



Florida's Forests, 2007

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United States Department of Agriculture

Forest Service

Southern Research Station

Resource Bulletin SRS–188

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Front cover: top left, Lake George State Forest. (photo by Jimmy Roberts, Florida Forest Service); top right, Anhinga on Wakulla River. (photo by Jay Frost, U.S. Forest Service); bottom, azaleas in natural pine stand. (photo by Michael Jenkins, Florida Forest Service). Back cover: top left, longleaf pine seedling stages. (photo by Jay Frost, U.S. Forest Service); top right, Lake George State Forest. (photo by Jimmy Roberts, Florida Forest Service); bottom, live oak and spanish moss. (photo by Jay Frost, U.S. Forest Service)

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Small perennial stream. (photo by by Roy Lima, Florida Forest Service)

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Florida coastal wetland. (photo by Larry Korhnak, University of Florida)

Welcome...



Jim Karels



Robert Doudrick

Welcome to the most recent Forest Inventory Analysis (FIA) report. Within these pages you'll find substantial information about the status of Florida's forest resource, from the number of trees and volume of wood currently growing in our State, to forest composition and stand structure, to identification of land ownership. Never before has this information been more critical to the quality of life, resource planning, and economic well being of our State.

Data from an ongoing study of the total value added impact of the forest and agricultural industries show that forestry has emerged as second only to environmental horticulture among seven leading agricultural industries in the State. With regard to employment and wages, forestry provides 64,500 jobs with an annual labor income of $3.4 billion. Overall, forestry contributes about $13.0 billion annually to Florida's economy. These numbers confirm forestry's role as a primary economic driver.

Amid the overall economic downturn at the time of this report, forestry's economic impact has explored expansion into wood pellet and bioenergy facilities. As a result of research contained in this report, we also know that Florida has more standing timber volume now than ever recorded, that growth exceeds harvests, and total forest area has stabilized from declines recorded in the 1980s and 1990s to 16.9 million acres today. So, we can be confident that the resource will be there to support the industry and the economy into the future. Most importantly, our forests can support expanding industry investments while still providing clean watersheds, beautiful landscapes, and abundant wildlife.

The U.S. Forest Service completed the first inventory of the Nation's forests in the 1930s. In the 1990s, recognizing the importance of high yield forests in all of the Southern States, the U.S. Forest Service and State forestry agencies began working together to reduce the interval between inventories. Florida's Forests, 2007 is Florida's first report using the State's annual inventory locations. Valuable additions to this year's report include information about forestry's contribution to Florida's economy, forest health subjects such as a survey of invasive plants, and an assessment of sustainability.

The Florida Forest Service looks forward to continuing our productive partnership with the U.S. Forest Service and to further emphasizing the relevance of forestry in the 21st century through the FIA program.

Jim Karels
State Forester, Florida Forest Service

Robert L. Doudrick

Robert Doudrick
Director, Southern Research Station
U.S. Forest Service

Foreword

The Forest and Rangeland Renewable Resources Research Act of 1978 authorized surveys of the Nation's forest resources. These surveys are part of a continuing, nationwide undertaking by the regional experiment stations of the Forest Service, U.S. Department of Agriculture. Inventories of the 13 Southern States (Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia), the Commonwealth of Puerto Rico, and the U.S. Virgin Islands are conducted by the Southern Research Station (SRS), Forest Inventory and Analysis (FIA) Research Work Unit, operating from its headquarters in Knoxville, TN, and offices in Asheville, NC, and Starkville, MS. The primary objective of these appraisals is to develop and maintain the resource information needed to formulate sound forest policies and programs. 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

This resource bulletin highlights the results of the first complete cycle of annual inventory information for Florida's forest resources. Annual surveys of U.S. forests were originally mandated by the Agricultural Research Extension and Education Reform Act of 1998 (Farm Bill). The annual surveys differ from the previous periodic surveys in many ways. The annual surveys feature: (1) a nationally consistent, fixed-radius, four-point plot configuration; (2) a systematic national sampling design consisting of a base grid derived by subdividing the Environmental Monitoring and Assessment Program grid into approximately 6,000-acre hexagons; (3) integration of the forest inventory and forest health monitoring sampling designs; (4) annual measurement of a fixed proportion of permanent plots; (5) reporting of data or data summaries on FIA Web site within 6 months after yearly sampling; (6) a default 5-year moving average estimator, with provisions for optional estimators based on techniques for updating information; and (7) a summary report every 5 years. Additional information about annual surveys is available at http://fia.fs.fed.us/.

The SRS FIA research work unit and the Florida Forest Service began data collection for this eighth survey of Florida in 2001. The strategy involves rotating measurements of five systematic samples (or panels), each of which represents about 20 percent of all plots in the State. A panel may take more than or less than 1 year to complete. This bulletin provides inventory statistics and discusses the principal findings from the measurement of all five

panels of annual inventory data from the mapped-plot design. Forest land estimates and inventory volume, growth, removals, and mortality statistics are summarized from the data collected.

Seven previous periodic inventories completed in 1936, 1949, 1959, 1970, 1980, 1987, and 1995 provide statistics for measuring changes and trends at the State level. However, caution is advised when making comparisons at the sub-State level. The annual system represents a dramatic departure from methods used to conduct the previous periodic surveys. Moreover, the annual system continues to evolve as changing technologies are adapted and implemented to improve FIA surveys. The 2007 inventory, for instance, incorporates land area stratification estimates (see current phase 1—land area stratification in appendix A—inventory methods) based on national land cover data satellite imagery which replaces the aerial photography estimation method used in previous inventories. Improving the accuracy or efficiency of the FIA surveys is justification for altering how the inventory is conducted. However, change detection and trend analysis over time become more difficult due to differences in inventory methods.

The 2007 inventory data, as well as data for other States and survey years, are available at http://www.ncrs2.fs.fed.us/4801/fiadb/fim30/wcfim30.asp. Tabular summaries of the current resource statistics for Florida used in this report are available at http://srsfia2.fs.fed.us/states/Florida.shtml. Click on the 2007 survey year. Tabular data for previous surveys also are available at that Web site.



Various members of Florida's field crews. Left to right, Paul Jackson, Ed Karol, Jenny Dreadon, Glenn Whittington, Sarah Tarrant, Jack Greenlee, Justin Medley, and Christopher McGarvey. (photo by Florida Forest Service)

Acknowledgments

We gratefully acknowledge the Florida Forest Service for its role in collecting the field data. The following Florida Forest Service and SRS FIA field personnel contributed to the inventory effort:

Florida Forest Service

Kawike Bailey
Jenny Dreaden
Britt Evans, Coordinator
Jay Frost
Jack Greenlee
Shawn Hartzer
Paul Jackson
Ed Karol
Justin Kilcrease
Doug Longshore
Jason Love
Chris McGarvey
Justin Medley
Sarah Tarrant
Mark Torok
Glenn Whittington

SRS FIA

Jay Frost, QA/QC
Terry Riley, QA/QC

We appreciate the cooperation of other public agencies and private landowners in providing access to measurement plots. We also would like to thank Brett Butler, Research Forester with the Northern Research Station for providing the data from the National Woodland Owner Survey of Florida.



Terry Riley using aerial access to remote plot locations. (photo by Jay Frost, U.S. Forest Service)



Jay Frost using watercraft to access difficult tidal plot locations. (photo by Sarah Tarrant, Florida Forest Service)

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Area

• Total forest area has risen from 16.2 million acres in 1995 to 16.9 million acres in 2007. Forests occupy 49 percent of the land area of Florida.

• Timberland area now totals 15.9 million acres, up almost 9 percent from 1995. Hardwood timber types (including oak-gum-cypress and oak-pine types) occupy nearly 8.1 million acres (51 percent) of timberland, an increase of 14 percent during the past 12 years.

• Softwood forest types occupy 7.3 million acres, or 46 percent of the State's timberland area, nonstocked areas occupy <4 percent. Area of planted pine declined slightly from 4.6 to 4.5 million acres.

• Longleaf-slash pine is the predominant forest-type group and occupies >5.6 million acres.

Ownership

• Most (63 percent) of the State's 15.9 million acres of timberland is under nonindustrial private forest (NIPF) ownership. Forest industry owns 9 percent, down from 32 percent in 1995. Public ownership has risen from 19 percent in 1995 to 28 percent as of 2007.

• Nearly 4.9 million acres of Florida's NIPF forest land is in the hands of some 406,000 private individuals.

Azaleas in natural pine stand. (photo by Michael Jenkins, Florida Forest Service)



Volume

• As of 2007, total all-live merchantable volume on timberland in Florida amounted to 19.3 billion cubic feet; the most merchantable volume ever reported for the State.

• With nearly 11.0 billion cubic feet, softwoods comprised 57 percent of all-live volume in the State. Hardwood volume totaled almost 8.4 billion cubic feet. The yellow pines (predominately longleaf and slash) accounted for 77 percent of softwood volume. Cypress made-up 22 percent, the remainder was mostly cedars.

Net Growth and Removals

• Total net annual growth of all-live trees on timberland averaged >743 million cubic feet per year between 1995 and 2007 and removals averaged 564 million cubic feet.

• Net growth for all-live softwood trees on timberland averaged 567 million cubic feet per year, and removals averaged 444 million cubic feet per year. Planted pine stands account for 337 million cubic feet (65 percent) of total yellow pine net annual growth, and 230 million cubic feet (60 percent) of total yellow pine annual removals.

• Hardwood net growth averaged 176 million cubic feet per year, a decrease of 4.3 percent from the 184 million cubic feet average between 1987 and 1995. Hardwood removals increased nearly 10 percent from an average of 109 million cubic feet in the previous survey, to the current 119 million cubic feet per year between 1995 and 2007.

Economic Impact

• Forestry continues its importance in Florida, contributing $13.0 billion annually to the State's economy and providing jobs for >64,000 people.

• Manufacture of forest products is a major component of Florida's manufacturing industry with $3.6 billion in value added and nearly 47,000 jobs based on a 2008 economic Impact Analysis for Planning analysis.

• Production of primary timber products has more than doubled within the last 60 years, growing from 218 million cubic feet in 1948 to 491 million cubic feet in 2007.

• There were 69 sawmills, pulpwood mills, and other primary wood-processing plants operating in Florida in 2007. These mills averaged 519 million cubic feet of timber products per year (including domestic fuelwood and plant byproducts) between 1995 and 2007.

• Roundwood harvested for saw log and pulpwood production amounted to 166 and 265 million cubic feet, respectively. These two products accounted for 83 percent of the total roundwood production for the State.

Forest Health

• Total mortality of live trees on Florida's forest land averaged 227 million cubic feet per year between 1995 and 2007. Hardwood species comprised 59 percent of total mortality and softwoods 41 percent.

• Redbay trees in Florida are showing symptoms of laurel wilt disease. Monitoring plots have confirmed laurel wilt in 16 counties and spreading. Mortality has reached as high as 92 percent in monitored sites.

• In order of prevalence, melaleuca, Chinese tallowtree, mimosa, and camphortree were the most commonly detected invasive trees. Brazilian pepper, privets, and coral ardisia were the most frequently detected invasive shrubs.



Quietly gliding. (photo by Stefis Demetropoulos, Florida Forest Service)

Introduction

The extent, condition, and health of Florida's forests are subject to many natural and human induced impacts that continually shape these forests. Surveys conducted by the Forest Inventory and Analysis (FIA) program provide data useful in describing the distribution, character, and health of forest resources at the State level. For instance, forest health can be evaluated by assessing the degree and cause of tree mortality, or by rating the status of certain forest health indicators. Current forest conditions can be better understood by evaluating past changes in forest structure caused by natural forces like weather, or from human influences such as forest management activities. Natural impacts to the forests can be gauged by assessing hurricane or fire damage to the forest resource. Human impacts can be determined by analyzing changes in land use, changes in forest ownership, and tracking landowner priorities and values congruent with owning forest land. The importance of forest resources to a State's economy depends on accurate assessments of forest extent and condition.

This report provides a general assessment and descriptive analysis of Florida's forest resources based on data circa 2007. These current estimates of forest area, timberland, related classifications such as ownership and forest type, and timber volumes are presented and compared with previous values (Brown 1996, Brown and Thompson 1988). Average annual rates of growth, removals, and mortality are summarized for the period since the previous inventory in 1995.

New Techniques in the Forest Inventory

A detailed explanation of inventory methods can be found in appendix A. However, a synopsis is presented here. Although this inventory is similar in scope to previous inventories, it differs in sampling design and intensity, standards and definitions, and methods used to determine key attributes such as stocking, forest type, and stand class. A major change was the shift to annual inventories, in which a portion of the samples is measured each year. By contrast, previous inventories were periodic and all samples were measured progressively across the State. Many of the changes in methods, plot design, and sampling intensity have been designed to provide national consistency among FIA research work units. While these changes will initially complicate data comparison between surveys, over the long term such comparisons will be easier to make and resource trends more readily identifiable. In this bulletin we make general comparisons where differences between inventories can be reconciled or are considered minimal. However, we caution that an analytical inconvenience accompanying the change in inventory methods is the loss of the ability to directly compare current and previous resource estimates, or track resource trends established by the periodic inventories. Change detection is confounded by sampling "noise" introduced with any new sampling methodology. Thus, comparisons to past data made in this report are offered with the understanding that changes noted in resource estimates over time are due to both measured differences and differences introduced as a result of altering inventory methods.

Land Use Factors

Area and condition of Florida's forest land is determined in many respects by trends in ownership and by land use changes. Change in forest land ownership often brings with it a change in the reasons for owning the land. Having knowledge about forest landowner intent is essential to assessing the impact they might have on the management and availability of the State's forests. Traditional timber harvesting or other forest-product based uses may be replaced by desires to develop and manage habitat for wildlife or provide new recreational opportunity. Change in ownership also can lead to a change in land use, particularly if there are plans to develop the land. Loss of forest land to urbanization continues to be a concern. However, the rate of conversion to development seems to have slowed at the time of this report, perhaps in response to the economic downturn encountered in the first decade of the new millennium.

The 2000 Census (U.S. Department of Commerce 2000) reports the population in Florida at nearly 16.0 million individuals, or about 303 people per square mile of land. Since the 1990 census, an additional 3.0 million people now live in the State. Increased population can bring increased pressure on limited natural resources, including the State's forest land.

FIA estimates of changes in land use between surveys, based on remeasured plots, are used to help explain changes in timberland area. Land use changes that add to the timberland base are collectively referred to as additions. Changes in land use that reduce timberland area are diversions. Additions typically result from previously nonforest land that has reverted naturally or was planted to a forested condition. Diversions occur when forest land is converted to some nonforest use, most often due to urban and other development, or clearing for agricultural use.

Table 1 summarizes the broad category distribution of land by use in Florida since 1959. Some general trends are apparent. Total land area of Florida is nearly 34.4 million acres, including nearly 0.5 million acres of noncensus water. Forests occupy 49 percent of the State's land area, or about 16.9 million acres. The remaining 17.5 million acres of land reflect a variety of nonforest uses such as agriculture and urban development. Total nonforest land has declined by 0.9 million acres since 1995. Land used for cropland has declined by 16 percent since 1995. Pasture and range has declined by 20 percent since 1995. Another long-term trend in land use is the increase in urban and other developed areas which have risen by 10 percent to 9.7 million acres in 2007. Tracking these two trends is important because shifts in agriculture and urban land uses often have direct impact on the extent and condition of Florida's forest land.

Clearing land for agriculture was once the primary reason for loss of forest. Although conversions to agriculture still occur, the principal threat to loss of forest land since the late 1980s has been urbanization. Table 1 shows that land classified as urban and other declined slightly up to 1980, indicating that some acres previously converted to a nonforest land use may have been planted or have reverted naturally to a forested condition. Whereas most of the loss of forest land due to urbanization is permanent, clearing of forest land for crops or pasture, in many instances, can be reversed. In fact, idle cropland and pasture continue to be the primary source for new acres of forest land, either from planting or from natural reversion.

As shown in table 1, ninety-four percent of Florida's 16.9 million acres in forest are classified as timberland. These 15.9 million acres are defined as capable of producing at least 20 cubic feet of industrial wood per acre per year and not classified as reserved

Table 1—Land area by land use and survey year, Florida, 1959 to 2007

Land use	Survey year					
	1959	1970	1980	1987	1995	2007
	acres					
Forest land						
Timberland	19,585.8	16,231.6	15,664.2	14,982.6	14,650.1	15,912.1
Reserved timberland	93.0	94.4	411.8	403.6	522.7	643.3
Other	1,337.0	1,606.9	1,057.9	1,162.8	1,048.0	341.7
Total	21,015.8	17,932.9	17,133.9	16,549.0	16,221.1	16,897.1
Nonforest land						
Cropland	3,540.9	3,692.2	3,784.5	3,937.2	3,616.3	3,055.0
Pasture and range	2,383.1	6,499.4	6,991.5	6,324.1	5,925.7	4,741.4
Other[a]	7,877.3	7,054.9	6,622.5	7,842.6	8,794.9	9,682.8
Total	13,801.3	17,246.5	17,398.5	18,103.8	18,336.9	17,479.2
All land[b]	34,817.1	35,179.4	34,532.4	34,652.8	34,558.2	34,376.3

Numbers in rows and columns may not sum to totals due to rounding.
[a] Includes swampland, industrial, urban, other nonforest, etc.
[b] From the U.S. Bureau of the Census.

and withdrawn from timber production. In 2007, Florida had 643,000 acres classified as reserved timberland. These are largely under public ownership and primarily located in the national forest wilderness areas and on national park and preserve lands. The remaining other forest land consists largely of unproductive or adverse sites. The area of other forest land has been somewhat consistent through 1995, but the area reported for 2007 has dropped substantially. Reasons for this change are unclear and could be related to the changes in inventory techniques as well as plausible changes in fire regimes and woodlands grazing which potentially enhanced tree stocking on many acres formerly classed as unproductive or rangeland. Since the acres classified as timberland are the ones subject to viable forest management activities and thus most apt to influence forest economics of the State, the remainder of this report will concentrate on timberland.

Ownership of Timberland

Changes in ownership can affect how forest land is managed. FIA classifies land ownership broadly as either private or public. The private owner category is subdivided into individuals, forest industry, and corporate owners. Public forest land includes national forests, other Federal lands, and State, county, and municipal ownership classes. Figure 1 shows the percent distribution of Florida's timberland as of 2007. Sixty-three

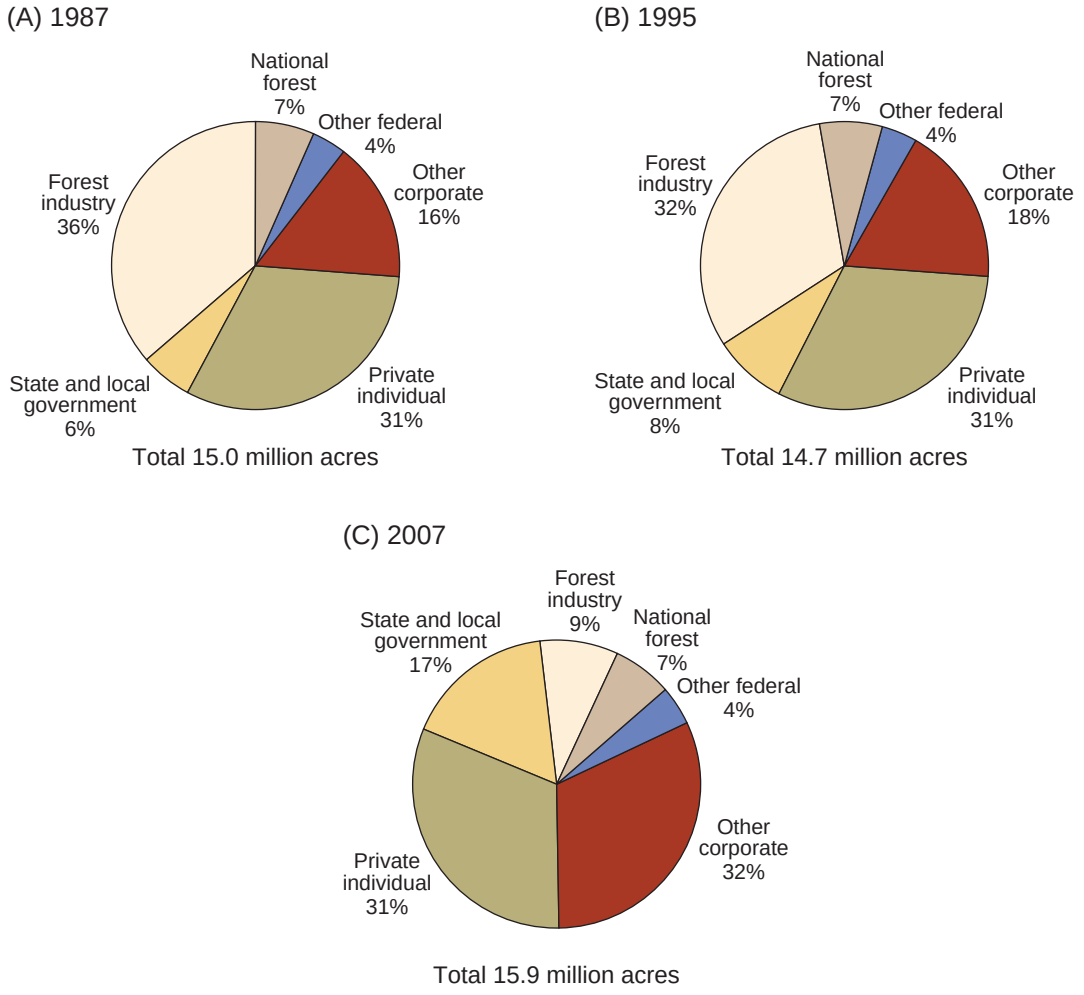


Figure 1—Trends in ownership of timberland by survey year, Florida (A) 1987, (B) 1995, and (C) 2007.

percent (10.1 million acres) of the State's 15.9 million acres of timberland is under nonindustrial private forest (NIPF) ownership. However, this category is comprised of private individuals and other nonindustrial corporate owners. Back in 1987, the NIPF group held 47 percent of the State's timberland. The increase in NIPF holdings to 63 percent for 2007 was largely due to increased corporate ownership of timberland as that for private individuals rose nominally.

Forest industry now controls just 9 percent, down from 32 percent in 1995. Corporate ownership has risen from 18 percent in 1995 to 32 percent in 2007. The magnitude of these changes shows the large degree to which changes in ownership are altering the face of forestry in Florida and across the Southern United States.

Millions of acres of Florida's timberland have changed hands over the past two decades, particularly acres once

belonging to forest industry. Forest industry began the divestiture of its timberland in the 1990s as first evidenced in the 1995 report on Florida's forests (Brown 1999). The downward trend in industry-owned forest acres has continued. In 2007, forest industry owned 1.4 million acres, which is 3.2 million fewer acres than were under industry management in 1995, and 4.0 million fewer acres than the 5.4 million reported in 1987 and for 1980. It appears forest industry holdings were at their peak of 5.7 million acres as reported in 1970. Some of these former forest industry acres are now owned by private individuals, but most appear to now be under corporate and public ownerships.

Corporate timberland amounted to >5.0 million acres in 2007, up from 2.6 million in 1995. These timberland acres are largely held in timber investment and management organizations, real estate investment trusts, limited liability corporations, and similar organizations. As forest industry-owned and managed timberland acres, there was some assurance that they would remain in the timber base and contribute to the State's wood supply. However, new landowners may have other management goals and priorities in mind.

Mixed hardwoods in floodplain.(photo by Larry Korhnak, University of Florida)



Public timberland amounted to >4.4 million acres in 2007, up from 2.8 million in 1995 and 2.4 million in 1987. However, most of this increase was driven by State ownership of timberland which has risen from 0.9 million acres in 1987 to 1.2 million acres in 1995, to 2.7 million acres in 2007.

Family Forest Landowners—Stewards of Private Timberland

The care and management of nearly 4.9 million acres of Florida's private timberland is in the hands of some 406,000 individuals (table 2). Predicting what these family forest landowners intend to do with their land is difficult without some knowledge of their interests and ownership objectives. The National Woodland Owner Survey (NWOS) (Butler 2008) gathers statistics describing the characteristics of these family forest owners and the land they own. This information provides some insight as to how they might manage and use their forest lands in the years to come.

The size of a forested tract often dictates how, or if, that particular forest parcel will be managed. The general rule-of-thumb is that it is not financially viable to manage for timber products on parcels <10 acres in size. In Florida, 18 percent (906,000 acres) of the family forest timberland is in tracts ranging from 1 to 9 acres (table 2). However, 79 percent (319,000) of the total family forest owners are found in this category. Another 17 percent (67,000) of the family forest owners are in the category with tracts ranging from 10 to 49 acres in size. This category accounts for 23 percent (1.1 million acres) of the total family forest timberland. The remaining 4 percent (23,000) of family forest owners control 59 percent (2.9 million acres) of the family forest timberland.

Family forest timberlands are held for a variety of reasons and are subject to owner related decisions to realize these goals and objectives. Maximizing the financial potential and managing for the production of wood products is often not the primary reason for ownership. The NWOS queried a

Table 2—Area and number of family forests by size of forest landholdings, Florida, 2006

Size of forest landholdings[a]	Area		Ownership	
	Acres	SE	Number	SE
	thousand	*percent*	*thousand*	*percent*
1–9	906.0	28.6	319	27.0
10–19	551.0	42.8	47	28.2
20–49	562.0	38.3	20	28.3
50–99	329.0	66.6	5	38.2
100–199	708.0	35.3	6	24.9
200–499	935.0	28.2	8	57.6
500–999	529.0	40.2	1	29.1
1,000–4,999	193.0	91.7	< 1	50.0
5,000–9,999	92.0	169.9	< 1	71.4
10,000+	94.0	177.8	< 1	76.2
Total	4,899.0	3.7	406	20.9

SE = sampling error.
[a] From National Woodland Owner Survey.

sample of family forest owners with a list of reasons and their responses were assessed (table 3) based on cumulative size of land-holdings (acres) involved per reason and by number of owners per reason.

Based on the acres involved, the number one reason for owning timberland was "to enjoy beauty or scenery" which involved >2.7 million acres, or 56 percent, of the family forest timberland. This reason involved the second highest number of family forest owners at 303,000.

The second reason for owning family forest timberland was "to protect nature and biologic diversity" which involved 2.6 million acres and the third highest number of family forest owners at 275,000. Although practically tied for second, the third reason for owning timberland was "for land investment" which also involved 2.6 million acres, but just the fifth highest number of family forest owners at 189,000.

Again based on acreage involved, the fourth reason for owning timberland was "privacy" which involved almost 2.6 (2.56) million acres, but was important to the highest number of family forest owners at 313,000. The fifth reason for owning timberland was "to pass land on to children or other heirs" which involved 2.5 million acres and the sixth highest number of family forest owners at 164,000.

The "production of saw logs, pulpwood, or other timber products" as a reason for owning timberland was seventh with <1.8 million acres and ninth in number of the family forest owners at 59,000. The reason of "hunting and fishing" was 8th with 1.7 million acres and 10th in number of family forest owners at 39,000. The "production

Table 3—Area and number of family forests by reason for owning forest land, Florida, 2006

Reason[a,b]	Area		Owners	
	Acres	SE	Number	SE
	thousand	*percent*	*thousand*	*percent*
To enjoy beauty or scenery	2,731.0	10.9	303.0	27.1
To protect nature and biologic diversity	2,599.0	11.4	275.0	29.4
For land investment	2,599.0	11.7	189.0	33.8
Part of home or vacation home	2,084.0	14.4	212.0	30.2
Part of farm or ranch	1,798.0	16.4	136.0	42.5
Privacy	2,560.0	11.8	313.0	26.4
To pass land on to children or other heirs	2,501.0	12.1	164.0	44.5
To cultivate/collect nontimber forest products	186.0	109.9	3.0	61.2
For production of firewood or biofuel	426.0	53.5	34.0	52.7
For production of saw logs, pulpwood, or other timber products	1,753.0	16.5	59.0	45.1
Hunting or fishing	1,700.0	17.4	39.0	45.3
For recreation other than hunting or fishing	1,232.0	22.6	151.0	40.6
No answer	48.0	229.3	10.0	100.4

SE = sampling error.
Numbers include landowners who ranked each objective as very important (1) or important (2) on a seven-point Likert scale.
[a] Categories are not exclusive.
[b] From National Woodland Owner Survey.

of firewood or biofuel" reason for owning timberland involved just 0.4 million acres and 34,000 family forest owners.

The hierarchy of these reasons for owning timberland where aesthetics, protection, and inheritance related issues apparently outweigh financial and production oriented reasons signify the close ties to the land by family forest owners. Reasons like privacy and biodiversity, although not income producing are apparently highly valued personal benefits from timberland ownership.

Recent forestry activity on some of these family forest timberlands provides evidence of forest management and financial gain from wood production. In the past 5 years, about 1.2 million acres have undergone a timber harvest, >1.0 million have been site prepared for planting, and >1.1 million acres have had trees planted (table 4). In addition, family forest owners practiced fire hazard reduction on 1.4 million acres of their timberlands. They implemented wildlife habitat improvement on nearly 1.1 million acres of timberland as well. The fact that a segment of the family forest owners benefit financially from traditional forestry related activities on their timberland combined with the many other reasons for owning timberland provides an optimistic view for sustaining the wood supply from these private lands.

To provide additional insight and further assess the future of these family forest timberlands, the NWOS queried landowners about their potential forest related plans for the next 5 years. The "leave it as is" and

Table 4—Area and number of family forests by recent (past 5 years) forestry activity, Florida, 2006

Activity[a,b]	Area		Owners	
	Acres	SE	Number	SE
	thousand	*percent*	*thousand*	*percent*
Timber harvest	1,194.0	25.6	13.0	59.5
Collection of NTFPs	609.0	43.5	36.0	60.7
Site preparation	1,038.0	25.8	32.0	55.4
Tree planting	1,130.0	24.2	46.0	44.9
Fire hazard reduction	1,417.0	20.2	28.0	61.1
Application of chemicals	830.0	30.5	14.0	43.9
Road/trail maintenance	1,329.0	21.3	32.0	56.3
Wildlife habitat improvement	1,077.0	25.2	44.0	51.0
Posting land	1,702.0	17.3	72.0	69.7
Private recreation	1,843.0	16.2	40.0	31.7
Public recreation	138.0	124.9	<1.0	89.2
None of the above	1,051.0	26.0	205.0	33.0

SE = sampling error.
NTFPs = nontimber forest products.
[a] Categories are not exclusive.
[b] From National Woodland Owner Survey.

"no current plans" responses combined, accounted for almost 2.2 million acres and 250,000 owners. This fact could bode well for this resource as it indicates the majority of family forest owners and 44 percent of their acreage will remain in timberland for the time being (table 5). Another 77,000 owners with 1.5 million acres, plan "minimal activity to maintain their forest land," and 53,000 owners with 570,000 acres plan to "buy more forest land." Plans for 30,000 owners include converting some of the nonforest land in their possession to forest. Regarding input to the timber supply, about 7,000 family forest owners plan to harvest saw logs or pulpwood from their 761,000 acres of timberland.

However, the plans of some family forest owners may not result in positive outcomes for the State's private timberland. About 66,000 landowners stated they planned to "sell some or all" of their 675,000 acres of timberland. An additional 13,000 owners representing 241,000 acres revealed plans to "subdivide some or all of their timberland." Changes in ownership create concerns about whether or not these lands will remain in timberland. Another 28,000 owners with 388,000 acres indicated plans to "convert some or all of their timberland to another use." Note however, that since these categories are not exclusive, the same lands may be involved in some responses and the economy may dictate realization of some plans.

Table 5—Area and number of family forests by landowners' future (next 5 years) plans for their forest land, Florida, 2006

Future plans[a,b]	Area		Owners	
	Acres	SE	Number	SE
	thousand	*percent*	*thousand*	*percent*
Leave it as is - no activity	1,085.0	27.8	149.0	45.0
Minimal activity to maintain forest land	1,512.0	21.6	77.0	48.4
Harvest firewood	281.0	67.4	9.0	56.3
Harvest saw logs or pulpwood	761.0	30.2	7.0	59.3
Collect nontimber forest products	265.0	75.7	2.0	61.0
Sell some or all of their forest land	675.0	36.6	66.0	38.4
Give some or all of their forest land to heirs	529.0	40.2	15.0	48.4
Subdivide some or all of their forest land and sell subdivisions	241.0	87.4	13.0	67.6
Buy more forest land	570.0	42.1	53.0	48.7
Convert some or all of their forest land to another use	388.0	57.9	28.0	52.9
Convert another land use to forest land	191.0	107.4	30.0	78.5
No current plans	1,081.0	27.8	101.0	59.6
Unknown	427.0	58.3	38.0	75.4
Other	237.0	78.0	1.0	56.1
No answer	N/A	N/A	N/A	N/A

SE = sampling error; N/A = not applicable.
[a] Categories are not exclusive.
[b] From National Woodland Owner Survey.

Area of Timberland

Area Trends

The 15.9 million acres of timberland in Florida in 2007 represents a reversal of a several decades long decline in area of timberland in the State (fig. 2). The nearly 1.3 million acre increase in timberland since 1995 has several possible explanations, but caution should be used in the comparison because of the aforementioned magnitude of changes in the FIA survey methods and users are advised to read the inventory methods in appendix A of this report. With that acknowledgment, evidence of real change in Florida's land area does exist.

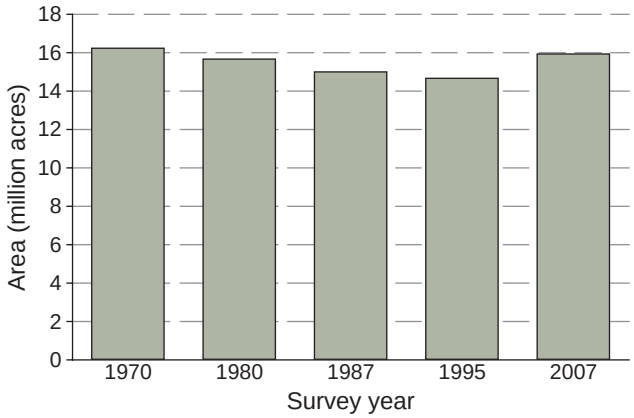


Figure 2—Area of timberland by survey year, Florida.

