volume. See methods section for map methodology.



SPECIES

Loblolly pine (*Pinus taeda*) was the predominant softwood species in Alabama accounting for over 17.6 billion cubic feet, or 46 percent of all-live softwood volume (table 3). The amount of volume in this one species was 17 times greater than the second ranked softwood species, longleaf pine (*P. palustris*). The 2020 inventory of loblolly pine accounted for almost 81 percent of the State's total softwood volume. Shortleaf pine (*P. echinata*) and other yellow pines were the only softwood species that lost volume over the last 20 years. From 2000 to 2020, shortleaf pine volume decreased 47 percent, while species classified as other yellow pines declined 8 percent. All other softwood species increased over this period (fig. 16).

Unlike its softwoods resource, Alabama's hardwoods were not dominated by a single species. The red oak group contained the most all-live volume, 5.7 billion cubic feet, followed by white oaks with 3.3 billion cubic feet, sweetgum (*Liquidambar styraciflua*) with

3.2 billion cubic feet, and yellow-poplar (*Liriodendron tulipifera*) with 2.4 billion cubic feet (fig. 17). While sweetgum and yellow-poplar are individual species, red and white oaks are species groups that include many species under those classifications.

Since the 2000 survey, all hardwood species groups experienced increases in volume. The red oak group experienced the greatest volume increase over the last 20 years by adding an additional 1 billion cubic feet of all-live volume. Yellow-poplar and white oak were the next big gainers in hardwood volume, increasing by 847 million cubic feet and 681 million cubic feet, respectively, over the past 20 years. It should be noted that there were other hardwood groups not depicted on figure 17, as the volume in these groups was too small to be displayed on the graph. These groups—ash, cottonwood and aspen, basswood, black walnut, other eastern hardwoods—experienced gains in volume from 2000 to 2020.

Table 3—Top 50 tree species dominant for volume (≥ 5.0 inches d.b.h.) on forest land, Alabama, 2020

Common name	Genus	Species	Volume ¹ million cubic feet
Loblolly pine	<i>Pinus</i>	<i>taeda</i>	17,635
Sweetgum	<i>Liquidambar</i>	<i>styraciflua</i>	3,243
Yellow-poplar	<i>Liriodendron</i>	<i>tulipifera</i>	2,353
Water oak	<i>Quercus</i>	<i>nigra</i>	2,352
White oak	<i>Quercus</i>	<i>alba</i>	1,675
Longleaf pine	<i>Pinus</i>	<i>palustris</i>	1,030
Slash pine	<i>Pinus</i>	<i>elliottii</i>	929
Southern red oak	<i>Quercus</i>	<i>falcata</i>	921
Chestnut oak	<i>Quercus</i>	<i>prinus</i>	855
Laurel oak	<i>Quercus</i>	<i>laurifolia</i>	695
Red maple	<i>Acer</i>	<i>rubrum</i>	695
Shortleaf pine	<i>Pinus</i>	<i>echinata</i>	662
Pignut hickory	<i>Carya</i>	<i>glabra</i>	645
Blackgum	<i>Nyssa</i>	<i>sylvatica</i>	640
Sweetbay	<i>Magnolia</i>	<i>virginiana</i>	556
Virginia pine	<i>Pinus</i>	<i>virginiana</i>	537
Mockernut hickory	<i>Carya</i>	<i>alba</i>	535
Swamp tupelo	<i>Nyssa</i>	<i>biflora</i>	465

(continued)



Species

Table 3 (continued)—Top 50 tree species dominant for volume (≥ 5.0 inches d.b.h.) on forest land, Alabama, 2020

Common name	Genus	Species	Volume ¹ <i>million cubic feet</i>
Post oak	<i>Quercus</i>	<i>stellata</i>	461
Cherrybark oak	<i>Quercus</i>	<i>pagoda</i>	432
Willow oak	<i>Quercus</i>	<i>phellos</i>	405
Water tupelo	<i>Nyssa</i>	<i>aquatica</i>	392
Green ash	<i>Fraxinus</i>	<i>pennsylvanica</i>	353
Baldcypress	<i>Taxodium</i>	<i>distichum</i>	352
American beech	<i>Fagus</i>	<i>grandifolia</i>	298
Northern red oak	<i>Quercus</i>	<i>rubra</i>	271
Scarlet oak	<i>Quercus</i>	<i>coccinea</i>	270
Eastern redcedar	<i>Juniperus</i>	<i>virginiana</i>	268
Sugarberry	<i>Celtis</i>	<i>laevigata</i>	240
Black oak	<i>Quercus</i>	<i>velutina</i>	238
Black cherry	<i>Prunus</i>	<i>serotina</i>	233
Shagbark hickory	<i>Carya</i>	<i>ovata</i>	232
Winged elm	<i>Ulmus</i>	<i>alata</i>	189
American sycamore	<i>Platanus</i>	<i>occidentalis</i>	189
Spruce pine	<i>Pinus</i>	<i>glabra</i>	188
Sourwood	<i>Oxydendrum</i>	<i>arboreum</i>	171
American elm	<i>Ulmus</i>	<i>americana</i>	142
Overcup oak	<i>Quercus</i>	<i>lyrata</i>	132
Florida maple	<i>Acer</i>	<i>barbatum</i>	117
White ash	<i>Fraxinus</i>	<i>americana</i>	112
River birch	<i>Betula</i>	<i>nigra</i>	107
Swamp chestnut oak	<i>Quercus</i>	<i>michauxii</i>	88
Southern magnolia	<i>Magnolia</i>	<i>grandiflora</i>	88
Chinkapin oak	<i>Quercus</i>	<i>muehlenbergii</i>	84
American hornbeam, musclewood	<i>Carpinus</i>	<i>caroliniana</i>	76
Water hickory	<i>Carya</i>	<i>aquatica</i>	54
American basswood	<i>Tilia</i>	<i>americana</i>	54
Pecan	<i>Carya</i>	<i>illinoensis</i>	51
Boxelder	<i>Acer</i>	<i>negundo</i>	50
American holly	<i>Ilex</i>	<i>opaca</i>	48
Total			38,498

Numbers in rows and columns may not sum to totals due to rounding.

¹Excludes rotten, missing, and form cull defects volume.

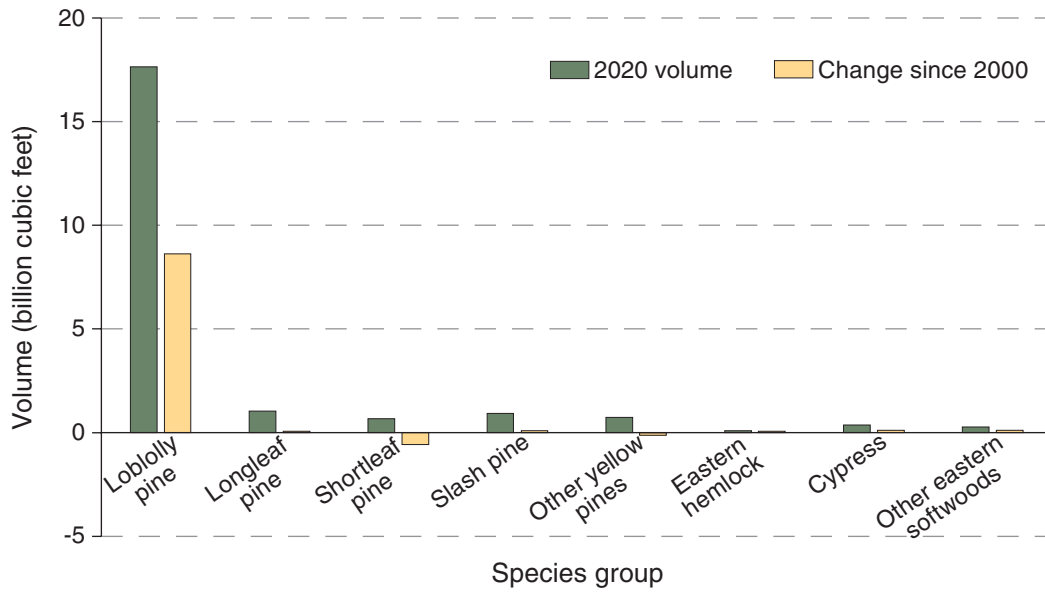


Figure 16—Volume of all-live softwoods on forest land by species group, Alabama 2020, and change since 2000.

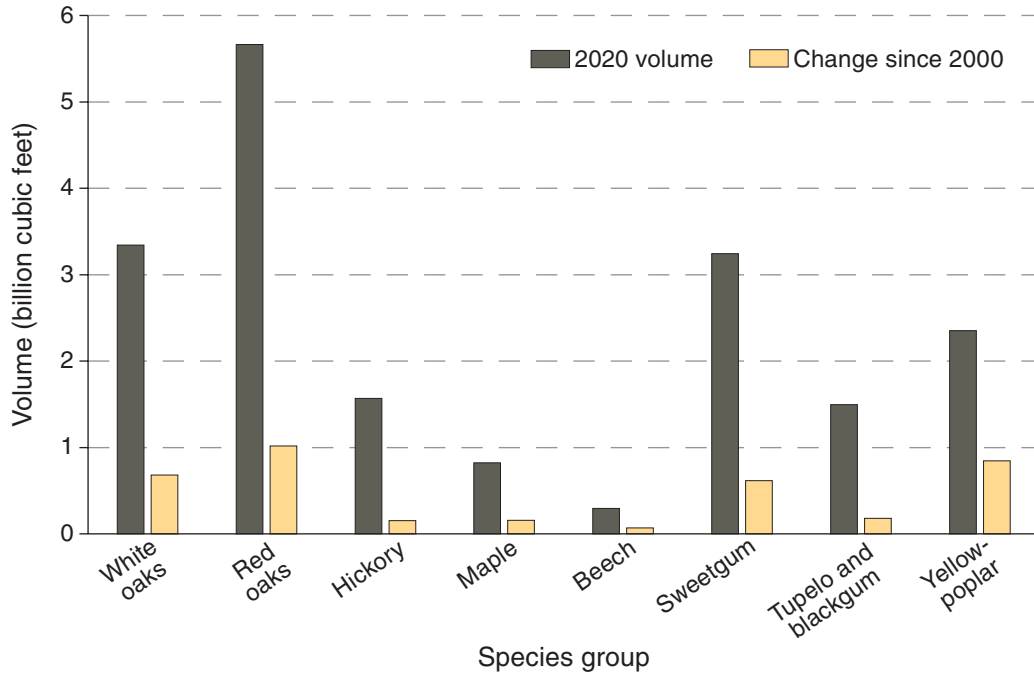


Figure 17—Volume of all-live hardwoods on forest land by species group, Alabama 2020, and change since 2000.



GROWTH AND REMOVALS

Average Annual Growth of All-Live Species

In 2020, 1.6 billion cubic feet of all-live softwood volume was produced each year in Alabama, a 41-percent increase in annual volume increment over the 2010 inventory (fig. 18). Conversely, 888.1 million cubic feet were removed each year in harvest operations, almost the same amount as in 2010. The 2020 growth-to-removals ratio for the State's softwoods was 1.8, indicating that for every cubic foot of softwood cut, 1.8 cubic feet was grown.

Alabama's forests have historically produced more hardwood all-live volume than has been removed. The latest survey results were no different. In 2020, 695.4 million cubic feet of hardwood was grown each year in Alabama, while 313 million cubic feet was removed (fig. 19). The 2020 estimate of annual hardwood growth was the highest recorded for the State. The 2020 results show a decrease in annual removals for the last two survey periods. The economic recession of 2008 was one of the drivers of this decrease in hardwood



The harvesting of forests is common throughout the State as it provides income for owners and, with proper management and planting, ensures that future generations have forests to enjoy.

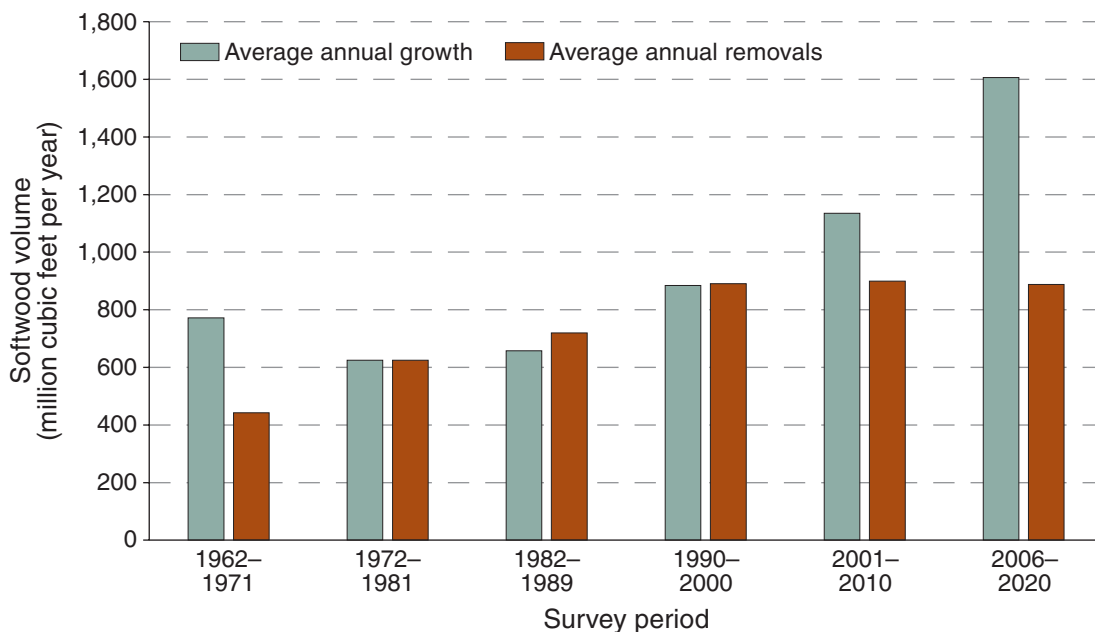


Figure 18—Average annual net growth and average annual removals of all-live softwood species on forest land, Alabama 1962–2020.

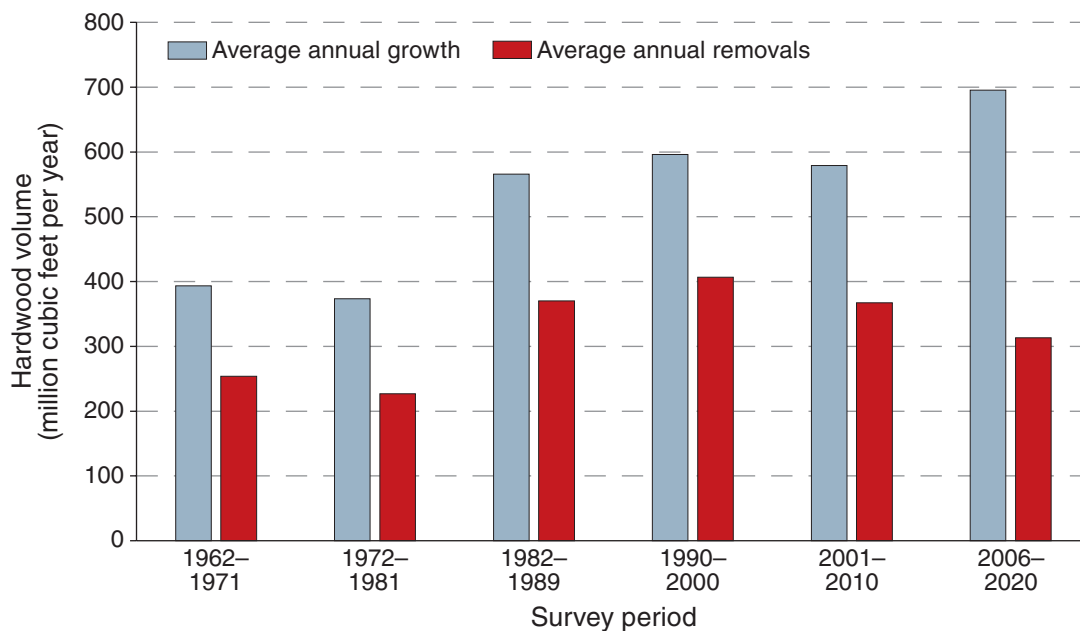


Figure 19—Average annual net growth and average annual removals of all-live hardwood species on forest land, Alabama 1962–2020.

removals. The growth-to-removals ratio for hardwoods was 2.2, the highest since surveys began.

The reader may notice that the inventory periods for the last two surveys overlap. This was an artifact of the annual inventory system that was utilized in 2020. The annual inventory began in 2000. A complete description of the annual versus periodic inventories as well as their impact on analysis is in Appendix A—Inventory Methods.

Alabama's forests grew at a rate of 2.3 billion cubic feet of all-live trees per year. Softwood growth was double the hardwood growth: 1.6 billion versus 0.69 billion cubic feet per year. One species group, loblolly and shortleaf pine, accounted for 92 percent of softwood growth. The top-ranked hardwood species were red oaks, which represented 29 percent of the total annual net growth of all live hardwoods, followed by sweetgum, white oaks, and yellow-poplar. These four hardwood species accounted for >73 percent of all hardwood growth in the State. In 2020, average annual growth exceeded removals for all species groups (table 4).

Stand origin had an impact on growth-to-removals ratios. Natural stands exhibit similar results as those found for all stands discussed in the previous paragraph. Ratios for all species groups were almost the same. The results were different for planted stands. The majority of the average annual growth and removals in these forests were from softwood species. Softwood species are responsible for over 85 percent of the total average annual growth and 80 percent of the average annual removals on planted stands. The growth-to-removals ratios for all softwood species groups were greater than 1 (table 4).

The most growth among species groups is accounted for by loblolly pine and shortleaf pine, red oaks, and sweetgum; so one would expect that forest types containing these species would also experience the most growth. It is supported by the fact that 1.4 billion cubic feet of all-live growth occurred on the loblolly-shortleaf forest type, which accounted for 60 percent of all average annual growth (table 5). Oak-hickory and oak-pine were the next two largest forest types in terms of average annual growth.



Table 4—Average net annual growth and net annual removals of all-live trees on forest land by species group and stand origin, Alabama, 2013–2020

Species group	Net growth	Net removals	Stand origin			
			Natural stands		Planted stands	
			Growth	Removals	Growth	Removals
<i>million cubic feet</i>						
Softwood						
Longleaf and slash pines	91.4	47.3	78.7	39.4	12.7	7.9
Loblolly and shortleaf pines	1,473.7	820.3	1,207.3	674.2	266.5	146.0
Other yellow pines	24.4	16.8	23.7	13.8	0.7	3.1
Eastern hemlock	0.5	0.0	0.5	0.0	0.0	0.0
Cypress	7.2	1.4	7.0	1.4	0.2	0.0
Other eastern softwoods	8.8	2.2	8.7	1.9	0.1	0.3
Total softwoods	1,605.9	888.1	1,325.8	730.8	280.2	157.3
Hardwood						
White oaks	94.9	44.4	89.4	40.1	5.5	4.3
Red oaks	202.7	93.7	189.3	79.9	13.4	13.8
Hickory	30.8	20.2	28.7	19.2	2.1	1.0
Maples	22.9	12.6	23.0	10.9	-0.1	1.7
Beech	8.0	1.7	7.0	1.4	1.0	0.3
Sweetgum	121.4	65.7	111.6	58.3	9.8	7.4
Tupelo and blackgum	27.1	9.5	25.3	8.2	1.8	1.3
Ash	10.6	5.2	9.9	4.6	0.7	0.7
Cottonwood and aspen	2.2	2.2	2.1	2.2	0.1	0.0
Basswood	2.0	0.3	1.8	0.3	0.3	0.0
Yellow-poplar	92.6	29.5	84.0	22.7	8.6	6.8
Black walnut	0.8	0.6	0.7	0.6	0.1	0.0
Other eastern soft hardwoods	46.3	12.5	45.2	11.6	1.1	0.9
Other eastern hard hardwoods	2.7	2.4	2.5	2.2	0.2	0.2
Eastern noncommercial hardwoods	30.5	12.5	27.2	10.7	3.3	1.9
Total hardwoods	695.4	313.1	647.6	272.9	47.8	40.2
All species	2,301.4	1,201.1	1,973.4	1,003.6	328.0	197.5

Numbers in rows and columns may not sum to totals due to rounding.

Table 5 illustrates the degree to which Alabama’s planted stands were dominated by one species group. Ninety-four percent of the average annual growth and 95 percent of the average annual removals in planted stands were from the loblolly and shortleaf pine species group. Loblolly pine was the main species in this group as revealed in the previous section on species dominance.

The majority of annual all-live tree growth and removals in Alabama occurs on NIPF. The NIPF lands accounted for 97 percent of softwood growth and 98 percent of softwood removals,

while 93 percent of hardwood growth and 98 percent of hardwood removals occurred on NIPF lands (table 6).

Average Annual Removals of All-Live Species

Softwood removals occurred across the State, but the highest concentrations occurred in the southwest portion of the State (fig. 20). In hardwood removals, the pattern is similar, but not as pronounced as in softwood removals (fig. 21).



Table 5—Average annual net growth and net annual removals of all-live trees on forest land by forest-type group and major species group, Alabama, 2013–2020

Forest-type group	Average annual growth			Average annual removals		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
	<i>million cubic feet</i>					
Softwood types						
White-red-jack pine	0.9	0.7	0.1	0.0	0.0	0.0
Longleaf-slash pine	84.9	77.0	7.9	44.6	40.8	3.8
Loblolly-shortleaf pine	1,355.8	1,251.2	104.6	807.6	760.3	47.3
Other eastern softwoods	6.0	5.1	0.9	0.7	0.6	0.1
Total softwoods	1,447.5	1,334.0	113.5	852.9	801.7	51.2
Hardwood types						
Oak-pine	255.2	159.5	95.7	107.7	56.2	51.5
Oak-hickory	413.8	83.6	330.2	175.0	24.0	151.0
Oak-gum-cypress	138.3	19.7	118.6	50.1	6.2	43.9
Elm-ash-cottonwood	40.0	6.1	33.9	14.7	0.0	14.7
Maple-beech-birch	0.0	0.0	0.0	0.0	0.0	0.0
Other hardwoods	0.4	0.2	0.3	0.0	0.0	0.0
Exotic hardwoods	2.0	0.9	1.1	0.2	0.0	0.2
Total hardwoods	849.8	270.0	579.8	347.8	86.4	261.4
Nonstocked	4.1	1.9	2.2	0.5	0.0	0.5
All groups	2,301.4	1,605.9	695.4	1,201.1	888.1	313.1

Numbers in rows and columns may not sum to totals due to rounding.

0.0 = no sample for the cell or a value of > 0.0 but < 0.05.

Table 6—Average net annual growth and net annual removals of all-live trees on forest land by ownership group and major species group, Alabama, 2013–2020

Ownership group	Net growth			Net removals		
	All species	Softwood	Hardwood	All species	Softwood	Hardwood
	<i>million cubic feet</i>					
National forest	30.9	13.9	17.0	6.4	4.8	1.6
Other Federal	20.8	8.4	12.4	1.8	1.3	0.5
State and local government	49.8	28.6	21.2	14.4	9.4	5.0
Nonindustrial private	2,199.8	1,555.0	644.8	1,178.6	872.7	305.9
Total	2,301.4	1,605.9	695.4	1,201.1	888.1	313.1

Numbers in rows and columns may not add to totals due to rounding.

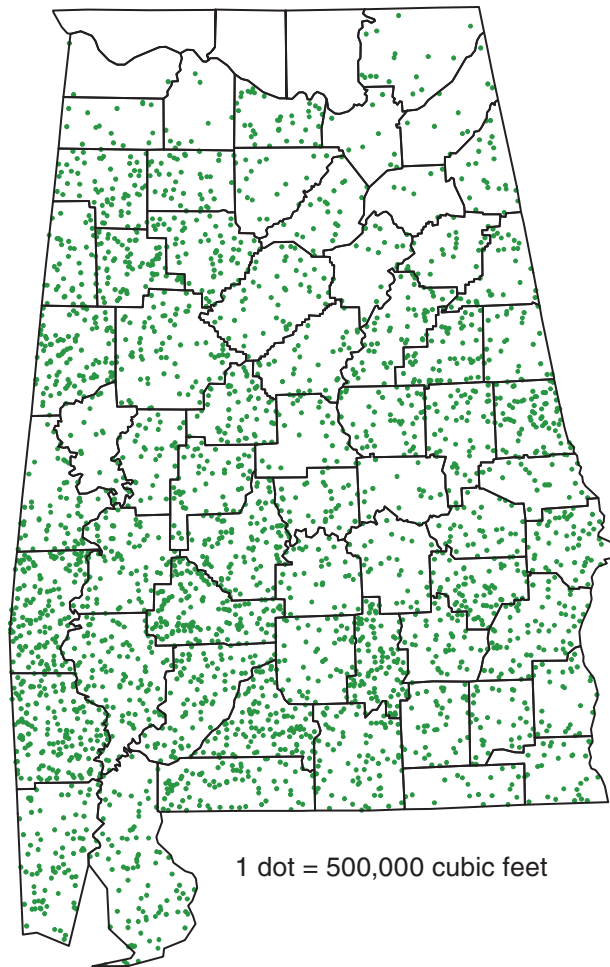


Figure 20—Average annual softwood removals volume, Alabama, 2003–2020. Each dot represents 500,000 cubic feet of softwood live-tree volume removed each year on forest land. See methods section for map methodology.

