United States
Department of
Agriculture

Forest Service

Southern
Research Station

e-General Technical
Report SRS–174

Forest Area and Conditions: A 2010 Update of Chapter 16 of the Southern Forest Resource Assessment

Andrew J. Hartsell and Roger C. Conner

Authors:

Andrew J. Hartsell is a Research Forester with the U.S. Department of Agriculture Forest Service, Southern Research Station, Forest Inventory and Analysis Research Work Unit, Knoxville, TN 37919.

Roger C. Conner is a Research Forester (retired) with the U.S. Department of Agriculture Forest Service, Southern Research Station, Forest Inventory and Analysis Research Work Unit, Knoxville, TN 37919.

Front Cover: (Base layer map): World Imagery (data courtesy ESRI and Bing Maps, Microsoft Corporation); (top overlay map): Average Vegetation Growth (data courtesy U.S. Geological Survey, Center for Earth Resources Observation and Science).

www.srs.fs.usda.gov

April 2013

Southern Research Station
200 W.T. Weaver Blvd.
Asheville, NC 28804

Forest Area and Conditions: A 2010 Update of Chapter 16 of the Southern Forest Resource Assessment

Andrew J. Hartsell and Roger C. Conner

Contents

Forest Area and Conditions: A 2010 Update of Chapter 16 of the Southern Forest Resource Assessment

Andrew J. Hartsell and Roger C. Conner

Key Findings

- As of 2010, southern forest land area was estimated to be 208.8 million acres (excludes west Oklahoma and west Texas).
- Timberland increased 4.0 million acres to 204.7 million acres in 2010 (excludes west Oklahoma and west Texas). Oak-hickory stands occupied 75.9 million acres of the South's timberland, more than any other forest-type group.
- Nonindustrial private owners now hold 77 percent of the South's timberland acres. Forest industry timberland area, estimated in 2010 to be 20.9 million acres, continues to decline.
- Planted pine stands in the Southern region occupied 39.5 million acres in 2010, compared to 30.7 million acres of natural pine.
- Total growing-stock volume amounted to 299.7 billion cubic feet in 2010 (excludes west Oklahoma and west Texas). Hardwood species account for 58 percent of the current growing-stock volume.
- Nearly 222.8 billion cubic feet (74 percent) of the current growing-stock volume is on nonindustrial private timberland.
- Growing-stock net annual growth averaged 13.1 billion cubic feet per year between 1999 and 2010. Net growth outpaced annual removals (9.5 billion cubic feet per year) by 3.6 billion cubic feet annually.
- Average annual mortality continued to trend upward, amounting to 2.7 billion cubic feet per year since 1999.

Introduction

This report updates Chapter 16: Forest Area and Conditions published as part of the Southern Forest Resource Assessment (SFRA) (Wear and Greis 2002). This 2010 update describes the status and condition of the South's forested lands based on data from Forest Inventory and Analysis (FIA) inventories conducted since 1999. The analyses in this update focus on the amount and distribution of timberland area by forest type, stand size, and ownership, as well as on changes in volume, growth, mortality, and removals of timber.

The Southern Research Station's FIA program is tasked with researching, analyzing, and reporting the extent and condition of southern forests. FIA researchers and analysts are constantly evaluating new inventory procedures and methods and implementing those that will better detect and describe change in the South's forested ecosystems. New annual inventory, mapped-plot procedures have been recently developed and are currently being used by the national FIA program. The latest available annual inventory data for each Southern State are included in this 2010 update.

The original SFRA report chapter detailed the differences in FIA sampling methods and changes in inventory design, standards, and definitions that occurred over time. These changes created data compatibility issues which allowed for only broad comparisons and analyses of changes in forest area, volume, growth, mortality, and removals. The data compatibility issues are perhaps even more relevant given the changes in FIA methods that have occurred since the SFRA report was published in 2002. For these reasons, the authors recommend that the 2010 FIA forest resource estimates only be regarded as

generally comparable to past values, and would best serve as a new baseline to compare to future annual inventory, mapped-plot estimates.

Methods and Data Sources

Traditionally, Forest Inventory and Analysis (FIA) units have surveyed each State in their regions at periodic intervals of 8 to 12 years. Since the beginnings of Forest Survey in the 1930s, every State in the South (except Kentucky) has been inventoried at least seven times. Past FIA data discussed in this bulletin are from published reports, and from extensive archived databases compiled by the Southern Research Station's FIA work unit located in Knoxville, TN. Additional data come from the 2001 RPA report (Smith and others 2001). Decadal Resource Planning Act (RPA) assessments, based on data collected by FIA units, have been published since the 1970s and provide trends and changes in key resource variables.

Previous periodic surveys detected changes between inventories, but the timing often was less than optimal. Up-to-date information was needed to accurately address rising resource issues or to determine the extent of damage from catastrophic events such as hurricanes or fires, or from widespread outbreaks of insects and disease.

The 1998 Farm Bill required that the national FIA program transition from periodic surveys, to annual inventories where a portion (usually 10 to 20 percent) of all sample locations is measured each year. In addition to implementing the annual sampling methodology, FIA recently adopted a fixed-area, mapped-plot sample design (Bechtold and Patterson 2005). The new methodology was used for the first time during the 1997 inventory of Georgia and for the 1999 survey of Tennessee. Today, annual inventories are underway in all 13 Southern States.

The bulk of the analyses for chapter 16 of the 2002 Southern Forest Resource Assessment (SFRA) report was based on FIA data for all 13 Southern States aggregated into three "report" years—1982, 1989, 1999—using the three most-recent surveys of each State. Only two States—Georgia (1997) and Tennessee (1999)—had data available from the annual, mapped-plot design. Resource estimates used in this update are based on annual, mapped-plot data now available for all 13 States. The 2010 report year includes data from the most recent annual inventory for each Southern State:

State	2010 Report year
Alabama	2010
Arkansas	2010
Florida	2007
Georgia	2010
Kentucky	2010
Louisiana	2008
Mississippi	2006
North Carolina	2010
Oklahoma (east)	2008
South Carolina	2010
Tennessee	2010
Texas (east)	2010
Virginia	2010

One advantage of the annual inventory design is immediately obvious; resource estimates for each State are based on data collected within the same general timeframe. Consistent data collection methodology and temporally compatible resource estimates make current analyses more accurate and timely. However, the implementation of annual sampling procedures and a new plot design complicate, and in some cases prevent, the detection of actual resource trends.

It should be noted that the 2010 report year for Oklahoma and Texas only include estimates for the eastern portions of each State. FIA surveys in west Oklahoma and west Texas, conducted for the first time, are currently underway and a small percentage of the sample locations in the western part of each State has been measured. Area and volume estimates based on the small samples are provided (see sidebar page 4) so that readers can determine total (statewide) forest land and timberland area, and total volume as of the 2010 report year.

Growth, removals, and mortality estimates for west Oklahoma and west Texas are not yet available. Lacking complete resource estimates for the western portion of the two States, the authors decided to include only the eastern portions where the full complement of resource estimates is available.

References to the "South" or "Southern States" in this update, therefore, exclude west Oklahoma and west Texas.

It is highly recommended that readers refer to the detailed information and overview of the sampling designs and methods and definitions used by FIA to conduct past statewide inventories provided in the original SFRA report (Chapter 16, Wear and Greis 2002).

Estimates of timber volume and forest classification are derived from tree measurements and classifications made at the ground sample locations. Volumes for individual tally trees are computed using equations for each of the major species in the State (Oswalt and Conner 2011). The equations were developed from detailed measurements collected on standing trees in each State and throughout the region.

For additional description of the current inventory design, please see Bechtold and Patterson (2005). Additionally, a national FIA glossary is under development and upon completion will be published and made available to FIA data users. In the interim, a draft copy of the glossary is available upon request from the Southern Research Station, Forest Inventory and Analysis, 4700 Old Kingston Pike, Knoxville, TN 37919.

FIA Area and Volume Estimates for west Oklahoma and west Texas

Statewide resource estimates for Oklahoma and Texas reported in the original SFRA chapter were taken from RPA publications. The resource estimates for the eastern portion of these States were derived from measurements taken at FIA sample locations. However, published estimates for the western parts of the two States were based on analyses of satellite imagery and are considered crude, at best.

FIA began inventorying west Oklahoma and west Texas in 2009 and 2004, respectively. Current area and volume estimates for west Oklahoma are based on measurements taken at 20 percent on the sample locations. Similar estimates for west Texas are based on 60 percent of the sample locations. Estimates for net annual growth, annual removals, and mortality will be available in the future as all the FIA sample locations in the western part of these two States are initially established, and then remeasured.

Though based on less than the full complement of samples, the west Oklahoma and west Texas area and volume estimates in the tabulation below are statistically sound and represent the first such estimates derived from FIA plot measurements. Area and volume estimates for the eastern portion of each State are provided so that statewide totals for forest land, timberland, and volume can be calculated.

State	Forest land	Timberland	Growing-stock volume
	--- thousand acres ---		*million cubic feet*
East Oklahoma	5,745	5,103	3,699
West Oklahoma	6,847	2,665	911
State total	12,592	7,768	4,610
East Texas	12,151	11,980	15,859
West Texas	50,293	2,393	1,143
State total	62,444	14,373	17,002

Additional area and volume estimates for west Oklahoma and west Texas are available online at http://srsfia2.fia.fs.fed or by contacting Sam Lambert (865-862-2097).

Results and Discussion

Changes in Forest Land Area in the South: 1999 to 2010

Forest land estimates include all reserved, woodland, and timberland acres in the 13 Southern States. As discussed above, the 2010 estimate excludes west Oklahoma and west Texas (readers are referred to the sidebar for an estimate of total forest land area including the western portion of each State).

The South's forest resources in place today are the result of centuries of change, and the changes continue. As of 2010, forest land area in the South is reported to be nearly 209.0 million acres (table A.1). Alabama, Florida, Georgia, Louisiana, Mississippi, and South Carolina all have gained acres of forest land compared to previous estimates. Overall, excluding Oklahoma and Texas, the South has gained 2.1 million acres since 1999.

Estimates of Timberland Area

Timberland is the primary component of forest land and is defined by FIA as forested acres capable of producing at least 20 cubic feet of industrial wood per year, and not withdrawn from timber utilization. Figure 1 shows changes in total timberland area since 1953, along with estimates for reserved and other forest land. "Other forest land" is forested land that does not meet the minimum standard of productivity to be classified as timberland, and land primarily stocked with tree species that are typically of poor form and quality.

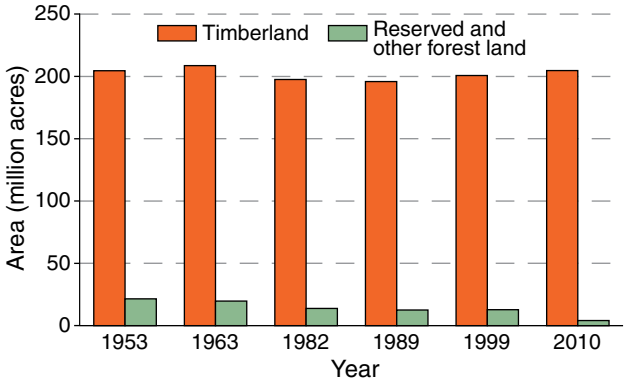

Figure 1—Total timberland area, and reserved and other forest land by year, Southern United States.

Reserved forest land includes State and national parks, monuments, wilderness areas, and other forested areas set aside by law or administrative designation. Reserved area estimates prior to 2010 were enumerated and were based on the 2001 RPA report (Smith and others 2001). These estimates include the western portions of Oklahoma and Texas, areas that (until recently) were not inventoried by FIA.

