Louisiana's Forests, 2005

Sonja N. Oswalt
and James W. Bentley

United States
Department of
Agriculture

Forest Service

Southern
Research Station

Resource Bulletin
SRS–192

About the Authors

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

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

Front cover: top left, pine trees on Big Branch Marsh, National Wildlife Refuge. (photo by Steve Hillebrand, U.S. Fish and Wildlife Service); top right, Southern lady slipper (*cypripedium kentuckiense*), Kisatchie Ranger District, Natchiotoches, Lousiania. (photo by Converse Griffith, U.S. Forest Service); bottom, Baldcypress in Lacassine National Wildlife Refuge. (photo by Steve Hillebrand, U.S. Fish and Wildlife Service). Back cover: top left, Baldcypress in Lacassine National Wildlife Refuge. (photo by Steve Hillebrand, U.S. Fish and Wildlife Service); top right, pine trees on Big Branch Marsh, National Wildlife Refuge. (photo by Steve Hillebrand, U.S. Fish and Wildlife Service); bottom, frog in the Evangeline Unit of the Calcasieu Ranger District, Kisatchie National Forest. (photo by Steve Shively, U.S. Forest Service)

www.srs.fs.usda.gov

Louisiana's
Forests, 2005

Sonja N. Oswalt and
James W. Bentley

Baldcypress in Lacassine National Wildlife Refuge. (photo by Steve Hillebrand, U.S. Fish and Wildlife Service)

Chinese tallowtree. (photo by James H. Miller, USDA Forest Service, Bugwood.org)

Foreword

This resource bulletin highlights the findings from the seventh forest survey of Louisiana. Field work began in 2000 and was initially completed in 2005. A subset of plots was revisited between 2004 and 2008, and final revisions to the data occurred in 2008. This publication primarily focuses on current conditions and trends in the data since 1991. Data used in this report were accessed from the publicly available forest inventory and analysis database on January 27, 2012.

Forest resource surveys are authorized by the Forest and Rangeland Renewable Resources Research Act of 1978. These surveys constitute a continual, nationwide program instituted by the U.S. Department of Agriculture Forest Service. Inventories of 13 Southern States including Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, the U.S. Virgin Islands, and the Commonwealth of Puerto Rico are conducted by the Southern Research Station (SRS), Forest Inventory and Analysis (FIA) Research Work Unit, headquartered in Knoxville, Tennessee. The primary objective of the program is to provide statistically valid data to aid in forest management, decision and policymaking, and resource use and health investigations. This report summarizes the extent and condition of forest and timberland, forest and timber volume, and rates of growth, removals, and mortality. Statewide data provide the highest level of statistical accuracy, and summaries of data for individual survey units will be less accurate than aggregate data summaries. At the end of this report, we discuss data collection methods and statistical reliability, along with data collection issues specific to this collection cycle for the State of Louisiana.

Forest resource data included in FIA reports are available to the public in an online tabular format. Data may be accessed via the Internet at http://srsfia2.fs.fed.us/. Additional information about any aspect of this survey may be obtained from:

Forest Inventory and Analysis
Southern Research Station
4700 Old Kingston Pike
Knoxville, TN 37919
Telephone: 865-862-2000
William G. Burkman
Program Manager

Acknowledgments

This bulletin would not have been possible without countless hours of field work performed by SRS field crews with help from Louisiana Department of Forestry crews early in data collection processes. Thanks is due the SRS FIA quality assurance and quality control team for outstanding performance in detecting data anomalies in the first iteration of data collection and working tirelessly to correct the problem. Additional outstanding support was provided by the Information Management and Publication Management teams at SRS FIA, and the authors thank them for their efforts. Individuals from the Louisiana Forestry Association conducted reviews of this report, and their invaluable assistance is appreciated as well.

Contents

List of Figures

Page

Text Figures

Frog in the Evangeline Unit of the Calcasieu Ranger District, Kisatchie National Forest. (photo by Steve Shively, U.S. Forest Service)

List of Figures

List of Tables

Page

Text Tables

Appendix Tables

List of Tables

Spider lily (*Hymenocallis* spp.) blossoms on the Lacassine National Wildlife Refuge. (photo by Steve Hillebrand, U.S. Fish and Wildlife Service)

• Forests cover 53 percent of Louisiana's land area. Most forest land in the State (99.6 percent) is available for timber production.

• Fifty-eight percent of Louisiana's forest land is in a hardwood forest-type group.

• Most (88 percent) of Louisiana's timberland is privately owned, and a large proportion of the noncorporate private landowners are over age 55.

• Total live tree volume on forest land in 2005 was 22.8 billion cubic feet.

• Of the 8 billion live trees measured on forest land in the 2005 survey, loblolly pine, sweetgum, and red maple were most common.

• In Louisiana 2005, total aboveground standing biomass (live and dead trees) equaled 579.3 million dry tons, or an average of 41 tons per acre.

• In 2002, about 60 sawmills, pulpwood mills, and other primary wood-processing plants distributed across the State directly employed nearly 20,000 individuals, with an annual payroll of $722 million.

• Total output of timber products, which includes residential fuelwood and plant byproducts, averaged 903 million cubic feet per year between 1991 and 2003.

• Average annual output of roundwood products (including residential fuelwood) was up 20 percent, or 131 million cubic feet, from 669 million cubic feet in the previous survey, to an average of 801 million cubic feet between 1991 and 2003.

• During the latest survey period roundwood harvested for saw-log and pulpwood production amounted to 264- and 317-million cubic feet, respectively. These two products accounted for 73 percent of the total roundwood production for the State.

Bottomland hardwoods on the Pearl River, LA. (photo by Gerald J. Lenhard, Louisiana State University, Bugwood.org)

Brown pelican (Louisiana State bird. (photo by
Tom MacKenzie, U.S. Fish and Wildlife Service)

Introduction

The findings of the seventh forest survey of Louisiana, initially completed in 2005, revised in 2008, and posted to Forest Inventory and Analysis database in 2011 are contained in this report. Findings are based on sampling conducted by the U.S. Department of Agriculture Forest Service, Southern Research Station (SRS), Forest Inventory and Analysis (FIA) headquartered in Knoxville, Tennessee. The FIA program subdivides Louisiana into five survey units based on physiographic and parish boundaries within the State (fig. 1). The five subdivisions in Louisiana are: North Delta (unit 1), South Delta (unit 2), Southwest (unit 3), Southeast (unit 4), and Northwest (unit 5). Data may, in some cases, be analyzed or presented in terms of these units.

This report addresses forest land and timberland area estimates, forest and timber volume, species composition, ownership, timber growth, removals, and mortality, and timber product output (TPO), along with comparisons of values from the sixth survey (completed in 1991). Readers are encouraged to review the appendix material regarding data collection methods and processing, statistical reliability, and issues specific to this survey prior to using the numbers contained

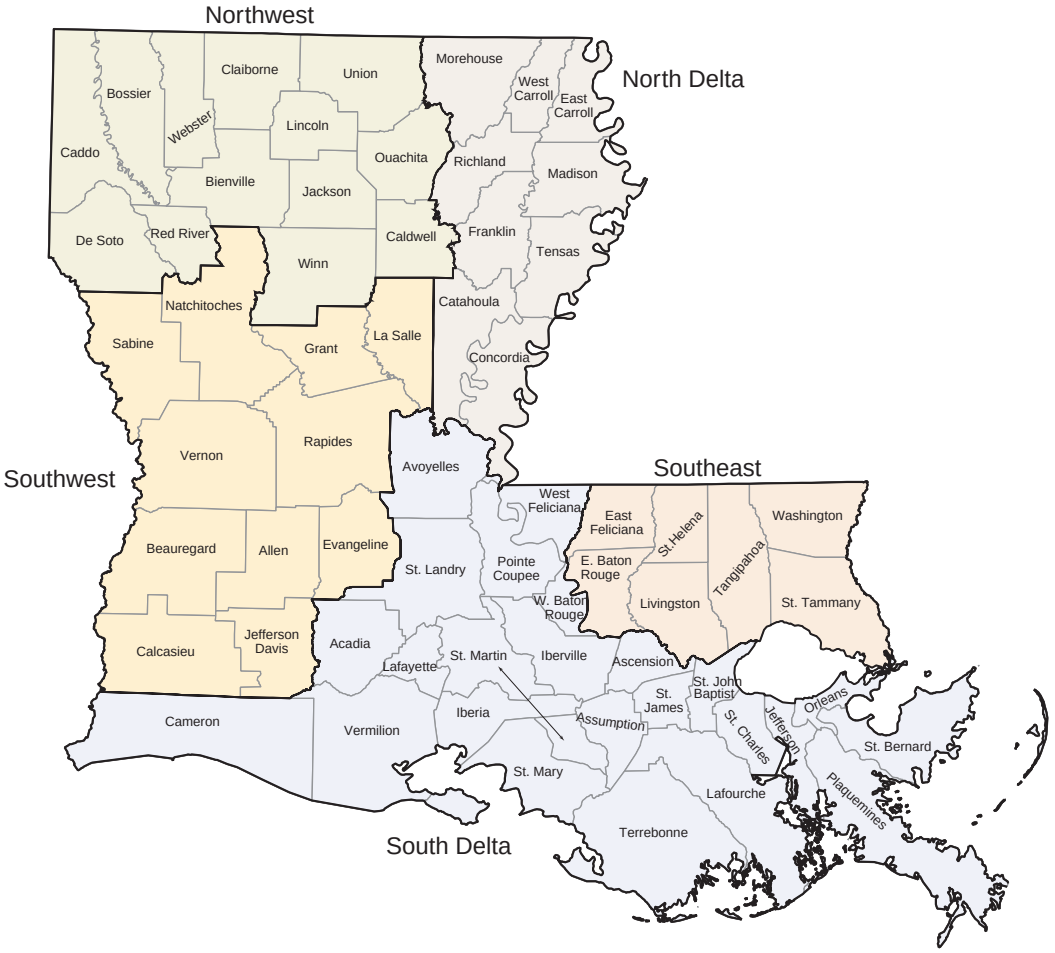


Figure 1—Forest survey regions in Louisiana.

herein. Standard statistical tables, lists of tree species common to Louisiana, and definitions of terms contained in the report are also contained in the appendices.

Previous surveys of Louisiana focused on reporting the characteristics of timberland; that is, land available for commercial production. In more recent years, the FIA program has begun to incorporate estimates from all forest land into its reporting efforts. In this report, we discuss characteristics of both forest land and timberland. When making comparisons with 1991 data, we refer to timberland, only.

Several changes in inventory methodology occurred between the 1991 and 2005 inventory cycles in Louisiana. Many definitions and classifications changed that may impact the reliability of trend comparisons between old and new inventories (see appendix for more details). For example, changes in algorithms have affected the way stocking, stand size, and forest type are computed. Procedures for computing tree volume also changed for all Southern States between 1991 and 2005. To help in comparisons, the 1991 Louisiana data were reprocessed using the 2005 volume equations. Thus, comparisons in this report use the reprocessed 1991 volumes, and will not match the volumes published in previous reports.

Despite the changes to the inventory, which were instituted as States across the United States moved toward a nationally consistent forest inventory program, this information still represents the best data available for describing the extent and characteristics of Louisiana's forests.

Longleaf pine forest and bog in Vernon parish, Lousiana. (photo by Converse Griffith, U.S. Forest Service)

Forest Area

Forests cover 53 percent of Louisiana's land area (land minus census water). Most forest land in the State (99.6 percent) is available for timber production, as opposed to being withdrawn from production by law or statute. Louisiana's timberland area is proportionally comparable to the surrounding States of Mississippi and Arkansas, which support 20 and 18 million acres of timberland, respectively (fig. 2).

Timberland area (forest available for commercial timber harvest) increased between the 1991 and 2005 survey (table 1), the first time timberland area in Louisiana has increased since the mid-1930s. Widespread clearing in the Louisiana Delta for the purposes of agriculture (particularly soybean production) from the 1970s into the late 1980s likely accounts for much of the loss of timberland in the State (fig. 3). Falling prices in the agriculture sector

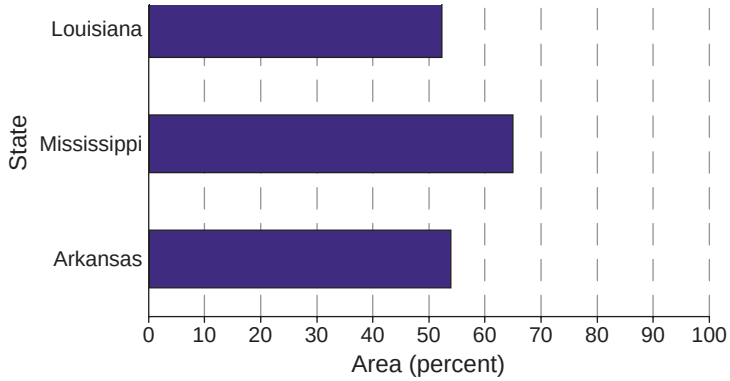


Figure 2—Proportion of land in timber by State, 2005.

Table 1—Area of timberland by year, Louisiana

Year	Timberland
	thousand acres
1936	16,156
1954	16,038
1964	16,037
1974	14,527
1984	13,873
1991	13,783
2005	14,238

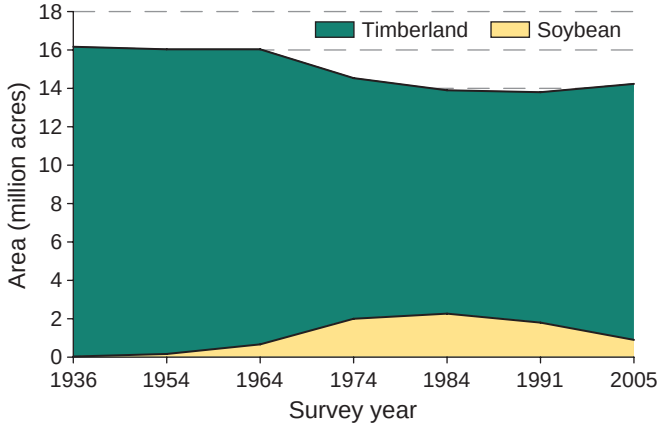
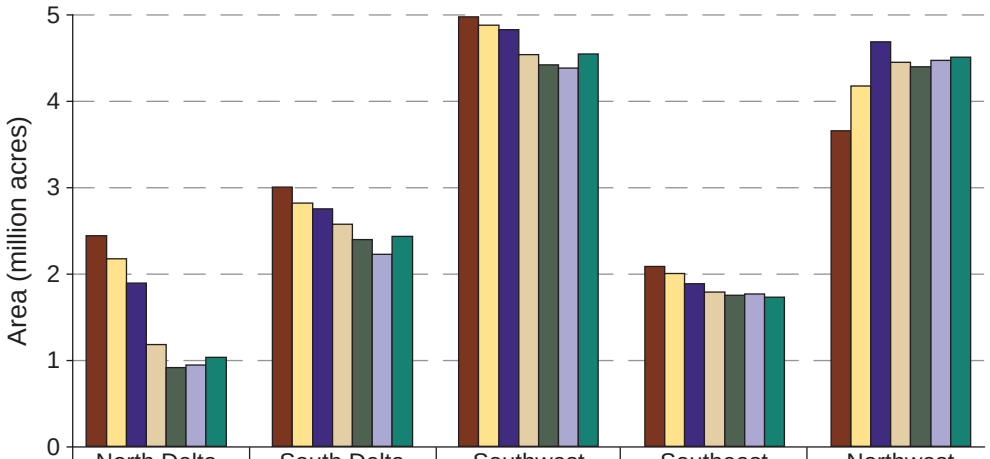


Figure 3—Trends in timberland acreage compared to soybean acreage by survey year, Louisiana.

coupled with incentives to landowners to allow fallow land to revert back to forest in the 1990s likely accounts for some increase in timberland over the last decade. Additionally, new interests in carbon sequestration and biomass production for fuel may result in further increases in timberland in the future. Despite recent increases in the acreage of land available for timber production, timberland in Louisiana has decreased overall by 12 percent since 1936.