Softwood removals exceeded growth in seven counties (fig. 22). Three of these counties had a growth-to-removals ratio >0.9 , which was close to unity (one-to-one) and two had ratios >0.85 . Morgan and Dallas Counties had the lowest softwood growth-to-removals ratio. Due to the dramatic drop in housing starts during the 2008 economic downturn, softwood removals and growth-to-removals ratios may have been impacted. This led to a decrease in average annual removals for several years after the downturn (Brandeis and others 2012).

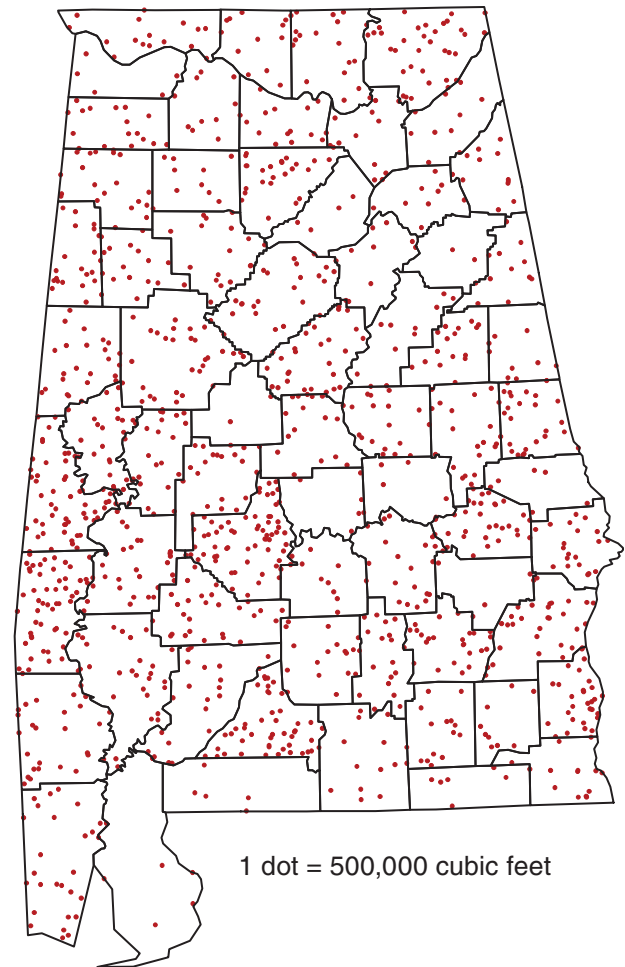


Figure 21—Average annual hardwood removals volume, Alabama, 2003–2020. Each dot represents 500,000 cubic feet of hardwood live-tree volume removed each year on forest land. See methods section for map methodology.

There were three counties in the northern and central parts of the State with the highest growth-to-removals ratios: Lauderdale, Madison, and Colbert. There was very little softwood volume in these counties, and they are subject to large changes even if there is very little change in the actual resource. In fact, almost no softwood removals occurred in Madison and Limestone Counties. Therefore, their corresponding growth-to-removals ratios were exceedingly high (or null as with Limestone County). According to AFC

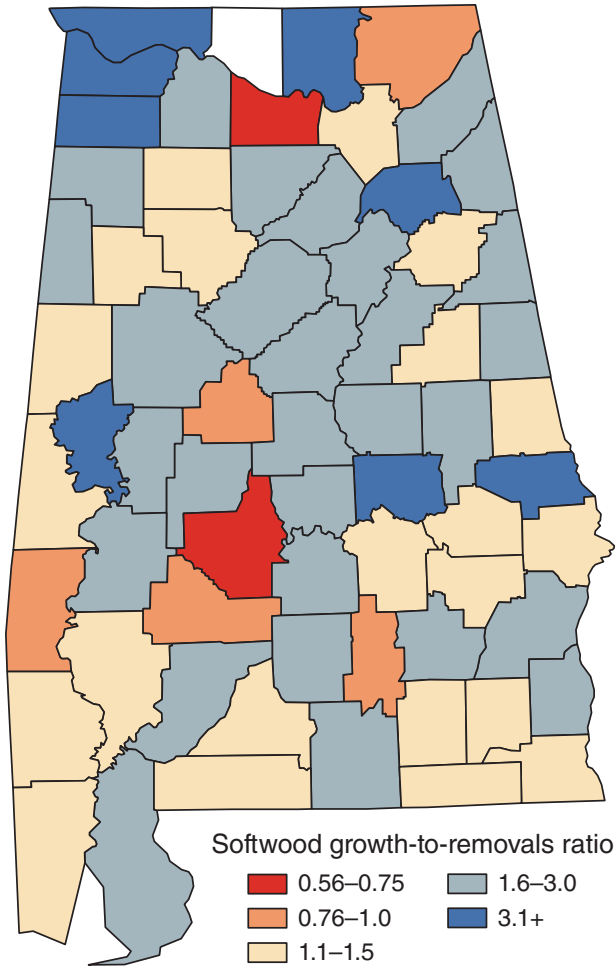


Figure 22—All-live softwood growth-to-removals ratio on forest land, Alabama, 2003–2020.

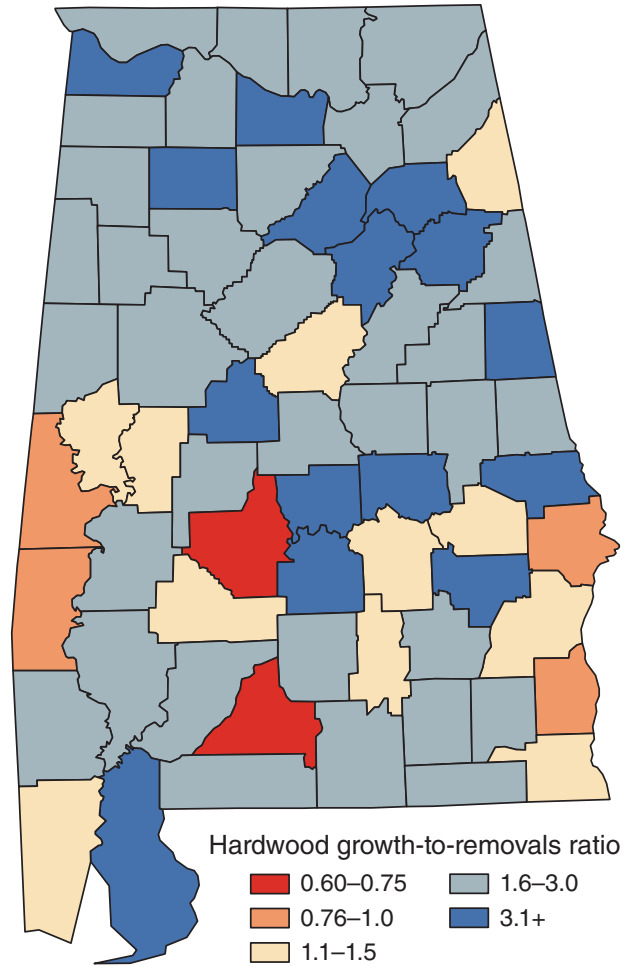
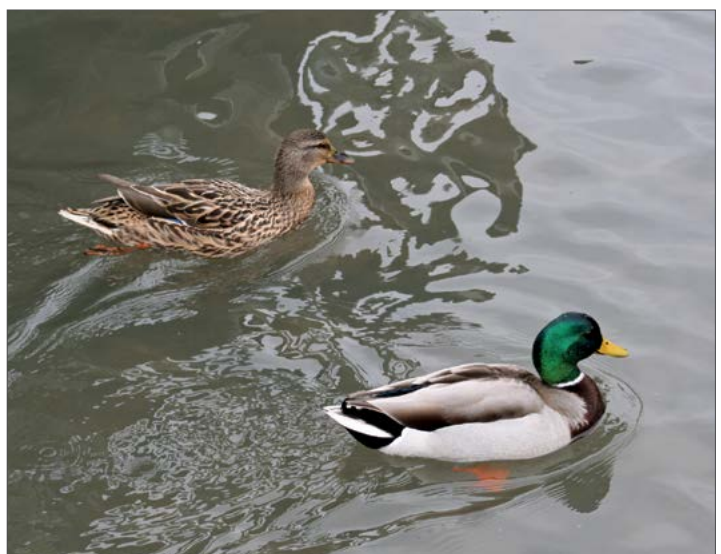


Figure 23—All-live hardwood growth-to-removals ratio on forest land, Alabama, 2003–2020.

representatives, the closing of International Paper Company’s Courtland mill in 2012 had a large impact on removals in those areas.

Between 2015 and 2020, average annual all-live hardwood removals exceeded growth in six Alabama counties (fig. 23). This was a notable increase from the 2010 report which noted only 14 counties with ratios >1. Only six counties had hardwood growth-to-removals ratios <1. Three of these counties had ratios ≥0.9, and thus close to unity. Conecuh County had the lowest ratio, followed by Dallas and Choctaw Counties. Bibb County had the highest hardwood growth-to-removals ratio at 14.8. Other counties with the largest growth-to-removals ratios were Calhoun, Elmore, Baldwin, and Bullock Counties.



Alabama lies within the Mississippi flyway which is used by ducks and other migrant waterfowl.



FOREST HEALTH

The health and condition of America’s forests have always been of major concern to the Forest Service, as well as the scientific community and the public at large. The Forest Health Monitoring (FHM) program was created to study the condition and long-term health of this country’s forest lands. In 2000, FHM merged with FIA as both programs shared many features. FHM information is collected on a subset of FIA plots. About 1 out of 16 FIA plots is selected for additional forest health sampling. Information from both sets of data, FIA and FHM, can be used to make inferences about the health of the State’s forests.

Mortality

Average annual mortality, collected on all remeasured FIA plots, is the metric used to describe trees that die from natural causes such as insects, disease, fire, competition, weather, or old age. During the most recent survey period, annual mortality of softwood and annual mortality of hardwood trees averaged 176.8 and 213.8 million cubic feet, respectively. Mean annual mortality of hardwoods decreased 4 percent since the previous survey. At the

same time, softwood mortality was down 14 percent for the same time period (table 7).

The pine forests of the Southeastern United States experienced a southern pine beetle (SPB), (*Dendroctonus frontalis*) outbreak at the turn of the 21st century. Over half of the softwood mortality reported in 2000–2005 was due to this insect. Since then, the infestations have declined. The decrease in SPB infestations is the primary driver for the decline in softwood mortality over these three inventory periods. Alabama forests were also impacted by Hurricanes Ivan and Katrina in 2004 and 2005. Both storms impacted the hardwood resource of the State more than the softwood resource. Increases in average annual hardwood mortality can be linked to damage caused by these storms.

Total average annual mortality of all-live species increased in Alabama for the first decade of the 21st century. But how much of this was due to the increase in live-tree volume and how big was the impact of these losses? The best way to answer these questions was to compute the mortality-to-volume ratio for the State. This ratio describes the impact that average annual mortality has upon the current

Table 7—Average annual mortality of live trees on forest land by agent of mortality, survey period, and major species group, Alabama

Agent	2000–2005			2001–2010			2013–2020		
	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods
<i>million cubic feet per year</i>									
Insect	113.1	112.4	0.7	81.2	80.7	0.5	88.6	88.0	0.6
Disease	104.1	28.1	75.9	62.7	16.8	45.9	91.2	12.7	78.5
Fire	4.1	1.1	3.0	5.4	2.4	3.0	9.3	3.8	5.4
Animal	10.9	1.7	9.2	12.2	1.5	10.7	5.3	0.2	5.1
Weather	72.6	27.5	45.0	183.8	72.4	111.4	88.5	28.5	60.0
Vegetation	42.5	18.1	24.4	41.9	18.1	23.8	78.1	32.8	45.4
Unknown	59.6	26.1	33.5	40.4	13.2	27.3	29.5	10.8	18.7
Total	406.8	215.1	191.7	427.6	205.0	222.5	390.6	176.8	213.8

Numbers in rows and columns may not add to totals due to rounding.



Fall foliage brings color to the State’s northern counties.

standing volume of trees, and to what degree this mortality impacts the forest resources of the State.

In 2020, the volume-to-mortality ratios for softwoods and hardwoods in Alabama were 1:0.008 and 1:0.011, respectively. Thus, just over 0.8 percent of the standing volume of softwoods and 1.1 percent of the volume of hardwoods died each year (fig. 24) from natural causes. The softwood volume-to-mortality ratio has decreased since 2010, indicating that softwood mortality decreased as softwood volume increased for this species group. Volume-to-mortality ratios for hardwoods increased during the hurricanes and have slightly decreased since then.

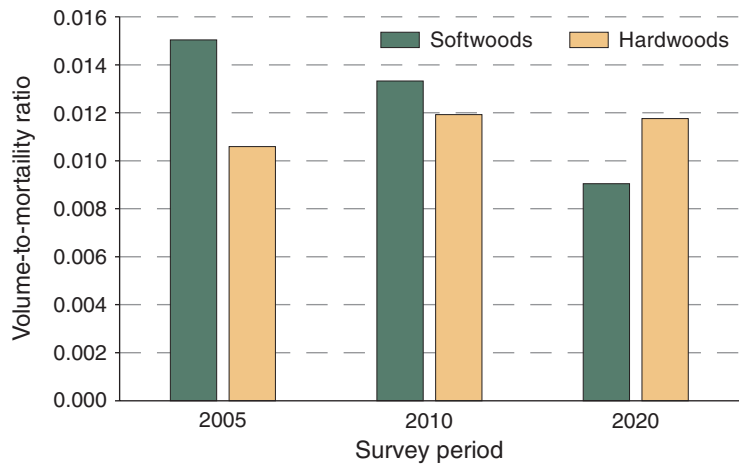


Figure 24—Average annual volume-to-mortality ratios of all-live trees on forest land by survey period and major species group, Alabama.



TIMBER PRODUCT OUTPUT AND UTILIZATION

Timber Products

A diverse forest products industry in Alabama was made up by a variety of mills, ranging from small- to large-sized softwood and hardwood sawmills, pole, and other miscellaneous mills to very large pulpmills. In 2015, there were 116 primary wood using mills, 119 in 2017, 120 in 2018, 120 in 2019, and 122 in 2020. Since 2015, the total number of sawmills, pulpwood mills, and other primary wood-processing plants distributed across the State has been relatively stable.

This section presents estimates from industry surveys conducted in 2015, 2017, 2018, 2019, and 2020. The estimates were used to determine the output for timber products and plant byproducts. The data used for this section were compiled from the timber product output (TPO) Toolkit-TPO Interactive Reporting Tool. TPO Data Download can be found at <https://www.fia.fs.usda.gov/program-features/tpo/> (U.S. Department of Agriculture Forest Service 2010).

In 2015 and 2017, estimates of TPO and plant residues were obtained from canvass surveys

(questionnaires) sent to all primary wood-using mills in the State. The 2018, 2019, and 2020 estimates were obtained through surveys using a sample design where all mills using more than 10,000 million cubic feet of roundwood were 100 percent sampled. An approximate 40 percent sample rate was used for mills with a population of 5 or more by type and roundwood consumption of less than 10,000 million cubic feet. The surveys were used to determine the types and amount of roundwood or timber (i.e., saw logs, pulpwood, plywood and veneer, poles, etc.) received by each mill, the county of origin, the species used, and how the mills disposed of the bark and wood residues produced. The canvass surveys were conducted every 2 years and the sample conducted annually by personnel from the SRS and AFC. In addition to the harvest and utilization study, these data are used to augment the FIA annual inventory of all-live timber removals to derive timber product proportions. Individual TPO studies, or industry surveys, were necessary to track trends and capture changes in product output levels.

In 2015, volume harvested and delivered for products (including residential fuelwood) from all sources totaled 1.1 billion cubic feet (39.7 million green tons) (table 8.). The output volumes increased moderately in 2017 to



Forest industry plays a vital role in the State's economy by harvesting timber products.

Timber Product Output and Utilization



Table 8—Output of industrial roundwood products by product, species group and year, Alabama

Product and species group	Year									
	2015	2017	2018	2019	2020	2015	2017	2018	2019	2020
	----- thousand cubic feet -----					----- green tons -----				
Saw logs										
Softwood	261,860	289,661	297,970	313,093	423,233	9,169,521	10,132,864	10,418,227	10,946,215	14,799,951
Hardwood	55,217	47,152	42,295	39,095	33,445	2,102,360	1,794,577	1,610,174	1,488,700	1,274,795
Total	317,077	336,813	340,265	352,188	456,678	11,271,881	11,927,441	12,028,401	12,434,915	16,074,746
Veneer logs										
Softwood	38,553	36,650	40,655	61,672	29,913	1,346,987	1,280,645	1,420,940	2,156,223	1,045,076
Hardwood	9,782	9,667	11,553	7,863	5,563	372,672	368,268	439,810	299,311	212,082
Total	48,335	46,317	52,208	69,535	35,476	1,719,659	1,648,913	1,860,750	2,455,534	1,257,158
Pulpwood										
Softwood	452,073	472,732	430,989	430,628	396,798	15,871,461	16,599,056	15,131,010	15,117,449	13,934,736
Hardwood	146,104	143,050	136,831	141,615	121,584	5,419,865	5,301,270	5,070,507	5,246,635	4,505,201
Total	598,177	615,782	567,820	572,243	518,382	21,291,326	21,900,326	20,201,517	20,364,084	18,439,937
Composite panel										
Softwood	43,204	50,910	56,555	53,717	57,064	1,511,002	1,780,526	1,977,770	1,878,481	1,995,763
Hardwood	6,609	3,806	3,474	3,802	5,453	250,061	144,026	131,454	143,842	206,332
Total	49,813	54,716	60,029	57,519	62,517	1,761,063	1,924,552	2,109,224	2,022,323	2,202,095
Bioenergy/fuelwood										
Softwood	35,802	43,696	38,634	39,930	28,926	1,255,381	1,532,183	1,354,689	1,400,137	1,014,293
Hardwood	9,775	23,489	15,957	17,033	7,579	362,501	871,110	591,775	631,702	281,078
Total	45,577	67,185	54,591	56,963	36,505	1,617,882	2,403,293	1,946,464	2,031,839	1,295,371
Miscellaneous¹										
Softwood	11,919	14,269	15,598	14,268	11,745	357,211	429,537	466,758	428,048	352,341
Hardwood	0	0	0	0	9,741	0	0	0	0	365,269
Total	11,919	14,269	15,598	14,268	21,486	357,211	429,537	466,758	428,048	717,610
Total (industrial)										
Softwood	843,411	907,918	880,401	913,308	947,679	29,511,563	31,754,811	30,769,394	31,926,553	33,142,160
Hardwood	227,487	227,164	210,110	209,408	183,365	8,507,459	8,479,251	7,843,720	7,810,190	6,844,757
Total	1,070,898	1,135,082	1,090,511	1,122,716	1,131,044	38,019,022	40,234,062	38,613,114	39,736,743	39,986,917
Residential fuelwood²										
Undifferentiated	21,888	17,556	17,556	17,556	17,556	1,662,394	1,333,378	1,333,378	1,333,378	1,333,378
Total	21,888	17,556	17,556	17,556	17,556	1,662,394	1,333,378	1,333,378	1,333,378	1,333,378
Total										
Softwood	843,411	907,918	880,401	913,308	947,679	29,511,563	31,754,811	30,769,394	31,926,553	33,142,160
Hardwood	227,487	227,164	210,110	209,408	183,365	8,507,459	8,479,251	7,843,720	7,810,190	6,844,757
Undifferentiated	21,888	17,556	17,556	17,556	17,556	1,662,394	1,333,378	1,333,378	1,333,378	1,333,378
Total	1,092,786	1,152,638	1,108,067	1,140,272	1,148,600	39,681,416	41,567,440	39,946,492	41,070,121	41,320,295

Numbers in rows and columns may not add to totals due to rounding.

¹ Includes poles, posts, and other miscellaneous products.

² Residential fuelwood volume from the latest U.S. Department of Energy estimates.



Timber Product Output and Utilization

1.2 billion cubic feet (41.6 million green tons), then declined slightly in 2018 to 1.1 billion cubic feet (39.9 million green tons). The output volumes increased slightly in 2019 and 2020 to 1.1 and 1.1 billion cubic feet or 41.1 million and 41.3 million green tons, respectively. In 2015, the volume harvested for softwood products totaled 843.4 million cubic feet (29.5 million green tons) and accounted for 77 percent of the total product volume, while in 2017 the volume increased to 907.9 million cubic feet (31.8 million green tons). In 2018, there was a slight decline from the 2017 output softwood volume totals to 880.4 million cubic feet (30.8 million green tons). The volume harvested for softwood products increased in 2019 and 2020 to 913.3 and 947.7 million cubic feet or 31.9 million and 33.1 million green tons, respectively. In 2020, the percentage of softwood roundwood harvested increased to a high of 83 percent. The volume and percent of total roundwood harvested for products increased over the report period for softwood roundwood. The hardwood output volume followed a different trend showing a decrease in output for each year of the report period, from 227.5 million cubic feet (8.5 million green tons) in 2015 to 183.4 million cubic feet (6.8 million green tons) in 2020.

The total number of sawmills remained stable ranging from 67 to 69 for the 2015–2019 report period and increased to 75 in 2020. The sawlog output increased from 317.1 million cubic feet in 2015 to 456.7 million cubic feet in 2020 with the largest annual increase, 30 percent, from the 2019 total to 456.7 million cubic feet in 2020. The sawlog output increased 44 percent over the 2015–2020 report period and 70 percent from 2011 to 2020. In 2020, softwoods accounted for 93 percent of sawlog output volume at 423.2 million cubic feet (14.8 million green tons) while hardwood output volume totaled 33.4 million cubic feet (1.3 million green tons).

Pulpwood production totaled 598.2 million cubic feet (21.3 million green tons) in 2015 and ranged from a high of 615.8 million cubic feet (21.9 million green tons) in 2017 to a low of 518.4 million cubic feet (18.4 million green

tons) in 2020. Over the 2015–2020 report period, the amount of roundwood used for pulp generally decreased. During the report period, pulpwood was the leading product produced in the State. The 11 pulpmills in the 2020 survey accounted for 46 percent of the 1.1 billion cubic feet total product output. In 2015, softwood pulpwood production totaled 452.1 million cubic feet (15.9 million green tons) with a peak of 472.7 million cubic feet (16.6 million green tons) in 2017. However, in 2018, 2019, and 2020, softwood pulpwood production decreased from 431.0 million cubic feet (15.1 million green tons) to 430.6 million cubic feet (15.1 million green tons), and to 396.8 million cubic feet (13.9 million green tons), respectively. The proportion of softwood roundwood used for pulpwood production was stable for the 2015–2020 report period, ranging from 75 to 77 percent. In 2015, hardwood pulpwood production totaled 146.1 million cubic feet (5.4 million green tons) and generally decreased during the 2015–2020 period. Hardwood pulpwood production decreased 17 percent from 2015 to 121.6 million cubic feet (4.5 million green tons) in 2020.

Volume harvested for veneer products totaled 48.3 million cubic feet (1.7 million green tons) in 2015. The veneer production varied greatly during the 2015–2020 report period, from a high of 69.5 million cubic feet in 2019 to a low of 35.5 million cubic feet in 2020. Veneer volume fell 27 percent from 2015 and 49 percent from the previous year's totals to 35.5 million cubic feet (1.3 million green tons) and made up only 3 percent of the total products for the State in 2020. Of all product types, veneer output showed the largest decline for the period of 2015–2020.

Volume harvested for composite panel products totaled 49.8 million cubic feet (1.8 million green tons) in 2015 and generally increased from 2015 through 2020. In 2020, volume harvested for composite panels increased 26 percent from 2015 totals to 62.5 million cubic feet (2.2 million green tons) and accounted for 5 percent of total products for the State.