As of 2010, the area of reserved and other forest land amounted to 4.1 million acres (excludes west Oklahoma and west Texas). With the implementation of the annual inventory design, the 2010 estimates of reserved area were based on plot sampling. Therefore, the reserved and other forest land estimates in figure 1 for 2010 do not match those reported by other sources.

Total timberland area in the South peaked in 1963 at 208.7 million acres, but by 1989 had declined to just under 196.0 million acres (fig. 1). From this low point, an upward trend in timberland began and by 1999 timberland area had risen to almost 201.0 million acres. The upward trend has continued, and timberland area has increased to nearly 205.0 million acres as of 2010; nearly 4.0 million acres more than were reported in 1999. This increase includes additional acres of timberland in eastern Oklahoma and eastern Texas.

Based on current inventory methodologies, estimates of timberland area have risen for several Southern States when compared to previously reported estimates included in the original SFRA report (see table A.2). Major gains in timberland were shown for Florida (+1.3 million acres), Mississippi (+970,000 acres), and Georgia (+599,000 acres). North Carolina (-604,000 acres) and Tennessee (-420,000 acres) suffered substantial losses of timberland area since the 1999 report year.

Timberland Ownership

Ownership continues to be the primary factor affecting how (or if) timberland acres are managed. Moreover, changes in timberland ownership can often indicate a shift in the availability of these acres for future harvesting or other uses.

FIA classifies timberland ownership into two broad owner groups: public or private. In 1999, public

timberland amounted to 21.4 million acres, including 11.5 million acres of national forest timberland (fig. 2 and table A.2). The 2010 estimates show national forest timberland area at nearly 12.7 million acres and other public timberland at 14.1 million for a total of 26.8 million acres.

The bulk of the South's timberlands continue to be in the hands of private landowners. Private owners held 179.3 million acres in 1999 and still own nearly 178.0 million in 2010. Forest industry and nonindustrial private forest (NIPF) landowners comprise the private timberland ownership category. The loss in forest industry acreage since 1999 was substantial, going from 37.3 million acres to just under 21.0 million in 2010 (fig. 2). Much of what was forest industry timberland is now in the hands of NIPF landowners or has been sold to corporations including timber investment and management organizations and Real Estate Investment Trusts.

NIPF landowners have increased their share of the South's timberlands since 1999 and continue to hold more acres than any other owner group. As of 2010, NIPF timberland amounted to 157.0 million acres, an increase of 15.0 million acres over the past decade. Much of the increase has come from the divestiture of forest industry landholdings.

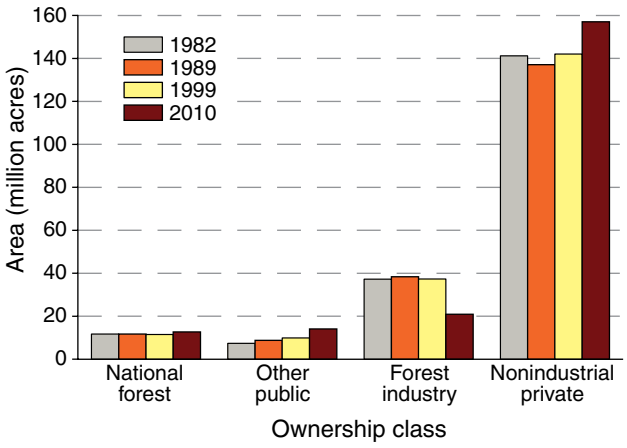

Figure 2—Timberland area by ownership class and year, Southern United States.

Timberland Distribution, Composition, and Stand Structure

The composition of the South's forests is in a constant state of change as a result of natural stand progression, catastrophic events, and impacts from human activity. FIA surveys provide timely data essential to understanding the large-scale changes in the forest resource resulting from these natural and human-induced causes. Change in forest resource composition over time can be identified by tracking the distribution of timberland area by forest type, stand size, and stand origin. Forest type and stand size are based on the tree species forming a plurality of live-tree stocking, and the diameter distribution of all live trees in a stand, respectively. Stand origin notes stand establishment resulting from either natural regeneration or from artificial regeneration efforts such as planting or seeding.

Distribution of Timberland by Forest-Type Group

Forest-type groups are aggregations of forest types that tend to be found in coexistence on similar ecological sites, and are named for the principal (i.e., most commonly occurring) forest type. Figure 3 shows a typical distribution of forest-type groups for

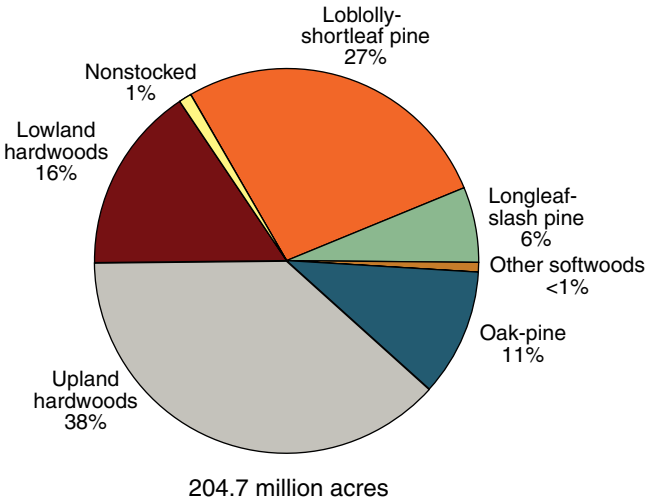

Figure 3—Percent distribution of timberland by forest-type group, Southern United States, 2010.

the southern region, based on data for the 2010 report year.

Hardwood forest types account for the majority (65 percent in 2010) of the South's timberland acres, with the remainder in softwoods. Upland hardwoods (principally oak-hickory forest types) currently makeup 38 percent (78.1 million acres) of the total timberland area, followed by lowland hardwoods (primarily oak-gum-cypress forest types) at 16 percent (fig. 3 and tables A.3 and A.4). The loblolly-shortleaf forest-type group continues its long history of dominating the area of softwoods in the South and accounts for 27 percent (55.6 million acres) of the region's timberland area as of 2010. These estimates exclude west Oklahoma and west Texas.

The decline in area of longleaf-slash pine forest types noted in the original report continues according to 2010 estimates, falling from 13.2 million acres in 1999 to just under 13.0 million acres now. However, a concerted effort is underway to restore longleaf pine to much of its original distribution. A detailed description of that project is available online at http://www.americaslongleaf.org.

Distribution of Timberland by Stand Size

Past distributions of southern timberland by stand size were shown by figure 16.9 in the original report. Compared to 1999 estimates, the 2010 distribution (fig. 4) shows a significant increase in the area of sawtimber. As noted in other instances in this report, changes in survey methods can account for some indeterminate portion of the differences in distribution between inventories. However, current FIA-based estimates do in fact reflect changing resource management related to softwood timber harvesting that help explain some of the recent shifts in stand-size distribution.

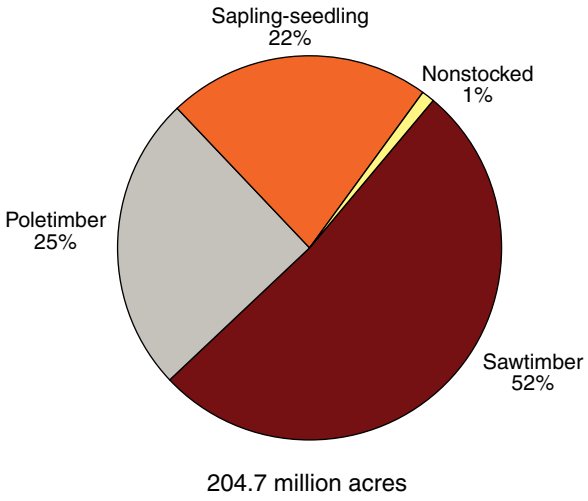

Figure 4—Percent distribution of timberland by stand-size class, Southern United States, 2010.

As figure 4 shows, sawtimber stands currently occupy over one-half (52 percent) of the area of timberland, or over 106.0 million acres (table A.5). That represents a 19-percent increase since 1999. It is softwood sawtimber that accounts for the significant rise in large-diameter stands. Since 1999, acres of softwood sawtimber have risen from 24.3 to 41.6 million acres, an increase of 71 percent. That increase is the culmination of increased planting efforts of the mid-1980s, incentivized by government programs such as the Conservation Reserve Program. Many of the acres planted at that time are now 25 to 30 years old, the "typical" harvest age for southern pine stands.

A decline in demand for most wood products due largely to the recent downturn in the economy made commercial thinning and final harvesting of these stands less economically viable to landowners. Owners have opted to delay harvest in hopes of a better return on their investment. This has contributed to the increase in softwood sawtimber in many Southern States.

The reduced harvesting is also a likely contributor to the increase in softwood poletimber which has risen from 18.5 million acres in 1999 to 28.1 million acres in 2010 (table A.5), an increase of 52 percent. Softwood and hardwood poletimber stands combined account for one quarter of the current timberland area (fig. 4).

The area of small-diameter, sapling-seedling softwood stands have increased substantially. Softwood sapling-seedling stands occupy 22.4 million acres in 2010, up from 20.9 million acres in 1999. Overall, sapling-seedling stands account for 22 percent (45.3 million acres) of the South's timberland area, down from 29 percent (59.2 million acres). All of the reduction is in small-diameter hardwood stands.

Timberland by Forest Management Type: Natural and Planted Acres

The distribution of timberland by forest management type is accomplished by identifying stand origin for each forest type. Stand origin is particularly important when discussing the southern pine resource. Planted pine is a relatively new category used to describe southern timberland acres. Virtually nonexistent a few decades ago, planted pine in the South is now a key factor in the supply of raw material to the South's pulpwood and timber mills. Over the past decade, planted pine acres in the region (excluding west Oklahoma and west Texas) have risen from 30.0 to 39.5 million acres (fig. 5 and table A.6). Except for Florida, planted-pine stands are more numerous in every Southern State since 1999 reported estimates.

Upland hardwoods in the region have steadily increased in area since the 1950s to 78.1 million acres in 2010. At 32.1 million acres, lowland hardwoods occupy more acres now than 40 years ago. Oak-pine acreage has fluctuated over time, with peaks over 29 million acres occurring in 1970 and 1999. However, the current estimate of 21.9 million acres is over 7 million acres less than 1999 inventory and the lowest measured value in almost 60 years. However, these stands are typically transition stands and often become either pine or hardwood stands as they mature. Addtionally these forests are often difficult for FIA methodology to accurately define and estimates can be affected by changing FIA procedures.

Only natural pine acres have declined in what is seemingly a correlation to increases in planted pine. Over the past nearly 60 years, natural pine acres in the South have declined from 72.0 to 30.7 million acres in 2010. However, given the accepted practice of replanting these natural stands after harvest, this decline is to be expected.

Changes in Growing-Stock Volume

FIA defines growing-stock volume as the cubic-foot volume of sound wood in growing-stock trees ≥5.0 inches diameter at breast height (d.b.h.) from a 1-foot stump to a 4.0-inch top diameter outside bark of the central stem. Volume data for report years prior to 2010 are from the 2001 RPA with the exception of volume by forest type which is based on FIA data. Estimates of growing-stock volume for the 2010 report year are from latest statewide FIA inventories.

