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# **Status of Longleaf Pine in the South**

## **An FIA Update**

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## An FIA Update

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# Abstract

In this report, we present an update on the status of longleaf pine in the Southern United States. Specifically, we provide selected tables and summary data for the two longleaf pine-dominant forest types—the longleaf pine type and the longleaf pine/oak type—using the latest round of forest inventory data from each of the nine States encompassing the range of longleaf pine. The report represents 7–8 years of change in the longleaf pine resource, and it provides a comparison with a previously published report on the history and current condition of longleaf pine. The data presented here show that the two dominant longleaf pine forest types occupy slightly more than 4.5 million acres across the South, a net gain of only about 232,000 acres since the 2012 report. But there are strong indications in this 2020 update that clearly show that efforts to restore this iconic forest type are meeting with success. There are dramatic increases in live tree longleaf pine numbers in the 10.9-inch and smaller diameter classes, and similar increases in the area of longleaf pine forest types in the 0–40 year age classes, both of which far exceed numbers in the previous 2012 report. In essence, a wave of ingrowth is headed toward the sawtimber size classes as efforts to establish and manage smaller size and age classes across all ownerships have been underway for several decades, and especially during the last 10 years. The data trends noted underscore the commitment to enhancing the establishment and development of new and existing longleaf pine stands, and especially the importance of planting to restore longleaf pine. This commitment has been strongly supported by public agencies such as the U.S. Department of Agriculture Natural Resources Conservation Service, as well as private nongovernmental organizations like the Longleaf Alliance and the Longleaf Partnership Council, established under the America’s Longleaf Restoration Initiative.

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## Key Findings

- Across the South, the overall area in the longleaf pine and longleaf pine/oak types combined has yet to exceed 5 million acres as of this 2020 update. The total area in these two longleaf pine-dominant forest types is slightly more than 4.517 million acres. It appears that continued commitments will be needed to achieve the America's Longleaf Restoration Initiative 8 million-acre goal by 2025.
- Private ownerships support 2.8 million acres (61.8 percent) of the longleaf pine-dominant forest types southwide. The balance is in various public ownerships, especially the National Forests (16 percent), States (9.9 percent), and the Department of Defense (9.7 percent).
- Across the South in the two dominant longleaf pine types, 1.659 million acres, or slightly more than one-third of the total area, shows clear evidence of planted origin.
- Across the South, the 0–20 year age classes comprise about 1.5 million acres, roughly one-third of the total area in longleaf pine types. Since the 2012 report, the area in the 0–20 year age class increased by ~337,000 acres. This suggests that the determined efforts by landowners and land managers over the past two decades to establish new stands of longleaf pine through natural regeneration and planting are paying off.
- The area occupied by medium size classes (5.0–8.9 inches d.b.h.) in both longleaf pine-dominant forest types now covers 1.2 million acres, nearly double that reported in 2012. Combined with results in younger age classes, a wave of ingrowth exceeding roughly 2.5-million acres will develop into the longleaf pine-dominant sawtimber classes over the next few decades.
- All told, the increases in area, numbers, and volume—especially in the younger age classes and smaller size classes—show positive results from commitments to restore longleaf pine on public and private lands. This is due largely to the dedicated efforts of landowners and land managers who are interested restoring this iconic species, and in bringing back the habitat these forests provide for flora and fauna that are underrepresented on the landscape.

# Introduction



Germinating longleaf pine seed (top) and longleaf pine grass stage in wiregrass (bottom).

The decline in the dominance of longleaf pine (*Pinus palustris* Mill.) ecosystems across the South has been well documented. Frost (1993) estimated that prior to European colonization of North America, longleaf pine-dominant ecosystems accounted for an estimated 91 million acres, of which 74 million acres were longleaf pine-dominant forests, and an additional 14 million acres were longleaf pine/oak forests. European colonization and westward expansion of the United States brought with it a demand for, as President Roosevelt suggested in 1905, “the making of prosperous homes.” Thus, the latter half of the 19th century and turn of the 20th century saw the harvest of vast areas of virgin southern pine forests, with longleaf pine highly desirable for its strength and quality. As Wahlenberg (1946) observed, land managers were having difficulty sustaining longleaf pine because deliberate regeneration of the species had proven difficult. The silvics of the species confounded managers by highly episodic seed production, the existence of seedlings in the grass stage, and the withdrawal of fire from the landscape before managers clearly understood the importance of fire for longleaf pine, especially in the context of release of seedlings from the grass stage. The species reached the nadir of its decline in 1990, when Forest Survey data reported 3.8 million acres in the two longleaf pine-dominant forest types, of which 3.05 million acres was longleaf pine and the balance longleaf pine/oak (Kelly and Bechtold 1989). With the loss of mature, open pine forest and woodland habitat came concerns about the loss of fauna and flora associated with those habitats, especially the endangered red-cockaded woodpecker. It took a major disturbance event—Hurricane Hugo in 1989—to strengthen a commitment to restore this iconic species and the flora and fauna that are adapted to its unique ecological conditions and habitat.





Croker shelterwood study, Kisatchie National Forest (top) and longleaf pine stand underplanted with longleaf pine, Conecuh National Forest (bottom).



Throughout the latter half of the 20th century, work was underway to solve the riddle of regenerating longleaf pine. Research on the Escambia Experimental Forest culminated in the development of silvicultural prescriptions to regenerate longleaf pine naturally using the shelterwood method (Croker 1956, Croker and Boyer 1975, Croker 1979, Croker 1987), one of the success stories of southern forestry in the 20th century. Work to learn how to plant longleaf pine began in the 1920s and was summarized in Wakeley's classic monograph, "Planting the Southern Pines" (Wakeley 1954). The development of the technology associated with the nursery culture and outplanting of containerized seedlings (Barnett and Brissette 1986), and cultural treatments to promote release from the grass stage, have further broadened our technical understanding of artificial regeneration of longleaf pine. Furthermore, and perhaps most importantly, the value of prescribed fire to enhance the

development of longleaf pine seedlings, especially when in the grass stage, has now been well documented.

While these technical advances have been extraordinarily important, they do not represent much of an advance if these practices are not made available to landowners and land managers. In 2007, the Longleaf Alliance and the Southeastern Regional Partnership for Planning and Sustainability led three key Federal agencies (Agriculture, Interior, and Defense) to convene a Regional Working Group to establish the America's Longleaf Restoration Initiative (ALRI).<sup>1</sup> In 2009, ALRI published the Range-wide Conservation Plan (ALRI 2009), which provided a pathway forward for restoration and a recognition that efforts to promote longleaf pine across its range would require the efforts of dozens of partners in the public and private sector. That document laid the groundwork for forming 18 regional Longleaf Implementation Teams in significant



Grass stage seedling after prescribed burn, Winn Ranger District, Kisatchie National Forest (left) and mature longleaf pine overstory with wiregrass understory, Apalachicola National Forest (right).

<sup>1</sup> America's Longleaf Restoration Initiative (ALRI) website: <http://www.americaslongleaf.org/resources/strategic-priorities-and-actions/>.

geographic areas representing about 75 percent of the remaining longleaf pine-dominant forests in the region. The publication also led to the creation of the Longleaf Partnership Council (LPC) in October 2011, a group of more than 30 diverse State and Federal agencies, industry groups, landowners, academics, and private conservation organizations, all dedicated to the restoration of this iconic species and forest type. The LPC has guided the on-the-ground work of the regional Implementation Teams and the annual reporting of accomplishments. This work is assisted by public and private funding through the U.S. Department of Agriculture (USDA) [specifically, the Forest Service and the Natural Resources Conservation Service (NRCS)], the U.S. Department of the Interior [specifically, the U.S. Fish and Wildlife Service], and the Department of Defense, as well as excellent cooperation and substantial support by the National Fish and Wildlife Foundation (NFWF).

The LPC issues annual reports that describe the accomplishments in longleaf pine restoration across the range of the species (see ALRI 2017, 2018, 2019, 2020). These reports emphasize the accomplishments the Longleaf Implementation Teams and others have made in restoration and management of longleaf pine on both public and private lands. These reports include data on acres planted, acres treated with prescribed fire, and acres managed to control invasive exotics, as well as data on flora restored and faunal habitat maintained or newly created.<sup>2</sup> But while the annual LPC progress reports clearly show what is being added to the bucket of longleaf pine ecosystem restoration, the LPC has repeatedly wondered about what is being lost. Specifically,

the LPC has noted anecdotal and visual evidence of loss of longleaf pine ecosystems due to conversion from forest to agricultural use, conversion of mature native longleaf pine forests to short-rotation loblolly pine planted stands, and removal from the wildland-urban interface.

This 2020 update provides the latest census of the status and dynamics of the region's longleaf pine resource, using the most recent complete periodic inventory data from the nine States where the presence of longleaf pine is currently reported (table 1). For trends over time, the 2012 report<sup>3</sup> (Oswalt et al. 2012) was based on 2010 data for each of the eight States represented in that report. As a result, the duration of time between the 2012 report and this 2020 update varies by State, from 6 years (Florida and Louisiana) to 9 years (Alabama and North Carolina). Note that since 2012, FIA plots with longleaf pine have been measured in Virginia, so the range of the species has expanded from eight to nine States.

**Table 1—Most recent complete annual inventory by Forest Inventory and Analysis (FIA), by State and year**

| State          | Current (most recent) |
|----------------|-----------------------|
| Alabama        | 2019                  |
| Florida        | 2016                  |
| Georgia        | 2017                  |
| Louisiana      | 2016                  |
| Mississippi    | 2018                  |
| North Carolina | 2019                  |
| South Carolina | 2018                  |
| Texas          | 2017                  |
| Virginia       | 2017                  |

\*Compare to Table 1 in Oswalt et al. (2012)

<sup>2</sup> The reports also provide information on the translocation of the endangered red-cockaded woodpecker in an effort to broaden the regional recovery of that species.

<sup>3</sup> In this 2020 update, references to the "2012 report" all refer to the following publication: Oswalt, Christopher M.; Cooper, Jason A.; Brockway, Dale G.; Brooks, Horace W.; Walker, Joan L.; Connor, Kristina F.; Oswalt, Sonja N.; Conner, Roger C. 2012. History and current condition of longleaf pine in the Southern United States. Gen. Tech. Rep. SRS-166. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 51 p. Available at: <https://www.fs.usda.gov/treearch/pubs/42259>.



## Area of Longleaf Pine Forest Types by State

This 2020 update reports that there are 4.517 million acres of longleaf pine forest types across the region (table 2). Of that, 3.721 million acres (82 percent) are in the longleaf pine-dominant forest types, and 796,000 acres are in the longleaf pine/oak type. Four States each have >500,000 acres of longleaf pine-dominant forest types: Florida (1,281,000 acres), Alabama (909,000 acres), Georgia (716,000 acres), and South Carolina (611,000 acres). These four States represent 78 percent of the longleaf pine-dominant area across the region. West of the Mississippi River, Louisiana and Texas together support 244,000 acres of longleaf pine-dominant forest types, roughly 5 percent of the southwide total. In the 2020 update, the State of Virginia shows 10,267 acres of longleaf pine-dominant forest types, a new addition since the 2012 report.

These data represent a net increase of 232,000 acres of longleaf pine and longleaf pine/oak forest types combined since the 2012 report. Thus, longleaf pine-dominant stands have increased in area between the two reports, and the declines observed in the latter half of the 20th century seem to have been reversed. But those who are interested in the regional recovery of longleaf pine ecosystems, especially in light of the 8 million-acre goal set by the ALRI Range-wide Conservation Plan (2009), will realize that a gain of this magnitude is only a fraction of the total gain needed.

The 232,000-acre net increase hides differences since the 2012 report between the longleaf pine type and the longleaf pine/oak type. The longleaf pine type has increased by almost 421,000 acres over that time, an excellent trend



Longleaf Ridge, Kisatchie National Forest.





Longleaf pine stand, Jones Center, southwest Georgia.