Seminole State Forest. (photo by Barbara Bowen, Florida State Forest Photo Contest)



For instance, area in citrus groves has declined for many reasons including conversion to other land uses and even abandonment of grove tending leading to forest reversion. Fire regimes have changed due to improved suppression efforts and controlled burns along with a reduction in woodland grazing in which fire plays an important role. These changes improve natural regeneration survival on former poorly stocked areas, natural range, and marginally productive sites. Thus, under these circumstances, areas classified as other forest land or unproductive could increase tree stocking and enter the timberland base.

Distribution

FIA surveys divide Florida into four units or regions (fig. 3). The panhandle is the Northwest unit, the big bend area to the Atlantic coast by Jacksonville is the Northeast unit, the middle of the peninsula is the Central unit, and the lower tip of the peninsula is the South unit. Timberland as a percentage of county land area (fig. 3) shows the most heavily forested part of the State to be the Northeast unit closely followed by the Northwest unit. In fact, one county (Liberty) in the Northwest unit is almost 100 percent forested. The South unit is the least forested part of the State.

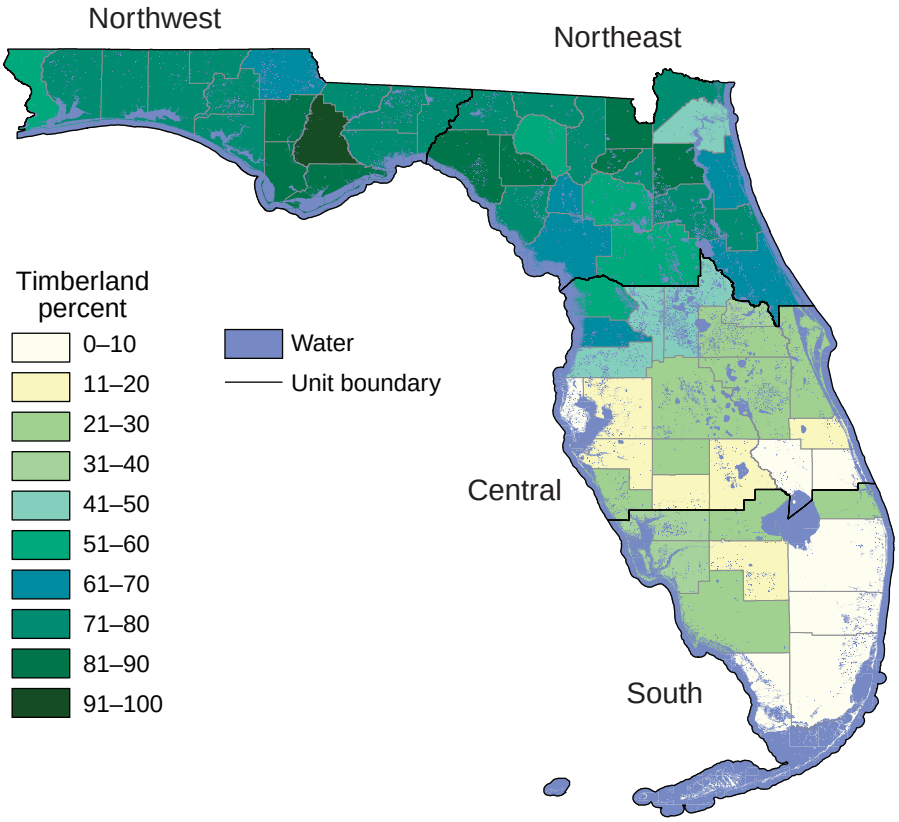


Figure 3—Timberland as a percentage of all land by county, Florida, 2007.

The increase in timberland was not uniform across the four survey units of the State (fig. 4). The Northwest unit remained practically the same as in 1995 following a slight gain since 1987. The Northeast unit gained only slightly from that in 1995 following a slight downturn from 1987. The biggest changes were in the Central and South units where 98 percent of the nearly 1.3 million acre increase in Florida's timberland occurred. More than one-half (57 percent) of the increase in these two southernmost units took place in the South unit alone. These southern units are where most of the aforementioned area trend changes involving loss of citrus acreage and altered fire and woodland grazing regimes took place.

Ownership

The increase in Florida's timberland was also distributed differently by broad ownership category. At the State level, all the increase in area of Florida's timberland was recorded in the public lands category (fig. 5). Area of publicly owned timberland increased by 57 percent overall to nearly 4.5 million acres. Nearly all the increase was provided by State acquisition of timberland. Also at the State level, private ownerships (NIPF and forest industry combined) lost area of timberland. Private ownership of timberland was down by 3 percent from 1995 levels to <11.5 million acres in 2007. Practically all the loss of privately owned timberland was driven by decreases in the forest industry owned segment of the category, most of which transferred to public and other corporate ownerships. Although public ownership increased in each of the four survey units of Florida, the loss for private owners did not occur in all four of the survey units. Area of timberland privately owned was down only in the Northeast and Northwest units, as increases in area of private timberland were recorded in the Central and South units of the State, where they were probably buoyed by the aforementioned increases in timberland from former citrus areas and altered fire and grazing regimes.

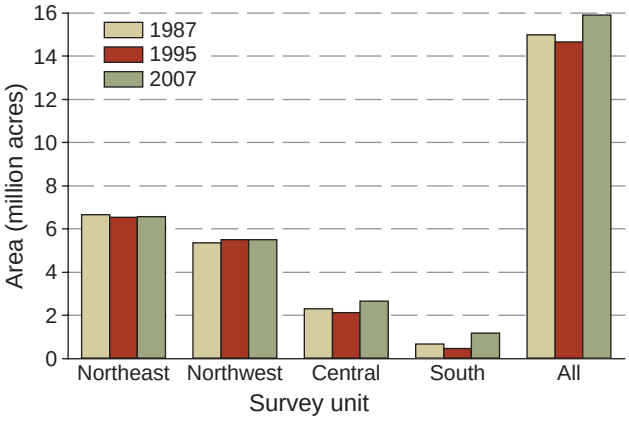


Figure 4—Area of timberland by survey unit and survey year, Florida.

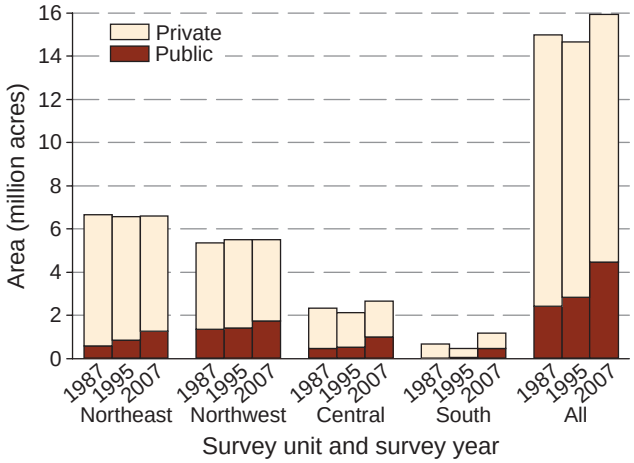


Figure 5—Area of timberland by survey unit, survey year, and ownership, Florida.

Forest Types

Florida has one of the highest tree species counts in the Nation. The temperate and subtropical climates found from one end of the State to the other permit the high diversity. The frequency of occurrence is much lower however because so many of the species (particularly the tropicals) are rare. For this reason, the accompanying species list is limited to some 75 tree species (appendix C). Furthermore, forest types are comprised from species associations that are most common. The individual forest types are named for the species forming a plurality of the stocking. Collapsing these individual forest types into forest-type groups enhances the reportability of the survey data especially when graphical representations are used as in this report. The forest-type groups of yellow pine, oak-pine, and hardwoods are typically used around the Southern United States. However, Florida has one of the highest cypress components of the Southern States and since the species has drawn considerable attention from its controversial use as mulch and its wetland species status, a cypress-type group has been included in this report.

The most common forest-type group occurring in the State are the yellow pine forest types (fig. 6). The yellow pine forest-type group (including other eastern softwoods, e.g., cedar) accounted for nearly 7.3 million acres, or 46 percent, of Florida's timberland. Collectively, the hardwood forest types as a group accounted for 5.5 million acres, or 35 percent of Florida's timberland. Oak-pine types were next with 1.5 million acres, or 9 percent of the State's timberland. The area of timberland classified as a cypress forest type accounted for almost 1.1 million acres, or >6 percent of the State total. Areas having insufficient stocking of trees to determine a forest type were classified as nonstocked. Nonstocked timberland accounted for 582,000 acres, or nearly 4 percent of Florida's timberland.

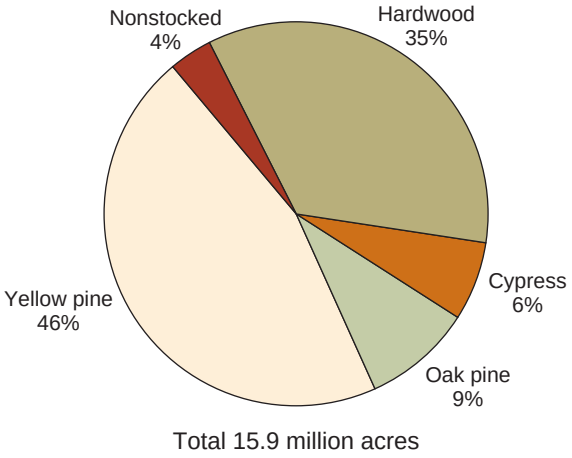


Figure 6—Area of timberland by forest-type group, Florida, 2007.

Since almost one-half of Florida's timberland is made-up of yellow pine types, some detail on those individual pine types and the associated trends in area for them is provided in figure 7. Slash pine forest type is clearly the dominant yellow pine type in the State, as well as the dominant individual forest type overall once the collective hardwood type group is split into its individual types. Slash pine forest type alone accounted for 4.8 million acres, or 30 percent of the State's timberland. Slash pine continued its dominance despite a 6 percent reduction in area since 1995 when it comprised 35 percent of the State's timberland. Although not depicted graphically, area of slash pine type has actually declined each survey since 1970 when it covered 5.4 million acres.

Loblolly pine forest type was the second most common yellow pine forest type in 2007 and has been since 1995 when it first surpassed the area of longleaf pine type which had been the second most prevalent back in 1987. Loblolly pine type accounted for almost 885,000 acres in 2007, a 10-percent increase from its area of timberland in 1995. This follows a 40-percent increase for loblolly pine that was recorded in 1995 since 1987. Although the increases

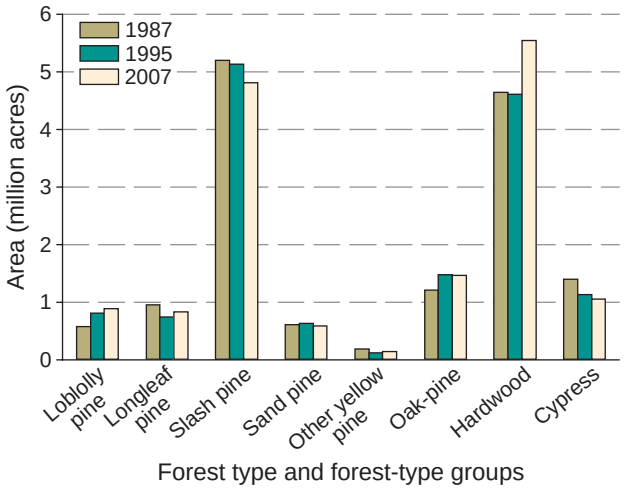


Figure 7—Area of timberland by yellow pine forest types and other forest-type groups, and survey year, Florida.

in loblolly pine have slowed, they show the preferred choice for it for artificial regeneration purposes during the late 1980s. This has been true southwide as well. The increase in area of loblolly pine type largely took place on some of the area lost from the slash pine type.

Area of longleaf pine forest type is the third most abundant yellow pine forest type in 2007 as it was in 1995. It was second in abundance of the yellow pines back in 1987. Area of longleaf pine has suffered a decline in area each survey since 1959 where it amassed 4.2 million acres of timberland and approached being as widespread as the area of slash pine forest type. Fortunate to the preservation of natural ecosystems, regeneration efforts have focused on reestablishment of longleaf pine on its former sites. Area of longleaf pine forest type has increased for the first time in decades (by 12 percent since 1995) and accounted for 829,000 acres in 2007. Longleaf pine forest type now accounts for 11 percent of the yellow pine forest-type group, or nearly 6 percent of the State's total timberland. Like with loblolly pine, the increase in area of longleaf pine type may have occurred on area lost from the slash pine type.

Area of sand pine forest type decreased since 1995 after increasing each survey since 1959. Area of sand pine forest type accounted for 593,000 acres in 2007, a decrease of 6 percent. Sand pine forest type now accounts for 8 percent of the yellow pine forest-type group timberland, or almost 4 percent of total timberland in Florida. The area of sand pine forest type appears to be the most stable of the yellow pine forest types, probably because of its adaptation to deep sands of xeric sites which are not as suitable for the loblolly and slash pines. Only the longleaf pine is adapted enough to compete with it for these sandy sites.

The aforementioned oak-pine forest types have been fairly stable since 1995 at 1.5 million acres. However, they had ranged from 912,000 acres in 1959 to nearly 1.7 million acres in 1970 and then down to 1.2 million in 1987 before increasing to 1.5 million in 1995. So why this roller-coaster of change? Well, each oak-pine forest type is based on a plurality of species stocking. There is a high pine component in each of these types. If, for reasons of removals, mortality, or growth, the species stocking mix changes, then the forest-type call changes. Many young pine stands compete with hardwood sprouts for stand dominance, and until they outgrow and suppress the hardwood competition, may actually be called an oak-pine or even hardwood stand. If the pines are harvested or killed by insects, then it can become a hardwood forest type based on residual stocking. So, this type group historically changes more frequently or is subject to change more easily.

Area of timberland in hardwood forest types increased 20 percent to 5.5 million acres. The large increase in area of hardwood forest types is related to the overall increase in area of timberland for the State. At the time of this report during a period with the absence of large increases in artificial regeneration combined with changes in fire regimes, timberland gains are more easily explained by increases in hardwood forest types which are depicted in figure 7.



Lake George State Forest. (photo by Jimmy Roberts, Florida Forest Service)

Area of timberland in a cypress forest type continues to decrease, but at a slower rate. Cypress timberland decreased 6 percent to <1.1 million acres in 2007 from >1.1 million acres in 1995. This is a lesser decrease than the 19 percent reduction recorded between 1995 and 1987. The popularity of cypress for mulch boomed in the 1990s and has since slowed due to environmental concerns and resultant alternative mixtures or products. However, as a cautionary note, the smaller sample sizes for cypress, longleaf pine, and sand pine, etc. from which estimates are made involve greater sampling error for the statistics produced than those for a larger sample size such as that for slash pine. Therefore data estimates are more reliable for the more prevalent species and forest types.

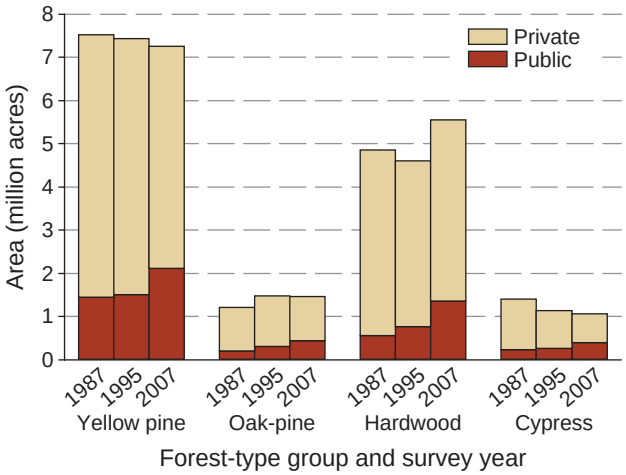


Figure 8—Area of timberland by forest-type group, survey year, and ownership, Florida.

Viewing the major forest-type groups by ownership over time shows public lands to have increased in each of the major forest-type group categories (fig. 8). The large increase in public ownership of yellow pine represents much of the forest industry land divestures. The area of timberland under private ownership has decreased for the yellow pine, oak-pine, and cypress forest types. Area of timberland under private ownership only increased for hardwood forest types.

Viewing the major forest-type groups by survey unit shows the largest portion of the State's 7.2 million acres in yellow pine forest-type timberland to be located in the Northeast unit, closely followed by the amount in the Northwest unit (fig. 9). In fact, 45 percent of the yellow pine forest-type acreage resides in the Northeast unit of the State and 41 percent in the Northwest unit. Yellow pine forest types are the predominant forest types in these two units, accounting for 50 percent in the Northeast unit and 54 percent in the Northwest unit. The Northeast unit also harbors the largest amount of the hardwood resource with 28 percent of the State's 5.5 million acres of hardwood

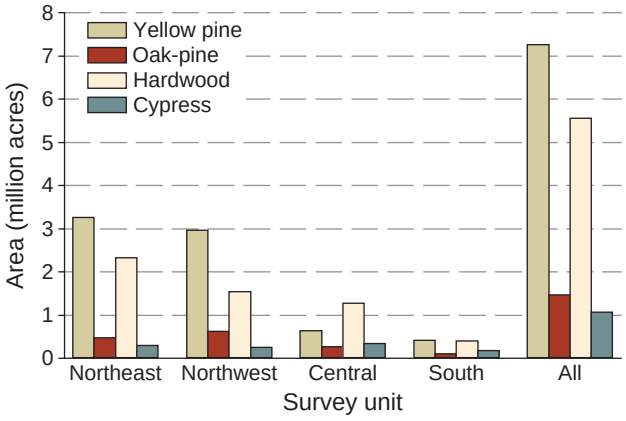


Figure 9—Area of timberland by survey unit and forest-type group, Florida, 2007.



Longleaf pine regeneration. (photo by Jimmy Roberts, Florida Forest Service)

forest types. Interestingly, timberland in the Central unit of Florida is dominated by hardwood forest types, and is the only part of the State where this occurs. In the Central unit of Florida, hardwood forest types comprise 48 percent of the unit's timberland while accounting for 23 percent of the State total. The South unit of the State is the only unit where area of hardwood forest type equals area of yellow pine forest type. The South unit has the lowest portion of the total cypress timberland in the State, yet it is also the unit where cypress timberland occupies the highest proportion of the timberland within the unit. In other words, the South unit has just 17 percent of the State's 1.06 million acres of cypress but 15 percent of the unit is in cypress timberland. The Central unit has the highest portion of the State's total cypress with 32 percent, while cypress accounts for 13 percent of the unit's timberland. The Northeast and Northwest units have 28 and 23 percent of the State's total cypress respectively, but cypress timberland only constitutes 4 percent of the timberland in each of these two units. The State's oak-pine forest-type timberland is greatest in the Northwest unit, where 43 percent of the total oak-pine timberland exists. Within the Northwest unit, oak-pine types makeup 11 percent of the timberland.

Stand Origin

Identifying stand origin, by determining whether a stand was established naturally or through planting, helps to describe the State's timberland. Since 1970, pine forest types have accounted for almost one-half of the total timberland area in Florida. Before the 1950s, natural stands prevailed. Then, land bank program incentives provided the impetus for the planting of trees in earnest. By 1970, FIA reported 2.8 million acres of timberland with evidence of artificial regeneration (table 6). In 1970, area of timberland planted accounted for 17 percent of Florida's timberland. Each survey since, the area of timberland with evidence of artificial regeneration has increased. Area with evidence of planting accounted for 5.2 million acres or 33 percent of the State's timberland in 2007.

Table 6—Area of timberland by stand origin and survey year, Florida

Survey year	Stand origin		Total area
	Natural	Artificial	
	million acres		
1970	13.43	2.80	16.23
1980	12.19	3.47	15.66
1987	10.76	4.22	14.98
1995	9.71	4.94	14.65
2007	10.68	5.23	15.91

Most of the area with evidence of artificial regeneration was classified as one of the yellow pine forest-type groups, such as longleaf-slash pine or loblolly-shortleaf pine. However, within the area artificially regenerated, there were stands classified as oak-pine or other hardwood based on stocking levels. As discussed earlier, forest types are based on a plurality of species stocking. So, in the case of poor pine seedling survival or natural succession, the type could be oak-pine or other hardwood. In 2007, almost 87 percent, or >4.5 million acres, of the 5.2 million with planting evidence were classified as yellow pine types.

Through 1980, area of natural pine outnumbered the area of planted pine in Florida. However, by the 1987 survey, area of planted pine exceeded area of natural pine and has continued to do so. Over the years, government tree planting incentives and increased harvesting followed by artificial regeneration resulted in the shift from natural pine stands to increasingly more planted pine acres. In 2007, the 4.5 million acres of planted pine exceeded natural pine stands by about 1.8 million acres. In fact, area of natural pine stands declined from 5.0 million acres in 1970 to a low of 2.5 million acres in 1995. However, the decline in area of natural stands has halted since 1995 and increased to 2.7 million acres in 2007. All of the increase in natural pine occurred within the area of longleaf-slash pine type as the area of natural loblolly-shortleaf pine type continued to decrease. The area of planted pine types which escalated in 1995 has decreased since from 4.6 million acres in 1995 to 4.5 million acres in 2007.

The reduction in planted stands can be partly traced to the divestiture of forest land by forest industry. Planting, harvesting, and replanting was a cycle regularly repeated on forest industry timberland. Many of the formerly forest industry-owned acres are now held by new owners with a variety of desires to manage or capabilities to invest in their forest land. The majority of the planting occurred on privately owned timberlands in response to timber markets and to Federal cost-share incentives such as the Conservation Reserve Program. With the absence of these, tree planting in Florida has trended downward and the decline has been steep. A reduction in acres harvested has also had an influence on this decade's downward trend in tree planting because many acres were replanted following harvest. The economic downturn at the time of this report has lowered wood prices enough to discourage many normal forestry practices such as tree planting.

As explained earlier, not all planted acres are classified as a yellow pine type based on stocking levels at the time of measurement.

Figure 10 shows the distribution of the area of timberland planted by the major forest-type groups. The graph portrays the discussed area of planted yellow pine stands increasing to 1995 and then beginning to decrease. Also evident is most planting ends up a yellow pine type. The area shown as planted in the oak-pine and hardwood types most likely originated as planted pine. This is especially true for the oak-pine type. However, it is possible that some of the planted hardwood type was actually a specific hardwood such as walnut, cottonwood, or eucalyptus. Only a trace of the cypress type was planted, and it was not in evidence until the 2007 survey.

The total area of timberland planted (all types) was not evenly distributed across the four survey units of Florida. Almost 5.0 million acres or 95 percent of the State's planted stands occurred in the two northern units (fig. 11). The Northeast unit had the largest area of timberland with evidence of planting at 2.7 million acres or 52 percent of the State total.

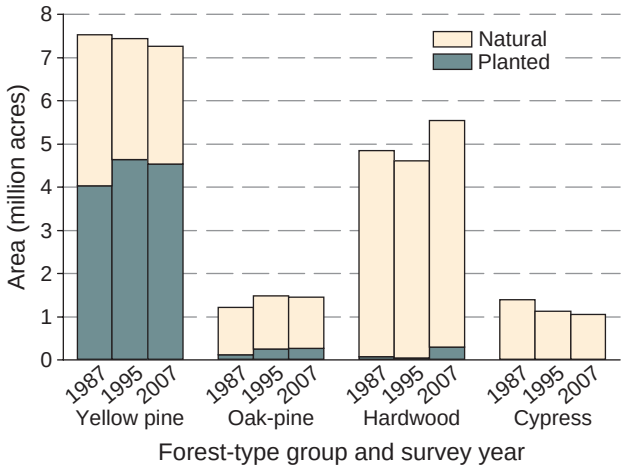


Figure 10—Area of timberland by forest-type group, survey year, and stand origin, Florida.

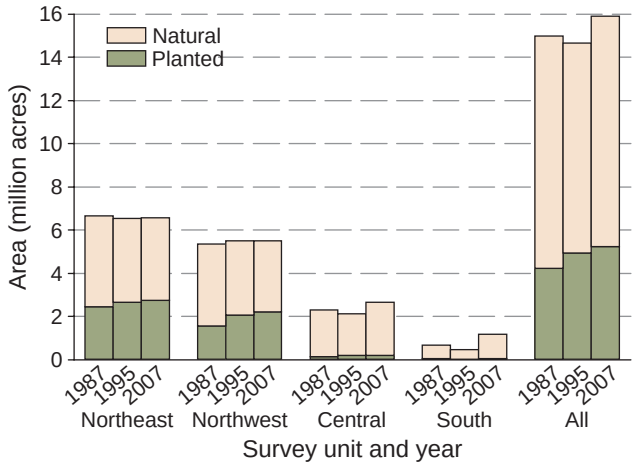


Figure 11—Area of timberland by survey unit, survey year, and stand origin, Florida.

The area of timberland planted (all types) was primarily on private ownerships (fig. 12). Also evident is that the percentage of private ownerships with planted timberland is double that on public ownerships. In other words, in 2007, planted timberland comprised 38 percent of private ownerships and 19 percent of public ownerships.

Planting on public ownerships continues to increase slightly whereas, planting on private ownerships has slowed. Statewide, planted timberland on private ownerships is highest in the Northeast unit (fig. 13). Planted timberland on public ownerships however, is highest in the Northwest unit of the State.

Tidal mangroves, Florida Keys. (photo by Amy Jenkins, University of Florida)



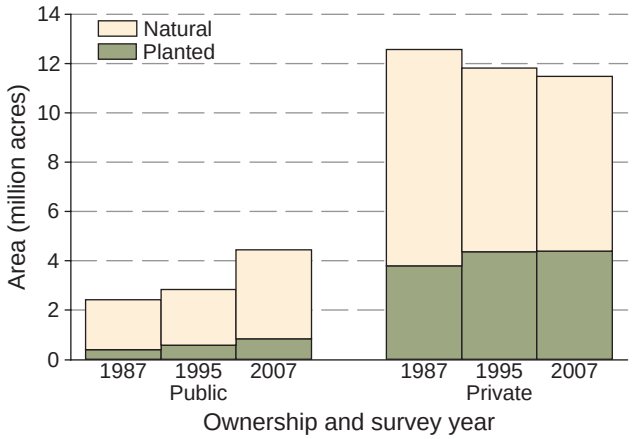


Figure 12—Area of timberland by ownership, survey year, and stand origin, Florida.

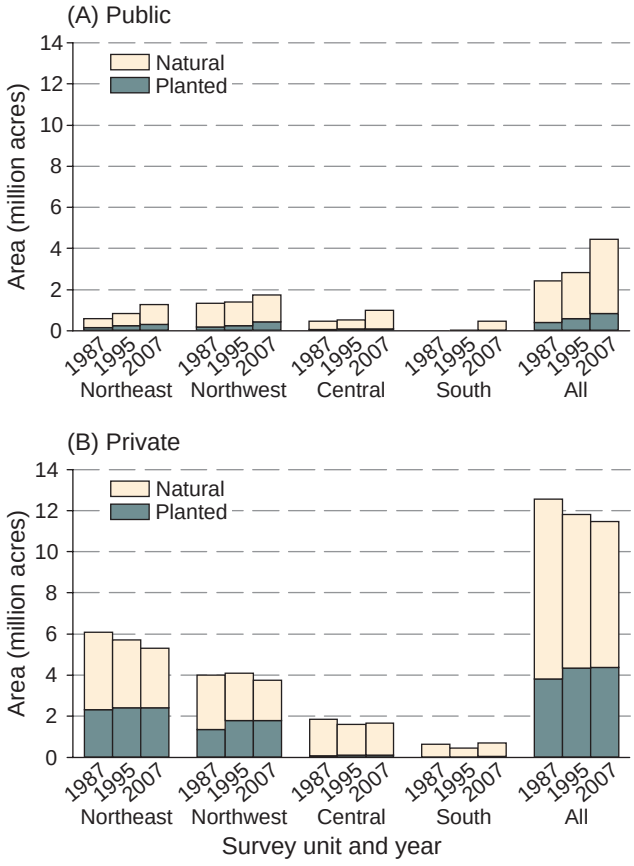


Figure 13—Area of timberland by ownership, survey unit, survey year, and stand origin, Florida (A) Public and (B) Private.

Figure 14 shows the distribution of planted timberland as a percentage of all land by county. Figure 15 shows the distribution of natural timberland as a percentage of all land by county. Notable differences exist between the two figures as shown by nearly all the counties with ≥20 percent of their timberland exhibiting evidence of planting lying north of the city of Ocala (fig. 14). Also obvious are all but one county south of Ocala have <10 percent of their timberland planted. Only Glades

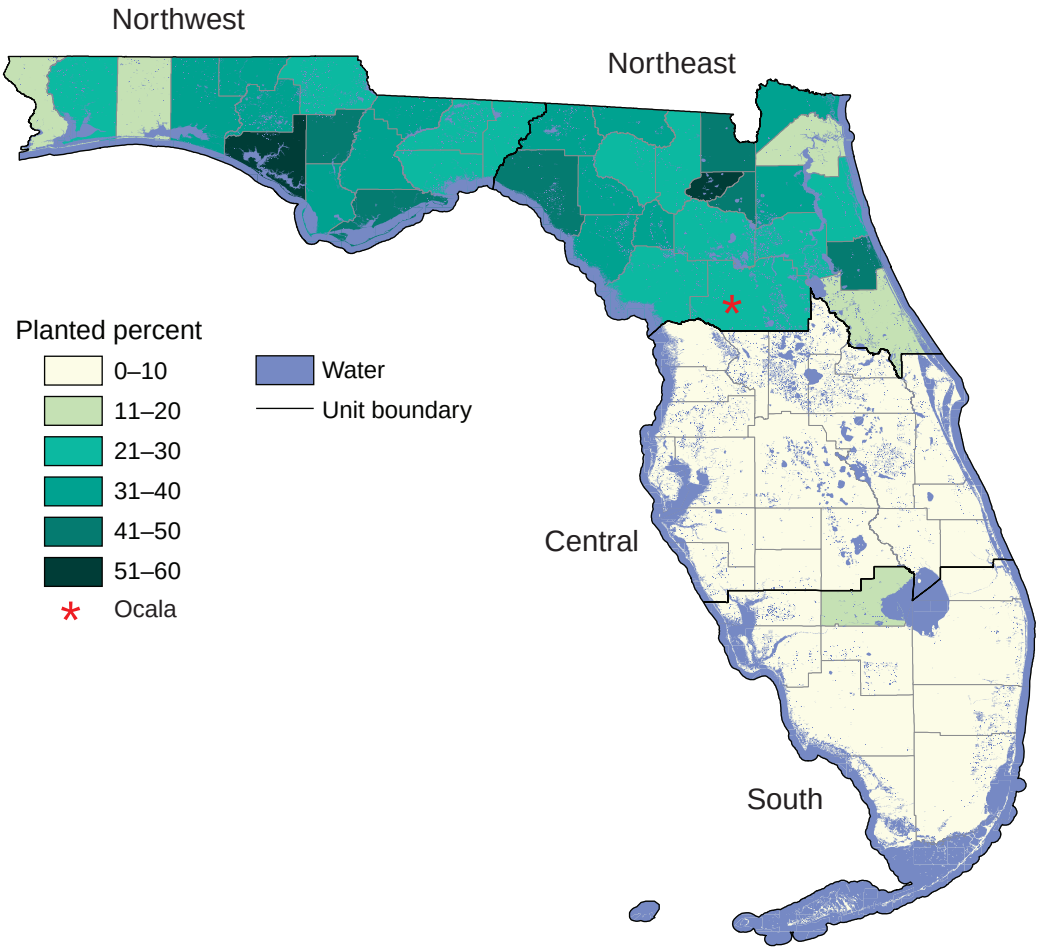


Figure 14—Timberland with evidence of planting as a percentage of all land by county, Florida, 2007.

County contains up to 20 percent of its timberland planted. The lack of large scale timber producing mills in the lower parts of the State are more of a contributing factor to having fewer areas planted there than is the productivity of the area. Other reasons include the higher degree of agricultural crops and grazing occurring in these parts of the State. Clearly, most of the timberlands south of Ocala are largely of natural origin (fig. 15).

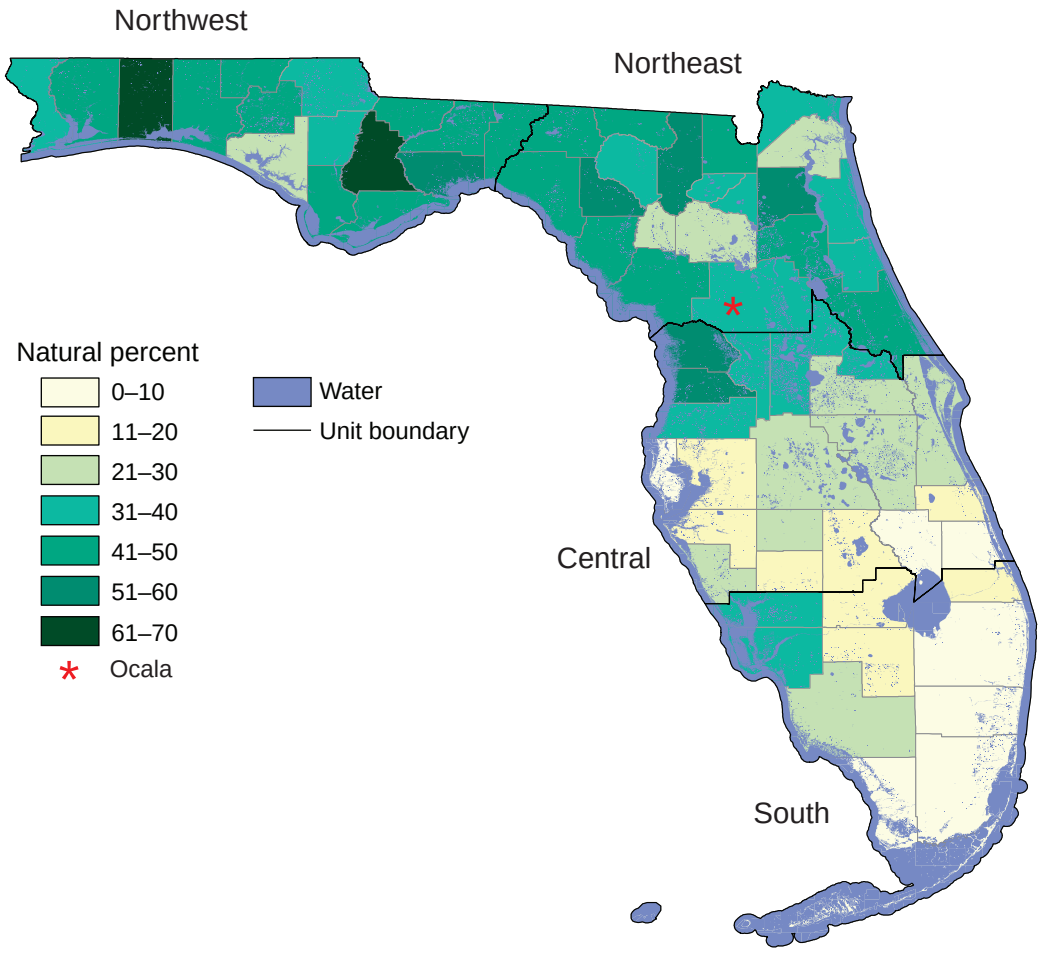


Figure 15—Natural timberland as a percentage of all land by county, Florida, 2007.