Growing-stock volume in the South has trended upward since the first FIA surveys were conducted in the 1930s. Since 1953, total volume has more than doubled and amounted to an estimated 299.7 billion cubic feet in 2010 (fig. 6 and table A.8). The current total growing-stock volume is 38.1 billion cubic feet higher than that reported just 10 years ago, and is higher in every State except Florida. The South has more volume now than at any other time since FIA

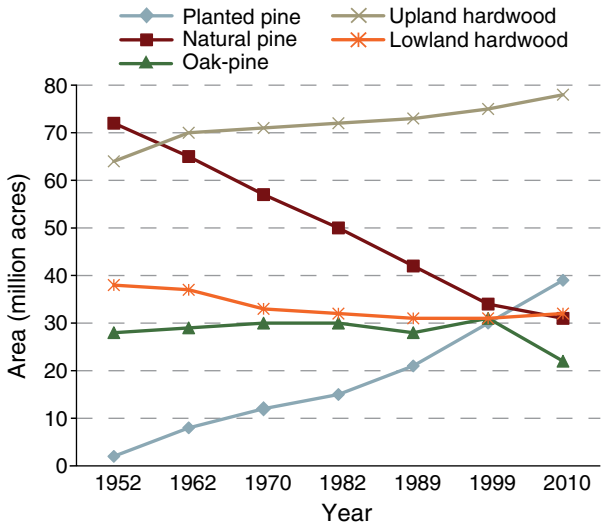

Figure 5—Area of timberland by forest-management type and year, Southern United States.

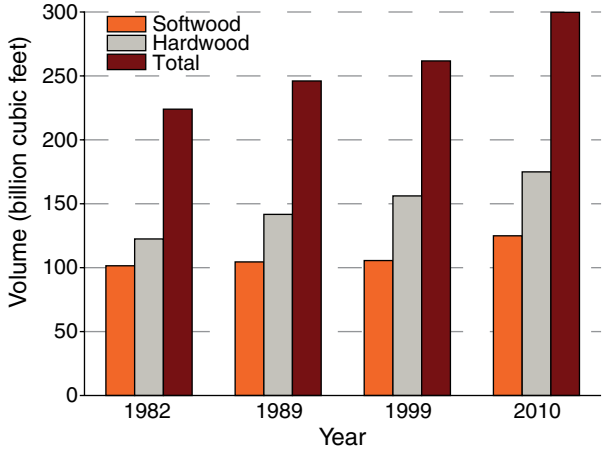

Figure 6—Volume of growing stock on timberland by species group and year, Southern United States.

inventories have been conducted (see sidebar for estimates of growing-sock volume in west Oklahoma and west Texas). Hardwood stands account for 58 percent of the current growing-stock volume and the majority of that is in upland hardwoods.

Nearly three-quarters (74 percent) of the total growing-stock volume is on nonindustrial private timberland acres (table A.14). Softwood growing stock increased 19.3 billion cubic feet since 1999 to 124.8 billion cubic feet (table A.9), and hardwood volume rose from 156.1 to 174.9 billion cubic feet (table A.10) since that year.

Increased volume is to be expected with the increase in timberland area and a maturing timber resource. Other factors driving the current rise in volume include reduced harvesting which leaves more fully-stocked stands to add volume from continual tree growth.

Growing-Stock Volume by Forest Type

The oak-hickory forest-type group has typically accounted for the majority of the hardwood growing-stock volume in the South. In 1999, oak-hickory growing stock was reported to be 82.1 billion cubic feet (fig. 7 and table A.15), and made-up one-third of all growing-stock volume. As of 2010, oak-hickory volume has risen to an estimated 113.3 billion cubic feet, an increase of 31.2 billion cubic feet over 1999 estimates. Volume in oak-hickory stands now accounts for 38 percent of all growing stock and 58 percent of the volume of hardwood forest types. Volume in oak-gum-cypress stands (41.6 billion cubic feet), and in stands of mixed oak-pine (27.2 billion cubic feet) declined slightly as of 2010, reversing gains in volume between 1989 and 1999.

Pine growing-stock volume in the South, much like hardwoods, is dominated by a single forest-type group. Volume in natural stands of loblolly-shortleaf forest types dropped slightly from 1999 to 46.2 billion cubic feet in 2010 (fig. 7 and table A.15), but this type-group accounted for 45 percent of all volume in softwood forest types. Planted loblolly-shortleaf volume amounted to 39.6 billion cubic feet in 2010, and is more than double the 17.8 billion cubic feet reported in 1999. The latter is the only forest-type group to register a substantial increase in volume since 1999. Planted and natural longleaf-slash stands increased by just 1.0 billion, and 599.0 million cubic feet, respectively.

Changes in Volume by Diameter Class

Change in growing-stock volume by 2-inch diameter class illustrates how softwood and hardwood volumes have changed throughout the range of tree sizes. Figure 8 shows the distribution of the South's softwood growing-stock volume by diameter class for the current, and three previous surveys. The 2010

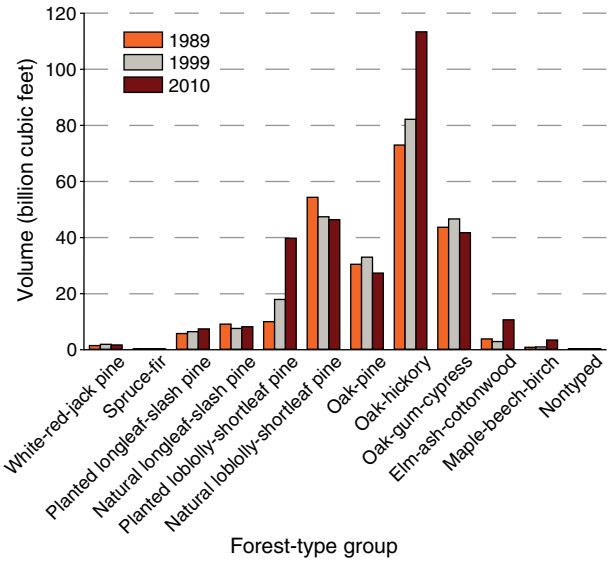

Figure 7—Volume of growing stock on timberland by forest-type group and year, Southern United States.

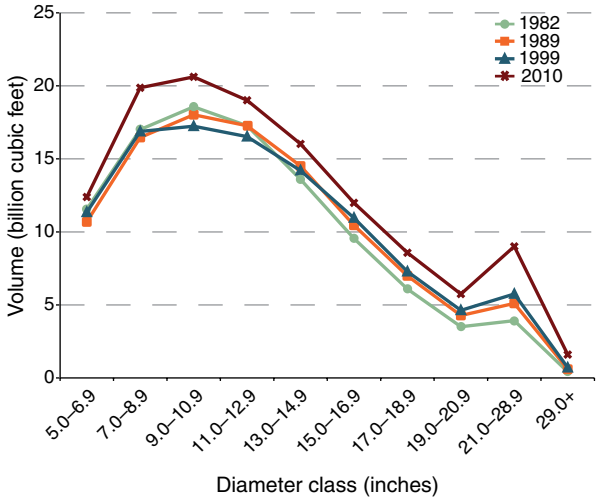

Figure 8—Volume of softwood growing stock on timberland by diameter class and year, Southern United States.

estimates of growing-stock volume show increases in all diameters compared to reported levels in 1999. Softwood volume in the poletimber classes (trees from 5.0 to 8.9 inches in diameter) combined has increased 4.0 billion cubic feet to 32.3 billion cubic feet. Softwood poletimber growing stock now accounts for 26 percent of the total softwood volume. Diameter classes >9.0 inches represent softwood volume in what would be classified by FIA as sawtimber trees. Softwood sawtimber growing stock amounted to 92.6 billion cubic feet, an increase of 15.3 billion cubic feet since 1999.

Total hardwood growing-stock volume also has increased since 1999, but not in the poletimber classes. Hardwood growing stock in poletimber trees (from 5.0 to 10.9 inches in diameter) fell from 51.8 billion cubic feet in 1999 to <46.0 billion cubic feet in 2010 (fig. 9). The remaining diameter classes represent hardwood sawtimber and volume is up in every class since 1999. Total hardwood sawtimber growing-stock volume amounted to 128.9 billion cubic feet in 2010, an increase of 24.6 billion cubic feet.

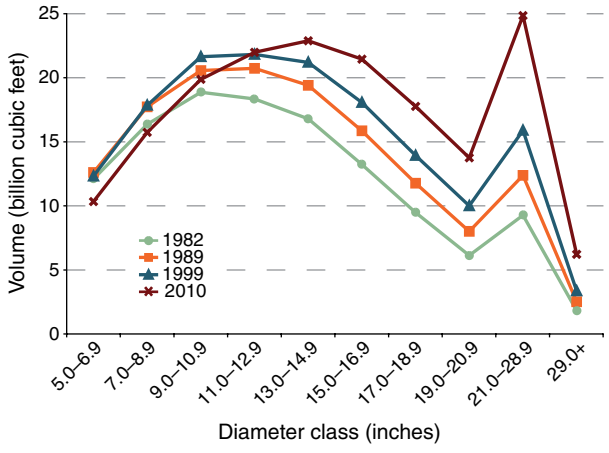

Figure 9—Volume of hardwood growing stock on timberland by diameter class and year, Southern United States.

Growing-Stock Net Annual Growth and Annual Removals

Estimates of growth and removals help explain a portion of the change in growing-stock volume between surveys. Comparisons of net annual growth to annual removals give some indication of resource sustainability. There have been few instances at the State level in the South where removals have exceeded net growth. Where this has occurred, the situation was largely generated by a catastrophic event such as a hurricane. The negative growth-to-removals relationship was typically short-lived as growth and removals rates returned to near their pre-event sustainable levels (Conner and others 2004). Forest inventory results for Southern States show that net annual growth most often exceeds annual removals.

The 2010 estimate of total net annual growth amounted to 13.1 billion cubic feet (fig. 10 and table A.16) and represents the peak in the rate of growth for the southern region since the early 1980s (estimates of net annual growth for west Oklahoma and west Texas are not yet available). This is true for both softwoods and hardwoods. Softwood net annual growth of growing stock averaged 7.8 billion cubic feet per year since 1999, and hardwood growth averaged 5.3 billion cubic feet per year since then. As is the case with timberland area and growing-stock volume, the majority (76 percent) of the net annual growth is on nonindustrial private timberland (table A.17).

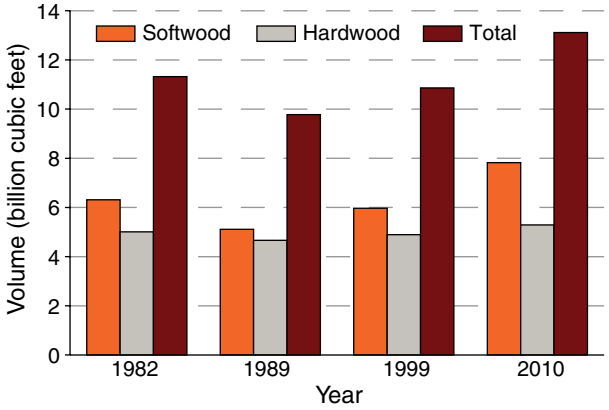

Figure 10—Average annual growth of growing stock on timberland by species group and year, Southern United States.

FIA defines removals as the average annual sound-wood volume of growing-stock trees removed from the inventory by harvesting, cultural operations (such as timber-stand improvement), land clearing, or changes in land use during the period between surveys. Average annual removals of growing stock for softwoods and hardwoods combined amounted to an estimated 9.5 billion cubic feet in 2010 (fig. 11 and table A.19) (estimates of annual removals for west Oklahoma and west Texas are not yet available). The current levels of annual removals were virtually unchanged from 1999 reported estimates, but were 1.9 billion cubic feet higher than the 1989 estimates. Net annual growth currently exceeds annual removals at the regional level by nearly 3.6 billion cubic feet per year. The excess of growth over removals is a contributing factor in the upward trend in southern growing-stock volume.