**Table 2—Area of all forest land within each State and within the specific forest type groups longleaf pine/slash pine (with longleaf pine and slash pine forest types) and oak/pine (with longleaf pine/oak and all other oak/pine forest types)**

| State                 | Longleaf/Slash Pine |               |            | Oak/Pine          |            | Longleaf-dominated types |
|-----------------------|---------------------|---------------|------------|-------------------|------------|--------------------------|
|                       | Total forest land   | Longleaf pine | Slash pine | Longleaf pine/oak | All others |                          |
|                       | ----- acres -----   |               |            |                   |            |                          |
| All                   | 158,735,850         | 3,721,493     | 9,295,848  | 795,625           | 14,402,037 | 4,517,118                |
| Alabama               | 23,104,630          | 736,341       | 395,254    | 172,531           | 2,570,577  | 908,872                  |
| Florida               | 17,052,566          | 1,000,538     | 4,626,279  | 280,940           | 1,246,710  | 1,281,478                |
| Georgia               | 24,520,480          | 580,181       | 2,945,625  | 136,054           | 2,645,826  | 716,235                  |
| Louisiana             | 15,048,767          | 177,837       | 577,915    | 27,038            | 1,113,388  | 204,875                  |
| Mississippi           | 19,244,569          | 286,694       | 552,046    | 59,423            | 1,778,520  | 346,117                  |
| North Carolina        | 18,750,217          | 386,981       | 50,808     | 10,543            | 2,256,090  | 397,524                  |
| South Carolina        | 12,857,041          | 510,236       | 64,028     | 100,908           | 1,404,868  | 611,144                  |
| Texas (east)          | 12,091,370          | 32,418        | 83,893     | 8,188             | 1,386,058  | 40,606                   |
| Virginia              | 16,066,210          | 10,267        | —          | —                 | —          | 10,267                   |
| LLP-dominated forests | 4,517,118           | 231,764       |            |                   |            |                          |

Note: longleaf pine-dominated forest types are defined as the longleaf pine and longleaf pine/oak forest types. Estimates prepared March 2020. Slash pine, longleaf pine/oak, and all other types were not observed in the State of Virginia during this time period.

\*Compare to Table 2 in Oswalt et al. (2012). Total forest land is not comparable due to changes in regions/sub-regions used. Totals of longleaf forest types are comparable.



that suggests the work of landowners and land managers to establish new stands of longleaf pine, use prescribed burning for hardwood mid-story reduction, and perhaps bring mixed stands of longleaf pine and other species increasingly to longleaf dominance, may be effective. NRCS and NFWF have funded work along these lines.

In contrast, the 232,000-acre net gain is balanced by a decline of 189,000 acres in the longleaf pine/oak type. Additional study is needed to decipher the reason(s) for this decline, but it may be reflective of these stands transitioning to either longleaf pine dominance or to oak dominance. It is possible that on a subset of these acres, the hardwood component has been reduced through mid-story removal, prescribed burning, or other silvicultural tools advocated by longleaf practitioners, resulting in the conversion of longleaf pine/oak stands to longleaf pine stands. Or, it is possible that active or passive management has reduced the longleaf component, leading to hardwood dominance.

There's a curious observation in the ratio of the longleaf pine/oak type as a percentage of overall forest area in the two dominant longleaf pine types. Southwide, 796,000 acres of the 4.517 million acres total area of longleaf pine-dominated forest types is in the longleaf pine/oak type. Most States are within a percentage point or two of this regional average; Florida has a slightly larger percentage of its longleaf pine types as longleaf pine/oak (21.9 percent), and Louisiana has a slightly lower percentage (13.2 percent). Note that in North Carolina, data show that the State has only 10,500 acres in the longleaf pine/oak type, but this is a sampling artifact caused by the presence of only a few FIA inventory plots in that forest type.



Retaining longleaf pine while thinning mixed stands will increase its dominance as the stand matures, Francis Marion National Forest.





In this mixed stand, slash pine was harvested and longleaf pine retained to develop into a dominant longleaf stand suitable for the red-cockaded woodpecker, Conecuh National Forest.

**Table 3—Percent of forest land classified as longleaf pine or longleaf pine/oak forest type by State**

| State          | Longleaf Pine       | Longleaf pine/<br>oak | All         |
|----------------|---------------------|-----------------------|-------------|
|                | ----- percent ----- |                       |             |
| <b>All</b>     | <b>2.17</b>         | <b>0.46</b>           | <b>2.63</b> |
| Alabama        | 3.18                | 0.70                  | 3.88        |
| Florida        | 5.87                | 1.65                  | 7.51        |
| Georgia        | 2.37                | 0.55                  | 2.92        |
| Louisiana      | 1.18                | 0.18                  | 1.36        |
| Mississippi    | 1.49                | 0.31                  | 1.80        |
| North Carolina | 2.06                | 0.06                  | 2.12        |
| South Carolina | 3.97                | 0.78                  | 4.75        |
| Texas (east)   | 0.27                | 0.07                  | 0.34        |
| Virginia       | 0.06                | 0.00                  | 0.06        |

Estimates prepared March 2020.

\*Compare to Table 3 in Oswalt et al. (2012). Overall total is comparable. Regional sub-totals are not comparable

The percent of forest land classified as the longleaf pine type or the longleaf pine/oak type averages 2.63 percent—slightly more than 1 in 40 acres (table 3). The longleaf pine type occupies 2.17 percent of forest land, and 0.46 percent is in the longleaf pine/oak type. Florida has the highest percentage, with 1 in 15 acres of forest land in longleaf pine or longleaf pine/oak forest types. Three States—South Carolina, Alabama, and Georgia—exceed the combined average of 1 acre in 40 in longleaf forest types. These observations highlight the importance of efforts to restore this species and the unique habitat for flora and fauna that it supports.

The percentages of forest land occupied by longleaf-dominant forest types have improved since the 2012 report, which showed 1 acre in 50 in longleaf pine southwide and longleaf



pine types occupying about 75 percent of the combined longleaf-dominant types. This change in percentages may reflect a change in overall forest land area between the 2012 report and the current work. However, if the denominator of these percentages varied widely from 2012 to 2020, that would affect these percentages.

The longleaf pine type has had losses and gains in area relative to other forest types since the 2012 report (table 4). The largest loss is 4.24 percent of longleaf pine area—about 1 in 20 acres—that is now in the loblolly pine type. Anecdotal observations across the Southern States over the past four decades shows how planted loblolly pine stands have increasingly come to dominate the forest land base of the South, at the expense of naturally-regenerated pine-dominated types, including longleaf pine. However, data show that 4.39 percent of longleaf pine area has been recruited from the loblolly pine type (table 4), reflecting the actions of landowners trying to replace loblolly pine stands with new longleaf pine stands, or taking other actions such as thinning to restore pine stands to longleaf dominance. The other significant loss is 3.23 percent of the area of the longleaf pine type to the longleaf pine/oak type, perhaps reflecting a certain degree of inattentive management. But that loss is more than doubly offset by the 6.63-percent increase in area of stands going from longleaf pine/oak to the longleaf pine type. These numbers corroborate data in table 2 showing the increase of longleaf pine area and the decrease in longleaf pine/oak area since the 2012 report.

**Table 4—Estimated losses and gains to the longleaf pine forest type as compared to previous inventories**

| Forest type                     | Losses <sup>1</sup> | Gains <sup>2</sup> |
|---------------------------------|---------------------|--------------------|
| ----- percent -----             |                     |                    |
| Longleaf pine /oak              | 3.23                | 6.63               |
| Southern scrub oak              | 0.29                | 0.85               |
| Shortleaf pine                  | —                   | 0.27               |
| Sand pine                       | 0.26                | 0.52               |
| Slash pine/hardwood             | 0.10                | 0.30               |
| Sweetbay/swamp tupelo/red maple | 0.02                | 0.19               |
| Loblolly pine                   | 4.24                | 4.39               |
| Loblolly pine/hardwood          | 0.71                | 0.81               |
| Post oak/blackjack oak          | —                   | 0.10               |
| White oak/red oak/hickory       | 0.13                | 0.20               |
| Other pine/hardwood             | —                   | 0.06               |
| Sassafras/persimmon             | 0.39                | 0.45               |
| Baldcypress/pondcypress         | —                   | 0.04               |
| Melaleuca                       | —                   | 0.03               |
| Sweetgum/Nutall oak/willow oak  | 0.04                | 0.04               |
| Willow                          | 0.00                | —                  |
| Pond pine                       | 0.12                | 0.10               |
| Sweetgum/yellow-poplar          | 0.29                | 0.26               |
| Cherry/white ash/yellow-poplar  | 0.11                | —                  |
| Mixed upland hardwoods          | 1.25                | 1.10               |
| Other exotic hardwoods          | 0.16                | —                  |
| Virginia pine                   | 0.18                | —                  |
| Slash pine                      | 1.62                | 1.36               |

Estimates prepared March 2020.

<sup>1</sup>Percent of longleaf pine acreage of previous inventory lost to each forest type.

<sup>2</sup>Percent of longleaf pine acreage of current inventory gained from each forest type.

\*Compare to Table 4 in Oswalt et al. (2012). Losses and gains can be compared, but some data overlap. Additionally, the estimates above are generated from a subset of all forested plots. Only plots measured at both periods and containing longleaf pine at either Time 1 or Time 2 are included. Direct comparisons of losses and gains to totals represented in other tables should be avoided.

## Area of Longleaf Pine by Ownership Class

Of the 4.517 million acres in the longleaf pine and longleaf pine/oak types southwide, 2.8 million acres (61.8 percent) are found on private ownerships (table 5c). The balance is in various public ownerships, including National Forests (16 percent), States (9.9 percent), and the Department of Defense (9.7 percent). The percentage on private ownerships by State varies widely, ranging from 100 percent (of only 10,000 acres) in Virginia, 88.6 percent in Georgia, and 76.1 percent in Alabama, to lows of 44 percent in Florida and Mississippi. In the public sector, the Department of Defense is responsible for >20 percent of a State's longleaf pine and longleaf pine/oak forest area in North Carolina and Louisiana, 14.2 percent in Florida, and 9.9 percent in South Carolina. State agencies have 22 percent of area in these two forest types in Florida, 12.7 percent in North Carolina, and 10.8 percent in South Carolina. National Forests make up a large percentage of area in these two forest types in Mississippi (51 percent), Louisiana (48.3 percent), and Texas (40.7 percent, but only 16,000 acres in area).

These trends are similar when subdividing the area of longleaf pine in the longleaf pine type or the longleaf pine/oak type by ownership class (tables 5a and 5b, respectively.) Of the six States with >250,000 acres in the longleaf pine type, private landowners have 78 percent in Alabama, 92.8 percent in Georgia, 63.3 percent in North Carolina, and 64.7 percent in South Carolina; whereas public landowners manage 60.3 percent in Florida and 59.4 percent in Mississippi. Of the four States with >100,000 acres of longleaf pine/oak type, private landowners own the majority in each State: 60.3 percent of this type in Florida, 67.7 percent in Alabama, 70.7 percent in Georgia, and 80 percent in North Carolina.

When compared to the 2012 report, the 232,000-acre increase in the combined longleaf pine and longleaf pine/oak types is more or less equally split between Department of Defense and private ownership. National Forests have increased slightly, but the data that underlie the 2020 update do not reflect the emphasis that the Southern Region is now giving to the Million-Acre Challenge.

Our analysis shows that in the longleaf pine type alone, there is a 421,000-acre increase in the longleaf pine-dominated forest type, an increase of 12.7 percent since the 2012 report. Three-quarters of this increase is in the private ownership sector, up 33 percent since the 2012 report. Other sectors that show an increase in this 2020 update are National Forests, up 30,000 acres (a 5-percent increase since the 2012 report), Department of Defense (up 96,000 acres, a 36-percent increase), and State lands (up 29,500 acres, a 9-percent increase). The data suggest that the largest decline is in the Other Federal land category, which dropped nearly 46,000 acres, an 85-percent decline; however, additional work is needed to better understand this minor decline.