Volume harvested for other industrial products such as poles, posts, and mulch totaled 11.9 million cubic feet (357,000 green tons) in 2015, or 1 percent of the State’s total product output. For the 2015–2020 report period, other industrial products volume generally increased. In 2020, other industrial products volume increased 80 percent from 2015 and 51 percent from 2019. The 2020 volume was 21.5 million cubic feet (718,000 green tons), or 2 percent of the State’s total product output. As of 2020, softwood represented 55 percent of the volume harvested for other industrial products after accounting for all the volume in 2015 through 2019.

Volume used for bioenergy and commercial fuelwood totaled 45.6 million cubic feet (1.6 million green tons) and accounted for 4 percent of total product output in 2015. There was a peak in the production of biofuel and commercial fuelwood at 67.2 million cubic feet (2.4 million green tons) in 2017 and a decrease to 36.5 million cubic feet (1.3 million green tons) in 2020, making up 3 percent of total production. The use of roundwood for bioenergy and commercial fuelwood production decreased 20 percent from 2015 to 2020.

Mill Residue

Mill or plant residues are defined as wood material generated in the production of timber products from roundwood at primary manufacturing plants. This material falls into three main categories:

1. Coarse residues, or material, such as slabs, edgings, trim, veneer cores and ends, which is suitable for chipping
2. Fine residues, or material, such as sawdust, shavings, and veneer residue, which is not suitable for chipping
3. Bark which is used mainly for industrial fuel

For many years, most mill residue produced in Alabama was utilized either for primary products such as pulp and bioenergy, in



Old homesites such as this one can be found in the forest.

secondary products such as mulch and animal bedding, or as fuel at wood product mills.

Table 9 depicts the volume of mill residue by roundwood and residue type. Data on mill residue production and disposal from the 2015 through 2020 forest industry surveys indicated 297.6 million cubic feet of wood and bark residue was generated from primary processors in 2015. This total gradually declined from 2015 to 2019 with a sharp increase of 49 percent to 380.6 million cubic feet in 2020. According to the most recent survey in 2020, sawmills generated most of the mill residue produced (300.9 million cubic feet). In 2015, bark accounted for 110.0 million cubic feet (37 percent) of mill residue produced, coarse residues accounted for 115.4 million cubic feet (39 percent), and sawdust and



Timber Product Output and Utilization

Table 9—Primary mill residue volume by roundwood type, species group, and residue type, Alabama

Roundwood type and species group	Residue type									
	All types					Bark				
	2015	2017	2018	2019	2020	2015	2017	2018	2019	2020
	<i>thousand cubic feet</i>									
Saw logs										
Softwood	163,123	158,059	138,325	136,377	273,726	23,308	22,058	18,041	17,294	39,342
Hardwood	32,859	20,918	34,931	17,808	27,133	5,943	3,745	6,274	3,139	4,260
Total	195,982	178,977	173,256	154,185	300,859	29,251	25,803	24,315	20,433	43,602
Veneer logs										
Softwood	17,791	14,516	13,131	25,015	10,262	2,911	2,833	2,091	4,334	2,308
Hardwood	6,558	5,900	5,615	5,461	3,212	1,358	1,147	1,188	880	557
Total	24,349	20,416	18,746	30,476	13,474	4,269	3,980	3,279	5,214	2,865
Pulpwood										
Softwood	41,540	43,286	40,455	39,496	35,899	41,540	43,286	40,455	39,496	35,899
Hardwood	26,108	21,920	22,890	22,762	20,961	26,108	21,920	22,890	22,762	20,961
Total	67,648	65,206	63,345	62,258	56,860	67,648	65,206	63,345	62,258	56,860
Composite panel										
Softwood	4,924	1,622	6,563	6,997	7,361	4,924	1,622	6,563	6,997	7,361
Hardwood	829	489	77	487	707	829	489	77	487	707
Total	5,753	2,111	6,640	7,484	8,068	5,753	2,111	6,640	7,484	8,068
Bioenergy/fuelwood										
Softwood	1,727	0	0	0	0	1,727	0	0	0	0
Hardwood	288	0	0	0	0	288	0	0	0	0
Total	2,015	0	0	0	0	2,015	0	0	0	0
Miscellaneous¹										
Softwood	1,828	1,774	1,757	1,276	1,319	1,077	1,151	1,071	766	816
Hardwood	0	0	0	0	0	0	0	0	0	0
Total	1,828	1,774	1,757	1,276	1,319	1,077	1,151	1,071	766	816
Total										
Softwood	230,933	219,257	200,231	209,161	328,567	75,487	70,950	68,221	68,887	85,726
Hardwood	66,642	49,227	63,513	46,518	52,013	34,526	27,301	30,429	27,268	26,485
Total	297,575	268,484	263,744	255,679	380,580	110,013	98,251	98,650	96,155	112,211

Numbers in rows and columns may not add to totals due to rounding.

¹Includes poles, pilings, posts, and other industrial products.

(continued)

shavings accounted for 72.2 million cubic feet (24 percent). Mill residue decreased by 13.9 million cubic feet for bark, 13.3 million cubic feet for coarse residues, 14.1 million cubic feet for sawdust, and 603,000 cubic feet for shavings from 2015 to 2019. Residue totals showed the largest increase, 49 percent, for all residue types from 2019 to 2020. During that period, sawdust residue increased 77 percent from 42.1 million cubic feet to 74.7 million cubic feet. Overall, roundwood residue

increased 28 percent from the 2015 total of 297.6 million cubic feet to 380.6 million cubic feet in 2020.

In 2015, nearly 159.7 million cubic feet or 54 percent of mill residue produced was used for industrial fuel either at pulpmills for boiler fuel, or at sawmills for dry kiln operations, pellets, or residential fuelwood (table 10). From 2015 to 2017, this total decreased 9 percent to 145.1 million cubic feet. From 2017 to 2020,



Table 9 (continued)—Primary mill residue volume by roundwood type, species group, and residue type, Alabama

Roundwood type and species group	Residue type									
	Coarse					Sawdust				
	2015	2017	2018	2019	2020	2015	2017	2018	2019	2020
	<i>thousand cubic feet</i>									
Saw logs										
Softwood	85,173	84,997	74,845	75,108	140,381	38,730	34,650	30,329	29,287	64,470
Hardwood	15,864	10,401	16,463	8,240	12,970	11,011	6,366	11,522	5,767	9,078
Total	101,037	95,398	91,308	83,348	153,351	49,741	41,016	41,851	35,054	73,548
Veneer logs										
Softwood	10,031	9,761	8,157	15,876	7,954	4,849	1,922	2,883	4,805	0
Hardwood	3,564	3,010	3,118	2,308	1,462	1,636	1,743	1,309	2,273	1,193
Total	13,595	12,771	11,275	18,184	9,416	6,485	3,665	4,192	7,078	1,193
Pulpwood										
Softwood	0	0	0	0	0	0	0	0	0	0
Hardwood	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
Composite panel										
Softwood	0	0	0	0	0	0	0	0	0	0
Hardwood	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
Bioenergy/fuelwood										
Softwood	0	0	0	0	0	0	0	0	0	0
Hardwood	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
Miscellaneous ¹										
Softwood	751	623	686	510	503	0	0	0	0	0
Hardwood		0	0	0	0	0	0	0	0	0
Total	751	623	686	510	503	0	0	0	0	0
Total										
Softwood	95,955	95,381	83,688	91,494	148,838	43,579	36,572	33,212	34,092	64,470
Hardwood	19,428	13,411	19,581	10,548	14,432	12,647	8,109	12,831	8,040	10,271
Total	115,383	108,792	103,269	102,042	163,270	56,226	44,681	46,043	42,132	74,741

Numbers in rows and columns may not add to totals due to rounding.

¹Includes poles, pilings, posts, and other industrial products.

(continued)

this total increased 29 percent to 186.6 million cubic feet. Bark and fine residues at 91.7 and 80.2 million cubic feet, respectively, accounted for 92 percent of mill residue utilized for industrial fuel in 2020 which was an increase from 89 percent in 2019 and matched the average for the 2015–2020 report period. In 2020, 82 percent of bark residue produced was utilized for fuel, with the remainder of the utilized bark used for miscellaneous and fiber products. Mill residue produced in Alabama

from 2015 to 2020 was used predominately for industrial fuel. During 2015, 2017, and 2018; 86, 91, and 90 percent of the coarse residue produced was utilized for fiber products, respectively. In 2019 and 2020, there was a decrease to 79 and 80 percent (80.9 and 130.5 million cubic feet), respectively. Bark and wood residues not utilized accounted for <1 percent of all residues produced in 2015, 2017, and 2018, while all bark residues were reported as utilized for a product in 2019 and 2020.



Table 9 (continued)—Primary mill residue volume by roundwood type, species group, and residue type, Alabama

Roundwood type and species group	Residue type				
	Shavings				
	2015	2017	2018	2019	2020
	<i>thousand cubic feet</i>				
Saw logs					
Softwood	15,912	16,354	15,110	14,688	29,533
Hardwood	41	406	672	662	825
Total	15,953	16,760	15,782	15,350	30,358
Veneer logs					
Softwood	0	0	0	0	0
Hardwood	0	0	0	0	0
Total	0	0	0	0	0
Pulpwood					
Softwood	0	0	0	0	0
Hardwood	0	0	0	0	0
Total	0	0	0	0	0
Composite panel					
Softwood	0	0	0	0	0
Hardwood	0	0	0	0	0
Total	0	0	0	0	0
Bioenergy/fuelwood					
Softwood	0	0	0	0	0
Hardwood	0	0	0	0	0
Total	0	0	0	0	0
Miscellaneous¹					
Softwood	0	0	0	0	0
Hardwood	0	0	0	0	0
Total	0	0	0	0	0
Total					
Softwood	15,912	16,354	15,110	14,688	29,533
Hardwood	41	406	672	662	825
Total	15,953	16,760	15,782	15,350	30,358

Numbers in rows and columns may not add to totals due to rounding.

¹Includes poles, pilings, posts, and other industrial products.

Land Use Removals

Land use removals (land clearing or set aside forest land), or removal volume attributed to land-use change accounted for <1 percent of total removals for each year surveyed through the 2015–2020 report period (table 11). The volume of land use removals was relatively stable during the report period, ranging from 14.1 million cubic feet in 2015 to 18.8 million cubic feet in 2019. In 2020, land use removals declined to 17.0 million cubic feet. The



Forested hills and agricultural valleys are a common sight throughout the Southeastern United States.

nonmerchantable (nongrowing stock) portion of live trees accounted for 67 to 68 percent of land-use change removals for the entire 2015–2020 reporting period. From 2015 to 2020, the hardwood species group accounted for 71 to 77 percent of the land-use change removals.

Logging Residue

The merchantable (growing stock) portions of trees cut and left onsite are under-utilized removals by FIA merchantability standards, while the nonmerchantable (nongrowing stock) portions of trees (part of the 1-foot stump or volume in tops <4 inches in diameter) used for products are considered overutilized removals. Under- and over-utilization factors used to determine average annual logging residue estimates used in this section were derived from estimates in the Alabama harvest and utilization studies conducted from 2015 through 2020. During recent years, logging residue has been considered a possible source for bioenergy and other timber products. It is important to keep in mind that logging residue, traditionally, has not had a marketable value. Retrieval of logging residue is a matter of economics and markets. If markets are available and a willingness to pay a reasonable price exists, then more total tree volume (including



Table 10—Disposal of residue at primary wood-using plants by product, species group, and type of residue, Alabama, 2015 to 2020

Product and species group	Residue type									
	All types					Bark				
	2015	2017	2018	2019	2020	2015	2017	2018	2019	2020
<i>thousand cubic feet</i>										
Fiber products										
Softwood	101,052	96,684	86,175	82,140	135,009	1,849	121	20	1,583	3,271
Hardwood	16,817	11,945	18,050	11,014	15,071	587	235	1,351	466	638
Total	117,869	108,629	104,225	93,154	150,080	2,436	356	1,371	2,049	3,909
Industrial fuel										
Softwood	116,015	110,083	103,605	116,338	150,900	68,902	64,209	64,226	65,173	67,076
Hardwood	43,667	35,013	44,184	35,503	35,731	32,799	26,550	28,697	26,802	24,635
Total	159,682	145,096	147,789	151,841	186,631	101,701	90,759	92,923	91,975	91,711
Miscellaneous										
Softwood	13,225	11,707	9,908	10,648	42,660	4,146	5,987	3,471	2,132	15,380
Hardwood	5,489	1,547	1,254	0	1,214	1,125	346	383	0	1,214
Total	18,714	13,254	11,162	10,648	43,874	5,271	6,333	3,854	2,132	16,594
Not used										
Softwood	641	784	543	36	0	590	633	505	0	0
Hardwood	669	720	27	0	0	16	169	0	0	0
Total	1,310	1,504	570	36	0	606	802	505	0	0
All products										
Softwood	230,933	219,258	200,231	209,162	328,569	75,487	70,950	68,222	68,888	85,727
Hardwood	66,642	49,225	63,515	46,517	52,016	34,527	27,300	30,431	27,268	26,487
Total	297,575	268,483	263,746	255,679	380,585	110,014	98,250	98,653	96,156	112,214

Numbers in rows and columns may not add to totals due to rounding.

(continued)

what has been left as logging residues) is utilized for products.

Woody material typically left on a logging site includes:

1. Whole trees ≥ 5 inches diameter at breast height (d.b.h.), or portions of the merchantable boles of severed trees broken and left during the felling operation (merchantable)
2. Small trees < 5 inches d.b.h., damaged, or killed during harvesting operations (nonmerchantable)
3. Residual stump portions, tops, and limbs or forks not utilized because of insufficient size or quality to fit on the trailers (nonmerchantable)

This wood material left on the site is known as merchantable and nonmerchantable logging residues.

FIA calculates the merchantable portion of logging residue in a two-stage process. First, for those plots that were classified as timberland during the previous inventory and remained in timberland for the current inventory cycle, the volume of whole trees cut and not utilized are identified by FIA field crews during the remeasurement phase of the inventory. A removal volume is derived for trees that are classified in this category. Second, under-utilization factors derived from felled-tree utilization studies are applied to the volume classified as utilized by field crews for the remainder of the merchantable portion of logging residue.



Timber Product Output and Utilization

Table 10 (continued)—Disposal of residue at primary wood-using plants by product, species group, and type of residue, Alabama, 2015 to 2020

Product and species group	Residue type									
	Coarse					Fines (sawdust & shavings)				
	2015	2017	2018	2019	2020	2015	2017	2018	2019	2020
	<i>thousand cubic feet</i>									
Fiber products										
Softwood	86,888	87,264	76,470	70,303	116,081	12,315	9,299	9,685	10,254	15,657
Hardwood	12,244	11,264	16,699	10,548	14,433	3,986	446	0	0	0
Total	99,132	98,528	93,169	80,851	130,514	16,301	9,745	9,685	10,254	15,657
Industrial fuel										
Softwood	6,618	7,956	7,183	16,759	14,737	40,495	37,918	32,196	34,406	69,087
Hardwood	4,738	1,703	2,882	0	0	6,130	6,760	12,605	8,701	11,096
Total	11,356	9,659	10,065	16,759	14,737	46,625	44,678	44,801	43,107	80,183
Miscellaneous										
Softwood	2,431	121	0	4,399	18,020	6,648	5,599	6,437	4,117	9,260
Hardwood	2,405	0	0	0	0	1,959	1,201	871	0	0
Total	4,836	121	0	4,399	18,020	8,607	6,800	7,308	4,117	9,260
Not used										
Softwood	18	41	35	33	0	33	110	3	3	0
Hardwood	41	444	0	0	0	612	107	27	0	0
Total	59	485	35	33	0	645	217	30	3	0
All products										
Softwood	95,955	95,382	83,688	91,494	148,838	59,491	52,926	48,321	48,780	94,004
Hardwood	19,428	13,411	19,581	10,548	14,433	12,687	8,514	13,503	8,701	11,096
Total	115,383	108,793	103,269	102,042	163,271	72,178	61,440	61,824	57,481	105,100

Numbers in rows and columns may not add to totals due to rounding.

The total removal volume was made up of volume from the merchantable and nonmerchantable portions of removal trees. Over-utilization factors from the utilization studies were used to determine how much of the nonmerchantable portion of removals was used for timber products. The nonmerchantable volume was calculated for the land-use change removal estimate and added to the merchantable volume for a total land-use change removal volume. With the nonmerchantable portion of timber products and land-use change values calculated and subtracted from total nonmerchantable removals volume, the remainder was the volume of nonmerchantable logging residues.

The logging residue volume in Alabama for 2015 totaled 246.4 million cubic feet, decreased

to 225.9 million cubic feet in 2017, increased to 229.2 million cubic feet in 2018, and remained stable for 2019 and 2020 at 228.1 and 229.0 million cubic feet, respectively (table 11). This volume accounted for <20 percent of total timber removals for the previously stated survey years. During 2015, logging residue from the merchantable portion of all-live removals totaled 73.6 million cubic feet, or 30 percent of total logging residue, declining to 67.1 million cubic feet (30 percent of total logging residue) in 2017. The merchantable portion of logging residues remained stable from 2018 through 2020 at 68.3, 67.9, and 68.3 million cubic feet, respectively (30 percent of total logging residue each year). Total logging residue accounted for about 16 to 19 percent of total removals during the 2015–2020 period. The merchantable portion of logging residue for both softwood



Table 11—Volume of timber removals by year, species group, removals class, and source

Year and species group	Roundwood products			Logging residues			Other removals			All removals		
	Growing stock	Non-growing stock	All sources	Growing stock	Non-growing stock	All sources	Growing stock	Non-growing stock	All sources	Growing stock	Non-growing stock	All sources
<i>thousand cubic feet</i>												
2015												
Softwood	752,964	90,446	843,410	34,086	98,957	133,043	1,028	2,983	4,011	788,078	192,386	980,464
Hardwood	217,611	9,874	227,485	39,491	73,900	113,391	3,508	6,565	10,073	260,610	90,339	350,949
Total	970,575	100,320	1,070,895	73,577	172,857	246,434	4,536	9,548	14,084	1,048,688	282,725	1,331,413
2017												
Softwood	808,609	99,309	907,918	32,181	93,427	125,608	976	2,834	3,810	841,766	195,570	1,037,336
Hardwood	216,315	10,848	227,163	34,919	65,346	100,265	4,268	7,986	12,254	255,502	84,180	339,682
Total	1,024,924	110,157	1,135,081	67,100	158,773	225,873	5,244	10,820	16,064	1,097,268	279,750	1,377,018
2018												
Softwood	788,857	91,542	880,399	32,036	93,004	125,040	1,104	3,204	4,308	821,997	187,750	1,009,747
Hardwood	200,313	9,796	210,109	36,280	67,892	104,172	4,915	9,198	14,113	241,508	86,886	328,394
Total	989,170	101,338	1,090,508	68,316	160,896	229,212	6,019	12,402	18,421	1,063,505	274,636	1,338,141
2019												
Softwood	820,719	92,588	913,307	32,152	93,340	125,492	1,367	3,968	5,335	854,238	189,896	1,044,134
Hardwood	199,362	10,047	209,409	35,726	66,855	102,581	4,682	8,762	13,444	239,770	85,664	325,434
Total	1,020,081	102,635	1,122,716	67,878	160,195	228,073	6,049	12,730	18,779	1,094,008	275,560	1,369,568
2020												
Softwood	863,932	83,747	947,679	31,818	92,371	124,189	1,244	3,613	4,857	896,994	179,731	1,076,725
Hardwood	175,212	8,153	183,365	36,499	68,302	104,801	4,229	7,913	12,142	215,940	84,368	300,308
Total	1,039,144	91,900	1,131,044	68,317	160,673	228,990	5,473	11,526	16,999	1,112,934	264,099	1,377,033

Numbers in rows and columns may not add to totals due to rounding.

and hardwood combined accounted for about 5 to 6 percent of total live removals for those survey periods. For softwoods, the merchantable portion of logging residue accounted for 3 percent of the total softwood all-live tree removals for the 2015–2020 surveys. The merchantable portion of hardwood logging residue accounted for 11 percent (39.5 million cubic feet) of all-live hardwood removals which amounted to 350.9 million cubic feet in 2015. The merchantable portion of hardwood logging residue proportion remained stable at 10 to 12 percent for 2017, 2018, 2019, and 2020 (34.9, 36.3, 35.7 and 36.5 million cubic feet, respectively). Nonmerchantable sources (such as the residual stump, forks, tops, and limbs) accounted for 172.9 million cubic feet, or 70 percent of total logging residue in 2015. This percentage was constant from

2015 through 2020 and the amount produced was steady at 158.8 million cubic feet in 2017, 160.9 million cubic feet in 2018, 160.2 million cubic feet in 2019, and 160.7 million cubic feet in 2020.

TPO Toolkit-TPO Interactive Reporting Tool is available at <https://public.tableau.com/views/TPOREPORTINGTOOL/MakeSelection?:showVizHome=no> (U.S. Department of Agriculture Forest Service 2021a).

TPO Toolkit-TPO Data Download is available at <https://usfs-public.app.box.com/s/y4ziirdb9v7zardus0cuajh7ziy9b2id> (U.S. Department of Agriculture Forest Service 2021b).



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A mountain top vista from Cheaha State Park located on the southernmost tip of the Appalachian mountain chain.

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GLOSSARY

All-live trees—All living trees. All size classes, all tree classes, and both saw-log and nonsaw-log species are included. See: FIA tree species list in the field manual.

Average annual mortality—Average annual volume of trees ≥ 5.0 inches d.b.h. that died from human and natural causes during the intersurvey period, excluding those removed by harvesting, cultural operations, land clearing or changes in land use.

Average annual removals—Average annual volume of trees ≥ 5.0 inches d.b.h. removed from the inventory by harvesting, cultural operations (such as timber-stand improvement), land clearing, or changes in land use during the intersurvey period.

Average net annual growth—Average annual net change in volume of trees ≥ 5.0 inches d.b.h./d.r.c. without taking into account losses from cutting (gross growth minus mortality) during the intersurvey period.

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

Bioindicator species—A tree, woody shrub, or nonwoody herbaceous species that responds to ambient levels of ozone pollution with distinct visible foliar symptoms that are easy to diagnose.

Biomass—For the Southern Region, total aboveground biomass is estimated using allometric equations and is defined as the aboveground weight of wood and bark in live trees ≥ 1.0 inch d.b.h./d.r.c. from the ground to the tip of the tree, excluding all foliage (leaves, needles, buds, fruit, and limbs < 0.5 inch in diameter). Biomass is expressed as oven-dry weight and the units are tons.

Note: the weight of wood and bark in limbs < 0.5 inch in diameter is included in the biomass of small-diameter trees.

Additionally, biomass in the merchantable stem is estimated regionally, where the main and merchantable stems are defined as follows.

Main stem—The central portion of the tree extending from the ground level to the tip for timber species. Woodland species includes from ground level to the tips of all branches of qualifying stems. For timber species trees that fork, the main stem refers to the fork that would yield the most merchantable volume.

Merchantable stem—That portion of the main stem of a timber species tree from a 1-foot stump to a minimum 4-inch top diameter inside or outside bark depending on species. That portion of a woodland species tree from the d.r.c. measurements to the 1.5-inch diameters of all the qualifying stems.

Nationally, aboveground and belowground biomasses are estimated from each tree's sound volume using a Component Ratio Method that is consistently applied in all FIA regions.

Gross aboveground biomass—Total tree biomass excluding foliage and roots with no deductions made for rotten, missing, or broken-top cubic-foot cull.

Net aboveground biomass—Gross aboveground biomass minus deductions for missing cull, broken-top, and a reduction for a proportion of rotten cull for live or standing dead trees ≥ 5.0 inches d.b.h. (rotten cull will have a factor to reduce specific gravity separately from sound wood). Live and standing dead trees 1.0 to 4.9 inches only have deductions for broken-top cull. Additional deductions are made for dead trees ≥ 1.0 inch using decay class.

Belowground biomass—Coarse roots only.

Further, the total net aboveground biomass estimated using the Component Ratio Method is divided into the following components:

Top—That portion of the main stem of a timber species tree above the 4-inch top diameter. For woodland species, this component of the biomass is included with branches.



Branches—All the branches of a timber species tree excluding the main stem. That portion of all the branches of qualifying stems of woodland species above the 1.5-inch diameter ends.

Bole—See: Merchantable stem.

Stump—That portion of timber species below 1-foot to ground level. That portion of woodland species from all the d.r.c. measurements to ground level.

Blind check—A reinstallation done by a qualified inspection crew without production crew data on hand; at least two full subplots are completely remeasured along with all the plot level information. The two datasets are maintained separately. Discrepancies between the two sets of data are not reconciled. See: Quality assurance and quality control.