Softwood annual removals averaged 6.0 billion cubic feet per between 1989 and 1999, then increased to 6.3 billion cubic feet per year from 1999 to the present. However, hardwood removals declined from an annual average of 3.5 billion cubic feet as of 1999, to an annual average of 3.2 billion cubic feet by 2010. Removals of softwood growing stock have been nearly double the rate of hardwoods for all survey years.

Annual removals from NIPF timberland increased to 7.4 billion cubic feet as of 2010. At 1.7 billion cubic feet, annual removals from forest industry timberland fell to near 1982 levels. The decline in industry removals coincides with the decline in forestry industry timberland area.

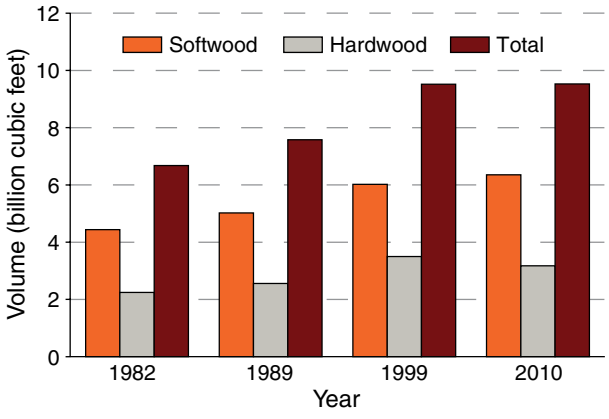

Figure 11—Average annual removals of growing stock on timberland by species group and year, Southern United States.

Average Annual Mortality of Growing Stock

Mortality of growing stock is defined as the average sound-wood volume in growing-stock trees dying each year from natural causes. Causes of tree mortality are numerous and often difficult to identify. Estimates of mortality can fluctuate widely depending upon the occurrence of large-scale events such as hurricanes, ice storms, or fire. Insects, more so than disease, also can impact mortality rates if the infestation is widespread and long term. Annual mortality is subtracted from gross growth to arrive at net annual growth.

The rate of annual mortality of growing stock in the South has been on the increase for several decades. The 2010 level of growing-stock mortality (2.7 billion cubic feet per year) is more than double the 1,278 million cubic feet reported in 1982 (fig. 12 and table A.22) (estimates of annual mortality for west Oklahoma and west Texas are not yet available). Growing-stock mortality has been nearly equally split between softwoods and hardwoods. Softwood mortality averaged 1.2 billion cubic feet per year since 1999, and hardwoods averaged about 1.5 billion cubic feet per year. Annual mortality on NIPF timberland averaged almost 2.0 billion cubic feet between 1999 and 2010 (table A.23).

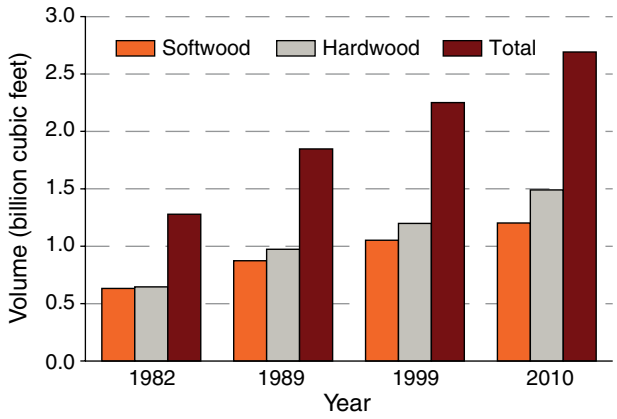

Figure 12—Average annual mortality of growing stock on timberland by species group and year, Southern United States.

Acknowledgments

The analyses presented in this report were made possible by the expertise and contributions of several members of FIA's staff. The authors wish to acknowledge the efforts of Anne Jenkins, Sharon Johnson, Janet Griffin, and Charlene Walker who were instrumental in editing, stat checking, and layout of the updated chapter.

Literature Cited

Bechtold, W.A.; Patterson, P.L.; eds. 2005. The enhanced forest inventory and analysis program: national sampling design and estimation procedures. Gen. Tech. Rep. SRS–80. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 85 p.

Conner, R.C.; Adams, T.; Butler, B. [and others]. 2004. The state of South Carolina's forests, 2001. Resour. Bull. SRS–96. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 67 p.

Oswalt, C.M.; Conner, R.C. 2011. Southern forest inventory and analysis volume equation user's guide. Gen. Tech. Rep. SRS–138. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 22 p.

Smith, W.B.; Vissage, J.S.; Darr, D.R.; Sheffield, R.M. 2001. Forest resources of the United States, 1997. Gen. Tech. Rep. NC–219. St. Paul, MN: U.S. Department of Agriculture Forest Service, North Central Research Station. 190 p.

Wear, D.N.; Greis, J.G., eds. 2002. Southern forest resource assessment. Gen. Tech. Rep. SRS–53. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 635 p.

Appendix

List of Tables

Table A.1—Area of forest land by State and year, Southern United States

State	Year								
	1630[a]	1907[a]	1938[a]	1953[a]	1963[a]	1982[b]	1989[c]	1999[d]	2010[e]
	thousand acres								
Alabama	29,540	20,000	18,878	20,771	21,770	21,375	21,725	21,965	22,815
Arkansas	31,940	24,200	20,963	19,681	20,051	17,139	17,687	18,790	18,720
Florida	29,840	24,128	21,740	20,817	19,050	17,134	16,549	16,221	16,897
Georgia	35,700	22,300	21,433	24,057	26,365	24,243	24,137	24,413	24,785
Kentucky	23,140	10,000	11,546	11,647	11,791	12,161	12,256	12,699	12,411
Louisiana	26,160	16,500	16,211	16,230	16,176	14,529	13,883	13,792	14,296
Mississippi	26,700	17,500	16,253	16,890	17,076	16,716	16,993	18,595	19,622
North Carolina	29,630	19,600	18,400	20,113	20,662	20,025	18,953	19,278	18,601
East Oklahoma	13,330	10,500	10,415	10,329	9,235	8,513	7,283	7,665	5,745
South Carolina	17,570	12,000	10,704	11,943	12,250	12,575	12,257	12,646	13,101
Tennessee	24,010	15,000	13,000	12,808	13,629	13,360	13,603	14,405	13,955
East Texas	41,980	30,000	26,949	24,708	23,954	23,279	20,505	18,354	12,151
Virginia	24,480	14,000	14,832	16,032	16,412	16,417	15,968	16,027	15,868
Total	354,020	235,728	221,324	226,026	228,421	217,465	211,799	214,848	208,810

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

[a] Data from Smith and others 2001.

[b] Data for 1982 are based on periodic inventories conducted by FIA between 1972 and 1982, except for Kentucky, Oklahoma, and Texas. Data for these States are taken from Smith and others 2001.

[c] Data for 1989 are based on periodic inventories conducted by FIA between 1982 and 1989, except for Kentucky, Oklahoma, and Texas. Data for these States are taken from Smith and others 2001.

[d] Data for 1999 are based on periodic and annual inventories conducted by FIA between 1990 and 1999, except for Oklahoma, and Texas. Data for these States are taken from Smith and others 2001.

[e] Data for 2010 are from annual inventories conducted by FIA between 1999 and 2010.

Table A.2—Area of timberland by State, year, and ownership class, Southern United States

State	Year[a]	All ownerships	Ownership class								
			Public						Private		
				Federal							
			Total public	Total Federal	National forest	Other	State	County and municipal	Total private	Forest industry	Non-industrial private
			thousand acres								
Alabama	1953	20,756	968	791	616	175	150	27	19,788	3,138	16,650
	1963	21,744	1,003	800	630	170	157	46	20,741	3,818	16,923
	1982	21,358	1,003	812	626	186	140	51	20,355	4,204	16,151
	1989	21,659	1,160	950	689	262	147	63	20,498	4,464	16,034
	1999	21,932	1,162	855	605	250	212	95	20,770	4,795	15,975
	2010	22,738	1,394	946	688	258	301	147	21,344	2,767	18,577
Arkansas	1953	19,627	2,916	2,799	2,292	507	115	2	16,711	4,157	12,554
	1963	19,971	2,856	2,651	2,385	266	194	11	17,115	4,007	13,108
	1982	16,707	3,011	2,659	2,329	330	311	41	13,696	4,258	9,438
	1989	17,245	3,077	2,679	2,298	382	342	55	14,168	4,364	9,804
	1999	18,392	3,296	2,835	2,372	463	394	67	15,096	4,497	10,599
	2010	18,522	3,499	2,966	2,415	551	436	97	15,022	3,739	11,284
Florida	1953	18,135	2,215	1,777	1,035	742	382	56	15,920	4,369	11,551
	1963	16,830	2,201	1,621	1,030	591	540	40	14,629	4,767	9,862
	1982	15,664	2,179	1,596	1,006	590	542	41	13,486	4,697	8,789
	1989	14,983	2,443	1,570	990	580	814	59	12,540	4,770	7,770
	1999	14,651	2,832	1,616	1,030	587	1,138	78	11,819	4,016	7,804
	2010	15,912	4,451	1,761	1,064	697	2,297	393	11,461	1,401	10,060
Georgia	1953	23,969	1,685	1,560	644	916	102	23	22,284	4,246	18,038
	1963	26,298	1,813	1,678	746	932	111	24	24,485	4,068	20,417
	1982	23,734	1,584	1,396	765	631	118	70	22,150	4,964	17,186
	1989	23,631	1,645	1,371	752	620	186	88	21,986	4,990	16,995
	1999	23,796	1,751	1,380	711	669	260	112	22,045	4,381	17,664
	2010	24,395	2,097	1,407	699	707	396	294	22,298	2,325	19,974
Kentucky	1953	11,497	725	672	455	217	53	0	10,772	308	10,464
	1963	11,651	652	575	438	137	77	0	10,999	308	10,691
	1982	11,902	896	819	589	230	76	1	11,007	255	10,752
	1989	11,909	890	856	583	273	34	0	11,019	205	10,814
	1999	12,347	1,004	863	628	235	141	0	11,344	205	11,139
	2010	12,218	1,277	1,025	766	259	178	74	10,941	119	10,822
Louisiana	1953	16,039	848	666	535	131	177	5	15,191	3,166	12,025
	1963	16,036	883	704	575	129	174	5	15,153	3,032	12,121
	1982	14,518	1,183	772	640	132	405	6	13,335	3,770	9,565
	1989	13,873	1,325	828	615	212	330	168	12,547	3,603	8,944
	1999	13,783	1,311	804	569	235	300	207	12,472	3,898	8,573
	2010	14,238	1,718	976	669	307	537	205	12,521	4,362	8,159

continued

Table A.2—Area of timberland by State, year, and ownership class, Southern United States (continued)