Live oak silhouette. (photo by Larry Korhnak, University of Florida)

Tree Volume

Volume as a descriptor of the timber resource is in many ways a better approach to analyzing the potential of a State's forests. Unlike area by forest type, volume can be analyzed related to tree species population estimates regardless of occurrence. For example, all yellow poplar volume can be summed for an individual survey unit regardless of its distribution on the ground, or trends in volume of yellow poplar can be tracked. Furthermore, volume can be summed for a species or species group by diameter class or for a particular ownership group alone. In essence, wood volume is the medium of exchange that propels the State's forest industry economy. Suffice it to say, volume is ultimately the basis for determining net change using components of growth to be discussed in the next section of this report.

Species Groups

Overall, all-live tree merchantable volume on timberland in Florida increased to 19.3 billion cubic feet in 2007 from 17.0 billion cubic feet in 1995. Merchantable volume is based on trees ≥5.0 inches in diameter at breast height (d.b.h.). The 19.3 billion cubic feet measured for 2007 is the highest volume recorded from eight inventories of the State. Altogether, the yellow pine species (including other eastern softwood e.g., cedars) accounted for 45 percent, or 8.6 billion cubic feet, of the total (fig. 16). In combination, all the hardwood species made-up 43 percent, or nearly 8.4 billion cubic feet. Volume of cypress comprised the remaining 12 percent, or nearly 2.4 billion cubic feet of the total all-live tree merchantable volume in the State.

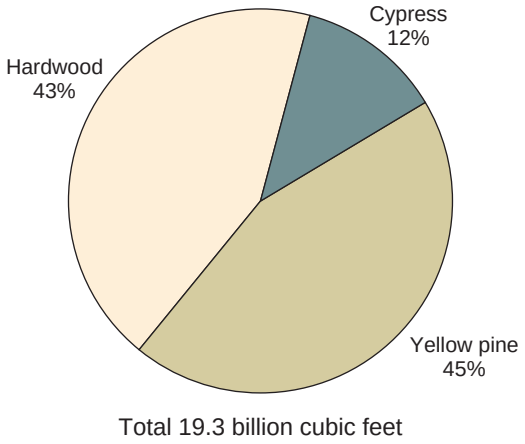


Figure 16—All-live volume by species group, Florida, 2007.

Diameter Class

The distribution of the State's all-live merchantable volume differs by diameter class between the species groups. Volume of yellow pine species is skewed toward the smaller diameter classes, with 57 percent of the all-live yellow pine volume found in trees ≤10 inches d.b.h. (based on 2-inch diameter classes) (fig. 17). In fact, the yellow pine volume peaks in the 8-inch d.b.h. class, so much so that 22 percent of the species volume resides in this one diameter class alone. This profile exists because of the high degree of yellow pine planted (discussed ahead) and the harvest rates of yellow pine as they increase in size.

In contrast, volume of hardwood species is distributed more widely across the range of diameter classes. Although hardwood volume peaks in the 12-inch d.b.h. class, it is less discernable and most of the volume (52 percent) is spread across the 8- to 14-inch d.b.h. classes. The volume

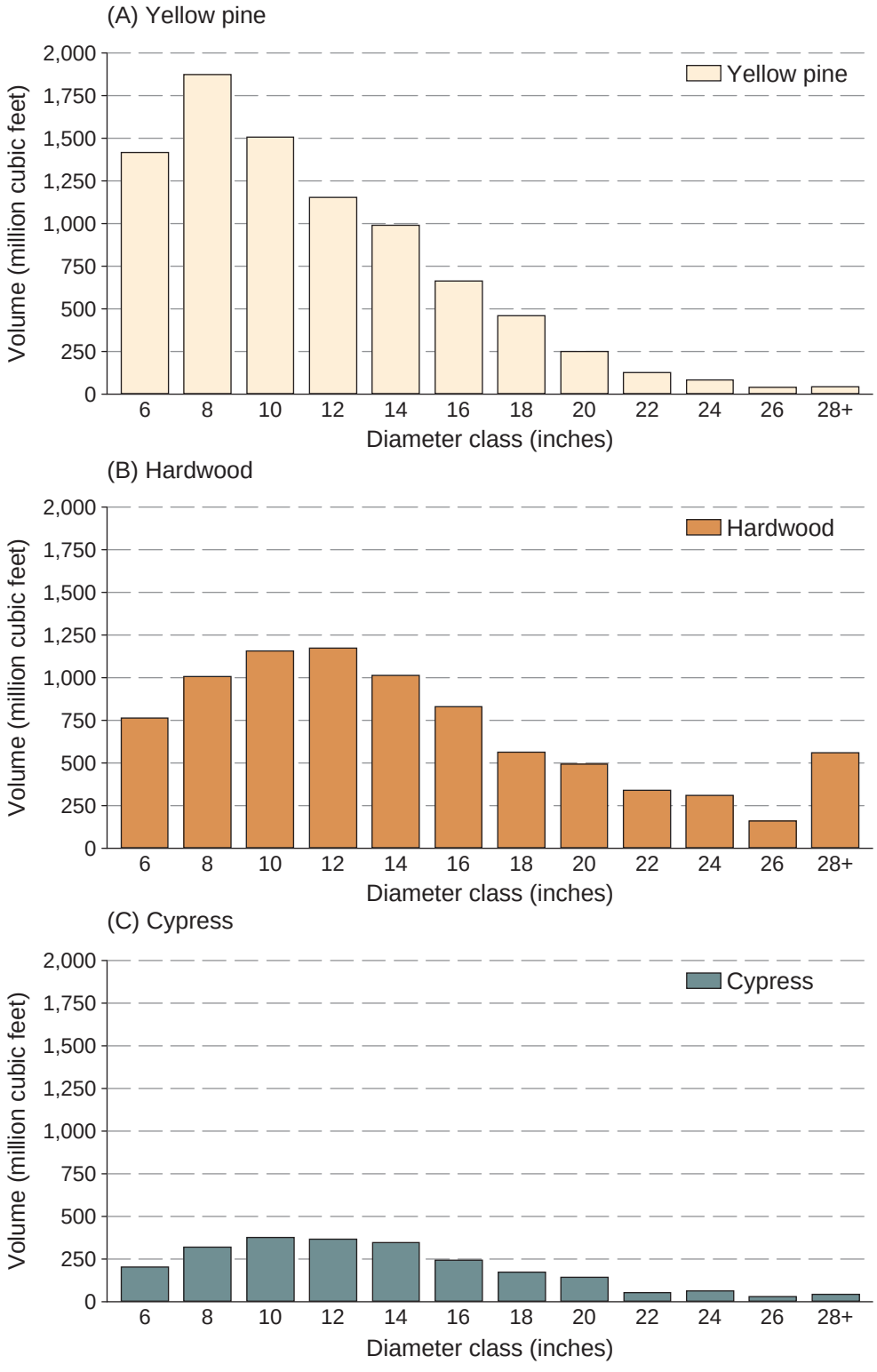


Figure 17—All-live volume on timberland by species group and diameter class, Florida, 2007 (A) Yellow pine, (B) Hardwood, and (C) Cypress.

of cypress species distribution is more like that for hardwoods than that for yellow pine. Actually, the profile of cypress volume distribution by diameter class is the most plateau like of the species groups. The peak in cypress volume is indistinguishable and occurs across the 10-, 12-, and 14-inch diameter classes, where 46 percent of the cypress volume is located.

Trends

The volume of yellow pine species has increased by 21 percent to 8.6 billion cubic feet in 2007 from 7.1 billion cubic feet in 1995. In fact, the volume of yellow pine species has increased each inventory period for decades (fig. 18). There are many reasons for the sustained increases, but one not included is more area of timberland because some of the yellow pine volume increases occurred during eras of decreases in area of timberland (fig. 2). One reason contributing to the yellow pine volume increases was the establishment of planted pine by the forest industry buildup that occurred up through the 1980s. Now that trend has reversed with the divesture of lands by the forest industry (fig. 1). As those latest stands established face liquidation through harvest, the increases in yellow pine volume may wane. Possibly inhibiting this occurrence already is the Nation's economic downturn and drop in housing starts, wood demand, and prices.

The volume of hardwood species has increased by 12 percent to 8.4 billion cubic feet in 2007 from 7.5 billion cubic feet in 1995. The volume of hardwood species has increased each inventory period for decades as well (fig. 18). Of the many reasons behind increases in hardwood volume, lack of industrial demand may support a buildup in volume. The latest increase may be related to an increase in timberland area, particularly in the Central and South survey units of the State (figs. 4 and 22).

The volume of cypress species has decreased by just 1 percent to <2.4 billion cubic feet in 2007 from 2.4 billion cubic feet for 1995. This follows a decrease of 14 percent recorded in 1995 from the nearly 2.8 billion cubic feet in 1987 (fig. 18). The steeper decrease recorded previously was largely due to a boom in the demand for cypress mulch from a formerly booming housing market. Various concerns regarding the species wetland status, sustainability of the resource, and regeneration of the species eventually affected demand by deterring some vendors from marketing the product and promoting others to use substitute mulches.

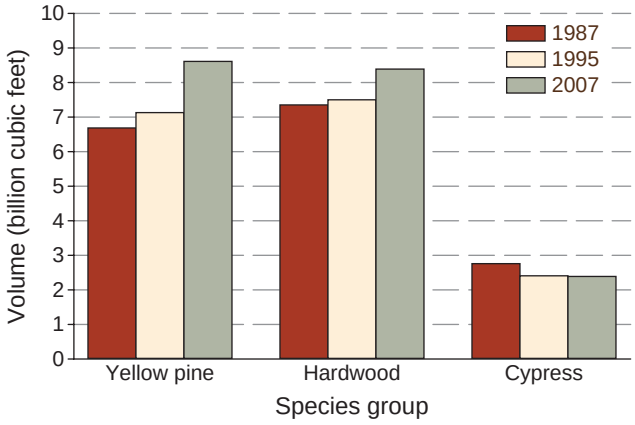


Figure 18—Trends in all-live volume by species group and survey year, Florida.

Ownership

Public ownership of Florida's all-live merchantable volume has increased dramatically (fig. 19). The increase in volume under public ownership has occurred for yellow pine, hardwood, and cypress species groups. The increases continue a trend recorded previously. Cypress volume under public ownership rose the most at 58 percent, then hardwood species volume by 50 percent, and yellow pine volume by 37 percent. Increases in area of public timberland, particularly State land acquisitions, are behind much of these increases (fig. 1). Changes in private ownership of the State's all-live merchantable volume reveal a different pattern. Yellow pine volume under private ownership provided the only sizable increase in this owner group and rose by 14 percent. The volume of hardwood species under private ownership was relatively stable in 2007 with a <1 percent increase. Hardwood volume in private ownership had decreased slightly from 1987 to 1995. Cypress volume in private ownership fell by 19 percent since 1995, the second decline after falling 21 percent from 1987 to 1995. The declines in cypress volume in private ownership may be related to the mulch boom as these ownerships likely sourced part of the production.

Stand Origin

Seventy-eight percent, or >15.0 billion cubic feet, of Florida's total all-live merchantable volume is in species from stands of natural origin. Twenty-two percent, or almost 4.3 billion cubic feet, is in species from stands with evidence of artificial regeneration (planting). Volume from species of natural origin has increased 8 percent for the yellow pines, increased 10 percent for the assorted hardwood species, and decreased by >1 percent for cypress (fig. 20). As might be expected, 94 percent or 4.0 billion cubic feet of the planted volume is comprised of yellow pine species. The remaining planted volume is mostly hardwood species with only a trace showing up as cypress. It is possible some of these trees were planted intentionally, but most probably just occurred in planted stands as ingrowth or residuals. The volume of planted yellow pine has increased by 45 percent since 1995 and follows a 37-percent increase recorded in 1995 since 1987. For the most part, the distribution of planted yellow pine volume by diameter class emulates the total yellow pine distribution portrayed earlier in this discussion. However, one notable difference is that the proportion of each diameter class comprised of planted yellow pine decreases

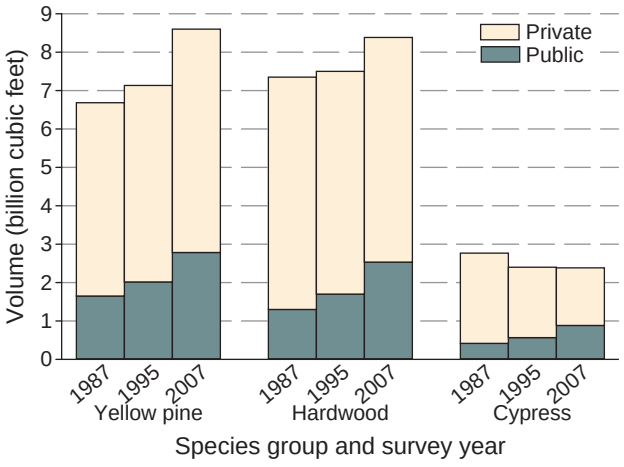


Figure 19—All-live volume by species group, survey year, and ownership, Florida.

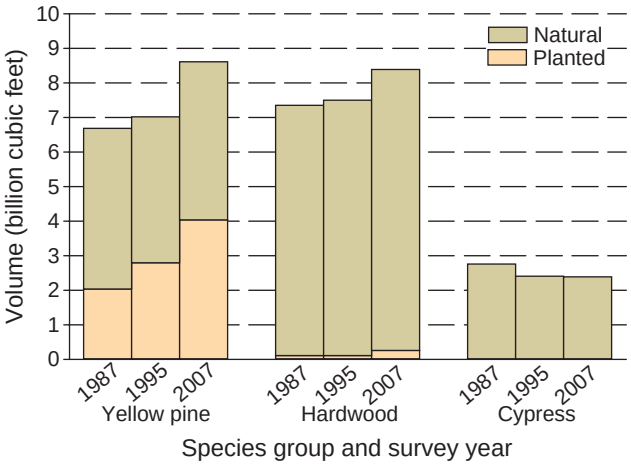


Figure 20—All-live volume by species group, survey year, and stand origin, Florida.

as diameter class increases (fig. 21). In the 6-inch diameter class, planted yellow pine accounts for 81 percent of the total yellow pine volume for that class. Planted yellow pine makes up 74 percent of the yellow pine volume in the 8-inch diameter class. For the 10-inch diameter class, the portion of yellow pine volume that is planted is 55 percent and by the 12-inch class, that figure is just 32 percent. Of course this mostly reflects the liquidation points for planted stands and at an apparently faster rate than that for natural stands.

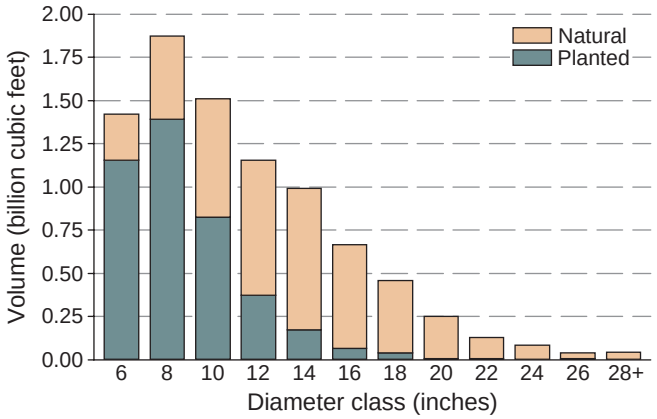


Figure 21—All-live merchantable yellow pine volume on timberland by diameter class and stand origin, Florida, 2007.



Natural pine stand. (photo by U.S. Forest Service)

Distribution

Seventy-six percent, or 14.7 billion cubic feet, of Florida's total 19.3 billion cubic feet of all-live merchantable volume occurs in the two northern units of the State. The Northeast unit alone accounts for the most volume of all the individual units with 40 percent (fig. 22). Until the 2007 inventory, most of the yellow pine volume was found in the Northeast unit where it has continued to increase to 3.6 billion cubic feet. However, volume of yellow pine in the Northwest unit has surpassed that to 3.9 billion cubic feet in 2007, a 32 percent increase since 1995. The Northeast unit formerly contained most of the planted yellow pine volume as well and despite its continued increase there to 1.9 billion cubic feet, the planted yellow pine volume in the Northwest unit more than doubled since 1995 to 2.0 billion cubic feet in 2007.

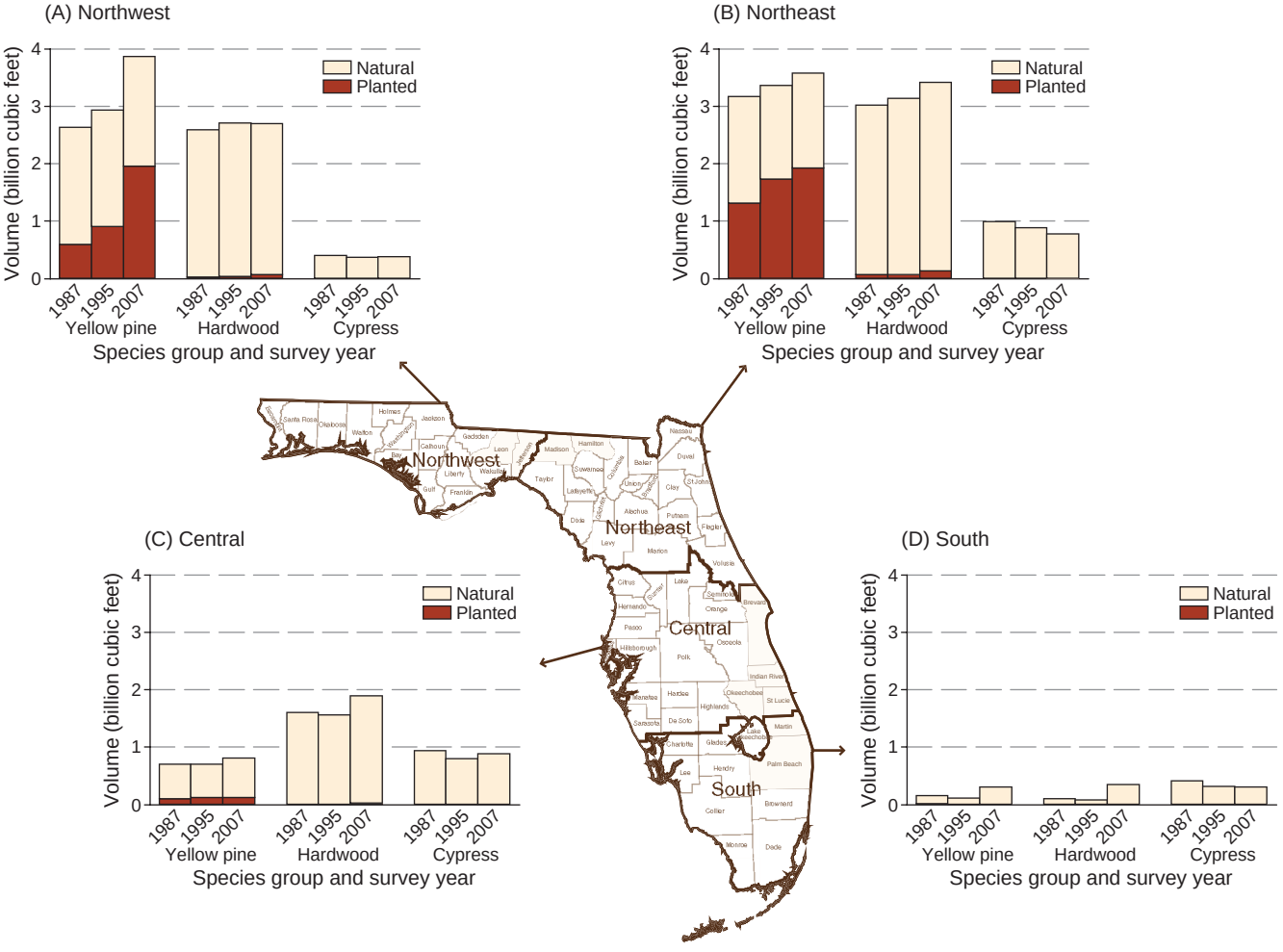


Figure 22—All-live merchantable volume by survey unit, species group, survey year, and stand origin, Florida (A) Northwest, (B) Northeast, (C) Central, and (D) South.

Planted yellow pine volume is relatively stable but nominal in the Central unit and negligible in the South unit of the State.

Survey unit trends by diameter class for each of the species groups revealed further differences as well. The large increase in yellow pine volume in the Northwest unit occurred across all diameter classes except for the 26-inch class which declined (fig. 23). The 8- and 10-inch classes provided the bulk of the increase. Although in 2007, the Northwest unit exceeded the Northeast unit in yellow pine volume for the first time, it does not in every diameter class. Despite the large gains in the smaller diameters in the Northwest unit, yellow pine volume in the 6- and 8-inch classes is still highest in the Northeast unit. However, the yellow pine volume in all other diameter classes <26 inches is highest in the Northwest unit. The volume

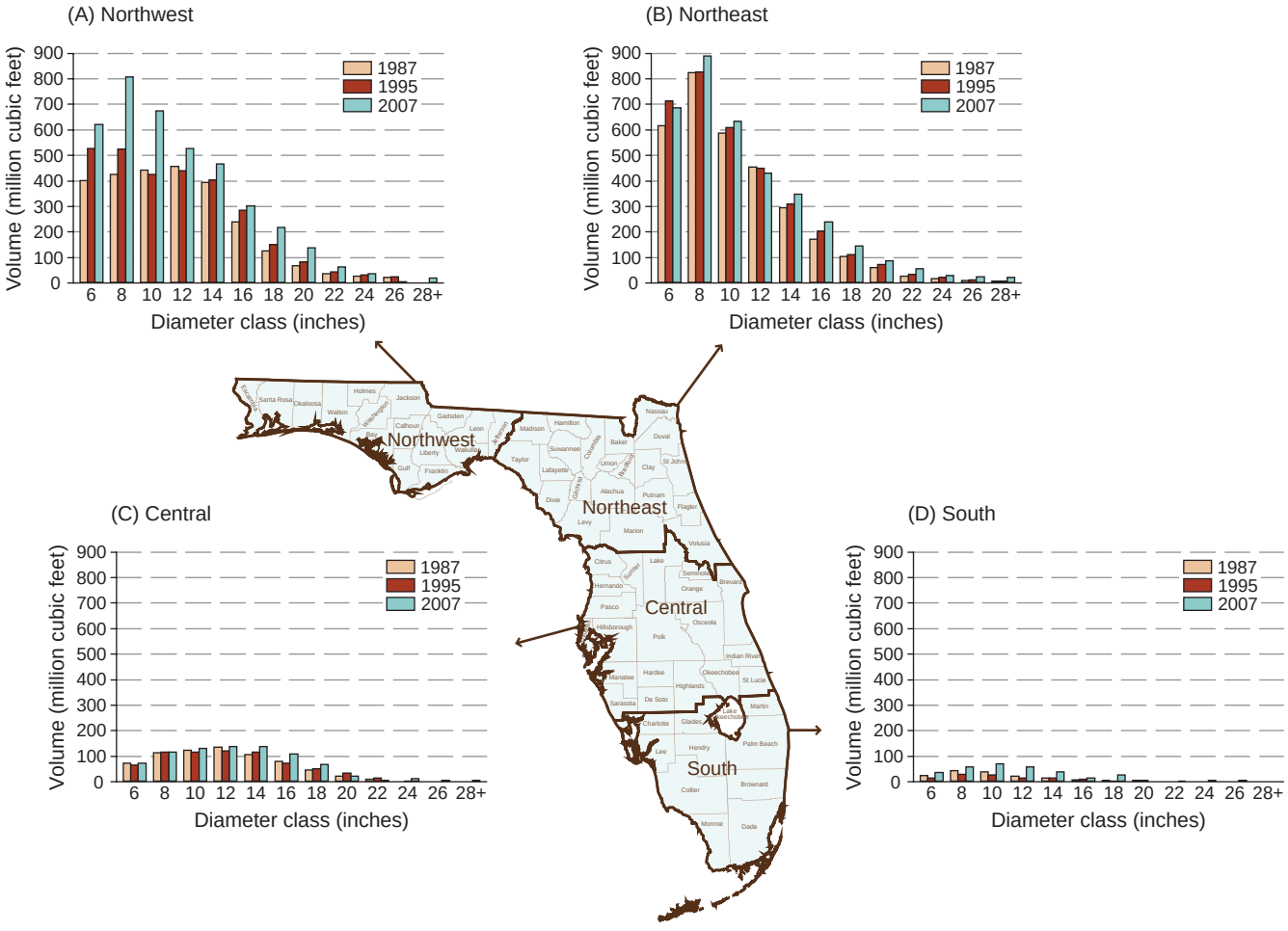


Figure 23—All-live merchantable yellow pine volume on timberland by survey unit, diameter class, and survey year, Florida (A) Northwest, (B) Northeast, (C) Central, and (D) South.

of yellow pine in the Northeast unit did not increase in all diameter classes; it was down in the 6- and 12-inch classes.

The volume of hardwood species was greatest in the Northeast unit where it increased in all but the 6- and 26-inch diameter classes for which it decreased (fig. 24). In contrast, hardwood volume in the Northwest unit decreased in all but the 8- and ≥20-inch diameter classes where it increased. In the Central unit of the State, hardwood volume increased in all diameter classes except the 6- and 24-inch classes. In the South unit, hardwood volume rose in all but one diameter class, only the 22-inch class decreased.

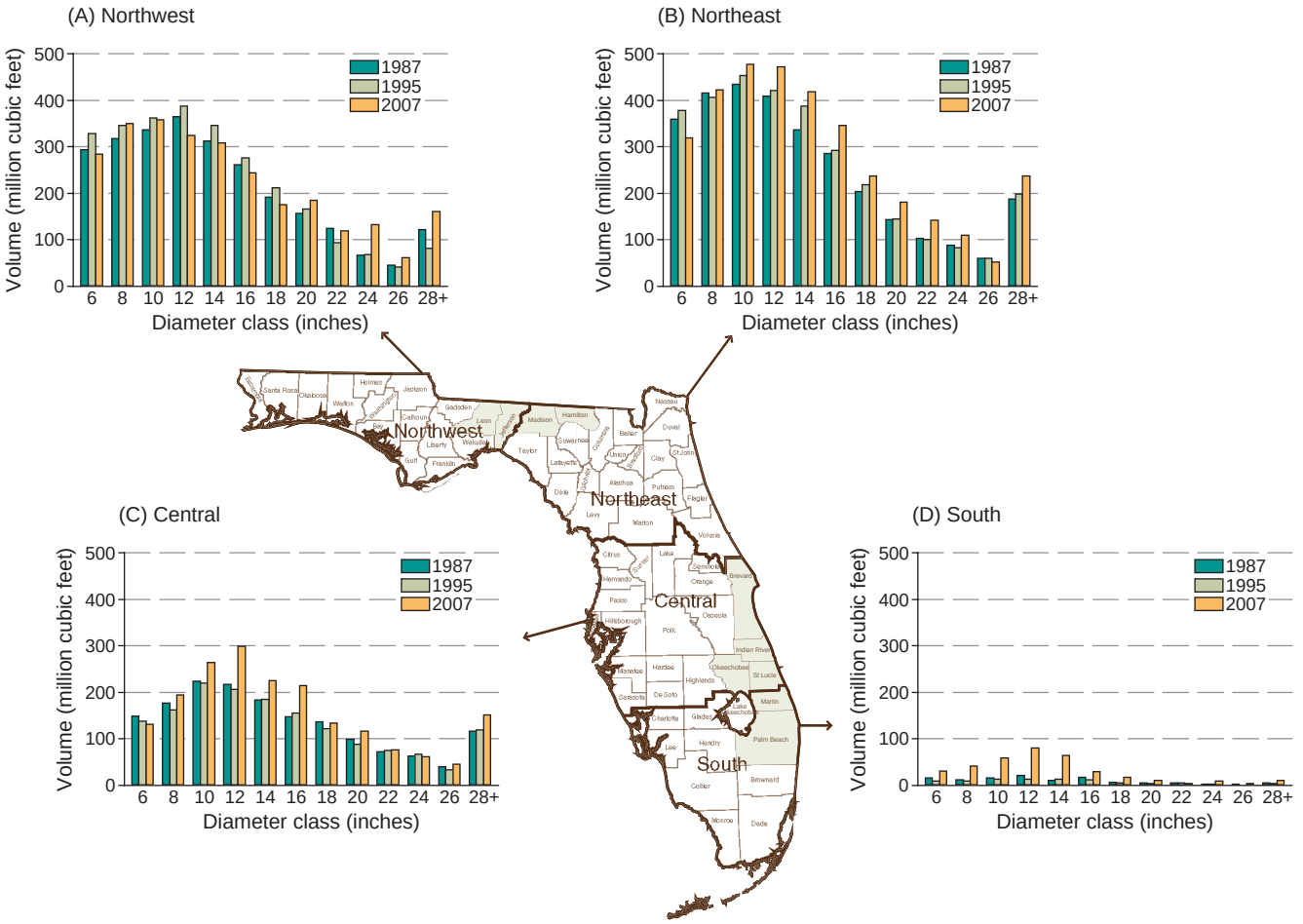


Figure 24—All-live merchantable hardwood volume on timberland by survey uit, diameter class, and survey year, Florida (A) Northwest, (B) Northeast, (C) Central, and (D) South.

In 2007, the volume of cypress was greatest in the Central unit. This occurred from an increase in the Central unit in combination with a decrease in the Northeast unit (fig. 22). Volume of small diameter cypress decreased in all but the South unit of the State (fig. 25). In fact, cypress volume was down in more than just the small diameter classes in the two units with most of the cypress volume. Cypress volume in the Central unit was down in every diameter class <14 inches. In the Northeast unit, cypress volume was down in every diameter class <18 inches. In both of these units, cypress volume increased in the largest diameter classes. These larger trees may be in less accessible places or of poorer form.

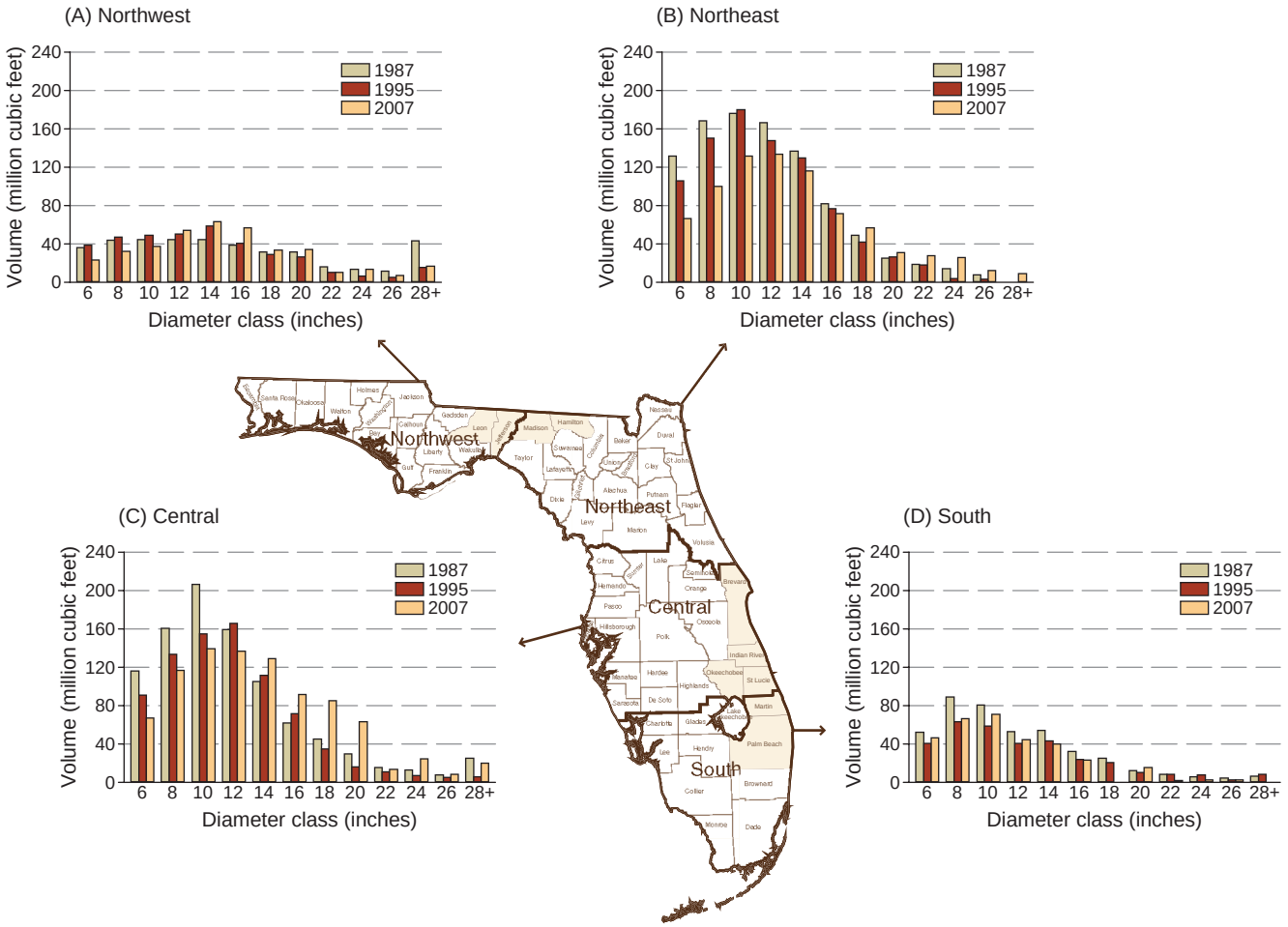


Figure 25—All-live merchantable cypress volume on timberland by survey unit, diameter class, and survey year, Florida (A) Northwest, (B) Northeast, (C) Central, and (D) South.