The greatest loss of timberland area in Louisiana between 1936 and 2005 occurred in the North Delta unit of the State, with a 58 percent reduction in timberland area (fig. 4). In contrast, the Northwest unit has gained timberland area since 1936, with a 23-percent increase in timberland area. The largest gains in timberland acreage between the 1991 survey and 2005 occurred in the North and South Delta units, each with 9-percent gains. Timberland in the Southwest unit increased by 4 percent, the Northwest by <1 percent, and the Southeast had declines in timberland area of about 2 percent.

Louisiana's forest land is almost evenly divided between softwood and hardwood forest-type groups, with 58 percent of forest land in a hardwood forest-type group and 40 percent in a softwood forest-type group. About 2 percent of Louisiana's forest land is considered nonstocked. The most common forest types are loblolly-shortleaf (34 percent of forest land), oak-gum-cypress (23 percent of forest land), and oak-hickory (16 percent of forest land; fig. 5). The majority of Louisiana's forest land area is naturally regenerated (fig. 6).



	North Delta	South Delta	Southwest	Southeast	Northwest
1936	2.44	3.00	4.97	2.09	3.66
1954	2.17	2.82	4.87	2.00	4.17
1964	1.89	2.75	4.82	1.88	4.68
1974	1.18	2.57	4.54	1.79	4.45
1984	0.91	2.39	4.42	1.75	4.40
1991	0.95	2.22	4.38	1.76	4.47
2005	1.03	2.43	4.54	1.73	4.50

Figure 4—Area of timberland by survey unit and year, Louisiana.

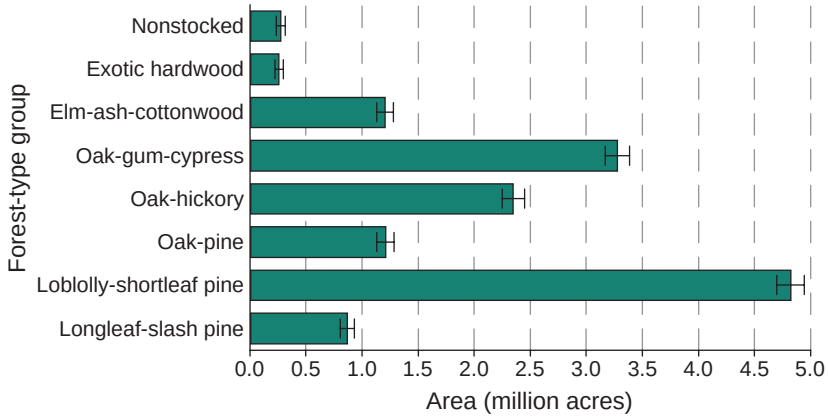


Figure 5—Area of forest land by forest-type group (±67 percent confidence interval), Louisiana, 2005.

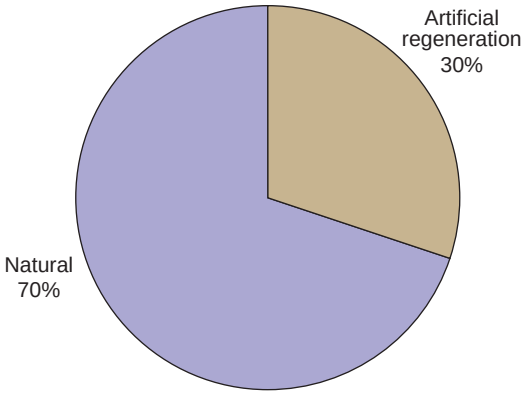


Figure 6—Proportion of forest land by stand origin, Louisiana, 2005.

Pine trees on Big Branch Marsh, National Wildlife Refuge. (photo by Steve Hillebrand, U.S. Fish and Wildlife Service)

Ownership

Forest land ownership is an extremely important variable in understanding Louisiana's forests and trends over time. Owners of land differ in terms of motivations, desires, goals, and needs for the use of their forests. Understanding those needs and motivations and viewing those in light of current socioeconomic conditions helps in recognizing and deciphering patterns and trends that emerge on the landscape.

Most of Louisiana's timberland area (88 percent) is privately owned (industrial and nonindustrial). Public ownership has increased slightly over the last four decades, however (fig. 7). Public landowners in Louisiana include the Federal Government (U.S. Forest Service, U.S. Fish and Wildlife Service, etc.) along with State and local governments. Private landowners include nonindustrial individuals, forest industry, conservation organizations, associations and clubs, and Native American ownerships.

The U.S. Forest Service conducts a National Woodland Owner Survey (NWOS) on a periodic basis in a nationwide attempt to identify the goals, desires, opinions, and motivations of private landowners (Butler 2008). The survey focuses on family-owned forest land; that is, forests owned by nonindustrial private individuals and their families. The 2002–06 NWOS revealed that of the approximately 5.8 million acres of family owned forest land in Louisiana, 72 percent is owned by people age 55 or older (fig. 8), 37 percent of whom are retired. An aging population of landowners may mean that much of Louisiana's forest land could change hands in the next several decades.

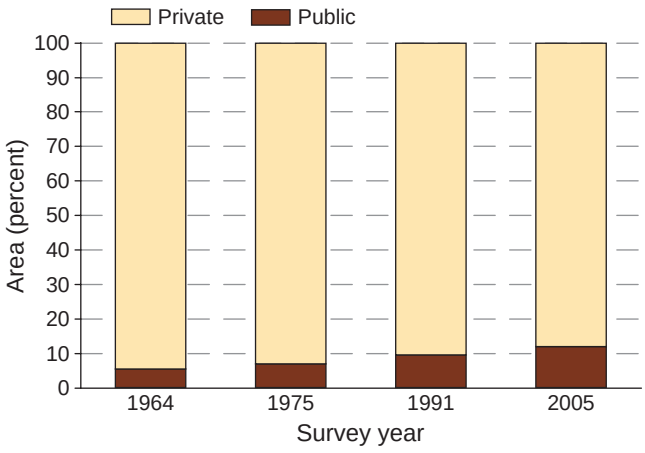


Figure 7—Trends in timberland ownership by survey year, Louisiana.

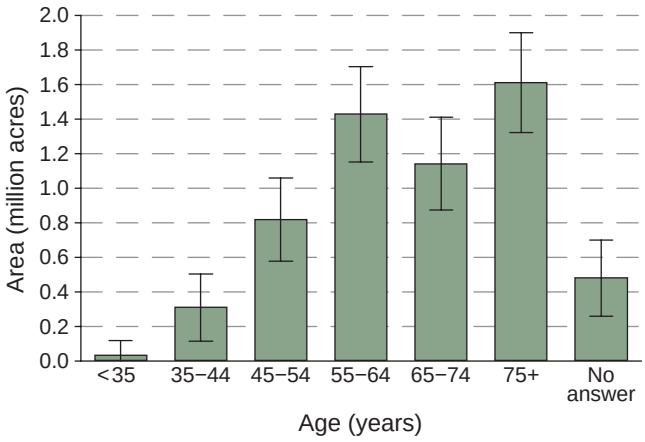


Figure 8—Area of family forests (±1 standard error) by age demographic, Louisiana, 2002–06.

Louisiana's landowners have many reasons for owning forest land, including aesthetics, cultural heritage, and commercial pursuits. Respondents to the NWOS for Louisiana indicated that privacy, aesthetics, and passing land to the next generation were among the most important reasons for owning forest land in the State, ranked by number of owners. Other high-ranking reasons for owning forest land included using land as an investment, vacation home, and to protect nature and biological diversity. Seventy-five percent of family forest owners indicated they had harvested timber on their property at some point during their ownership tenure, though only 57 percent had conducted a commercial harvest.

When asked about forest health concerns, respondents in Louisiana indicated that insects, diseases, and weather-related events were primary concerns, followed by fire, undesirable plants, and pollution (fig. 9). From a social standpoint, landowners are most concerned about keeping their land intact for future generations, controlling property taxes, and coping with trespassers and poachers.

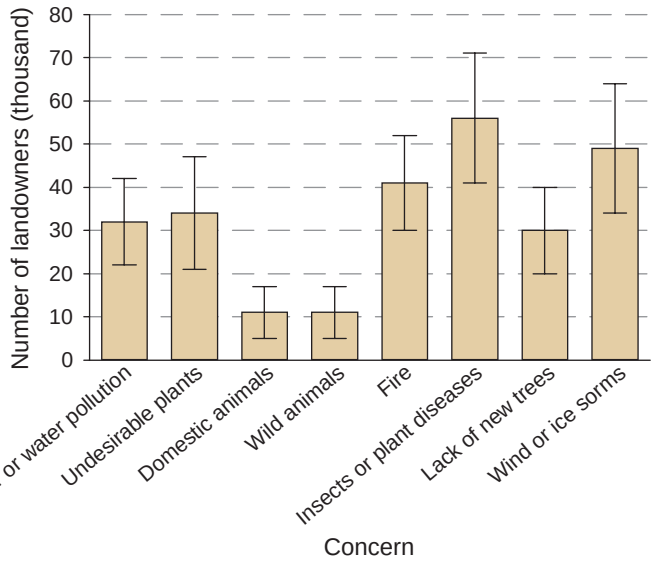


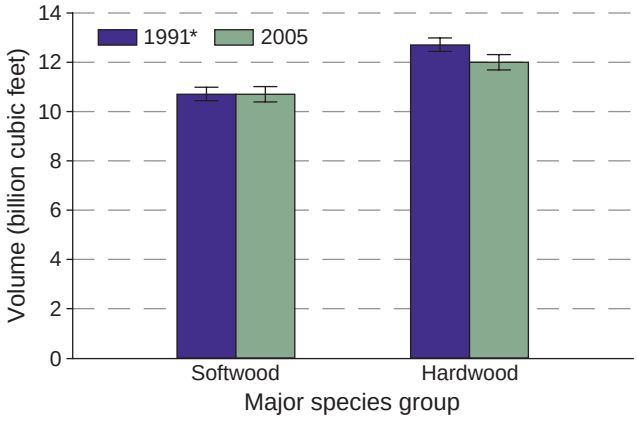
Figure 9—Reported forest health concerns by number of landowners (±1 standard errror), Louisiana, 2002–06.

Volume and Species Composition

Measurements of the volume of wood and the numbers of individuals of different tree species in forests shed valuable light on the overall composition of the forest and the amount of wood available for use by people. Live-tree volume on timberland remained mostly stable in Louisiana between 1991 and 2005, with small decreases in hardwood volume that may be partially due to changes in FIA methodologies between reporting periods. Total live-tree volume on timberland in 2005 was 22.7 billion cubic feet. Hardwood volume was slightly higher than softwood volume at 12.0- and 10.7-billion cubic feet, respectively (fig. 10).

Most of Louisiana's live-tree volume is split between the Southwest, Northwest, and South Delta units of the State, while the heavily agricultural North Delta and Southeast units contain a relatively small proportion of the State's volume (fig. 11). The loblolly and shortleaf pine species group accounts for the largest proportion of Louisiana's live-tree volume at 34 percent, followed by red oaks (15 percent), sweetgum (8 percent), and cypress (8 percent).

At the time of the 2005 inventory, Louisiana's hardwood volume was highest on forest land in the parishes surrounding the Red and Atchafalaya Rivers, and was lowest in the southeast, southwest, and northeast parishes of the State (fig. 12). The parishes with the most hardwood volume on forest land were Natchitoches, Iberville, and Pointe Coupee.



*Volumes for 1991 do not match FIADB volumes. See http://srsfia2.fs.fed.us/states/la/LA_7th_survey_notes_200609.shtml.

Figure 10—Volume of all-live trees on timberland (±67 percent confidence interval) by major species group and survey year, Louisiana.

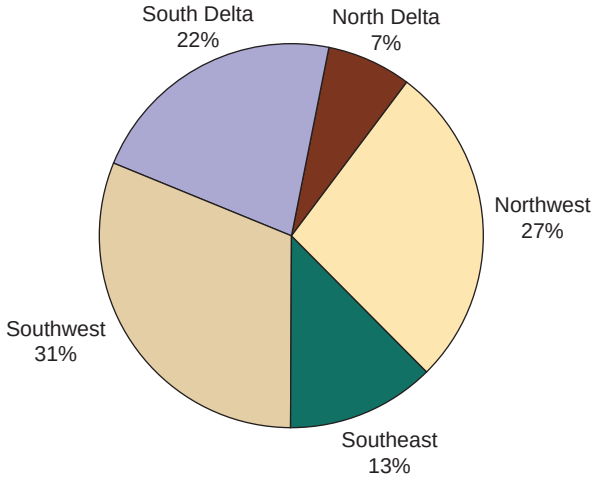


Figure 11—Volume of all-live trees on forest land by unit, Louisiana, 2005.

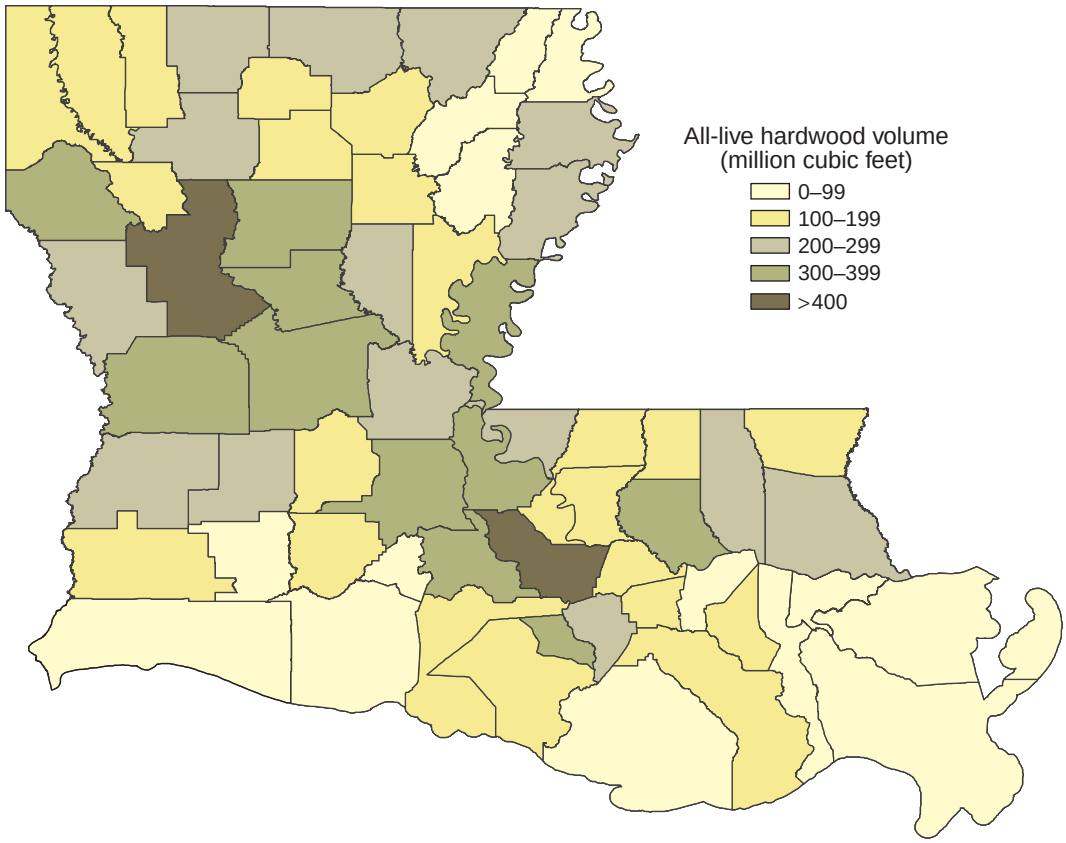


Figure 12—Total all-live volume of hardwoods on forest land by parish, Louisiana, 2005.