State	Year[a]	All ownerships	Ownership class: Public: Total public	Public: Federal: Total Federal	Public: Federal: National forest	Public: Federal: Other	Public: State	Public: County and municipal	Private: Total private	Private: Forest industry	Private: Non-industrial private
			thousand acres								
Mississippi	1953	16,853	1,709	1,235	1,036	199	54	420	15,144	2,461	12,683
	1963	17,044	1,708	1,255	1,109	146	55	398	15,336	2,526	12,810
	1982	16,685	1,751	1,516	1,258	258	112	123	14,934	3,029	11,905
	1989	16,987	1,950	1,581	1,218	363	253	116	15,037	3,200	11,838
	1999	18,587	1,951	1,541	1,107	435	310	100	16,636	3,238	13,398
	2010	19,557	2,274	1,811	1,321	490	236	227	17,283	1,990	15,294
North Carolina	1953	19,584	1,541	1,252	1,020	232	253	36	18,043	2,584	15,459
	1963	19,989	1,663	1,290	1,033	257	307	66	18,326	2,495	15,831
	1982	19,545	1,745	1,347	1,011	336	320	78	17,800	2,135	15,665
	1989	18,450	1,922	1,509	1,117	393	332	80	16,529	2,337	14,191
	1999	18,711	2,003	1,572	1,082	490	347	84	16,708	2,252	14,456
	2010	18,107	2,609	1,727	1,175	551	636	246	15,499	1,330	14,169
East Oklahoma	1953	5,075	494	309	213	96	185	0	4,581	889	3,692
	1963	4,892	427	291	223	68	136	0	4,465	865	3,600
	1982	4,316	478	356	196	160	116	6	3,837	967	2,870
	1989	4,741	628	508	243	265	114	6	4,114	1,046	3,068
	1999	4,895	637	498	223	275	118	21	4,259	1,047	3,212
	2010	5,103	718	554	258	297	136	28	4,385	568	3,817
South Carolina	1953	11,884	955	802	563	239	128	25	10,929	1,650	9,279
	1963	12,171	1,034	858	564	294	153	23	11,137	2,010	9,127
	1982	12,503	1,091	901	579	322	167	23	11,413	2,243	9,170
	1989	12,179	1,173	913	577	337	233	27	11,006	2,626	8,379
	1999	12,455	1,114	904	560	344	177	33	11,341	2,322	9,019
	2010	13,004	1,516	993	595	398	383	141	11,488	545	10,943
Tennessee	1953	12,551	1,114	806	564	242	298	10	11,437	713	10,724
	1963	13,365	1,199	834	591	243	344	21	12,166	923	11,243
	1982	12,959	1,375	966	585	381	379	30	11,585	1,226	10,359
	1989	13,265	1,509	1,027	556	471	422	59	11,756	1,122	10,635
	1999	13,965	1,568	981	557	424	519	69	12,397	1,393	11,004
	2010	13,545	1,826	1,010	682	327	719	97	11,719	262	11,457
East Texas	1953	13,081	782	745	654	91	35	2	12,299	3,019	9,280
	1963	12,960	832	780	623	157	50	2	12,128	3,362	8,766
	1982	11,662	843	774	661	113	52	17	10,820	3,835	6,985
	1989	11,565	769	700	610	90	57	12	10,797	3,796	7,001
	1999	11,774	790	675	577	98	68	47	10,985	3,720	7,265
	2010	11,980	982	814	662	152	117	52	10,997	1,229	9,769

continued

Table A.2—Area of timberland by State, year, and ownership class, Southern United States (continued)

State	Year[a]	All ownerships	Ownership class								
			Public						Private		
				Federal							
			Total public	Total Federal	National forest	Other	State	County and municipal	Total private	Forest industry	Non-industrial private
			thousand acres								
Virginia	1953	15,497	1,493	1,355	1,198	157	86	52	14,004	1,095	12,909
	1963	15,753	1,535	1,395	1,203	192	88	52	14,218	1,454	12,764
	1982	15,973	1,956	1,704	1,458	246	183	69	14,017	1,670	12,347
	1989	15,436	1,994	1,708	1,487	221	209	77	13,442	1,834	11,608
	1999	15,448	1,983	1,689	1,468	221	211	83	13,464	1,537	11,927
	2010	15,412	2,435	1,935	1,705	231	292	208	12,977	266	12,712
Total	1953	204,548	17,445	14,769	10,825	3,944	2,018	658	187,103	31,795	155,308
	1963	208,704	17,806	14,732	11,150	3,582	2,386	688	190,898	33,635	157,263
	1982	197,527	19,095	15,618	11,703	3,915	2,921	556	178,433	37,251	141,182
	1989	195,923	20,485	16,202	11,734	4,468	3,473	810	175,438	38,356	137,082
	1999	200,736	21,401	16,211	11,487	4,724	4,195	995	179,335	37,301	142,034
	2010	204,731	26,795	17,924	12,699	5,225	6,663	2,209	177,936	20,901	157,035

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

[a] Data for 1953 and 1963, as well as data for Kentucky prior to 2010 are from Smith and others 2001. The 1982, 1989, and 1999 data for all other States are based on periodic or annual inventories conducted by FIA between 1972 and 1982, 1982 and 1989, and 1990 and 1999, respectively. Data for 2010 are from FIA annual inventories conducted between 1999 and 2010.

Table A.3—Area of timberland by year and forest-type group, Southern United States

Year[a]	All groups	Forest-type group[b]											
		White-red-jack pine	Spruce-fir	Longleaf-slash pine	Loblolly-shortleaf-pine	Other soft-woods	Oak-pine	Oak-hickory	Oak-gum-cypress	Elm-ash-cotton-wood	Maple-beech-birch	Other hard-woods	Non-stocked
		thousand acres											
1953	204,546	329	12	26,926	51,792	0	23,970	54,872	34,498	4,051	750	400	7,346
1963	208,703	439	15	24,902	52,201	0	24,310	61,801	34,747	3,461	566	0	6,261
1982	197,525	453	8	15,926	47,766	0	29,556	67,752	27,613	3,082	996	0	4,374
1989	195,916	551	19	14,594	46,277	0	27,964	72,534	26,724	2,868	877	0	3,510
1999	200,736	688	13	13,176	49,797	0	29,875	74,027	28,093	2,533	1,015	0	1,522
2010	204,731	478	20	12,988	55,550	1,168	21,936	75,950	23,889	8,353	1,770	400	2,230

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

[a] Data for 1963 and 1953 are taken from Smith and others 2001. Data for 1982, 1989, and 1999 are based on periodic or annual FIA inventories conducted between 1972 and 1982, 1982 and 1989, and 1990 and 1999, respectively. Data for 2010 are from annual inventories conducted by FIA between 1999 and 2010.

[b] Other softwoods is included as a separate forest-type group for the first time in 2010. Oak-gum-cypress includes exotic and tropical hardwood forest-type groups. Other hardwoods, also included separately for 2010, includes the woodland hardwood forest-type group. The maple-beech-birch forest-type group includes aspen-birch forest types.

Table A.4—Area of timberland by State, year, and forest-type group, Southern United States

State	Year[a]	All groups	Forest-type group[b]										Non-stocked
			White-red-jack pine	Long-leaf-slash	Loblolly-shortleaf pine	Other soft-woods	Oak-pine	Oak-hickory	Oak-gum-cypress	Elm-ash-cotton-wood	Maple-beech-birch	Other hard-woods	
			thousand acres										
Alabama	1982	21,358	—	1,512	6,499	—	5,081	5,650	2,479	23	—	—	114
	1989	21,659	—	1,409	5,819	—	4,426	7,415	2,456	40	—	—	95
	1999	21,932	5	1,187	6,255	—	4,522	7,650	2,253	16	—	—	44
	2010	22,738	6	1,086	8,376	72	3,000	7,256	2,067	634	—	24	218
Arkansas	1982	16,707	—	—	4,304	—	2,995	6,568	2,681	144	—	—	16
	1989	17,245	—	—	4,192	—	3,039	7,269	2,575	158	—	—	11
	1999	18,392	—	—	5,077	—	3,137	7,127	2,791	227	—	—	32
	2010	18,522	—	—	5,449	288	2,083	7,589	2,063	892	—	29	129
Florida	1982	15,664	—	6,024	1,163	—	1,320	1,240	3,846	61	—	—	2,011
	1989	14,983	—	5,743	1,330	—	1,116	1,114	3,826	84	—	—	1,772
	1999	14,651	—	5,621	1,554	—	1,463	1,981	3,562	42	—	—	428
	2010	15,912	—	5,644	1,615	3	1,461	2,727	3,727	96	6	50	582
Georgia	1982	23,734	81	4,595	6,557	—	2,922	5,448	2,990	447	—	—	694
	1989	23,631	74	4,048	6,794	—	3,048	5,582	3,109	312	—	—	663
	1999	23,796	85	3,403	7,153	—	3,567	5,421	3,555	222	1	—	390
	2010	24,395	40	3,638	7,404	9	2,846	6,345	3,311	522	—	17	265
Kentucky	1982	11,902	14	—	679	—	800	9,169	82	628	514	—	15
	1989	11,902	14	—	679	—	800	9,169	82	628	514	—	15
	1999	12,347	37	—	646	—	858	9,516	59	571	661	—	—
	2010	12,218	38	—	173	252	545	9,202	153	734	1,054	22	45
Louisiana	1982	14,518	—	988	4,069	—	2,169	1,680	4,897	395	—	—	319
	1989	13,873	—	927	4,049	—	1,897	2,165	4,337	409	—	—	89
	1999	13,783	—	864	4,143	—	1,887	2,079	4,345	396	—	—	70
	2010	14,238	—	864	4,817	—	1,210	2,350	3,507	1,207	—	16	268
Mississippi	1982	16,685	—	1,034	4,210	—	3,434	4,310	3,391	131	—	—	175
	1989	16,987	—	854	3,939	—	3,470	5,508	3,040	134	—	—	42
	1999	18,588	—	866	4,885	—	3,218	5,834	3,561	151	—	—	73
	2010	19,557	—	760	7,108	78	2,216	5,368	2,649	1,198	—	14	167
North Carolina[b]	1982	19,545	151	532	6,046	—	2,484	7,034	2,171	425	214	—	488
	1989	18,450	223	571	5,446	—	2,252	6,844	2,244	385	158	—	328
	1999	18,710	246	411	5,538	—	2,568	6,975	2,453	172	194	—	153
	2010	18,108	146	293	5,308	31	2,389	7,156	1,888	525	64	122	185
East Oklahoma	1982	4,316	—	—	814	—	704	2,369	331	93	—	—	6
	1989	4,741	—	—	956	—	747	2,600	360	78	—	—	—
	1999	4,895	—	—	1,099	—	702	2,591	410	94	—	—	—
	2010	5,103	—	—	1,057	40	530	2,921	141	370	—	9	35
South Carolina	1982	12,503	13	970	4,538	—	1,716	2,760	1,961	273	—	—	273
	1989	12,179	11	763	4,619	—	1,533	2,482	2,250	248	—	—	274
	1999	12,455	12	592	4,915	—	1,893	2,483	2,372	96	—	—	92
	2010	13,004	16	540	5,425	15	1,541	2,884	2,039	418	—	11	115

continued

Table A.4—Area of timberland by State, year, and forest-type group, Southern United States (continued)

State	Year[a]	All groups	Forest-type group[b]										
			White-red-jack pine	Long-leaf-slash	Loblolly-shortleaf pine	Other soft-woods	Oak-pine	Oak-hickory	Oak-gum-cypress	Elm-ash-cotton-wood	Maple-beech-birch	Other hard-woods	Non-stocked
			thousand acres										
	1989	4,741	—	—	956	—	747	2,600	360	78	—	—	—
Tennessee	1982	12,959	50	—	1,303	—	1,422	9,259	757	32	137	—	—
	1989	13,265	64	—	1,334	—	1,592	9,477	639	43	111	—	6
	1999	13,965	104	—	1,365	—	1,625	9,911	609	241	16	—	94
	2010	13,545	75	—	902	256	981	9,879	367	735	287	27	37
East Texas	1982	11,662	—	271	4,334	—	2,591	2,672	1,679	104	—	—	12
	1989	11,565	—	280	3,976	—	2,365	3,351	1,508	59	11	—	17
	1999	11,774	—	232	4,065	—	2,502	3,127	1,741	65	—	—	42
	2010	11,980	—	163	5,058	49	1,476	2,866	1,613	633	—	31	92
Virginia	1989	15,436	183	—	3,145	—	1,682	9,559	296	290	83	—	198
	1999	15,448	212	—	3,104	—	1,932	9,332	383	239	142	—	104
	2010	15,412	177	—	2,857	75	1,659	9,410	365	390	358	29	93
Total	1982	197,525	461	15,926	47,766	—	29,556	67,752	27,613	3,082	996	—	4,374
	1989	195,916	570	14,594	46,277	—	27,964	72,534	26,724	2,868	877	—	3,510
	1999	200,736	701	13,176	49,797	—	29,875	74,027	28,093	2,533	1,015	—	1,522
	2010	204,731	497	12,988	55,550	1,168	21,936	75,950	23,889	8,353	1,770	400	2,230

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

— = no sample for the cell.