Bole—Trunk or main stem of a tree. See: Main stem.

Census water—See: Land use.

Coarse woody debris (CWD)—Downed, dead tree and shrub boles, large limbs, and other woody pieces with a minimum small-end diameter of ≥ 3 inches and a length of ≥ 3 feet not attached to a living or standing dead source.

Cold check—An inspection done either as part of the training process, or as part of the ongoing quality control program. Normally the installation crew is not present at the time of inspection. The inspector has the completed data in-hand at the time of inspection. The inspection can include the whole plot or a subset of the plot. Data errors are corrected. See: Quality assurance and quality control.

Components of change—Volume increment and decrement values that explain the change in inventory between two points in time. Components of change are usually expressed in terms of growing-stock or all-live merchantable volume. These components can be expressed as average annual values by dividing the component by the number of years in the measurement cycle. FIA inventories

are designed to measure net change over time, as well as the individual components of change that constitute net change (e.g., growth, removals, mortality). Change estimates are computed for two sequential measurements of each inventory panel. Upon remeasurement, a new initial inventory is established for remeasurement at the next scheduled inventory. As such, computation of change components is not intended to span more than one inventory cycle. Rather, the change estimation process is repeated cycle by cycle. This simplifies field protocols and ensures that change estimation is based on short and relatively constant time intervals (e.g., 5 years). Change estimates for individual panels are combined across multiple panels in the same manner as panels are combined to obtain current inventory parameters such as total standing volume. FIA recognizes the following components of change as prescribed core variables; they usually are expressed in terms of growing-stock or all-live volume, where t is the initial inventory of a measurement cycle, and $t + 1$ is the terminal inventory:

Cut—The volume of trees cut between time t and time $t + 1$. The estimate is based on tree size at the midpoint of the measurement interval (includes cut growth). Tree size at the midpoint is modeled from tree size at time t . Trees felled or killed in conjunction with a harvest or silvicultural operation (whether they are utilized or not) are included, but trees on land diverted from forest to nonforest (diversions) are excluded.

Cut growth—The growth of cut trees between time t and the midpoint of the measurement interval. Tree size at the midpoint is modeled from tree size at time t . This term also includes the subsequent growth on ingrowth trees that achieve the minimum diameter threshold prior to being cut.

Diversion—The volume of trees on land diverted from forest to nonforest (or, for some analyses, this may also include land diverted to reserved forest land and other forest land), whether utilized or not, between time t and time $t + 1$. The estimate is based on tree size at the midpoint of the measurement interval



(includes diversion growth). Tree size at the midpoint is modeled from tree size at time t .

Diversion growth—The growth of diversion trees from time t to the midpoint of the measurement interval. Tree size at the midpoint is modeled from tree size at time t . This term also includes the subsequent growth on ingrowth trees that achieve the minimum diameter threshold prior to diversion.

Growth on ingrowth—The growth on trees between the time they grow across the minimum d.b.h./d.r.c. threshold and time $t + 1$.

Ingrowth—The volume of trees at the time that they grow across the minimum d.b.h./d.r.c. threshold between time t and time $t + 1$. The estimate is based on the size of trees at the d.b.h./d.r.c. threshold which is 1.0 inch for all-live trees and 5.0 inches for growing-stock trees. This term also includes trees that subsequently die (i.e., ingrowth mortality), are cut (i.e., ingrowth, cut), or diverted to nonforest (i.e., ingrowth diversion); as well as trees that achieve the minimum threshold after an area reverts to a forest land use (i.e., reversion ingrowth).

Mortality—The volume of trees that die from human or natural causes between time t and time $t + 1$. The estimate is based on tree size at the midpoint of the measurement interval (includes mortality growth). Tree size at the midpoint is modeled from tree size at time t .

Mortality growth—The growth of trees that died from human or natural causes between time t and the midpoint of the measurement interval. Tree size at the midpoint is modeled from tree size at time t . This term also includes the subsequent growth on ingrowth trees that achieve the minimum diameter threshold prior to mortality.

Reversion—The volume of trees on land that reverts from a nonforest land use to a forest land use (or, for some analyses, land that reverts from any source to timberland) between time t and time $t + 1$. The estimate is based on tree size at the midpoint of

the measurement interval. Tree size at the midpoint is modeled from tree size at time $t + 1$.

Reversion growth—The growth of reversion trees from the midpoint of the measurement interval to time $t + 1$. Tree size at the midpoint is modeled from tree size at time $t + 1$. This term also includes the subsequent growth on ingrowth trees that achieve the minimum diameter threshold after reversion.

Survivor growth—The growth on trees tallied at time t that survive until time $t + 1$.

The following components of change may be used to further quantify changes in growing-stock (but not all-live) volume:

Cull decrement—The net gain in growing-stock volume due to reclassification of cull trees to growing-stock trees between two surveys. Cull decrement is the volume of trees that were cull at time t , but growing stock at time $t + 1$. The estimate is based on tree size at the midpoint of the measurement interval. Tree size at the midpoint can be modeled from tree size at time t , time $t + 1$, or both.

Cull decrement growth—The growth from the midpoint of the measurement interval to time $t + 1$ on trees that were cull at time t , but growing stock at time $t + 1$. Tree size at the midpoint can be modeled from tree size at time t , time $t + 1$, or both.

Cull increment—The net reduction in growing-stock volume due to reclassification of growing stock trees to cull trees between two surveys. Cull increment is the volume of trees that were growing stock at time t , but cull at time $t + 1$. The estimate is based on tree size at the midpoint of the measurement interval (includes cull increment growth). Tree size at the midpoint can be modeled from tree size at time t , time $t + 1$, or both.

Cull increment growth—The growth to the midpoint of the measurement interval between time t and $t + 1$ of trees that were growing stock at time t , but cull trees at time $t + 1$. Tree size at the midpoint can be modeled from tree size at time t , time $t + 1$, or both.



Condition class—The combination of discrete landscape and forest attributes that identify, define, and stratify the area associated with a plot. Examples of such attributes include condition status, forest type, stand origin, stand size, owner group, reserve status and stand density.

Crown—The part of a tree or woody plant bearing live branches or foliage.

Crown vigor class—A visual assessment of the apparent crown vigor of saplings. The purpose is to separate excellent saplings with superior crowns from stressed individuals with poor crowns.

Crown density—The amount of crown stem, branches, twigs, shoots, buds, foliage, and reproductive structures that block light penetration through the projected crown outline. Measured as a percentage.

Crown dieback—Recent mortality of branches with fine twigs, which begins at the terminal portion of a branch and proceeds toward the trunk. Dieback is only considered when it occurs in the upper and outer portions of the tree. Dead branches in the lower live crown are not considered part of crown dieback unless there is continuous dieback from the upper and outer crown down to those branches.

Cull—Portions of a tree that are unusable for industrial wood products because of rot, form, or other defect. Cull is further categorized as the following:

Broken-top cubic-foot cull—The broken-top proportion of a timber species tree's merchantable portion from the break to the actual or projected 4-inch top diameter outside bark, or to where the central stem forks, where all forks are <4.0 inches diameter. For trees 1.0 to 4.9 inches diameter this is the proportion of the main stem missing due to a broken-top.

Form board-foot cull—The part of the tree's saw-log portion that is sound but not usable for sawn wood products due to sweep, crook, forking, or other physical culls.

Missing cubic-foot cull—The proportion of a tree's merchantable portion that is missing or absent. Does not include any cull deductions above actual length for broken-top timber trees. Does include cull deductions above actual length for broken-top woodland species. Trees with d.b.h./d.r.c. <5.0 inches have a null value in this field.

Percent board-foot cull—Percentage of sound and unsound board-foot volume, to the nearest 1 percent.

Rotten cubic-foot cull—The proportion of a tree's merchantable portion that is in a decayed state. Does not include any cull deductions above actual length for broken-top timber trees. Does include cull deductions above actual length for broken-top woodland species. Trees <5.0 inches d.b.h. have a null value in this field.

Rotten/missing cull—The part of the tree's merchantable portion that is decayed and/or absent due to other factors.

Total board-foot cull—The proportion of a timber species tree's saw-log portion that is rotten, missing, or sound but not useable for sawn wood products due to sweep, crook, forking, or other physical defects (form board-foot cull). Nonsaw-log species and softwoods <9.0 inches d.b.h. and hardwoods <11.0 inches d.b.h. have a null value in this field.

Cull tree—Live trees that are unsuitable for the production of some roundwood products, now or prospectively. Cull trees can include those with decay (rotten cull) or poor form, limbiness, or splits (rough cull). Rough cull is suitable for pulpwood and other fiber products.

Cycle—One sequential and complete set of panels.

Diameter at breast height (d.b.h.)—The diameter for tree stem, located at 4.5 feet above the ground (breast height) on the uphill side of a tree. The point of diameter measurement may vary on abnormally formed trees.



Diameter class—A classification of trees based on diameter outside bark, measured at breast height (d.b.h.) above the ground or at root collar (d.r.c.). Note: Diameter classes are commonly in 2-inch increments, beginning with 2 inches. Each class provides a range of values with the class name being the approximate midpoint. For example, the 6-inch class includes trees 5.0–6.9 inches d.b.h.

Disturbance—Natural or human-caused disruption that is ≥ 1.0 acre in size and results in mortality and/or damage to 25 percent of all trees in a stand or 50 percent of an individual species' count or, in the case when the disturbance does not initially affect tree growth or health (e.g., grazing, browsing, flooding, etc.), affects 25 percent of the soil surface or understory vegetation. For initial forest plot establishment the disturbance must be within the last 5 years. For remeasured plots only those disturbances that have occurred since the previous inventory are recognized.

Diversion—See: Components of change.

Down woody material (DWM)—DWM is dead material on the ground in various stages of decay. It includes coarse and fine woody material. Previously named down woody debris (DWD). The depth of duff layer, litter layer, and overall fuelbed; fuel loading on the microplot; and residue piles are also measured as part of the DWM indicator for FIA.

Dry weight—The oven-dry weight of biomass.

Federal land—An ownership class of public lands owned by the U.S. Government. See: Ownership.

Fine woody debris (FWD)—Downed, dead branches, twigs, and small tree or shrub boles < 3 inches in diameter not attached to a living or standing dead source.

Fixed-radius plot—A circular sampled area with a specified radius in which all trees of a given size, shrubs, or other items are tallied.

Foliage transparency—The amount of skylight visible through microholes in the live

portion of the crown, i.e. where you see foliage, normal or damaged, or remnants of its recent presence. Recently defoliated branches are included in foliage transparency measurements. Macroholes are excluded unless they are the result of recent defoliation. Dieback and dead branches are always excluded from the estimate. Foliage transparency is different from crown density because it emphasizes foliage and ignores stems, branches, fruits, and holes in the crown.

Forest floor—The entire thickness of organic material overlying the mineral soil, consisting of the litter and the duff (humus).

Forest industry land—See: Ownership.

Forest land—Land that is at least 10 percent stocked by forest trees of any size, or land formerly having such tree cover, and is not currently developed for a nonforest use. The minimum area for classification as forest land is 1 acre. Roadside, streamside, and shelterbelt strips of timber must be at least 120 feet wide to qualify as forest land. Unimproved roads and trails, streams and other bodies of water, or natural clearings in forested areas shall be classified as forest, if < 120 feet in width or 1.0 acre in size. Forest land is divided into timberland, reserved forest land, and other forest land (such as woodland).

Forest type—A classification of forest land based upon and named for the tree species that forms the plurality of live-tree stocking. A forest-type classification for a field location indicates the predominant live-tree species cover for the field location; hardwoods and softwoods are first grouped to determine predominant group, and forest type is selected from the predominant group.

Forest-type group—A combination of forest types that share closely associated species or site requirements.

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



Loblolly-shortleaf pine—Forests in which loblolly pine, shortleaf pine, or other southern yellow pines, except longleaf or slash pine, singly or in combination, constitute a plurality of the stocking. (Common associates include oak, hickory, and gum.)

Maple-beech-birch—Forests in which maple, beech, or yellow birch, singly or in combination, constitute a plurality of the stocking. (Common associates include hemlock, elm, basswood, and white pine.)

Oak-gum-cypress—Bottomland forests in which tupelo, blackgum, sweetgum, oaks, or southern cypress, singly or in combination, constitute a plurality of the stocking, except where pines account for 25–50 percent of stocking, in which case the stand is classified as oak-pine. (Common associates include cottonwood, willow, ash, elm, hackberry, and maple.)

Oak-hickory—Forests in which upland oaks or hickory, singly or in combination, constitute a plurality of the stocking, except where pines account for 25–50 percent, in which case the stand is classified oak-pine. (Common associates include yellow-poplar, elm, maple, and black walnut.)

Oak-pine—Forests in which hardwoods (usually upland oaks) constitute a plurality of the stocking but in which pines account for 25–50 percent of the stocking. (Common associates include gum, hickory, and yellow-poplar.)

Fuel class—Categories of forest fire fuels defined by the approximate amount of time it takes for moisture conditions to fluctuate. Large coarse woody debris pieces take longer to dry out than smaller fine woody pieces.

1,000-hour fuels—Coarse woody debris with a transect diameter ≥ 3.0 inches in diameter and ≥ 3.0 feet long.

100-hour fuels—Fine woody debris with a transect diameter between 1.0 and 2.9 inches.

10-hour fuels—Fine woody debris with a transect diameter between 0.25 and 0.9 inches.

1-hour fuels—Fine woody debris with a transect diameter ≤ 0.24 inches.

Growing-stock trees—Live large-diameter timber species (excludes nonsaw-log species) trees with one-third or more of the gross board-foot volume in the entire saw-log portion meeting grade, soundness, and size requirements or the potential to do so for medium-diameter and small-diameter trees. A growing-stock tree must have one 12-foot log or two noncontiguous 8-foot merchantable logs, now (large diameter) or prospectively (medium diameter and small diameter), to qualify as growing stock.

Hardwoods—Tree species belonging to the botanical divisions Magnoliophyta, Ginkgophyta, Cycadophyta, or Pteridophyta, usually angiospermic, dicotyledonous, broad-leaved, and deciduous.

Soft hardwoods—Hardwood species with an average specific gravity of ≤ 0.50 , such as gums, yellow-poplar, cottonwoods, red maple, basswoods, and willows.

Hard hardwoods—Hardwood species with an average specific gravity > 0.50 , such as oaks, hard maples, hickories, and beech.

Hot check—An inspection normally done as part of the training process. The inspector is present on the plot with the trainee and provides immediate feedback regarding data quality. Data errors are corrected. Hot checks can be done on training plots or production plots. See: Quality assurance and quality control.

Land—The area of dry land and land temporarily or partly covered by water, such as marshes, swamps, and river flood plains.

Land cover—The dominant vegetation or other kind of material that covers the land surface. A given land cover may have many land uses.



Land use—The purpose of human activity on the land; it is usually, but not always, related to land cover.

Southern regional present land use categories are as follows:

Accessible timberland—Land that is within the population of interest, is accessible, is on a subplot that can be occupied at subplot center, can safely be visited, and meets the criteria for forest land. See: Forest land.

Accessible other forest land—Land that meets the definition of accessible forest land but is incapable of producing 20 cubic feet per acre per year of industrial wood under natural conditions because of adverse site conditions. Adverse conditions include sterile soils, dry climate, poor drainage, high elevation, steepness, and soil rockiness.

Agricultural land—Land managed for crops, pasture, or other agricultural use. The area must be at least 1.0 acre in size and 120 feet wide (with the exception of windbreak/shelterbelt, which has no minimum width). This land use includes cropland, pasture (improved through cultural practices), idle farmland, orchard, Christmas tree plantation, maintained wildlife opening, and windbreak/shelterbelt.

Rangeland—Land primarily composed of grasses, forbs, or shrubs. This includes lands vegetated naturally or artificially to provide a plant cover managed like native vegetation and does not meet the definition of pasture. The area must be ≥ 1.0 acre in size and ≥ 120 feet wide.

Developed—Land used primarily by humans for purposes other than forestry or agriculture. This land use includes cultural (business, industrial/commercial, residential, and other places of intense human activity), rights-of-way (improved roads, railway, power lines, maintained canal), recreation (parks, skiing, golf courses), and mining.

Other—Land parcels ≥ 1.0 acre in size and ≥ 120 feet wide, which do not fall into one of the uses described above. Examples include undeveloped beaches, barren land (rock, sand), marshes, bogs, ice, and snow. This land

use includes nonvegetated, wetland, beach, and nonforest-chaparral.

Census water—Rivers and streams that are >200 feet wide and bodies of water >4.5 acres in size.

Noncensus water—Rivers, streams, and other bodies of water that do not meet the requirements for census water.

Nonsampled—Not sampled due to denied access, hazardous conditions, being outside the United States or other reasons.

Large-diameter trees—Softwoods ≥ 9.0 inches d.b.h. and hardwoods ≥ 11.0 inches d.b.h. These trees were called sawtimber-sized trees in prior surveys. See: Stand-size class.

Litter—Undecomposed or only partially decomposed organic material that can be readily identified (e.g., plant leaves, twigs, etc.).

Main stem—The central portion of the tree extending from the ground level to the tip for timber species. For woodland species the main stem extends from the ground level to the tips of all branches of qualifying stems. For timber species trees that fork, the main stem follows the fork that would yield the most merchantable volume.

Measurement quality objective (MQO)—A data user's estimate of the precision, bias, and completeness of data necessary to satisfy a prescribed application (e.g., Resource Planning Act, assessments by State foresters, forest planning, forest health analyses). Describes the acceptable tolerance for each data element. MQOs consist of two parts: a statement of the tolerance and a percentage of time when the collected data are required to be within tolerance. MQOs can only be assigned where standard methods of sampling or field measurements exist, or where experience has established upper or lower bounds on precision or bias. MQOs can be set for measured data elements, observed data elements, and derived data elements.

Medium-diameter tree—Softwood timber species 5.0 to 8.9 inches d.b.h. and hardwood



timber species 5.0 to 10.9 inches d.b.h. These trees were called poletimber-sized trees in prior surveys. See: Stand-size class.

Microplot—A circular, fixed-radius plot with a radius of 6.8 feet (0.003 acre) that is used to sample trees <5.0 inches d.b.h./d.r.c., as well as other vegetation. Point center is 90 degrees and 12 feet offset from point center of each subplot.

Mortality—See: Components of change.

National forest land—See: Ownership.

Noncensus water—See: Land use.

Nonforest land—Land that does not support or has never supported forests, and lands formerly forested where use for timber management is precluded by development for other uses. Includes areas used for crops, improved pasture, residential areas, city parks, improved roads of any width and adjoining rights-of-way, power line clearings of any width, and noncensus water. If intermingled in forest areas, unimproved roads and nonforest strips must be ≥120 feet wide, and clearings, etc., ≥1.0 acre in size, to qualify as nonforest land.

Nonindustrial private forest land—See: Ownership.

Operability—The viability of operating logging equipment in the vicinity of the condition. Operability classes are as follows:

No problems.

Seasonal access due to water conditions in wet weather.

Mixed wet and dry areas typical of multichanneled streams punctuated with dry islands.

Broken terrain, cliffs, gullies, outcroppings, etc., which would severely limit equipment, access, or use.

Year-round water problems (includes islands).

Slopes 20–40 percent.

Slopes >40 percent.

Other forest land—Forest land other than timberland and reserved forest land. It includes available and reserved forest land that is incapable of producing 20 cubic feet per acre per year of wood under natural conditions because of adverse site conditions such as sterile soils, dry climate, poor drainage, high elevation, steepness, or rockiness.

Other public land—See: Ownership.

Other removals—The volume of trees removed from the inventory by cultural operations such as timber stand improvement, land clearing, and other changes in land use, resulting in the removal of the trees from timberland.

Ownership—A legal entity having control of a parcel or group of parcels of land. An ownership may be an individual; a combination of persons; a legal entity such as corporation, partnership, club, or trust; or a public agency.

National forest land—Federal land that has been legally designated as national forests or purchase units, and other land under the administration of the U.S. Forest Service, including experimental areas and Bankhead-Jones Title III land.

Forest industry land—An ownership class of private lands owned by a company or an individual(s) operating a primary wood-processing plant.

Nonindustrial private forest (NIPF) land—Privately owned land excluding forest industry land.

Corporate—Owned by corporations, including incorporated farm ownerships.

Individual—All lands owned by individuals, including farm operators.

Other public—An ownership class that includes all public lands except national forests.

Miscellaneous Federal land—Federal land other than national forests.

State, county, and municipal land—Land owned by States, counties, and local public agencies



or municipalities, or land leased to these governmental units for 50 years or more.

Ozone (O₃)—A gaseous air pollutant produced primarily through sunlight-driven chemical reactions of NO₂ and hydrocarbons in the atmosphere and causing foliar injury to deciduous trees, conifers, shrubs, and herbaceous species.

Ozone bioindicator site—An open area used for ozone injury evaluations on ozone-sensitive species. The area must meet certain site selection guidelines regarding size, condition, and plant counts to be used for ozone injury evaluations in FIA.

Phase 1 (P1)—FIA activities related to remote sensing, the primary purpose of which is to label plots and obtain stratum weights for population estimates.

Phase 2 (P2)—FIA activities conducted on the network of ground plots. The primary purpose is to obtain field data that enable classification and summarization of area, tree, and other attributes associated with forest land uses.

Plantation—Stands that currently show evidence of being planted or artificially seeded.

Poletimber-sized tree—Softwood timber species 5.0 to 8.9 inches d.b.h. and hardwood timber species 5.0 to 10.9 inches d.b.h. Now referred to as medium-diameter trees.

Private land—See: Ownership.

Productivity class—A classification of forest land in terms of potential annual cubic-foot volume growth per acre at culmination of mean annual increment (MAI) in fully stocked natural stands.

Quality assurance (QA)—The total integrated program for ensuring that the uncertainties inherent in FIA data are known and do not exceed acceptable magnitudes within a stated level of confidence. Quality assurance encompasses the plans,

specifications, and policies affecting the collection, processing, and reporting of data. It is the system of activities designed to provide program managers and project leaders with independent assurance that total system quality control is being effectively implemented.

Quality control (QC)—The routine application of prescribed field and laboratory procedures (e.g., random check cruising, periodic calibration, instrument maintenance, use of certified standards, etc.) in order to reduce random and systematic errors and ensure that data are generated within known and acceptable performance limits. Quality control also ensures the use of qualified personnel; reliable equipment and supplies; training of personnel; good field and laboratory practices; and strict adherence to standard operating procedures.

Reserved forest land—Forest land where management for the production of wood products is prohibited through statute or administrative designation. Examples include national forest wilderness areas and national parks and monuments.

Reversion—Land that reverts from a nonforest land use to a forest land use. See: Components of change.

Sapling—Live trees 1.0 to 4.9 inches d.b.h./d.r.c.

Seedling—Live trees <1.0 inch d.b.h./d.r.c. that are ≥6.0 inches in height for softwoods, ≥12.0 inches in height for hardwoods, and >0.5-inch d.b.h./d.r.c. at ground level for longleaf pine.

Site index—The average total height that dominant and codominant trees in fully-stocked, even-aged stands will obtain at key ages (usually 25 or 50 years).

Small-diameter trees—Trees 1.0 to 4.9 inches in d.b.h./d.r.c. These were called sapling-seedling sized trees in prior surveys. See: Stand-size class.



Softwoods—Tree species belonging to the botanical division Coniferophyta, usually evergreen having needles or scale-like leaves.

Species group—A collection of species used for reporting purposes.

Stand—Vegetation or a group of plants occupying a specific area and sufficiently uniform in species composition, age arrangement, structure, and condition as to be distinguished from the vegetation on adjoining areas.

Stand age—A stand descriptor that indicates the average age of the live dominant and codominant trees in the predominant stand-size class of a condition.

Standing dead tree—A dead tree ≥ 5.0 inches d.b.h. that has a bole which has an unbroken actual length of at least 4.5 feet, and lean < 45 degrees from vertical as measured from the base of the tree to 4.5 feet.

Stand origin—A classification of forest stands describing their means of origin.

Planted—Planted or artificially seeded.

Natural—No evidence of artificial regeneration.

Stand-size class—A classification of forest land based on the diameter-class distribution of live trees in the stand. See definitions of large-, medium-, and small-diameter trees.

Large-diameter stands—Stands at least 10 percent stocked with live trees, with one-half or more of total stocking in large- and medium-diameter trees, and with large-diameter tree stocking at least equal to medium-diameter tree stocking.