Softwood all-live volume on forest land in 2005 was mostly concentrated in parishes on the midwestern side of the State (fig. 13). Parishes with the most softwood volume included Vernon, Rapides, Winn, Natchitoches, Sabine, and Bienville. Forest land in the parishes surrounding the Mississippi River and Atchafalaya River Basin, along with many of the coastal parishes, contained the lowest softwood volume.

There were an estimated 8 billion live trees on Louisiana forest land in 2005. Loblolly pine, sweetgum, and red maple were the most common species noted in the survey (fig. 14). Despite the fact that hardwood trees outnumber softwood trees by 2 to 1, loblolly pine trees were the most common individual species, and made-up 24 percent of the total number of live trees in the State.

Sugarberry, sweetgum, and loblolly pine were the most common species in the North Delta FIA unit, with 55-, 53-, and 31-million trees, respectively. In the South Delta unit red maple, sugarberry, green ash, sweetgum, and Chinese tallowtree were all common with 248-, 89-, 89-, 74-, and 64-million trees, respectively. The most common species in the Southwest unit were loblolly pine, sweetgum, slash pine, water oak, and Chinese tallowtree with 775-, 354-, 254-, 171-, and 140-million trees, respectively. Loblolly pine, sweetgum, water oak, and Chinese tallowtree were the most common trees in the Southeast unit, with populations of 296-, 95-, 93-, and 84-million, respectively. Loblolly pine was also the most common species in the Northwest unit, with 842 million trees, followed by sweetgum, water oak, red maple, and winged elm with 482-, 194-, 138-, and 124-million trees, respectively.

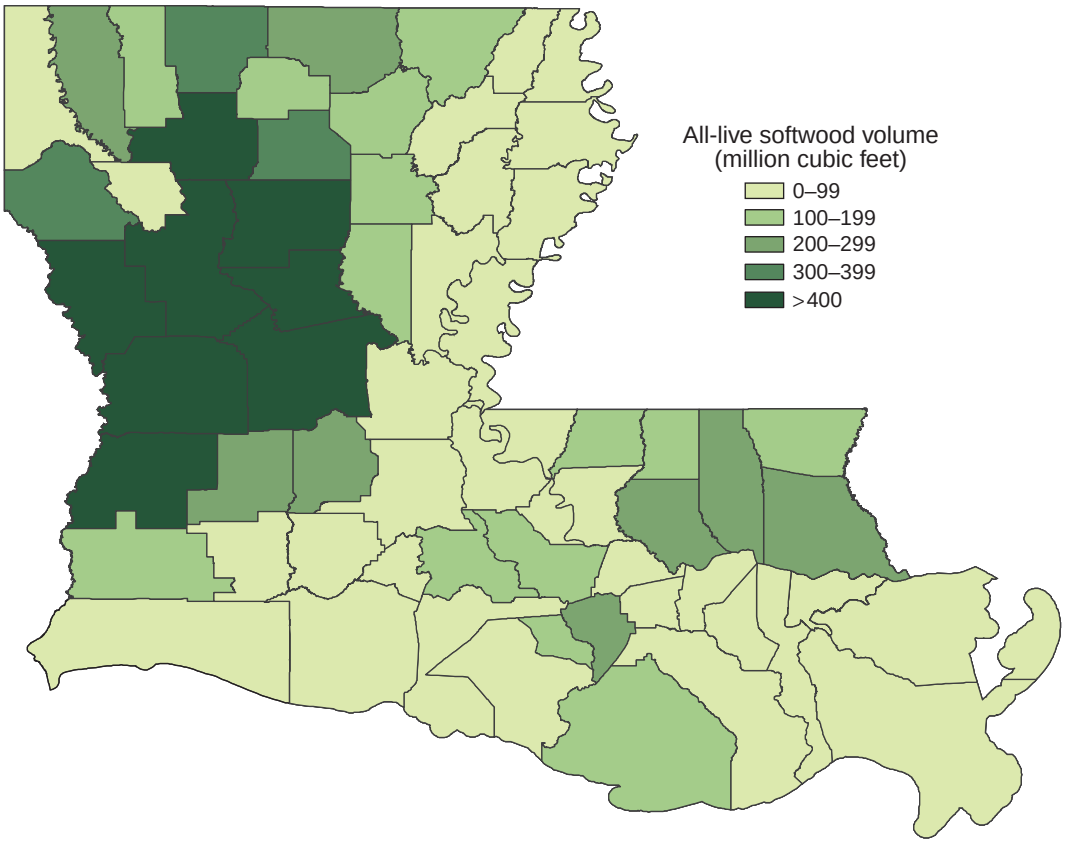


Figure 13—Total all-live volume of softwoods on forest land by parish, Louisiana, 2005.

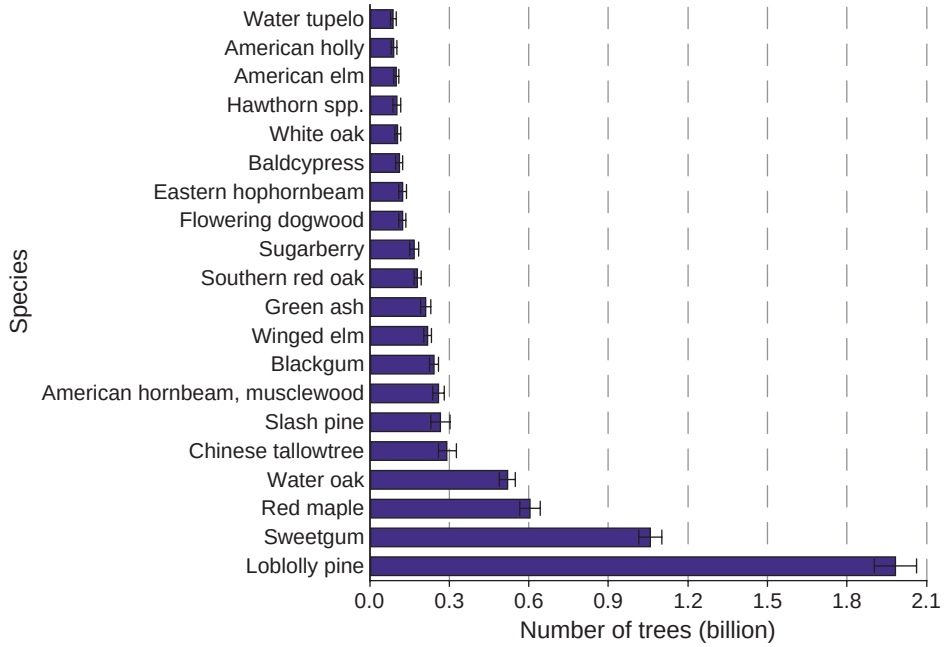


Figure 14—Top 20 tree species in terms of number of live trees on forest land (±67 percent confidence interval), Louisiana, 2005.

Forest Density and Structure

Measurements of tree diameter at 4.5 feet aboveground (diameter at breast height, [d.b.h.]) combine with the number of trees in a forest to determine how fully a particular site is being used for growing trees. When a stand is fully stocked, no space is wasted and trees are able to use the productivity of a site to its full potential. A fully stocked stand represents the most efficient use of space on the landscape. If a stand is overstocked, too many trees occupy a site, and the stand becomes less productive from a commercial standpoint because individuals may not reach their full potential due to competition with surrounding trees. Moderately stocked stands are not as efficient as fully stocked stands, but given time they may develop into fully stocked conditions through natural regeneration or artificial supplementation. Poorly stocked stands represent the least efficient use of forest land, at least from a commercial perspective, because potentially valuable growing space remains empty.

In Louisiana in 2005, 6.1 million acres (43 percent) of timberland were classified as fully stocked, a decline from 6.8 million acres in 1991. About 5.1 million acres (36 percent) of timberland were considered moderately stocked, an increase from 4.4 million acres in 1991. About 1.1 million acres (8 percent) were classified as overstocked and 1.7 million acres (12 percent) as poorly stocked in 2005, compared to 1.8 million acres (13 percent) overstocked and 715,000 acres (5 percent) poorly stocked in 1991 (fig. 15). On average, trees have decreased in size in Louisiana since 1991. The average d.b.h. of trees ≥5.0 inches on timberland was 10.3 inches in 2005, compared to 14.0 inches in 1991.

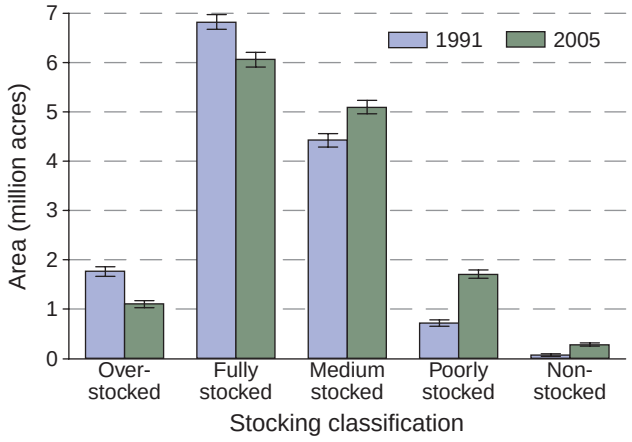


Figure 15—Area of timberland (±67 percent confidence interval) by live-tree stocking classification and survey year, Louisiana.

Biomass

Forest biomass is the living material present in a forest system, and is extremely important in current global conversations about energy, the environment, and the economy. It is receiving increasing attention as a key renewable energy source as our Nation seeks ways to reduce reliance on imported energy supplies. Central to developing a renewable energy market is an understanding of the on-ground resource. Simultaneously, increased industrialization worldwide has led to increases in greenhouse gas emissions, including carbon dioxide. Trees act as important sinks for carbon by absorbing the greenhouse gas carbon dioxide and storing it, and biomass is roughly 50-percent carbon. Therefore, the amount of biomass is of great interest in an era where the topic of climate change is at the forefront of science. Both energy and environmental concerns impact local, national, and global economies on a multitude of scales and in a multitude of ways. In all cases, understanding the current status of the biomass resource in each State and across the Nation is the first step in developing energy, environmental, and economic plans for the future.

In Louisiana 2005, total above-ground standing biomass (live and dead trees) equaled 579.3 million dry tons, or an average of 41 tons per acre. Seventy percent of standing biomass is contained in the merchantable portion of the bole (1-foot stump to 4-inch diameter top)—the portion of the tree that can be used for lumber or other high value wood products (fig. 16). Fifteen percent of standing biomass is in the branches and foliage of the tree and 4 percent is in the stump (<1 foot). The remaining standing biomass is contained in saplings (8 percent) and standing dead trees (3 percent). Those "nonmerchantable" sources of biomass may be considered useful for bioenergy production if mechanisms for their harvest and removal from the woods are available and cost effective. The environmental and long-term site impacts of removing all portions of standing tree biomass must also be weighed by landowners against possible financial benefits, since long-term site nutrient deficiencies can result.

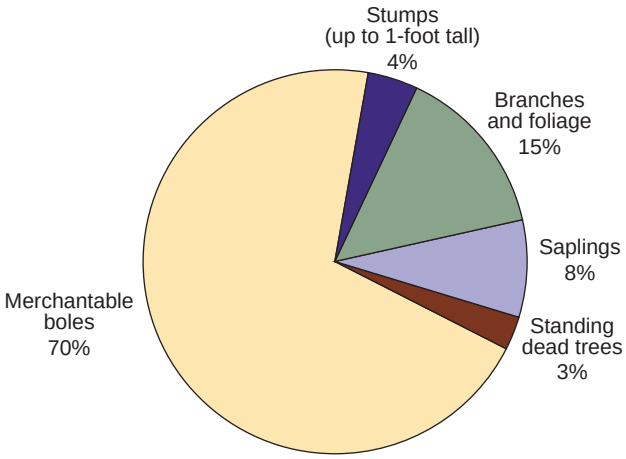


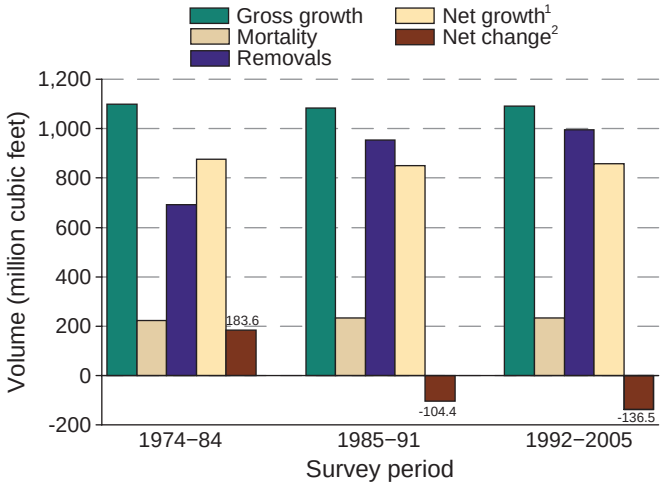
Figure 16—Components of aboveground tree biomass on forest land, Louisiana, 2005.

Growth, Removals, and Mortality

Forests are dynamic, renewable systems. With appropriate management, forests provide a steady stream of products for human consumption without compromising the productivity of the forest over time. Individual components of change such as growth, removals, and mortality contribute to our understanding of net change in tree volume. Gross tree growth includes ingrowth (trees that grew from <5 inches into ≥5 inches diameter class since the previous inventory); growth on standing trees that were ≥5 inches at the last inventory; growth on trees that were removed since the last inventory; and growth on trees that were ≥5 inches at the last inventory but have since died. Net growth is the difference in gross growth minus mortality. Tree removals include harvests from land classified as timberland, reclassification of timberland into reserved forest land (even if the trees are still standing), and trees lost from the timberland base due to conversion to another land use like agriculture or urban development. Net change is the difference in net growth minus removals. All components of change are average annual values.

The annual gross growth on Louisiana timberland from 1992 to 2005 averaged 1,092.7 million cubic feet per year, which was similar to averages from previous inventories (1,098.3 million cubic feet per year on average from 1974 to 1984 and 1,084.4 million cubic feet per year on average from 1985 to 1991) (fig. 17). Mortality averaged 233.6 million cubic feet per year, leaving an average annual net growth of 859.1 million cubic feet per year.

Annual removals averaged higher than previous inventories, at 995.6 million cubic feet per year from 1992 to 2005 compared to 693 million cubic feet per year from 1974 to 1984 and 954.7 million cubic feet per year from 1985 to 1991. Thus, the net change for Louisiana from 1991 to 2005 was an average loss of 136.5 million cubic feet per year (fig. 17). About 9 percent of removals annually were the result of diversions from timberland to other land uses like urban development or agriculture or reclassification of timberland to reserved forest land. The remaining 91 percent of average annual removals were removals from timberland as a result of harvests (either utilized for products or left as logging residue).



[1]Net growth = gross growth - mortality.

[2]Net change = net growth - removals.

Figure 17—Average annual components of change on timberland by survey period, Louisiana.

Nonnative Invasive Species

Nonnative invasive species are plants, animals, or insects that are native to other countries but have been accidentally or intentionally introduced in the United States, and that have the ability to become established and rapidly spread in their new environments. In the United States, billions of dollars are spent annually on nonnative invasive species control and eradication programs, and millions of dollars are lost due to damage to natural resources or management objectives (Pimentel and others 2005). In their native habitats, nonnative invasive species are often controlled by native predators, inter- or intraspecific competition, or environmental conditions that limit their spread across the landscape. Once introduced into a landscape where these control mechanisms are absent, however, nonnative invasive species have the ability to quickly outcompete native plants and animals, or (in the case of insects), inflict damage on species that did not evolve with defense mechanisms suitable for protecting against the attacks. The FIA program collects information on a selected list of particularly troublesome nonnative invasive plant species in the Southern States, including Louisiana. Species are categorized into six life forms: trees, shrubs, vines, ferns, herbs, and grasses.