Conversely, longleaf pine/oak forest type area has declined by 189,000 acres, down 19 percent since the 2012 report. About 94 percent of this decline is in the private sector. However, table 5a shows a 315,000-acre increase in longleaf pine-dominated forest type, so it is reasonable to infer that some to the decline in the longleaf pine/oak type was offset by management to improve longleaf dominance. A similar argument could be made for the ~37,000-acre decline shown in the State-owned longleaf pine/oak type; table 5a shows an increase in longleaf-dominant stands on State lands of ~29,000 acres.



**Table 5a—Area of forest land by longleaf pine forest type, State, and ownership class**

| State          | Total     | National Forest | Fish and Wildlife Service | Dept of Defense | Other Federal | State   | County and Municipal | Private   |
|----------------|-----------|-----------------|---------------------------|-----------------|---------------|---------|----------------------|-----------|
| <i>acres</i>   |           |                 |                           |                 |               |         |                      |           |
| All            | 3,721,494 | 624,382         | 48,859                    | 360,830         | 7,965         | 364,652 | 34,410               | 2,280,395 |
| Alabama        | 736,341   | 116,446         | —                         | 20,212          | —             | 12,950  | 12,180               | 574,553   |
| Florida        | 1,000,538 | 193,675         | 6,204                     | 153,976         | 3,250         | 230,415 | 16,251               | 396,767   |
| Georgia        | 580,181   | 5,908           | 5,906                     | 22,143          | —             | 7,542   | —                    | 538,681   |
| Louisiana      | 177,837   | 92,275          | —                         | 32,719          | —             | 1,549   | —                    | 51,294    |
| Mississippi    | 286,694   | 158,448         | —                         | —               | —             | 5,993   | 5,979                | 116,274   |
| North Carolina | 386,981   | 12,857          | 6,168                     | 83,269          | —             | 39,913  | —                    | 244,773   |
| South Carolina | 510,236   | 30,185          | 30,581                    | 48,510          | 4,715         | 66,289  | —                    | 329,955   |
| Texas (east)   | 32,418    | 14,587          | —                         | —               | —             | —       | —                    | 17,831    |
| Virginia       | 10,267    | —               | —                         | —               | —             | —       | —                    | 10,267    |

**Table 5b—Area of forest land by longleaf pine/oak forest type, State, and ownership class**

| State          | Total   | National Forest | Fish and Wildlife Service | Dept of Defense | Other Federal | State  | County and Municipal | Private |
|----------------|---------|-----------------|---------------------------|-----------------|---------------|--------|----------------------|---------|
| <i>acres</i>   |         |                 |                           |                 |               |        |                      |         |
| All            | 795,624 | 99,529          | 6,221                     | 76,290          | 1,625         | 83,528 | 15,363               | 513,068 |
| Alabama        | 172,531 | 44,714          | —                         | —               | —             | 5,238  | 5,780                | 116,800 |
| Florida        | 280,940 | 25,931          | —                         | 28,625          | 1,625         | 51,233 | 4,257                | 169,270 |
| Georgia        | 136,054 | —               | —                         | 23,383          | —             | 16,515 | —                    | 96,156  |
| Louisiana      | 27,038  | 6,781           | —                         | 12,351          | —             | —      | —                    | 7,906   |
| Mississippi    | 59,423  | 18,244          | —                         | —               | —             | —      | 5,327                | 35,852  |
| North Carolina | 10,543  | —               | —                         | —               | —             | 10,543 | —                    | —       |
| South Carolina | 100,908 | 1,908           | 6,221                     | 11,931          | —             | —      | —                    | 80,847  |
| Texas (east)   | 8,188   | 1,950           | —                         | —               | —             | —      | —                    | 6,237   |
| Virginia       | —       | —               | —                         | —               | —             | —      | —                    | —       |

**Table 5c—Area of forest land by longleaf pine-dominated forest types, State, and ownership class**

| State          | Total     | National Forest | Fish and Wildlife Service | Dept of Defense | Other Federal | State   | County and Municipal | Private   |
|----------------|-----------|-----------------|---------------------------|-----------------|---------------|---------|----------------------|-----------|
| <i>acres</i>   |           |                 |                           |                 |               |         |                      |           |
| All            | 4,517,118 | 723,911         | 55,080                    | 437,120         | 9,590         | 448,180 | 49,773               | 2,793,463 |
| Alabama        | 908,872   | 161,160         | —                         | 20,212          | —             | 18,188  | 17,960               | 691,353   |
| Florida        | 1,281,478 | 219,606         | 6,204                     | 182,601         | 4,875         | 281,648 | 20,508               | 566,037   |
| Georgia        | 716,235   | 5,908           | 5,906                     | 45,526          | —             | 24,057  | —                    | 634,837   |
| Louisiana      | 204,875   | 99,056          | —                         | 45,070          | —             | 1,549   | —                    | 59,200    |
| Mississippi    | 346,117   | 176,692         | —                         | —               | —             | 5,993   | 11,306               | 152,126   |
| North Carolina | 397,524   | 12,857          | 6,168                     | 83,269          | —             | 50,456  | —                    | 244,773   |
| South Carolina | 611,144   | 32,093          | 36,802                    | 60,441          | 4,715         | 66,289  | —                    | 410,802   |
| Texas (east)   | 40,606    | 16,537          | —                         | —               | —             | —       | —                    | 24,068    |
| Virginia       | 10,267    | —               | —                         | —               | —             | —       | —                    | 10,267    |

Estimates prepared March 2020.

\*Compare to Table 5 in Oswalt et al. (2012). Overall total is comparable. Regional sub-totals are not comparable

## Area of Longleaf Pine by Stand Age

The data in table 6c show the distribution of area in longleaf pine and longleaf pine/oak types by age class. Southwide, the 0–10 and 11–20 year age classes contain by far the most area in longleaf pine—781,000 acres and 724,000 acres, respectively. From the 21–30 year age class through the 71–80 year age class, the 10-year age classes average more than 400,000 acres each, with a low of 380,000 acres in the 31–40 year age class to a high of 464,000 acres in the 51–60 year age class, pointing to a certain measure of stability through those age classes. The area of longleaf pine types drops to 263,000 acres in the 81–90 year age class, to 110,000 acres in the 91–100 year age class, and to 30,000 acres in the age classes >100 years old. These age classes were young stands when the period of exploitation of southern pines was reaching its conclusion prior to 1940.



Planted longleaf pine stand between 5 and 10 years old, Winn Ranger District, Kisatchie National Forest.

The data trends show that efforts to get new age classes of longleaf pine are successful. Across the region, 1.505 million acres in these two types are in the 0–20 year age classes, almost exactly one-third of the total 4.517 million acres found southwide. The distribution of these young stands varies by State. At the upper end of the range, more than half (53.6 percent) of the combined longleaf types in Georgia are in the 0–20 year age classes, as is almost half (47.2 percent) of the two types in Alabama. The proportion is lower in the western part of the range; only 19.2 percent of longleaf forest types in Mississippi, 17.5 percent in Louisiana, and 5.1 percent in Texas are in these 0–20 year age classes. This is due to the fact that those three States have high proportions of longleaf pine on Federal lands, especially National Forests, where management of the species is dedicated to mature, open pine woodlands on rotations of 80 to 120 years. As the Million-Acre Challenge develops, the area in young stands should increase in these States.

Longleaf pine forest types >80 years old cover 403,000 acres across the South, slightly <10 percent of the entire area of longleaf pine in the South. Florida has the largest share of that (124,000 acres, 30.7 percent), and three other States each account for >16 percent of the area in this age group—South Carolina (69,000 acres), North Carolina (68,000 acres), and Alabama (67,000 acres).

Our analysis of 2020 data compared to 2012 data (Oswalt et al. 2012) indicates the largest net gains in the combined area of the two longleaf pine-dominant types are in the youngest age classes. Unfortunately, there has been a 243,000-acre loss of forest area in the 41–80 year age classes, about a 12-percent loss from the 2012 report. That loss is partly balanced by a 138,000-increase in forest area in the 80-year and older age classes, a 52-percent increase in those age classes since the 2012 report. In summary, these data reflect the ongoing efforts to establish new longleaf pine stands, as well as



**Table 6a—Area of forest land by longleaf pine forest type, State, and stand-age class**

| State             | All Classes | Stand age (years) |         |         |         |         |         |         |         |         |        |        |
|-------------------|-------------|-------------------|---------|---------|---------|---------|---------|---------|---------|---------|--------|--------|
|                   |             | 0-10              | 11-20   | 21-30   | 31-40   | 41-50   | 51-60   | 61-70   | 71-80   | 81-90   | 91-100 | 100+   |
| ----- acres ----- |             |                   |         |         |         |         |         |         |         |         |        |        |
| All               | 3,721,494   | 656,699           | 631,761 | 404,400 | 289,284 | 355,065 | 326,125 | 365,329 | 341,882 | 232,421 | 93,911 | 24,618 |
| Alabama           | 736,341     | 167,786           | 190,642 | 63,845  | 32,900  | 53,999  | 55,225  | 72,078  | 37,277  | 51,049  | 11,540 | —      |
| Florida           | 1,000,538   | 88,735            | 131,663 | 80,920  | 129,058 | 109,315 | 96,641  | 138,192 | 126,275 | 63,572  | 24,236 | 11,931 |
| Georgia           | 580,181     | 213,494           | 154,570 | 25,470  | 18,246  | 35,324  | 34,897  | 22,189  | 39,680  | 11,948  | 18,320 | 6,043  |
| Louisiana         | 177,837     | 15,259            | 4,525   | 28,028  | 6,785   | 24,631  | 17,882  | 31,329  | 31,766  | 13,786  | 3,847  | —      |
| Mississippi       | 286,694     | 30,232            | 18,298  | 38,585  | 25,350  | 41,082  | 49,807  | 47,117  | 26,552  | 5,943   | 3,728  | —      |
| North Carolina    | 386,981     | 62,587            | 60,122  | 26,530  | 38,754  | 45,139  | 21,451  | 14,769  | 49,703  | 42,591  | 19,167 | 6,168  |
| South Carolina    | 510,236     | 68,338            | 69,872  | 132,839 | 33,170  | 43,506  | 50,222  | 24,580  | 30,627  | 43,532  | 13,073 | 477    |
| Texas (east)      | 32,418      | —                 | 2,069   | 8,183   | 5,021   | 2,069   | —       | 15,075  | —       | —       | —      | —      |
| Virginia          | 10,267      | 10,267            | —       | —       | —       | —       | —       | —       | —       | —       | —      | —      |

**Table 6b—Area of forest land by longleaf pine/oak forest type, State, and stand-age class**

| State             | All Classes | Stand age (years) |        |        |        |        |         |        |        |        |        |       |
|-------------------|-------------|-------------------|--------|--------|--------|--------|---------|--------|--------|--------|--------|-------|
|                   |             | 0-10              | 11-20  | 21-30  | 31-40  | 41-50  | 51-60   | 61-70  | 71-80  | 81-90  | 91-100 | 100+  |
| ----- acres ----- |             |                   |        |        |        |        |         |        |        |        |        |       |
| All               | 795,624     | 124,724           | 92,670 | 47,893 | 90,703 | 63,701 | 137,691 | 92,578 | 93,167 | 30,542 | 15,912 | 6,043 |
| Alabama           | 172,531     | 39,789            | 30,542 | 6,085  | 5,951  | 11,062 | 27,261  | 20,904 | 26,397 | 4,541  | —      | —     |
| Florida           | 280,940     | 32,561            | 19,929 | 20,244 | 50,732 | 21,570 | 44,492  | 34,894 | 32,262 | 13,862 | 10,395 | —     |
| Georgia           | 136,054     | 6,049             | 9,758  | 14,005 | 12,432 | 6,059  | 36,133  | 22,288 | 17,769 | —      | 5,518  | 6,043 |
| Louisiana         | 27,038      | 3,193             | 12,847 | —      | —      | 4,713  | 6,285   | —      | —      | —      | —      | —     |
| Mississippi       | 59,423      | 9,384             | 8,609  | 1,981  | 11,562 | 8,968  | 9,812   | 4,147  | 4,959  | —      | —      | —     |
| North Carolina    | 10,543      | 4,375             | —      | —      | 6,168  | —      | —       | —      | —      | —      | —      | —     |
| South Carolina    | 100,908     | 29,373            | 10,985 | 5,578  | 1,908  | 11,329 | 7,473   | 10,344 | 11,780 | 12,138 | —      | —     |
| Texas (east)      | 8,188       | —                 | —      | —      | 1,950  | —      | 6,237   | —      | —      | —      | —      | —     |
| Virginia          | —           | —                 | —      | —      | —      | —      | —       | —      | —      | —      | —      | —     |