Red mangrove. (photo by Jay Frost, U.S. Forest Service)

Net Change Components

Gross Growth, Mortality, Net Growth, and Removals

A main purpose of the forest inventory is to determine resource change. The components of change revolve around measurements of gross growth, mortality, and removal volumes calculated in terms of average annual rates based on the remeasurement period involved. Change is determined by first subtracting mortality from gross growth resulting in net growth. Secondly, measured removals are then subtracted from net growth resulting in net change in the inventory.

Species Groups Net Change

The average annual components of change for yellow pine volume (including the fraction of other eastern softwoods) in Florida are pictured in figure 26. The gross growth of yellow pine has increased by 19 percent to an average of 597 million cubic feet annually for the period ending in 2007. Mortality of yellow pine increased as well, by 67 percent to an average of 77 million cubic feet annually. The impact of several hurricanes and major fire outbreaks may have contributed to the increased mortality. Subtraction of the mortality from gross growth results in net growth that averaged 520 million cubic feet annually. Removals of yellow pine (including the small amount of other eastern softwoods) decreased however, from an average of 434 to 412 million cubic feet annually. Thus, yellow pine growth exceeded removals. Then, after subtracting the removals from the net growth, the net change in inventory of yellow pine averaged +108 million cubic feet annually for the period 1995–2007.

The dynamics of net change are such that a positive net change generally adds to the total inventory, whereas a negative net change detracts from the total. To put the net change impact in perspective, figure 27 shows the growth and removals dynamics compared to total inventory volume of yellow pine. For the period ending in 2007, yellow pine net growth averaged 6.0 percent of total inventory volume and removals averaged 4.8 percent. The positive yellow pine net change averaged 1.3 percent of total inventory. These last two forest inventories of Florida (1995 and 2007) have recorded positive net changes in yellow pine volume which have contributed to the inventory increase.

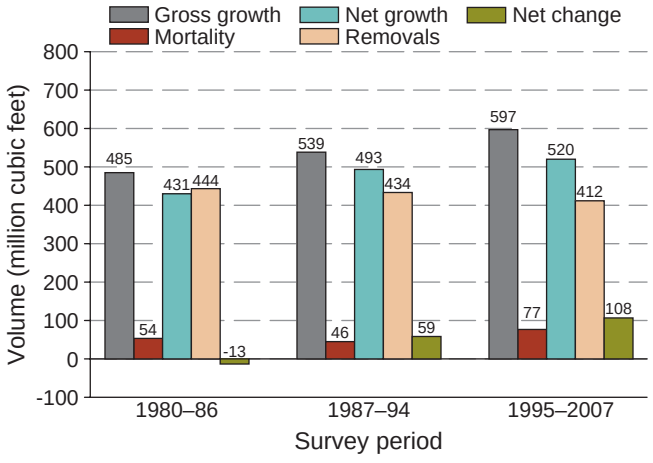


Figure 26—Average annual components of change for all-live merchantable yellow pine volume on timberland by survey period, Florida.

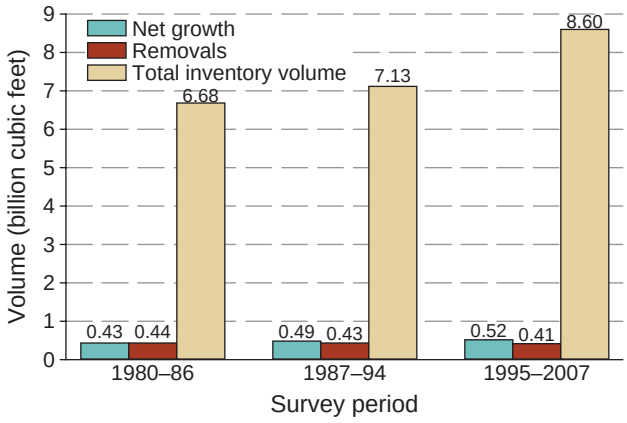


Figure 27—Average annual all-live merchantable yellow pine net growth and removals volume compared to total all-live merchantable yellow pine volume on timberland by survey period, Florida.

By stand origin, the yellow pine components of change differed for natural pine and planted pine in 2007 (fig. 28). Gross growth of planted pines was higher than that for natural pines despite more of the yellow pine inventory volume (53 percent) residing in natural pine trees. Mortality was disproportionate, as most of the mortality of yellow pine, 76 percent, occurred in natural pine stands. Perhaps the planted pine stands are more resistant by virtue of improved tree genetics, age distribution, stand structure, or management schemes. As a result, net growth of planted pine was almost double that of natural pine. More yellow pine removals (56 percent) came from planted pine than natural pine. Growth exceeded removals by a wider margin in planted pine than natural pine. Thus, most of the positive net change in yellow pine volume was supplied by planted pine.

In perspective, planted pine net growth averaged 8.4 percent of total planted pine inventory volume, and removals averaged 6.2 percent. The positive planted pine net change averaged 2.2 percent of total planted pine inventory (fig. 29). It turns out that these are the highest growth, removals, and net change percentages of total inventory of the three major species groups discussed in this report. This fact essentially confirms the focus of more forest practice activities on the planted pine species group.

In comparison, natural pine net growth averaged 3.9 percent of total natural pine inventory volume and removals averaged 3.5 percent. The positive natural pine net change averaged 0.4 percent of total natural pine inventory (fig. 29), which was the lowest net change of the species groups discussed in this report.

Gross growth of hardwood has increased by 16 percent to an average of 311 million cubic feet annually for the period ending in 2007 (fig. 30). The mortality of hardwoods has increased as well, by 61 percent to an average of 134 million cubic feet annually. The impacts of hurricanes and fires are at play here as well. The subtraction of the hardwood mortality from gross growth results in net growth that averaged 176 million cubic feet annually for hardwoods in the State. The removals of hardwood increased slightly to 119 million cubic

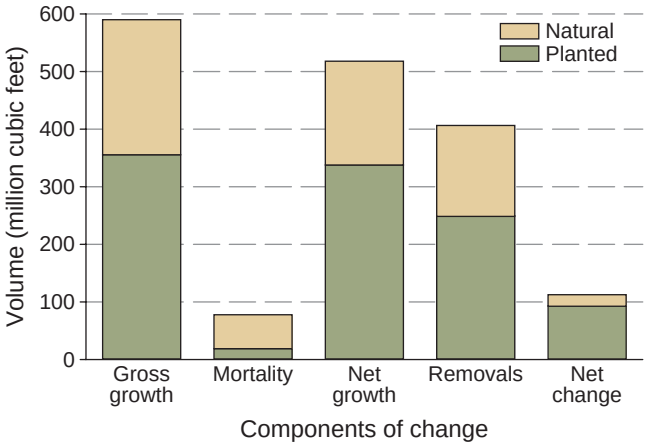


Figure 28—Average annual components of change for all-live merchantable yellow pine volume on timberland by stand origin, Florida, 1995–2007.

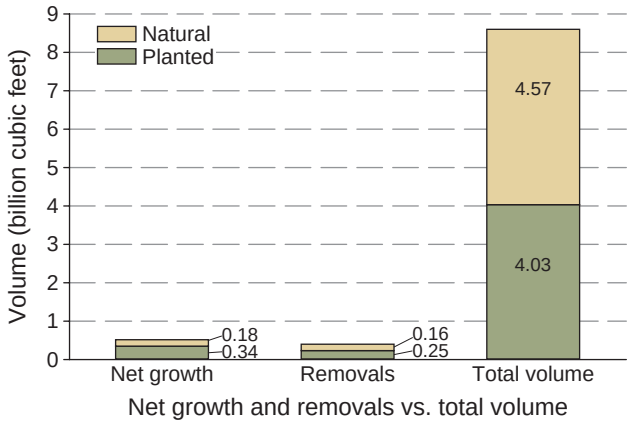


Figure 29—Average annual all-live merchantable yellow pine net growth and removals volume compared to total all-live merchantable yellow pine volume on timberland by stand origin, Florida, 1995–2007.



Use of prescribed fire. (photo by Larry Korhnak, University of Florida)

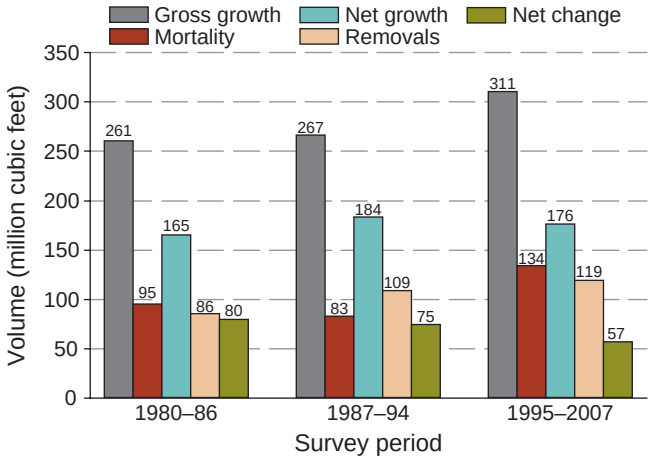


Figure 30—Average annual components of change for all-live merchantable hardwood volume on timberland by survey period, Florida.

feet annually. Still, hardwood net growth continues to exceed hardwood removals. After subtraction of removals, net change in the hardwood inventory averaged a positive 57 million cubic feet annually for the period 1995–2007 in Florida.

In perspective, hardwood net growth averaged 2.1 percent of total hardwood inventory volume and removals averaged 1.4 percent. The positive hardwood net change averaged 0.7 percent of total hardwood inventory (fig. 31).

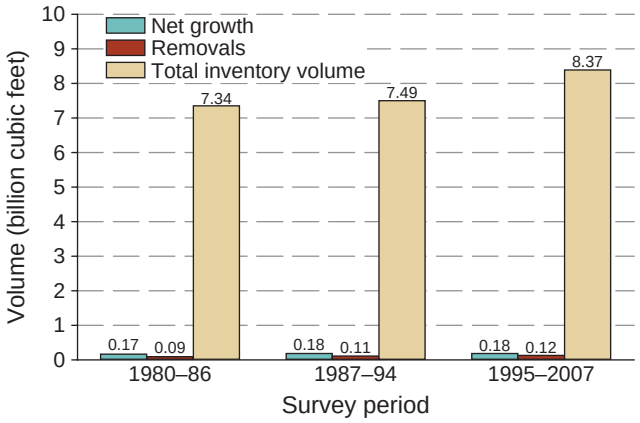


Figure 31—Average annual all-live merchantable hardwood net growth and removals volume compared to total all-live merchantable hardwood volume on timberland by survey period, Florida.

Gross growth of cypress has increased by 29 percent to an average of 63 million cubic feet annually for the period ending in 2007 (fig. 32). The mortality of cypress has increased as well, by 67 percent to an average of 15 million cubic feet annually. Again, weather and fire had roles in the increase. The subtraction of cypress mortality from gross growth results in net growth that averaged 47 million cubic feet annually for the period 1995–2007. After increasing between the previous two survey periods, the removals of cypress decreased by 24 percent, to 32 million cubic feet annually for the period 1995–2007. Net growth of cypress now exceeds removals where it did not for the previous survey period 1987–94. After subtraction of removals, net change in the cypress inventory averaged 15 million cubic feet annually for the period 1995–2007.

In perspective, cypress net growth averaged 2.1 percent of total cypress inventory volume and removals averaged 1.3 percent resulting in a positive cypress net change of 0.8 percent of the total cypress inventory (fig. 33). Although the net change for cypress was on par or higher than that for hardwood and natural pine, the cypress net growth and removals percentages of total cypress inventory volume were the lowest of the species groups discussed in this report. This fact indicates less frequent forest practice activity for the cypress species group compared to the yellow pine and hardwood species groups. The tendency of cypress to exist on adverse sites that affect accessibility could be a factor here.

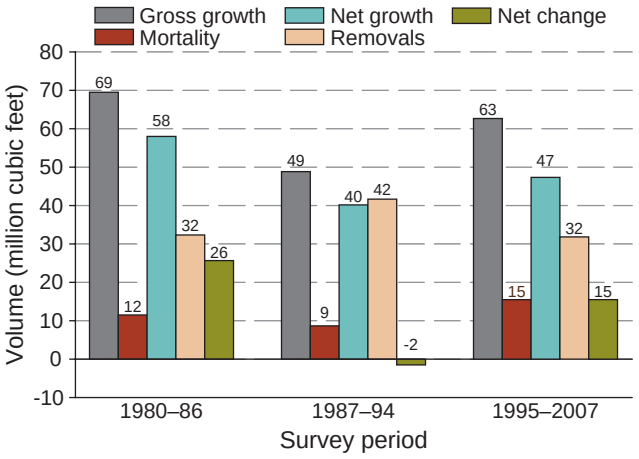


Figure 32—Average annual components of change for all-live merchantable cypress volume on timberland by survey period, Florida.

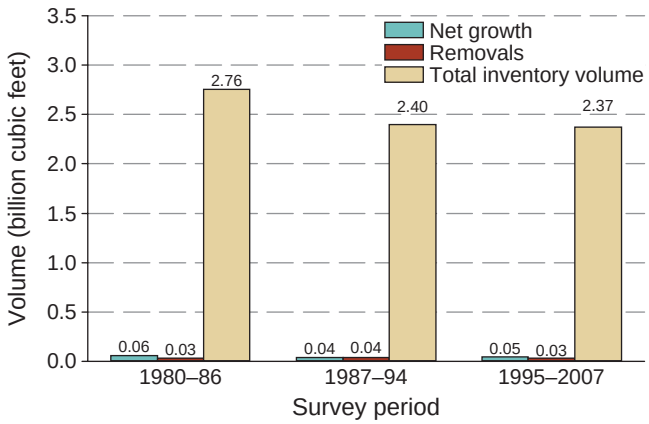


Figure 33—Average annual all-live merchantable cypress net growth and removals volume compared to total all-live merchantable cypress volume on timberland by survey period, Florida.

Timber Product Output

Removals and Utilization

Average annual timber removals from timberland include the merchantable and nonmerchantable volume of trees harvested for products and whole trees or portions of trees cut and left behind as logging residue. Average annual removals volume also includes trees removed due to land clearing for agriculture or urban development and timberland set aside by statute prohibiting tree harvesting. The latter removals are considered land use change removals. Total removals include harvested products, logging residues, and land use removals and are reported by broad species group at the regional, State, FIA survey unit, or county level for ownership, forest type, diameter class, stand origin, and other variables.

Most FIA removal tables report only the merchantable portion or volume from a 1-foot stump to the 4-inch top in cubic feet for trees ≥5 inches d.b.h. For sawtimber size trees, removal volume is reported in board feet (International ¼-inch log rule), as well. Removal estimates are generated for the sawtimber portion of growing-stock trees, all other growing-stock trees ≥5 inches d.b.h., and all-live trees ≥5 inches d.b.h. which include rough and rotten cull trees. It is best to think of these categories for removals as subsets; sawtimber removals are a subset of growing-stock removals, growing-stock removals are a subset of all-live tree removals, and all of these are a subset of total aboveground tree removals which include the volume of the stumps, tops, and limbs to 1-inch in diameter. Volume of removal trees <5 inches d.b.h. have been considered noncommercial and have not been reported on a routine basis.

Reporting removals in this fashion served FIA and its users well for many decades when dealing with the traditional timber products such as saw logs, veneer logs, poles, and other solid-wood forest products. However, the traditional fiber products industries (pulpwood, composite panel, and mulch) along with the emerging bioenergy industry have, and will dramatically increase the utilization of rough and cull trees, tops and limbs, a portion of trees <5 inches d.b.h., and in some cases, understory vegetation.

The majority of timber bought and sold commercially has been scaled by weight at the destination mills for many years. The forestry community has become familiar with weight as a unit of measure for timber products and has requested FIA to include weight as a reporting unit for removals. The cubic foot volumes have been converted to green tons throughout this section using 69.58 pounds of wood and bark per cubic foot of solid wood for softwoods and 74.53 pounds of wood and bark per cubic foot of solid wood for hardwoods.[1] It is important to keep in mind that this is fresh green weight of wood and bark per cubic foot immediately after harvest.

This section focuses on total average annual removals for all-live tree volume for trees >5 inches d.b.h. expressed in cubic feet and green tons. It will also include an estimate of removals for stumps, tops, and limbs and will be expressed as average annual harvest removals from nonmerchantable sources. In addition, an estimate of removals for trees <5 inches is discussed under the section for logging residue and is not included in total annual removals. Figure 34 shows the total annual removals by the subcategories previously discussed.

Between 1995 and 2007, total removals from all sources in Florida, for both softwoods and hardwoods totaled 704.9 million cubic feet (fig. 34), or 24.9 million tons (tables 7 and 8). Softwoods accounted for 79 percent of total removals, 555.7 million cubic feet (19.3 million green tons). Volume of removals

[1] Conversion factors are based on cycle 8 live inventory (green weight) and applied to removals at time severed or harvested. As a general rule, green weight can be converted to dry weight by multiplying by 0.5.

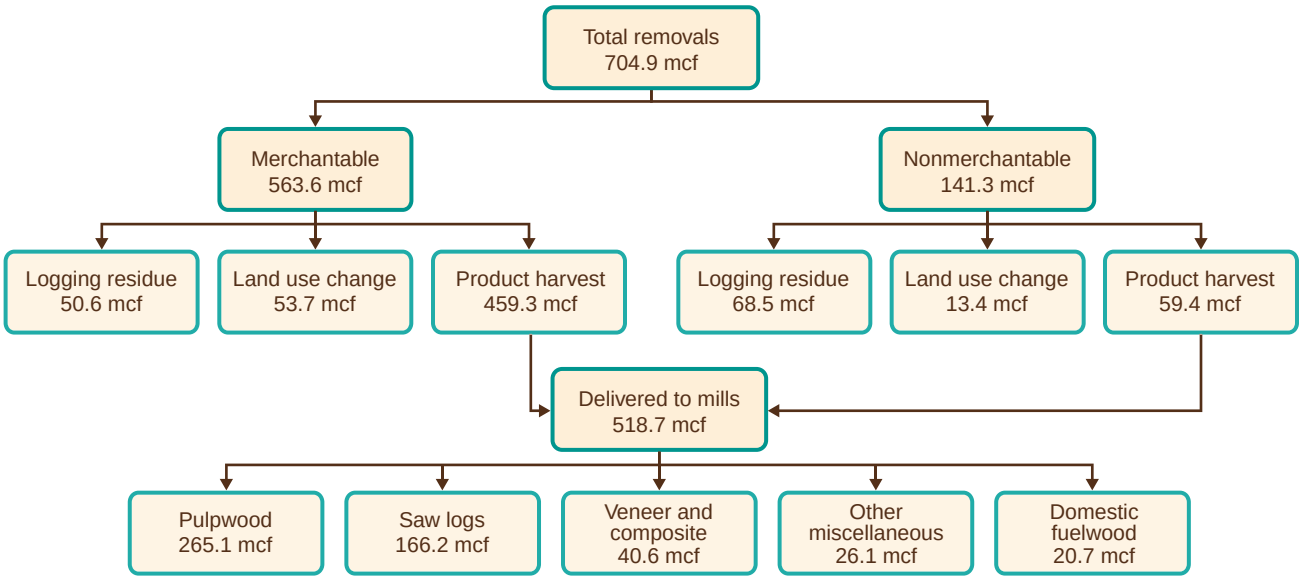


Figure 34—Total removals in million cubic feet (mcf) by merchantability and category, Florida, 2007.

Table 7—Average annual volume of all-live timber removals by removals class, species group, and source, Florida, 1995–2007

Removals class and species group	All sources	Source	
		Merchantable	Non-merchantable
		thousand cubic feet	
Timber products			
Softwood	459,882	408,925	50,957
Hardwood	58,814	50,391	8,423
Total	518,696	459,316	59,380
Logging residues			
Softwood	82,557	24,617	57,940
Hardwood	36,517	25,959	10,558
Total	119,074	50,576	68,498
Land use removals			
Softwood	13,268	10,604	2,664
Hardwood	53,825	43,108	10,717
Total	67,093	53,712	13,381
Total removals			
Softwood	555,707	444,146	111,561
Hardwood	149,156	119,458	29,698
Total	704,863	563,604	141,259

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

Table 8—Average annual green weight of timber removals by removals class, species group, and source, Florida, 1995–2007

Removals class and species group	All sources	Source	
		Merchantable	Non-merchantable
		green tons	
Timber products			
Softwood	16,000,008	14,227,142	1,772,866
Hardwood	2,191,597	1,877,727	313,870
Total	18,191,605	16,104,869	2,086,736
Logging residues			
Softwood	2,872,279	856,464	2,015,815
Hardwood	1,360,741	967,314	393,427
Total	4,233,020	1,823,778	2,409,242
Land use removals			
Softwood	461,614	368,930	92,684
Hardwood	2,005,692	1,606,340	399,352
Total	2,467,306	1,975,270	492,036
Total removals			
Softwood	19,333,901	15,452,536	3,881,365
Hardwood	5,558,030	4,451,381	1,106,649
Total	24,891,931	19,903,917	4,988,014

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

attributed to the merchantable portion of all-live tree removals accounted for 563.6 million cubic feet (19.9 million green tons), while nonmerchantable sources accounted for 141.3 million cubic feet (5.0 million green tons) (tables 7 and 8).

The following sections present an average annual estimate for the merchantable and nonmerchantable portions of annual timber product output (TPO) (timber harvested and delivered to mills), land use removals, and an estimate of logging residue in Florida for the period 1995 through 2007.

Timber Products

A diverse forest products industry in Florida is made-up of a variety of mills, ranging from small to medium-sized pole, post, and mulch mills to the very large softwood sawmills, pulpmills, and plywood mills. In 2007, there were about 69 sawmills, pulpwood mills, and other primary wood-processing plants distributed across the State (fig. 35). This section presents estimates of average annual timber product harvest volume for the period 1995 through 2007.

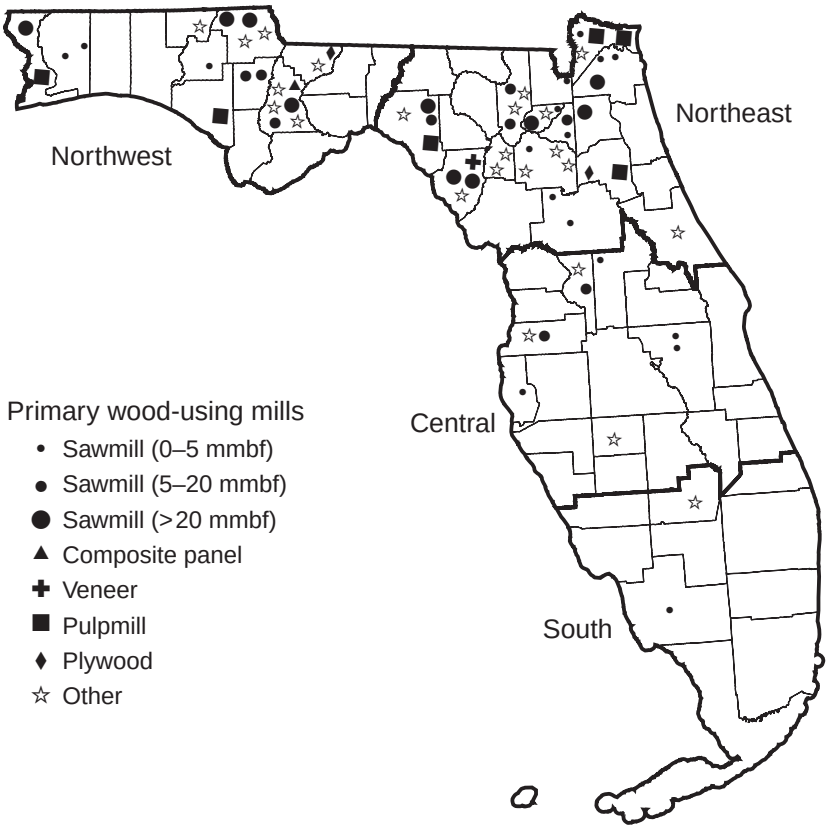


Figure 35—Primary wood-using mills by survy unit, Florida, 2007.

Estimates of TPO and plant residues were obtained from canvasses (questionnaires) sent to all major primary wood-using mills in the State. The canvasses are used to determine the types and amount of roundwood or timber (i.e. saw logs, pulpwood, plywood and veneer, poles, etc.) received by each mill, the county of origin, the species used, and how the mills disposed of the bark and wood residues produced. The canvasses are conducted every 2 years by personnel from the Southern Research Station and the Florida Forest Service, Division of Forestry. These data are used to augment the FIA annual inventory of all-live timber removals by providing the proportions that are used for timber products. Individual TPO studies, or industry surveys, are necessary to track trends and capture changes in product output levels.

Industry surveys conducted in 1995, 1997, 1999, 2003, 2005, and 2007 were used to determine average annual output for timber products and plant byproducts for the latest FIA cycle (Johnson and others 1997; Howell and Ford 1999; Bentley and others 2002; Bentley and others 2006; Johnson and others 2008; Johnson and others 2009). Therefore, the average volumes



Logging deck. (photo by Roy Lima, Florida Forest Service)

reported in this section for individual products will not match specific year values reported in TPO publications or online query tools.

Volume harvested and delivered for products (including residential fuelwood) from all sources totaled 518.7 million cubic feet (18.2 million green tons), or 74 percent, of total removals. The merchantable portion of all-live removals accounted for 459.3 million cubic feet (16.1 million green tons), or 89 percent of timber harvest product volume. Nonmerchantable sources from all-live removals accounted for 59.4 million cubic feet (2.1 million green tons), or 11 percent of product output levels. Average annual volume harvested for softwood products totaled 459.9 million cubic feet (16.0 million green tons) and accounted for 89 percent of the total product volume. Average annual volume harvested for hardwood products totaled 58.8 million cubic feet (2.2 million green tons).

Figure 36 shows trends in average annual harvest volume by product type for the survey periods from 1959 through 2007. While output used for saw logs, veneer, and other industrial products increased, roundwood used for pulpwood and residential fuelwood were down from the previous survey period. Table 9 depicts the average annual output of timber products by survey years or the survey period, species group, the softwood proportion for each category and the proportion that category made-up of total products. Although the volume harvested and delivered to pulpmills was down, the six pulpmills operating in Florida over the time period made pulpwood the primary wood product produced during the latest survey period. Pulpwood output as a proportion of total product output has declined from 74 percent during the 1959–69 survey period, to 56 percent during the 1980–86 survey period (table 9). Pulpwood output during the latest remeasurement period accounted for 51 percent of total product output for the State, down 6 percent from the previous survey period. Average annual harvest for pulpwood (softwood and hardwood combined) totaled 265.1 million cubic feet (9.3 million green tons) (tables 10 and 11). Although softwood pulpwood production was down 10 percent from the previous survey period it still totaled 235.5 million cubic feet (8.2 million green tons) and accounted for 89 percent of total pulpwood harvest volume. Hardwood pulpwood production was down 28 percent to 29.6 million cubic feet (1.1 million green tons).

Volume harvested for saw-log products, used mainly for dimension lumber, was the second leading product in Florida averaging just over 166.2 million cubic feet (5.8 million green tons) and accounted for

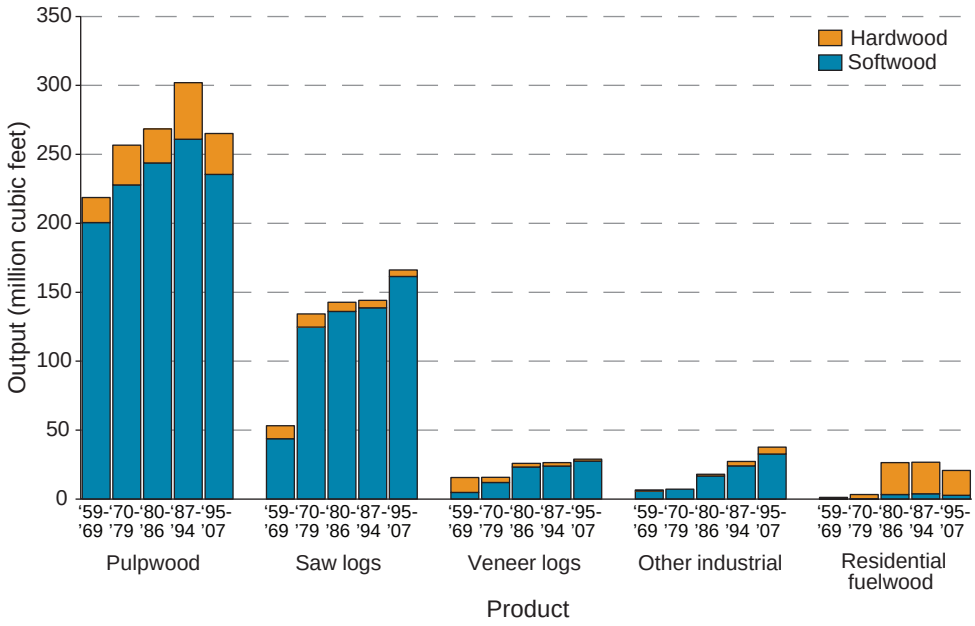


Figure 36—Average annual output of roundwood timber products by survey period, product, and species group, Florida, 1959–2007.

Table 9—Average annual volume of timber products by product type, survey years, and species group, Florida

Product type and survey years	Softwood	Hardwood	Total	Softwood	Proportion of total	Soft-wood	Hard-wood	Total
	- - - - - - thousand cubic feet - - - - - -			*- - - - - percent - - - - -*		*- - - percent change - - -*		
Saw logs								
1959–69	43,791	9,363	53,154	0.82	0.18			
1970–79	124,671	9,625	134,296	0.93	0.32			
1980–86	136,091	6,594	142,685	0.95	0.30			
1987–94	138,700	5,400	144,100	0.96	0.27			
1995–2007	161,493	4,717	166,210	0.97	0.32	0.16	-0.13	0.15
Veneer logs								
1959–69	4,815	10,842	15,657	0.31	0.05			
1970–79	12,055	3,749	15,804	0.76	0.04			
1980–86	23,191	2,666	25,857	0.90	0.05			
1987–94	23,900	2,500	26,400	0.91	0.05			
1995–2007	27,504	1,485	28,989	0.95	0.06	0.15	-0.41	0.10
Pulpwood								
1959–69	200,528	18,227	218,755	0.92	0.74			
1970–79	227,903	28,720	256,623	0.89	0.62			
1980–86	243,771	24,697	268,468	0.91	0.56			
1987–94	261,000	41,000	302,000	0.86	0.57			
1995–2007	235,476	29,627	265,103	0.89	0.51	-0.10	-0.28	-0.12
Other industrial								
1959–69	5,785	829	6,614	0.87	0.02			
1970–79	7,162	—	7,162	1.00	0.02			
1980–86	16,700	1,228	17,928	0.93	0.04			
1987–94	24,100	3,200	27,300	0.88	0.05			
1995–2007	32,678	4,993	37,671	0.87	0.07	0.36	0.56	0.38
Residential fuelwood								
1959–69	166	1,037	1,203	0.14	0.00			
1970–79	26	3,286	3,312	0.01	0.01			
1980–86	3,343	23,039	26,382	0.13	0.05			
1987–94	3,900	22,800	26,700	0.15	0.05			
1995–2007	2,731	17,992	20,723	0.13	0.04	-0.30	-0.21	-0.22
All products								
1959–69	255,085	40,298	295,383	0.86	NA			
1970–79	371,817	45,380	417,197	0.89	NA			
1980–86	423,096	58,224	481,320	0.88	NA			
1987–94	451,600	74,900	526,500	0.86	NA			
1995–2007	459,882	58,814	518,696	0.89	NA	0.02	-0.21	-0.01

— = no value for the cell; NA = not applicable.

Table 10—Average annual timber removals from all sources on timberland by item, softwood, and hardwood, Florida, 1995–2007

Item	All species	Softwood	Hardwood
	thousand cubic feet		
Timber products			
Saw logs	166,210	161,493	4,717
Veneer logs and bolts	28,989	27,504	1,485
Pulpwood	265,103	235,476	29,627
Composite panels	11,609	7,304	4,305
Other	26,062	25,374	688
Residential fuelwood	20,723	2,731	17,992
All products	518,696	459,882	58,814
Logging residues	119,074	82,557	36,517
Land use removals	67,093	13,268	53,825
Total removals	704,863	555,707	149,156

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

Table 11—Average annual green weight of timber removals from all sources on timberland by item, softwood, and hardwood, Florida, 1995–2007

Item	All species	Softwood	Hardwood
		green tons	
Timber products			
Saw logs	5,794,377	5,618,600	175,777
Veneer logs and bolts	1,012,202	956,890	55,312
Pulpwood	9,296,599	8,192,600	1,103,999
Composite panels	414,544	254,120	160,424
Other	908,444	882,788	25,656
Residential fuelwood	765,439	95,010	670,429
All products	18,191,605	16,000,008	2,191,597
Logging residues	4,233,020	2,872,279	1,360,741
Land use removals	2,467,306	461,614	2,005,692
Total removals	24,891,931	19,333,901	5,558,030

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

32 percent of total product output. The total number of sawmills have varied between 68 in 1995 to the current number of 37 in 2007. At 161.5 million cubic feet (5.6 million green tons) softwoods accounted for 97 percent of saw-log output. Veneer and composite panel production combined totaled 40.6 million cubic feet (1.4 million green tons), or 8 percent of total output. Volume used for other miscellaneous products such as poles, posts, and mulch totaled 26.1 million cubic feet (908,000 green tons), or 5 percent of total product harvest volume. Volume used for residential fuelwood totaled 20.7 million cubic feet (765,000 green tons) and accounted for 4 percent of total product output. At 18.0 million cubic feet (670,000 green tons) hardwoods accounted for 87 percent of the residential fuelwood harvest.

Mill Residue

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

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

For many years, most mill residue produced in Florida has been utilized either for primary products such as pulp or in secondary products such as mulch and animal bedding, or as fuel at wood product mills.