Medium-diameter stands—Stands at least 10 percent stocked with live trees, with one-half or more of total stocking in medium- and large-diameter trees, and with medium-diameter tree stocking exceeding large-diameter tree stocking.

Small-diameter stands—Stands at least 10 percent stocked with live trees, in which

small-diameter trees account for more than one-half of total stocking.

Nonstocked stands—Stands < 10 percent stocked with live trees.

Stand structure—The predominant canopy structure for the condition, only considering the vertical position of the dominant and codominant trees in the stand and not considering trees that are intermediate or overtopped. As a general rule, a different story should comprise 25 percent of the stand.

Nonstocked—The condition is < 10 percent stocked.

Single-storied—Most of the dominant/codominant tree crowns form a single canopy (i.e., most of the trees are approximately the same height).

Multistoried—Two or more recognizable levels characterize the crown canopy. Dominant/codominant trees of many sizes (diameters and heights) for a multi-level canopy.

State, county, and municipal land—See: Ownership.

Stocking—(1) At the tree level, stocking is the density value assigned to a sampled tree (usually in terms of numbers of trees or basal area per acre), expressed as a percent of the total tree density required to fully utilize the growth potential of the land. (2) At the stand level, stocking refers to the sum of the stocking values of all trees sampled.

Subplot—A circular area with a fixed horizontal radius of 24.0 feet ($1/24$ acre), primarily used to sample trees ≥ 5.0 inches at d.b.h./d.r.c.

Survivor tree—A sample tree alive at both the current and previous inventories.

Timberland—Forest land that is producing or capable of producing 20 cubic feet per acre or more per year of wood at culmination of MAI. Timberland excludes reserved forest lands.

Treatment—Forestry treatments are a form of human disturbance. The term treatment



further implies that a silvicultural application has been prescribed. This does not include occasional stumps of unknown origin or sparse removals for firewood, Christmas trees, or other miscellaneous purposes. The area affected by any treatment must be at least 1.0 acre in size.

None—No observable treatment.

Cutting—The removal of one or more trees from a stand. SRS FIA categories are the following:

Clearcut harvest—The removal of the majority of the merchantable trees in a stand; residual stand stocking is under 50 percent.

Partial harvest—Removal primarily consisting of highest quality trees. Residual consists of lower quality trees because of high grading or selection harvest (e.g., uneven aged, group selection, high grading, species selection).

Seed-tree/shelterwood harvest—Crop trees are harvested leaving seed source trees either in a shelterwood or seed tree. Also includes the final harvest of the seed trees.

Commercial thinning—The removal of trees (usually of medium-diameter) from medium-diameter stands leaving sufficient stocking of growing-stock trees to feature in future stand development. Also included are thinning in large-diameter stands where medium-diameter trees have been removed to improve the quality of those trees featured in a final harvest.

Timber stand improvement (cut trees only)—The cleaning, release, or other stand improvement involving noncommercial cutting applied to an immature stand that leaves sufficient stocking.

Salvage cutting—The harvesting of dead or damaged trees, or of trees in danger of being killed by insects, disease, flooding, or other factors in order to save their economic value.

Site preparation—Clearing, slash burning, chopping, disking, bedding, or other

practices clearly intended to prepare a site for either natural or artificial regeneration.

Artificial regeneration—Following a disturbance or treatment (usually cutting), a new stand where at least 50 percent of the live trees present resulted from planting or direct seeding.

Natural regeneration—Following a disturbance or treatment (usually cutting), a new stand where at least 50 percent of the live trees present (of any size) were established through the growth of existing trees and/or natural seeding or sprouting.

Other silvicultural treatment—The use of fertilizers, herbicides, girdling, pruning, or other activities designed to improve the commercial value of the residual stand, or chaining, which is a practice used on woodlands to encourage wildlife forage.

Tree—A woody perennial plant, typically large, with a single well-defined stem carrying a more or less definite crown; sometimes defined as attaining a minimum diameter of 3 inches and a minimum height of 15 feet at maturity. For FIA, any plant on the tree list in the current field manual is measured as a tree.

Tree class—An assessment of the general quality of a tree.

Cull species—Species measured at d.r.c. and timber species (measured at d.b.h.) that would not produce saw logs. See national list of nonsaw-log species.

Growing stock—Live large-diameter timber species (excludes nonsaw-log species) trees with one-third or more of the gross board-foot volume in the entire saw-log portion meeting grade, soundness, and size requirements or the potential to do so for medium-diameter trees. A growing-stock tree must have one 12-foot log or two noncontiguous 8-foot merchantable logs, now (large-diameter) or prospectively (medium-diameter), to qualify as growing stock.

Rough cull—Trees that do not contain at least one 12-foot saw log or two 8-foot logs now or prospectively, primarily because of roughness



or poor form. Less than $\frac{1}{3}$ of its gross board-foot volume meets size, soundness, and grade requirements and $<\frac{1}{2}$ of the cubic-foot cull is rotten or unsound.

Rotten cull—Trees that do not contain at least one 12-foot saw log or two 8-foot logs now or prospectively and/or do not meet grade specifications for percent sound primarily because of rot. All species not having $\frac{1}{3}$ or more of the gross board-foot volume meeting size, soundness, and grade requirements, and over $\frac{1}{2}$ of the cubic-foot cull is rotten or unsound.

Tree grade—A classification of the saw-log portion of large-diameter trees based on: (1) the grade of the butt log, or (2) the ability to produce at least one 12-foot or two 8-foot logs in the upper section of the saw-log portion. Tree grade is an indicator of quality; grade 1 is the best quality.

Volume—A measure of the solid content of the tree stem used to measure wood quantity.

Gross board-foot volume—Total board-foot volume of wood inside bark without deductions for total board-foot cull.

Gross cubic-foot volume—Total cubic-foot volume of wood inside bark without deductions for rotten, missing, or broken-top cull.

Net board-foot volume—Gross board-foot volume minus deductions for total board-foot cull.

Net cubic-foot volume—Gross cubic-foot volume minus deductions for rotten, missing, and broken-top cull.



APPENDIX A—INVENTORY METHODS

What Is Forest Inventory and Analysis?

The Forest Inventory and Analysis (FIA) program of the U.S. Forest Service was created in 1928 to provide comprehensive information on the Nation's forest resources necessary for economic and forest management planning. Forest inventories were conducted periodically in each State until the Agricultural Research, Extension, and Education Reform Act of 1998 (the Farm Bill) mandated a nationally consistent methodology in which a portion of all plots in each State were measured each year. The States in the Southern Research Station Forest Inventory and Analysis (SRS-FIA) unit are on a 5- to 10-year measurement cycle.

What is a Tree?

A tree is a perennial woody plant with a central stem and a distinct crown. FIA defines a tree as any perennial woody plant species that can attain a height of 15 feet at maturity. A complete list of the tree species measured in Alabama during this inventory is included in appendix table C.24. Throughout this report, the size of a tree is usually expressed as diameter at breast height (d.b.h.) in inches. This is the diameter, outside the bark, at a point 4.5 feet above the ground.

What is a Forest?

FIA collects data only in forested areas; therefore, the definition used for forest land affects the estimates produced in each inventory year. The FIA program defines a forest as currently or formerly (within 30 years) at least 10-percent canopy cover of trees of any size and not currently developed for nonforest use. Forests must be at least 1 acre in size where a minimum width of 120 feet is maintained.

How Do We Estimate a Tree's Volume?

To estimate a live tree's volume, FIA uses volume equations developed for each tree species group found within the Southeastern United States. Individual tree volumes are based on species, diameter, and height. FIA

reports volume in cubic feet and board feet (International ¼-inch rule). Board-foot volume measurements are applicable only for sawtimber-size trees, that is, softwood trees ≥ 9 inches d.b.h. and hardwood trees ≥ 11 inches d.b.h. Some wood products are often measured in cords (a stack of wood 8 feet long by 4 feet wide and 4 feet high). A cord of wood consists of about 79 to 85 cubic feet of solid wood, with the remaining 43 to 49 cubic feet made up of bark and air.

Ground Plots

Bechtold and Patterson (2005) describe ground plots and their use. These plots are clusters of four points arranged so that one point is central and the other three lie 120 feet from it at azimuths of 0, 120, and 240 degrees (fig. A.1). Each point is the center of a circular subplot with a fixed 24-foot radius. Trees ≥ 5.0 inches d.b.h. are measured in these subplots. Each subplot in turn contains a circular microplot with a fixed 6.8-foot radius. Trees 1.0 to 4.9 inches d.b.h. and seedlings (< 1.0 -inch d.b.h.) are measured in these microplots.

Sometimes a plot cluster straddles two or more land use or forest condition classes (Bechtold and Patterson 2005). There are seven condition-class variables that require mapping of a unique condition on a plot: land use, forest type, stand size, ownership, stand density, regeneration status, and reserved status. A new condition is defined and mapped each time one of these variables changes during plot measurement.

Annual Inventory

Data used in this report were collected using an annual inventory method. Alabama's annual inventory began in 2000. Prior to this, all data collection was based on periodic inventories. This information was then compared to older periodic inventories to determine change. For example, average annual change estimates (growth, removals, and mortality) in the 1990 report were derived by comparing tree and plot data obtained from the 1982 periodic inventory to data collected in 1990. The same process was then repeated in 2000, except the 1990 information served as the initial base year and

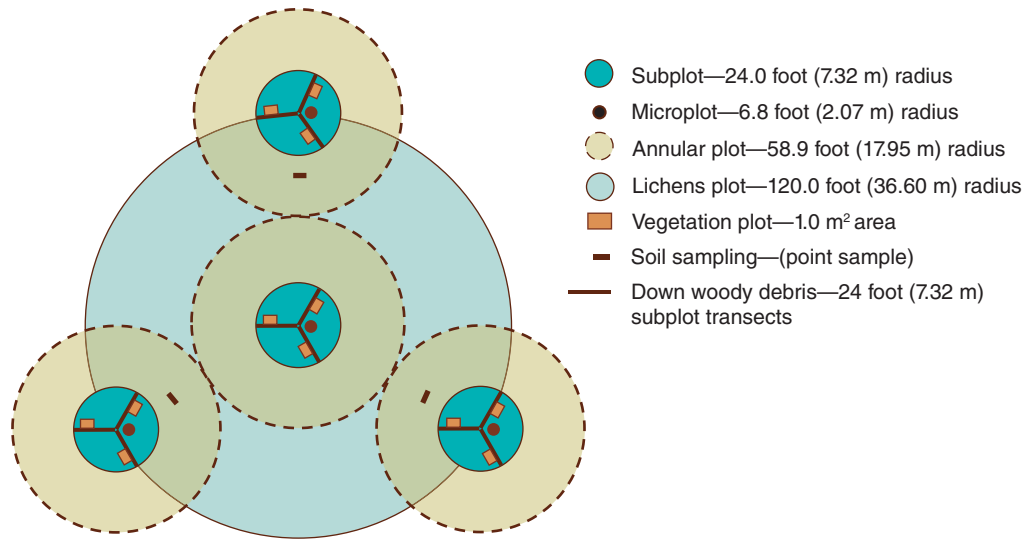


Figure A.1—Annual inventory fixed-plot design (the P2 plot).

the 2000 information as the final estimate. An issue with periodic inventories was that the average time between measurements in the South ranged from 6 to 10 years. The demand for newer data and more frequent updates necessitated the move to an annual inventory design.

Alabama switched to a 5-year annual inventory in 2000. In the 5-year annual inventory, 20 percent of the plots across the State were sampled each year. Each year’s sample was spatially distributed evenly across the State. Thus, after 5 years, a complete set of data called a cycle was obtained. The Alabama 2005 report (Hartsell and Johnson 2009) was based on the 5-year system. Alabama’s 5-year annual inventory scheme changed to a 7-year annual inventory after 2005. Currently, approximately 14 percent of the State’s plots are visited each year under this 7-year cycle. This same 7-year cycle length was used for Alabama's Forests, 2010 (Hartsell and Cooper 2013), Alabama's Forests, 2015 (Hartsell 2018), and the current 2020 report. The annual inventory provides users with up-to-date information, but only from a small portion of the full cycle of data. For example, two sub-cycles were 2 years old or less, but two sub-cycles were 6 or 7 years old.

Table A.1 illustrates how the annual inventory impacts data interpretation. Currently, Alabama’s forests contain 43.6 billion cubic

Table A.1—Volume of all-live species by measurement year on Alabama's forests

Measurement year	All-live volume	
	<i>million cubic feet</i>	<i>percent of total</i>
2013	1,072.2	2.5
2014	5,872.4	13.5
2015	5,930.6	13.6
2016	5,032.9	11.5
2017	6,198.1	14.2
2018	6,464.2	14.8
2019	6,265.0	14.4
2020	6,770.0	15.5
Total	43,605.4	100.0

feet of all-live volume. Table A.1 illustrates the distribution of the expected sampling intensity of around 14 percent, as the actual yearly rates ranged from 11.5 percent to 15.5 percent, with the exception of 2013. A small portion, 2.5 percent, of the 2020 estimate was sampled in 2013. Table A.1 reveals that of the 43.6 billion cubic feet of 2020 all-live volume in Alabama, 5.9 billion was from plots measured in 2014, 5.9 billion from 2015, and so on. It is important for FIA data users to understand that all estimates of current values in this report were derived by summing a series of sequential annual measurements.



The author, Andrew J. Hartsell (in orange hard hat), teaching forestry students about the forest survey.

The annual inventory has an even greater impact on analysis of change estimates such as average annual growth, removals, and mortality. Computation of these require an initial and terminal inventory for each plot. Table A.2 indicates that on average, 1.2 billion cubic feet of all-live volume was removed from Alabama’s forests each year. Rows represent the year that the latest data was collected, or the terminal year. Hence, 170.3 million of the 1.2 billion cubic feet estimate was from plots that were visited in 2020, while 174.8 billion were from plots visited in 2019. Each column is the year that the plots were visited in the

past, or the initial year. This means that of the 170.3 million cubic feet of removals assigned to 2020, 127.2 million were from plots that were initially visited in 2013. It is important for users to understand that most 2020 removal estimates were from plots measured 7 years ago (74 percent) but also from the years 2013 to 2016. This is primarily due to logistical issues during the implementation of the field work.

Table A.3 is based on data found in table A.2, except that the estimates are a percent of total removals for the State. The estimate for terminal year 2020 and initial year 2013 indicates that 10.6 percent of the latest estimate of all-live removals can be attributed to plots measured initially in 2013 and again in 2020. Plots measured in 2009 and remeasured in 2016 accounted for 9.7 percent of the current total removals estimate of 1.2 billion cubic feet. Column totals reveal the removals volume for each initial inventory. Plots initially measured in 2006 account for only 3.5 percent of the current removals estimate. Table A.3 shows that almost 86 percent of the current estimate for all-live removals was based on plots whose initial measurement occurred before 2013. Users need to be aware that the remeasurement period for the 7-year annual inventory was much longer than 7 years.

Definitions, methods, location, ownership, precision, scale, and temporal trends are important factors to consider when analyzing

Table A.2—Average annual removals of all-live species by initial and terminal inventory year, Alabama

Terminal inventory	Total	Initial inventory										
		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
<i>million cubic feet</i>												
2013	29.0	29.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2014	127.7	5.7	119.2	1.3	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2015	193.6	4.2	0.5	182.5	1.3	5.1	0.0	0.0	0.0	0.0	0.0	0.0
2016	130.8	3.5	2.3	0.0	117.1	1.7	6.2	0.0	0.0	0.0	0.0	0.0
2017	172.5	0.0	0.4	1.9	36.3	131.9	0.5	1.5	0.0	0.0	0.0	0.0
2018	202.5	0.0	0.0	0.0	1.5	34.6	165.1	1.3	0.0	0.0	0.0	0.0
2019	174.8	0.0	0.0	0.0	0.0	0.0	36.1	138.7	0.0	0.0	0.0	0.0
2020	170.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	127.2	2.7	4.2	36.1
Total	1,201.2	42.3	122.5	185.7	157.7	173.4	207.8	141.6	127.2	2.7	4.2	36.1

Numbers in rows and columns may not add to totals due to rounding.



Table A.3—Average annual removals of all-live species expressed as a percentage of total removals by initial and terminal inventory year, Alabama

Terminal inventory	Total	Initial inventory										
		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
<i>percent of total removals</i>												
2013	2.42	2.42										
2014	10.63	0.47	9.92	0.10	0.13							
2015	16.11	0.35	0.04	15.20	0.11	0.42						
2016	10.89	0.29	0.19	0.00	9.74	0.14	0.52					
2017	14.36		0.04	0.16	3.02	10.98	0.04	0.12				
2018	16.86				0.12	2.88	13.74	0.11				
2019	14.55						3.00	11.55				
2020	14.17								10.59	0.23	0.35	3.01
Total	100.00	3.52	10.19	15.46	13.13	14.43	17.30	11.78	10.59	0.23	0.35	3.01

Numbers in rows and columns may not add to totals due to rounding.

FIA data. Estimates are derived from sample plots throughout a State. Larger geographic areas will contain more plots and thus produce more reliable estimates. For example, there may not be a sufficient number of plots within a county or single forest type from which to derive reliable estimates. It is also important to consider the degree to which a variable can be measured precisely. For instance, a stand variable, such as age, is not as precise as forest type; and a tree variable, such as crown dieback, is not as precise as diameter. Because forest resources vary by geographic unit and ownership group, location and ownership should also be considered when analyzing the status and trends of forests. In addition, because some definitions and procedures have changed between inventories, some comparisons and estimates should be made with caution.

What Is In This Report?

This report presents a summary of Alabama's forest resources, highlighting key forest characteristics estimated from inventory field plots sampled across the State over the 7-year period from 2013 through 2020. For the 2020 inventory cycle, 5,654 locations in Alabama were selected for measurement. Of these plots, 4,276 contained forest land, 1,330 were nonforest, and 48 were not sampled due to access constraints. All estimates of current forest area, composition, volume, and other

forest statistics are based on the 4,276 sampled plots. To get reliable estimates of change (e.g., forest area change, growth, mortality, and removals), FIA uses only those plots sampled during both the 2020 cycle and the previous cycle. Of the 4,276 measured in the 2020 inventory, 19 plots were not sampled during the previous cycle; therefore estimates of change in the 2020 report were based on 4,257 plots.

Online information pertaining to previous State reports for Alabama, along with additional information and online tools can be found at <https://www.fs.usda.gov/srsfia/states/alabama.shtml>. An extensive set of 70 summary data tables accompanies this report and can be downloaded from the web at https://www.fs.usda.gov/srsfia/states/al/tables/Alabama_2020_20220204.xlsx. These tables provide estimates of forest area, number of trees, volume, biomass, carbon, and forest change for the State.

Where To Find Additional Information?

Hartsell (2009), Hartsell and Johnson (2009), Hartsell and Cooper (2013), and Hartsell (2018) provided detailed information on annual inventory methods and definitions as well as prior periodic inventories implemented in Alabama. The SRS-FIA website (<https://www.fs.usda.gov/srsfia/>) has most of the data used



in this report accessible through the Forest Inventory and Analysis Database (FIADB) application that contains both national core data and regional variables collected only by the SRS-FIA unit. This website has up-to-date reports and statistics for each State in the SRS-FIA unit and field guides that include SRS-FIA regional variables. The main FIA web page (<https://www.fia.fs.usda.gov/>) includes links to resources such as publications or data and tools. EVALIDator and DATIM are the primary estimation tools that allow users to generate custom summaries from the most recent data in FIADB. Definitions of tables and fields are available in the FIADB user manual (O’Connell and others 2017) and core FIA field guides contain details on how each data item was collected. A glossary of FIA terms can be found at <https://www.nrs.fs.usda.gov/fia/data-tools/state-reports/glossary/default.asp>.

Dot Map Methodology

Dot maps are a valuable tool to portray the areal distribution of volumetric data. In forestry, these data may be tree volume, tree

growth, forest area, etc. They are especially useful in displaying relative densities of resource attributes across State regions. There are three factors that affect the usefulness and accuracy of dot maps: (1) the size of the dots, (2) the value assigned to each dot, and (3) the placement of the dots on a map (Robinson and others 1984). The choices of values for factors (1) and (2) are mostly arbitrary but the important function of the maps was to show relative densities of resource attributes across the State of Alabama.

Summary

Users wishing to make rigorous comparisons of data between surveys should be aware of any changes in methodologies between measurements. The most valuable and powerful trend information is obtained when the same plots are revisited from one survey to the next and measured in the same way. Determining the strength of a trend or the level of confidence associated with a trend is difficult or impossible when sampling methods change over time.



APPENDIX B—DATA RELIABILITY

A relative standard of accuracy has been incorporated into the forest survey. This standard satisfies user demands, minimizes human and instrumental sources of error, and keeps costs within prescribed limits. The two primary types of error are measurement error and sampling error.

Measurement Error

There are three elements of measurement error: (1) biased error, caused by instruments not properly calibrated; (2) compensating error, caused by instruments of moderate precision; and (3) accidental error, caused by human error in measuring and compiling. All of these are held to a minimum by the Forest Inventory and Analysis (FIA) quality assurance (QA) program. The goal of the QA program is to provide a framework of quality control procedures to assure the production of complete, accurate, and unbiased forest assessments for given standards. These methods include the use of nationally standardized field manuals, the use of portable data recorders, thorough entry-level training, periodic review training, supervision, use of check plots, editing checks, and an emphasis on careful work. Additionally, data quality is assessed and documented by using performance measurements and post-survey assessments. These assessments are then used to identify areas of the data collection process that need improvement or refinement in order to meet the program's quality objectives.

Each variable collected by FIA is assigned a measurement quality objective (MQO) and a measurement tolerance level. The MQOs are documented in the FIA national field core guide (U.S. Department of Agriculture Forest Service 2007). In some instances the MQOs are a "best guess" of what experienced field crews should be able to achieve consistently. Tolerances are somewhat arbitrary and are based on the crews' ability to make repeatable measurements or observations within the assigned MQO.



The white-tailed deer is one of the State's most abundant wildlife species.

Evaluation of field crew performance is accomplished by calculating the differences between data collected by the field crew and data collected by the QA crew on blind-check plots. The results of these calculations are compared to the established MQOs. In the analysis of blind-check data, an observation is within tolerance when the difference between the field crew observation and the QA crew observation does not exceed the assigned tolerance for that variable. For many categorical variables, the tolerance is "no error" allowed, so only identical observations are within the tolerance level.

Sampling Error

Sampling error is associated with the natural and expected deviation of the sample from the true population mean. This deviation is susceptible to a mathematical evaluation of the probability of error. Sampling errors for State totals are based on one standard deviation. That is, there is a 68.27-percent probability that the confidence interval given for each sample estimate will cover the true population mean (table B.1).

The size of the sampling error generally increases as the size of the area examined



Table B.1—Sampling errors, at one standard error, for estimates of area, volume, average annual growth, average annual removals, and average annual mortality, Alabama, 2020

Item	Sample estimate and 68.27 percent confidence interval	Sampling error percent
Forest land (thousand acres)		
State	23,093.0 ± 113.2	0.49
Southwest-South	2,808.2 ± 48.3	1.72
Southwest-North	3,726.9 ± 33.9	0.91
Southeast	6,431.2 ± 63.7	0.99
West Central	3,521.7 ± 48.6	1.38
North Central	4,379.7 ± 59.1	1.35
North	2,226.1 ± 45.6	2.05
All-live volume on forest land ¹		
Standing inventory		
All species	43,605.4 ± 479.7	1.10
Softwoods	21,654.9 ± 389.8	1.80
Hardwoods	21,950.4 ± 401.7	1.83
Net annual growth		
All species	2,301.4 ± 32.9	1.43
Softwoods	1,605.9 ± 32.3	2.01
Hardwoods	695.4 ± 15.6	2.25
Net annual removals		
All species	1,201.1 ± 45.2	3.76
Softwoods	888.1 ± 37.2	4.19
Hardwoods	313.1 ± 20.5	6.56
Net annual mortality		
All species	390.6 ± 13.0	3.33
Softwoods	176.8 ± 8.7	4.90
Hardwoods	213.8 ± 9.4	4.39

¹ Million cubic feet.

decreases. Also, as area or volume totals are stratified by forest type, species, diameter class, ownership, or other subunits, the sampling error may increase and be greatest for the smallest divisions. However, there may be instances where a smaller component does not have a proportionately larger sampling error. This can happen when the post-defined strata are more homogeneous than the larger strata,

thereby having a smaller variance. For specific post-defined strata, the sampling error can be calculated by using the following formula. Sampling errors obtained by this method are only approximations of reliability because this process assumes constant variance across all subdivisions of totals.

$$SE_s = SE_t \frac{\sqrt{X_t}}{\sqrt{X_s}}$$

where

SE_s = sampling error for subdivision of survey unit or State total

SE_t = sampling error for survey unit or State total

X_s = sum of values for the variable of interest (area or volume) for subdivision of survey unit or State

X_t = total area or volume for survey unit or State

For example, the estimate of the sampling error for softwood live-tree volume on forest industry forest land is computed as:

$$SE_s = 1.10 \left[\frac{\sqrt{21,654.9}}{\sqrt{3,066.6}} \right] = 2.92$$

Thus, the sampling error is 2.92 percent, and the resulting 68.27-percent confidence interval for softwood live-tree volume on forest industry timberland is 3,066.6 ± 89.5 million cubic feet.