**Table 6c—Area of forest land by longleaf pine-dominated forest types, State, and stand-age class**

| State             | All Classes | Stand age (years) |         |         |         |         |         |         |         |         |         |        |
|-------------------|-------------|-------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--------|
|                   |             | 0-10              | 11-20   | 21-30   | 31-40   | 41-50   | 51-60   | 61-70   | 71-80   | 81-90   | 91-100  | 100+   |
| ----- acres ----- |             |                   |         |         |         |         |         |         |         |         |         |        |
| All               | 4,517,118   | 781,423           | 724,431 | 452,293 | 379,987 | 418,766 | 463,816 | 457,907 | 435,049 | 262,963 | 109,823 | 30,661 |
| Alabama           | 908,872     | 207,575           | 221,184 | 69,930  | 38,851  | 65,061  | 82,486  | 92,982  | 63,674  | 55,590  | 11,540  | —      |
| Florida           | 1,281,478   | 121,296           | 151,592 | 101,164 | 179,790 | 130,885 | 141,133 | 173,086 | 158,537 | 77,434  | 34,631  | 11,931 |
| Georgia           | 716,235     | 219,543           | 164,328 | 39,475  | 30,678  | 41,383  | 71,030  | 44,477  | 57,449  | 11,948  | 23,838  | 12,086 |
| Louisiana         | 204,875     | 18,452            | 17,372  | 28,028  | 6,785   | 29,344  | 24,167  | 31,329  | 31,766  | 13,786  | 3,847   | —      |
| Mississippi       | 346,117     | 39,616            | 26,907  | 40,566  | 36,912  | 50,050  | 59,619  | 51,264  | 31,511  | 5,943   | 3,728   | —      |
| North Carolina    | 397,524     | 66,962            | 60,122  | 26,530  | 44,922  | 45,139  | 21,451  | 14,769  | 49,703  | 42,591  | 19,167  | 6,168  |
| South Carolina    | 611,144     | 97,711            | 80,857  | 138,417 | 35,078  | 54,835  | 57,695  | 34,924  | 42,407  | 55,670  | 13,073  | 477    |
| Texas (east)      | 40,606      | —                 | 2,069   | 8,183   | 6,971   | 2,069   | 6,237   | 15,075  | —       | —       | —       | —      |
| Virginia          | —           | —                 | 44,155  | —       | —       | —       | —       | —       | —       | —       | —       | —      |

Estimates prepared March 2020.

\*Compare to Table 6 in Oswalt et al. (2012). Overall total is comparable. Regional sub-totals are not comparable.



Mature, well-burned longleaf pine stand, North Carolina Sandhills.

efforts to develop older age classes, which are of extraordinary value to the species of flora and fauna adapted to longleaf ecosystems.

These trends since 2012 are reflected in the longleaf pine-dominant forest type (table 6a) where stands from age 0 to age 20 account for 34.6 percent of total area. Together, Georgia and Alabama account for more than half of the area in that age group, and five States (those two plus Florida, North Carolina, and South Carolina) hold 1.207 million acres, or 93.7 percent of the area, in this 0–20 age class. The six 10-year age classes from 21–30 years to 71–80 years average 347,000 acres of longleaf pine area, and the age classes >80 years old occupy another 351,000 acres. Similarly, the data in table 6a show a 421,000-acre increase in area in the longleaf pine type, as previously noted, and

that 100 percent of this increase is in the 0–30 year age class. The ~132,000-acre decline in longleaf pine-dominant type in the 41–80 year age classes is balanced by an approximately equal increase in area in age classes older than 80 years.

There is a little more variability in the longleaf pine/oak type by age class (table 6b) as of this 2020 update. Stands in age classes 0–20 years account for 27.3 percent of the total 796,000 area in the longleaf pine/oak type, and three-quarters of the area in this age group is found in three States—Alabama, Florida, and South Carolina. In Alabama, 40 percent of the longleaf pine/oak type area is found in the 0–20 age class.

Between the 2012 report and the 2020 update, the area in longleaf pine/oak type declined across all age classes by ~19 percent. The 0–40





Mature, well-burned longleaf pine stand, North Carolina Sandhills.

year age class shows a loss of ~85,000 acres, and the 41–80 year age class has declined by ~110,000 acres. Some variations are difficult to explain; for example, the area in the 0–10 age class dropped by 30 percent, perhaps reflecting better plantation establishment to develop pine-dominant young stands. Conversely, the area in the 11–20 age class increased by 28 percent, perhaps suggesting an age when hardwoods catch up with planted pines.

The nadir of the area of longleaf pine forest types was reported around 1990, 30 years prior to this 2020 update. Figure 1 captures the data from tables 6a and 6b, and the low status of the 31–40 year age class relative to older and especially younger age classes suggests that nadir in the age-class distribution of these forest types. The better story, as told above, is the response since

1990, displayed in the area of longleaf pine types found in the 0–20 age classes. That will provide the ingrowth to feed the future development of the area occupied by these forest types into the 21–30 year and the 31–40 year age classes over the next two decades.

Comparing figure 1 (A) with figure 1 (B) in the 2012 report demonstrates the success of these ongoing efforts to recover the longleaf pine-dominant forest types. The differences are most pronounced in the 11–20 year age class, where longleaf pine-dominated forest land area has nearly doubled from the 2012 report to the 2020 update. Similarly, the area in the 81–90 year age class also has nearly doubled; this is the ideal condition class for mature open forest and woodland habitat for flora and fauna adapted to these longleaf pine forest types.

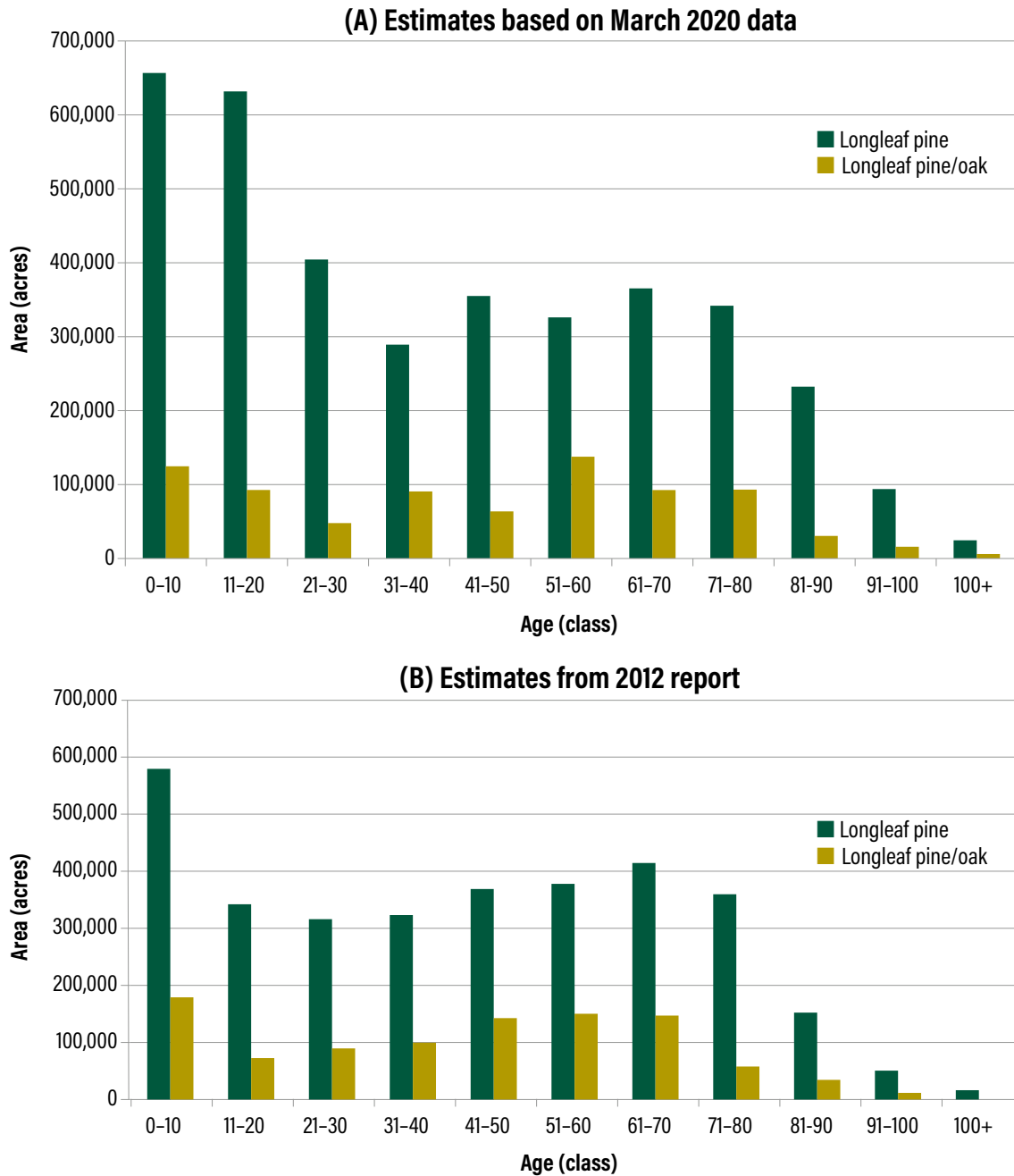


Figure 1—Area of forest land by longleaf pine-dominated forest type and 10-year stand-age class.



## Longleaf Pine Stand Origin

FIA field crews assess whether a stand is planted or of natural origin when they conduct their fieldwork, and this is a useful metric to evaluate whether landowners are using planting or natural regeneration to manage their longleaf pine stands. Of the 4.517 million acres of longleaf pine across the South in the two dominant longleaf pine types, 1.659 million acres, or slightly more than one-third of the total area, show clear evidence of planted origin (table 7c). About 421,000 acres, or one-quarter of the area in planted longleaf stands southwide, are in Georgia, where the area of planted stands is 58.7 percent of the area of longleaf-dominant stand types in the State. Alabama also has about 412,000 acres, or one-quarter of the area of planted longleaf stands southwide, and these account for 45.4 percent of the longleaf pine-dominant forest types in that State. The three States of Florida, North Carolina, and South Carolina together have 727,000 acres of planted longleaf pine,

43.7 percent of the southwide total. All of the 10,500 acres of longleaf pine reported in Virginia are planted, as one might expect in a State where FIA plots reported no longleaf pine in the 2012 report.

These trends, again, are similar for the longleaf pine type only (table 7A). Southwide, 39.4 percent of the forest area in the longleaf pine type is planted. The longleaf pine type accounts for 82 percent of all longleaf types but has 88.4 percent of all planted longleaf pine southwide. The five States having the most planted longleaf in the longleaf pine type are Georgia, Alabama, Florida, South Carolina, and North Carolina, which collectively have 94.6 percent of area of all planted longleaf pine stands in this type. Conversely, the longleaf pine/oak type shows a bit more variation than the overall averages (table 7b). Southwide, the longleaf pine and longleaf pine/oak types combined account for 17.6 percent of all longleaf pine types, but only 11 percent of planted longleaf stands.



Planted longleaf pine stand on private land in Autauga County, AL.