[a] Except for Kentucky, data for 1982, 1989, and 1999 are based on periodic FIA inventories conducted between 1972 and 1982, 1982 and 1989, and 1990 and 1999, respectively. Kentucky data for 1999 are from the 1988 FIA periodic inventory, data for both the 1982 and 1989 reporting years are from the 1975 inventory. Data for 2010 are from annual inventories conducted by FIA between 1999 and 2010.

[b] Estimates of white-red-jack pine in North Carolina include 7,900, 18,500, 13,100, and 12,000 acres of spruce-fir forest type for years 1982, 1989, 1999, and 2010 respectively. Estimates of white-jack-red pine in Virginia includes 7,600 acres of spruce-fir forest type for the 2010 survey year. Other softwoods is included as a separate forest-type group for the first time in 2010. The oak-gum-cypress forest-type group includes exotic and tropical hardwood forest-type groups. Other hardwoods, also included separately for 2010, includes the woodland hardwood forest-type group. The maple-beech-birch forest-type group includes aspen-birch forest types.

Table A.5—Area of timberland by State, year, and stand-size class for softwood and hardwood, Southern United States

State	Year[a]	All classes	Stand-size class						Non-stocked
			Sawtimber		Poletimber		Sapling seedling		
			Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	
			thousand acres						
Alabama	1982	21,358	2,930	3,945	2,706	4,514	2,376	4,774	114
	1989	21,659	2,985	4,593	2,042	4,334	2,201	5,409	95
	1999	21,932	2,587	5,053	2,139	3,773	2,722	5,615	44
	2010	22,738	5,234	5,142	4,042	2,127	3,263	2,711	218
Arkansas	1982	16,707	2,467	4,892	934	4,429	903	3,066	16
	1989	17,245	2,149	5,206	920	4,158	1,123	3,678	11
	1999	18,392	2,652	5,887	1,319	4,133	1,107	3,263	32
	2010	18,522	4,192	6,059	1,954	2,809	1,674	1,705	129
Florida	1982	15,664	1,946	3,020	2,409	1,711	2,832	1,735	2,011
	1989	14,983	1,833	3,094	2,330	1,553	2,909	1,492	1,772
	1999	14,651	1,655	3,132	2,437	1,587	3,083	2,330	428
	2010	15,912	2,985	3,170	3,028	1,462	2,711	1,975	582
Georgia	1982	23,734	4,444	5,065	3,769	3,953	3,020	2,790	694
	1989	23,631	3,946	5,340	3,038	3,257	3,934	3,455	663
	1999	23,796	3,569	6,044	3,253	2,390	3,818	4,333	390
	2010	24,395	6,200	5,247	4,831	2,194	2,905	2,753	265
Kentucky	1982	11,902	242	5,042	89	2,763	362	3,389	15
	1989	11,902	242	5,042	89	2,763	362	3,389	15
	1999	12,347	294	6,829	203	2,994	185	1,843	—
	2010	12,218	436	7,937	370	2,238	201	991	45
Louisiana	1982	14,518	2,719	5,144	1,322	2,108	1,016	1,889	319
	1989	13,873	2,881	5,172	961	1,557	1,134	2,079	89
	1999	13,783	2,681	5,468	957	1,205	1,370	2,034	70
	2010	14,238	3,173	4,391	1,601	1,014	2,118	1,675	268
Mississippi	1982	16,685	2,574	4,844	1,451	3,199	1,219	3,223	175
	1989	16,987	2,386	5,369	1,046	2,696	1,361	4,087	42
	1999	18,588	2,129	5,618	1,474	2,299	2,149	4,847	73
	2010	19,557	4,390	4,659	3,266	1,848	2,506	2,722	167
North Carolina	1982	19,545	2,268	5,944	2,181	4,111	2,280	2,273	488
	1989	18,450	2,576	6,403	2,049	3,238	1,615	2,242	328
	1999	18,710	2,586	6,531	2,061	2,878	1,548	2,953	153
	2010	18,108	3,956	5,814	2,170	1,925	2,042	2,016	185
East Oklahoma	1982	4,316	349	868	245	1,274	221	1,354	6
	1989	4,741	392	905	221	1,422	343	1,458	—
	1999	4,895	392	1,105	530	1,474	176	1,218	—
	2010	5,103	811	1,352	467	1,222	349	867	35
South Carolina	1982	12,503	2,309	3,145	1,762	1,791	1,450	1,773	273
	1989	12,179	2,382	3,129	1,359	1,727	1,651	1,657	274
	1999	12,455	1,954	2,811	1,468	1,670	2,097	2,364	92
	2010	13,004	3,521	2,809	2,441	1,123	1,575	1,420	115

continued

Table A.5—Area of timberland by State, year, and stand-size class for softwood and hardwood, Southern United States (continued)

State	Year[a]	All classes	Stand-size class						Non-stocked
			Sawtimber		Poletimber		Sapling seedling		
			Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	
			thousand acres						
Tennessee	1982	12,960	439	4,884	519	4,510	394	2,213	—
	1989	13,265	596	5,926	471	3,926	331	2,010	6
	1999	13,965	622	6,569	359	3,099	488	2,734	94
	2010	13,545	954	7,906	738	2,093	522	1,295	37
East Texas	1982	11,662	2,810	3,356	937	1,868	857	1,822	12
	1989	11,565	2,511	3,217	786	1,661	958	2,415	17
	1999	11,774	2,069	3,199	1,040	1,549	1,188	2,688	42
	2010	11,980	3,575	2,631	1,692	986	1,478	1,525	92
Virginia	1982	15,973	975	5,381	1,259	4,746	1,168	2,193	252
	1989	15,436	1,060	6,269	1,326	3,777	942	1,864	198
	1999	15,448	1,149	6,450	1,230	3,480	937	2,097	104
	2010	15,412	2,216	7,384	1,505	1,941	1,047	1,226	93
Total	1982	197,525	26,472	55,528	19,582	40,977	18,098	32,493	4,374
	1989	195,916	25,939	59,663	16,639	36,068	18,863	35,235	3,510
	1999	200,736	24,337	64,693	18,470	32,532	20,866	38,316	1,522
	2010	204,731	41,643	64,500	28,105	22,982	22,391	22,879	2,230

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

— = no sample for the cell.

[a] Data for 1982, 1989, and 1999 are based on periodic or annual FIA inventories conducted between 1972 and 1982, 1982 and 1989, and 1990 and 1999, respectively. Kentucky data for 1999 are from the 1988 FIA periodic inventory, and data for both the 1982 and 1989 inventories. Reporting years are from the 1975 inventory. Data for 2010 are from annual inventories conducted by FIA between 1999 and 2010.

Table A.6—Area of timberland by State, forest-management type, and year, Southern United States

State and forest-management type	Year						
	1952[a]	1962[a]	1970[a]	1982[b]	1989[b]	1999[b]	2010[b]
	thousand acres						
Alabama							
Planted pine	165	814	1,203	1,293	1,903	3,432	5,854
Natural pine	6,672	8,327	6,955	6,719	5,326	4,015	3,687
Oak-pine	5,803	4,839	4,982	5,081	4,426	4,522	3,000
Upland hardwoods	5,622	5,397	5,773	5,650	7,415	7,650	7,280
Lowland hardwoods[c]	2,495	2,366	2,505	2,502	2,495	2,270	2,700
All types	20,757	21,743	21,418	21,244	21,565	21,889	22,520
Arkansas							
Planted pine	55	161	256	436	1,193	1,839	2,668
Natural pine	4,481	4,690	4,180	3,867	2,999	3,238	3,069
Oak-pine	2,181	2,667	2,870	2,995	3,039	3,137	2,083
Upland hardwoods	8,500	8,351	7,779	6,568	7,269	7,127	7,618
Lowland hardwoods[c]	4,410	4,102	2,947	2,825	2,733	3,018	2,955
All types	19,627	19,971	18,032	16,692	17,233	18,359	18,393
Florida							
Planted pine	291	1,506	2,645	3,267	3,987	4,627	4,535
Natural pine	10,311	6,911	5,365	3,920	3,085	2,547	2,727
Oak-pine	751	1,137	1,558	1,320	1,116	1,463	1,461
Upland hardwoods	2,452	2,565	2,423	1,240	1,114	1,981	2,783
Lowland hardwoods[c]	4,330	4,711	4,270	3,907	3,910	3,604	3,823
All types	18,135	16,830	16,261	13,654	13,212	14,222	15,330
Georgia							
Planted pine	357	1,592	2,738	3,583	5,031	6,070	6,900
Natural pine	13,260	11,620	9,855	7,650	5,886	4,570	4,190
Oak-pine	2,266	3,604	3,674	2,921	3,048	3,567	2,846
Upland hardwoods	3,619	4,971	5,230	5,448	5,582	5,422	6,362
Lowland hardwoods[c]	4,467	4,511	3,605	3,438	3,422	3,777	3,832
All types	23,969	26,298	25,102	23,040	22,969	23,406	24,130
Kentucky							
Planted pine	—	—	—	—	—	—	19
Natural pine	—	—	—	—	—	—	444
Oak-pine	—	—	—	—	—	—	545
Upland hardwoods	—	—	—	—	—	—	10,278
Lowland hardwoods[c]	—	—	—	—	—	—	887
All types	—	—	—	—	—	—	12,173
Louisiana							
Planted pine	103	893	1,274	1,406	1,471	2,169	3,458
Natural pine	4,625	4,575	4,022	3,651	3,505	2,837	2,224
Oak-pine	2,644	2,242	2,199	2,169	1,897	1,887	1,210
Upland hardwoods	2,046	1,800	1,734	1,680	2,165	2,079	2,365
Lowland hardwoods[c]	6,621	6,526	5,901	5,292	4,747	4,741	4,714
All types	16,039	16,036	15,130	14,198	13,785	13,713	13,971

continued

Table A.6—Area of timberland by State, forest-management type, and year, Southern United States (continued)

State and forest-management type	Year						
	1952[a]	1962[a]	1970[a]	1982[b]	1989[b]	1999[b]	2010[b]
	thousand acres						
Virginia							
Planted pine	46	235	432	680	1,170	1,468	1,963
Natural pine	4,932	3,848	3,282	2,722	2,158	1,848	1,146
Oak-pine	1,297	1,569	1,753	1,921	1,682	1,932	1,659
Upland hardwoods	8,278	9,541	9,897	9,724	9,642	9,473	9,797
Lowland hardwoods[c]	944	559	495	673	586	622	754
All types	15,497	15,752	15,859	15,720	15,238	15,343	15,319
Total							
Planted pine	1,846	7,587	12,144	15,085	21,715	30,033	39,528
Natural pine	71,987	64,908	56,692	48,375	39,032	32,958	30,655
Oak-pine	27,088	27,501	29,185	28,757	27,167	29,016	21,944
Upland hardwoods	55,382	61,102	61,559	59,066	63,728	64,863	78,119
Lowland hardwoods[c]	36,747	35,953	31,732	29,983	28,881	29,995	32,056
All types[d]	193,050	197,051	191,312	181,265	180,522	186,865	202,501

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

— = no sample for the cell.