Sampling errors obtained by this method are only approximations of reliability because this process assumes constant variance across all subdivisions of totals. The resulting errors derived by this approximation method should be considered very liberal, i.e., it usually produces sampling errors much better than those derived by the actual random sampling formula. Users are free to use more conservative variance estimators based on their specific applications.



Table C.1—Area of forest land by ownership class and land status, Alabama, 2020

Ownership class	All forest land	Unreserved			Reserved		
		Total	Timberland	Unproductive	Total	Productive	Unproductive
<i>thousand acres</i>							
U.S. Forest Service							
National forest	655.4	619.1	619.1	0.0	36.3	36.3	0.0
Total	655.4	619.1	619.1	0.0	36.3	36.3	0.0
Other Federal							
National Park Service	18.2	0.0	0.0	0.0	18.2	18.2	0.0
U.S. Fish and Wildlife Service	31.7	0.0	0.0	0.0	31.7	31.7	0.0
Dept. of Defense/Dept. of Energy	151.2	151.2	151.2	0.0	0.0	0.0	0.0
Other Federal	85.4	79.3	79.3	0.0	6.1	6.1	0.0
Total	286.5	230.5	230.5	0.0	56.0	56.0	0.0
State and local government							
State	453.3	453.3	453.3	0.0	0.0	0.0	0.0
Local	164.9	164.9	164.9	0.0	0.0	0.0	0.0
Other non-Federal public	11.5	11.5	11.5	0.0	0.0	0.0	0.0
Total	629.7	629.7	629.7	0.0	0.0	0.0	0.0
Forest industry							
Corporate	2,079.3	2,079.3	2,079.3	0.0	0.0	0.0	0.0
Unincorporated local partnership/association/club	7.6	7.6	7.6	0.0	0.0	0.0	0.0
Native American	6.1	6.1	6.1	0.0	0.0	0.0	0.0
Individual	553.6	553.6	553.6	0.0	0.0	0.0	0.0
Total	2,646.7	2,646.7	2,646.7	0.0	0.0	0.0	0.0
Nonindustrial private							
Corporate	6,442.5	6,442.5	6,436.7	5.8	0.0	0.0	0.0
Conservation/natural resources organization	12.3	12.3	12.3	0.0	0.0	0.0	0.0
Unincorporated local partnership/association/club	74.8	74.8	74.8	0.0	0.0	0.0	0.0
Individual	12,346.1	12,346.1	12,346.1	0.0	0.0	0.0	0.0
Total	18,875.7	18,875.7	18,869.9	5.8	0.0	0.0	0.0
All classes	23,093.9	23,001.7	22,995.9	5.8	92.2	92.2	0.0

Numbers in rows and columns may not sum to totals due to rounding.
0.0 = no sample for the cell or a value of > 0.0 but < 0.05.



Appendix C—Supplemental Tables

Table C.2—Area of timberland by forest-type group and site productivity class, Alabama, 2020

Forest-type group	All classes	Site productivity class (cubic feet/acre/year)						
		0–19	20–49	50–84	85–119	120–164	165–224	225+
		<i>thousand acres</i>						
Softwood types								
White-red-jack pine	11.6	0.0	6.1	5.6	0.0	0.0	0.0	0.0
Longleaf-slash pine	1,146.5	0.0	186.9	630.3	274.6	54.7	0.0	0.0
Loblolly-shortleaf pine	9,391.3	0.0	250.1	3,816.7	3,250.8	1,666.5	398.2	9.2
Other eastern softwoods	66.9	0.0	29.2	34.7	3.0	0.0	0.0	0.0
Total softwoods	10,616.4	0.0	472.3	4,487.2	3,528.3	1,721.2	398.2	9.2
Hardwood types								
Oak-pine	2,659.8	0.0	239.7	1,252.8	798.8	313.0	55.5	0.0
Oak-hickory	6,772.8	0.0	774.9	3,746.6	1,575.8	539.9	109.9	25.5
Oak-gum-cypress	2,173.3	0.0	180.5	887.2	773.3	236.3	90.0	6.1
Elm-ash-cottonwood	582.1	0.0	21.0	241.8	222.7	83.2	13.4	0.0
Other hardwoods	6.8	0.0	0.0	5.0	0.0	1.8	0.0	0.0
Exotic hardwoods	55.1	0.0	0.0	27.8	21.2	6.1	0.0	0.0
Total hardwoods	12,249.9	0.0	1,216.2	6,161.3	3,391.8	1,180.2	268.8	31.6
Nonstocked	129.7	0.0	1.6	83.0	32.6	8.2	4.4	0.0
All groups	22,995.9	0.0	1,690.0	10,731.5	6,952.7	2,909.6	671.3	40.8

Numbers in rows and columns may not sum to totals due to rounding.
0.0 = no sample for the cell or a value of > 0.0 but < 0.05.



Table C.3—Area of forest land by forest-type group and ownership group, Alabama, 2020

Forest-type group	Ownership group					
	All ownerships	U.S. Forest Service	Other Federal	State and local government	Forest industry	Nonindustrial private
	<i>thousand acres</i>					
Softwood types						
White-red-jack pine	16.6	7.7	0.0	0.0	0.0	9.0
Longleaf-slash pine	1,146.5	135.9	20.2	45.3	163.2	781.9
Loblolly-shortleaf pine	9,422.9	133.5	49.7	182.9	1,547.5	7,509.2
Other eastern softwoods	66.9	0.0	0.0	0.0	0.0	66.9
Total softwoods	10,652.9	277.1	69.9	228.2	1,710.7	8,366.9
Hardwood types						
Oak-pine	2,669.4	145.1	23.3	75.0	247.3	2,178.7
Oak-hickory	6,802.0	208.7	83.7	212.4	452.7	5,844.5
Oak-gum-cypress	2,185.4	24.5	74.1	107.7	188.0	1,791.0
Elm-ash-cottonwood	592.6	0.0	35.4	4.7	12.6	539.8
Other hardwoods	6.8	0.0	0.0	0.0	0.0	6.8
Exotic hardwoods	55.1	0.0	0.0	0.0	9.1	46.0
Total hardwoods	12,311.3	378.3	216.6	399.9	909.6	10,406.9
Nonstocked	129.7	0.0	0.0	1.5	26.3	101.9
All groups	23,093.9	655.4	286.5	629.7	2,646.7	18,875.7

Numbers in rows and columns may not sum to totals due to rounding.

0.0 = no sample for the cell or a value of > 0.0 but < 0.05.



Appendix C—Supplemental Tables

Table C.4—Area of forest land by forest-type group and stand-size class, Alabama, 2020

Forest-type group	Stand-size class				
	All classes	Large diameter	Medium diameter	Small diameter	Nonstocked
	<i>thousand acres</i>				
Softwood types					
White-red-jack pine	16.6	9.1	7.6	0.0	0.0
Longleaf-slash pine	1,146.5	583.5	299.8	263.3	0.0
Loblolly-shortleaf pine	9,422.9	4,762.9	3,083.9	1,576.1	0.0
Other eastern softwoods	66.9	25.4	15.0	26.5	0.0
Total softwoods	10,652.9	5,380.8	3,406.2	1,865.9	0.0
Hardwood types					
Oak-pine	2,669.4	1,376.8	672.5	620.1	0.0
Oak-hickory	6,802.0	3,693.1	1,471.6	1,637.4	0.0
Oak-gum-cypress	2,185.4	1,378.3	498.4	308.7	0.0
Elm-ash-cottonwood	592.6	323.6	125.9	143.0	0.0
Other hardwoods	6.8	0.0	0.0	6.8	0.0
Exotic hardwoods	55.1	3.0	29.5	22.6	0.0
Total hardwoods	12,311.3	6,774.8	2,797.9	2,738.6	0.0
Nonstocked	129.7	0.0	0.0	0.0	129.7
All groups	23,093.9	12,155.6	6,204.1	4,604.5	129.7

Numbers in rows and columns may not sum to totals due to rounding.
0.0 = no sample for the cell or a value of > 0.0 but < 0.05.



Table C.5—Area of forest land by forest-type group and stand-age class, Alabama, 2020

Forest-type group	All classes	Stand-age class (years)										Nonstocked	
		1–20	21–40	41–60	61–80	81–100	101–120	121–140	141–160	161–180	181–200		201+
<i>thousand acres</i>													
Softwood types													
White-red-jack pine	16.6	0.0	6.1	4.2	1.4	0.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0
Longleaf-slash pine	1,146.5	417.6	238.8	224.9	197.8	64.2	3.2	0.0	0.0	0.0	0.0	0.0	0.0
Loblolly-shortleaf pine	9,422.9	4,564.3	3,575.9	806.0	369.7	69.4	4.5	0.0	0.0	0.0	0.0	0.0	32.9
Other eastern softwoods	66.9	8.5	33.1	15.8	1.5	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total softwoods	10,652.9	4,990.5	3,853.8	1,050.9	570.4	141.7	12.8	0.0	0.0	0.0	0.0	0.0	32.9
Hardwood types													
Oak-pine	2,669.4	862.2	674.8	553.4	493.5	59.1	8.3	0.0	0.0	0.0	0.0	0.0	18.1
Oak-hickory	6,802.0	1,639.2	1,290.6	1,438.4	1,640.2	565.3	70.2	5.9	0.0	0.0	0.0	0.0	152.2
Oak-gum-cypress	2,185.4	292.7	428.8	563.9	700.1	127.3	36.7	5.9	0.0	0.0	0.0	0.0	30.1
Elm-ash-cottonwood	592.6	161.2	152.5	146.0	111.6	21.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other hardwoods	6.8	1.6	0.0	1.8	0.0	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Exotic hardwoods	55.1	27.8	12.2	9.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.1
Total hardwoods	12,311.3	2,984.6	2,558.8	2,712.5	2,945.4	776.4	115.1	11.8	0.0	0.0	0.0	0.0	206.6
Nonstocked	129.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	129.7
All groups	23,093.9	7,975.1	6,412.7	3,763.4	3,515.8	918.0	127.9	11.8	0.0	0.0	0.0	0.0	369.2

Numbers in rows and columns may not sum to totals due to rounding.

0.0 = no sample for the cell or a value of > 0.0 but < 0.05.



Appendix C—Supplemental Tables

Table C.6—Area of forest land by forest-type group and stand origin, Alabama, 2020

Forest-type group	Total	Stand origin	
		Natural stands	Artificial regeneration
<i>thousand acres</i>			
Softwood types			
White-red-jack pine	16.6	16.6	0.0
Longleaf-slash pine	1,146.5	657.5	489.0
Loblolly-shortleaf pine	9,422.9	3,276.3	6,146.6
Other eastern softwoods	66.9	60.0	6.9
Total softwoods	10,652.9	4,010.4	6,642.5
Hardwood types			
Oak-pine	2,669.4	2,250.1	419.3
Oak-hickory	6,802.0	6,564.4	237.6
Oak-gum-cypress	2,185.4	2,147.3	38.1
Elm-ash-cottonwood	592.6	557.5	35.1
Other hardwoods	6.8	6.8	0.0
Exotic hardwoods	55.1	47.6	7.5
Total hardwoods	12,311.3	11,573.7	737.6
Nonstocked	129.7	112.6	17.1
All groups	23,093.9	15,696.7	7,397.2

Numbers in rows and columns may not sum to totals due to rounding.
0.0 = no sample for the cell or a value of > 0.0 but < 0.05.



Table C.7—Area of forest land disturbed annually by forest-type group and disturbance class, Alabama, 2020

Forest-type group ²	Disturbance class ¹							
	Insects	Disease	Weather	Fire	Domestic animals	Wild animals	Human	Other natural
	<i>thousand acres</i>							
Softwood types								
White-red-jack pine	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Longleaf-slash pine	0.5	6.1	0.0	81.1	0.0	0.0	1.9	0.2
Loblolly-shortleaf pine	20.4	15.7	10.0	212.9	4.7	0.9	1.6	5.5
Other eastern softwoods	0.0	0.0	0.3	0.6	1.0	0.2	0.0	0.0
Total softwoods	20.9	21.9	10.3	294.6	5.8	1.1	3.5	5.7
Hardwood types								
Oak-pine	3.0	2.9	5.9	53.3	3.8	0.9	0.4	2.0
Oak-hickory	2.7	3.6	18.3	53.7	25.5	1.0	3.1	3.6
Oak-gum-cypress	0.0	0.0	11.1	4.2	1.6	12.7	0.9	0.2
Elm-ash-cottonwood	0.0	0.0	3.2	0.8	5.6	5.1	0.0	0.8
Maple-beech-birch	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other hardwoods	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Exotic hardwoods	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9
Total hardwoods	5.7	6.6	38.5	112.0	36.5	19.6	4.4	7.5
Nonstocked	0.2	0.0	0.0	2.1	0.0	0.4	0.0	1.8
All groups	26.8	28.4	48.8	408.7	42.2	21.2	7.8	15.0

Numbers in rows and columns may not sum to totals due to rounding.

0.0 = no sample for the cell or a value of > 0.0 but < 0.05.

¹Based on current conditions.

²Based on past conditions.



Appendix C—Supplemental Tables

Table C.8—Number of live trees on forest land by species group and diameter class, Alabama, 2020

Species group	All classes	Diameter class (inches)														
		1.0–2.9	3.0–4.9	5.0–6.9	7.0–8.9	9.0–10.9	11.0–12.9	13.0–14.9	15.0–16.9	17.0–18.9	19.0–20.9	21.0–24.9	25.0–28.9	29.0–32.9	33.0–36.9	37.0+
<i>million trees</i>																
Softwood																
Longleaf and slash pines	327.3	96.2	81.9	54.2	38.6	23.2	12.6	9.4	6.3	2.8	1.6	0.6	0.1	0.0	0.0	0.0
Loblolly and shortleaf pines	3,647.3	1,224.0	798.1	610.5	454.9	262.2	145.7	74.6	38.9	20.0	9.9	6.7	1.2	0.6	0.1	0.0
Other yellow pines	275.3	138.2	65.2	35.7	17.4	8.3	4.4	3.0	1.8	0.7	0.4	0.1	0.1	0.0	0.0	0.0
Eastern hemlock	4.5	0.8	1.2	0.8	0.5	0.3	0.4	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cypress	21.6	4.1	2.7	4.1	2.3	2.2	2.0	1.2	0.7	0.8	0.5	0.6	0.4	0.1	0.0	0.0
Other eastern softwoods	224.0	148.5	36.2	17.9	10.5	5.3	2.8	1.6	0.7	0.5	0.1	0.0	0.0	0.0	0.0	0.0
Total softwoods	4,500.0	1,611.8	985.3	723.1	524.2	301.5	167.8	90.0	48.4	24.8	12.5	8.0	1.8	0.7	0.1	0.0
Hardwood																
Select white oaks	375.1	204.1	67.4	34.7	21.3	13.3	10.6	7.9	6.0	4.2	2.4	2.2	0.6	0.3	0.0	0.0
Select red oaks	93.9	53.4	14.5	7.2	4.5	3.3	2.5	2.3	1.9	0.9	1.0	1.1	0.8	0.3	0.0	0.1
Other white oaks	294.5	151.7	52.8	26.5	20.2	12.8	10.2	6.3	5.7	3.1	2.1	1.9	0.8	0.3	0.0	0.0
Other red oaks	2,039.8	1,433.3	296.9	115.7	65.1	43.2	26.4	19.7	14.1	8.7	5.8	6.7	2.8	0.7	0.5	0.2
Hickory	619.7	432.8	75.8	37.4	24.0	17.4	12.5	9.1	5.1	2.9	1.3	1.2	0.1	0.0	0.0	0.0
Hard maple	147.3	104.2	28.6	7.2	3.0	2.0	1.0	0.6	0.4	0.1	0.0	0.1	0.0	0.0	0.0	0.0
Soft maple	1,040.9	822.1	131.4	43.6	21.6	10.8	5.2	2.8	1.3	1.1	0.4	0.4	0.1	0.0	0.0	0.0
Beech	109.8	73.1	18.9	6.7	3.6	2.1	1.3	0.9	1.1	0.5	0.4	0.6	0.4	0.0	0.0	0.0
Sweetgum	2,386.8	1,627.9	448.5	155.3	68.4	36.6	21.4	12.0	7.8	4.2	1.8	2.2	0.5	0.1	0.0	0.0
Tupelo and blackgum	611.3	397.7	93.6	43.7	27.9	18.0	11.6	8.9	4.6	2.6	1.5	0.9	0.1	0.1	0.0	0.0
Ash	244.3	171.1	36.9	14.0	8.0	5.1	3.4	2.8	1.1	0.9	0.5	0.4	0.0	0.0	0.0	0.0
Cottonwood and aspen	5.9	0.4	3.1	1.1	0.2	0.4	0.1	0.2	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Basswood	14.4	5.4	4.0	1.9	0.9	0.8	0.5	0.3	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0
Yellow-poplar	469.5	258.0	84.3	44.0	27.0	18.7	11.8	8.9	6.1	3.9	2.7	2.5	1.1	0.3	0.1	0.0
Black walnut	4.5	0.9	0.9	0.7	0.7	0.5	0.3	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Other eastern soft hardwoods	1,239.9	871.1	215.3	77.1	35.6	17.5	8.9	5.9	3.4	1.7	1.3	1.3	0.3	0.4	0.1	0.0
Other eastern hard hardwoods	786.7	654.0	95.9	24.7	7.7	2.2	1.2	0.5	0.3	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Eastern noncommercial hardwoods	1,577.3	1,155.5	265.0	88.7	35.7	16.7	8.7	3.9	1.4	0.9	0.5	0.1	0.1	0.0	0.0	0.0
Total hardwoods	12,061.6	8,416.7	1,934.1	730.3	375.3	221.4	137.7	93.3	60.8	36.1	22.1	21.9	8.0	2.6	0.8	0.4
All species	16,561.6	10,028.5	2,919.4	1,453.4	899.5	522.9	305.5	183.3	109.2	60.9	34.6	29.9	9.8	3.4	0.9	0.5

Numbers in rows and columns may not sum to totals due to rounding.
0.0 = no sample for the cell or a value of > 0.0 but < 0.05.

Table C.9—Net¹ volume of live trees on forest land by ownership class and land status, Alabama, 2020

Ownership class	All forest land	Unreserved			Reserved		
		Total	Timberland	Unproductive	Total	Pro-ductive	Unpro-ductive
<i>million cubic feet</i>							
U.S. Forest Service							
National forest	1,748.6	1,636.3	1,636.3	0.0	112.3	112.3	0.0
Total	1,748.6	1,636.3	1,636.3	0.0	112.3	112.3	0.0
Other Federal							
National Park Service	65.4	0.0	0.0	0.0	65.4	65.4	0.0
U.S. Fish and Wildlife Service	99.5	0.0	0.0	0.0	99.5	99.5	0.0
Dept. of Defense/Dept. of Energy	353.3	353.3	353.3	0.0	0.0	0.0	0.0
Other Federal	228.0	220.1	220.1	0.0	7.9	7.9	0.0
Total	746.3	573.4	573.4	0.0	172.8	172.8	0.0
State and local government							
State	1,108.0	1,108.0	1,108.0	0.0	0.0	0.0	0.0
Local	366.2	366.2	366.2	0.0	0.0	0.0	0.0
Other non-Federal public	41.4	41.4	41.4	0.0	0.0	0.0	0.0
Total	1,515.6	1,515.6	1,515.6	0.0	0.0	0.0	0.0
Forest industry							
Corporate	3,394.5	3,394.5	3,394.5	0.0	0.0	0.0	0.0
Unincorporated local partnership/association/club	16.1	16.1	16.1	0.0	0.0	0.0	0.0
Native American	19.6	19.6	19.6	0.0	0.0	0.0	0.0
Individual	1,063.1	1,063.1	1,063.1	0.0	0.0	0.0	0.0
Total	4,493.3	4,493.3	4,493.3	0.0	0.0	0.0	0.0
Nonindustrial private							
Corporate	11,654.3	11,654.3	11,652.5	1.8	0.0	0.0	0.0
Conservation/natural resources organization	58.4	58.4	58.4	0.0	0.0	0.0	0.0
Unincorporated local partnership/association/club	123.0	123.0	123.0	0.0	0.0	0.0	0.0
Individual	23,266.0	23,266.0	23,266.0	0.0	0.0	0.0	0.0
Total	35,101.6	35,101.6	35,099.8	1.8	0.0	0.0	0.0
All classes	43,605.4	43,320.2	43,318.4	1.8	285.1	285.1	0.0

Numbers in rows and columns may not sum to totals due to rounding.

0.0 = no sample for the cell or a value of > 0.0 but < 0.05.

¹ Excludes rotten, missing, and form cull defects volume.



Appendix C—Supplemental Tables

Table C.10—Net⁷ volume of live trees on forest land by forest-type group and stand-size class, Alabama, 2020

Forest-type group	All classes	Stand-size class			Nonstocked
		Large diameter	Medium diameter	Small diameter	
<i>million cubic feet</i>					
Softwood types					
White-red-jack pine	55.6	43.2	12.5	0.0	0.0
Longleaf-slash pine	1,928.9	1,481.8	408.3	38.8	0.0
Loblolly-shortleaf pine	18,147.8	13,204.3	4,733.3	210.2	0.0
Other eastern softwoods	48.3	33.3	9.5	5.5	0.0
Total softwoods	20,180.7	14,762.7	5,163.5	254.5	0.0
Hardwood types					
Oak-pine	4,627.4	3,568.4	894.5	164.4	0.0
Oak-hickory	12,152.1	9,781.5	2,020.0	350.6	0.0
Oak-gum-cypress	5,461.4	4,624.1	752.7	84.6	0.0
Elm-ash-cottonwood	1,152.1	970.8	151.9	29.4	0.0
Other hardwoods	1.6	0.0	0.0	1.6	0.0
Exotic hardwoods	23.9	5.2	15.4	3.3	0.0
Total hardwoods	23,418.5	18,950.2	3,834.5	633.8	0.0
Nonstocked	6.2	0.0	0.0	0.0	6.2
All groups	43,605.4	33,712.8	8,998.0	888.3	6.2

Numbers in rows and columns may not sum to totals due to rounding.

0.0 = no sample for the cell or a value of > 0.0 but < 0.05.

⁷ Excludes rotten, missing, and form cull defects volume.



Table C.11—Net¹ volume of live trees on forest land by species group and ownership group, Alabama, 2020

Species group	All ownerships	Ownership group				
		U.S. Forest Service	Other Federal	State and local government	Forest industry	Nonindustrial private
<i>million cubic feet</i>						
Softwood						
Longleaf and slash pines	1,958.7	319.7	10.5	100.1	192.6	1,335.8
Loblolly and shortleaf pines	18,296.1	463.5	196.8	368.8	2,840.3	14,426.7
Other yellow pines	728.6	64.0	9.4	46.5	22.4	586.4
Eastern hemlock	36.8	21.1	0.3	0.0	0.0	15.4
Cypress	364.1	0.0	11.7	76.1	6.1	270.2
Other eastern softwoods	270.7	10.8	7.9	5.6	5.2	241.3
Total softwoods	21,654.9	879.1	236.6	597.1	3,066.6	16,875.6
Hardwood						
Select white oaks	1,861.1	174.2	26.2	83.9	96.2	1,480.6
Select red oaks	738.8	21.1	54.5	12.9	25.8	624.5
Other white oaks	1,482.5	143.3	17.7	103.6	48.3	1,169.6
Other red oaks	4,924.6	132.3	142.2	159.8	311.5	4,178.7
Hickory	1,569.0	64.3	32.7	58.3	67.0	1,346.7
Hard maple	128.1	3.5	2.2	4.8	6.7	110.8
Soft maple	696.0	36.1	10.8	34.6	52.7	561.8
Beech	297.6	7.6	1.9	4.3	24.7	259.1
Sweetgum	3,242.8	84.8	114.8	100.3	262.4	2,680.6
Tupelo and blackgum	1,496.8	35.4	2.7	192.6	109.3	1,156.8
Ash	466.9	4.2	13.8	29.3	19.6	400.0
Cottonwood and aspen	37.1	0.0	0.0	0.6	1.3	35.2
Basswood	82.9	2.4	0.8	7.3	6.3	66.1
Yellow-poplar	2,353.4	92.2	14.4	54.3	195.0	1,997.6
Black walnut	34.9	0.0	0.7	0.7	3.1	30.5
Other eastern soft hardwoods	1,389.9	11.1	53.8	45.8	97.4	1,181.8
Other eastern hard hardwoods	170.7	4.0	8.9	4.9	10.4	142.6
Eastern noncommercial hardwoods	977.3	52.9	11.9	20.5	89.0	803.0
Total hardwoods	21,950.4	869.5	509.7	918.5	1,426.7	18,226.0
All species	43,605.4	1,748.6	746.3	1,515.6	4,493.3	35,101.6

Numbers in rows and columns may not sum to totals due to rounding.