Chinese tallowtree (*Triadica sebiferum*) was the most commonly detected invasive tree on plots during the 2005 Louisiana survey, with detection on 25 percent of sampled plots (430 out of 1,718) (fig. 18). Chinese tallowtree disrupts forest and prairies by changing soil chemical properties and altering the composition and structure of native plant communities (Cameron and Spencer 1989, Bruce and others 1995). A comparison of FIA data from 1991 to 2005 showed that the number of Chinese tallowtrees in the 1.0- to 2.9-inch diameter class increased by 6.5 times, and the total volume of Chinese tallowtree increased by 395 percent between the two time periods (Oswalt 2010).

Chinese and European privets (*Ligustrum* spp.) were the most common shrubs detected on FIA plots, and were recorded on 270 of 1,718 sampled plots (16 percent) (fig. 19). Originally introduced for

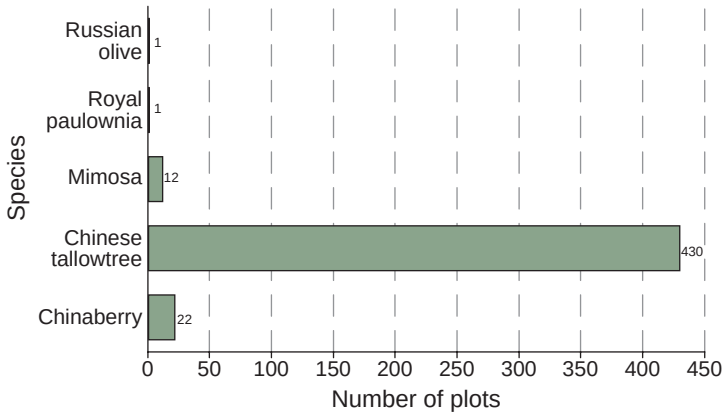


Figure 18—Number of FIA plots containing invasive trees by common species name, Louisiana, 2005. Plot counts are given at the end of each bar.

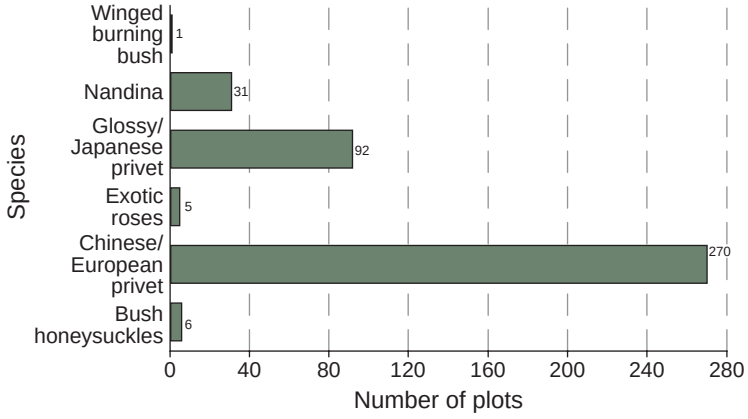


Figure 19—Number of FIA plots containing invasive shrubs by common species name, Louisiana, 2005. Plot counts are given at the end of each bar.

landscaping purposes (and still used in that capacity), privets are very invasive plants in the southeast, particularly in disturbed areas and along forest edges. Privet can form thickets capable of shading out native understory plants (Wilcox and Beck 2007).

The most frequently recorded vine in Louisiana was Japanese honeysuckle (*Lonicera japonica*). Honeysuckle, common throughout the South, occurred on 27 percent of sampled plots (fig. 20). In comparison, the often-photographed invasive vine kudzu (*Pueraria montana* var. *lobata*) was recorded on only two plots.

The invasive fern, Japanese climbing fern (*Lygodium japonicum*) was recorded on 21 percent of plots in Louisiana. Japanese climbing fern is most common in southern Louisiana, and is most likely to be found in areas with moist soils. Japanese climbing fern may smother native species and reduce plant diversity (Minogue and others 2009).

Invasive herbs and grasses were not recorded on many forest plots in Louisiana. The only invasive herbs recorded were Chinese lespedeza (*Lespedeza cuneata*), noted on four plots, and shrubby lespedeza (*L. bicolor*), noted on one plot. Similarly, there were only four nonnative invasive grasses recorded: giant reed (*Arundo donax*) in two plots, tall fescue (*Lolium arundinaceum*) in one plot, Nepalese browntop (*Microstegium vimineum*) in one plot, and nonnative bamboos (*Phyllostachys* spp./*Bambus* spp.) in three plots.

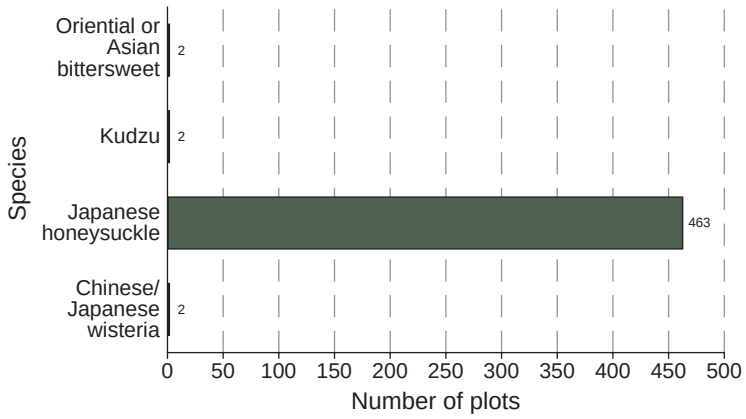


Figure 20—Number of FIA plots containing invasive vines by common species name, Louisiana, 2005. Plot counts are given at the end of each bar.

Air Quality: Ozone

Ozone (O_3) is a chemical compound that occurs naturally in the Earth's atmosphere. In the upper atmosphere, O_3 is essential for protecting the Earth's surface from intense ultraviolet rays coming from the Sun. In the troposphere, however, O_3 becomes a secondary pollutant that affects the growth and development of forest vegetation (Skelly 2000). Pollution due to high concentrations of tropospheric O_3 affects forest vegetation growth and directly damages the foliage of sensitive species (Lefohn and others 1997, Coulston and others 2004). Forests in the Eastern United States may be particularly susceptible because of lingering high-pressure systems common in the region, combined with concentrated areas of urbanization and industrialization that generate the precursors to O_3 (Skelly 2000). The resulting O_3 travels downwind of these population centers, often reaching peak concentrations in remote areas.

Some species are known to be particularly sensitive to O_3 and exhibit this sensitivity through changes in leaf pigmentation, leaf senescence, or other species-specific symptoms. These sensitive species are used as bioindicators of O_3 presence, and are particularly useful in areas where O_3 monitoring stations may not be present, such as remote forest locations (Skelly 2000). In Louisiana, species used as bioindicators include black cherry, sassafras, and yellow-poplar, among others (table 2).

O_3 data was collected on 6,480 plants of 6 species from the bioindicator list in Louisiana on 85 sites from 2001 through 2004. Eight percent of all evaluated biosites contained some O_3-related damage. Less than 1 percent of the plants sampled exhibited signs of O_3-related damage (table 3). Data from the Environmental Protection Agency combined with FIA data suggest that mean ambient O_3 concentrations and the overall impacts of air quality on sensitive species in Louisiana are low compared to the rest of the United States (fig. 21).

Table 2—List of bioindicators by common and scientific name, Louisiana

Common name	Scientific name
Blackberry	*Rubus allegheniensis*
Black cherry	*Prunus serotina*
Milkweed	*Asclepias* spp.
Yellow-poplar	*Liriodendron tulipifera*
White ash	*Fraxinus americana*
Sassafras	*Sassafras albidum*
Spreading dogbane	*Apocynum androsaemifolium*
Big leaf aster	*Eurybia macrophylla*
Sweetgum	*Liquidambar styraciflua*
Pin cherry	*Prunus pensylvanica*

Table 3—Summary of ozone biosite data, Louisiana

Parameter	Year			
	2001	2002	2003	2004
	number			
Biosites evaluated	22	21	21	21
Biosites with injury	7	0	0	0
Plants evaluated	675	1,730	2,010	2,065
Plants injured	32	0	0	0
Average biosite injury score[a]	5.64	0	0	0
Species evaluated[b]				
Sweetgum	300 (18)	614 (0)	660 (0)	660 (0)
Yellow-poplar	—	—	—	165 (0)
Black cherry	50 (0)	170 (0)	240 (0)	480 (0)
Blackberry	207 (14)	613 (0)	630 (0)	360 (0)
White ash	32 (0)	108 (0)	135 (0)	30 (0)
Sassafras	86 (0)	225 (0)	345 (0)	370 (0)

A dash (—) indicates no sample for the cell.
[a] The biosite index is based on the average injury score (amount of injury x severity of injury) for each species averaged across all species on the biosite multiplied by 1,000.
[b] Total number of injured plants given in parenthesis.

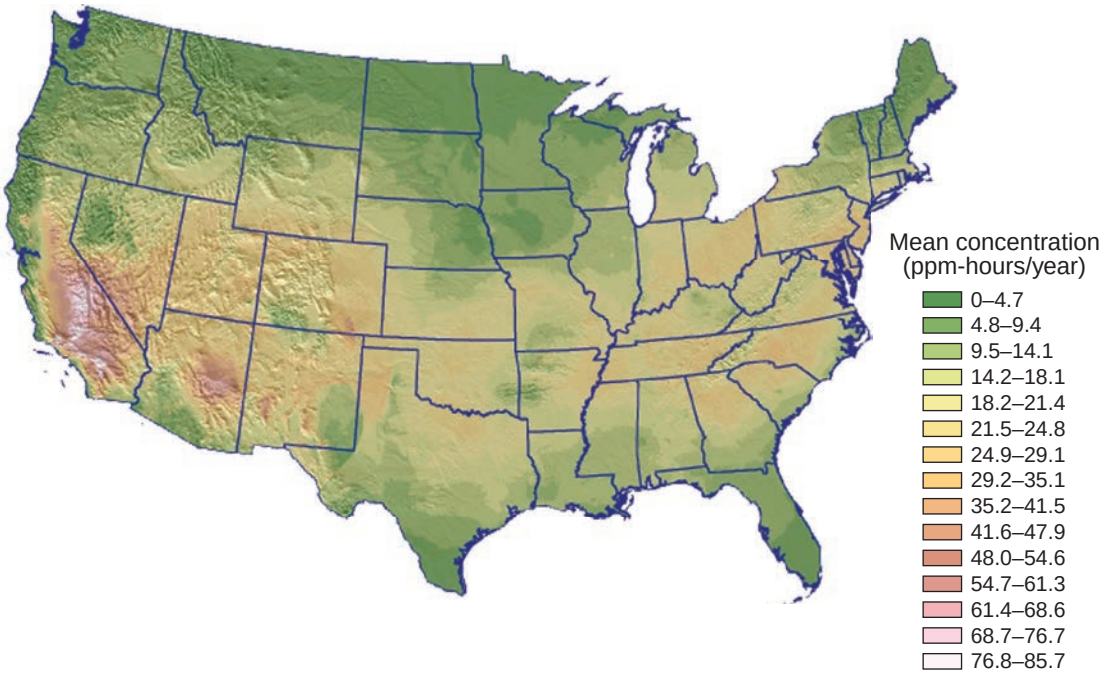


Figure 21—Mean ambient ozone concentrations in the United States, 2000–04.

Timber Products and the Economy

Louisiana's forest products industry is a vital component of the State's economy. According to IMPLAN (IMpact Analysis for PLANning) (Abt and others 2002), a model generated by the U.S. Department of Agriculture Forest Service, the total economic importance of Louisiana's forests in 2001 were calculated to be nearly $9.4 billion. The $9.4 billion includes all activities associated with the forest products industry which includes direct, indirect, and induced effects resulting from the industry operation.

In 2002, about 60 sawmills, pulpwood mills, and other primary wood-processing plants distributed across the State directly employed more than 19,807 individuals, with an annual payroll of nearly $722 million. In 2002, the total value of shipments for the wood products and paper manufacturing sectors combined contributed >$6.15 billion to the State's economy (U.S. Department of Commerce, Bureau of the Census 2005). The number of employees fluctuated from 19,494 in 1997 to the current number of 18,561 and averaged 19,876 employees over the 1997–2003 time period. The payroll for the same time period averaged $570 million, reaching a peak in 2002 at $722 million. Value of shipments have remained relatively stable over the last 7 years and averaged >$6.1 billion for the time period.

Baldcypress in Lacassine National Wildlife Refuge. (photo by Steve Hillebrand, U.S. Fish and Wildlife Service)

Baldcypress in Lacassine National Wildlife Refuge. (photo by Steve Hillebrand, U.S. Fish and Wildlife Service)

Timber Product Output and Removals

This section presents estimates of average annual roundwood product output and timber removals for the period 1992 through 2003. Estimates of TPO and plant residues were obtained from canvasses (questionnaires) sent to all primary wood-using mills in the State. The canvasses are used to determine the types and amount of roundwood (i.e., saw logs, pulpwood, poles, etc.) received by each mill, the county of origin of the wood, the species used, and how the mills dispose of the bark and wood residues produced. The canvasses are conducted every 3 years by personnel from the SRS and Louisiana Department of Agriculture and Forestry. These data are used to augment FIA's annual inventory of timber removals by providing the product proportions for that segment of removals that is used for products. Individual studies are necessary to track trends and changes in product output levels. Industry surveys were conducted in 1996[1], 1999, and 2002 and were used to determine average annual product output for roundwood and plant byproducts. Total product output, averaged over the survey period, is the sum of the volume of roundwood products from all sources (growing stock and other sources) and the volume of plant byproducts, or the mill residues.

Total output of timber products, which includes residential fuelwood and plant byproducts, averaged >903 million cubic feet per year from 1992 to 2003 (table 4). Eighty-nine percent, or 801 million cubic

[1] Stratton, D.P.; Westbrook, R.F. 1998. Louisiana's timber industry—an assessment of timber product output and use, 1996. Resour. Bull. SRS–[Unpublished]. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 19 p.

Table 4—Average annual output of timber products by product, species group, and type of material, Louisiana, 1992–2003

Product and species group	Total output	Roundwood products	Plant byproducts
		million cubic feet	
Saw logs[a]			
Softwood	211.6	204.7	6.9
Hardwood	59.5	59.5	0.0
Total	271.1	264.2	6.9
Veneer logs			
Softwood	135.6	135.6	—
Hardwood	0.7	0.7	—
Total	136.4	136.4	—
Pulpwood[b]			
Softwood	298.1	220.3	77.7
Hardwood	102.3	96.9	5.4
Total	400.4	317.2	83.2
Poles, posts, and pilings			
Softwood	3.4	3.4	—
Hardwood	—	—	—
Total	3.4	3.4	—
Other industrial[c]			
Softwood	27.9	17.1	10.7
Hardwood	15.8	14.2	1.7
Total	43.7	31.3	12.4
Total industrial products			
Softwood	676.6	581.2	95.4
Hardwood	178.4	171.2	7.1
Total	854.9	752.4	102.5
Residential fuelwood[d]			
Softwood	3.9	3.9	—
Hardwood	44.2	44.2	—
Total	48.2	48.2	—
All products			
Softwood	680.5	585.1	95.4
Hardwood	222.6	215.5	7.1
Total	903.1	800.6	102.5

Numbers in rows and columns may not sum to totals due to rounding.
A dash (—) indicates no sample for the cell; 0.0 indicates a value of >0.0 but <0.05 for the cell.