The trends in longleaf pine stand origin data since the 2012 report show how far managers in the region have come with restoring longleaf pine to the landscape. Figure 10 in the 2012 report depicts the planted area in the longleaf pine and longleaf pine/oak types at 1.138 million acres; in this 2020 update, that number has increased to 1.659 million acres, an increase of more than 520,000 acres. In the 2012 report, the

longleaf pine-dominant forest type occupied 29 percent of area planted. These changes over time reflect the efforts on public and private lands to restore longleaf pine using planting, a tool that managers rely upon to restore longleaf pine on sites where it had been locally extirpated, on abandoned agricultural sites, or on forested sites where the mature longleaf component could not be relied upon to naturally regenerate.

**Table 7—Area of forest type by stand origin**

| State            | Longleaf pine forest |                |   | Longleaf pine/oak forest |                |   | Longleaf pine-dominated forest |                |   |
|------------------|----------------------|----------------|---|--------------------------|----------------|---|--------------------------------|----------------|---|
|                  | Total                | Natural stands | Clear evidence of artificial regeneration | Total                    | Natural stands | Clear evidence of artificial regeneration | Total                          | Natural stands | Clear evidence of artificial regeneration |
| ----- area ----- |                      |                |   |                          |                |   |                                |                |   |
| All              | 3,721,494            | 2,250,640      | 1,470,854                                 | 795,624                  | 607,164        | 188,460                                   | 795,624                        | 607,164        | 188,460                                   |
| Alabama          | 736,341              | 379,660        | 356,681                                   | 172,531                  | 116,716        | 55,816                                    | 172,531                        | 116,716        | 55,816                                    |
| Florida          | 1,000,538            | 746,374        | 254,165                                   | 280,940                  | 222,946        | 57,995                                    | 280,940                        | 222,946        | 57,995                                    |
| Georgia          | 580,181              | 182,573        | 397,608                                   | 136,054                  | 113,068        | 22,985                                    | 136,054                        | 113,068        | 22,985                                    |
| Louisiana        | 177,837              | 157,217        | 20,620                                    | 27,038                   | 17,064         | 9,974                                     | 27,038                         | 17,064         | 9,974                                     |
| Mississippi      | 286,694              | 238,336        | 48,358                                    | 59,423                   | 48,894         | 10,529                                    | 59,423                         | 48,894         | 10,529                                    |
| North Carolina   | 386,981              | 240,381        | 146,601                                   | 10,543                   | 6,168          | 4,375                                     | 10,543                         | 6,168          | 4,375                                     |
| South Carolina   | 510,236              | 273,681        | 236,555                                   | 100,908                  | 74,121         | 26,787                                    | 100,908                        | 74,121         | 26,787                                    |
| Texas (east)     | 32,418               | 32,418         | —   | 8,188                    | 8,188          | —   | 8,188                          | 8,188          | —   |
| Virginia         | 10,267               | —              | 10,267                                    | —                        | —              | —   | —                              | —              | —   |

Estimates prepared March 2020.

\*Compare to Figure 11a in Oswalt et al. (2012). General comparisons can be made between States and regions. Direct comparisons to regional sub-totals are not advised.



## Area of Longleaf Pine by Stand Size Class



The distribution of forest land area in the longleaf pine types subdivided by stand size suggests trends in forest stand dynamics similar to that found in the age class distribution (tables 8a-c). This 2020 update shows that large diameter classes (trees with d.b.h. >9.0 inches) account for almost half of the total forest land area in both longleaf pine types, combined [fig. 2 (A)], and the balance is split more or less equally between the medium (5 inches  $\leq$  d.b.h.  $\leq$  8.9 inches) and small size classes (d.b.h. <5 inches). The same pattern can be seen in the longleaf pine type, with the large diameter class roughly 75-percent greater than the medium and small size classes, which occupy more or less the same area (~1 million acres). The longleaf pine/oak type has a more balanced share of area among the large, medium, and small size classes (fig. 2), with the large and small diameter classes having slightly larger areas than the medium size class.



Recently burned longleaf pine overstory with palmetto understory, Harrison Experimental Forest, DeSoto National Forest (top) and medium-diameter size class, long leaf pine, Calcasieu Ranger District, Kisatchie National Forest, Vernon Parish, LA (bottom).

**Table 8a—Area of longleaf pine forest type by stand size class**

| State          | Total     | Stand-size class |                 |                |
|----------------|-----------|------------------|-----------------|----------------|
|                |           | Large diameter   | Medium diameter | Small diameter |
| All            | 3,721,494 | 1,703,199        | 1,023,678       | 994,617        |
| Alabama        | 736,341   | 292,426          | 233,334         | 210,581        |
| Florida        | 1,000,538 | 496,813          | 250,906         | 252,819        |
| Georgia        | 580,181   | 147,516          | 211,610         | 221,056        |
| Louisiana      | 177,837   | 136,521          | 18,728          | 22,587         |
| Mississippi    | 286,694   | 178,445          | 55,440          | 52,809         |
| North Carolina | 386,981   | 201,102          | 85,908          | 99,971         |
| South Carolina | 510,236   | 232,836          | 167,752         | 109,648        |
| Texas (east)   | 32,418    | 17,539           | —               | 14,878         |
| Virginia       | 10,267    | —                | —               | 10,267         |

**Table 8b—Area of longleaf pine/oak forest type by stand size class**

| State          | Total   | Stand-size class |                 |                |
|----------------|---------|------------------|-----------------|----------------|
|                |         | Large diameter   | Medium diameter | Small diameter |
| All            | 795,624 | 341,889          | 181,193         | 272,543        |
| Alabama        | 172,531 | 74,797           | 52,166          | 45,568         |
| Florida        | 280,940 | 128,177          | 62,448          | 90,316         |
| Georgia        | 136,054 | 57,720           | 31,758          | 46,575         |
| Louisiana      | 27,038  | 6,285            | —               | 20,754         |
| Mississippi    | 59,423  | 31,704           | 6,259           | 21,460         |
| North Carolina | 10,543  | —                | —               | 10,543         |
| South Carolina | 100,908 | 35,019           | 28,562          | 37,326         |
| Texas (east)   | 8,188   | 8,188            | —               | —              |
| Virginia       | —       | —                | —               | —              |

**Table 8c—Area of longleaf pine-dominated forest types by stand size class**

| State          | Total     | Stand-size class |                 |                |
|----------------|-----------|------------------|-----------------|----------------|
|                |           | Large diameter   | Medium diameter | Small diameter |
| All            | 4,517,118 | 2,045,088        | 1,204,871       | 1,267,160      |
| Alabama        | 908,872   | 367,223          | 285,500         | 256,149        |
| Florida        | 1,281,478 | 624,990          | 313,354         | 343,135        |
| Georgia        | 716,235   | 205,236          | 243,368         | 267,631        |
| Louisiana      | 204,875   | 142,806          | 18,728          | 43,341         |
| Mississippi    | 346,117   | 210,149          | 61,699          | 74,269         |
| North Carolina | 397,524   | 201,102          | 85,908          | 110,514        |
| South Carolina | 611,144   | 267,855          | 196,314         | 146,974        |
| Texas (east)   | 40,606    | 25,727           | —               | 14,878         |
| Virginia       | 10,267    | —                | —               | 10,267         |

Estimates prepared March 2020.

\*Compare to Table 8 in Oswalt et al. (2012). Calculated percent can be compared.



We compared current (2020) stand size class data with data presented in the 2012 report [fig. 2 (B)] and found a notable difference. In this report, the increased area found in the medium size class in both the combined longleaf types and the longleaf-dominant type is nearly

double that seen in the 2012 report. In terms of stand dynamics, that increase is driven by ingrowth from the small diameter class, and yet that small diameter class has remained stable despite showing a slight decrease in the total area and in the longleaf pine/oak type.

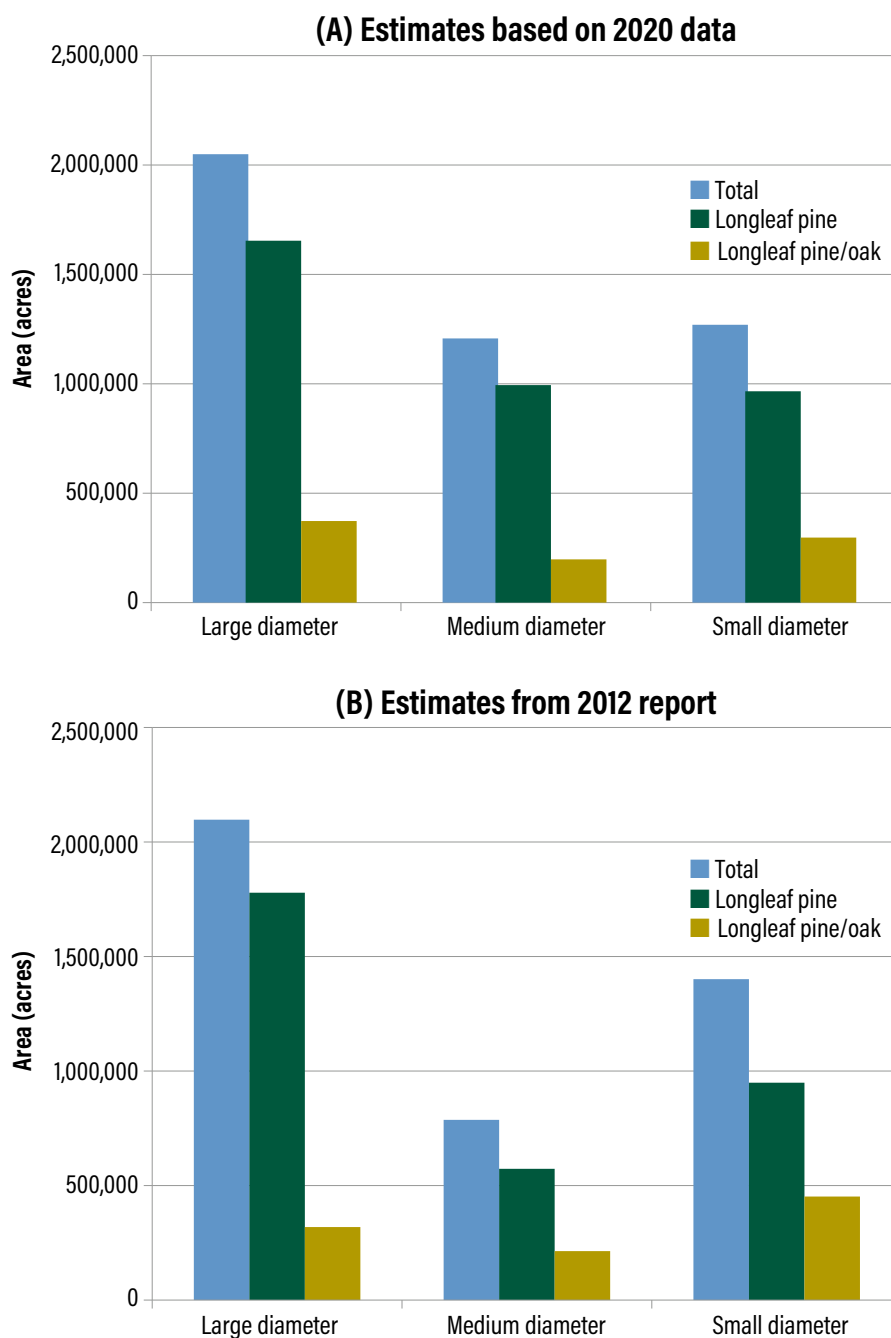


Figure 2—Area of forest land for longleaf pine-dominated forest types by stand size class.

## Number of Live Longleaf Pine Trees by Forest Type

As the Nation's forest census, the FIA database allows analysts to calculate absolute numbers of trees by species, forest type, and other subdivisions (see tables 9a-b and tables 10a-c). Longleaf pine trees (with d.b.h. >1.0 inch) are found in stands as a minor and varying component in dozens of forest types across the South. Data suggest there are 1.07 billion longleaf pines with d.b.h. >1 inch southwide (table 11), represented in 35 different FIA forest types. Of these >1 billion trees, roughly speaking, 15 percent are in the large diameter class, 25 percent in the medium diameter class, and 60 percent in the small diameter class.