[a] Data are from "The South's Fourth Forest" (U.S. Department of Agriculture Forest Service 1988).

[b] Data are based on periodic or annual FIA inventories conducted between 1972 and 1982, 1982 and 1989, and 1990 and 1999, respectively. The 2010 data are from annual inventories conducted by FIA between 1999 and 2010. Data for Kentucky are available for the 2010 reporting year only.

[c] Includes exotic and tropical forest types.

[d] Excludes timberland acres classified as nonstocked.

Table A.7—Area of timberland by stand-age class and forest-management type, Southern United States, 2010

Stand-age class	All types	Forest-management type[a]					
		Planted pine	Natural pine	Planted oak-pine	Natural oak-pine	Upland hardwood	Lowland hardwood[b]
		thousand acres					
0–7	21,867	7,524	1,469	1,970	1,221	7,159	2,524
8–12	16,164	7,007	1,710	564	1,230	3,982	1,671
13–17	15,237	6,573	2,485	260	1,193	3,208	1,519
18–22	15,080	6,701	2,607	259	1,228	2,750	1,535
23–27	13,158	5,680	2,376	236	1,082	2,469	1,314
28–32	10,780	3,135	2,352	111	1,123	2,732	1,327
33–37	9,235	1,329	2,195	46	1,196	2,845	1,624
38–42	9,888	602	2,194	71	1,277	3,831	1,913
43–47	10,777	353	2,297	13	1,174	4,724	2,216
48–52	11,903	225	2,408	27	1,413	5,458	2,371
53–57	12,187	144	2,124	12	1,416	5,828	2,662
58–62	12,093	63	1,766	4	1,266	6,484	2,511
63–67	10,319	49	1,309	3	986	5,772	2,201
68–72	9,730	40	1,390	—	790	5,556	1,955
73–77	7,098	36	805	—	545	4,298	1,415
78–82	5,493	6	516	—	457	3,455	1,059
83–87	3,793	—	296	—	311	2,396	790
88–92	2,585	18	183	—	166	1,691	527
93+	5,115	20	218	—	285	3,484	1,109
All classes[c]	202,501	39,504	30,699	3,577	18,359	78,120	32,242

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

— = no sample for the cell.

[a] Data are based on annual surveys conducted between 1999 and 2010.

[b] Includes exotic and tropical forest types.

[c] Excludes timberland acres classified as nonstocked.

Table A.8—Volume of growing stock on timberland by State and year, Southern United States

State	Year[a]					
	1953	1963	1982	1989	1999	2010
	million cubic feet					
Alabama	12,352	16,466	19,350	21,394	23,076	29,771
Arkansas	14,109	15,069	17,369	18,999	21,687	26,162
Florida	8,901	10,686	13,815	14,422	15,366	14,933
Georgia	19,351	22,701	31,268	31,078	31,704	35,404
Kentucky	6,351	8,924	11,968	14,610	16,002	20,594
Louisiana	11,009	14,668	16,674	19,249	18,844	20,649
Mississippi	10,044	11,541	17,426	20,202	20,611	25,801
North Carolina	21,420	23,160	28,307	31,387	32,742	33,450
East Oklahoma	1,381	1,519	2,052	2,314	3,001	3,699
South Carolina	10,212	12,268	17,706	18,009	16,685	20,241
Tennessee	8,250	9,298	12,935	16,646	22,456	24,230
East Texas	7,893	9,415	12,238	12,713	12,939	15,859
Virginia	17,197	18,357	22,804	24,965	26,487	28,914
Total	148,470	174,072	223,913	245,987	261,601	299,707

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

[a] Data for 1953 and 1963, as well as data for Kentucky prior to 2010 are from Smith and others 2001. The 1982, 1989, and 1999 data for all other States are based on periodic or annual inventories conducted by FIA between 1972 and 1982, 1982 and 1989, and 1990 and 1999, respectively. Data for 2010 are from FIA annual inventories conducted between 1999 and 2010.

Table A.9—Volume of softwood growing stock on timberland by State and year, Southern United States

State	Year[a]					
	1953	1963	1982	1989	1999	2010
	million cubic feet					
Alabama	5,875	8,684	10,705	11,423	11,102	14,758
Arkansas	4,640	5,812	8,244	7,918	9,342	10,853
Florida	5,384	6,685	8,940	9,006	9,425	10,460
Georgia	10,751	12,513	16,682	15,713	15,224	19,345
Kentucky	493	567	916	1,110	1,218	1,299
Louisiana	4,253	6,357	9,030	10,842	9,928	10,474
Mississippi	3,674	5,259	9,013	9,298	9,208	12,667
North Carolina	9,097	9,634	11,305	12,041	12,530	12,275
East Oklahoma	541	692	1,008	1,037	1,395	1,510
South Carolina	4,800	6,066	9,178	8,944	8,034	11,168
Tennessee	1,227	1,480	2,434	2,893	3,586	2,987
East Texas	4,211	6,062	8,117	7,900	7,879	9,545
Virginia	5,516	5,276	5,929	6,258	6,648	7,489
Total	60,462	75,087	101,501	104,383	105,518	124,830

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

[a] Data for 1953 and 1963, as well as data for Kentucky prior to 2010 are from Smith and others 2001. The 1982, 1989, and 1999 data for all other States are based on periodic or annual inventories conducted by FIA between 1972 and 1982, 1982 and 1989, and 1990 and 1999, respectively. Data for 2010 are from annual inventories conducted by FIA between 1999 and 2010.

Table A.10—Volume of hardwood growing stock on timberland by State and year, Southern United States

State	Year[a]					
	1953	1963	1982	1989	1999	2010
	million cubic feet					
Alabama	6,477	7,782	8,646	9,971	11,974	15,013
Arkansas	9,469	9,257	9,125	11,081	12,345	15,309
Florida	3,517	4,001	4,874	5,416	5,942	4,473
Georgia	8,600	10,188	14,586	15,365	16,480	16,059
Kentucky	5,858	8,357	11,052	13,500	14,785	19,294
Louisiana	6,756	8,311	7,644	8,408	8,916	10,176
Mississippi	6,370	6,282	8,413	10,904	11,403	13,133
North Carolina	12,323	13,526	17,002	19,345	20,214	21,175
East Oklahoma	840	827	1,044	1,277	1,607	2,189
South Carolina	5,412	6,202	8,528	9,065	8,651	9,073
Tennessee	7,023	7,818	10,501	13,753	18,870	21,243
East Texas	3,682	3,353	4,122	4,813	5,060	6,314
Virginia	11,681	13,081	16,875	18,707	19,839	21,425
Total	88,008	98,985	122,412	141,604	156,085	174,877

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

[a] Data for 1953 and 1963, as well as data for Kentucky prior to 2010 are from Smith and others 2001. The 1982, 1989, and 1999 data for all other States are based on periodic or annual inventories conducted by FIA between 1972 and 1982, 1982 and 1989, and 1990 and 1999, respectively. Data for 2010 are from annual inventories conducted by FIA between 1999 and 2010.

Table A.11—Volume of growing stock on timberland by year and diameter class, Southern United States

Year[a]	All classes	Diameter class (*inches at breast height*)									
		5.0–6.9	7.0–8.9	9.0–10.9	11.0–12.9	13.0–14.9	15.0–16.9	17.0–18.9	19.0–20.9	21.0–28.9	29+
	million cubic feet										
1953	148,470	15,230	21,998	25,726	24,255	19,942	14,316	9,955	6,271	9,221	1,556
1963	174,072	19,733	26,809	30,026	28,160	23,055	16,602	11,232	7,119	9,767	1,568
1982	223,913	23,659	33,374	37,434	35,616	30,392	22,783	15,572	9,640	13,201	2,242
1989	245,987	23,295	34,194	38,588	38,005	33,919	26,318	18,763	12,295	17,493	3,117
1999	261,604	23,667	34,724	38,875	38,342	35,402	29,027	21,216	14,635	21,646	4,071
2010	299,707	22,727	35,609	40,497	40,998	38,911	33,444	26,343	19,501	33,855	7,822

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

[a] Data for 1953 and 1963, as well as data for Kentucky prior to 2010 are from Smith and others 2001. The 1982, 1989, and 1999 data for all other States are based on periodic or annual inventories conducted by FIA between 1972 and 1982, 1982 and 1989, and 1990 and 1999, respectively. Data for 2010 are from annual inventories conducted by FIA between 1999 and 2010.

Table A.12—Volume of softwood growing stock on timberland by year and diameter class, Southern United States

Year[a]	All classes	Diameter class (*inches at breast height*) 5.0–6.9	7.0–8.9	9.0–10.9	11.0–12.9	13.0–14.9	15.0–16.9	17.0–18.9	19.0–20.9	21.0–28.9	29+
					million cubic feet						
1953	60,462	7,143	10,610	12,027	10,912	7,738	5,106	3,109	1,691	1,879	247
1963	75,087	9,339	13,074	14,241	13,050	9,653	6,625	4,108	2,354	2,399	243
1982	101,501	11,565	17,005	18,565	17,271	13,599	9,555	6,089	3,507	3,924	419
1989	104,383	10,686	16,464	18,023	17,269	14,509	10,456	6,991	4,280	5,109	597
1999	105,518	11,347	16,873	17,236	16,523	14,199	10,960	7,285	4,634	5,753	708
2010	124,830	12,389	19,868	20,618	19,014	16,025	11,991	8,575	5,747	9,005	1,600

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

[a] Data for 1953 and 1963, as well as data for Kentucky prior to 2010 are from Smith and others 2001. The 1982, 1989, and 1999 data for all other States are based on periodic or annual inventories conducted by FIA between 1972 and 1982, 1982 and 1989, and 1990 and 1999, respectively. Data for 2010 are from annual inventories conducted by FIA between 1999 and 2010.

Table A.13—Volume of hardwood growing stock on timberland by year and diameter class, Southern United States

Year[a]	All classes	Diameter class (*inches at breast height*) 5.0–6.9	7.0–8.9	9.0–10.9	11.0–12.9	13.0–14.9	15.0–16.9	17.0–18.9	19.0–20.9	21.0–28.9	29+
					million cubic feet						
1953	88,008	8,087	11,388	13,699	13,343	12,204	9,210	6,846	4,580	7,342	1,309
1963	98,985	10,394	13,735	15,785	15,110	13,402	9,977	7,124	4,765	7,368	1,325
1982	122,413	12,093	16,369	18,870	18,345	16,793	13,228	9,483	6,132	9,277	1,824
1989	141,604	12,609	17,731	20,565	20,736	19,410	15,862	11,772	8,015	12,384	2,520
1999	156,086	12,320	17,851	21,639	21,819	21,203	18,067	13,931	10,001	15,892	3,363
2010	174,877	10,338	15,741	19,879	21,984	22,886	21,453	17,768	13,754	24,851	6,222

Data source: 1997 RPA (Renewable Resources Planning Act) (includes Kentucky data).

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

[a] Data for 1953 and 1963, as well as data for Kentucky prior to 2010 are from Smith and others 2001. The 1982, 1989, and 1999 data for all other States are based on periodic or annual inventories conducted by FIA between 1972 and 1982, 1982 and 1989, and 1990 and 1999, respectively. Data for 2010 are from annual inventories conducted by FIA between 1999 and 2010.