[a] International ¼-inch rule.
[b] Roundwood figures include an estimated 2.8 million cubic feet of roundwood chipped at other primary wood-using plants.
[c] Includes liter, mulch, particleboard, charcoal, and other specialty products.
[d] Excludes approximately 80.6 million cubic feet of wood residues and 67.1 million cubic feet of bark used for industrial fuel.

feet, of the total output was from roundwood products, while the remainder was from plant byproducts (mill residue). At 681 million cubic feet, softwood species provided 75 percent of the total product output volume. Hardwoods provided the remaining 25 percent, or 223 million cubic feet of total output.

Pulpwood was the primary wood product produced by Louisiana mills. Pulpwood production totaled >400 million cubic feet, accounting for 44 percent of total product output for the State. Softwood pulpwood production totaled 298 million cubic feet and accounted for 74 percent of total pulpwood production, while hardwood pulpwood production amounted to 102 million cubic feet. Plant byproducts, or mill residue, accounted for 26 and 5 percent, respectively, of total softwood and hardwood pulpwood production. The 83 million cubic feet of plant byproducts used for pulpwood production accounted for 81 percent of mill residue utilized for products. Saw-log production used mainly for dimension lumber totaled >271 million cubic feet. Saw-log output accounted for 30 percent of the total TPO volume between 1992 and 2003. Veneer-log production totaled 136 million cubic feet and accounted for 15 percent of the total product output. At 44 million cubic feet, other industrial products accounted for only 5 percent of total product output. Industrial products accounted for 95 percent of the State's total product output. Residential fuelwood totaled >48 million cubic feet, and accounted for 5 percent of total product output for the State. Mill residue used for industrial fuel totaled nearly 148 million cubic feet accounting for 59 percent of the utilized mill byproducts.

Figure 22 shows trends in average annual roundwood product output from 1955 through 2003. While roundwood used for saw logs was up significantly from the previous survey period, roundwood used for pulpwood, veneer logs, other

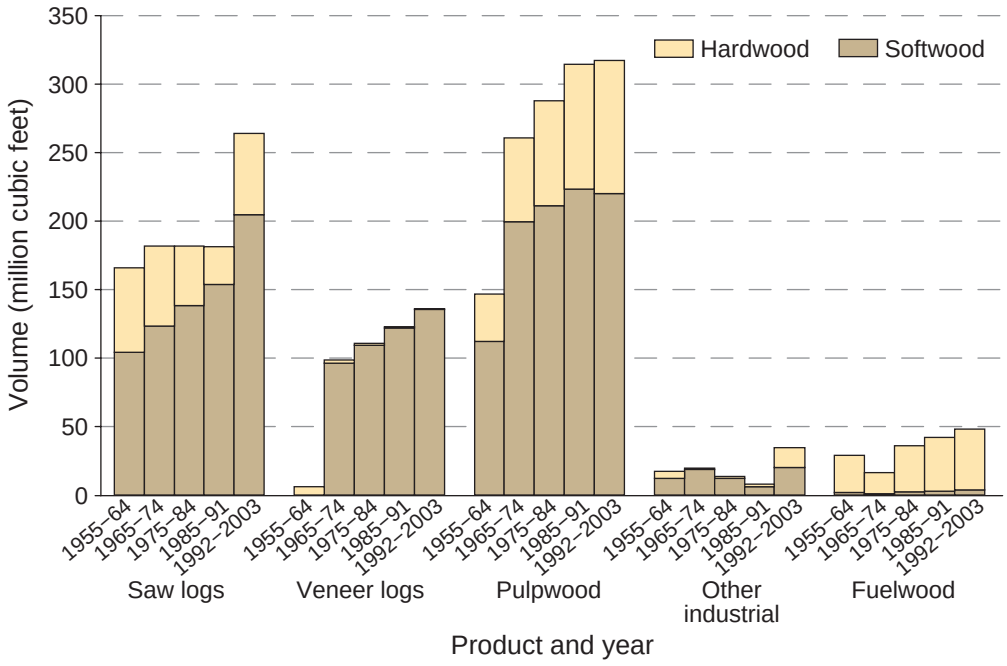


Figure 22—Average annual output of roundwood timber products by product and species group, Louisiana, 1955–2003.

Merchandizing and loading cypress. (photo by Tony Johnson, (retired) U.S. Forest Service)

industrial, and fuelwood products showed a slight increase. Average annual output of roundwood products (including fuelwood) was up nearly 20 percent, or 131 million cubic feet, from 669 million cubic feet in the previous survey period, to an average of 801 million cubic feet between 1992 and 2003. Softwood roundwood production increased nearly 15 percent to 585 million cubic feet, while hardwood roundwood production increased 34 percent to 215 million cubic feet. Roundwood saw log and pulpwood production amounted to 264- and 317-million cubic feet, respectively. These two products accounted for nearly 73 percent of the total roundwood production for the State. Ninety-one percent of the roundwood products volume came from growing-stock trees, split between sawtimber (79 percent) and poletimber (21 percent) trees (table 5). Other sources, which include cull trees, salvable dead, and stumps and tops of harvested trees, amounted to 72 million cubic feet.

Total timber removals, averaged over the time period, are the sum of the volume of roundwood products, logging residues (unused portions of trees left in the woods which includes volume from tops, limbs, and stumps), and other removals (removals attributed to land clearing or land use changes) from growing-stock and nongrowing-stock sources. Removals from all sources, for both softwoods and hardwoods combined, totaled >912 million cubic feet (table 6). Softwoods accounted for 70 percent of total removals. Volume used for roundwood products totaled 729 million cubic feet, or 80 percent, of total removals. Logging residues and other removals amounted to 105 million cubic feet (12 percent) and 78 million cubic feet (9 percent), respectively.

Table 5—Average annual output of roundwood products by product, species group, and source of material, Louisiana, 1992–2003

Product and species group	All sources	Growing-stock trees[a]			Other-sources[b]
		Total	Sawtimber	Poletimber	
	million cubic feet				
Saw logs					
Softwood	204.7	200.4	171.8	28.6	4.3
Hardwood	59.5	58.4	54.3	4.1	1.1
Total	264.2	258.8	226.0	32.7	5.4
Veneer logs					
Softwood	135.6	133.2	131.8	1.3	2.5
Hardwood	0.7	0.7	0.7	—	0.0
Total	136.4	133.9	132.6	1.3	2.5
Pulpwood					
Softwood	220.3	204.8	139.9	64.9	15.6
Hardwood	96.9	60.9	35.0	25.8	36.0
Total	317.2	265.6	175.0	90.7	51.6
Posts, poles, and pilings					
Softwood	3.4	3.2	2.5	0.7	0.2
Hardwood	—	—	—	—	—
Total	3.4	3.2	2.5	0.7	0.2
Other industrial					
Softwood	17.1	13.7	4.1	9.6	3.4
Hardwood	14.2	11.8	7.1	4.7	2.4
Total	31.3	25.4	11.1	14.3	5.8
Total industrial products					
Softwood	581.2	555.2	450.1	105.2	25.9
Hardwood	171.2	131.7	97.1	34.6	39.5
Total	752.4	686.9	547.2	139.8	65.5
Residential fuelwood					
Softwood	3.9	3.6	2.3	1.3	0.4
Hardwood	44.2	38.4	26.9	11.5	5.8
Total	48.2	42.0	29.2	12.8	6.2
All products					
Softwood	585.1	558.8	452.4	106.5	26.3
Hardwood	215.5	170.1	124.0	46.1	45.3
Total	800.6	728.9	576.4	152.6	71.7

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

A dash (—) indicates no sample for the cell; 0.0 indicates a value of >0.0 but <0.05 for the cell.

[a] On timberland.

[b] Includes trees <5.0 inches in diameter, tree tops, and limbs from timberland, or material from other forest land or nonforest land such as fence rows or suburban areas.

Table 6—Average annual timber removals from growing stock on timberland by item and species group, Louisiana, 1992–2003

Item	All species	Species group	
		Softwood	Hardwood
	million cubic feet		
Roundwood products			
Saw logs	258.8	200.4	58.4
Veneer logs and bolts	133.9	133.2	0.7
Pulpwood	265.6	204.8	60.9
Posts, poles, and pilings	3.2	3.2	—
Other	25.4	13.7	11.8
Fuelwood	42.0	3.6	38.4
All products	728.9	558.8	170.1
Logging residues	105.3	48.6	56.6
Other removals	78.2	27.6	50.5
Total removals	912.4	635.1	277.3

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

A dash (—) indicates no sample for the cell; 0.0 indicates a value of >0.0 but <0.05 for the cell.

Specialty Forest Products

Nontimber benefits of the forest such as specialty forest products, recreation, water, wildlife habitat, and aesthetic values also contribute greatly to the State's economy and well-being of the general population. Specialty forest products or nontimber forest products (NTFP) have been harvested from Louisiana's forests for many years. Although these products contribute a much smaller percentage to the overall economy than traditional forest products they are, none the less, very important and provide millions of dollars to many local rural economies each year. Many of these products are collected with very little forest disturbance and range from edible products (fruits, nuts, mushrooms, ramps, and maple syrup), to medicinal-type products (saw palmetto and bloodroot), to ornamental products (galax, pine tips for garlands, and grapevines), landscape products (pine straw and native plants), and specialty woods (burl and crotch wood for fine crafts).

According to a survey of county extension agents, as of April 2003, Louisiana had 551 NTFP enterprises (Chamberlain and Predny 2003). Thirty-six percent, or 200 of the NTFP enterprises in the State fell into the specialty wood and landscape categories. The medicinal plants and edible products comprised 257, or 47 percent, of the NTFP enterprises, while floral and decorative products category had 94, or 17 percent, of the firms. Louisiana ranked 13 in total number of NTFP enterprises in the Southern region, accounting for 2 percent of the total NTFP firms.

Wetlands class of 2010, Cat Island, National Wildlife Refuge. (photo courtesy of Sammy King, U.S. Geological Survey)

Literature Cited

Abt, K.L.; Winter, S.A.; Huggett, R.J., Jr. 2002. Local economic impacts of the forests. In: Wear, D.N.; Greis, J.G., eds. Southern forest resource assessment. Gen. Tech. Rep. SRS–53. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station: 239–267.

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.

Beers, T.W.; Miller, C.I. 1964. Point sampling: research results, theory and applications. Res. Bull. 786. Lafayette, IN: Purdue University Agricultural Experiment Station. 55 p. + insert.

Bruce, K.A.; Cameron, G.N.; Harcombe, P.A. 1995. Initiation of a new woodland type on the Texas coastal prairie by the Chinese tallow tree (*Sapium sebiferum* (L.) Roxb.). Bulletin of the Torrey Botanical Club. 122(3): 215–225.

Butler, B.J. 2008. Family forest owners of the United States, 2006. Gen. Tech. Rep. NRS–27. Newtown Square, PA: U.S. Department of Agriculture Forest Service, Northern Research Station. 72 p.

Cameron, G.N.; Spencer, S.R. 1989. Rapid leaf decay and nutrient release in a Chinese tallow forest. Oecologia. 80(2): 222–228.

Chamberlain, J.L.; Predny, M. 2003. Non-timber forest products enterprises in the South: perceived distribution and implications for sustainable forest management. In: Miller, J.E.; Midtbo, J.M., eds. Proceedings, first national symposium on sustainable natural resource-based alternative enterprises. Mississippi State, MS: Mississippi State University Extension Service and Mississippi State University Forest and Wildlife Research Center: 48–63.

Coulston, J.W.; Riitters, K.H.; Smith, G.C. 2004. A preliminary assessment of Montreal process indicators of air pollution for the United States. Environmental Monitoring and Assessment. 95: 57–74.

Lefohn, A.S.; Jackson, W.; Shadwick, D.S.; Knudsen, H.P. 1997. Effect of surface ozone exposures on vegetation grown in the southern Appalachian Mountains: identification of possible areas of concern. Atmospheric Environment. 31(11): 1695–1708.

Minogue, P.J.; Jones, S.; Bohn, K.K.; Williams, R.L. 2009. Biology and control of Japanese climbing fern (*Lygodium japonicum*). Publication FOR218. Gainesville, FL: School of Forest Resources and Conservation Department, Florida Cooperative Extension Service, University of Florida Institute of Food and Agricultural Sciences. 7 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.

Oswalt, S.N. 2010. Chinese tallow (*Triadica sebiferum* (L.) Small) population expansion in Lousiana, East Texas, and Mississippi. Res. Note SRS–20. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 5 p.

Pimentel, D.; Zuniga, R.; Morrison, D. 2005. Update on the environmental and economic costs associated with alien-invasive species in the United States. Ecological Economics. 52(3): 273–278.

Skelly, J.M. 2000. Tropospheric ozone and its importance to forest and natural plant communities of the northeastern United States. Northeastern Naturalist. 7: 221–236.

Smith, G.C.; Coulston, J.W.; O'Connell, B.M. 2008. Ozone bioindicators and forest health: a guide to the evaluation, analysis, and interpretation of the ozone injury data in the forest inventory and analysis program. Gen. Tech. Rep. NRS–34. Newtown Square, PA: U.S. Department of Agriculture Forest Service, Northern Research Station. 100 p.

U.S. Department of Commerce, Bureau of the Census. 2005. Statistics for the United States and states by industry group; 2005 and earlier years. Washington, DC: U.S. Government Printing Office.

Van Deusen, P.C.; Dell, T.R.; Thomas, C.E. 1986. Volume growth estimation from permanent horizontal points. Forest Science. 32(2): 415–422.

Wilcox, J.W.; Beck, C.W. 2007. Effects of *Ligustrum sinense* Lour. (Chinese privet) on abundance and diversity of songbirds and native plants in a southeastern nature preserve. Southeastern Naturalist. 6(3): 535–550.

Fire scar, turpentine tree, Kisatchie Hills Wilderness Area, Kisatchie Hills National Forest, Lousiana (photo courtesy of Stephen F. Austin State University, Bugwood.org)

Glossary

Afforestation—Area of land previously classified as nonforest that is converted to forest by tree planting or by natural reversion to forest.

Average annual mortality—Average annual volume of trees ≥5.0 inches d.b.h. that died from natural causes during the intersurvey period.

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

Average net annual growth—Average annual net change in volume of trees ≥5.0 inches d.b.h. in the absence of cutting (gross growth minus mortality) during the intersurvey period.

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

Biomass—The aboveground fresh weight of solid wood and bark in live trees ≥1.0-inch d.b.h. from the ground to the tip of the tree. All foliage is excluded. The weight of wood and bark in lateral limbs, secondary limbs, and twigs <0.5 inch in diameter at the point of occurrence is included for sapling-size trees but is excluded for poletimber and sawtimber-size trees.

Bole—That portion of a tree between a 1-foot stump and a 4-inch top d.o.b. in trees ≥5.0 inches d.b.h.

Census water—Streams, sloughs, estuaries, canals, and other moving bodies of water ≥200-feet wide, and lakes, reservoirs, ponds, and other permanent bodies of water ≥4.5 acres in area.

Commercial species—Tree species currently or potentially suitable for industrial wood products.

D.b.h.—Tree diameter in inches (outside bark) at breast height (4.5 feet aboveground).

Diameter class—A classification of trees based on tree d.b.h. Forest inventory and analysis commonly uses 2-inch diameter classes, with the even inch as the approximate midpoint for a class. For example, the 6-inch class includes trees 5.0 through 6.9 inches d.b.h.

D.o.b. (diameter outside bark)—Stem diameter including bark.

Forest land—Land at least 10 percent stocked by forest trees of any size, or formerly having such tree cover and not currently developed for nonforest use. The minimum area considered for classification is 1 acre. Forested strips must be at least 120-feet wide.