Within the two dominant longleaf pine types across the South, there are slightly more than 900 million longleaf pines (table 11). The longleaf pine type has more than 823 million trees, and 56.96 percent of the total number of stems of all species with d.b.h. >1.0 inch in this type are longleaf pine. Compared to the 2012 report, this is a 22.4-percent increase in the number of longleaf pine trees in the longleaf pine type, but a 16.5-percent decrease in the percentage of longleaf pine trees relative to all trees in the type. The longleaf pine/oak type contains another 80 million trees; however, only 20.6 percent of stems >1 inch d.b.h. in this type are longleaf pine. Compared to the 2012 report, this is an 11.8-percent decrease in the number of longleaf pine trees in the longleaf pine/oak type, but a 10.6-percent increase in the percentage of longleaf pine trees relative to all trees in the type.

The five non-longleaf forest types that contain the most longleaf pine trees with d.b.h. >1.0 inch are also shown in table 11. Together, these five types contain 147 million longleaf pines, or 13.7 percent of the total number of longleaf pine trees with d.b.h. >1.0 inch across the South. For example, the loblolly pine type is the largest of all the forest types across the South; it includes 92 million longleaf pines with d.b.h. >1 inch, more than are found in the longleaf pine/oak type. However, the loblolly type has more than 36 billion trees southwide, so it should not be too surprising that the proportion of longleaf pine in that type is only a quarter of one percent. Similarly, 27.6 million longleaf pines with d.b.h. >1 inch are found in the slash pine type, and 27.2 million longleaf pines with d.b.h. >1 inch are also found in the next three types: the southern scrub oak type, the mixed upland hardwoods type, and the loblolly pine/hardwood type. Although FIA data cannot depict stand-level structure and species composition, it is possible that the longleaf pines in these non-longleaf forest types may be a minor but manageable component in some stands, such as mixed loblolly-longleaf stands where the loblolly only slightly outnumber the longleaf pines, or in mixed slash pine/longleaf pine stands west of the Mississippi River outside the native range of slash pine. Under these circumstances, practices that use thinning to harvest non-longleaf pines and retain longleaf, thereby increasing the dominance of longleaf pine in certain stands, might be a feasible management alternative in the loblolly and slash pine types on some ownerships (Guldin 2019).



**Table 9a—Number of live trees on forest land classified as longleaf pine forest type by state and diameter class**

| State         | All classes   | Diameter class |             |             |             |            |            |            |            |           |           |           |           |           |           |           |           |
|---------------|---------------|----------------|-------------|-------------|-------------|------------|------------|------------|------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|               |               | 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 | 21.0-22.9 | 23.0-24.9 | 25.0-26.9 | 27.0-28.9 | 29.0-30.9 | 31.0-32.9 |
| All           | 1,445,907,606 | 689,633,993    | 322,071,867 | 179,827,106 | 109,669,085 | 56,603,614 | 35,055,506 | 23,892,677 | 15,505,404 | 8,258,371 | 3,743,924 | 1,071,055 | 279,439   | 233,836   | 61,730    | —         | —         |
| Alabama       | 365,141,856   | 183,093,947    | 85,443,246  | 43,999,468  | 24,626,041  | 12,476,347 | 5,708,759  | 4,344,408  | 3,227,171  | 1,317,667 | 580,665   | 193,520   | 30,264    | 100,352   | —         | —         | —         |
| Florida       | 286,563,824   | 137,754,118    | 58,998,343  | 32,647,997  | 22,608,258  | 13,521,853 | 9,462,000  | 6,216,345  | 3,055,133  | 1,597,622 | 702,155   | —         | —         | —         | —         | —         | —         |
| Georgia       | 207,125,769   | 79,917,708     | 53,971,570  | 36,319,257  | 22,521,092  | 6,561,877  | 3,003,361  | 2,329,772  | 1,243,412  | 565,333   | 364,311   | 144,999   | 109,093   | 73,985    | —         | —         | —         |
| Louisiana     | 58,053,347    | 28,830,326     | 10,710,970  | 5,200,908   | 3,080,439   | 2,264,414  | 2,492,541  | 1,726,260  | 1,525,066  | 1,297,468 | 610,455   | 222,181   | 30,588    | —         | 61,730    | —         | —         |
| Mississippi   | 100,648,372   | 47,314,718     | 20,860,024  | 9,985,662   | 7,694,221   | 4,919,464  | 4,132,442  | 2,699,620  | 1,682,747  | 887,791   | 389,601   | 211,972   | 59,605    | 10,515    | —         | —         | —         |
| NorthCarolina | 138,866,199   | 62,095,495     | 31,652,304  | 16,076,527  | 9,767,002   | 6,197,703  | 5,276,255  | 3,218,165  | 2,521,810  | 1,252,371 | 592,461   | 179,576   | —         | 36,532    | —         | —         | —         |
| SouthCarolina | 268,439,537   | 134,322,704    | 59,321,407  | 34,122,370  | 18,828,763  | 10,309,985 | 4,758,006  | 3,004,225  | 1,957,577  | 1,177,455 | 492,540   | 107,070   | 37,437    | —         | —         | —         | —         |
| Texas(east)   | 16,676,647    | 11,912,922     | 1,314,004   | 1,474,928   | 543,268     | 351,972    | 222,142    | 353,882    | 292,487    | 162,664   | 117,37    | 11,737    | 12,452    | 12,452    | —         | —         | —         |
| Virginia      | 4,392,054     | —              | —           | —           | —           | —          | —          | —          | —          | —         | —         | —         | —         | —         | —         | —         | —         |

**Table 9b—Number of live trees on forest land classified as longleaf pine/oak forest type by state and diameter class**

| Foresttype group | All classes | Diameter class |            |            |            |           |           |           |           |           |           |           |           |           |           |           |           |
|------------------|-------------|----------------|------------|------------|------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                  |             | 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 | 21.0-22.9 | 23.0-24.9 | 25.0-26.9 | 27.0-28.9 | 29.0-30.9 | 31.0-32.9 |
| All              | 390,030,334 | 247,349,559    | 71,197,087 | 28,405,453 | 16,107,498 | 9,544,652 | 6,638,379 | 4,423,643 | 2,863,762 | 1,667,619 | 807,101   | 602,257   | 173,988   | 49,455    | 37,334    | 49,441    | 35,125    |
| Alabama          | 103,904,469 | 67,700,105     | 16,950,065 | 7,384,829  | 4,931,811  | 2,621,351 | 1,551,408 | 1,176,144 | 865,720   | 470,788   | 143,899   | 71,733    | —         | —         | —         | —         | 36,617    |
| Florida          | 120,547,925 | 73,683,838     | 22,632,593 | 9,785,356  | 5,169,561  | 3,140,733 | 2,592,511 | 1,544,615 | 855,567   | 594,216   | 225,194   | 183,416   | 67,866    | —         | 37,334    | —         | 35,125    |
| Georgia          | 50,522,644  | 29,662,618     | 9,922,878  | 4,624,643  | 1,963,637  | 1,385,153 | 838,221   | 754,567   | 502,078   | 286,921   | 257,123   | 179,436   | 71,485    | —         | —         | 37,520    | 36,364    |
| Louisiana        | 16,607,448  | 12,009,197     | 3,264,828  | 709,249    | 136,818    | 151,282   | 75,641    | 33,510    | 113,462   | 75,641    | —         | 37,821    | —         | —         | —         | —         | —         |
| Mississippi      | 34,698,897  | 21,477,428     | 7,882,685  | 1,861,950  | 1,244,689  | 909,787   | 590,949   | 239,510   | 240,826   | 95,585    | 59,907    | 71,740    | —         | 11,919    | —         | 11,921    | —         |
| NorthCarolina    | 5,529,667   | 3,699,091      | 1,387,159  | 148,477    | 183,581    | 74,239    | 37,119    | —         | —         | —         | —         | —         | —         | —         | —         | —         | —         |
| SouthCarolina    | 56,664,624  | 38,182,136     | 9,156,879  | 3,806,465  | 2,418,716  | 1,201,097 | 879,782   | 478,206   | 253,574   | 109,255   | 109,241   | 34,636    | 34,636    | —         | —         | —         | —         |
| Texas(east)      | 1,554,659   | 935,146        | —          | 84,484     | 58,686     | 61,010    | 72,747    | 197,091   | 37,536    | 35,211    | 11,737    | 23,474    | —         | 37,536    | —         | —         | —         |
| Virginia         | —           | —              | —          | —          | —          | —         | —         | —         | —         | —         | —         | —         | —         | —         | —         | —         | —         |

Estimates prepared March 2020.

Table 10a—Number of live longleaf pine trees on forest land classified as longleaf pine forest type by state and diameter class

| Forest type group | Diameter class |             |             |             |            |            |            |            |            |           |           |           |           |           |           |           |           |
|-------------------|----------------|-------------|-------------|-------------|------------|------------|------------|------------|------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                   | All classes    | 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 | 21.0-22.9 | 23.0-24.9 | 25.0-26.9 | 27.0-28.9 | 29.0-30.9 | 31.0-32.9 |
| All               | 823,652,361    | 291,596,836 | 204,695,645 | 129,044,145 | 85,774,883 | 42,113,847 | 26,587,016 | 19,534,159 | 13,235,321 | 6,770,875 | 3,096,048 | 816,981   | 237,254   | 118,288   | 30,865    | —         | —         |
| Alabama           | 175,307,400    | 57,061,612  | 50,160,469  | 29,304,215  | 18,274,970 | 8,914,992  | 3,899,399  | 3,382,667  | 2,731,789  | 959,220   | 453,223   | 132,993   | —         | 31,851    | —         | —         | —         |
| Florida           | 180,245,332    | 69,342,750  | 42,318,286  | 22,779,519  | 17,738,431 | 10,392,187 | 7,759,523  | 5,238,092  | 2,635,619  | 1,394,553 | 646,372   | —         | —         | —         | —         | —         | —         |
| Georgia           | 128,482,343    | 29,514,244  | 37,612,701  | 29,933,644  | 20,034,840 | 5,265,562  | 2,215,693  | 1,901,108  | 995,058    | 388,012   | 328,768   | 108,635   | 109,093   | 73,985    | —         | —         | —         |
| Louisiana         | 23,108,718     | 5,317,632   | 5,193,702   | 2,747,062   | 1,811,263  | 1,510,152  | 1,932,501  | 1,565,532  | 1,312,330  | 1,060,822 | 411,907   | 184,361   | 30,588    | —         | 30,865    | —         | —         |
| Mississippi       | 48,435,305     | 16,591,455  | 9,969,710   | 5,755,565   | 5,191,657  | 3,442,410  | 2,888,489  | 2,028,007  | 1,295,742  | 753,175   | 307,344   | 164,068   | 47,684    | —         | —         | —         | —         |
| North Carolina    | 79,782,505     | 27,041,796  | 18,484,987  | 11,289,438  | 7,403,963  | 4,588,221  | 4,222,436  | 2,639,287  | 2,304,527  | 1,112,043 | 516,230   | 179,576   | —         | —         | —         | —         | —         |
| South Carolina    | 170,281,403    | 71,426,159  | 40,298,788  | 26,461,353  | 15,074,857 | 7,757,988  | 3,521,542  | 2,515,681  | 1,791,133  | 940,385   | 420,467   | 35,611    | 37,437    | —         | —         | —         | —         |
| Texas (east)      | 13,617,301     | 10,909,133  | 657,002     | 773,348     | 244,902    | 241,336    | 147,432    | 263,784    | 169,322    | 162,664   | 11,737    | 11,737    | 12,452    | 12,452    | —         | —         | —         |
| Virginia          | 4,392,054      | —           | —           | —           | —          | —          | —          | —          | —          | —         | —         | —         | —         | —         | —         | —         | —         |

Table 10b—Number of live longleaf pine trees on forest land classified as longleaf pine/oak forest type by state and diameter class.