Table 12 depicts the average annual disposal of mill residue or how it was utilized. Data on mill residue production and disposal generated from the averaged forest industry surveys over the time period indicated 156.7 million cubic feet of wood and bark residue was generated from primary processors. Sawmills and



Wood pile at the mill. (photo by Bonnie Stine, Florida Forest Service)

Table 12—Disposal of average annual volume of residue at primary wood-using plants by product, species group, and type of residue, Florida, 1995–2007

Product and species group	All types	Type of residue			
		Bark	Coarse	Sawdust	Shavings
		thousand cubic feet			
Fiber products					
Softwood	44,503	0	43,591	104	809
Hardwood	1,249	1	1,248	0	0
Total	45,752	1	44,839	104	809
Particleboard					
Softwood	5,371	0	47	1,127	4,197
Hardwood	0	0	0	0	0
Total	5,371	0	47	1,127	4,197
Charcoal/ chemical wood					
Softwood	219	0	219	0	0
Hardwood	0	0	0	0	0
Total	219	0	219	0	0
Sawn products					
Softwood	2,033	0	2,033	0	0
Hardwood	5	0	5	0	0
Total	2,037	0	2,037	0	0
Industrial fuel					
Softwood	69,737	36,785	2,679	24,200	6,074
Hardwood	6,365	5,175	135	1,053	2
Total	76,102	41,959	2,815	25,253	6,076
Miscellaneous					
Softwood	25,919	11,348	7,490	5,376	1,704
Hardwood	1,096	229	547	317	2
Total	27,014	11,577	8,037	5,694	1,706
Not used					
Softwood	160	92	51	17	0
Hardwood	53	0	49	4	0
Total	213	92	100	21	0
All products					
Softwood	147,942	48,224	56,111	30,824	12,783
Hardwood	8,766	5,405	1,983	1,374	5
Total	156,709	53,629	58,094	32,198	12,788

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



veneer mills generated the majority of the mill residue produced. Bark accounted for 53.6 million cubic feet (34 percent), coarse residues accounted for 58.1 million cubic feet (37 percent), and sawdust and shavings accounted for 45.0 million cubic feet (29 percent) of mill residue produced.

More than 76.1 million cubic feet, or 49 percent, of mill residue produced was used for industrial fuel either at pulpmills for boiler fuel or at sawmills for dry kiln operations. Industrial fuel was by far the largest use of mill residue produced in Florida. Bark and sawdust, at 42.0 and 25.3 million cubic feet, respectively, accounted for 88 percent of mill residue utilized for fuel. Seventy-eight percent of bark residue produced was utilized for fuel, while the remainder was used in the production of mulch or miscellaneous products. Seventy-seven percent of the coarse residue produced, 44.8 million cubic feet, was utilized for pulp or fiber products.

Land Use Removals

Land use removals (land clearing or set aside forest land), or removal volume attributed to land use change, accounted for 10 percent of total removals with 67.1 million cubic feet (2.5 million green tons) (tables 7 and 8). The merchantable portion of live trees accounted for 53.7 million cubic feet (2.0 million green tons), while nonmerchantable sources accounted for 13.4 million cubic feet (492,000 green tons). The hardwood species group accounted for 80 percent of the land use change removals.

Logging Residue

The merchantable portions of trees cut and left onsite are underutilized removals by FIA merchantability standards, while the nonmerchantable portions of trees (part of the 1-foot stump or volume in tops <4 inches) used for products are considered overutilized removals by FIA merchantability standards. With this in mind, under- and overutilization factors used to determine average annual logging residue estimates used in this section were derived from the 2008 Florida harvest and utilization study (Bentley and Johnson 2009). Logging residue has been considered a possible source for bioenergy and other timber products during recent years. It is important to keep in mind that logging residue, traditionally, has not had a marketable value. Retrieval of logging residue is a matter of economics and markets. If markets are available and a willingness to pay a reasonable price exists, then more total tree volume (including what has been left as logging residues) is utilized for products.

Most loggers are setup to merchandise the main bole of the tree or the merchantable portion of the tree (from a 1-foot stump to a 4-inch top). The current conventional logging system in Florida is a feller buncher, working with one or two rubber tired grapple skidders, a delimbing gate or pull-through delimber at the deck, a knuckleboom loader, and the appropriate number of tractor trailers to haul the volume harvested. The improved mechanization and equipment capabilities have dramatically increased productivity and utilization across the South. These systems are typically capable of producing on average about 10 loads per day of tree-length wood (Bentley and Johnson 2009).

Woody material typically left on a logging site includes:

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

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

FIA calculates the merchantable portion of logging residue in a two stage process. First, for those plots that were classified as timberland during the previous inventory and stayed in timberland for the current inventory cycle, the volume of whole trees cut and not utilized are identified by FIA field crews during the remeasurement phase of the inventory. A removal volume is derived for trees that are classified in this category.

Second, underutilization factors derived from felled-tree utilization studies are applied to the volume classified as utilized by field crews for the remainder of the merchantable portion of logging residue. For instance, felled-tree utilization studies conducted for Florida showed that only 5.89 percent of the merchantable softwood bole was not utilized for products, while 15.18 percent of the merchantable hardwood bole was not utilized. The reader must remember that total removal volume is made-up of volume from the merchantable and nonmerchantable portions of removal trees. Overutilization factors from the utilization studies were used to determine how much of the nonmerchantable portion of removals was used for timber products. The nonmerchantable volume is calculated for the land use change removal estimate and added to the merchantable volume for a total land use change removal volume. With the nonmerchantable portion of timber products and land use change values calculated and subtracted from total nonmerchantable removals volume the remainder is the volume of nonmerchantable logging residues.

With this in mind, the annual logging residue volume in Florida from 1995 to 2007 averaged 119.1 million cubic feet per year, or 4.2 million green tons. This volume accounted for 17 percent of total timber removals. Nearly 82.6 million cubic feet (2.9 million green tons), or 69 percent, of the logging residues generated came from softwoods, while 36.5 million cubic feet (1.4 million green tons) came from hardwood species. Logging residue from the merchantable portion of all-live removals totaled 50.6 million cubic feet per year (1.8 million green tons), or >42 percent of total logging residue. It is interesting to note that while total logging residue accounted for 17 percent of total removals, the merchantable portion of logging residue for both softwood and hardwood combined accounted for about 9 percent of total live removals. For softwoods, the merchantable portion of logging residue accounted for 6 percent of the total softwood all-live tree removals which totaled 444.1 million cubic feet. The merchantable portion of hardwood logging residue accounted for 22 percent of all-live hardwood removals which amounted to 119.5 million cubic foot. Nonmerchantable sources (such as the residual stump, forks, tops, and limbs) accounted for 68.5 million cubic feet (2.4 million green tons), or 58 percent of total logging residue. Trees <5 inches contributed another 2.9 million green tons of possible logging residue.

Over the same time period, the area of timber harvested annually in Florida amounted to nearly 330,500 acres. Of this area, 190,600 acres (58 percent) underwent a final harvest, while >69,000 acres (21 percent) had a partial harvest and 61,900 acres (19 percent) had commercial thinning. The removals volume attributed to timber products and logging residues are directly related to these treated acres. Based on these estimates, nearly 68 tons per acre in the merchantable and nonmerchantable portion of trees >5 inches were removed annually from Florida timberland. Of this, >55 tons per acre were utilized for products, while nearly 11.6 tons per acre were left as logging residue after discounting the residual stump volume. Adding in 8.8 tons per acre for trees <5 inches the total logging residue amounts to 20.4 tons per acre. This volume would be the equivalent of about three-fourths of a tree-length trailer load of wood for every acre treated in Florida.

Potential Recoverable Logging Residue

Conventional logging operations are designed to haul tree length wood that fit between the stanchions of the trailer. A more effective way to handle the nonmerchantable portion of removals trees – rough trees with crooked boles, tops, and limbs – is to chip this material at the site and transport the material in chip vans. Some Florida loggers have begun to add whole-tree chippers and chip vans to their inventory of equipment. Current markets for chipped wood captured from logging residue are limited to facilities with wood fired boiler systems or production of mulch. Where bioenergy or mulch markets are available, chipping this material onsite is a cost efficient way of handling and transporting rough and rotten trees, the nonmerchantable portions of cut trees, as well as small trees <5 inches.

What is a realistic recovery rate of logging residue in Florida? Current literature and personal communications with loggers and others in the forestry field suggests that, conventional logging operations described above could capture 60 percent of what is currently being left behind as logging residue. This recovery rate excludes residual stump volume and would seem to be a realistic goal for possible extraction of formerly unutilized material (Perlack and others 2005).

For this assessment the nonmerchantable portion of logging residue has been reduced by 63 percent to account for residual stump (409,000 green tons) and tops and limb volume (1.1 million green tons) that are not immediately recoverable to 900,000 green tons (table 13). This amount combined with the merchantable logging residue of 1.2 million green tons leaves a total of 2.1 million green tons available from trees ≥5 inches d.b.h., or 6.2 tons per acre. Residual volume following harvest operations for trees <5 inches d.b.h. account for another 2.9 million green tons. This report assumes only 20 percent could realistically be extracted, or almost 580,000 green tons.[2] This volume adds another 1.8 ton per acre. Combined, the average annual recovery of logging residue at a 60-percent recovery rate from all sources could have amounted to an additional 8.0 tons per acre added to the product stream.

[2] Personal communication. 2008.H.M (Mac) Lupold, Lupold Consulting, Inc., 224 Chestnut Ferry Road, Camden, SC 29020.

Table 13—Average annual green weight of logging residue by recovery rate and tons per acre, Florida, 1995–2007

Logging residue in harvested trees by size class	Total		Non-recoverable: Discounted stump volume	Non-recoverable: Discounted <5" volume	Base total volume	Base total	Potentially recoverable at 60% recovery rate[a]: Discounted ≥5" volume	Potentially recoverable at 60% recovery rate[a]: Total volume	Potentially recoverable at 60% recovery rate[a]: Total
	green tons	*tons/ acre*	*green tons*	*green tons*	*green tons*	*tons/ acre*	*green tons*	*green tons*	*tons/ acre*
Merchantable volume ≥5"	1,823,778	5.5	0	0	1,823,778	5.5	669,559	1,154,219	3.5
Nonmerchantable volume ≥5"	2,409,242	7.3	409,084	0	2,000,158	6.1	1,100,086	900,071	2.7
Total	4,233,020	12.8	409,084	0	3,823,936	11.6	1,769,645	2,054,290	6.2
Nonmerchantable volume <5"	2,898,695	8.8	0	2,318,956	579,739	1.8	0	579,739	1.8
All classes	7,131,715	21.6	409,084	2,318,956	4,403,675	13.4	1,769,645	2,634,029	8.0

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

[a] This value is calculated from the base total volume of 4,403,674 tons.

Timber Product Output Summary

Traditional markets for paper and construction materials remain the dominant wood products industry. However, timber removals and utilization continue to change as increased demand for wood as a source for energy creates new market opportunities.

FIA and TPO data indicate substantial sources of fiber that are currently underutilized and could be used for bioenergy or other timber products if effectively captured. New facilities that utilize wood for energy may provide opportunities to capture logging residue and minimize the increase to current harvest levels. This will require further study.

New markets, such as bioenergy facilities that plan to use logging residues as a primary source for fuel, must carefully assess average annual volume available in a procurement area, and consider incentives to attract loggers to invest in operations that harvest wood residues at minimum costs.

With proper assessment, investment, and operation, industries utilizing logging residues could possibly offer opportunities for a renewable energy source while creating "green" jobs. Loggers would realize additional markets for fiber and additional sources of income from each logging site. Landowners may also receive additional income with increased utilization from harvested acres and lower site prep costs for establishment of new forests.

Economic Impact

Forest Products

In 2008 based on economical modeling methods, forestry plus wood and paper product manufacturing generated $13.0 billion in output, $4.42 billion in value added, and close to 64,500 in jobs impacts (Hodges and Rahmani 2010). Forestry, together with wood and paper products manufacturing, was the largest sector in terms of output among the seven leading agricultural commodity groups in Florida. In terms of value added and employment impacts forestry and timber tracts management activities alone generated $512 million and close to 12,800 jobs. Commercial logging had a value added impact of $288 million and 5,000 jobs. While forest products manufacturing impacts were $3.62 billion in value added and nearly 46,700 in jobs.

Based on a 2003 direct survey of forestry and forest products manufacturing businesses, total value of industry sales was $7.78 billion a year (Hodges and others 2005). This figure included $6.37 billion in sales by forest products manufacturers, $1.02 billion by service firms, and $382 million by landowners. Total direct employment in the industry was estimated at 30,000 jobs. Among manufactured forest products values in excess of $100 million were generated by sales of pulp ($2.18 billion), paper and paperboard ($1.78 billion), preservative-treated wood ($859 million), dimension lumber ($388 million), plywood ($365 million), wood chemicals ($245 million), chipped wood ($185 million), and mulch and shavings ($123 million). Forestry services revenue included timber harvesting ($615 million), timber trucking ($113 million), commissions from forest thinning ($107 million), service fees from tree trimming and removal ($61 million), and site preparation expenditures ($48 million). Income received by forest landowners included pulpwood ($80 million), pine straw ($79 million), chip-and-saw logs ($62 million), and sawtimber logs ($37 million). The forest products industry also produced a significant amount of electricity and steam to meet its energy needs for manufacturing processes, through utilization of wood residuals and its own byproducts (Hodges and others 2005).

Most of the forest management activities and forest product manufacturing have been located in the northern part of the State where they are leading economic activities in many rural counties. Regionally, the highest value of all forest products and services in 2003 was $3.80 billion in northeast Florida (unit 1), followed by $2.01 billion in central Florida (unit 3), $1.21 billion in northwest Florida (unit 2), and $695 million in south Florida (unit 4) (Hodges and others 2005). Together north Florida (units 1 and 2) represented $5.01 billion, or 65 percent in forest products and services generated in the State.

Despite urbanization and forest fragmentation which accompany Florida's development and increased population pressures since the end of the Second World War, forestry continued to grow over the decades. Production of primary timber products

has more than doubled within the last 60 years, growing from 218.1 million cubic feet in 1948 to 491.1 million cubic feet in 2007 (Brown and Nowak 2009). According to the latest available survey, Florida has 37 sawmills, 3 veneer mills, 6 pulp and paper mills, 1 composite panel mill, 1 pellet mill and 21 other mills for the total of 69 primary wood using plants (Johnson and others 2009). There is also a number of secondary wood product manufacturing facilities including millwork and engineered wood and truss manufacturing.

Nature Based Recreation

Florida is a world-known tourist destination and most of the 70 million domestic and 6 million foreign visitors coming to the State annually engage in nature based recreation of some kind according to Florida Fish and Wildlife Conservation Commission data (Wyman and Stein 2007). Collectively, visitors spent around $50 billion a year while in Florida (Hodges and others 2005). The exact dollar value spent on forest based recreation is not known; however, according to U.S. Fish and Wildlife Service surveys, wildlife-related recreational activities accounted for total expenditures of $6.05 billion in 2001. About one-half of that amount was spent on trip costs, lodging, and meals, while the other one-half was spent on recreational equipment purchases such as gear, boats, guns, etc. The recreational activities on State forests alone (>1 million acres administered by the Florida Forest Service) bring on average $1.2 million a year from user fees.

Ecosystem Services

In addition to the commercial commodity and recreational use values associated with Florida's forests, there are many ecosystem services which forests provide, but which are currently not easily quantified and/or marketed. Some of the ecosystem services provided by forests include surface and ground water purification and storage, air purification, noise abatement, mitigation of droughts and floods, carbon sequestration, stabilization of climate and weather events, generation and protection of soils and nutrient cycling, waste detoxification and decomposition, as well as provision of wildlife habitat and biodiversity among others. Globally, the value of the earth's biosphere ecosystem services was estimated to be on average about twice the size of global gross national product per year (Costanza and others 1997). In Florida, total economic value of ecosystem services in a four-county area (Clay, Duval, Putnam, and St. Johns Counties) was estimated at about $3.2 billion per year (Kroeger 2005). In 2007 Florida's gross domestic product was $742 billion, therefore applying the rule of thumb (see Constanza and others 1997 above), the value of all ecosystem services terrestrial and marine could be as high as $1.48 trillion per year.

Woody Biomass and Energy

In recent years energy security and global climate change concerns rekindled interest in production of renewable energy from wood sources. The debate on what constitutes "renewable energy" and what role woody biomass should play in satisfying our Nation's energy needs is still ongoing, both on the State and Federal levels. The very definition of "renewable biomass" is also hotly debated. Two most commonly pursued directions in renewable energy production from wood are electricity and liquid transportation fuels. At the time of this writing 30 States and the District of Columbia have either enacted a mandate or a voluntary goal to produce a percentage of their electricity from renewable sources by a legislated date. The so called renewable portfolio standard (RPS) goals range from 8 percent by 2020 in Pennsylvania to 33 percent by 2030 in California. Two States adopted their RPS goals in terms of megawatt (MW) capacity – Texas 5,880 MW by 2015 and Iowa 105 MW without specifying a target date. Technologies to produce wood-derived liquid transportation fuels are still being developed in the United States and throughout the world.

At this time Florida does not have officially adopted renewable energy goals, defined either as a RPS for electricity production, or a renewable fuel standard (RFS) for liquid fuel production. However, based on the 2008 legislation, the Florida Public Service Commission developed a "Draft



Wood pellets. (photo by Jarek Nowak, Florida Forest Service)

Renewable Portfolio Standard Rule" with a timetable for adoption of 20-percent RPS in the State. A clean portfolio standard which would have allowed up to 25 percent of the mandate to be achieved from nuclear energy or fossil fuels with carbon capture and storage, was also considered. By a request of Florida legislature, the Florida Department of Agriculture and Consumer Services, through the Florida Forestry Service, and Florida Department of Environmental Protection in cooperation with the University of Florida prepared a report evaluating the potential of Florida's private timberland, urban wood waste, and short rotation energy crops (SREC) for supplying woody biomass feedstocks for renewable electricity production under varying electricity demand and wood supply scenarios. Private lands were chosen due to the individual landowner's ability to quickly adapt their management practices to meet market demands. The study was motivated by forest sustainability concerns in face of new demands for wood placed on Florida's forests by proposed development of renewable energy facilities in the State.

Electricity from Woody Biomass

In 2007, Florida had 1,048 MW of renewable electricity generation capacity, which was 1.9 percent of the total. Wood and wood waste contributed 354 MW, or 0.6 percent to that capacity, but generated 1.93 million MWh, or 0.9 percent of all electricity (U.S. Department of Energy 2009b). Because the demand for electricity in Florida is projected to grow (U.S. Department of Energy 2009a), and other renewable energy sources contribution is predicted to reach a plateau (table 14), a 7-percent RPS in Florida translates into a need of between 1- and 3-percent woody biomass contribution to electricity generation between 2013 and 2040. For a 12-percent RPS the share of electricity from wood would grow to between 6 and 8 percent, while for a 20-percent RPS woody biomass would need to contribute from 14 to 16 percent of total electricity consumption for the period beginning in 2013 until 2040 (table 14). However, to sustainably achieve 1- to 3-percent levels of electricity production from wood sources, logging

Table 14—Woody biomass and base other renewable energy sources contributions to electricity production in Florida under a hypothetical 7-, 12-, or 20-percent renewable portfolio standard in 2025

Energy sources	TWh	7% RPS	TWh	12% RPS	TWh	20% RPS
Woody biomass contribution	6.3	2	20.4	7	43.0	15
ORES contribution	13.5	5	13.5	5	13.5	5
Total renewable electricity	19.8	7	33.9	12	56.5	20
Total electricity production	282.5	100	282.5	100	282.5	100

TWh = trillion watt hours; RPS = renewable portfolio standard; ORES = other renewable energy sources.

residues and urban wood waste have to also be utilized besides merchantable timber, and reforestation has to keep pace with harvest removals. Beyond 3 percent of electricity generation from wood sources, SREC need to fulfill an increasingly larger share of the fuel mix beside all other feedstock sources mentioned above to assure forest sustainability in terms of timber volumes.

The increasing amount of woody biomass needed to produce renewable electricity in Florida over time due to the projected increases in demand for electricity is depicted in figure 37. Florida currently harvests about 20 million green tons of merchantable timber annually. By 2025, a 2-percent contribution from wood to electricity generation would require an additional 10 million green tons, a 7-percent contribution would require an additional 30 million green tons, while a 15-percent contribution would require an additional 60 million green tons of woody biomass beyond what the current forest products industry may need. Assuming current harvest levels for traditional wood products remain the same, such changes would require anywhere from 1.5 to more than fourfold increase in wood output by forestry and allied activities. The fourfold increase would require landscape-scale adjustments in timber and other woody biomass production methods, high and sustained reforestation and afforestation, and infrastructure changes to plant, grow, harvest, and transport short rotation woody crops on up to 1.4 million acres of currently nonforested lands (Rossi and others 2010).

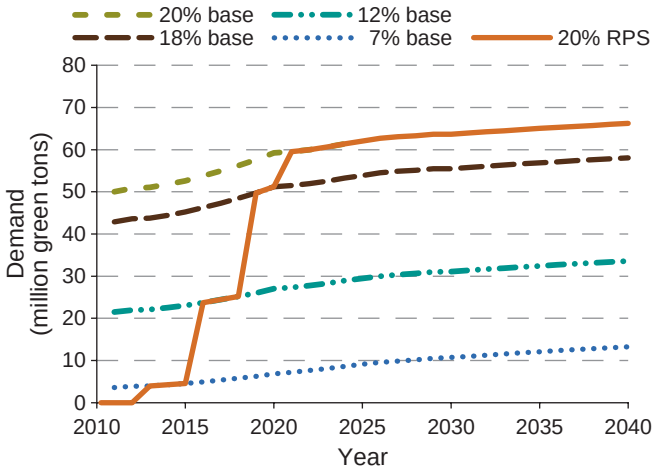


Figure 37—Projected change (solid line) in demand for woody biomass above 2007 harvest levels of 20 million green tons resulting from a theoretical 20 percent renewable portfolio standard (RPS), assuming "base" other renewable sources (ORES) projection and a step-wise portfolio adoption. Also shown—projected amount of woody biomass needed for a hypothetical 7, 12, or 18 percent RPS with base ORES.

Hodges and others 2010 showed that increasing woody biomass use for electric power generation in Florida would bring about a relatively small increase in gross domestic product (GDP), overall employment, and State government revenues, while modestly decreasing imports of fossil fuels. At the biomass supply level of 40 million tons, with capital assumed to be mobile, GDP would increase by 0.32 percent above the base level, representing $2.2 billion. Output or sales of the forestry sector would be increased dramatically, about 69 percent above current levels, to meet new demand for woody biomass fuels. Under the fixed capital scenario, output of the forest products manufacturing sector would decrease by 6.7 percent due to competition for the forest resources, and prices

for forest commodities may increase by up to 18 percent in the short run due to competition, but would likely be much lower in the long run as capital resources are reallocated to biofuel production. The relatively modest effects on forest commodity prices observed in the fixed capital analysis, even in the face of a threefold increase in demand, may be attributed to the moderating effect of increased imports, substitution effects, the diverse mix of different biomass resources available, and the fact that commercial timber production in the model used represents <25 percent of the total forestry sector. When the model was modified to restrict imports of timber and logging/support services, prices for forestry products increased by 150 percent, and prices for logging/support services increased by 280 percent. The model also predicted price increases for manufactured wood products anywhere from 0.03 to 4.6 percent under various model settings.

Incentives such as a renewable energy production tax credit for electricity generated from biomass, and a subsidy to forestry biomass producers, would further increase forest sector output and State GDP and employment, and reduce imports of fossil fuels. In particular, an electricity production tax credit equivalent to $0.010–0.011/kWh would substantially increase output of the electric power sector, and decrease imports of fossil fuels, while reducing the negative impact of higher electricity prices on all other sectors. However, assuming that the tax credit is unlimited, the State-sponsored incentive would significantly reduce State government revenues by nearly $200 million at the 40 million ton biomass supply level. The 100-percent biomass feedstock Federal subsidy to forestry producers would dramatically increase both electric power and forestry commodity output, but would not appreciably affect State government revenues (Hodges and others 2010).

Liquid Fuels from Woody Biomass

Liquid transportation fuels, often referred to as "biofuels," can be produced from a variety of biomass materials including wood by one of two basic processes: a biochemical, or a thermochemical conversion. It is commonly believed that between 50 and 65 gallons of ethanol can be produced from a moisture-free ton of wood. This so called cellulosic ethanol can then be mixed with gasoline to produce gasoline-ethanol blends. A 10-percent ethanol blend (E10) can be used in most motor vehicles without a need for engine modification. Flex fuel vehicles can use up to 85-percent ethanol blends (E85). Florida law requires that all conventional motor gasoline sold in the State has at least 10-percent ethanol by volume as of December 31, 2010. Most gasoline filling stations in the State already comply with the E10 mandate. However, thus far the E10 offered for sale in Florida contains ethanol produced from corn or other grains out of State. In 2008, Florida drivers used 8.17 billion gallons of gasoline fuel (Florida Energy and Climate Commission 2009). Assuming a conservative yield of 50 gallons cellulosic ethanol per ton of moisture-free wood, it would take close to 33 million green tons (at 50-percent moisture) to fulfill the current 10-percent gasoline-ethanol blending requirement from wood sources alone, and that is after the conversion technologies mature. This is roughly equivalent to 7 percent of all Florida electricity produced from wood sources in a 12-percent RPS in the year 2025. While the case can be made for how woody biomass could be produced in Florida to support either or both future RPS (electricity) and RFS (biofuels) at various levels, major increases in tree planting acreage and forest management intensity would have to be made to meet any new substantial wood harvest goals beyond the current timber harvests of about 20 million tons annually, which supports traditional forest products industry.



Pine straw bailing. (photo by Anna Osiecka, University of Florida)

Nontimber Forest Products

Florida, with its diverse forest ecosystems, produces an array of nontimber forest products (NTFP). The products are not included in standard definition of the forest products industry, although they are important components to other industries – herbal medicines, culinary, crafts, and floral. They may range from edible products (e.g., jellies, fruits, nuts, and honey), to ornamental products (e.g., pine tips for garlands, grapevines), landscape products (e.g., pine straw, native plants), and specialty woods (e.g., burl and crotch wood for fine crafts).

The State, with its subtropical climate, is favorably located to supply NTFP for many markets. It is a major international shipping hub for floral products such as cut flowers, greens, and live plants. For example, Galax leaves harvested in North Carolina are shipped through Florida for global destinations. Spanish moss collected from Florida forests are marketed in the craft industry. One of the major plants used in the herbal medicine industry, saw palmetto is collected from Florida forests. The State is the major global provider of this important medicinal plant. Unfortunately, statistics in these and other important NTFPs of Florida are difficult to find.

Value

The national forests in Florida keep track of convertible and nonconvertible products cut and sold from the forests. Nonconvertible products are those products of which the harvest volumes are not readily translated into board-feet or a volume that relates directly to timber. Until recently nonconvertible product sales were lumped into one category. In recent years the national

forests have kept track of particular categories of NTFP that include Christmas trees, moss, fruit and berries, foliage, limbs, and boughs. Table 15 presents value of NTFP of the national forests of Florida from 2001–08, as reported on the Cut and Sold reports for those years.

Though the overall value of the NTFP harvested from the national forests of Florida may not be nearly as high as that for timber, the information is telling. Over the 8 years, the national forests of Florida collected about $129,300 from the sale of nonconvertible forest products, or an average of $16,000 worth of NTFP annually.

In 2006, the national forests of Florida started reporting more diverse categories of nonconvertibles. Over the 3 years, about 44 percent of revenues generated by nonconvertibles have been from the harvest of limbs and boughs. Foliage makes up 23 percent of revenues, on average, while the sale of permits for fruits and berries account for almost 20 percent of revenues.

Enterprises

The NTFP industry is not well defined and illustrating its many facets is challenging. In a survey of county extension agents, with a response rate of almost 94 percent, which was designed to estimate the number and distribution of NTFP enterprises in Southern United States, Florida had about 1,412 NTFP firms (Chamberlain and Predny 2003). The State ranked sixth in the Southern region for the number of NTFP enterprises, accounting for 5.6 percent of the total (table 16). The responses from county agents suggest that Florida has one of the smallest NTFP segment dealing with edible forest products (i.e., 216 firms, representing 5.6 percent of total in the South). It is ranked 10th out of 13 States for firms dealing with floral forest products and 11th for firms dealing with specialty forest products. Florida ranked third for enterprises using NTFP for landscaping (i.e., 837 firms, 14.3 percent of total).

According to county extension agents, Florida has a variety of enterprises that use nontimber forest resources to manufacture products. Almost 15 percent of the 1,412 NTFP enterprises in Florida deal with edible forest products. About 9 percent of the total NTFP firms in the State manufacture specialty wood products, and almost 13 percent manufacture floral and decorative items from nontimber forest resources. Enterprises that use native plants in landscaping account for 59 percent of

Table 15—Sold value of nontimber forest products from the national forests of Florida

Product description	2001	2002	2003	2004	2005	2006	2007	2008
				dollars				
Christmas trees	$1,057	$1,057	$777	$1,211	$973	$847	$700	$847
Nonconvertibles	18,914	14,485	19,658	14,109	16,607	2,407	100	NA
Moss	NA	50	NA	NA	NA	400	625	300
Fruits and berries	NA	NA	NA	NA	200	7,700	1,990	NA
Limbs and boughs	NA	NA	NA	NA	NA	6,103	4,526	5,729
Foliage	NA	NA	NA	NA	NA	2,145	2,795	3,035
Total	19,971	15,592	20,435	15,320	17,780	19,602	10,736	9,911

Source: Cut and Sold Reports 2000-08, USDA Forest Service.
NA = not applicable.

Table 16—Distribution of NTFP enterprises in Southern United States, as perceived by county extension agents

State	Edible	Specialty wood	Floral and decorative	Landscape	Medicinal	Total	Percent of total
			number				
Alabama	221	377	378	377	58	1,411	6
Arkansas	224	257	208	120	251	1,060	4
Florida	216	127	182	837	50	1,412	6
Georgia	250	186	384	1086	68	1,974	8
Kentucky	490	826	562	373	2670	4,921	19
Louisiana	249	119	94	81	8	551	2
Mississippi	234	252	207	192	15	900	4
North Carolina	526	452	3283	1326	770	6,357	25
Oklahoma	275	148	75	65	14	577	2
South Carolina	89	81	145	216	25	556	2
Tennessee	390	794	481	593	314	2,572	10
Texas	438	210	200	196	27	1,071	4
Virginia	239	370	698	376	262	1,945	8
Total all States	3,841	4,199	6,897	5,838	4,532	25,307	
Percent of total	15	17	27	23	18		

NTFP = nontimber forest products.

Florida's NTFP industry, and firms that use medicinal plants account for about 4 percent of the industry in the State.

An examination of county level assessment provides further insight into the distribution of NTFP enterprises. Eleven out of the 53 counties that reported to the survey indicated having NTFP enterprises. The top five counties with NTFP enterprises were Columbia, Sarasota, Brevard, Calhoun, and Hillsborough. These counties accounted for 58 percent of the total NTFP enterprises in Florida. Columbia County ranked number one with 233 enterprises, most of which dealt with landscape plants. Sarasota County was estimated to have 204 enterprises, with 200 dealing with landscape plants. Brevard County was estimated to have 150 NTFP enterprises and ranked second in landscape enterprises. Calhoun County had the fourth largest number of NTFP enterprises (126 firms) and ranked number one for edible forest product enterprises. Hillsborough County was estimated to have 109 NTFP enterprises and was fourth for number of landscape firms using NTFP.

These examples provide only a partial representation of the NTFPs industry in Florida. Clearly the perception of county extension agents was that the NTFP industry is a significant contributor to Florida's rural economy. To get a more comprehensive, accurate, and reliable portrayal of the industry will require substantial investment. Such assessment would provide a more complete valuation of these important resources.

Forest Health Factors

Quantifying and assessing various aspects of forest health can be approached using a broad range of factors. Levels of tree mortality and determining what may have contributed to the trees' demise are important components of any assessment of forest health. Insects and disease are always present in forest environments, but it is only when widespread tree mortality occurs that their presence becomes a concern. Identifying which specific disease or insect is causing the mortality and determining whether it is native to the area or is an introduced species then becomes valuable. Estimating levels and cause of disturbance, and identifying the impacts from invasive plants also help quantify forest health.

Tree Mortality and Standing Dead Trees (Snags)

Tree mortality is a natural part of forest ecosystem processes. Whether age and senescence results in tree death, or external factors (weather events, insects and disease, animal damage) play a role, dead trees provide habitat for many animal species, store carbon, and play a vital role in nutrient cycling.



Wildfire suppression efforts. (photo by Florida Forest Service)

An average of 27 million trees died on timberland annually in Florida from 2002 to 2007, equivalent to about two trees per acre per year. Per-acre average annual mortality rates were highest in the Central unit, and lowest in the South unit (fig. 38). Thirty-four percent of mortality was attributed to disease, 20 percent was caused by competition with other vegetation, 19 percent was attributed to fire damage, and 13 percent to weather events (fig. 39).

There were 106.5 million standing dead trees (snags) recorded on Florida forest land, or about six snags per acre. The number of snags was higher, in general, on public land and was highest on public land in the Central unit, reflecting the higher levels of mortality (fig. 40). Standing dead trees contributed about 13 million dry tons of carbon to Florida's carbon stock during this inventory, or a little over three quarters of a ton per acre of forest land.

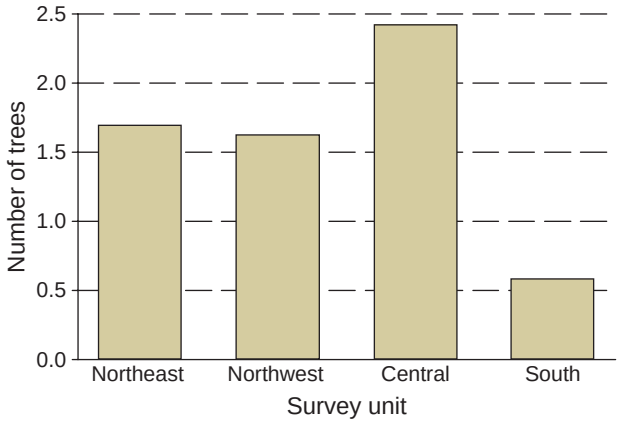


Figure 38—Average annual mortality per acre of all-live trees on timberland by survey unit, Florida, 2007.