Forest management type—A classification of timberland based on forest type and stand origin.

Pine plantation—Stand that (a) has been artificially regenerated by planting or direct seeding, (b) is classed as a member of the pine or other softwood forest type, and (c) has at least 10-percent stocking.

Natural pine—Stand that (a) has not been artificially regenerated, (b) is classed as a member of the pine or other softwood forest type, and (c) has at least 10-percent stocking.

Oak-pine—Stand that has at least 10-percent stocking and is classed as a member of the oak-pine forest type.

Upland hardwood—Stand that has at least 10-percent stocking and classed as a member of the oak-hickory or maple-beech-birch forest type.

Lowland hardwood—Stand that has at least 10-percent stocking and is classed as a member of the oak-gum-cypress, elm-ash-cottonwood, palm, or other tropical forest type.

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

Forest type—A classification of forest land based on the species forming a plurality of live-tree stocking. Major eastern forest-type groups are:

White-red-jack pine—Forests in which eastern white pine, red pine, or jack pine, singly or in combination, constitute a plurality of the stocking. (Common associates include hemlock, birch, and maple.)

Spruce-fir—Forests in which spruce or true firs, singly or in combination, constitute a plurality of the stocking. (Common associates include maple, birch, and hemlock.)

Longleaf-slash pine—Forests in which longleaf or slash pine, singly or in combination, constitute a plurality of the stocking. (Common associates include oak, hickory, and gum.)

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

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

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

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

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

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

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

Forested tract size—The area of forest within the contiguous tract containing each forest inventory and analysis sample plot.

Fresh weight—Mass of tree component at time of cutting.

Gross growth—Annual increase in volume of trees ≥5.0 inches d.b.h. in the absence of cutting and mortality. (Gross growth includes survivor growth, ingrowth, growth on ingrowth, growth on removals before removal, and growth on mortality before death.)

Growing-stock trees—Living trees of commercial species classified as sawtimber, poletimber, saplings, and seedlings. Trees must contain at least one 12-foot or two 8-foot logs in the saw-log portion, currently or potentially (if too small to qualify), to be classed as growing stock. The log(s) must meet dimension and merchantability standards to qualify. Trees must also have, currently or potentially, one-third of their gross board-foot volume in sound wood.

Growing-stock volume—The cubic-foot volume of sound wood in growing-stock trees ≥5.0 inches d.b.h. from a 1-foot stump to a minimum 4.0-inch top d.o.b. of the central stem.

Hardwoods—Dicotyledonous trees, usually broadleaf and deciduous.

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

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

Industrial wood—All roundwood products except fuelwood.

Land area—The area of dry land and land temporarily or partly covered by water, such as marshes, swamps, and river floodplains (omitting tidal flats below mean high tide), streams, sloughs, estuaries, and canals <200-feet wide, and lakes, reservoirs, and ponds <4.5 acres in area.

Live trees—All living trees. All size classes, all tree classes, and both commercial and noncommercial species are included.

Log grade—A classification of logs based on external characteristics indicating quality or value.

Logging residues—The unused merchantable portion of growing-stock trees cut or destroyed during logging operations.

Net annual change—Net annual increase or decrease in volume of live trees ≥5.0 inches d.b.h. Net annual change is equal to net annual growth minus average annual removals.

Noncommercial species—Tree species of typically small size, poor form, or inferior quality that normally do not develop into trees suitable for industrial wood products.

Nonforest land—Land that has never supported forests and land formerly forested where timber production is precluded by development for other uses.

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

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

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

Ownership—The property owned by one ownership unit, including all parcels of land in the United States.

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

Forest industry land—Land owned by companies or individuals operating primary wood-using plants.

Nonindustrial private forest (NIPF) land—Privately owned land that is not forest industry land.

Corporate—Owned by corporations, including incorporated farm ownerships.

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

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

Miscellaneous Federal land—Federal land other than national forests.

State, county, and municipal land—Land owned by States, counties, and local public agencies or municipalities or land leased to these governmental units for ≥50 years.

Plant residues—Wood material generated in the production of timber products at primary manufacturing plants.

Coarse residues—Material, such as slabs, edgings, trim, veneer cores and ends, suitable

Fine residues—Material, such as sawdust, shavings, and veneer chippings, not suitable for chipping.

Plant byproducts—Residues (coarse or fine) used in the manufacture of industrial products or for consumer use or as fuel.

Unused plant residues—Residues (coarse or fine) not used for any product, including fuel.

Poletimber-size trees—Softwoods 5.0–8.9 inches d.b.h. and hardwoods 5.0–10.9 inches d.b.h.

Primary wood-using plants—Industries receiving roundwood or chips from roundwood for the manufacture of products, such as veneer, pulp, and lumber.

Productive-reserved forest land—Forest land sufficiently productive to qualify as timberland but withdrawn by statute or administrative regulation from production of timber that is utilized.

Reforestation—Area of land previously classified as forest that is regenerated by tree planting or natural regeneration.

Rotten trees—Live trees of commercial species not containing at least one 12-foot saw log, or two noncontiguous saw logs, each ≥8 feet in length, now or prospectively, primarily because of rot or missing sections, and with less than one-third of the gross board-foot tree volume in sound material.

Rough trees—Live trees of commercial species not containing at least one 12-foot saw log, or two noncontiguous saw logs, each ≥8 feet in length, now or prospectively, primarily because of roughness, poor form, splits, and cracks, and with less than one-third of the gross board-foot tree volume in sound material; and live trees of noncommercial species.

Roundwood (roundwood logs)—Logs, bolts, or other round sections cut from trees for industrial or consumer uses.

Roundwood chipped—Any timber cut primarily for pulpwood, delivered to nonpulpmills, chipped, and then sold to pulpmills as residues, including chipped tops, jump sections, whole trees, and pulpwood sticks.

Roundwood products—Any primary product such as lumber, poles, pilings, pulp, or fuelwood that is produced from roundwood.

Salvable dead trees—Standing or downed dead trees that were formerly growing stock and are considered merchantable. Trees must be ≥5.0 inches d.b.h. to qualify.

Saplings—Live trees 1.0–5.0 inches d.b.h.

Saw log—A log meeting minimum standards of diameter, length, and defect, including logs ≥8-feet long, sound and straight, with a minimum diameter inside bark for softwoods of 6 inches (8 inches for hardwoods).

Saw-log portion—The part of the bole of sawtimber trees between a 1-foot stump and the saw-log top.

Saw-log top—The point on the bole of sawtimber trees above which a conventional saw log cannot be produced. The minimum saw-log top is 7.0 inches d.o.b. for softwoods and 9.0 inches d.o.b. for hardwoods.

Sawtimber-size trees—Softwoods ≥9.0 inches d.b.h. and hardwoods ≥11.0 inches d.b.h.

Sawtimber volume—Growing-stock volume in the saw-log portion of sawtimber-size trees in board feet (International ¼-inch rule).

Seedlings—Trees <1.0-inch d.b.h. and >1-foot tall for hardwoods, >6 inches tall for softwood, and >0.5 inch in diameter at ground level for longleaf pine.

Select red oaks—The group consisting of cherrybark, Shumard, and northern red oaks. Other red oak species are included in the "other red oaks" group.

Select white oaks—The group consisting of white, swamp chestnut, swamp white, chinkapin, Durand, and bur oaks. Other white oak species are included in the "other white oaks" group.

Site class—A classification of forest land in terms of potential capacity to grow crops of industrial wood based on fully stocked natural stands.

Softwoods—Coniferous trees, usually evergreen, having leaves that are needles or scalelike.

Yellow pines—Loblolly, longleaf, slash, pond, shortleaf, pitch, Virginia, sand, spruce, and Table Mountain pines.

Other softwoods—Cypress, eastern redcedar, white-cedar, eastern white pine, eastern hemlock, spruce, and fir.

Stand age—The average age of dominant and codominant trees in the stand.

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

Planted—Planted or artificially seeded.

Natural—No evidence of artificial regeneration.

Stand-size class—A classification of forest land based on the diameter class distribution of live trees in the stand.

Sawtimber stands—Stands at least 10 percent stocked with live trees, with one-half or more of total stocking in sawtimber and poletimber trees, and with sawtimber stocking at least equal to poletimber stocking.

Poletimber stands—Stands at least 10 percent stocked with live trees, with one-half or more of total stocking in poletimber and sawtimber trees, and with poletimber stocking greater than sawtimber stocking.

Sapling-seedling stands—Stands at least 10 percent stocked with live trees and with more than one-half of total stocking in saplings and seedlings.

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

Stocking—The degree of occupancy of land by trees, measured by basal area or the number of trees in a stand and spacing in the stand, compared with a minimum standard, depending on tree size, required to fully utilize the growth potential of the land.

Density of trees and basal area per acre required for full stocking:

D.b.h. class	Trees per acre for full stocking	Basal area
		square feet per acre
Seedlings	600	—
2	560	—
4	460	—
6	340	67
8	240	84
10	155	85
12	115	90
14	90	96
16	72	101
18	60	106
20	51	111

— = not applicable.

Timber products—Roundwood products and byproducts.

Timberland—Forest land capable of producing 20 cubic feet of industrial wood per acre per year and not withdrawn from timber utilization.

Tree—Woody plant having at maturity one erect perennial stem or trunk ≥3.0 inches d.b.h., a more or less definitely formed crown of foliage, and a height of ≥13 feet.

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

Upper-stem portion—The part of the main stem or fork of sawtimber trees above the saw-log top to a minimum top diameter of 4.0 inches d.o.b. or to the point where the main stem or fork breaks into limbs.

Volume of live trees—The cubic-foot volume of sound wood in live trees ≥5.0 inches d.b.h. from a 1-foot stump to a minimum 4.0-inch top d.o.b. of the central stem.

Volume of saw-log portion of sawtimber trees—The cubic-foot volume of sound wood in the saw-log portion of sawtimber trees. Volume is the net result after deductions for rot, sweep, and other defects that affect use for lumber.

Louisiana black bear. (photo by Gary Stolz, U.S. Fish and Wildlife Service)

Public Access to FIA Data

Data collected by the U.S. Department of Agriculture (USDA) Forest Service, Forest Inventory and Analysis (FIA) program are made available to the public via the Internet. To access data, go to the USDA Forest Service FIA Web site at http://www.fia.fs.fed.us and enter the Online Databases section. The data are stored in a way that permits individual users to select and download data so they can produce their own estimates and summaries. Users can also access an online table generator to easily query the data within the Internet forum.

Diamondback water snake, Kisatchie National Forest. (photo by Steve Shively, U.S. Forest Service)

Forest Inventory Methods

The following is a general description of the sample design currently used to collect the information and of the procedures used to derive the forest resource estimates provided in this report. The inventory design and methodology used to collect and process the information needed to derive the current forest resources estimates for the 2005 survey of Louisiana have undergone change since the previous survey conducted in 1991. The 2005 sample design differs from the 1991 sample design in some key ways. First, the method of estimating forest area has changed; second, the temporal nature of collecting the ground samples switched from a periodic survey to an annualized survey; third, plot designs changed from a variable-radius prism plot design to a fixed-radius plot design. The following section details previous and current plot methodologies.

Sample Design

Previous design—For surveys prior to 2005, field crews visited all sample locations within a State, and measured attributes at those locations within a 1- or 2-year period. The Forest Inventory and Analyis (FIA) program typically conducted surveys one State at a time. This periodic inventory system was designed to provide updated forest resource estimates for all States every 7 to 10 years. The sample design was based on a two-phase system whereby forest area was determined using aerial photographs, and stand and tree-level characteristics were determined using on-the-ground mensuration techniques.

Timberland area was determined by overlaying a dot grid on aerial photographs and interpreting each dot as falling on forest or nonforest land. Each dot represented about 230 acres. Dot counts were adjusted by ground checks at permanent sample locations. The ratio of forest to nonforest dots provided the percent forest for each county. This percentage was then applied to data from the U.S. Census Bureau to develop an estimate of forest area in each parish. Expansion factors based on the number of forested plots in a parish varied by parish.

Stand and tree-level characteristics were measured on plots located on a 3- by 3-mile sample grid. At each sample plot, 10 satellite points were spread over approximately 1 acre. At each forested sample plot, trees ≥5.0 inches diameter at breast height (d.b.h.) were tallied on each of the 10 satellite points using a 37.5-factor prism. Trees ≤5.0 inches were tallied on a circular 1/275th acre plot situated around the first three satellite points.

Current design—In 1995, the FIA program began efforts to standardize an inventory design to be used in all States. The FIA inventory today is a 3-phase, fixed-plot sample survey (Bechtold and Patterson 2005). The three phases of the current sampling method are arranged on a hexagonal grid design, with each successive phase sampled with less intensity. There are 16 phase 2 (P2) hexagons for every phase 3 (P3) hexagon, and 27 phase 1 (P1) hexagons for every P2 hexagon. P1 hexagons represent about 222 acres, while P2 and P3 hexagons represent roughly 6,000 and 96,000 acres, respectively.

Current P1 stratified estimation procedures reduce variance associated with estimates of forest land area and produce more precise estimates than simple random sampling. A statistical estimation technique is used to classify digital satellite imagery and initially stratify the land base as forest or nonforest to assign a representative acreage to each sample plot. Pixels within 0.04 mile (2 pixel widths) of a forest/nonforest boundary form two additional strata: forest edge and nonforest edge. Forest pixels within 0.04 mile of the boundary on the forest side are classified as forest edge while pixels within 0.04 mile of the boundary on the nonforest side are classified as nonforest edge. The estimated population total for the variable is the sum across all strata of the product of each stratum's area (from the pixel count) and variable's mean per unit area (from plot measurements) for the stratum.

The P2 sample design utilizes a fixed-radius plot consisting of four subplots spaced 120 feet apart in a triangular fashion. The cumulative sample area of these four subplots is 1/6 of an acre. The cluster plot is a 1.5-acre circle that circumscribes the outer boundary of the three outer subplots. Trees ≥5 inches d.b.h. are measured on each subplot. Trees ≥1.0 but <5.0 inches d.b.h. and seedlings (<1.0-inch d.b.h.) are measured on a microplot (1/300 of an acre; 6.8-foot radius) on each of the four subplots. The microplot is offset 12 feet at 90 degrees from the subplot center.

A unique feature of this plot design is in the mapping of different land use and forest conditions that are encountered on the cluster plot. Since the plots are placed on the ground without bias, i.e., systematically but at a scale large enough to be considered random, there is a probability that the cluster plot will straddle more than one type of land use or forest condition. When this does occur, a boundary is drawn across the plot so that the different homogeneous units are identified and isolated. There are two steps in the mapping process. The first step involves identifying forest and nonforest areas on the plot and establishing a boundary line on the plot if both are present. The second step involves identifying homogeneous areas in the forested portion of the plot based on six factors: forest type, stand size, ownership, stand density, regeneration status, and reserved status. These, too, are mapped into separate entities.

P3 procedures involve sampling on a subset ($1/16^{th}$) of the P2 sample locations. P3 measurements are combined with P2 measurements to assess the overall health of forested ecosystems within each State. P3 data collection includes variables pertaining to tree crown health, down woody material (DWM), foliar ozone injury, lichen diversity, and soil composition. Tree crown health, DWM, and soil composition measurements are collected using the same plot design used during P2 data collection, while lichen data are collected within a 120-foot radius circle centered on subplot one of each FIA P3 field plot.

Biomonitoring sites for ozone data collection are based on specific criteria and are located independently of the FIA grid. Sites chosen are 1-acre fields or similar open areas adjacent to or surrounded by forest land, and containing at least a minimum number of plants of at least two identified bioindicator species (Smith and others 2008). Plants are evaluated for ozone injury and voucher specimens are submitted to a regional expert for verification of ozone-induced foliar injury.