0.0 = no sample for the cell or a value of > 0.0 but < 0.05.

¹Excludes rotten, missing, and form cull defects volume.



Appendix C—Supplemental Tables

Table C.12—Net¹ volume of live trees on forest land by species group and diameter class, Alabama, 2020

Species group	All classes	Diameter class (inches)												
		5.0–6.9	7.0–8.9	9.0–10.9	11.0–12.9	13.0–14.9	15.0–16.9	17.0–18.9	19.0–20.9	21.0–24.9	25.0–28.9	29.0–32.9	33.0–36.9	37.0+
<i>million cubic feet</i>														
Softwood														
Longleaf and slash pines	1,958.7	152.6	280.7	308.9	275.7	302.6	282.8	166.4	123.6	54.4	11.0	0.0	0.0	0.0
Loblolly and shortleaf pines	18,296.1	1,646.5	3,057.0	3,376.3	3,099.8	2,367.6	1,745.6	1,195.7	762.6	720.6	186.3	119.7	18.4	0.0
Other yellow pines	728.6	120.7	126.7	110.0	90.1	95.5	80.3	44.2	30.0	14.7	16.4	0.0	0.0	0.0
Eastern hemlock	36.8	2.0	2.9	3.2	8.3	5.9	4.1	2.0	2.5	0.0	0.0	6.0	0.0	0.0
Cypress	364.1	13.2	16.9	29.3	37.9	35.0	26.1	41.6	35.1	53.7	50.3	14.6	0.0	10.6
Other eastern softwoods	270.7	42.7	56.0	51.1	40.3	34.8	19.6	19.4	3.6	3.1	0.0	0.0	0.0	0.0
Total softwoods	21,654.9	1,977.7	3,540.3	3,878.8	3,552.1	2,841.4	2,158.4	1,469.2	957.3	846.4	263.9	140.4	18.4	10.6
Hardwood														
Select white oaks	1,861.1	101.1	140.7	163.7	214.9	228.3	242.4	233.0	163.1	218.8	84.1	58.0	4.5	8.5
Select red oaks	738.8	24.1	32.0	41.1	52.2	66.0	77.7	49.3	72.2	105.7	111.2	51.0	0.0	56.2
Other white oaks	1,482.5	75.0	129.7	147.5	183.6	167.6	205.8	146.4	128.5	152.7	95.1	41.8	8.8	0.0
Other red oaks	4,924.6	344.1	427.5	515.7	485.4	547.4	537.8	437.7	373.4	572.7	370.4	122.6	118.4	71.6
Hickory	1,569.0	92.9	149.8	205.5	240.3	268.0	212.2	153.0	93.4	121.5	13.6	6.0	7.0	5.8
Hard maple	128.1	20.3	19.3	21.4	17.5	16.2	13.4	6.0	2.6	5.4	0.0	6.1	0.0	0.0
Soft maple	696.0	128.6	130.8	115.5	88.4	68.4	42.8	47.5	23.6	35.4	15.1	0.0	0.0	0.0
Beech	297.6	19.2	21.9	25.8	25.5	25.9	41.4	25.5	25.2	50.5	36.6	0.0	0.0	0.0
Sweetgum	3,242.8	396.8	457.2	471.1	454.9	380.6	354.0	246.0	137.8	236.7	80.1	27.7	0.0	0.0
Tupelo and blackgum	1,496.8	125.0	184.3	220.1	226.3	245.3	169.4	132.9	94.7	73.8	14.6	10.4	0.0	0.0
Ash	466.9	42.1	54.8	60.5	64.9	79.9	41.0	47.4	34.8	37.4	4.0	0.0	0.0	0.0
Cottonwood and aspen	37.1	3.6	1.5	5.4	2.6	7.0	0.0	1.5	2.1	8.1	5.2	0.0	0.0	0.0
Basswood	82.9	6.5	6.3	9.9	10.8	9.0	8.4	12.6	9.8	4.1	5.5	0.0	0.0	0.0
Yellow-poplar	2,353.4	141.5	198.6	252.3	254.8	278.2	271.5	227.3	196.6	263.0	164.4	57.5	35.9	11.8
Black walnut	34.9	2.1	3.6	4.8	4.8	5.2	6.1	3.3	0.0	0.0	5.0	0.0	0.0	0.0
Other eastern soft hardwoods	1,389.9	209.4	216.9	187.1	152.5	148.8	119.7	78.0	74.0	97.5	30.6	61.5	13.9	0.0
Other eastern hard hardwoods	170.7	56.3	41.5	21.8	19.0	14.6	9.1	1.6	5.2	1.5	0.0	0.0	0.0	0.0
Eastern noncommercial hardwoods	977.3	227.0	206.0	171.6	138.5	92.4	46.9	40.8	22.0	11.2	16.3	4.7	0.0	0.0
Total hardwoods	21,950.4	2,015.7	2,422.2	2,640.6	2,636.9	2,648.9	2,399.7	1,889.9	1,459.1	1,996.0	1,051.8	447.3	188.5	153.8
All species	43,605.4	3,993.4	5,962.5	6,519.4	6,189.0	5,490.3	4,558.1	3,359.0	2,416.4	2,842.4	1,315.8	587.6	206.9	164.4

Numbers in rows and columns may not sum to totals due to rounding.

0.0 = no sample for the cell or a value of > 0.0 but < 0.05.

¹Excludes rotten, missing, and form cull defects volume.



Table C.13—Net¹ volume of live trees on timberland by forest-type group and stand origin, Alabama, 2020

Forest-type group	Total	Stand origin	
		Natural stands	Planted stands
<i>million cubic feet</i>			
Softwood types			
White-red-jack pine	32.2	32.2	0.0
Longleaf-slash pine	1,928.9	1,423.6	505.3
Loblolly-shortleaf pine	18,032.7	7,316.7	10,716.0
Other eastern softwoods	48.3	47.5	0.9
Total softwoods	20,042.2	8,820.0	11,222.2
Hardwood types			
Oak-pine	4,583.0	4,262.2	320.8
Oak-hickory	12,095.8	12,029.4	66.4
Oak-gum-cypress	5,429.7	5,383.6	46.1
Elm-ash-cottonwood	1,136.1	1,108.8	27.3
Other hardwoods	1.6	1.6	0.0
Exotic hardwoods	23.9	23.9	0.0
Total hardwoods	23,270.1	22,809.6	460.6
Nonstocked	6.2	5.5	0.7
All groups	43,318.4	31,635.0	11,683.4

Numbers in rows and columns may not sum to totals due to rounding.

0.0 = no sample for the cell or a value of > 0.0 but < 0.05.

¹ Excludes rotten, missing, and form cull defects volume.



Appendix C—Supplemental Tables

Table C.14—Aboveground dry weight⁷ of live trees on forest land by ownership class and land status, Alabama, 2020

Ownership class	All forest land	Unreserved			Reserved		
		Total	Timberland	Unproductive	Total	Productive	Unproductive
<i>thousand tons</i>							
U.S. Forest Service							
National forest	44,553.7	41,729.3	41,729.3	0.0	2,824.4	2,824.4	0.0
Total	44,553.7	41,729.3	41,729.3	0.0	2,824.4	2,824.4	0.0
Other Federal							
National Park Service	1,611.1	0.0	0.0	0.0	1,611.1	1,611.1	0.0
U.S. Fish and Wildlife Service	2,517.4	0.0	0.0	0.0	2,517.4	2,517.4	0.0
Dept. of Defense/Dept. of Energy	9,489.9	9,489.9	9,489.9	0.0	0.0	0.0	0.0
Other Federal	5,949.7	5,776.6	5,776.6	0.0	173.1	173.1	0.0
Total	19,568.1	15,266.5	15,266.5	0.0	4,301.6	4,301.6	0.0
State and local government							
State	29,028.5	29,028.5	29,028.5	0.0	0.0	0.0	0.0
Local	9,149.4	9,149.4	9,149.4	0.0	0.0	0.0	0.0
Other non-Federal public	1,035.5	1,035.5	1,035.5	0.0	0.0	0.0	0.0
Total	39,213.4	39,213.4	39,213.4	0.0	0.0	0.0	0.0
Forest industry							
Corporate	88,956.5	88,956.5	88,956.5	0.0	0.0	0.0	0.0
Unincorporated local partnership/association/club	375.1	375.1	375.1	0.0	0.0	0.0	0.0
Native American	433.4	433.4	433.4	0.0	0.0	0.0	0.0
Individual	27,464.0	27,464.0	27,464.0	0.0	0.0	0.0	0.0
Total	117,229.1	117,229.1	117,229.1	0.0	0.0	0.0	0.0
Nonindustrial private							
Corporate	305,664.5	305,664.5	305,613.2	51.4	0.0	0.0	0.0
Conservation/natural resources organization	1,464.6	1,464.6	1,464.6	0.0	0.0	0.0	0.0
Unincorporated local partnership/association/club	3,253.2	3,253.2	3,253.2	0.0	0.0	0.0	0.0
Individual	621,076.1	621,076.1	621,076.1	0.0	0.0	0.0	0.0
Total	931,458.4	931,458.4	931,407.1	51.4	0.0	0.0	0.0
All classes	1,152,022.7	1,144,896.7	1,144,845.3	51.4	7,126.0	7,126.0	0.0

Numbers in rows and columns may not sum to totals due to rounding.

0.0 = no sample for the cell or a value of > 0.0 but < 0.05.

⁷ Calculations based on TREE_REGIONAL_BIOMASS.REGIONAL_DRYBIOT.

Table C.15—Total carbon¹ of live trees on forest land by ownership class and land status, Alabama, 2020

Ownership class	All forest land	Unreserved			Reserved		
		Total	Timberland	Unproductive	Total	Productive	Unproductive
<i>thousand tons</i>							
U.S. Forest Service							
National forest	22,276.8	20,864.6	20,864.6	0.0	1,412.2	1,412.2	0.0
Total	22,276.8	20,864.6	20,864.6	0.0	1,412.2	1,412.2	0.0
Other Federal							
National Park Service	805.5	0.0	0.0	0.0	805.5	805.5	0.0
U.S. Fish and Wildlife Service	1,258.7	0.0	0.0	0.0	1,258.7	1,258.7	0.0
Dept. of Defense/Dept. of Energy	4,744.9	4,744.9	4,744.9	0.0	0.0	0.0	0.0
Other Federal	2,974.8	2,888.3	2,888.3	0.0	86.5	86.5	0.0
Total	9,784.0	7,633.2	7,633.2	0.0	2,150.8	2,150.8	0.0
State and local government							
State	14,514.2	14,514.2	14,514.2	0.0	0.0	0.0	0.0
Local	4,574.7	4,574.7	4,574.7	0.0	0.0	0.0	0.0
Other non-Federal public	517.7	517.7	517.7	0.0	0.0	0.0	0.0
Total	19,606.7	19,606.7	19,606.7	0.0	0.0	0.0	0.0
Forest industry							
Corporate	44,478.2	44,478.2	44,478.2	0.0	0.0	0.0	0.0
Unincorporated local partnership/association/club	187.6	187.6	187.6	0.0	0.0	0.0	0.0
Native American	216.7	216.7	216.7	0.0	0.0	0.0	0.0
Individual	13,732.0	13,732.0	13,732.0	0.0	0.0	0.0	0.0
Total	58,614.6	58,614.6	58,614.6	0.0	0.0	0.0	0.0
Nonindustrial private							
Corporate	152,832.3	152,832.3	152,806.6	25.7	0.0	0.0	0.0
Conservation/natural resources organization	732.3	732.3	732.3	0.0	0.0	0.0	0.0
Unincorporated local partnership/association/club	1,626.6	1,626.6	1,626.6	0.0	0.0	0.0	0.0
Individual	310,538.1	310,538.1	310,538.1	0.0	0.0	0.0	0.0
Total	465,729.2	465,729.2	465,703.5	25.7	0.0	0.0	0.0
All classes	576,011.3	572,448.3	572,422.7	25.7	3,563.0	3,563.0	0.0

Numbers in rows and columns may not sum to totals due to rounding.

0.0 = no sample for the cell or a value of > 0.0 but < 0.05.

¹ Estimates of carbon calculated by multiplying aboveground dry tree biomass by 0.5. Calculations based on TREE_REGIONAL_BIOMASS.REGIONAL_DRYBIOT.



Appendix C—Supplemental Tables

Table C.16—Average annual net growth of live trees on forest land by forest-type group and stand-size class, Alabama, 2020 (2006–2020)

Forest-type group ¹	All classes	Stand-size class ¹			Nonstocked
		Large diameter	Medium diameter	Small diameter	
<i>million cubic feet per year</i>					
Softwood types					
White-red-jack pine	0.9	0.9	0.0	0.0	0.0
Longleaf-slash pine	84.9	32.9	35.9	16.1	0.0
Loblolly-shortleaf pine	1,355.8	450.9	630.7	274.1	0.0
Other eastern softwoods	6.0	1.1	0.9	3.9	0.0
Total softwoods	1,447.5	485.8	667.5	294.2	0.0
Hardwood types					
Oak-pine	255.2	95.0	66.5	93.7	0.0
Oak-hickory	413.8	200.7	113.9	99.3	0.0
Oak-gum-cypress	138.3	88.1	31.3	18.9	0.0
Elm-ash-cottonwood	40.0	20.0	12.6	7.5	0.0
Maple-beech-birch	0.0	0.0	0.0	0.0	0.0
Other hardwoods	0.4	0.0	0.0	0.4	0.0
Exotic hardwoods	2.0	0.0	0.5	1.5	0.0
Total hardwoods	849.8	403.8	224.7	221.2	0.0
Nonstocked	4.1	0.0	0.0	0.0	4.1
All groups	2,301.4	889.6	892.3	515.4	4.1

Numbers in rows and columns may not sum to totals due to rounding.

0.0 = no sample for the cell or a value of > 0.0 but < 0.05.

¹Based on past conditions.



Table C.17—Average annual removals of live trees on forest land by forest-type group and stand-size class, Alabama, 2020 (2006–2020)

Forest-type group ¹	All classes	Stand-size class ¹			Nonstocked
		Large diameter	Medium diameter	Small diameter	
<i>million cubic feet per year</i>					
Softwood types					
White-red-jack pine	0.0	0.0	0.0	0.0	0.0
Longleaf-slash pine	44.6	35.3	9.2	0.1	0.0
Loblolly-shortleaf pine	807.6	467.4	328.6	11.5	0.0
Other eastern softwoods	0.7	0.7	0.0	0.0	0.0
Total softwoods	852.9	503.4	337.8	11.7	0.0
Hardwood types					
Oak-pine	107.7	77.5	21.7	8.4	0.0
Oak-hickory	175.0	130.1	34.2	10.8	0.0
Oak-gum-cypress	50.1	35.6	12.7	1.9	0.0
Elm-ash-cottonwood	14.7	13.6	1.1	0.0	0.0
Maple-beech-birch	0.0	0.0	0.0	0.0	0.0
Other hardwoods	0.0	0.0	0.0	0.0	0.0
Exotic hardwoods	0.2	0.0	0.2	0.0	0.0
Total hardwoods	347.8	256.8	69.9	21.1	0.0
Nonstocked	0.5	0.0	0.0	0.0	0.5
All groups	1,201.1	760.3	407.6	32.8	0.5

Numbers in rows and columns may not sum to totals due to rounding.

0.0 = no sample for the cell or a value of > 0.0 but < 0.05.

¹Based on past conditions.



Appendix C—Supplemental Tables

Table C.18—Average annual mortality of live trees on forest land by forest-type group and stand-size class, Alabama, 2020 (2006–2020)

Forest-type group ¹	All classes	Stand-size class ¹			Nonstocked
		Large diameter	Medium diameter	Small diameter	
<i>million cubic feet per year</i>					
Softwood types					
White-red-jack pine	0.3	0.3	0.0	0.0	0.0
Longleaf-slash pine	13.3	9.6	3.0	0.7	0.0
Loblolly-shortleaf pine	132.3	98.5	30.6	3.2	0.0
Other eastern softwoods	0.5	0.1	0.0	0.3	0.0
Total softwoods	146.5	108.5	33.7	4.3	0.0
Hardwood types					
Oak-pine	48.0	35.7	9.7	2.6	0.0
Oak-hickory	128.4	101.0	21.9	5.5	0.0
Oak-gum-cypress	51.1	42.9	6.7	1.4	0.0
Elm-ash-cottonwood	15.9	13.2	2.2	0.5	0.0
Maple-beech-birch	0.2	0.2	0.0	0.0	0.0
Other hardwoods	0.1	0.0	0.0	0.1	0.0
Exotic hardwoods	0.3	0.0	0.1	0.1	0.0
Total hardwoods	244.0	193.0	40.7	10.3	0.0
Nonstocked	0.1	0.0	0.0	0.0	0.1
All groups	390.6	301.5	74.3	14.6	0.1

Numbers in rows and columns may not sum to totals due to rounding.

0.0 = no sample for the cell or a value of > 0.0 but < 0.05.

¹Based on past conditions.



Table C.19—Average annual net growth of live trees on forest land by species group and ownership group, Alabama, 2020 (2006–2020)

Species group	Ownership group ¹					
	All ownerships	U.S. Forest Service	Other Federal	State and local government	Forest industry	Nonindustrial private
<i>million cubic feet per year</i>						
Softwood						
Longleaf and slash pines	91.4	4.9	0.4	3.8	12.7	69.6
Loblolly and shortleaf pines	1,473.7	8.9	7.2	22.3	267.0	1,168.3
Other yellow pines	24.4	-0.4	0.1	1.1	0.7	22.8
Eastern hemlock	0.5	0.3	0.0	0.0	0.0	0.2
Cypress	7.2	0.0	0.5	1.2	0.2	5.2
Other eastern softwoods	8.8	0.2	0.1	0.2	0.1	8.2
Total softwoods	1,605.9	13.9	8.4	28.6	280.7	1,274.3
Hardwood						
Select white oaks	60.4	2.8	0.4	2.2	4.2	50.7
Select red oaks	17.3	0.5	0.5	0.6	1.0	14.7
Other white oaks	34.5	2.9	0.8	2.1	1.2	27.4
Other red oaks	185.5	2.5	4.3	7.1	12.4	159.3
Hickory	30.8	-0.2	0.5	0.8	2.1	27.6
Hard maple	3.0	0.1	0.0	0.1	-0.1	2.9
Soft maple	19.8	0.8	0.7	0.8	0.0	17.6
Beech	8.0	0.0	0.0	0.1	1.0	6.8
Sweetgum	121.4	2.1	2.8	2.9	9.8	103.8
Tupelo and blackgum	27.1	0.8	-0.1	0.2	1.8	24.4
Ash	10.5	0.2	0.4	0.5	0.7	8.8
Cottonwood and aspen	2.2	0.0	0.0	0.0	0.1	2.1
Basswood	2.0	-0.1	0.0	0.2	0.3	1.6
Yellow-poplar	92.6	3.0	0.8	1.4	8.6	78.7
Black walnut	0.8	0.0	-0.1	0.0	0.1	0.8
Other eastern soft hardwoods	46.3	0.5	0.7	2.1	1.1	42.0
Other eastern hard hardwoods	2.7	0.1	0.1	0.0	0.2	2.3
Eastern noncommercial hardwoods	30.5	1.0	0.5	-0.1	3.3	25.8
Total hardwoods	695.4	17.0	12.4	21.0	47.8	597.1
All species	2,301.4	30.9	20.8	49.7	328.5	1,871.4

Numbers in rows and columns may not sum to totals due to rounding.

0.0 = no sample for the cell or a value of > 0.0 but < 0.05.

¹Based on current conditions.



Appendix C—Supplemental Tables

Table C.20—Average annual removals of live trees on forest land by species group and ownership group, Alabama, 2020 (2006–2020)

Species group	All ownerships	Ownership group ¹				
		U.S. Forest Service	Other Federal	State and local government	Forest industry	Nonindustrial private
<i>million cubic feet per year</i>						
Softwood						
Longleaf and slash pines	47.3	0.2	0.0	2.6	7.9	36.6
Loblolly and shortleaf pines	820.3	4.5	1.3	6.9	147.3	660.4
Other yellow pines	16.8	0.1	0.0	0.2	3.0	13.4
Eastern hemlock	0.0	0.0	0.0	0.0	0.0	0.0
Cypress	1.4	0.0	0.0	0.0	0.0	1.4
Other eastern softwoods	2.2	0.0	0.0	0.0	0.4	1.8
Total softwoods	888.1	4.8	1.3	9.7	158.7	713.6
Hardwood						
Select white oaks	23.4	0.1	0.0	0.4	2.6	20.2
Select red oaks	10.4	0.0	0.0	0.2	2.0	8.2
Other white oaks	21.0	0.2	0.0	0.3	1.6	19.0
Other red oaks	83.3	0.4	0.5	2.4	11.8	68.3
Hickory	20.2	0.0	0.0	0.2	1.0	19.0
Hard maple	1.4	0.0	0.0	0.6	0.0	0.8
Soft maple	11.2	0.1	0.0	0.0	1.6	9.5
Beech	1.7	0.0	0.0	0.0	0.3	1.4
Sweetgum	65.7	0.1	0.1	0.5	7.4	57.6
Tupelo and blackgum	9.5	0.0	0.0	0.1	1.3	8.1
Ash	5.2	0.0	0.0	0.1	0.7	4.5
Cottonwood and aspen	2.2	0.0	0.0	0.0	0.0	2.2
Basswood	0.3	0.0	0.0	0.0	0.0	0.3
Yellow-poplar	29.5	0.6	0.0	0.7	6.9	21.4
Black walnut	0.6	0.0	0.0	0.0	0.0	0.6
Other eastern soft hardwoods	12.5	0.0	0.0	0.2	0.9	11.4
Other eastern hard hardwoods	2.4	0.1	0.0	0.0	0.2	2.1
Eastern noncommercial hardwoods	12.5	0.1	0.0	0.0	1.9	10.6
Total hardwoods	313.1	1.6	0.5	5.6	40.2	265.1
All species	1,201.1	6.4	1.8	15.3	198.9	978.7

Numbers in rows and columns may not sum to totals due to rounding.

0.0 = no sample for the cell or a value of > 0.0 but < 0.05.

¹Based on current conditions.



Table C.21—Average annual mortality of live trees on forest land by species group and ownership group, Alabama, 2020 (2006–2020)

Species group	All ownerships	Ownership group ¹				
		U.S. Forest Service	Other Federal	State and local government	Forest industry	Nonindustrial private
<i>million cubic feet per year</i>						
Softwood						
Longleaf and slash pines	12.8	2.2	0.0	1.3	2.0	7.3
Loblolly and shortleaf pines	140.4	9.4	2.1	3.9	22.4	102.6
Other yellow pines	18.9	2.5	0.0	0.7	1.7	14.1
Eastern hemlock	0.3	0.0	0.0	0.0	0.0	0.3
Cypress	0.9	0.0	0.0	0.1	0.0	0.8
Other eastern softwoods	3.4	0.0	0.2	0.0	0.1	3.1
Total softwoods	176.8	14.1	2.3	6.0	26.2	128.2
Hardwood						
Select white oaks	7.6	2.0	0.1	0.1	0.4	5.1
Select red oaks	9.9	0.0	1.7	0.0	0.1	8.0
Other white oaks	11.0	0.6	0.0	0.5	0.6	9.4
Other red oaks	50.0	2.6	0.8	0.7	4.0	41.9
Hickory	13.6	1.3	0.1	0.7	0.3	11.2
Hard maple	1.3	0.0	0.0	0.1	0.4	0.8
Soft maple	15.0	0.5	0.1	0.5	2.7	11.2
Beech	0.8	0.2	0.0	0.0	0.0	0.6
Sweetgum	30.6	1.0	0.5	1.5	3.9	23.8
Tupelo and blackgum	9.3	0.4	0.2	2.1	0.4	6.2
Ash	6.7	0.0	0.1	0.2	0.1	6.3
Cottonwood and aspen	0.8	0.0	0.0	0.0	0.0	0.7
Basswood	0.7	0.1	0.0	0.0	0.0	0.6
Yellow-poplar	15.5	0.3	0.0	0.1	2.1	12.9
Black walnut	0.5	0.0	0.1	0.0	0.0	0.4
Other eastern soft hardwoods	22.8	0.1	1.7	0.9	3.7	16.5
Other eastern hard hardwoods	5.5	0.2	0.1	0.1	0.4	4.7
Eastern noncommercial hardwoods	12.1	0.7	0.1	0.8	0.6	9.9
Total hardwoods	213.8	10.2	5.5	8.3	19.5	170.2
All species	390.6	24.3	7.8	14.3	45.7	298.4

Numbers in rows and columns may not sum to totals due to rounding.