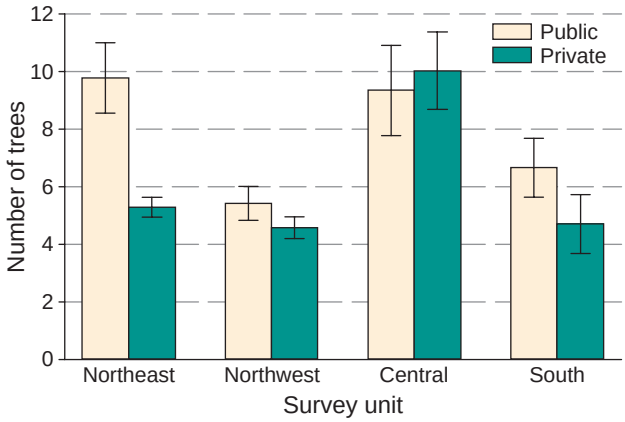


Figure 40—Number of standing dead trees per acre of forest land by survey unit and ownership, Florida, 2007. Error bars represent one standard error.

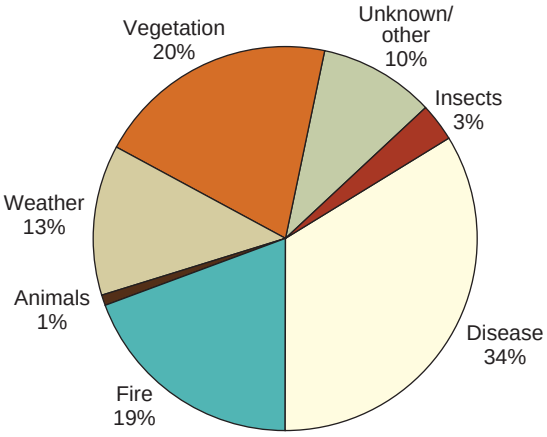


Figure 39—All-live mortality on timberland by damaging agent, Florida, 2007.

Down Woody Material

Downed deadwood is recognized for its important role in forest ecosystems as a source of forest fuels, an important component of wildlife habitat, its role in nutrient cycling, and its importance as a carbon sink, among other important ecosystem services (Waddell 2002, Bate and others 2004). A host of organisms rely on down woody material (DWM) to provide structural and/or thermal protection, foraging sites, or travel corridors (Bate and others 2004). However, excessive deadwood in the forest can result in large fuel loads, sustaining damaging wildfires over large

areas. Establishing a balance between the dead wood necessary to sustain a healthy, productive forest, while addressing concerns related to wildfire is essential to maintaining healthy forests.

FIA collects DWM on phase-3 plots (appendix A) across the Nation. The data used in this report was collected between 2001 and 2004 on forested plots throughout the State and corresponds to the 2007 Resources Planning Act (Smith and others 2009). DWM in Florida averaged between 20 and 30 tons per forested acre in the area of the State that lies within the southern Florida Coastal Plain and Southern Coastal Plain ecoregions, with slightly lower values of 10 to 20 tons per acre near the State's borders with Georgia and Alabama, which is part of the Southeastern Plains ecoregion (fig. 41).

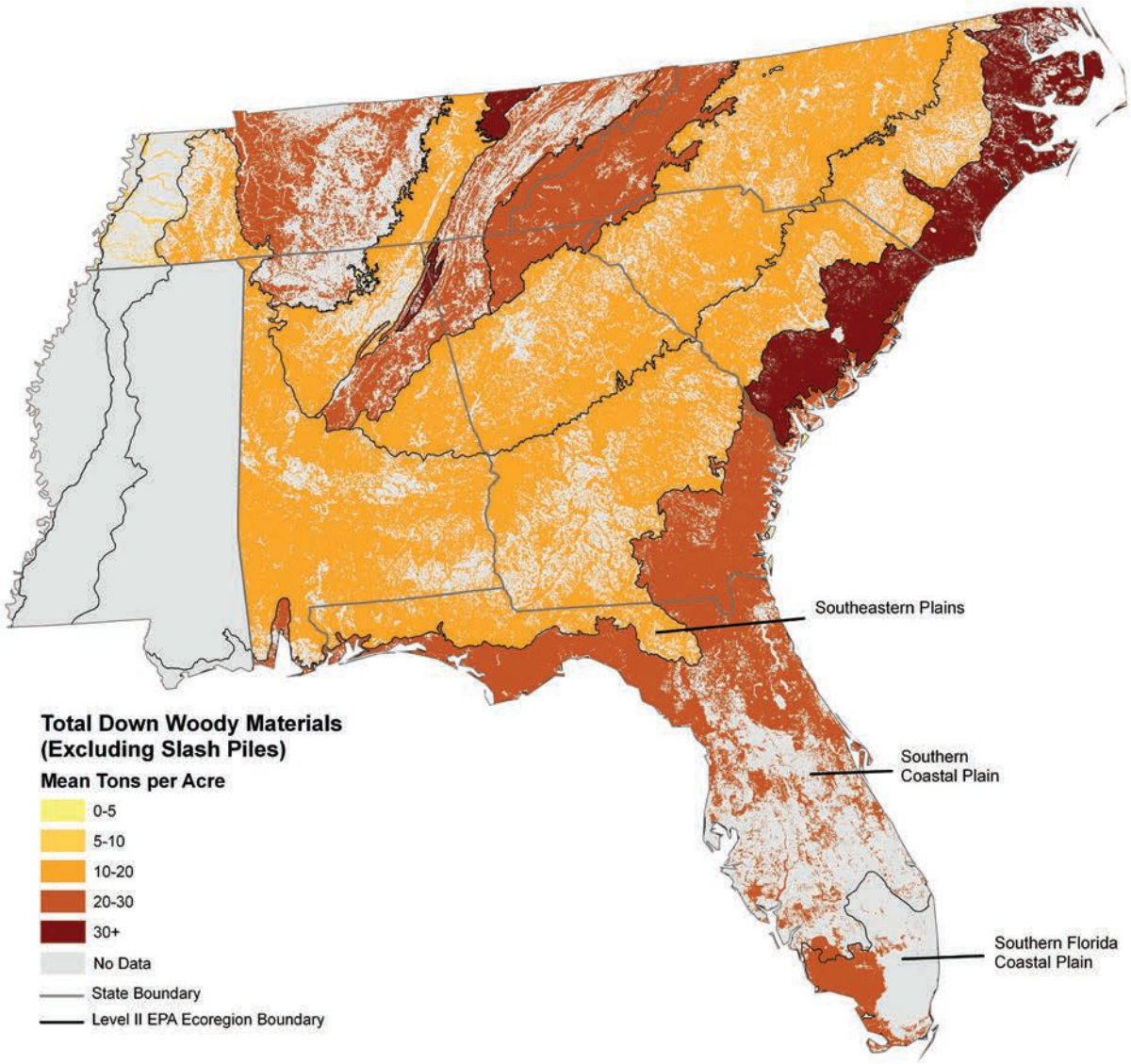


Figure 41—Down woody material in Florida and surrounding States, averaged by Level II Environmental Protection Agency ecoregion (Smith and others 2009).

Duff (mostly decomposed organic matter at the soil surface), coarse woody material, and litter made-up the majority of the total tonnage measured in Florida (fig. 42). Carbon content of DWM (based on field measurements and modeling) was estimated at 37 million dry tons, or 2 tons per forested acre.

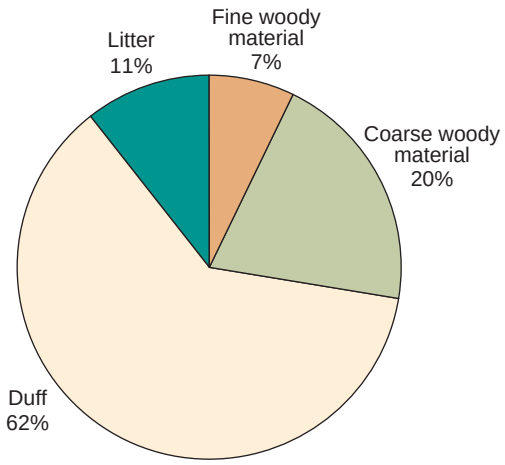


Figure 42—Proportion of down woody material by material type, Florida, 2007.

Invasive Plants

The impact of nonnative invasive pest plants, now recognized worldwide as a major threat to biodiversity and ecosystem health, is of particular importance in Florida forests. The State's mild climate, peninsular geography, active nursery trade, and abundant international ports all contribute to its susceptibility to invasion by nonnative species. It has been estimated that >30 percent of plant species growing outside of cultivation in Florida are exotic, and of those about 10 percent are problematic invaders (Wunderlin 1998). Due to the scope of this problem, any large-scale strategy for managing and maintaining Florida's forests and other natural areas must include plans for controlling existing infestations of invasive plants, and preventing their establishment and spread into new areas.

With over 140 plant species recognized as currently or potentially invasive by the Florida Exotic Pest Plant Council, a comprehensive account of individual species is beyond the scope of this report. Among the more notable invasive plant species affecting Florida forests are cogongrass (*Imperata cylindrica*), Chinese privet (*Ligustrum sinensis*), melaleuca (*Melaleuca quinquinervia*), Japanese and old-world climbing ferns (*Lygodium japonicum* and *L. microphyllum*), air potato (*Dioscorea bulbifera*), kudzu (*Pueraria montana*), Chinese tallow (*Triadica sebifera*), and Brazilian pepper (*Schinus terebrinthifolius*). In addition to competitively excluding native species, many invasive plants have the ability to alter ecosystem characteristics by changing soil chemistry and altering plant community structure, altering disturbance regimes like fire frequency and duration, and changing hydrologic regimes in wetland-associated systems (D'Antonio and Vitousek 1992, Schmitz and Brown 1994). In Florida, for example, the nonnative invasive tree *Melaleuca quinquenervia* has drastically altered hundreds of thousands of acres of wetlands in the Everglades National Park by transforming



Measurement of melaleuca trees. (photo by Florida Forest Service)

sawgrass, freshwater marsh, and wet prairies into forest monocultures (Mazzotti and others 1997). In addition to environmental impacts, invasive plant species control efforts cost the United States as much as $25 billion annually, and Melaleuca costs Florida an estimated $3-6 million annually in control efforts (Pimental and others 2005).

The southern FIA program began monitoring nonnative invasive plant species in 2001 in response to a growing desire to track potential forest health threats on U.S. forest land. No other program in the United States provides a mechanism for monitoring the spread of common invasive species across both public and private lands on a regularly updated basis. The invasive plants selected for survey are regionally recognized exotic pest plants known to invade interior forest stands and forest edges, canopy gaps and streamsides. FIA collects presence information and estimates of cover for invasive trees, shrubs, vines, grasses, canes, forbs, and ferns.

FIA field crews sampled forested subplots in Florida for 12 invasive tree species (table 17). All 12 were found on at least

Table 17—Nonnative invasive plants monitoring list

Common name	Scientific name[a, b, c]	Common name	Scientific name[a, b, c]
Trees		Vines (continued)	
Australian pine[d]	*Casuarina equisetifolia*	English ivy[d]	*Hedera helix*
Camphor tree[d]	*Cinnamomum camphora*	Japanese honeysuckle[d]	*Lonicera japonica*
Carrotwood[d]	*Cupaniopsis anacardioides*	Kudzu[d]	*Pueraria Montana* var. *lotata*
Chinaberry[d]	*Melia azedarach*	Nonnative vincas, periwinkles	*Vinca minor*/*V. major*
Chinese tallowtree[d]	*Triadica sebifera, Sapium sebiferum*	Nonnative yams[d]	*Dioscorea bulbifera*/*D. oppositifolia*
Java plum[d]	*Syzygium cumini*	Oriental or Asian bittersweet	*Celastrus orbiculatus*
Melaleuca[d]	*Melaleuca quinquenervia*	Rosary pea[d]	*Abrus precatorius*
Mimosa, silktree[d]	*Albizia julibrissin*	Skunk vine[d]	*Paederia foetida*
Princesstree, royal paulownia[d]	*Paulownia tomentosa*	Winter creeper	*E. fortunei*
Russian olive[d]	*Elaeagnus angustifolia*	Grasses	
Schefflera[d]	*Schefflera actinophylla*	Chinese silvergrass	*Miscanthus sinensis*
Tree-of-heaven[d]	*Ailanthus altissima*	Cogongrass[d]	*Imperata cylindrica*
Shrubs		Giant reed	*Arundo donax*
Autumn olive	*E. umbellata*	Napier grass	*Pennisetum purpureum*
Brazilian pepper[d e]	*Schinus terebinthifolius*	Nepalese browntop[d]	*Microstegium vimineum*
Bush honeysuckle	*Lonicera* spp.	Nonnative bamboos[d]	*Phyllostachys* spp./*Bambusa* spp.
Chinese/European privet[d]	*Ligustrum sinense*/*L. vulgare*	Tall fescue[d]	*Lolium arundinaceum*
Guava[d e]	*Psidium guajava*	Herbs	
Coral ardisia[d]	*Ardisia crenata*	Chinese lespedeza[d]	*Lespedeza cuneata*
Downy rose myrtle[d e]	*Rhodomyrtus tomentosa*	Garlic mustard	*Alliaria petiolata*
Japanese/glossy privet[d]	*L. japonicum*/*L. lucidum*	Rough hairy indigo[d]	*Indigofera hirsuta*
Lantana[d]	*Lantana camara*	Shrub lespedeza[d]	*L. bicolor*
Nonnative roses	*Rosa* spp.	Tropical soda apple[d]	*Solanum viarum*
Sacred bamboo, nandina[d]	*Nandina domestica*	Ferns	
Silverthorn, thorny olive[d]	*E. pungens*	Japanese climbing fern[d]	*Lygodium japonicum*
Surinam cherry[d e]	*Eugenia uniflora*	Old world climbing fern[d]	*L. microphyllum*
Winged burning bush	*Euonymus alata*	Sword fern[d]	*Nephrolepis cordifolia*
Vines			
Catclawvine[d]	*Macfadyena unguis-cati*		
Chinese/Japanese wisteria[d]	*Wisteria sinensis*/*W. floribunda*		

Note: lack of detection on forested FIA plots does not mean that the species may not occur elsewhere in the State.

Each species is monitored on all standard Southern Research Station Forest Inventory and Analysis (FIA) field plots. Species are grouped by life forms and were compiled from State and Federal noxious plant lists.

[a] Little (1979).

[b] USDA Natural Resources Conservation Service (2006).

[c] Miller and others (2010).

[d] Species detected on forested subplots in Florida.

[e] Species monitored by FIA within the State of Florida.

one subplot. Melaleuca, Chinese tallowtree, mimosa, and camphortree were the most commonly detected invasive trees (fig. 43). Among those, melaleuca was the most frequent, and occurs primarily in the southern part of Florida where it has invaded >50 percent of forested subplots in Lee and Palm Beach Counties, and >11 percent of forested subplots in six other counties (fig. 43). In some cases, the subplots infested with melaleuca may represent new forest structure, whereas they may

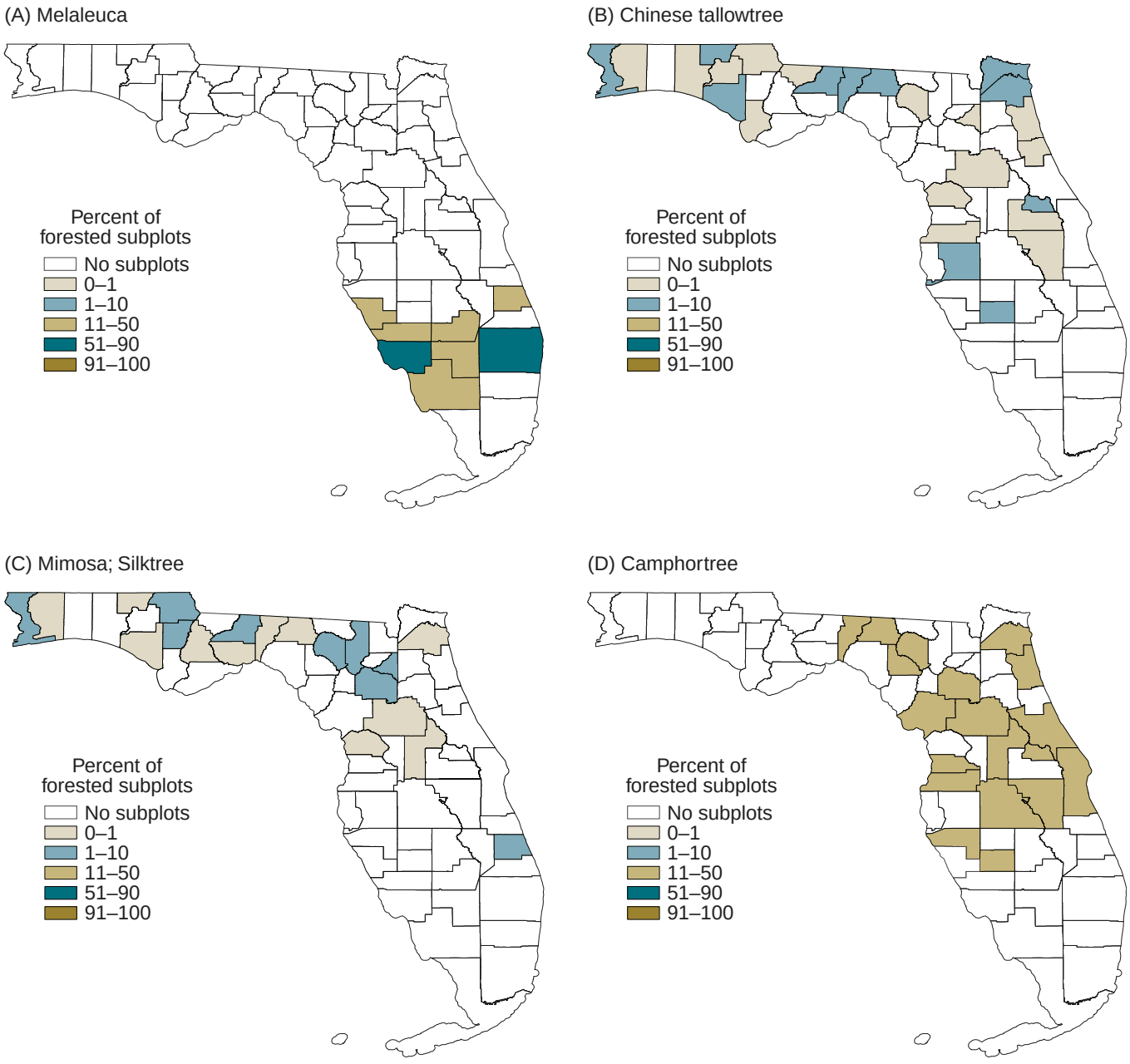


Figure 43—Four most frequently detected nonnative invasive trees on Forest Inventory and Analysis forested subplots in Florida A) Melaleuca, B) Chinese tallowtree, C) Mimosa, and D) Camphortree.

have been nonforest sawgrass or wet prairie in previous inventories. While Chinese tallowtree was the next most common invasive tree species detected in Florida, compared to other States with tallowtree infestations, the rate of invasion is relatively low (fig. 44). However, Chinese tallowtree spreads at rapid rates, and evidence suggests that warming temperatures may further exacerbate the spread of the invasive tree (Gan and others 2009). Tallowtree has spread at an alarming rate in the coastal areas of Louisiana, Mississippi, and east Texas over the last 15 years (Oswalt 2010). Therefore, continued monitoring is essential to track the rate of spread of this problematic species in Florida.

Field crews also inventoried Florida's forested subplots for 14 species of shrubs. Of those, field crews detected 11 species (table 17). Brazilian pepper was the most frequently detected shrub, followed by Chinese/European privet, glossy/Japanese

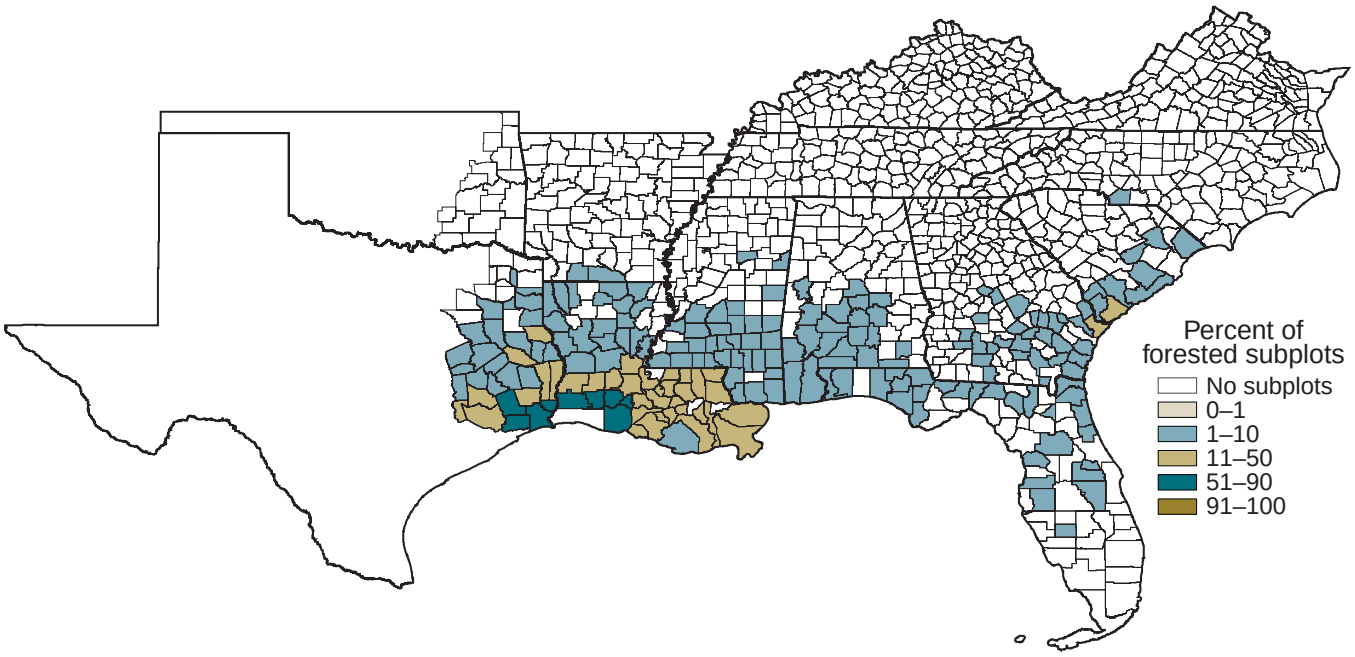


Figure 44—Chinese tallowtree occurrence on Forest Inventory and Analysis subplots across the Southern United States.

privet, and coral ardisia (fig. 45). Brazilian pepper occurred primarily in the South and Central units of Florida, with detections on >50 percent of forested subplots in 11 counties, and >11 percent in 13 additional counties. Brazilian pepper can cause allergic reactions similar to rashes caused by poison oak and poison ivy, is poisonous to domestic grazing animals, and is detrimental to the growth of native plant

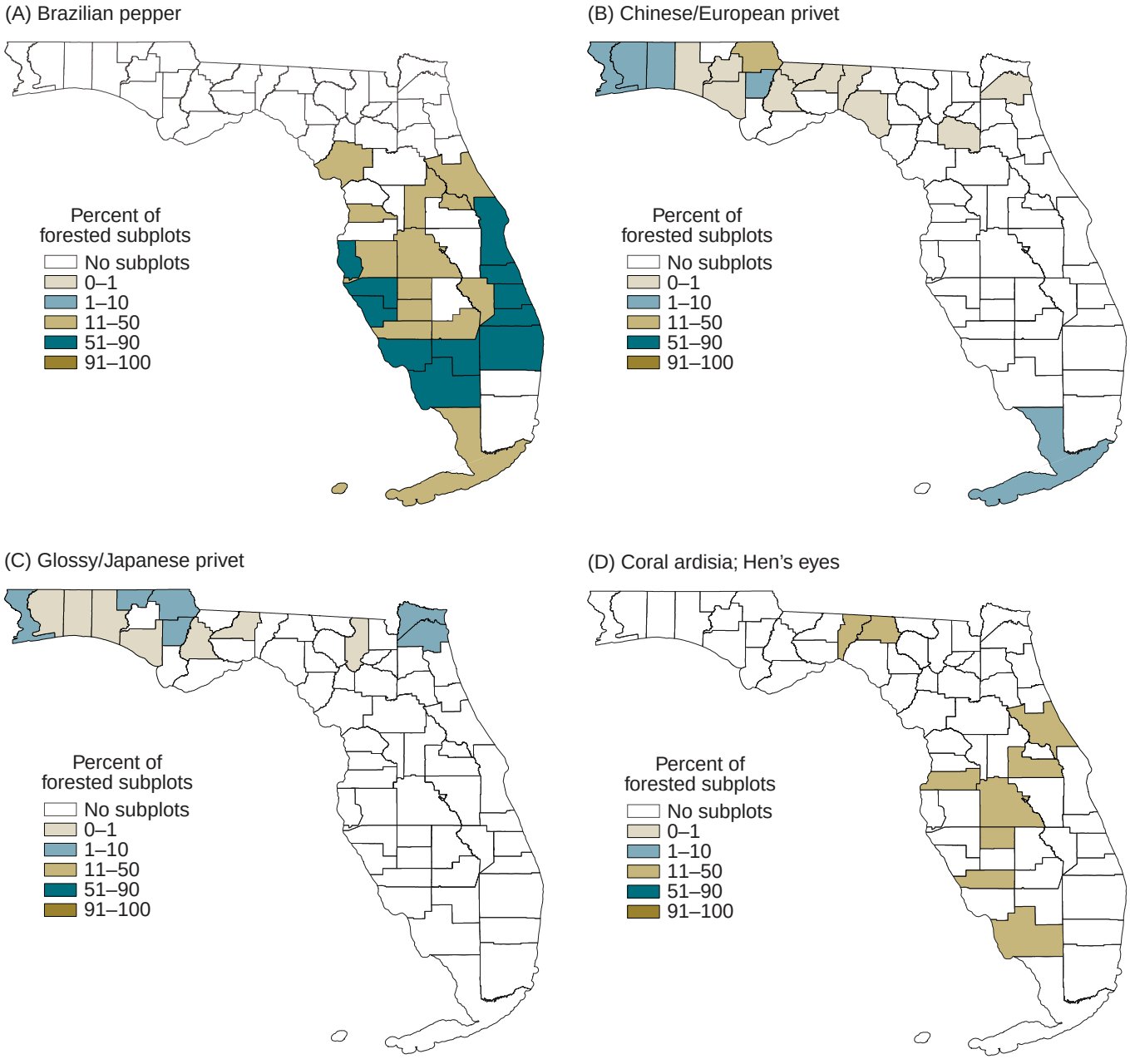


Figure 45—Four most frequently detected nonnative invasive shrubs on Forest Inventory and Analysis forested subplots in Florida A) Brazilian pepper, B) Chinese/European privet, C) Glossy/Japanese privet, and D) Coral ardisia.

species because of its allelopathic properties (Morton 1978, Morgan and Overholt 2005). Although Chinese/European privet was the next most frequently recorded species, Florida's infestation is small compared to surrounding States (fig. 46). However, nonnative privets continue to expand in range and degree of infestation, and landowners are encouraged to explore control options for these detrimental species.

Field crews monitored Florida's subplots for 11 vines, 7 grasses, 5 herbs, and 3 ferns. Of those, they detected eight vines, four grasses, four herbs, and three ferns on sampled forest land (table 17). Japanese honeysuckle was the most commonly detected vine, nepalese browntop was the most frequently detected grass, tropical soda apple was the most common herb, and Japanese climbing fern was the most

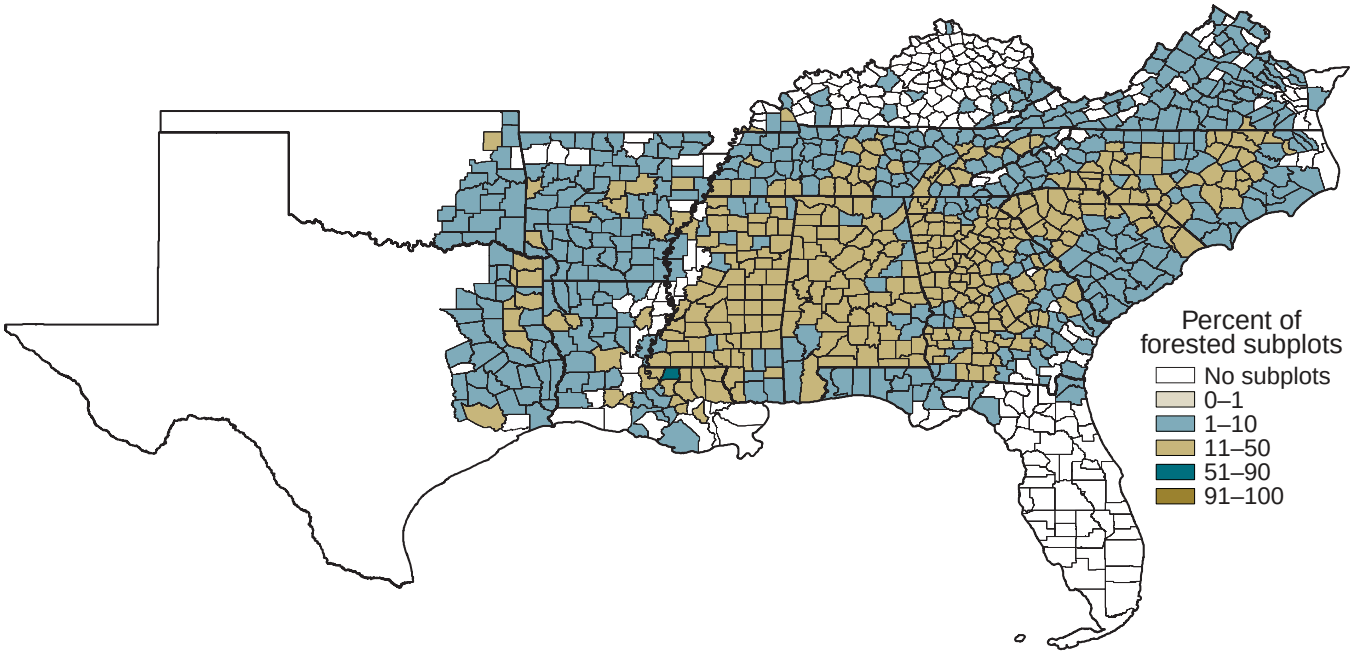


Figure 46—Chinese/European privet occurrence on Forest Inventory and Analysis subplots across the Southern United States.

common fern (fig. 47). Japanese honeysuckle has become naturalized across the Southeast. In Florida, Japanese honeysuckle was primarily detected in the Northwest and Northeast units, extending into the northern counties in the Central unit. In the counties where it was recorded, Japanese honeysuckle was found on <10 percent of forested subplots. Nepalese browntop is more common north of Florida, in counties near its point of introduction in Tennessee. However, it was detected on

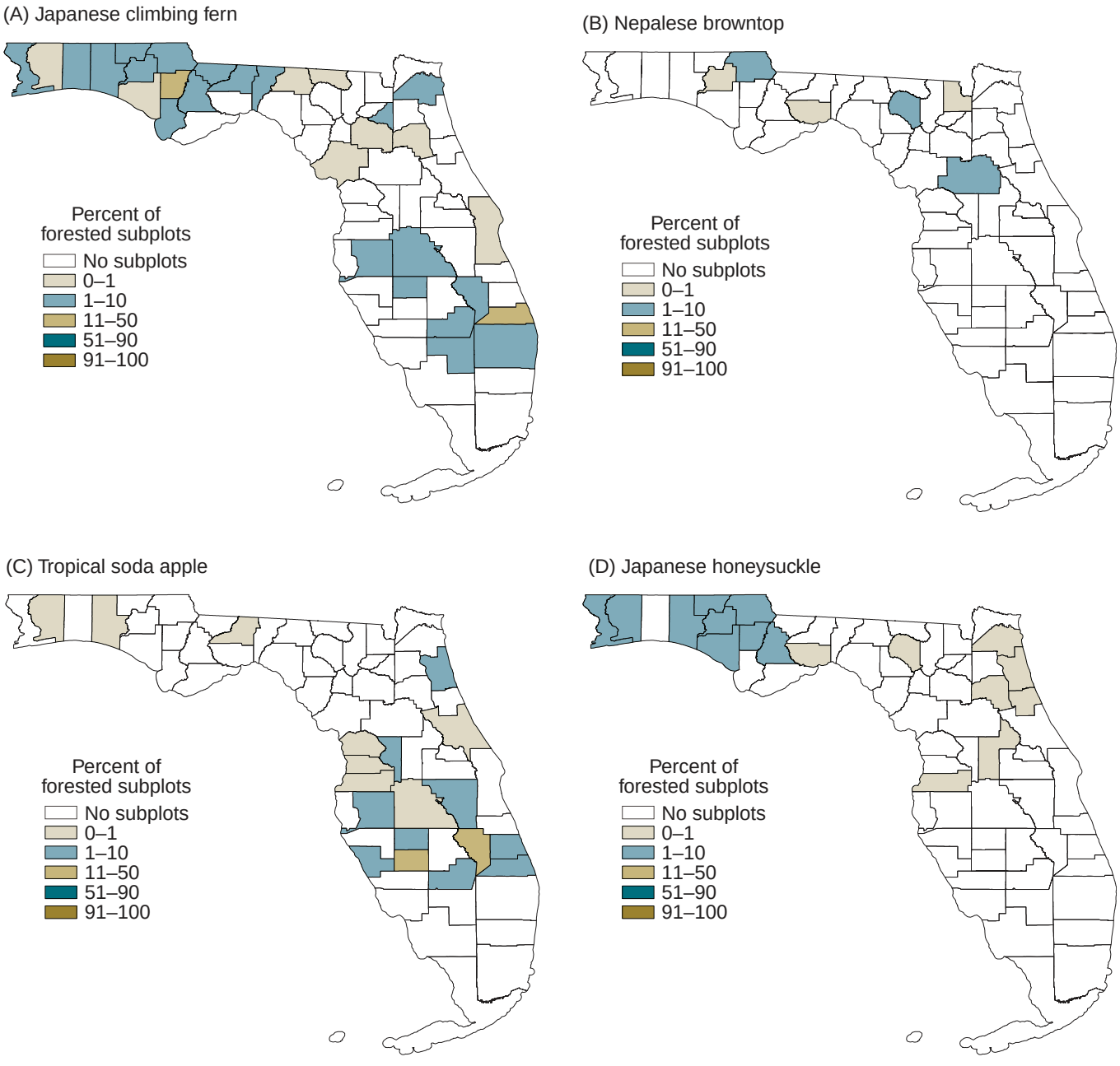


Figure 47—Four most frequently recorded vine, grass, herb, and fern on Forest Inventory and Analysis forested subplots in Florida A) Japanese honeysuckle, B) Nepalese browntop, C) Tropical soda apple, and D) Japanese climbing fern.