Determining Forest Resource Statistics

The changes in sample design and plot layout changed the derivation of basic resource statistics, e.g., stocking, growth, removals, and mortality. The following section briefly describes the methods and processes used and explains how they have changed with the transition from the previous to the current inventory system.

Forest type—Forest type is derived via algorithm using a classification tree model. The forest type indicates the predominant live-tree species cover. Hardwoods and softwoods are first aggregated to determine the predominant group, and forest type is selected from the predominant group. Eastern softwood groups have ≥50 percent softwood stocking and contain the named species that constitute a plurality of the stocking; the oak-pine group and hardwood groups have <50 percent softwood stocking. The nonstocked group includes stands <10 percent stocked with live trees.

Under the variable-radius sample design, a single forest type was determined for the entire plot regardless of the number of forest conditions present. The current fixed-radius inventory design identifies a forest type for each forest condition.

Estimating volume—Currently, Forest Inventory and Analysis (FIA) computes tree volume using a simple linear regression model (D^2H) that predicts gross cubic foot volume from a 1-foot stump to a 4-inch upper diameter for each sample tree based on d.b.h. (D) and total height (H). Separate equation coefficients for 77 species or species groupings, developed from standing and felled tree volume studies conducted across several Southern States, are used (Oswalt and Conner 2011). Volume in forks or limbs outside of the main bole is excluded. FIA derives net cubic foot volume by subtracting a field crew estimate of rotten or missing wood for each sample tree. Volume of the saw-log portion (expressed in International ¼-inch board feet and in cubic feet) of sample trees is computed using board foot-cubic foot ratio equations. Equations and coefficients were derived from standing and felled-tree volume studies conducted across several Southern States.

Methods used to estimate tree volumes in the previous inventory differed from those described above. FIA derived tree volume from several measurements on each tree tallied on forested sample plots. These measurements included d.b.h., bark thickness, total height, bole length, log length, and up to four upper-stem diameters that defined pole top, pole mid, saw top, and saw mid. Gross tree volumes (cubic and board foot values) were determined by applying the formula for a conic frustum to sections of the bole. The volumes of the sections were then added together to produce a total stem volume. Obtaining net cubic foot volume involved subtracting a field crew estimate of rotten or missing wood for each sample tree. Merchantable volume was calculated from measurements of the bole from a 1-foot stump to an upper-stem stopping point determined by merchantability standards. The upper-stem diameter at this point could be as low as 4 inches but often was larger depending upon the perceived condition and product merchantability of the upper tree bole.

Estimating growth, removals, and mortality—Volume change components were derived from data collected during the remeasurement of sample plots established in the previous inventory. The plot design for the previous inventory was based on a cluster of 10 prism points established at 66 feet intervals. Previously at each prism point, trees ≥5.0 inches d.b.h. were selected with a 37.5-basal-area-factor prism. Trees <5.0 inches d.b.h. but ≥1.0-inch d.b.h. were tallied on three 1/275-acre circular fixed plots, each of which was centered at one of the first three prism points.

At the time of remeasurement, some changes were made to the previous sample design. For trees <5.0 inches d.b.h. but ≥1.0-inch d.b.h., the 1/275-acre circular fixed plots at prism points 1, 2, and 3 were reduced to 1/300-acre circular fixed plots. For trees that were ≥5.0 inches d.b.h., only the first 5 of the 10 prism points were sampled at remeasurement. This means that prism points 1 through 5 carry twice the weight as in the previous inventory.

The former Southern FIA unit estimated growth components using a Beers and Miller (1964) approach, as modified by Van Deusen and others (1986). The Van Deusen modification included new trees that grew into the prism sample. However, for this remeasurement, crews measured only survivor trees for growth. The only new tally trees on the prism points were those trees missed by the previous crew or were determined to be "through growth" (trees that previously were <1.0-inch d.b.h. on the 1/300-acre fixed circular plot at prism points 1 to 3 and that grew to ≥5.0 inches d.b.h. since the previous survey). Additionally, on reversions (previously nonforest land that has since reverted to forest land) all trees ≥5.0 inches d.b.h. in the new subplot design located in the reverted forested condition were evaluated to determine if they qualified as remeasured 37.5-basal-area-factor tally trees (based on d.b.h. and distance).

Data Quality Control in Louisiana, 2005

The FIA program utilizes a quality control program consisting of comprehensive training and mentorship combined with checks by a certified quality assurance (QA) cruiser on a random selection of plots. Each new Federal or State field person is trained for several months under the guidance of an experienced cruiser. QA personnel conduct checks on plots both independently of cruisers following collection of a selected plot, and also coincidentally with cruisers to evaluate performance and data quality concerns. In Louisiana 2005, a series of post-collection checks revealed potential irregularities in data collection. QA teams returned to as many plots as possible to correct the irregularities, and those recollected data were used in this report. Although attempts were made to address the known problems, the true impact of the irregularities will remain obscure until the completion of the next full cycle of data. Assessments of statewide and survey resource statistics did not indicate any apparent anomalies due to uncorrected problems at the State level. However, users are advised to exercise caution when evaluating small subsets of the data

(e.g., individual species or species groups within a parish) until a full set of new data collection has occurred. More information on this topic is available on request from the Southern Research Station FIA office.

Sample Accuracy

FIA data are collected nationwide to provide reliable statistics for forest resources at the State and survey unit levels. Sampling errors are a measure of the reliability of inventory statistics. These sampling errors mean that the chances are two out of three that the true population value is within the limits indicated by a confidence interval. Sampling errors (in percent) and associated confidence intervals around the sample estimates for forest land and timberland area, inventory volumes on forest land, and components of change on timberland are presented in the following tabulation.

Item	Sample estimate and confidence interval	Sampling error
		percent
Forest land (*1,000 acres*)	14,296.0 ± 108.6	0.8
Timberland (*1,000 acres*)	14,238.0 ± 109.6	0.8
All live (*million cubic feet*)		
Inventory (forest land)	22,797.0 ± 430.9	1.9
Net annual growth (timberland)	859.1 ± 25.8	3.0
Annual removals (timberland)	955.6 ± 35.7	3.7
Annual mortality (timberland)	233.6 ± 10.3	4.4
Growing stock (*million cubic feet*)		
Inventory (forest land)	20,713.7 ± 412.2	2.0
Net annual growth (timberland)	827.4 ± 24.4	3.0
Annual removals (timberland)	919.8 ± 34.9	3.8
Annual mortality (timberland)	169.5 ± 8.5	5.0
Sawtimber (*million board feet*)		
Inventory (forest land)	14,783.6 ± 351.8	2.4
Net annual growth (timberland)	3,692.5 ± 123.0	3.3
Annual removals (timberland)	3,827.3 ± 164.2	4.3
Annual mortality (timberland)	667.5 ± 39.6	5.9

Sampling error increases as the area or volume considered decreases in magnitude. Sampling errors and associated confidence intervals are often unacceptably high for small components of the total resource. Statistical confidence may be computed for any subdivision of survey unit or State totals using the following formula. Sampling errors obtained by this method are only approximations of reliability because this process assumes constant variance across all subdivisions of totals.

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

where

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

SE_t = sampling error for survey unit or State total,

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

X_t = total area or volume for survey unit or State.

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

$$SE_s = 1.9 \frac{\sqrt{22{,}797.0}}{\sqrt{8{,}821.9}} = 3.05$$

Thus, the sampling error is about 3.05 percent, and the resulting confidence interval (two times out of three) for softwood live-tree volume on Louisiana's forest land is 8,821.9 ± 269.4 million board feet. Sampling errors are also generated automatically using the online table producer "evalidator" which is available through the forest inventory and analysis Web site at http://www.fia.fs.fed.us.

Metric Equivalents

1 acre = 4,046.86 m^2 or 0.404686 ha
1 cubic foot = 0.028317 m^3
1 inch = 2.54 cm or 0.0254 m
Breast height = 1.4 m above the ground
1 square foot = 929.03 cm^2 or 0.0929 m^2
1 square foot per basal area = 0.229568 m^2/ha
1 pound = 0.454 kg
1 ton = 0.907 metric ton

Table D.1—Percentage of area by land status, Louisiana, 2005

Land status	Area
	percent
Accessible forest land	
Unreserved forest land	
Timberland	41.6
Unproductive	0.1
Total	41.7
Reserved forest land	
Productive	0.1
Unproductive	0.0
Total	0.1
Total forest land	41.7
Nonforest and other area	
Nonforest land	38.0
Water	
Noncensus water	0.5
Census water	18.0
Total	56.5
Nonsampled area	
Access denied	0.6
Hazardous conditions	1.1
All area	100.0
Total area (*thousand acres*)	33,177.3

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

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

Table D.2—Area of forest land by forest-type group and site productivity class, Louisiana, 2005

Forest-type group	All classes	Site productivity class (*cubic feet/acre/year*) 0–19	20–49	50–84	85–119	120–164	165–224	225+
				thousand acres				
Softwood								
Longleaf-slash pine	870.6	0.0	32.8	202.6	344.6	283.7	6.9	0.0
Loblolly-shortleaf pine	4,823.5	0.0	46.8	635.5	1,931.2	1,799.6	404.5	5.9
Total softwoods	5,694.1	0.0	79.5	838.1	2,275.8	2,083.3	411.4	5.9
Hardwood								
Oak-pine	1,209.8	0.0	44.8	242.5	528.6	338.7	55.3	0.0
Oak-hickory	2,349.7	0.0	63.1	684.4	939.0	526.9	99.5	36.7
Oak-gum-cypress	3,280.2	17.9	307.1	1,466.5	908.7	407.9	138.3	34.0
Elm-ash-cottonwood	1,206.9	0.0	106.8	457.3	332.5	193.8	70.2	46.4
Other hardwoods	15.8	0.0	0.0	2.0	0.0	13.8	0.0	0.0
Exotic hardwoods	261.9	0.0	13.5	98.7	73.6	68.6	7.6	0.0
Total hardwoods	8,324.3	17.9	535.3	2,951.3	2,782.3	1,549.6	370.8	117.1
Nonstocked	277.6	9.9	31.9	84.3	59.1	83.5	7.2	1.6
All groups	14,296.0	27.8	646.8	3,873.8	5,117.2	3,716.4	789.4	124.6

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

Table D.3—Area of forest land by forest-type group and ownership group, Louisiana, 2005

Forest-type group	All ownerships	Ownership group				
		U.S. Forest Service	Other Federal	State and local government	Forest industry	Nonindustrial private
	thousand acres					
Softwood						
Longleaf-slash pine	870.6	163.3	9.9	13.1	393.2	291.1
Loblolly-shortleaf pine	4,823.5	316.6	46.1	68.0	2,306.2	2,086.7
Total softwoods	5,694.1	479.9	56.0	81.1	2,699.4	2,377.8
Hardwood						
Oak-pine	1,209.8	50.6	18.3	8.3	417.1	715.6
Oak-hickory	2,349.7	100.8	21.2	56.8	539.8	1,631.0
Oak-gum-cypress	3,280.2	55.3	164.6	423.5	511.9	2,124.9
Elm-ash-cottonwood	1,206.9	0.7	58.7	137.9	113.5	896.1
Other hardwoods	15.8	0.0	0.0	0.0	6.9	8.9
Exotic hardwoods	261.9	0.0	0.0	6.9	24.5	230.5
Total hardwoods	8,324.3	207.5	262.9	633.3	1,613.7	5,607.0
Nonstocked	277.6	0.0	0.0	31.0	51.5	195.0
All groups	14,296.0	687.4	318.8	745.4	4,364.6	8,179.8

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

Table D.4—Area of forest land by forest-type group and stand-size class, Louisiana, 2005

Forest-type group	All size classes	Stand-size class			Non-stocked
		Large diameter	Medium diameter	Small diameter	
			acres		
Softwood					
Longleaf-slash pine	870.6	465.7	175.1	229.8	0.0
Loblolly-shortleaf pine	4,823.5	2,132.6	1,285.2	1,405.7	0.0
Total softwoods	5,694.1	2,598.3	1,460.3	1,635.5	0.0
Hardwood					
Oak-pine	1,209.8	581.0	146.3	482.5	0.0
Oak-hickory	2,349.7	1,116.2	289.5	944.0	0.0
Oak-gum-cypress	3,280.2	2,554.2	367.0	359.0	0.0
Elm-ash-cottonwood	1,206.9	708.8	307.1	191.0	0.0
Other hardwoods	15.8	8.9	0.0	6.9	0.0
Exotic hardwoods	261.9	13.2	57.0	191.6	0.0
Total hardwoods	8,324.3	4,982.4	1,166.9	2,175.0	0.0
Nonstocked	277.6	0.0	0.0	0.0	277.6
All groups	14,296.0	7,580.7	2,627.3	3,810.5	277.6

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

Table D.5—Area of forest land by forest-type group and stand origin, Louisiana, 2005

Forest-type group	Total	Stand origin	
		Natural stands	Artificial regeneration
	acres		
Softwood			
Longleaf-slash pine	870.6	263.2	607.4
Loblolly-shortleaf pine	4,823.5	1,972.9	2,850.6
Total softwoods	5,694.1	2,236.1	3,458.0
Hardwood			
Oak-pine	1,209.8	841.0	368.8
Oak-hickory	2,349.7	2,062.7	287.0
Oak-gum-cypress	3,280.2	3,212.3	67.9
Elm-ash-cottonwood	1,206.9	1,170.0	36.9
Other hardwoods	15.8	15.8	0.0
Exotic hardwoods	261.9	251.3	10.6
Total hardwoods	8,324.3	7,553.1	771.2
Nonstocked	277.6	201.2	76.4
All groups	14,296.0	9,990.4	4,305.6

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

Table D.6—Area of forest land disturbed annually by forest-type group and disturbance class, Louisiana, 2005

Forest-type group	Disturbance class							
	Insects	Disease	Weather	Fire	Domestic animals	Wild animals	Human	Other natural
	acres							
Softwood								
Longleaf-slash pine	1.9	1.2	2.1	27.4	0.0	0.0	2.6	0.0
Loblolly-shortleaf pine	1.0	1.6	6.1	44.2	0.4	0.4	27.5	0.0
Total softwoods	2.9	2.8	8.2	71.6	0.4	0.4	30.1	0.0
Hardwood								
Oak-pine	1.0	0.4	4.5	10.5	0.5	0.0	4.5	0.0
Oak-hickory	0.0	0.0	9.3	5.0	3.0	0.0	10.8	0.0
Oak-gum-cypress	1.4	0.0	44.0	0.5	0.4	1.7	6.1	0.5
Elm-ash-cottonwood	0.0	1.2	11.2	0.0	0.3	0.3	1.7	1.0
Other hardwoods	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Exotic hardwoods	0.0	0.0	3.2	0.0	0.0	0.0	1.1	0.0
Total hardwoods	2.4	1.6	72.2	15.9	4.1	2.0	24.1	1.5
Nonstocked	0.0	0.0	2.0	3.0	0.0	0.5	2.5	0.5
All groups	5.3	4.4	82.5	90.5	4.5	2.9	56.7	2.0

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

Table D.7—Number of all-live trees on forest land by species group and diameter class, Louisiana, 2005