Table A.14—Volume of growing stock on timberland by year and ownership class, Southern United States

Year[a]	All classes	Ownership class			
		National forest	Other public	Forestry industry	Non-industrial private
	million cubic feet				
1953	148,470	9,766	4,574	27,785	106,345
1963	174,072	13,245	5,818	34,869	120,140
1982	223,913	18,806	7,397	41,236	156,474
1989	245,987	18,983	12,605	40,692	173,706
1999	261,601	20,873	16,043	41,722	182,964
2010	299,707	27,160	24,749	25,009	222,788

Data source: 1997 RPA (Renewable Resources Planning Act) (includes Kentucky data).

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

[a] Data for 1953 and 1963, as well as data for Kentucky prior to 2010 are from Smith and others 2001. The 1982, 1989, and 1999 data for all other States are based on periodic or annual inventories conducted by FIA between 1972 and 1982, 1982 and1989, and 1990 and 1999, respectively. Data for 2010 are from annual inventories conducted by FIA between 1999 and 2010.

Table A.15—Volume of growing stock on timberland by forest-type group and year, Southern United States

Forest-type group[a]	Year[b]		
	1989	1999	2010
	million cubic feet		
White-red-jack pine	1,327	1,778	1,519
Spruce-fir	25	16	57
Planted longleaf-slash	5,610	6,283	7,277
Natural longleaf-slash	8,960	7,450	8,049
Planted loblolly-shortleaf	9,877	17,791	39,611
Natural loblolly-shortleaf	54,224	47,261	46,226
Other softwoods	0	0	599
Oak-pine	30,348	32,846	27,194
Oak-hickory	72,895	82,057	113,262
Oak-gum-cypress	43,530	46,511	41,631
Elm-ash-cottonwood	3,700	2,733	10,525
Maple-beech-birch	719	833	3,323
Other hardwoods	0	0	369
Nontyped	163	40	66
All groups	231,378	245,600	299,708

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

[a] Oak-gum-cypress includes exotic and tropical hardwood forest-type groups. Other softwoods is included as a separate forest-type group for the first time in 2010. Other hardwoods, also included separately for 2010, includes the woodland hardwood forest-type group. The maple-beech-birch forest-type group includes aspen-birch forest types.

[b] Data for 1989 and 1999 are based on periodic or annual inventories conducted by FIA between 1982 and 1989, and 1990 and 1999, respectively. Data for 1989 and 1999 excludes Kentucky. Data for 2010 are from annual inventories conducted by FIA between 1999 and 2010. The 2010 data includes Kentucky.

Table A.16—Average net annual growth of growing stock on timberland by species group and year, Southern United States

Species group	Year					
	1953	1963	1982	1989	1999	2010
	million cubic feet					
Softwoods	3,641	4,699	6,315	5,113	5,970	7,822
Hardwoods	3,041	3,394	5,009	4,662	4,892	5,289
All species	6,683	8,093	11,323	9,775	10,862	13,111

Data Source: 1997 RPA (includes Kentucky data).
Numbers in columns may not sum to totals due to rounding.

Table A.17—Average net annual growth of growing stock on timberland by year and ownership class, Southern United States

Year	All classes	Ownership class			
		National forest	Other public	Forest industry	Non-industrial private
	million cubic feet				
1953	6,683	432	209	1,456	4,586
1963	8,093	624	245	1,841	5,383
1982	11,323	667	400	2,294	7,962
1989	9,775	533	402	2,134	6,705
1999	10,862	511	462	2,618	7,271
2010	13,111	627	750	1,781	9,953

Data source: 1997 RPA (Renewable Resources Planning Act) (includes Kentucky data).
Numbers in rows may not sum to totals due to rounding.

Table A.18—Average net annual growth of growing stock on timberland by forest-type group and year, Southern United States

Forest-type group[a]	Year[b]		
	1989	1999	2010
	million cubic feet		
White-red-jack pine	42	47	44
Spruce-fir	1	1	3
Planted longleaf-slash	568	597	604
Natural longleaf-slash	363	294	270
Planted loblolly-shortleaf	879	1,768	3,692
Natural loblolly-shortleaf	2,283	2,118	2,054
Other softwoods	0	0	34
Oak-pine	1,287	1,419	1,387
Oak-hickory	2,635	2,873	3,604
Oak-gum-cypress	1,203	1,258	1,000
Elm-ash-cottonwood	109	72	300
Maple-beech-birch	19	15	83
Other hardwoods	0	0	18
Nontyped	3	18	18
All groups	9,391	10,478	13,111

Numbers in columns may not sum to totals due to rounding.
[a] Oak-gum-cypress includes exotic and tropical hardwood forest-type groups. Other softwoods is included as a separate forest-type group for the first time in 2010. Other hardwoods, also included separately for 2010, includes the woodland hardwood forest-type group. The maple-beech-birch forest-type group includes aspen-birch forest types.
[b] Data for 1989 and 1999 are based on periodic or annual inventories conducted by FIA between 1982 and 1989, and 1990 and 1999, respectively. The 1989 and 1999 data excludes Kentucky. Data for 2010 are from annual inventories conducted by FIA between 1999 and 2010. The 2010 data includes Kentucky.

Table A.19—Average annual removals of growing stock on timberland by species group and year, Southern United States

Species group	Year			
	1982	1989	1999	2010
	million cubic feet			
Softwoods	4,436	5,021	6,019	6,353
Hardwoods	2,242	2,559	3,496	3,173
All species	6,679	7,579	9,516	9,527

Data source: 1997 RPA (Renewable Resources Planning Act) (includes Kentucky data).
Numbers in columns may not sum to totals due to rounding.

Table A.20—Average annual removals of growing stock on timberland by year and ownership class, Southern United States

Year	All classes	Ownership class			
		National forest	Other public	Forest industry	Non-industrial private
	million cubic feet				
1982	6,679	288	218	1,805	4,368
1989	7,579	317	171	2,293	4,798
1999	9,516	291	294	2,508	6,423
2010	9,527	125	294	1,742	7,366

Data source: 1997 RPA (Renewable Resources Planning Act) (includes Kentucky data).
Numbers in rows may not sum to totals due to rounding.

Table A.21—Average annual removals of growing stock on timberland by forest-type group and year, Southern United States

Forest-type group[a]	Year[b]		
	1989	1999	2010
	million cubic feet		
White-red-jack pine	9	22	24
Spruce-fir	0	0	2
Planted longleaf-slash	403	376	526
Natural longleaf-slash	209	199	382
Planted loblolly-shortleaf	1,032	1,166	2,701
Natural loblolly-shortleaf	1,174	1,297	2,143
Other softwoods	0	0	6
Oak-pine	1,160	1,598	959
Oak-hickory	2,435	3,195	1,855
Oak-gum-cypress	850	1,104	711
Elm-ash-cottonwood	67	65	167
Maple-beech-birch	4	10	43
Other hardwoods	0	0	5
Nontyped	58	305	3
All groups	7,400	9,337	9,526

Numbers in columns may not sum to totals due to rounding.
[a] Oak-gum-cypress includes exotic and tropical hardwood forest-type groups. Other softwoods is included as a separate forest-type group for the first time in 2010. Other hardwoods, also included separately for 2010, includes the woodland hardwood forest-type group. The maple-beech-birch forest-type group includes aspen-birch forest types.
[b] Data for 1989 and 1999 are based on periodic or annual inventories conducted by FIA between 1982 and 1989, and 1990 and 1999, respectively. The 1989 and 1999 data excludes Kentucky. Data for 2010 are from annual inventories conducted by FIA between 1999 and 2010. The 2010 data includes Kentucky.

Table A.22—Average annual mortality of growing stock on timberland by species group and year, Southern United States

Species group	Year					
	1953	1963	1982	1989	1999	2010
	million cubic feet					
Softwood	333	399	632	874	1,052	1,202
Hardwood	639	770	646	973	1,199	1,490
All groups	972	1,169	1,278	1,847	2,251	2,692

Data source: 1997 RPA (Renewable Resources Planning Act) (includes Kentucky data).

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

Table A.23—Average annual mortality of growing stock on timberland by year and ownership class, Southern United States

Year	All classes	Ownership class			
		National forest	Other public	Forest industry	Non-industrial private
	million cubic feet				
1953	972	55	29	178	711
1963	1,169	68	41	227	833
1982	1,278	80	57	231	911
1989	1,846	136	98	292	1,321
1999	2,251	181	141	355	1,574
2010	2,693	275	243	189	1,986

Data source: 1997 RPA (Renewable Resources Planning Act) (includes Kentucky data).

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

Table A.24—Average annual mortality of growing stock on timberland by forest-type group and year, Southern United States

Forest-type group[a]	Year[b]		
	1989	1999	2010
	million cubic feet		
White-red-jack pine	6	13	22
Spruce-fir	0	0	0
Planted longleaf-slash	0	0	44
Natural longleaf-slash	36	36	78
Planted loblolly-shortleaf	48	47	213
Natural loblolly-shortleaf	59	113	537
Other softwoods	0	0	2
Oak-pine	351	399	299
Oak-hickory	254	345	831
Oak-gum-cypress	568	658	494
Elm-ash-cottonwood	391	503	156
Maple-beech-birch	38	40	12
Other hardwoods	0	0	3
Nontyped	4	7	1
All groups	1,758	2,162	2,692

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

[a] Oak-gum-cypress includes exotic and tropical hardwood forest-type groups. Other softwoods is included as a separate forest-type group for the first time in 2010. Other hardwoods, also included separately for 2010, includes the woodland hardwood forest-type group. The maple-beech-birch forest-type group includes aspen-birch forest types.

[b] Data for 1989 and 1999 are based on periodic or annual inventories conducted by FIA between 1982 and 1989, and 1990 and 1999, respectively. The 1989 and 1999 data excludes Kentucky. Data for 2010 are from annual inventories conducted by FIA between 1999 and 2010. The 2010 data includes Kentucky.

Hartsell, Andrew J.; Conner, Roger C. 2013. Forest area and conditions: a 2010 update of Chapter 16 of the Southern Forest Resource Assessment. e-Gen. Tech. Rep. SRS–174. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 32 p.

This report updates the findings of Chapter 16 of the Southern Forest Resource Assessment (Wear and Greis 2002), based on 2010 report year data. Analysis focuses on changes in the South's forest resources since 1999 using annual inventory, mapped-plot design data available for the first time for all 13 Southern States (excluding west Oklahoma and west Texas). The recently implemented inventory design is a drastic departure from the traditional periodic, variable-radius survey design used to collect past resource estimates. The authors advise caution when making direct comparisons to past estimates. The 2010 data perhaps best serve as a new baseline from which to analyze future changes in southern forest resources. The 2010 results estimate southern forest land area to be 208.8 million acres compared to 214.8 million estimated in 1999. The timberland component of forest land increased 4.0 million acres to 204.7 million. Total growing-stock volume amounted to 299.7 billion cubic feet in 2010, some 38.1 billion cubic feet more than reported in 1999. Hardwood species account for 58 percent of the current growing-stock volume. Nearly 222.8 billion cubic feet (74 percent) of the current growing stock is on nonindustrial private timberland. Growing-stock net annual growth averaged 13.1 billion cubic feet per year between 1999 and 2010. Net growth outpaced annual removals (9.5 billion cubic feet per year) by 3.6 billion cubic feet annually. Average annual mortality continued to trend upward, amounting to 2.7 billion cubic feet per year since 1999.

Keywords: Diameter class, FIA, forest industry timberland, forest management type, forest-type group, loblolly-shortleaf pine, national forest timberland, oak-hickory, sawtimber, softwoods, stand-size class.

How do you rate this publication?
Scan this code to submit your feedback
or go to www.srs.fs.usda.gov/pubeval

You may request additional copies of this publication by email at pubrequest@fs.fed.us

The Forest Service, U.S. Department of Agriculture (USDA), is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives—as directed by Congress—to provide increasingly greater service to a growing Nation.