≤10 percent of subplots in three counties. Nepalese browntop impacts species diversity and density in disturbed forests, and may alter successional trajectories in regenerating forest stands (Oswalt and others 2007). Though infestation in Florida is light compared to surrounding States, these species are well-established in the South, and continue to spread. Therefore, continued monitoring is important.

Tropical soda apple is a thorn-covered herb that primarily invades pastures and other grassy areas, but can permeate forest edges. Most commonly found in Florida where it was introduced in the 1980s, tropical soda apple has also invaded landscapes as far north as Tennessee (Miller 2003). Tropical soda apple is a host to diseases that infect vegetable plants, so it is of economic concern anywhere where it becomes invasive (McGovern and others 1994). Field crews detected tropical soda apple on ≤50 percent of forested subplots in two counties in Florida, and ≤10 percent of subplots in nine additional counties.

Three ferns were detected on forested subplots in Florida (table 17), but Japanese climbing fern was most frequently detected. Introduced into Florida in the 1930s as an ornamental plant, Japanese climbing fern can form climbing mats similar to kudzu that smother shrubs and trees (Miller 2003). The warm climate in Florida allows the plant to grow year-round, enabling it to infest open or disturbed forests and cypress forests and hammocks. FIA field crews detected Japanese climbing fern in counties across the State. The fern occurred on ≤50 percent of forested subplots in two counties, and ≤10 percent of forested subplots in 20 additional counties. Japanese climbing fern causes significant ecological and economic damages where it occurs, including causing contamination and harvesting problems in pine plantations where harvesting pine straw is important (Florida Department of Agriculture and Consumer Services 2004).

Laurel Wilt

Perhaps the most significant forest health issue that emerged in Florida between 2001–08 is laurel wilt, a vascular wilt disease caused by a nonnative fungus (*Raffaelea lauricola*) which is vectored by the nonnative redbay ambrosia beetle (*Xyleborus glabratus*). Laurel wilt affects a number of native woody plant species in the laurel family (*Lauraceae*). Native trees in the genus *Persea* such as redbay (*P. borbonia*) and swamp bay (*P. palustris*) appear to be particularly susceptible, and laurel wilt has the potential to virtually eliminate these species as major components of coastal plain forests. Other confirmed hosts include sassafras (*Sassafras albidum*), pondspice (*Litsea aestivalis*), and pondberry (*Lindera mellisaefolia*). Avocado (*P. americana*) trees have also been confirmed as hosts for the insect and pathogen, causing serious concern regarding laurel wilt's potential impact on commercial avocado production in south Florida.

The presence of the redbay ambrosia beetle (RAB) in the United States was first detected in 2002, in monitoring traps near Port Wentworth, Georgia. Tree mortality due to laurel wilt was first observed in South Carolina in 2003. The presence of laurel wilt and RAB in Florida was first confirmed by Florida Forest Service Health Section staff in 2005, following investigation of unusual mortality of redbay trees

in coastal Duval County that was first observed in 2004. In monitoring plots established in the area, cumulative mortality of redbay trees increased from 9.8 to 92.4 percent over 15 months (Fraedrich and others 2008). By the end of 2008, tree mortality due to laurel wilt had been confirmed in 16 Florida counties and was continuing to spread (fig. 48).

Other Diseases

There were no specific outbreaks of diseases causing catastrophic losses of forest trees in Florida during the current survey cycle. Traditional diseases of "management concern" in pine plantation forestry such as fusiform rust (caused by *Cronatium fusiforme* f. sp. *quercuum*), pitch canker (caused by *Fusarium circinatum*), and annosum root

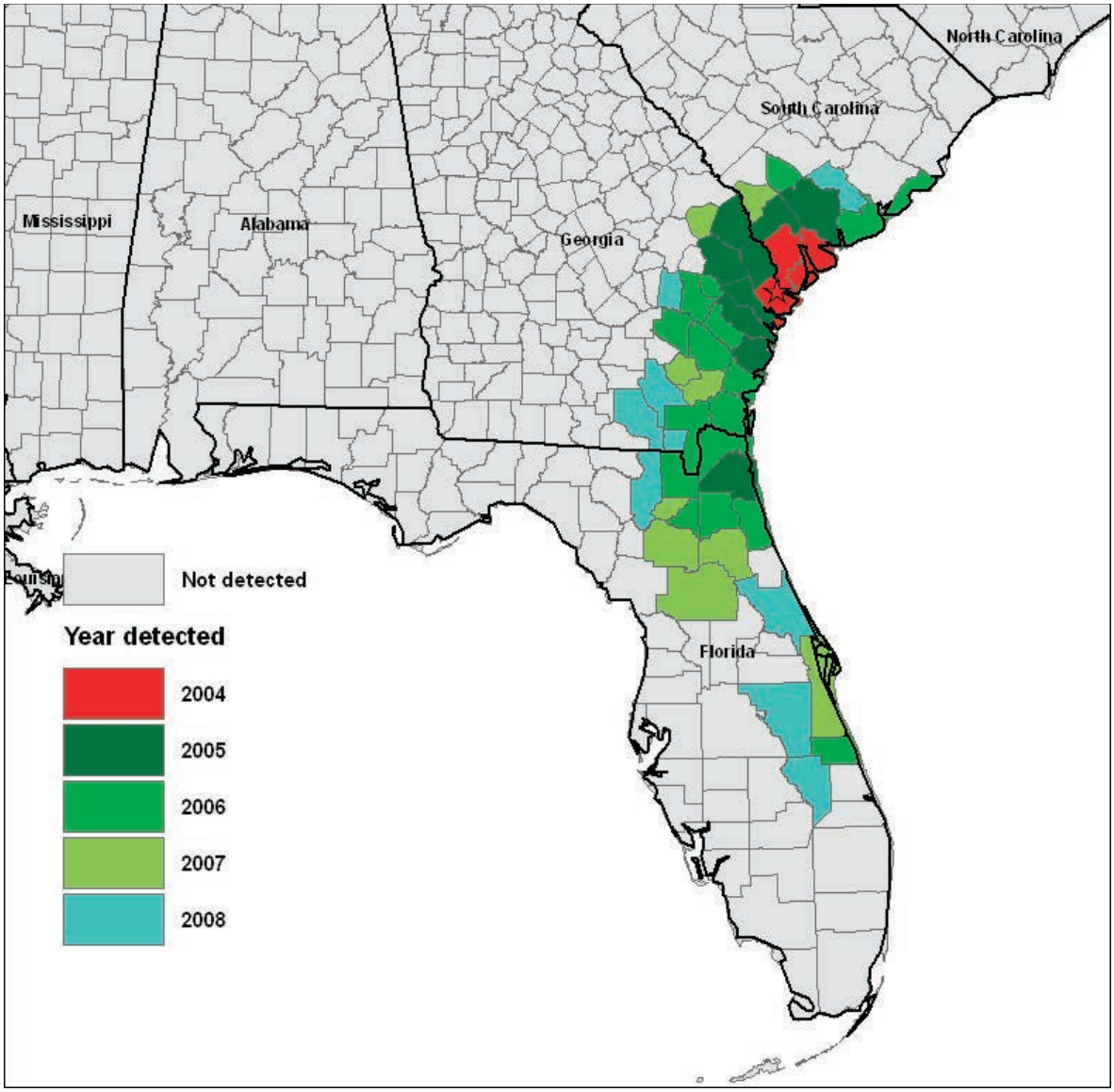


Figure 48—Distribution of counties with laurel wilt disease by year of initial detection.

disease (caused by *Heterobasidion annosum*) continued to "smolder" at various levels in plantations in the northern part of the State depending on management regimes, site specifics, predisposing environmental conditions, tree genetics, etc. In few locations, if any, did incidence and impact exceed what would be considered historical norms. However, ephemeral outbreaks of pitch canker activity in slash pine plantations near large poultry farms did cause significant damage to pines in direct proportion to the proximity of pines to poultry houses and/or their large ventilation fans. In addition, a survey of pine plantations across 29 counties of north and central Florida revealed occasional longleaf pine plantations with substantial incidence of fusiform rust; levels considered of management significance and perhaps warranting some monitoring, research, and management response. In addition to these pine diseases, oak mortality (particularly, *Quercus hemisphaerica*, *Q. laevis*, and *Q. nigra*—all relatively short-lived species) in both urban and forested areas continues to occur sporadically throughout the State of Florida, often in rhythm with extreme rainfall patterns. Pathogens associated with this mortality include *Armillaria tabescens*, *Ganoderma lucidum*, *Phytophthora cinnamomi*, and *Xylella fastidiosa*. The relationship of this mortality and associated pathogens to "oak decline" is unknown, but there is a certain degree of geographical superimposition (inset in fig. 49 below shows distribution of *X. fastidiosa* in Florida oaks).

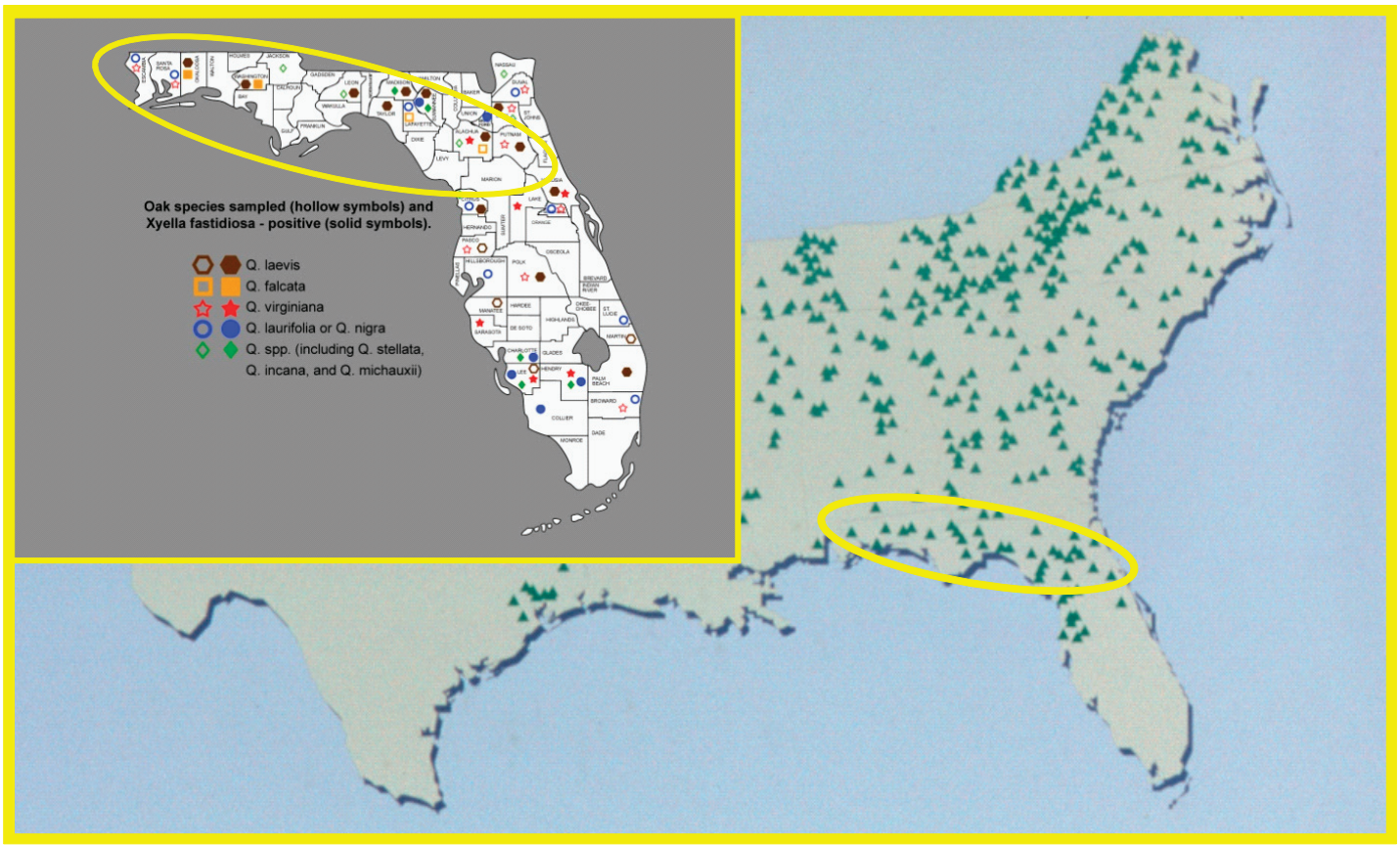


Figure 49—Historical map of plots with "oak decline" affected upland oaks in the Southern United States (Starkey and others 1992) and inset of distribution of related "oak decline" pathogens in Florida.

Insects

Florida experienced widespread outbreaks of the southern pine beetle (*Dendroctonus frontalis*, or SPB) from 2000–02, with the peak level of activity occurring in 2001 (fig. 50). In that year alone, 2,892 SPB infestations were reported, killing pine trees on about 17,600 acres. By 2003, SPB activity had returned to low levels, and it remained low through 2008. SPB populations and activity continue to be monitored with annual spring pheromone trapping and aerial surveys, and the SPB prevention cost-share program has been offered since 2006 to encourage landowners to conduct forest management practices which increase forest health and reduce SPB hazard.

Sporadic outbreaks of other pine bark beetles, such as pine engraver beetles (*Ips* spp.) and black turpentine beetle (*Dendroctonus terebrans*, or BTB) have been periodically observed across the State. These species are generally regarded as secondary pests that respond to stressed, injured, and declining pine trees. Unusually heavy BTB infestations have occasionally been observed in the years following partial harvest of slash pine stands, particularly on well-drained sites following a period of drought. Both *Ips* and BTB activity was notably high for several years in areas impacted by the six hurricanes that hit Florida in 2004 and 2005. This was especially true in areas that were affected by two or more hurricanes within 2 years, including parts of south Florida and the western Panhandle.

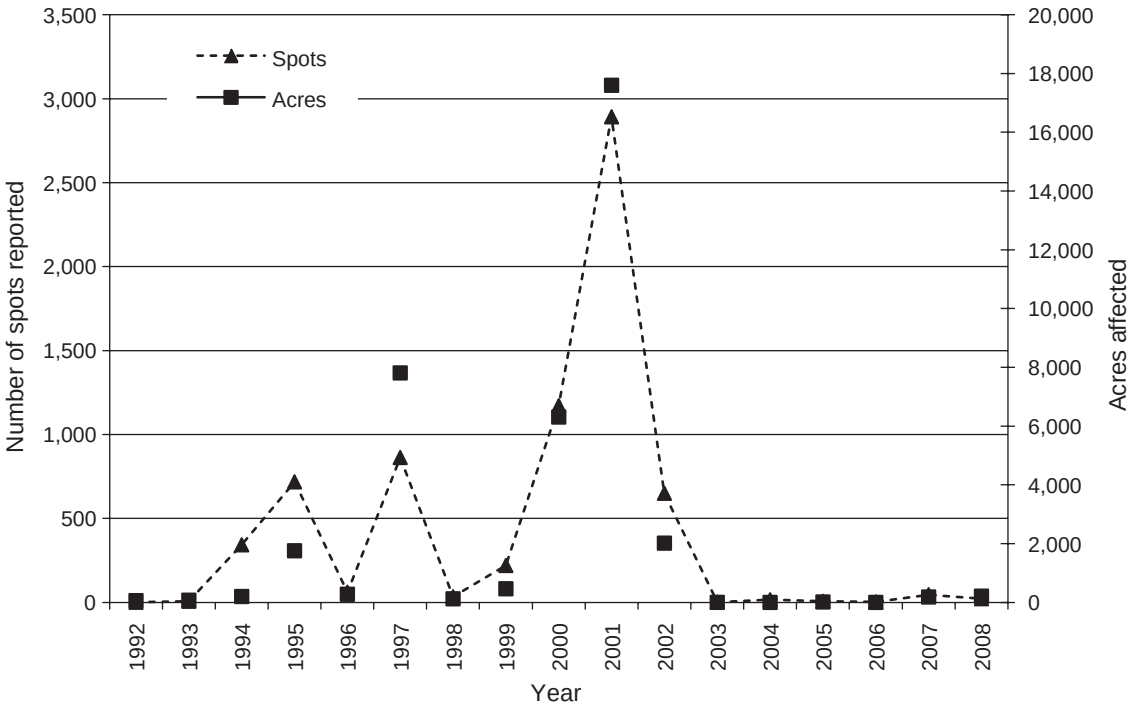


Figure 50—Impact of southern pine beetle on Florida timberland by year.



Southern pine beetle. (photo by Erich G. Vallery, U.S. Forest Service, Bugwood.org)

Forests in Florida have also been subject to sporadic and periodic defoliation by a number of different insects. In 2003, particularly heavy defoliation of hundreds of acres of pine trees by redheaded pine sawfly (*Neodiprion lecontei*) and blackheaded pine sawfly (*N. exitans*) was observed in south and central Florida. Defoliation by pink-striped oakworm (*Anisota virginiensis*) was unusually abundant in southeast Florida in 2005, especially on laurel oak (*Quercus hemisphaerica*). Widespread outbreaks of walnut caterpillar (*Datana integerrima*) defoliated hickory and pecan (*Carya* spp.) trees in many areas of central and northern Florida in 2005 and 2007. Outbreaks of variable oakleaf caterpillar (*Lochmaeus manteo*) severely defoliated laurel oak trees in areas of northeast and north-central Florida in 2007 and 2008. As with many other native defoliators, populations of these sawfly and caterpillar species are often characterized by "boom" and "bust" cycles, and rarely cause widespread tree mortality.

Report Summary

With the decline in acres planted to pine, installation of the world's largest pellet mill, and proposed influx of bioenergy related wood using plants, sustainability of Florida's forest resources is the subject of debate. Despite statistical findings of a volume surplus, the traditional forest industries are questioning the available wood supply of the size, species, and stand origin they are accustomed to processing. After a decade's worth of divestures of company landholdings to supply their mills, the dilemma of sustainability further rides on private sources of wood and the economy of investments and liquidations. In light of the current economic downturn and fewer housing starts, wood prices have declined and remain low at the time of this report.

The 2007 FIA survey recorded 15.9 million acres of timberland in Florida. All indications are that these forested acres are relatively healthy despite recent hurricanes and fire events, and as productive as in any previous survey. Growth rates are at their highest reported levels and net growth exceeds latest reported removals estimates. The 2007 Florida survey data suggest a surplus of wood volume available to meet future increases in demand for more wood products. Much of the surplus occurs on planted pine stands and is the result of landowner planting incentives offered in the mid-1980s. Similar incentives in the future will be needed to maintain Florida's wood volume at the current high levels. However, despite reduced harvest levels, significant reductions in total regeneration rates (fig. 51) are heightening concerns about the continued availability of an in-State supply of wood.

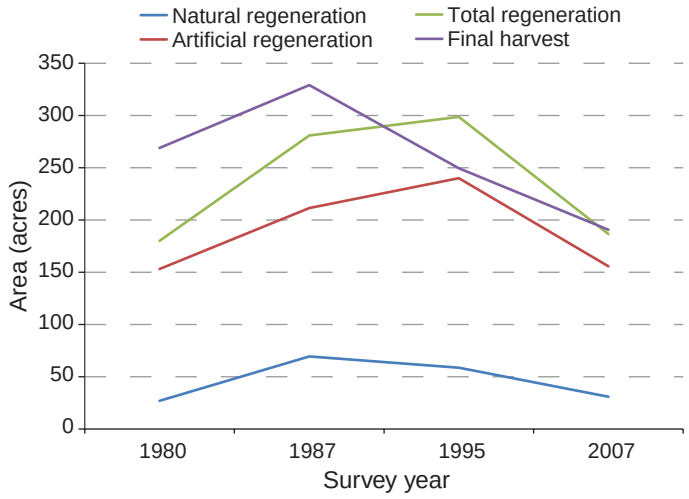


Figure 51—Average annual rates of timberland acres receiving final havest and regeneration by stand origin and survey year, Florida.



White tail deer. (photo by Larry Korhnak, University of Florida)

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Gopher turtle. (photo by Faith Barbour, Florida State Forest Photo Contest)



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Glossary

Terms used in this report are defined in the Forest Inventory and Analysis glossary available on the FIA Web site at http://www.fia.fs.fed.us/tools-data/docs/. For a hardcopy of the glossary please call 865-862-2000 or write to the following address:

Southern Research Station
Forest Inventory & Analysis
4700 Old Kingston Pike
Knoxville, TN 37919

Royal palm. (photo by Bill Lea, U.S. Forest Service)



Inventory Methods

Inventory design and methods for collecting and processing forest resource data have changed substantially since the previous Florida survey in 1995. These changes necessitate the use of caution when making rigorous comparisons between forest resource assessments.

The current inventory is a 3-phase, fixed-plot design conducted on an annualized basis. Annualized means that a portion of the entire sample population (a cycle) is collected each year until all plots have been measured. For the 2007 survey, the inventory was done over a 5-year period. Phase 1 (P1) provides the area estimates for the inventory. Phase 2 (P2) involves on-the-ground measurements of sample plots by field personnel. Phase 3 (P3) is a subset of the P2 plot system where additional measurements are made by field personnel to assess unique forest health indicators, many of which are not measured on the P2 plots.

The data that were used to derive the estimates in this report came from panels 1, 2, 3, 4, and 5 of cycle 8. Collectively, these five panels represent the full sample compliment of the cycle. The data was processed with the national inventory and monitoring system (NIMS) version 4.0 software.

Sample Design Overview: Annual versus Periodic

The current survey's sample design differs in several ways from the one employed previously. One change involved the switch from a periodic survey to an annualized survey. Another involved switching from a variable-radius sample to a fixed-plot sample. These changes, alone or in combination, weaken comparisons between surveys. The only way to quantify the true impact of such changes on trend analysis would be to conduct the survey using both plot designs simultaneously and compare the results of these two independent surveys. Neither the time nor other resources were available to do this.

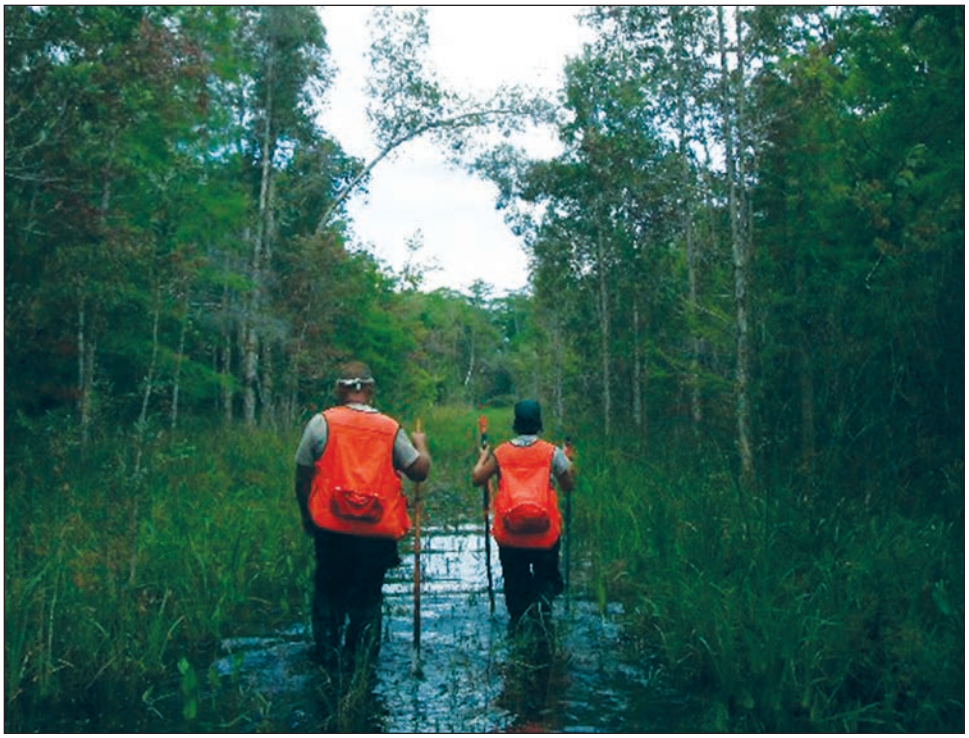
Previous surveys of Florida were periodic; all plots were measured in about 2 years, and the time between remeasurement averaged 7 to 11 years. The current, annual inventory design was implemented to provide more up-to-date information about forest resources and comparability from State to State across the United States. Under the annual inventory system, 20 percent (1 panel) of the total number of plots in a State are measured every year over a 5-year period (1 cycle). Each panel of plots is selected on a subgrid which is slightly offset from the previous panel, so that each panel covers essentially the same sample area (both spatially and in intensity) as the prior panel. In the sixth year, the plots that were measured in the first panel are remeasured. This marks the beginning of the next cycle of data collection. After field measurements are completed, a cycle of data is available for the 5-year report. Because of logistics, economics, and sample implementation protocols, the dataset consists of data that are <1-year old (the most recently collected data) as well as data up to 5 years old (the data collected at the beginning of the cycle).

One of the major impacts on data interpretation and analysis of switching to the annual inventory design is the length of time for data collection (5 years versus 1 or 2 years). Data collected over a longer period of time have a higher probability of sampling a specific event, e.g., a hurricane or fire, but with only a small proportion of the sample. However, data collected over a shorter time span, such as data collected in the periodic survey, may miss an event entirely until the next periodic measurement takes place, at which time all the sample plots would reflect the event.

Sample Design Phases

The three phases (P1, P2, and P3) of the current sampling method are based upon a hexagonal-grid design for sample placement on the ground; successive phases are sampled with less intensity. In general, the P1 phase involves area estimation, the P2 and P3 phases involves placement of sample plots on the ground, where measurement of variable attributes are made. The grid ensures a systematic placement of P2 and P3 plots on the ground. There are 16 P2 hexagons for every P3 hexagon. The P2 and P3 hexagons represent about 6,000 and 96,000 acres, respectively. To ensure systematic coverage of the sample domain (a State), the goal is to place one P2 plot in every hexagonal grid cell.

Area, current P1—The new approach in the determination of forest area applies a stratification technique to improve the precision of the estimate, i.e., it reduces the variance of the estimate. With this method, the placement (on the ground) and subsequent classification (by land use) of the P2 plot carries much of the weight in determining forest area. The area of control was the survey unit. Forest Inventory and Analysis (FIA) used National Land



Florida field crew enroute to plot location. (photo by Jay Frost, U.S. Forest Service)

Cover Data (NLCD) for the stratification platform. The NLCD data has a land classification produced by the U.S. Geological Survey, derived from Landsat Thematic Mapper data. Using this data, FIA identifies four strata to improve the variance of the area estimate. These strata are identified by a pixel classification according to four types of placement: (1) pixels in forest, (2) pixels in nonforest, (3) pixels in nonforest but within a 2-pixel width of a forest edge, and (4) pixels in a forest area but within a 2-pixel width of a forest edge. The estimation of forest area is then the sum across all strata from respective pixel counts (based on placement within the above strata) and the mean area from the P2 plots. This type of approach places more weight on the P2 plot in area determination than with previous aerial-photo dot count methods.

Area, previous P1—In the 1995 Florida survey, the estimate of forest and nonforest areas was based on interpreting dot-cluster counts systematically spaced on recent aerial photographs with each dot classified as forest or nonforest. In the Northwest and Northeast units, estimates of forest and nonforest areas were based on the ground classification of 85,107 sample clusters. The forest or nonforest estimate was then adjusted by ground-truth checks at 6,513 of the 16-point clusters, and a linear regression was fitted to the data to develop the relationship between the photo and ground classification of the subsample. This procedure provides a means for adjusting the initial estimates of area for change in land use since date of photography and for photo misclassification. In the Central and South units, estimates of forest and nonforest areas were based on the ground classification of 6,030 sample clusters systematically distributed across the landscape. At each of the clusters, 16 points were classified as to land use. Overall, samples represented about 2,800 acres per plot for the State.

Change in Assessing National Forest and Reserved Lands

Current—Under the annual inventory system, area estimation of all lands and ownerships was based on the probability of selection of P2 plot locations. There was no enumeration of any ownership (no use of known areas of ownership to determine area and plot expansion factors). As a result, the known forest land area (for specific ownerships) does not always agree with area estimates based on probability of selection. For example, the acreage of national forests, published by the National Forest System, will not agree exactly with the statistical estimate of national forest land derived by FIA. These numbers may differ substantially for very small areas.

Previous—In the 1995 Florida survey, all national forest, other public, and forest industry lands in a county were enumerated. In addition, additional plots were added to improve sampling errors. The enumerated or known acreages were taken from public agency reports and other public domain documents. For example, the enumerated national forest area in each county was divided by the number of sample locations to derive expansion factors. The enumerated forest areas were subtracted from the total forest area derived for the county from P1 estimates and the remaining forested plots were then divided into this area to derive the expansion factors for the nonenumerated ownerships.

Plot Design

Current P2—Bechtold and Patterson (2005) describe the current P2 and P3 ground plots and explain their use. These plots are clusters of four points arranged so that one point is central and the other three lie 120 feet from it at azimuths of 0, 120, and 240 degrees (fig. A.1). Each point is the center of a circular subplot with a fixed 24-foot radius. Trees ≥5.0 inches in diameter at breast height (d.b.h.) are measured in these subplots. Each subplot in turn contains a circular 1/300 acre microplot with a fixed 6.8-foot radius (fig. A.2). Trees 1.0 to 4.9 inches in d.b.h. and seedlings (<1.0 inch in d.b.h.) are measured on these microplots.

Sometimes a plot cluster straddles two or more land use or forest condition classes (Bechtold and Patterson 2005). There are seven condition-class variables that require mapping of a unique condition on a plot: land use, forest type, stand size, ownership, stand density, regeneration status, and reserved status. A new condition is defined and mapped each time the aerial extent of one of these variables is encountered during plot measurement. The process of mapping any of these conditions on a plot changes the plot size for a respective condition, i.e., the condition size will be smaller than a full plot complement and this may increase the variance of the estimate.

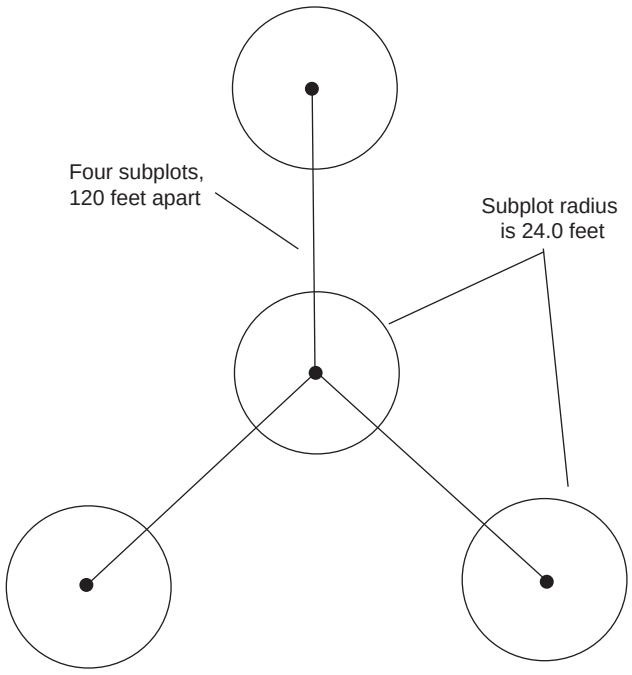


Figure A.1—Annual inventory fixed-plot design (the P2 plot).

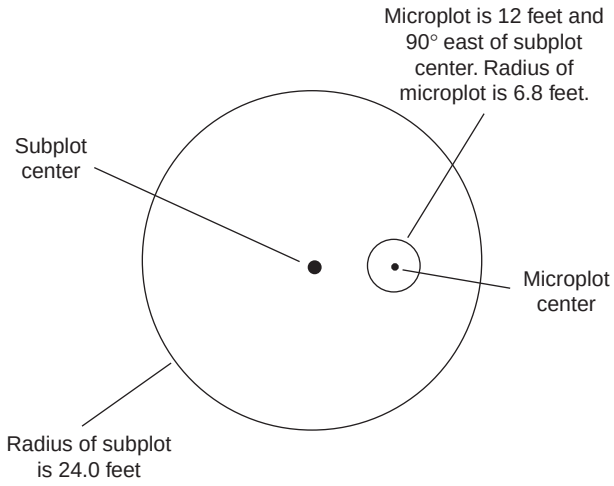


Figure A.2—Subplot and microplot layout.

Previous P2—In the 1995 inventory of Florida, FIA utilized a prism sampling design. At each forested location, a sample plot cluster was installed based on 10 satellite points. This cluster covered about one acre. In most cases at each forested sample plot, a variable plot was established by using a basal area factor of 37.5 square feet per acre systematically spaced within a single forest condition at 5 of the 10 cluster points. Trees ≥5.0 inches in d.b.h. were selected with a 37.5-basal-area-factor prism at each of the satellite points. Trees ≥1.0, but < 5.0 inch in d.b.h., were tallied on a 1/300-acre circular fixed-radius plot (6.8 foot radius) centered at the first three satellite points.

Forest conditions were not mapped on the prism 5-point cluster. The land use designation for the entire plot was based on the land use determined at point center of point 1, i.e., if the point center fell on forest land, the entire plot was classified as forest; if the point center fell on a nonforest area, the entire plot was classed as nonforest. In situations where point 1 was forested but portions of the 5-point plot cluster straddled a forest-nonforest area, points that fell in the nonforest area were systematically rotated into the forest area by means of detailed systematic instructions that ensured all field people would rotate points in the same manner for any given situation.

Current P3—Data on forest health variables (P3) are collected on about $1/16^{th}$ of the P2 sample plots (U.S. Department of Agriculture 2004). P3 data are coarse descriptions, and are meant to be used as general indicators of overall forest health over large geographic areas. 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 (fig. A.3).