| Forest type group | Diameter class |            |            |           |           |           |           |           |           |           |           |           |           |           |           |           |           |
|-------------------|----------------|------------|------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                   | All classes    | 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 | 21.0-22.9 | 23.0-24.9 | 25.0-26.9 | 27.0-28.9 | 29.0-30.9 | 31.0-32.9 |
| All               | 80,330,691     | 39,829,883 | 17,330,299 | 7,071,210 | 4,648,695 | 3,299,258 | 2,680,056 | 2,141,232 | 1,573,527 | 984,061   | 339,899   | 358,672   | 36,364    | 37,536    | —         | —         | —         |
| Alabama           | 17,333,637     | 6,582,885  | 4,505,019  | 2,018,869 | 1,245,149 | 880,803   | 495,033   | 639,001   | 433,682   | 297,381   | 35,815    | —         | —         | —         | —         | —         | —         |
| Florida           | 31,331,283     | 17,782,911 | 4,911,159  | 3,010,918 | 1,639,718 | 1,137,368 | 1,071,782 | 819,917   | 440,375   | 370,037   | 74,086    | 73,041    | —         | —         | —         | —         | —         |
| Georgia           | 15,479,464     | 8,177,712  | 3,670,536  | 812,868   | 667,816   | 629,747   | 438,229   | 327,689   | 248,766   | 144,539   | 146,302   | 179,436   | 36,364    | —         | —         | —         | —         |
| Louisiana         | 3,220,366      | 1,670,631  | 762,065    | 461,748   | 611,777   | —         | 75,641    | —         | 113,462   | 75,641    | —         | —         | —         | —         | —         | —         | —         |
| Mississippi       | 4,283,938      | 1,940,165  | 1,177,256  | 249,679   | 331,595   | 178,315   | 119,732   | 83,883    | 83,668    | 47,903    | 11,921    | 59,821    | —         | —         | —         | —         | —         |
| North Carolina    | 573,744        | 462,386    | —          | —         | 371,119   | 371,119   | 371,119   | —         | —         | —         | —         | —         | —         | —         | —         | —         | —         |
| South Carolina    | 8,223,775      | 3,213,733  | 2,304,265  | 517,127   | 664,383   | 435,906   | 442,519   | 259,004   | 253,574   | 36,822    | 71,804    | 34,636    | —         | —         | —         | —         | —         |
| Texas (east)      | 8,4484         | —          | —          | —         | 11,737    | —         | —         | 11,737    | —         | 11,737    | —         | 11,737    | —         | 37,536    | —         | —         | —         |
| Virginia          | —              | —          | —          | —         | —         | —         | —         | —         | —         | —         | —         | —         | —         | —         | —         | —         | —         |

Table 10c—Number of live longleaf pine trees on forest land classified as longleaf pine or longleaf pine/oak forest type by state and diameter class

| Forest type group | Diameter class |             |             |             |            |            |            |            |            |           |           |           |           |           |           |           |           |
|-------------------|----------------|-------------|-------------|-------------|------------|------------|------------|------------|------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                   | All classes    | 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 | 21.0-22.9 | 23.0-24.9 | 25.0-26.9 | 27.0-28.9 | 29.0-30.9 | 31.0-32.9 |
| All               | 903,983,052    | 331,426,719 | 222,025,944 | 136,115,355 | 90,423,578 | 45,413,105 | 29,267,072 | 21,675,391 | 14,809,048 | 7,754,936 | 3,435,947 | 1,175,653 | 273,618   | 155,824   | 30,865    | —         | —         |
| Alabama           | 192,441,037    | 63,644,497  | 54,685,488  | 31,323,084  | 19,520,119 | 9,795,795  | 4,394,432  | 4,021,668  | 3,165,471  | 1,256,601 | 489,038   | 132,993   | —         | 31,851    | —         | —         | —         |
| Florida           | 211,576,615    | 87,125,661  | 47,229,445  | 25,790,437  | 19,376,149 | 11,529,555 | 8,831,305  | 6,058,009  | 3,075,994  | 1,764,590 | 720,428   | —         | —         | —         | —         | —         | —         |
| Georgia           | 143,961,807    | 37,691,416  | 41,283,237  | 30,746,512  | 20,702,656 | 5,896,309  | 2,653,922  | 2,228,797  | 1,243,824  | 532,551   | 475,070   | 288,071   | 145,457   | 73,985    | —         | —         | —         |
| Louisiana         | 26,329,084     | 6,988,263   | 5,955,767   | 3,208,810   | 1,872,440  | 1,510,152  | 2,008,142  | 1,565,532  | 1,425,792  | 1,136,463 | 411,907   | 184,361   | 30,588    | —         | 30,865    | —         | —         |
| Mississippi       | 52,719,243     | 18,531,620  | 11,146,966  | 6,005,244   | 5,523,252  | 3,620,725  | 3,009,221  | 2,111,890  | 1,379,410  | 801,078   | 319,250   | 273,889   | 47,684    | —         | —         | —         | —         |
| North Carolina    | 80,356,249     | 27,504,182  | 18,484,987  | 11,289,438  | 7,441,082  | 4,625,340  | 4,259,285  | 2,639,287  | 2,304,527  | 1,112,043 | 516,230   | 179,576   | —         | —         | —         | —         | —         |
| South Carolina    | 178,505,178    | 74,639,892  | 42,603,053  | 26,978,480  | 15,729,240 | 8,193,894  | 3,964,061  | 2,714,685  | 2,044,707  | 977,207   | 492,271   | 70,247    | 37,437    | —         | —         | —         | —         |
| Texas (east)      | 13,701,785     | 10,909,133  | 657,002     | 773,348     | 256,639    | 241,336    | 147,432    | 275,521    | 169,322    | 174,401   | 11,737    | 23,474    | 12,452    | 49,988    | —         | —         | —         |
| Virginia          | 4,392,054      | —           | —           | —           | —          | —          | —          | —          | —          | —         | —         | —         | —         | —         | —         | —         | —         |

Estimates prepared March 2020.



**Table 11— Number of all live trees and longleaf pine stems (at least 1 inch d.b.h./d.r.c.) across stand size class, and percent of longleaf of all stems in trees, on forest land by forest type.**

| Forest type                                  | Total       | Sawtimber-size | Poletimber-size | Sapling-size | Forest type                           | All Stems (all species) | Total       | Sawtimber-size | Poletimber-size | Sapling-size | Longleaf (percent of all stems) |
|--|-------------|----------------|-----------------|--------------|---------------------------------------|-------------------------|-------------|----------------|-----------------|--------------|---------------------------------|
| Longleaf pine                                | 1445907606  | 138401817      | 295799930       | 1011705860   | Longleafpine                          | 1,445,907,606           | 823,652,361 | 112,540,853    | 214,819,027     | 496,292,481  | 56.984                          |
| Longleaf pine / oak                          | 3900303334  | 21376297       | 50107390        | 318546646    | Longleafpine/oak                      | 390,030,334             | 80,330,691  | 11,450,604     | 11,719,905      | 57,160,182   | 20.596                          |
| Southern scrub oak                           | 277083245   | 12118505       | 273787149       | 227577591    | Southernscruboak                      | 277,083,245             | 10,022,742  | 1,292,071      | 2,084,851       | 6,645,820    | 3.617                           |
| Pond pine                                    | 285706650   | 27846053       | 51339070        | 206471427    | Pondpine                              | 285,706,550             | 3,007,102   | 691,976        | 455,539         | 1,859,587    | 1.053                           |
| Nonstocked                                   | 44720034    | 3538776        | 15271769        | 25909488     | Nonstocked                            | 44,720,034              | 363,324     | 181,943        | 181,381         | —            | 0.812                           |
| Sand pine                                    | 346702855   | 15331976       | 79250941        | 252119938    | Sandpine                              | 346,702,855             | 2,393,676   | 436,457        | 861,780         | 1,095,440    | 0.690                           |
| Slash pine                                   | 4348493115  | 421548109      | 1112538045      | 2814406961   | Slashpine                             | 4,348,493,115           | 276,48,559  | 9,348,825      | 8,163,256       | 10,136,677   | 0.636                           |
| Post oak / blackjack oak                     | 1038947775  | 64694269       | 140488711       | 825764796    | Postoak/blackjackoak                  | 1,038,947,775           | 4,050,044   | 412,383        | 543,351         | 3,094,310    | 0.390                           |
| Sassafras / persimmon                        | 142830254   | 5371034        | 16462523        | 120996697    | Sassafras/persimmon                   | 142,830,254             | 549,897     | 402,965        | 146,932         | —            | 0.385                           |
| Other pine / hardwood                        | 427990934   | 26971045       | 71468650        | 329551239    | Otherpine/hardwood                    | 427,990,934             | 1,301,886   | 222,998        | 183,494         | 895,394      | 0.304                           |
| Loblolly pine                                | 36873734306 | 2938946581     | 6262944018      | 27671843707  | Loblollypine                          | 36,873,734,306          | 92,238,010  | 12,843,712     | 19,116,216      | 60,278,082   | 0.250                           |
| Eastern redcedar / hardwood                  | 253118400   | 15913909       | 42608273        | 194596219    | Easternredcedar/hardwood              | 253,118,400             | 447,392     | —              | —               | 447,392      | 0.177                           |
| Slash pine / hardwood                        | 927834559   | 58513985       | 148980558       | 720340016    | Slashpine/hardwood                    | 927,834,559             | 1,569,649   | 539,544        | 444,089         | 586,015      | 0.169                           |
| Mixed upland hardwoods                       | 7401914921  | 342750403      | 915847420       | 6143317098   | Mixeduplandhardwoods                  | 7,401,914,921           | 8,950,152   | 2,832,018      | 2,354,085       | 3,764,050    | 0.121                           |
| Atlantic white-cedar                         | 30458708    | 1608672        | 2596707         | 26253329     | Atlanticwhite—cedar                   | 30,458,708              | 35,125      | 35,125         | —               | —            | 0.115                           |
| Pitch pine                                   | 33497679    | 3936389        | 6944379         | 22616911     | Pitchpine                             | 33,497,679              | 37,404      | —              | 37,404          | —            | 0.112                           |
| Loblolly pine / hardwood                     | 8242840529  | 393216027      | 102012430       | 6829512072   | Loblollypine/hardwood                 | 8,242,840,529           | 8,240,844   | 1,784,329      | 1,303,528       | 5,152,986    | 0.100                           |
| Chestnut oak / black oak / scarlet oak       | 1617742660  | 159914336      | 330642253       | 1127186071   | Chestnutoak/blackoak/scarletoak       | 1,617,742,660           | 1,304,500   | 207,914        | 186,215         | 910,371      | 0.081                           |
| Virginia pine                                | 1366186264  | 79392353       | 200745822       | 1086048088   | Virginiapine                          | 1,366,186,264           | 856,581     | 293,502        | 109,314         | 453,765      | 0.063                           |
| Shortleaf pine                               | 649140181   | 61431116       | 95320906        | 492389059    | Shortleafpine                         | 649,141,081             | 403,692     | 98,917         | 149,667         | 155,108      | 0.062                           |
| Shortleaf pine / oak                         | 734580992   | 55892816       | 117032699       | 561655477    | Shortleafpine/oak                     | 734,580,992             | 251,634     | 213,813        | 37,821          | —            | 0.034                           |
| Cherry / white ash / yellow-poplar           | 1172795699  | 37123722       | 122549818       | 1013122159   | Cherry/whiteash/yellow—poplar         | 1,172,795,699           | 291,049     | 217,748        | 73,300          | —            | 0.025                           |
| Sweetbay / swamp tupelo / red maple          | 5321318040  | 299067836      | 877522869       | 4144727335   | Sweetbay/swamptupelo/redmaple         | 5,321,318,040           | 1,252,063   | 508,006        | 299,259         | 444,798      | 0.024                           |
| Red maple / oak                              | 318520333   | 15748488       | 36712196        | 266059649    | Redmaple/oak                          | 318,520,333             | 71,084      | —              | 71,084          | —            | 0.022                           |
| Chestnut oak                                 | 1075264933  | 133496718      | 234768626       | 706999590    | Chestnutoak                           | 1,075,264,933           | 168,429     | 131,991        | 36,438          | —            | 0.016                           |
| White oak / red oak / hickory                | 4411595357  | 363269405      | 698067607       | 3350258345   | Whiteoak/redeoak/hickory              | 4,411,595,357           | 558,380     | 454,303        | 104,077         | —            | 0.013                           |
| Other exotic hardwoods                       | 641857200   | 7242854        | 76774280        | 557840066    | Otherexotic hardwoods                 | 641,857,200             | 76,355      | 36,064         | 40,291          | —            | 0.012                           |
| Overcup oak / water hickory                  | 445169355   | 37486242       | 77646356        | 330036757    | Overcupoak/waterhickory               | 445,169,355             | 37,821      | 37,821         | —               | —            | 0.008                           |
| Baldcypress / pondcypress                    | 108670727   | 98866620       | 204684453       | 805119654    | Baldcypress/pondcypress               | 1,086,670,727           | 91,119      | —              | 91,119          | —            | 0.008                           |
| Eastern redcedar                             | 197296481   | 12420526       | 31931384        | 152944571    | Easternredcedar                       | 197,296,481             | 10,515      | 10,515         | —               | —            | 0.005                           |
| Sweetgum / yellow-poplar                     | 4324947641  | 177308141      | 506368373       | 3641271126   | Sweetgum/yellow—poplar                | 4,324,947,641           | 182,890     | 72,399         | 110,490         | —            | 0.004                           |
| Baldcypress / water tupelo                   | 1187534676  | 214210131      | 269926924       | 703397620    | Baldcypress/watertupelo               | 1,187,534,676           | 38,313      | —              | 38,313          | —            | 0.003                           |
| Yellow-poplar                                | 1308440491  | 89092876       | 192988775       | 1026358840   | Yellow—poplar                         | 1,308,440,491           | 34,403      | —              | 34,403          | —            | 0.003                           |
| Yellow-poplar / white oak / northern red oak | 2409844462  | 195074949      | 371590298       | 184379215    | Yellow—poplar/whiteoak/northernredoak | 2,409,844,462           | 35,036      | —              | 35,036          | —            | 0.001                           |
| Sweetgum / Nuttall oak / willow oak          | 5229933768  | 329497008      | 818179133       | 4082257627   | Sweetgum/Nuttalloak/willowoak         | 5,229,933,768           | 34,403      | 34,403         | —               | —            | 0.001                           |