Species group	All classes	Diameter class (*inches at breast height*) 1.0–2.9	3.0–4.9	5.0–6.9	7.0–8.9	9.0–10.9	11.0–12.9	13.0–14.9	15.0–16.9	17.0–18.9	19.0–20.9	21.0–24.9	25.0–28.9	29.0–32.9	33.0–36.9	37.0+
	million trees															
Softwood																
Longleaf and slash pines	313.2	135.0	78.6	42.6	17.7	11.9	10.2	8.6	5.3	2.1	0.7	0.4	0.0	0.0	0.0	0.0
Loblolly and shortleaf pines	2,011.1	849.9	492.8	294.2	165.1	83.5	48.8	29.9	20.7	11.7	6.8	5.8	1.6	0.2	0.2	0.0
Other yellow pines	8.8	3.3	2.3	0.9	0.7	0.5	0.3	0.2	0.3	0.0	0.0	0.2	0.0	0.0	0.0	0.0
Cypress	115.3	23.5	17.3	15.1	13.3	11.8	8.9	6.5	6.2	4.4	3.2	3.6	0.8	0.5	0.1	0.1
Other eastern softwoods	6.8	4.5	1.4	0.4	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	2,455.2	1,016.2	592.4	353.3	197.0	107.9	68.3	45.3	32.4	18.3	10.7	9.9	2.4	0.7	0.3	0.1
Hardwood																
Select white oaks	128.5	73.6	24.4	8.9	6.0	4.5	3.4	2.2	1.7	1.3	0.9	1.0	0.4	0.2	0.0	0.1
Select red oaks	39.0	16.8	6.7	3.6	2.8	2.1	1.2	1.4	1.3	0.9	0.6	0.7	0.3	0.3	0.1	0.0
Other white oaks	113.4	57.5	20.7	9.2	6.5	4.8	3.7	2.4	2.4	1.8	0.9	2.3	0.8	0.4	0.0	0.1
Other red oaks	882.7	637.6	108.7	42.2	26.2	16.7	12.3	11.6	7.4	5.5	4.3	5.6	2.6	1.0	0.5	0.5
Hickory	175.2	113.1	25.0	11.0	7.5	5.6	3.8	2.4	2.3	1.6	1.1	0.9	0.4	0.2	0.0	0.1
Hard maple	11.2	8.3	1.4	0.7	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Soft maple	605.0	447.6	94.9	31.5	15.4	7.6	3.5	2.1	1.1	0.7	0.3	0.3	0.1	0.0	0.0	0.0
Beech	32.3	21.8	3.6	1.4	1.1	0.8	0.7	0.4	0.6	0.7	0.6	0.3	0.3	0.1	0.0	0.0
Sweetgum	1,058.8	764.0	150.1	56.1	32.1	21.7	12.6	8.6	6.1	3.2	2.0	1.4	0.7	0.1	0.0	0.0
Tupelo and blackgum	383.2	218.5	54.6	31.5	24.4	17.1	14.7	10.1	5.5	3.4	1.4	1.0	0.7	0.1	0.0	0.0
Ash	239.0	165.0	32.2	13.6	7.8	7.0	4.9	2.8	1.7	1.4	0.9	0.8	0.4	0.2	0.0	0.0
Cottonwood and aspen	4.6	1.5	1.0	0.3	0.3	0.5	0.2	0.2	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0
Basswood	3.5	3.3	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yellow-poplar	19.3	10.4	5.1	1.6	0.8	0.2	0.2	0.3	0.2	0.1	0.1	0.2	0.1	0.0	0.0	0.0
Black walnut	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other eastern soft hardwoods	825.9	546.9	138.9	57.8	31.2	19.3	11.5	7.9	4.7	3.5	1.1	2.0	0.5	0.2	0.0	0.1
Other eastern hard hardwoods	308.8	236.8	49.9	11.8	4.6	2.2	1.1	1.0	0.8	0.3	0.2	0.0	0.0	0.0	0.0	0.0
Eastern noncommercial hardwoods	974.7	744.2	153.1	45.7	19.4	6.9	2.9	1.1	0.7	0.4	0.1	0.2	0.0	0.0	0.0	0.0
Total	5,805.1	4,066.8	870.3	327.5	186.8	117.2	76.8	54.6	36.7	25.1	14.7	16.9	7.4	2.8	0.9	1.0
All species	8,260.3	5,083.0	1,462.7	680.8	383.8	225.0	145.1	99.9	69.1	43.3	25.4	26.8	9.8	3.4	1.2	1.1

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

Table D.8—Net[a] volume of all-live trees on forest land by forest-type group and stand-size class, Louisiana, 2005

Forest-type group	All classes	Stand-size class: Large diameter	Medium diameter	Small diameter	Non-stocked
		million cubic feet			
Softwood					
Longleaf-slash pine	1,308.0	1,103.0	179.3	25.7	0.0
Loblolly-shortleaf pine	7,513.9	5,763.5	1,574.3	176.1	0.0
Total	8,821.9	6,866.5	1,753.6	201.8	0.0
Hardwood					
Oak-pine	1,651.9	1,396.1	176.4	79.4	0.0
Oak-hickory	2,848.8	2,444.1	274.6	130.0	0.0
Oak-gum-cypress	7,548.7	7,061.7	406.1	80.9	0.0
Elm-ash-cottonwood	1,791.6	1,466.2	296.1	29.2	0.0
Other hardwoods	6.7	6.7	0.0	0.0	0.0
Exotic hardwoods	115.2	14.2	62.4	38.6	0.0
Totals	13,962.9	12,389.1	1,215.7	358.2	0.0
Nonstocked	12.2	0.0	0.0	0.0	12.2
All groups	22,797.0	19,255.6	2,969.3	559.9	12.2

Numbers in rows and columns may not sum to totals due to rounding.
0.0 = no sample for the cell or a value of >0.0 but <0.05.
[a] Excludes rotten, missing, and form cull defects volume.

Table D.9—Net[a] volume of all-live trees on forest land by species group and ownership group, Louisiana, 2005

Species group	All ownerships	Ownership group				
		U.S. Forest Service	Other Federal	State and local government	Forest industry	Nonindustrial private
	million cubic feet					
Softwood						
Longleaf and slash pines	1,301.2	384.0	29.1	17.8	453.1	417.1
Loblolly and shortleaf pines	7,652.8	884.7	138.3	160.4	2,801.9	3,667.5
Other yellow pines	80.4	1.3	0.0	1.2	19.8	58.1
Cypress	1,721.6	37.5	50.0	237.9	168.1	1,228.2
Other eastern softwoods	7.6	0.1	0.0	0.0	0.9	6.6
Woodland softwoods	0.8	0.0	0.0	0.0	0.0	0.8
Total	10,764.5	1,307.6	217.4	417.4	3,443.9	5,378.3
Hardwood						
Select white oaks	621.6	61.9	3.5	15.4	192.0	348.8
Select red oaks	444.6	33.0	6.9	11.7	107.2	285.8
Other white oaks	754.6	38.6	58.4	192.4	93.4	371.9
Other red oaks	2,919.9	183.2	126.5	227.0	551.3	1,832.0
Hickory	666.9	30.8	35.1	114.7	82.2	404.1
Hard maple	8.5	0.0	0.0	0.1	2.6	5.8
Soft maple	442.4	9.9	20.5	20.8	60.9	330.3
Beech	173.9	18.9	2.6	0.3	65.9	86.4
Sweetgum	1,842.2	94.7	103.1	92.4	419.7	1,132.3
Tupelo and blackgum	1,430.6	51.6	56.4	111.9	249.6	961.1
Ash	623.3	6.9	52.4	80.6	49.5	433.8
Cottonwood and aspen	68.8	0.0	13.5	14.8	5.5	35.1
Basswood	2.3	0.0	0.0	0.0	0.0	2.3
Yellow-poplar	67.5	0.0	0.0	6.9	17.9	42.7
Black walnut	1.8	0.0	0.0	0.0	0.0	1.8
Other eastern soft hardwoods	1,429.0	17.5	76.3	172.4	134.5	1,028.2
Other eastern hard hardwoods	166.8	6.4	7.4	27.2	24.6	101.3
Eastern noncommercial hardwoods	367.7	12.1	3.8	39.4	67.2	245.2
Total hardwoods	12,032.5	565.6	566.3	1,128.0	2,124.1	7,648.6
All species	22,797.0	1,873.2	783.6	1,545.3	5,568.0	13,026.9

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

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

[a] Excludes rotten, missing, and form cull defects volume.

Table D.10—Net[a] volume of all-live trees on forest land by forest-type group and stand origin, Louisiana, 2005

Forest-type group	Total	Stand origin	
		Natural stands	Artificial regeneration
	million cubic feet		
Softwood			
Longleaf-slash pine	1,308.0	500.0	808.0
Loblolly-shortleaf pine	7,513.9	4,514.9	2,999.0
Total	8,821.9	5,015.0	3,807.0
Hardwood			
Oak-pine	1,651.9	1,522.9	129.0
Oak-hickory	2,848.8	2,751.0	97.8
Oak-gum-cypress	7,548.7	7,548.6	0.1
Elm-ash-cottonwood	1,791.6	1,785.1	6.5
Other hardwoods	6.7	6.7	0.0
Exotic hardwoods	115.2	115.2	0.0
Total	13,962.9	13,729.5	233.4
Nonstocked	12.2	11.0	1.2
All groups	22,797.0	18,755.5	4,041.5

Numbers in rows and columns may not sum to totals due to rounding.
0.0 = no sample for the cell or a value of >0.0 but <0.05.
[a] Excludes rotten, missing, and form cull defects volume.

Table D.11—Aboveground dry weight of all-live trees on forest land by ownership class and land status, Louisiana, 2005

Ownership class	All forest land	Unreserved			Reserved		
		Total	Timberland	Unproductive	Total	Productive	Unproductive
	thousand tons						
U.S. Forest Service							
National Forest	47,194.3	45,898.7	45,898.7	0.0	1,295.6	1,295.6	0.0
Total	47,194.3	45,898.7	45,898.7	0.0	1,295.6	1,295.6	0.0
Other federal							
National Park Service	321.6	0.0	0.0	0.0	321.6	321.6	0.0
U.S. Fish and Wildlife Service	7,830.2	7,830.2	7,830.2	0.0	0.0	0.0	0.0
Dept. of Defense/Dept. of Energy	3,084.7	3,084.7	3,084.7	0.0	0.0	0.0	0.0
Other federal	9,136.6	9,136.6	9,136.6	0.0	0.0	0.0	0.0
Total	20,373.1	20,051.5	20,051.5	0.0	321.6	321.6	0.0
State and local government							
State	28,828.0	28,828.0	28,820.3	7.8	0.0	0.0	0.0
Local	12,129.5	12,129.5	12,129.5	0.0	0.0	0.0	0.0
Total	40,957.5	40,957.5	40,949.7	7.8	0.0	0.0	0.0
Forest industry							
Corporate	150,378.4	150,378.4	150,378.4	0.0	0.0	0.0	0.0
Individual	1,949.8	1,949.8	1,949.8	0.0	0.0	0.0	0.0
Total	152,328.2	152,328.2	152,328.2	0.0	0.0	0.0	0.0
Nonindustrial private							
Corporate	102,731.9	102,731.9	102,699.5	32.4	0.0	0.0	0.0
Conservation/natural resources organization	1,466.2	1,466.2	1,466.2	0.0	0.0	0.0	0.0
Unincorporated local partnership/association/club	6,090.0	6,090.0	6,090.0	0.0	0.0	0.0	0.0
Native American	803.5	803.5	803.5	0.0	0.0	0.0	0.0
Individual	236,133.9	236,133.9	236,133.9	0.0	0.0	0.0	0.0
Total	347,225.4	347,225.4	347,193.0	32.4	0.0	0.0	0.0
All classes	608,078.5	606,461.3	606,421.1	40.2	1,617.2	1,617.2	0.0

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

Table D.12—Average annual net growth of all-live trees on timberland by forest-type group and stand-size class, Louisiana, 2005

Forest-type group[a]	All classes	Stand-size class[a]			Non-stocked
		Large diameter	Medium diameter	Small diameter	
	million cubic feet				
Softwood					
Longleaf-slash pine	70.9	37.3	17.8	15.8	0.0
Loblolly-shortleaf pine	398.8	183.1	133.3	82.5	0.0
Total	469.7	220.3	151.1	98.2	0.0
Hardwood					
Oak-pine	121.4	68.9	20.5	31.9	0.0
Oak-hickory	83.9	39.5	17.8	26.7	0.0
Oak-gum-cypress	158.0	125.0	21.9	11.1	0.0
Elm-ash-cottonwood	25.1	15.0	5.2	5.0	0.0
Exotic hardwoods	0.5	0.0	0.0	0.5	0.0
Total hardwoods	389.0	248.4	65.4	75.2	0.0
Nonstocked	0.4	0.0	0.0	0.0	0.4
All groups	859.1	468.8	216.5	173.4	0.4

Numbers in rows and columns may not sum to totals due to rounding.
0.0 = no sample for the cell or a value of >0.0 but <0.05.
[a] Stand-size class and forest-type group are representative of previous (time 1) conditions.

Table D.13—Average annual mortality of all-live trees on timberland by forest-type group and stand-size class, Louisiana, 2005

Forest-type group[a]	All classes	Stand-size class[a]			Non-stocked
		Large diameter	Medium diameter	Small diameter	
	million cubic feet				
Softwood					
Longleaf-slash pine	9.1	7.8	0.9	0.4	0.0
Loblolly-shortleaf pine	37.6	23.0	7.2	7.4	0.0
Total	46.8	30.8	8.2	7.8	0.0
Hardwood					
Oak-pine	20.9	16.6	2.6	1.7	0.0
Oak-hickory	26.3	20.3	2.8	3.2	0.0
Oak-gum-cypress	95.0	85.5	7.2	2.3	0.0
Elm-ash-cottonwood	44.6	37.6	6.5	0.6	0.0
Exotic hardwoods	0.0	0.0	0.0	0.0	0.0
Total	186.8	160.0	19.0	7.8	0.0
Nonstocked	0.0	0.0	0.0	0.0	0.0
All groups	233.6	190.7	27.2	15.6	0.0

Numbers in rows and columns may not sum to totals due to rounding.
0.0 = no sample for the cell or a value of >0.0 but <0.05.
[a] Stand-size class and forest-type group are representative of previous (time 1) conditions.

Table D.14—Average annual removals of all-live trees on timberland by forest-type group and stand-size class, Louisiana, 2005

Forest-type group[a]	All classes	Stand-size class[a]			Non-stocked
		Large diameter	Medium diameter	Small diameter	
	million cubic feet				
Softwood					
Longleaf-slash pine	83.3	62.5	17.0	3.8	0.0
Loblolly-shortleaf pine	506.2	369.6	116.1	20.5	0.0
Total	589.5	432.0	133.1	24.4	0.0
Hardwood					
Oak-pine	153.6	117.3	27.0	9.3	0.0
Oak-hickory	86.5	57.1	18.1	11.3	0.0
Oak-gum-cypress	111.7	103.3	8.2	0.3	0.0
Elm-ash-cottonwood	54.2	42.5	8.7	3.0	0.0
Exotic hardwoods	0.0	0.0	0.0	0.0	0.0
Total	406.0	320.2	61.9	23.9	0.0
Nonstocked	0.1	0.0	0.0	0.0	0.1
All groups	995.6	752.2	195.0	48.2	0.1

Numbers in rows and columns may not sum to totals due to rounding.
0.0 = no sample for the cell or a value of >0.0 but <0.05.
[a] Stand-size class and forest-type group are representative of previous (time 1) conditions.

Oswalt, Sonja N.; Bentley, James W. 2013. Louisiana's forests, 2005. Resour. Bull. SRS–192. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 56 p.

This bulletin describes forest resources of the State of Louisiana at the time of the 2005 forest inventory. It is based on sampling conducted by the U.S. Department of Agriculture Forest Service, Southern Research Station, Forest Inventory and Analysis. This bulletin addresses forest area estimates; timber growth, removals, and mortality; invasive species; and timber product output.

Keywords: Annual removals, FIA, forest land area, forest productivity, Louisiana.

February 2013

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

Southern lady slipper (*cypripedium kentuckiense*) Kisatchie Ranger District, Natchitoches, Lousiana. (photo by Converse Griffith, U.S. Forest Service)

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

Louisiana's Forests, 2005

February 2013