0.0 = no sample for the cell or a value of > 0.0 but < 0.05.

¹Based on current conditions.



Appendix C—Supplemental Tables

Table C.22—Area of sampled forest land by county and major ownership group, Alabama, 2020

Survey unit and county	Total forest land	Major ownership group				
		U.S. Forest Service	Other Federal	State and local government	Forest industry	Nonindustrial private
<i>thousand acres</i>						
Southwest-South						
Baldwin	720.4	0.0	7.4	74.6	134.3	504.1
Covington	491.3	57.1	0.0	0.0	48.1	386.1
Escambia	473.1	33.6	0.0	14.8	193.4	231.4
Mobile	498.3	0.0	0.0	79.5	24.4	394.4
Washington	625.1	0.0	0.0	4.5	94.5	526.1
Total	2,808.3	90.7	7.4	173.4	494.8	2,042.1
Southwest-North						
Choctaw	531.6	0.0	5.9	0.0	58.1	467.6
Clarke	738.8	0.0	0.0	11.8	167.7	559.3
Conecuh	447.0	0.0	0.0	0.0	79.9	367.1
Marengo	477.7	0.0	0.0	0.0	66.7	411.0
Monroe	571.4	0.0	0.0	11.8	77.9	481.6
Sumter	455.4	0.0	11.8	5.2	23.6	414.8
Wilcox	505.0	0.0	4.4	5.9	78.8	415.8
Total	3,726.9	0.0	22.1	34.7	552.9	3,117.2
Southeast						
Autauga	304.1	0.0	5.5	11.3	63.7	223.6
Barbour	433.6	0.0	5.5	30.1	34.2	363.9
Bullock	327.8	0.0	0.0	0.0	37.7	290.1
Butler	407.8	0.0	0.0	4.3	52.2	351.3
Chambers	310.8	0.0	1.5	0.0	59.1	250.2
Chilton	330.4	26.2	0.0	0.0	21.5	282.7
Coffee	246.8	0.0	0.0	0.0	34.6	212.2
Crenshaw	319.5	0.0	0.0	3.3	35.9	280.3
Dale	264.0	0.0	34.5	5.1	10.2	214.3
Dallas	439.4	5.3	0.0	0.0	76.5	357.6
Elmore	238.1	0.0	0.0	6.1	6.1	226.0
Geneva	197.3	0.0	0.0	5.8	6.1	185.4
Henry	269.4	0.0	0.0	0.0	24.0	245.3
Houston	175.9	0.0	4.6	1.5	0.0	169.8
Lee	252.4	0.0	0.0	11.0	71.3	170.1
Lowndes	314.5	0.0	4.4	7.5	19.2	283.4
Macon	331.7	20.5	0.0	6.1	69.0	236.1
Montgomery	256.2	0.0	0.0	12.2	46.2	197.9
Pike	303.6	0.0	0.0	0.0	29.8	273.8
Russell	314.1	0.0	11.9	0.0	69.7	232.5
Tallapoosa	393.7	0.0	0.0	12.2	85.2	296.4
Total	6,431.2	52.0	67.7	116.4	852.2	5,342.9

(continued)



Table C.22 (continued)—Area of sampled forest land by county and major ownership group, Alabama, 2020

Survey unit and county	Total forest land	Major ownership group				
		U.S. Forest Service	Other Federal	State and local government	Forest industry	Nonindustrial private
<i>thousand acres</i>						
West Central						
Bibb	320.5	62.7	6.2	0.0	50.6	200.9
Fayette	339.1	0.0	0.0	14.5	47.7	277.0
Greene	347.1	0.0	15.5	0.0	35.3	296.4
Hale	288.9	31.2	0.0	0.0	26.7	231.0
Lamar	338.6	0.0	0.0	5.4	39.0	294.2
Marion	369.0	0.0	0.0	6.2	19.8	343.1
Perry	343.9	44.3	0.0	0.0	57.9	241.7
Pickens	476.5	0.0	6.2	0.0	132.8	337.5
Tuscaloosa	698.1	5.3	0.0	24.2	84.8	583.7
Total	3,521.7	143.6	27.9	50.3	494.5	2,805.4
North Central						
Blount	231.0	0.0	0.0	6.0	0.0	225.0
Calhoun	195.5	15.6	17.3	0.0	0.0	162.6
Cherokee	256.6	5.3	6.1	5.8	6.1	233.5
Clay	309.4	67.5	0.0	0.0	6.1	235.8
Cleburne	258.3	73.0	0.0	6.1	0.0	179.2
Coosa	377.1	0.0	0.0	0.0	72.2	304.8
Cullman	241.2	0.0	0.0	6.1	16.7	218.5
Etowah	186.0	0.0	0.0	0.4	0.0	185.6
Jefferson	387.3	0.0	0.0	32.5	12.5	342.2
Randolph	281.9	0.0	0.0	6.1	0.0	275.8
Shelby	338.3	0.0	0.0	17.6	22.7	298.0
St. Clair	309.3	0.0	0.0	6.1	6.1	297.2
Talladega	306.4	35.1	0.0	12.8	6.1	252.5
Walker	387.9	0.0	0.0	15.2	7.6	365.1
Winston	313.6	94.8	0.0	0.0	24.5	194.3
Total	4,379.8	291.3	23.3	114.5	180.5	3,770.1
North						
Colbert	227.7	0.0	12.1	42.4	6.1	167.1
DeKalb	184.4	0.0	6.1	1.2	0.0	177.1
Franklin	299.7	0.0	16.7	6.1	36.2	240.6
Jackson	449.1	0.0	12.1	59.1	5.9	372.0
Lauderdale	180.9	0.0	0.0	20.3	5.4	155.2
Lawrence	224.4	77.8	4.5	0.0	12.1	129.9
Limestone	103.5	0.0	18.2	0.0	0.0	85.3
Madison	207.9	0.0	51.5	7.9	6.1	142.4
Marshall	158.9	0.0	6.1	3.5	0.0	149.3
Morgan	189.7	0.0	10.8	0.0	0.0	179.0
Total	2,226.1	77.8	138.1	140.4	71.8	1,797.9
Total all units	23,093.9	655.4	286.5	629.7	2,646.7	18,875.7



Appendix C—Supplemental Tables

Table C.23—Volume of all-live trees on forest land by county name and major species group, Alabama, 2020

County	Total	Major species group		County	Total	Major species group	
		Softwoods	Hardwoods			Softwoods	Hardwoods
<i>million cubic feet</i>				<i>million cubic feet</i>			
Autauga	496.07	265.92	230.15	Houston	305.29	135.18	170.11
Baldwin	1,372.96	807.63	565.33	Jackson	1,055.26	117.16	938.10
Barbour	772.15	436.79	335.36	Jefferson	845.70	454.00	391.70
Bibb	664.37	332.49	331.88	Lamar	628.09	303.28	324.81
Blount	430.38	207.50	222.88	Lauderdale	366.84	69.56	297.28
Bullock	624.97	337.23	287.74	Lawrence	498.61	180.75	317.86
Butler	773.71	497.37	276.34	Lee	536.02	307.67	228.36
Calhoun	381.91	177.13	204.78	Limestone	253.66	18.14	235.52
Chambers	574.14	359.05	215.09	Lowndes	579.02	305.05	273.96
Cherokee	484.62	234.35	250.27	Macon	628.27	290.18	338.09
Chilton	574.83	258.06	316.77	Madison	623.23	128.12	495.10
Choctaw	1,000.50	637.61	362.90	Marengo	921.28	472.37	448.91
Clarke	1,309.78	811.23	498.55	Marion	650.38	387.98	262.40
Clay	627.37	295.31	332.06	Marshall	279.82	63.28	216.53
Cleburne	573.43	294.26	279.18	Mobile	761.90	410.50	351.40
Coffee	417.05	228.67	188.38	Monroe	1,006.49	620.45	386.04
Colbert	511.60	158.65	352.95	Montgomery	550.42	171.81	378.61
Conecuh	759.89	499.79	260.10	Morgan	463.10	99.66	363.45
Coosa	600.91	373.07	227.84	Perry	625.45	349.74	275.71
Covington	869.53	588.89	280.64	Pickens	943.03	477.09	465.94
Crenshaw	584.62	288.76	295.86	Pike	610.70	318.54	292.17
Cullman	463.49	160.77	302.72	Randolph	524.04	267.22	256.82
Dale	513.58	183.74	329.84	Russell	463.86	235.31	228.55
Dallas	709.41	294.84	414.57	St. Clair	654.52	277.79	376.73
DeKalb	387.10	120.99	266.11	Shelby	648.61	334.14	314.47
Elmore	505.19	262.53	242.66	Sumter	803.04	408.88	394.16
Escambia	662.80	489.72	173.08	Talladega	577.35	348.29	229.06
Etowah	329.94	106.22	223.73	Tallapoosa	800.02	455.51	344.51
Fayette	623.56	330.92	292.64	Tuscaloosa	1,347.77	627.53	720.23
Franklin	522.46	197.89	324.57	Walker	808.51	432.40	376.11
Geneva	453.95	223.66	230.30	Washington	1,168.88	695.36	473.52
Greene	656.46	255.74	400.72	Wilcox	820.30	427.01	393.30
Hale	558.13	225.37	332.76	Winston	654.62	310.28	344.34
Henry	410.38	212.59	197.80				
				Total	43,605.32	21,654.97	21,950.40



Table C.24—Trees tallied (≥ 1.0 inches at d.b.h.) in the FIA sample by FIA species code, common name, genus, and species, Alabama, 2020

FIA species code	Common name	Genus	Species	Trees measured number
43	Atlantic white-cedar	<i>Chamaecyparis</i>	<i>thyoides</i>	28
67	Southern redcedar	<i>Juniperus</i>	<i>virginiana</i>	2
68	Eastern redcedar	<i>J.</i>	<i>virginiana</i>	1,440
107	Sand pine	<i>Pinus</i>	<i>clausa</i>	19
110	Shortleaf pine	<i>P.</i>	<i>echinata</i>	1,339
111	Slash pine	<i>P.</i>	<i>elliottii</i>	1,752
115	Spruce pine	<i>P.</i>	<i>glabra</i>	308
121	Longleaf pine	<i>P.</i>	<i>palustris</i>	2,850
131	Loblolly pine	<i>P.</i>	<i>taeda</i>	47,742
132	Virginia pine	<i>P.</i>	<i>virginiana</i>	2,102
221	Baldcypress	<i>Taxodium</i>	<i>distichum</i>	401
222	Pondcypress	<i>T.</i>	<i>ascendens</i>	23
261	Eastern hemlock	<i>Tsuga</i>	<i>canadensis</i>	78
311	Florida maple	<i>Acer</i>	<i>barbatum</i>	652
313	Boxelder	<i>A.</i>	<i>negundo</i>	309
316	Red maple	<i>A.</i>	<i>rubrum</i>	4,510
317	Silver maple	<i>A.</i>	<i>saccharinum</i>	8
318	Sugar maple	<i>A.</i>	<i>saccharum</i>	34
323	Chalk maple	<i>A.</i>	<i>leucoderme</i>	6
332	Yellow buckeye	<i>Aesculus</i>	<i>flava</i>	23
341	Ailanthus	<i>Ailanthus</i>	<i>altissima</i>	24
345	Mimosa, silktree	<i>Albizia</i>	<i>julibrissin</i>	104
356	Serviceberry spp.	<i>Amelanchier</i>	spp.	93
367	Pawpaw	<i>Asimina</i>	<i>triloba</i>	17
372	Sweet birch	<i>Betula</i>	<i>lenta</i>	1
373	River birch	<i>B.</i>	<i>nigra</i>	213
391	American hornbeam, musclewood	<i>Carpinus</i>	<i>caroliniana</i>	1,320
401	Water hickory	<i>Carya</i>	<i>aquatica</i>	107
402	Bitternut hickory	<i>C.</i>	<i>cordiformis</i>	77
403	Pignut hickory	<i>C.</i>	<i>glabra</i>	1,652
404	Pecan	<i>C.</i>	<i>illinoensis</i>	98
405	Shellbark hickory	<i>C.</i>	<i>laciniosa</i>	16
407	Shagbark hickory	<i>C.</i>	<i>ovata</i>	424
408	Black hickory	<i>C.</i>	<i>texana</i>	5
409	Mockernut hickory	<i>C.</i>	<i>alba</i>	1,779
410	Sand hickory	<i>C.</i>	<i>pallida</i>	10
412	Red hickory	<i>C.</i>	<i>ovalis</i>	16
413	Southern shagbark hickory	<i>C.</i>	<i>carolinae-septentrionalis</i>	4
422	Allegheny chinkapin	<i>Castanea</i>	<i>pumila</i>	2
451	Southern catalpa	<i>Catalpa</i>	<i>bignonioides</i>	17
461	Sugarberry	<i>Celtis</i>	<i>laevigata</i>	681
462	Hackberry	<i>C.</i>	<i>occidentalis</i>	71
471	Eastern redbud	<i>Cercis</i>	<i>canadensis</i>	268
481	Yellowwood	<i>Cladrastis</i>	<i>kentukea</i>	3
491	Flowering dogwood	<i>Cornus</i>	<i>florida</i>	907

(continued)



Appendix C—Supplemental Tables

Table C.24 (continued)—Trees tallied (≥ 1.0 inches at d.b.h.) in the FIA sample by FIA species code, common name, genus, and species, Alabama, 2020

FIA species code	Common name	Genus	Species	Trees measured number
500	Hawthorn spp.	<i>Crataegus</i>	spp.	80
502	Downy hawthorn	<i>C.</i>	<i>mollis</i>	2
521	Common persimmon	<i>Diospyros</i>	<i>virginiana</i>	556
531	American beech	<i>Fagus</i>	<i>grandifolia</i>	694
541	White ash	<i>Fraxinus</i>	<i>americana</i>	350
544	Green ash	<i>F.</i>	<i>pennsylvanica</i>	1,104
545	Pumpkin ash	<i>F.</i>	<i>profunda</i>	7
548	Carolina ash	<i>F.</i>	<i>caroliniana</i>	1
551	Waterlocust	<i>Gleditsia</i>	<i>aquatica</i>	1
552	Honeylocust	<i>G.</i>	<i>triacanthos</i>	36
581	Carolina silverbell	<i>Halesia</i>	<i>carolina</i>	31
582	Two-wing silverbell	<i>H.</i>	<i>diptera</i>	5
591	American holly	<i>Ilex</i>	<i>opaca</i>	909
601	Butternut	<i>Juglans</i>	<i>cinerea</i>	6
602	Black walnut	<i>J.</i>	<i>nigra</i>	80
611	Sweetgum	<i>Liquidambar</i>	<i>styraciflua</i>	13,109
621	Yellow-poplar	<i>Liriodendron</i>	<i>tulipifera</i>	4,261
641	Osage-orange	<i>Maclura</i>	<i>pomifera</i>	141
651	Cucumber tree	<i>Magnolia</i>	<i>acuminata</i>	57
652	Southern magnolia	<i>M.</i>	<i>grandiflora</i>	414
653	Sweetbay	<i>M.</i>	<i>virginiana</i>	2,353
654	Bigleaf magnolia	<i>M.</i>	<i>macrophylla</i>	203
658	Umbrella magnolia	<i>M.</i>	<i>tripetala</i>	16
662	Southern crab apple	<i>Malus</i>	<i>angustifolia</i>	8
681	White mulberry	<i>Morus</i>	<i>alba</i>	2
682	Red mulberry	<i>M.</i>	<i>rubra</i>	201
691	Water tupelo	<i>Nyssa</i>	<i>aquatica</i>	523
693	Blackgum	<i>N.</i>	<i>sylvatica</i>	2,648
694	Swamp tupelo	<i>N.</i>	<i>biflora</i>	1,215
701	Eastern hophornbeam	<i>Ostrya</i>	<i>virginiana</i>	798
711	Sourwood	<i>Oxydendrum</i>	<i>arboreum</i>	1,454
712	Paulownia, empress-tree	<i>Paulownia</i>	<i>tomentosa</i>	59
721	Redbay	<i>Persea</i>	<i>borbonia</i>	92
722	Water-elm, planertree	<i>Planera</i>	<i>aquatica</i>	25
731	American sycamore	<i>Platanus</i>	<i>occidentalis</i>	227
742	Eastern cottonwood	<i>Populus</i>	<i>deltoides</i>	72
762	Black cherry	<i>Prunus</i>	<i>serotina</i>	1,883
766	American plum	<i>P.</i>	<i>americana</i>	67
802	White oak	<i>Quercus</i>	<i>alba</i>	3,087
804	Swamp white oak	<i>Q.</i>	<i>bicolor</i>	2
806	Scarlet oak	<i>Q.</i>	<i>coccinea</i>	422
808	Durand oak	<i>Q.</i>	<i>sinuata</i>	32
812	Southern red oak	<i>Q.</i>	<i>falcata</i>	1,843
813	Cherrybark oak	<i>Q.</i>	<i>pagoda</i>	394
819	Turkey oak	<i>Q.</i>	<i>laevis</i>	85

(continued)



Table C.24 (continued)—Trees tallied (≥ 1.0 inches at d.b.h.) in the FIA sample by FIA species code, common name, genus, and species, Alabama, 2020

FIA species code	Common name	Genus	Species	Trees measured number
820	Laurel oak	<i>Q.</i>	<i>laurifolia</i>	2,299
822	Overcup oak	<i>Q.</i>	<i>lyrata</i>	162
824	Blackjack oak	<i>Q.</i>	<i>marilandica</i>	212
825	Swamp chestnut oak	<i>Q.</i>	<i>michauxii</i>	157
826	Chinkapin oak	<i>Q.</i>	<i>muehlenbergii</i>	193
827	Water oak	<i>Q.</i>	<i>nigra</i>	6,620
828	Texas red oak	<i>Q.</i>	<i>texana</i>	51
831	Willow oak	<i>Q.</i>	<i>phellos</i>	443
832	Chestnut oak	<i>Q.</i>	<i>prinus</i>	1,409
833	Northern red oak	<i>Q.</i>	<i>rubra</i>	444
834	Shumard oak	<i>Q.</i>	<i>shumardii</i>	29
835	Post oak	<i>Q.</i>	<i>stellata</i>	1,239
836	Delta post oak	<i>Q.</i>	<i>similis</i>	1
837	Black oak	<i>Q.</i>	<i>velutina</i>	471
838	Live oak	<i>Q.</i>	<i>virginiana</i>	132
840	Dwarf post oak	<i>Q.</i>	<i>margarettae</i>	6
841	Dwarf live oak	<i>Q.</i>	<i>minima</i>	4
842	Bluejack oak	<i>Q.</i>	<i>incana</i>	12
858	Camphortree	<i>Cinnamomum</i>	<i>camphora</i>	1
901	Black locust	<i>Robinia</i>	<i>pseudoacacia</i>	61
922	Black willow	<i>Salix</i>	<i>nigra</i>	203
931	Sassafras	<i>Sassafras</i>	<i>albidum</i>	264
951	American basswood	<i>Tilia</i>	<i>americana</i>	99
952	White basswood	<i>T.</i>	<i>americana</i>	11
953	Carolina basswood	<i>T.</i>	<i>americana</i>	47
971	Winged elm	<i>Ulmus</i>	<i>alata</i>	1,521
972	American elm	<i>U.</i>	<i>americana</i>	418
975	Slippery elm	<i>U.</i>	<i>rubra</i>	140
976	September elm	<i>U.</i>	<i>serotina</i>	9
993	Chinaberry	<i>Melia</i>	<i>azedarach</i>	129
994	Chinese tallowtree	<i>Triadica</i>	<i>sebifera</i>	200
996	Smoketree	<i>Cotinus</i>	<i>obovatus</i>	4
999	Other or unknown live tree	Tree	unknown	34

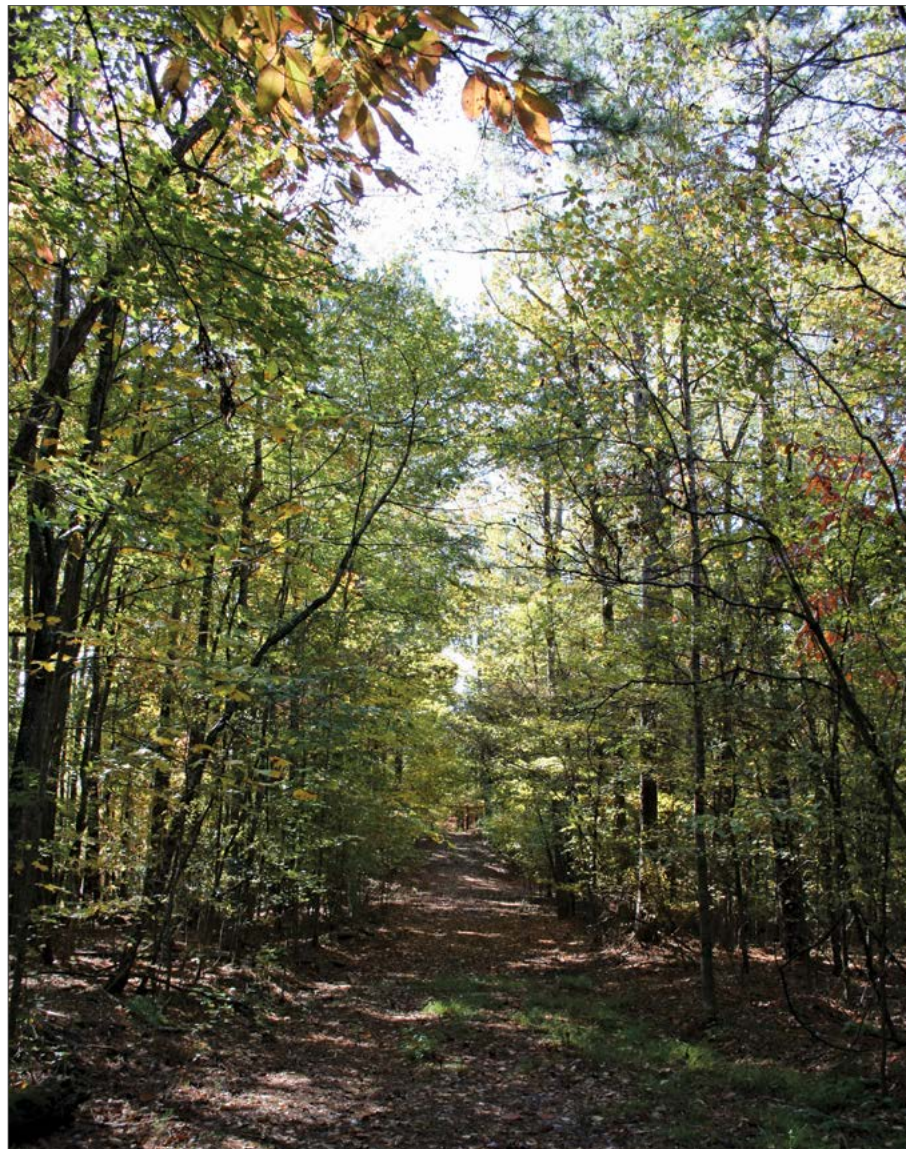


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The principal findings of the 11th forest survey of Alabama (2020) and changes that have occurred since the previous surveys are presented. Topics examined include forest area, ownership, forest-type groups, stand structure, basal area, timber volume, growth, removals, mortality, and timber products. Alabama's contribution to the Nation's forest resources and regional comparisons are detailed.

Keywords: Alabama, FIA, forest health, forest inventory, forest survey, forest trends, plantations, pulpwood production, TPO, wood-processing plants.

A trail beckons visitors to explore the wonders of Alabama's forests.





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