# Live-Tree Volume of Longleaf Pine

FIA data show that the volume of longleaf pine trees southwide totals 5.424 billion cubic feet (table 12). Of this, 1.258 billion cubic feet, or 23.2 percent of the total, is found on National Forests (with 16 percent of area), and 2.961 billion cubic feet, or 54.6 percent of the total, is found on private lands (with 61.8 percent of area). Of the nine Southern States, Florida has the highest percent of total longleaf pine volume (22.8 percent), followed by Alabama (18.7 percent), Georgia (14.2 percent), and South Carolina (13.5 percent). Southwide, the volume per unit area in longleaf pine, calculated using data in table 5, averages 1201 cubic feet per acre, with a range from 2148 cubic feet per acre in Texas and 2111 cubic feet per acre in Louisiana, to 965 cubic feet per acre in Florida and 1076 cubic feet per acre in Georgia.

Comparing these data with the 2012 report gives an indication of vitality in the longleaf pine resource. Across the South, the total longleaf pine volume increased 700 million cubic feet, or 15 percent since the 2012 report. National Forest volume increased 146 million cubic feet, or 13 percent since the 2012 report. The volume on U.S. Fish and Wildlife Service lands has increased by 9.5 million cubic feet, an 11-percent increase since the 2012 report. Lands managed by the Department of Defense increased nearly 129 million cubic feet, a 29-percent increase since the 2012 report. Together, the State, County, and Municipal volume is up 96 million cubic feet, a 23-percent increase since the 2012 report. And more than half of the 700 million-acre increase southwide was in private ownership, which increased 378 million cubic feet, or 14.7 percent since the 2012 report.

Table 12—All-live volume of longleaf pine species on forest land by region and ownership class

| State code                               | Ownership class |                 |                           |                 |               |             |                      |               |
|--|-----------------|-----------------|---------------------------|-----------------|---------------|-------------|----------------------|---------------|
|  | Total           | National Forest | Fish and Wildlife Service | Dept of Defense | Other federal | State       | County and Municipal | Private       |
| ----- all-live volume (cubic feet) ----- |                 |                 |                           |                 |               |             |                      |               |
| All                                      | 5,423,618,538   | 1,257,705,248   | 94,712,480                | 572,710,691     | 14,293,202    | 466,610,080 | 57,067,636           | 2,960,519,200 |
| Alabama                                  | 1,016,380,174   | 249,307,053     | —                         | 10,492,737      | —             | 25,901,266  | 22,390,840           | 708,288,279   |
| Florida                                  | 1,236,129,218   | 283,095,631     | 23,538,406                | 149,216,727     | 11,854,108    | 262,812,105 | 9,770,031            | 495,842,211   |
| Georgia                                  | 770,662,208     | 116,654         | 5,674,773                 | 95,678,011      | —             | 22,243,452  | 219,852              | 646,729,465   |
| Louisiana                                | 432,446,544     | 257,655,364     | —                         | 51,193,823      | —             | 1,479,458   | 2,367,650            | 119,750,250   |
| Mississippi                              | 564,774,141     | 327,594,611     | —                         | —               | —             | 117,033     | 19,880,723           | 217,181,774   |
| North Carolina                           | 583,343,824     | 31,066,203      | 11,557,773                | 163,246,273     | —             | 67,559,036  | —                    | 309,914,538   |
| South Carolina                           | 732,640,881     | 53,084,662      | 53,941,528                | 102,883,120     | 2,439,093     | 86,497,731  | 2,438,540            | 431,356,207   |
| Texas (east)                             | 87,241,547      | 55,785,070      | —                         | —               | —             | —           | —                    | 31,456,476    |
| Virginia                                 | —               | —               | —                         | —               | —             | —           | —                    | —             |

Estimates prepared March 2020.  
\*Compare to Table 13 in Oswalt et al. (2012). Overall total is comparable. Regional sub-totals are not comparable.





Calcasieu Ranger District, Kisatchie National Forest.

It is disappointing to report that the overall area in the longleaf pine and longleaf pine/oak types combined has yet to exceed 5 million acres as of this 2020 update. The total area in these two longleaf pine-dominant forest types is slightly more than 4.517 million acres. It appears that other commitments<sup>4</sup> will be needed to achieve the ALRI 8 million-acre goal by 2025. Of the 4.517 million acres in the longleaf pine and longleaf pine/oak types southwide, 2.8 million acres (61.8 percent) are found on private ownerships (Table 5c). The balance is in various public ownerships, especially the National Forests (16 percent), States (9.9 percent), and the Department of Defense (9.7 percent).

There is a net gain of 232,000 acres in longleaf pine types southwide since the 2012 report. The longleaf pine type has increased by nearly 421,000 acres over that time, with gains in excess of 100,000 acres in each of the Department of Defense holdings and on private lands. Of the six States with more than 250,000 acres in the longleaf pine type, private landowners have 78 percent in Alabama, 92.8 percent in Georgia, 63.3 percent in North Carolina, and 64.7 percent in South Carolina; whereas public landowners manage 60.3 percent in Florida and 59.4 percent in Mississippi. But that 421,000-acre gain is balanced by a decline of 189,000 acres in the longleaf pine/

<sup>4</sup>One such commitment is the Million-Acre Challenge that the Southern Region of the Forest Service, U.S. Department of Agriculture, initiated in 2018, and is currently underway. The Forest Service issued the Million-Acre Challenge to put an additional 1 million acres of National Forest System lands on the path towards restoration of longleaf pine-dominant stands in support of the America's Longleaf Restoration Initiative.

oak type since the 2012 report, and ongoing analyses continue to characterize how plots that were in longleaf pine/oak have changed since the 2012 report. Perhaps some of the area in this forest type moved into the longleaf pine type. But it is also possible that some of this area transitioned to hardwood-dominated types or was converted to agricultural or other non-forest land uses entirely.

The good news in this report is that the 0–10 and 11–20 year age classes contain by far the most area in longleaf pine—781,000 acres and 724,000 acres, respectively, one-third of the total area in longleaf pine types. Since the 2012 report, the area in the 0–20 year age class increased by ~337,000 acres. In the 2012 report, 29 percent of area in the longleaf pine-dominant forest type was planted; in the 2020 update, that number has increased to nearly 40 percent. The differences are most pronounced in the 11–20 year age class, the area of which has nearly doubled from the 2012 report to the 2020 update. This suggests that the determined efforts by landowners and land managers over the past two decades to establish new stands of longleaf pine through natural regeneration and planting are paying off.

It's also good news to report that the area occupied by medium size class (5.0–8.9 inches d.b.h.) in both longleaf pine-dominant forest types combined has nearly doubled since

the 2012 report, and the area in the small size class (d.b.h. <5 inches) has remained constant. This points toward a wave of ingrowth covering roughly 2.5 million acres headed toward the sawtimber classes over the next few decades. Also, the data show a crest of live-tree longleaf pine numbers in the diameter classes 10.9 inches and smaller that far exceeds numbers in those size classes in the 2012 report.

Finally, there are more than 1 billion longleaf trees >1.0 inch d.b.h. across the South, and 143 million of those are in forest types not dominated by longleaf pine. This may open the door to intermediate treatment opportunities at the stand level, such as thinning to convert stands with a minor manageable component of longleaf pine to longleaf dominance. In addition, the volume of longleaf pines across the South is in excess of 5.4 billion cubic feet and has increased by 15 percent since the 2012 report.

All told, the increases in area, numbers, and volume show a positive developmental dynamic in these stands over the past decade. This success is due largely to the dedicated efforts of landowners and land managers who are interested in this iconic species, and who are working hard to restore the habitat values that longleaf pine ecosystems provide for species of flora and fauna that are underrepresented on the landscape.



Louisiana Longleaf seed orchard, Catahoula Ranger District, Kisatchie National Forest.



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**Oswalt, Christopher; Guldin, James M.** 2021. Status of longleaf pine in the South: an FIA update. 29 p. Unpublished report. On file with: Chris Oswalt, Southern Research Station, Forest Inventory and Analysis, 4700 Old Kingston Pike, Knoxville, TN 37919.

In this report, we present an update on the status of longleaf pine in the Southern United States. Specifically, we provide selected tables and summary data for the two longleaf pine-dominant forest types—the longleaf pine type and the longleaf pine/oak type—using the latest round of forest inventory data from each of the nine States encompassing the range of longleaf pine. The report represents 7–8 years of change in the longleaf pine resource, and it provides a comparison with a previously published report on the history and current condition of longleaf pine. The data presented here show that the two dominant longleaf pine forest types occupy slightly more than 4.5 million acres across the South, a net gain of only about 232,000 acres since the 2012 report. But there are strong indications in this 2020 update that clearly show that efforts to restore this iconic forest type are meeting with success. There are dramatic increases in live tree longleaf pine numbers in the 10.9-inch and smaller diameter classes, and similar increases in the area of longleaf pine forest types in the 0–40 year age classes, both of which far exceed numbers in the previous 2012 report. In essence, a wave of ingrowth is headed toward the sawtimber size classes as efforts to establish and manage smaller size and age classes across all ownerships have been underway for several decades, and especially during the last 10 years. The data trends noted underscore the commitment to enhancing the establishment and development of new and existing longleaf pine stands, and especially the importance of planting to restore longleaf pine. This commitment has been strongly supported by public agencies such as the U.S. Department of Agriculture Natural Resources Conservation Service, as well as private nongovernmental organizations like the Longleaf Alliance and the Longleaf Partnership Council, established under the America’s Longleaf Restoration Initiative.





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