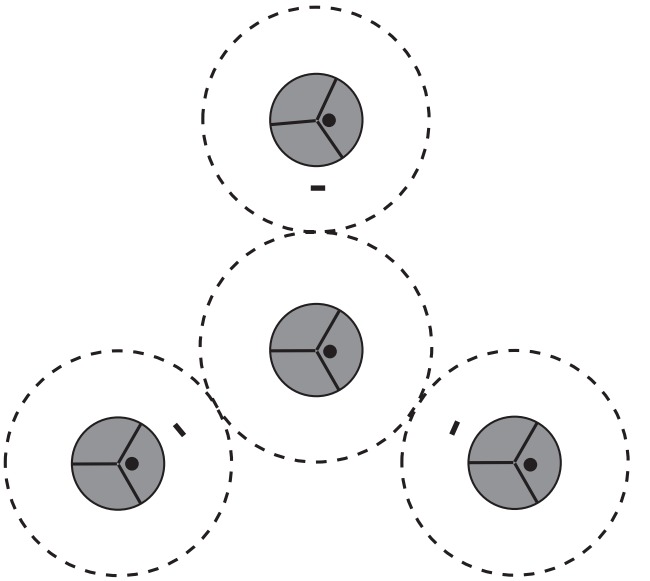


Figure A.3—Layout of the fixed-radius plot design illustrating where the P3 variables (soil and down woody material) were collected.

Biomonitoring sites for ozone data collection are located independently of the FIA grid. Sites must be 1-acre fields or similar open areas adjacent to or surrounded by forest land, and must contain a minimum number of plants of at least two identified bioindicator species (U.S. Department of Agriculture 2006). Plants are evaluated for ozone injury, and voucher specimens are submitted to a regional expert for verification of ozone-induced foliar injury.

Volume Estimation

Current—Tree volumes for each individual tally tree were derived by a linear regression model. The general form of the model involves two tree measurements from sample trees: d.b.h. and total height. This equation estimated gross cubic foot volume from a 1-foot stump to a 4-inch upper diameter for each sample tree. Separate equation coefficients for 77 species or species groupings were utilized. The volume in forks in the central bole and the volume in limbs outside of the main bole were excluded. Net cubic foot volume was derived by subtracting the estimate of rotten or missing wood for each sample tree. Volume of the saw-log portion (expressed in International 1/4-inch board feet) of sample trees was derived by using board foot-to-cubic foot ratio equations. All equations and coefficients were developed from standing and felled tree volume studies conducted by FIA across several Southern States. For more detailed and specific information regarding volume models and coefficients, contact the Southern Research Station, Forest Inventory and Analysis work unit.

Previous—Volumes in the 1995 Florida survey were derived from measurements of trees on forested sample locations, standing tree studies using sectional poles and mirror calipers, and felled tree studies measured at 50 active cutting operations. These data supplement the standing-tree volume data and are used to construct volume equations. The deterministic volume measurements included d.b.h., bark thickness, total height, bole length, and log length. In addition, volume equations were developed to estimate the volume for trees not surviving the measurement period or for past volumes of new sample trees.

Biomass (and Carbon) Estimation

Current—Tree biomass for each individual tally tree was derived by applying models and coefficients derived by McClure and others (1981) and McClure and Knight (1984). The general form of the model utilized two tree measurements from sample trees: d.b.h. and total height. The coefficients derived green weight by means of a volume conversion method. The dry weight was then derived by multiplying the green weight by 0.5. The tree biomass model gives the weight of the total tree, including wood and bark, from ground level; foliage is not included. The model for the merchantable stem, including wood and bark, gives the weight of the stem from a 1-foot stump to a 4-inch top. For more detailed and specific information regarding biomass models and coefficients, contact the Southern Research Station, Forest Inventory and Analysis work unit.

Previous—Tree biomass for each individual tally tree was derived by applying models and coefficients derived by Alexander Clark (Research Forester (retired); U.S. Forest Service, Southern Research Station, Athens, GA). The general form of the model utilized two tree measurements from sample trees: d.b.h. and total height. The coefficients for both dry and green weights were applied to the tree data. The tree biomass models gave the weight, including wood and bark, of all tree components from a 1-foot stump; foliage was not included. The merchantable stem component, including wood and bark, includes that from a 1-foot stump to a 4-inch top.

Growth, Removals, and Mortality Estimation

Growth, removals, and mortality (GRM) estimates were determined from the remeasurement of sample plots measured in the 1995 inventory. Several factors impacted the GRM estimates, especially if comparing these with past surveys of Florida. First, all of the plots from the 1995 survey were not remeasured because of logistics, economics, and efficiency involving field work. Of the 5,424 timberland plots measured in 1995, 2,731 were remeasured (fig. A.4) compared to 5,591 remeasured in

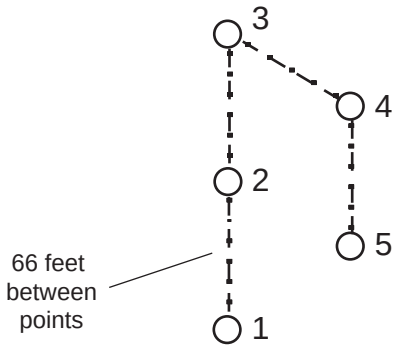


Figure A.4—Configuration of 5-point satellite sample unit (used to collect remeasurement data for growth, removals, and mortality in the 2005 survey).

1995 from the 1987 survey. This weakened reversion and diversion (see definitions in glossary) estimates. Second, the Beers and Miller (1964) estimator technique was used to determine gross growth, net growth, removals, mortality, and net change of the inventory. Ingrowth was derived from new trees on the microplot (fig. A.5). This methodology required personnel to account only for previously tallied trees. The 1995 survey utilized the Van Deusen method to derive growth, a method that utilized ongrowth and nongrowth trees (Van Deusen and others 1986). Because of the issues above, GRMs in this report were only reported for plots that were on timberland in 1995 and were still on timberland in 2007. In addition, many of the factors discussed weaken comparisons with past GRM estimates of Florida.

Changes in Variable Algorithms

The methods used to assess various attributes have also changed and this, too, impacts trend analysis. Three of the more important attributes in the forest survey are stocking, forest type, and stand size. A stocking algorithm is used to determine individual tree stocking and this in turn is used as an importance value in deriving a forest type and stand size for each plot in the 1995 survey. With the implementation of the new fixed plot sample design, the stocking algorithm changed, along with the forest-type algorithm and stand-size algorithm.

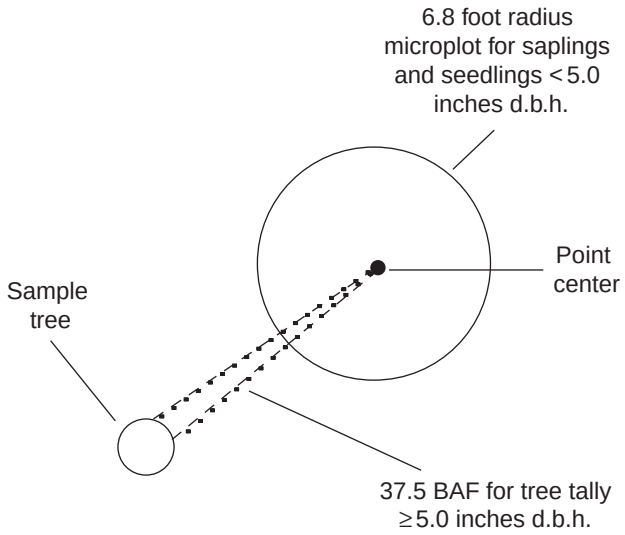


Figure A.5—Configuration of one satellite point.

Methods Summary

Users wishing to make rigorous comparisons of data between surveys should be aware of the significant differences in plot designs and variable assessments. Assuming there is no bias in plot selection or maintenance of plot integrity, the most valuable and powerful trend information is obtained when the same plots are revisited from one survey to the next and measured in the same way. This is also the only method that yields reliable components of change estimation (GRM) especially by specific attributes such as species. This approach reduces the noise that is present in data for natural forest stands and increases the level of confidence in assessments of trends. However, if sample designs change, there can never be a high level of certainty that the trends in the data are real and not due to procedural changes. Even though both designs may be judged statistically valid, the naturally occurring noise in the data hinders confident and rigorous assessments of trend over time. Determining the strength of a trend, or determining the level of confidence associated with a trend, is difficult or impossible when sampling methods change over time.



Florida field crew member recording data. (photo by Jay Frost, U.S. Forest Service)

Data Reliability

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

Measurement Error

Measurement error is also called nonsampling or data acquisition error. These are errors that arise in the acquisition, recording, or editing of statistical data (Burt and Barber 1996). There are three elements of measurement error: (1) biased error, caused by instruments not properly calibrated; (2) compensating error, caused by instruments of moderate precision; and (3) accidental error, caused by human error in measuring, recording, and compiling. All of these are held to a minimum by a system, the FIA quality assurance (QA) program that incorporates training, check plots, and editing and checking for consistency. The goal of the QA program is to provide a framework to assure the production of complete, accurate, and unbiased forest assessments for given standards.

It is not possible to determine measurement error statistically but it is held to a minimum level through a number of quality control (QC) procedures. These methods include use of nationally standardized field manuals, use of portable data recorders (PDRs), thorough entry-level training, periodic review training, supervision, use of check plots, editing checks, and an emphasis on careful work. Additionally, data quality is assessed and documented using performance measurements and post survey assessments. These assessments are then used to identify areas of the data collection process that need improvement or refinement in order to meet quality objectives of the program.

Editing checks in the PDR and office screen out logical and data entry inconsistencies and errors for all plots. Use of PDR's also helps ensure that specified procedures are followed. The minimum national standards for annual training of field crews are: (1) a minimum of 40 hours for new employees, and (2) a minimum of 8 hours for returning employees. Field crew members are certified on a test plot. All crews are required to have at least one certified person present on the plot at all times.

Field audits consist of hot checks, cold checks, and blind checks. A hot check is an inspection normally done as part of the training process. The inspector is present with the crew to document crew performance as plots are measured. The recommended intensity for hot checks is 2 percent of the plots installed.

Cold checks are done at regular intervals throughout the field season. The crew that installed the plot is not present at the time of inspection and does not know when or which plots will be remeasured. The inspector visits the completed plot, evaluates the crew's data collection, and notes corrections where necessary. The recommended intensity for cold checks is 5 percent of the plots installed.

A blind check is a complete reinstallation measurement of a previously completed plot. However, the QA crew performs the remeasurement without the previously recorded data. This type of blind measurement provides a direct, unbiased observation of measurement precision from two independent crews. Plots selected for blind checks are chosen to be a representative subsample of all plots measured and are randomly selected. Blind checks are planned to take place within two weeks of the date of the field measurement. The recommended intensity for blind checks is 3 percent of the plots installed.

Sampling Error

A measure of reliability of inventory statistics is provided by sampling errors. Sampling error is associated with the natural and expected deviation of the sample from the true population mean. This deviation is susceptible to a mathematical evaluation of the probability of error. Sampling errors for State totals are based on one standard deviation, meaning that the chances are two out of three that the true population value is within the limits indicated by a confidence interval.

Forest Inventory and Analysis inventories supported by the full complement of sample plots are designed to achieve reliable statistics at the survey unit and State levels. However, users should note that sampling error increases as the area considered decreases in magnitude. Sampling errors and associated confidence intervals are often unacceptably high for small components of the total resource.

Sampling errors (in percent) and associated confidence intervals around the sample estimates for timberland area, inventory volumes, and components of change are presented in the following tabulation.

Item	Sample estimate and confidence interval	Sampling error
		percent
Timberland (*1,000 acres*)	15,912.1 ± 144.8	0.91
All live (*million cubic feet*)		
Inventory	19,342.3 ± 396.5	2.05
Net annual growth	743.5 ± 23.3	3.13
Annual removals	563.6 ± 27.4	4.87
Annual mortality	226.8 ± 11.0	4.83
Growing stock (*million cubic feet*)		
Inventory	14,933.1 ± 333.0	2.23
Net annual growth	646.2 ± 21.3	3.29
Annual removals	527.2 ± 26.1	4.96
Annual mortality	175.1 ± 9.6	5.47
Sawtimber (*million board feet*)		
Inventory	46,785.9 ± 1,398.9	2.99
Net annual growth	1,902.4 ± 75.0	3.94
Annual removals	1,325.6 ± 86.6	6.53
Annual mortality	534.8 ± 33.6	6.28

Statistical confidence may be computed for any subdivision of the State totals using the following formula. Sampling errors obtained from 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 State total
SE_t = sampling error for State total
X_s = sum of values for the variable of interest (area or volume) for subdivision of State
X_t = total area or volume for State

For example, the estimate of sampling error for softwood live-tree volume on public timberland is computed as:

$$SE_s = 2.05 \frac{\sqrt{19{,}342.3}}{\sqrt{3{,}642.7}} = 2.05 \frac{139.1}{60.4} = 4.72$$

Thus, the sampling error is 4.72 percent, and the resulting confidence interval (two times out of three) for softwood live-tree inventory on public timberland is 3,642.7 ± 171.9 million cubic feet.

Fox squirel. (photo by Faith Barbour, Florida State Forest Photo Contest)



Table C.1—Species list[a] by common and scientific name, Florida, 2007

Common name	Scientific name[b]
Softwoods	
Australian pine	*Casuarina* L.
Atlantic white-cedar	*Chamaecyparis thyoides* (L.) B.S.P.
Southern redcedar	*Juniperus silicicola* (Small) Bailey
Eastern redcedar	*J. virginiana* L.
Caribbean pine	*Pinus caribaea* Morelet
Sand pine	*P. clausa* (Chapm. ex Engelm.) Vasey ex Sarg.
Shortleaf pine	*P. echinata* Mill.
Slash pine	*P. elliottii* Engelm.
Spruce pine	*P. glabra* Walt.
Longleaf pine	*P. palustris* Mill.
Pond pine	*P. serotina* Michx.
Loblolly pine	*P. taeda* L.
Baldcypress	*Taxodium distichum* (L.) Rich.
Pondcypress	*T. distichum* var. *nutans*
Florida yew	*Taxus floridana* Nutt. ex Chapman
Florida torreya	*Torreya taxifolia* Arn.
Hardwoods	
Florida maple	*Acer barbatum* Michx.
Boxelder	*A. negundo* L.
Red maple	*A. rubrum* L.
Silver maple	*A. saccharinum* L.
Ailanthus	*Ailanthus altissima* (Mill.) Swingle
Tung-oil tree	*Aleurites fordii* Hemsl.
Serviceberry	*Amelanchier* spp. Med.
Torchwood	*Amyris elemifera* L.
Pond apple	*Annona glabra* L.
Black mangrove	*Avicennia germinans* (L.) L.
River birch	*Betula nigra* L.
Gumbo limbo	*Bursera simaruba* (L.) Sarg.
American hornbeam	*Carpinus caroliniana* Walt.
Hickory	*Carya* spp. Nutt.
Water hickory	*C. aquatica* (Michx. f.) Nutt.
Bitternut hickory	*C. cordiformis* (Wangenh.) K. Koch
Pignut hickory	*C. glabra* (Mill.) Sweet
Pecan	*C. illinoensis* (Wangenh.) K. Koch
Shellbark hickory	*C. laciniosa* (Michx. f.) Loud.
Nutmeg hickory	*C. myristiciformis* (Michx. f.) Nutt.
Shagbark hickory	*C. ovata* (Mill.) K. Koch
Mockernut hickory	*C. tomentosa* (Poir.) Nutt.
Allegheny chinkapin	*Castanea pumila* Mill.
Florida chinkapin	*Castanea alnifolia* Nutt.
Catalpa	*Catalpa* spp. Scop.
Southern catalpa	*Catalpa bignonioides* Walt.
Sugarberry	*Celtis laevigata* Willd.
Eastern redbud	*Cercis canadensis* L.
Hardwoods (continued)	
Camphor tree	*Cinnamomum camphora* (L.) J. Presl
Fiddlewood	*Citharexylum fruticosum* L.
Citrus spp.	*Citrus* L.
Pigeon plum	*Coccoloba diversifolia* Jacq.
Soldierwood	*Colubrina elliptica* (Sw.) Briz. & Stern
Button-mangrove	*Conocarpus erectus* L.
Largeleaf geigertree	*Cordia sebestena* L.
Flowering dogwood	*Cornus florida* L.
Hawthorn	*Crataegus spp.* L.
Carrotwood	*Cupaniopsis anacardioides* (A. Rich.) Radlk.
Common persimmon	*Diospyros virginiana* L.
Red stopper	*Eugenia rhombea* Krug & Urban
Inkwood (butterbough)	*Exothea paniculata* (Juss.) Radlk.
American beech	*Fagus grandifolia* Ehrh.
Strangler fig	*Ficus aurea* Nutt.
Shortleaf fig (wild banyantree)	*F. citrifolia* P. Mill.
White ash	*Fraxinus americana* L.
Carolina ash	*F. caroliniana* P. Mill.
Green ash	*F. pennsylvanica* Marsh.
Pumpkin ash	*F. profunda* (Bush) Bush
Waterlocust	*Gleditsia aquatica* Marsh.
Honeylocust	*G. triacanthos* L.
Loblolly bay	*Gordonia lasianthus* (L.) Ellis
Longleaf blolly (beeftree)	*Guapira discolor* (Spreng.) Little
Manchineel	*Hippomane mancinella* L.
American holly	*Ilex opaca* Ait.
Black walnut	*Juglans nigra* L.
White mangrove	*Laguncularia racemosa* (L.) Gaertn. f.
Sweetgum	*Liquidambar styraciflua* L.
Yellow-poplar	*Liriodendron tulipifera* L.
False tamarind	*Lysiloma latisiliquum* (L.) Benth.
Cucumbertree	*Magnolia acuminata* L.
Southern magnolia	*M. grandiflora* L.
Bigleaf magnolia	*M. macrophylla* Michx.
Sweetbay	*M. virginiana* L.
Crabapple	*Malus angustifolia* (Ait.) Michx.
Mango	*Mangifera indica* L.
False mastic	*Mastichodendron foetidissimum* (Jacq.) H.J. Lam
Melaleuca	*Melaleuca quinquenervia* (Cav.) Blake
Chinaberry	*Melia azedarach* L.
Florida poisonwood	*Metopium toxiferum* (L.) Krug & Urban

continued

Table C.1—Species List[a] by common and scientific name, Florida, 2007 (continued)

Common name	Scientific name[b]
Hardwoods (continued)	
White mulberry	*Morus alba* L.
Red mulberry	*M. rubra* L.
Water tupelo	*Nyssa aquatica* L.
Blackgum	*N. sylvatica* Marsh.
Swamp tupelo	*N. sylvatica* var. *biflora* (Walt.) Sarg.
Eastern hophornbeam	*Ostrya virginiana* (Mill.) K. Koch
Sourwood	*Oxydendrum arboreum* (L.) DC.
Redbay	*Persea borbonia* (L.) Spreng.
Fishpoison tree	*Piscidia piscipula* (L.) Sarg.
Planertree	*Planera aquatica* J.F. Gmel.
American sycamore	*Platanus occidentalis* L.
Cottonwood	*Populus* spp. L.
American plum	*Prunus americana* Marsh.
Carolina laurelcherry	*P. caroliniana* (P. Mill.) Ait.
Black cherry	*P. serotina* Ehrh.
White oak	*Quercus alba* L.
Scarlet oak	*Q. coccinea* Muenchh.
Durand oak	*Q. durandii* Buckl.
Southern red oak	*Q. falcata* Michx.
Cherrybark oak	*Q. falcata* var. *pagodifolia* Ell.
Bluejack oak	*Q. incana* Bartr.
Turkey oak	*Q. laevis* Walt.
Laurel oak	*Q. laurifolia* Michx.
Overcup oak	*Q. lyrata* Walt.
Swamp chestnut oak	*Q. michauxii* Nutt.
Chinkapin oak	*Q. muehlenbergii* Engelm.
Water oak	*Q. nigra* L.
Nuttall oak	*Q. nuttallii* Palmer
Willow oak	*Q. phellos* L.
Shumard oak	*Q. shumardii* Buckl.
Post oak	*Q. stellata* Wangenh.
Black oak	*Q. velutina* Lam.
Live oak	*Q. virginiana* Mill.
Hardwoods (continued)	
Red mangrove	*Rhizophora mangle* L.
Willow	*Salix* spp. L.
Sassafras	*Sassafras albidum* (Nutt.) Nees
Schefflera (octopus tree)	*Schefflera actinophylla* (Endl.) H.A.T. Harms
False mastic	*Sideroxylon foetidissimum* Jacq.
White bully (willow bustic)	*S. salicifolium* (L.) Lam.
Paradise tree	*Simarouba glauca* DC.
West Indian mahogany	*Swietenia mahagoni* (L.) Jacq.
Java plum	*Syzygium cumini* (L.) Skeels
Tamarind	*Tamarindus indica* L.
Carolina basswood	*Tilia americana* var. *caroliniana* (P. Mill.) Castigl.
White basswood	*T. heterophylla* Vent.
Winged elm	*Ulmus alata* Michx.
American elm	*U. americana* L.
Cedar elm	*U. crassifolia* Nutt.
Chinese elm	*U. parvifolia* Jacq.
English elm	*U. procera* Salisb.
Slippery elm	*U. rubra* Muhl.
Palms	
Paurotis palm	*Acoelorraphe wrightii* (Griseb. & H. Wendl.) H. Wendl. ex Becc.
Florida silver palm	*Coccothrinax argentata* (Jacq.) Bailey
Coconut palm	*Cocos nucifera* L.
Florida royal palm	*Roystonea elata* (Bartr.) F. Harper
Cabbage palm	*Sabal palmetto* (Walt.) Lodd. ex J.A. & J.H. Schultes
Key thatch palm	*Thrinax morrisii* H. Wendl.
Florida thatch palm	*T. radiata* Lodd. ex J.A. & J.H. Schultes

[a] Scientific and common names of tree species subject to survey in Florida.
[b] Little (1979).

Table D.1—Area by survey unit and land status, Florida, 2007

Survey unit	Total area	All forest	Unreserved			Reserved			Nonforest land	Census water
			Total	Timberland	Unproductive	Total	Productive	Unproductive		
	thousand acres									
Northeast	10,783.8	6,701.5	6,600.2	6,577.8	22.4	101.3	101.3	0.0	2,997.5	1,084.8
Northwest	8,488.8	5,607.9	5,554.8	5,500.1	54.7	53.2	48.8	4.4	1,615.9	1,264.9
Central	11,815.6	2,781.8	2,694.2	2,657.6	36.6	87.6	77.8	9.8	7,142.5	1,891.3
South	10,994.7	1,805.9	1,283.1	1,176.6	106.5	522.8	415.4	107.4	5,723.3	3,465.5
All units	42,082.8	16,897.1	16,132.3	15,912.1	220.1	764.8	643.3	121.6	17,479.2	7,706.5

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

Table D.2—Area of forest land by ownership class and land status, Florida, 2007

Ownership class	All forest	Unreserved			Reserved		
		Total	Timberland	Unproductive	Total	Productive	Unproductive
	thousand acres						
U.S. Forest Service							
National forest	1,116.8	1,063.9	1,058.0	5.8	53.0	48.5	4.4
Other Forest Service	5.8	5.8	5.8	0.0	0.0	0.0	0.0
Total	1,122.6	1,069.6	1,063.8	5.8	53.0	48.5	4.4
Other Federal							
National Park Service	410.4	0.0	0.0	0.0	410.4	317.6	92.8
U.S. Fish and Wildlife Service	164.3	100.0	85.1	14.8	64.3	60.4	3.9
Dept. of Defense/Dept. of Energy	427.6	427.6	421.8	5.8	0.0	0.0	0.0
Other Federal	190.4	190.4	190.4	0.0	0.0	0.0	0.0
Total	1,192.6	717.9	697.3	20.7	474.7	378.0	96.6
State and local government							
State	2,549.5	2,347.5	2,297.2	50.3	202.0	187.8	14.3
Local	450.1	420.6	392.9	27.7	29.4	23.2	6.3
Other nonfederal public	5.8	0.0	0.0	0.0	5.8	5.8	0.0
Total	3,005.4	2,768.2	2,690.1	78.1	237.2	216.7	20.5
Nonindustrial private							
Undifferentiated private	11,576.6	11,576.6	11,461.0	115.6	0.0	0.0	0.0
Total	11,576.6	11,576.6	11,461.0	115.6	0.0	0.0	0.0
All classes	16,897.1	16,132.3	15,912.1	220.1	764.8	643.3	121.6

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 timberland by forest-type group and site productivity class, Florida, 2007

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 types								
Longleaf-slash pine	5,643.6	0.0	1,082.6	2,779.1	1,443.4	332.3	6.1	0.0
Loblolly-shortleaf pine	1,615.4	0.0	356.5	724.8	298.0	148.2	87.9	0.0
Other eastern softwoods group	3.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0
Total softwoods	7,262.0	0.0	1,439.1	3,507.0	1,741.4	480.5	94.0	0.0
Hardwood types								
Oak-pine	1,461.3	0.0	377.5	752.7	235.7	65.8	29.6	0.0
Oak-hickory	2,726.6	0.0	997.4	1,186.1	361.3	144.1	33.1	4.6
Oak-gum-cypress	3,193.4	0.0	1,098.0	1,460.0	571.2	58.3	5.8	0.0
Elm-ash-cottonwood	96.4	0.0	64.8	13.0	14.0	4.6	0.0	0.0
Maple-beech-birch	6.4	0.0	6.4	0.0	0.0	0.0	0.0	0.0
Other hardwoods group	50.4	0.0	19.5	23.4	7.5	0.0	0.0	0.0
Tropical hardwoods	452.2	0.0	249.7	160.2	36.5	5.8	0.0	0.0
Exotic hardwood	81.3	0.0	50.9	30.4	0.0	0.0	0.0	0.0
Total hardwoods	8,067.9	0.0	2,864.2	3,625.8	1,226.1	278.7	68.5	4.6
Nonstocked	582.2	0.0	220.6	269.5	80.7	9.5	1.9	0.0
All groups	15,912.1	0.0	4,523.9	7,402.3	3,048.3	768.7	164.3	4.6

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.4—Area of timberland by forest-type group and ownership group, Florida, 2007

Forest-type group	All ownerships	Ownership group			
		U.S. Forest Service	Other Federal	State and local government	Nonindustrial private
	thousand acres				
Softwood types					
Longleaf-slash pine	5,643.6	505.8	234.3	932.9	3,970.6
Loblolly-shortleaf pine	1,615.4	214.8	101.3	116.4	1,183.0
Other eastern softwoods group	3.0	0.0	0.0	1.5	1.5
Total softwoods	7,262.0	720.6	335.6	1,050.8	5,155.0
Hardwood types					
Oak-pine	1,461.3	107.7	82.2	242.7	1,028.6
Oak-hickory	2,726.6	65.3	151.4	310.7	2,199.0
Oak-gum-cypress	3,193.4	140.9	83.4	713.7	2,255.3
Elm-ash-cottonwood	96.4	0.0	14.3	17.4	64.7
Maple-beech-birch	6.4	0.0	0.0	0.0	6.4
Other hardwoods group	50.4	0.0	7.8	13.1	29.6
Tropical hardwoods	452.2	17.3	1.4	180.4	253.1
Exotic hardwood	81.3	0.0	0.0	28.2	53.1
Total hardwoods	8,067.9	331.3	340.6	1,506.2	5,889.8
Nonstocked	582.2	11.9	21.1	133.1	416.1
All groups	15,912.1	1,063.8	697.3	2,690.1	11,461.0

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.5—Area of timberland by forest-type group and stand-age class, Florida, 2007

Forest-type group	All classes	Stand-age class (*years*) 1–10	11–20	21–30	31–40	41–50	51–60	61–70	71–80	81–90	91–100	101+	Non-stocked
						thousand acres							
Softwood types													
Longleaf-slash pine	5,643.6	1,246.6	1,514.5	1,049.8	545.0	409.6	325.2	264.6	153.3	70.1	20.1	30.8	14.0
Loblolly-shortleaf pine	1,615.4	256.9	525.4	431.3	168.3	121.7	46.6	43.1	13.1	8.9	0.0	0.0	0.0
Other eastern softwoods group	3.0	0.0	0.0	0.0	1.5	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0
Total softwoods	7,262.0	1,503.5	2,039.9	1,481.2	714.9	531.3	371.8	309.2	166.4	79.1	20.1	30.8	14.0
Hardwood types													
Oak-pine	1,461.3	151.5	179.3	234.7	190.7	251.0	172.2	133.5	86.2	32.5	12.3	17.4	0.0
Oak-hickory	2,726.6	398.0	281.9	325.2	399.1	380.0	298.2	260.8	175.8	74.9	53.9	51.5	27.2
Oak-gum-cypress	3,193.4	250.2	204.1	238.2	284.9	389.2	423.9	335.2	428.7	289.0	136.6	184.9	28.5
Elm-ash-cottonwood	96.4	26.1	26.2	7.7	1.5	12.3	5.4	10.3	3.8	3.2	0.0	0.0	0.0
Maple-beech-birch	6.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.4	0.0	0.0
Other hardwoods group	50.4	6.4	2.9	7.8	11.5	0.0	10.3	5.8	0.0	0.0	5.8	0.0	0.0
Tropical hardwoods	452.2	50.4	55.9	49.8	69.0	74.3	33.0	56.3	31.1	24.5	7.8	0.0	0.0
Exotic hardwood	81.3	43.2	20.9	5.4	5.8	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total hardwoods	8,067.9	925.8	771.3	868.8	962.5	1,112.8	943.0	801.9	725.5	424.2	222.7	253.8	55.7
Nonstocked	582.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	582.2
All groups	15,912.1	2,429.3	2,811.2	2,349.9	1,677.4	1,644.1	1,314.7	1,111.0	891.9	503.2	242.8	284.6	651.9

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.

Table D.6—Area of timberland by forest-type group and stand origin, Florida, 2007

Forest-type group	Total	Stand origin	
		Natural stands	Artificial regeneration
	thousand acres		
Softwood types			
Longleaf-slash pine	5,643.6	2,155.8	3,487.8
Loblolly-shortleaf pine	1,615.4	568.5	1,046.9
Other eastern softwoods group	3.0	3.0	0.0
Total softwoods	7,262.0	2,727.3	4,534.7
Hardwood types			
Oak-pine	1,461.3	1,194.7	266.5
Oak-hickory	2,726.6	2,463.0	263.5
Oak-gum-cypress	3,193.4	3,165.3	28.1
Elm-ash-cottonwood	96.4	94.6	1.8
Maple-beech-birch	6.4	6.4	0.0
Other hardwoods group	50.4	47.5	2.9
Tropical hardwoods	452.2	452.2	0.0
Exotic hardwood	81.3	67.2	14.2
Total hardwoods	8,067.9	7,490.9	577.0
Nonstocked	582.2	464.0	118.2
All groups	15,912.1	10,682.3	5,229.9

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.

Table D.7—Area of timberland disturbed annually by forest-type group and disturbance class, Florida, 2007

Forest-type group	Disturbance class							
	Insects	Disease	Weather	Fire	Domestic animals	Wild animals	Human	Other natural
	thousand acres							
Softwood types								
Longleaf-slash pine	2.3	3.9	7.1	79.0	0.9	0.6	8.0	0.9
Loblolly-shortleaf pine	0.6	1.0	5.7	9.8	0.0	0.0	1.5	0.4
Other eastern softwoods group	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total softwoods	2.9	4.9	12.8	88.8	0.9	0.6	9.5	1.3
Hardwood types								
Oak-pine	0.6	0.5	4.1	17.1	0.4	0.5	2.5	0.9
Oak-hickory	2.9	0.0	16.0	16.0	0.9	0.0	4.5	0.1
Oak-gum-cypress	0.0	1.0	27.4	11.3	0.3	0.0	2.5	0.5
Elm-ash-cottonwood	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0
Maple-beech-birch	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other hardwoods group	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0
Tropical hardwoods	0.0	0.3	5.3	5.8	0.0	0.0	0.5	2.1
Exotic hardwood	0.0	0.0	1.6	2.0	0.0	0.0	0.0	0.0
Total hardwoods	3.5	1.8	57.1	52.3	1.7	0.5	9.9	3.5
Nonstocked	0.0	0.0	2.9	10.9	1.2	0.0	0.4	0.0
All groups	6.4	6.7	72.7	152.0	3.7	1.1	19.8	4.8

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.8—Area of timberland treated annually by forest-type group and treatment class, Florida, 2007

Forest-type group	Treatment class									
		Cutting								
	Total treated	Final harvest	Partial harvest	Seed-tree/ shelter-wood harvest	Commer-cial thinning	Timber stand improve-ment	Site prepar-ation	Artificial regen-eration	Natural regen-eration	Other silvi-cultural
	thousand acres									
Softwood types										
Longleaf-slash pine	140.8	89.2	10.7	1.2	36.9	2.8	96.7	111.0	3.2	11.8
Loblolly-shortleaf pine	36.2	15.6	6.6	0.7	13.0	0.3	16.5	22.8	1.4	1.8
Other eastern softwoods group	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total softwoods	177.0	104.8	17.3	1.9	49.9	3.1	113.3	133.9	4.6	13.6
Hardwood types										
Oak-pine	22.1	9.4	6.7	0.0	4.9	1.1	5.4	7.1	3.3	0.4
Oak-hickory	56.7	30.6	18.5	1.7	5.1	0.7	8.6	9.6	10.1	3.9
Oak-gum-cypress	38.5	19.6	18.2	0.0	0.2	0.5	3.3	1.8	9.2	0.6
Elm-ash-cottonwood	1.4	0.8	0.6	0.0	0.0	0.0	0.1	0.1	0.0	0.0
Maple-beech-birch	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other hardwoods group	1.6	0.7	0.6	0.0	0.4	0.0	0.0	0.0	0.7	0.0
Tropical hardwoods	3.6	1.0	2.6	0.0	0.0	0.0	0.7	0.0	0.2	0.6
Exotic hardwood	3.1	2.5	0.6	0.0	0.0	0.0	0.0	0.0	0.6	0.3
Total hardwoods	127.1	64.6	47.8	1.7	10.6	2.4	18.1	18.7	24.0	5.9
Nonstocked	26.9	21.2	4.1	0.1	1.4	0.0	8.3	3.1	2.4	0.8
All groups	330.9	190.6	69.1	3.8	61.9	5.5	139.7	155.7	30.9	20.3

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

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

Table D.9—Area of timberland by forest-type group and stand-size class, Florida, 2007

Forest-type group	All size classes	Stand-size class			
		Large diameter	Medium diameter	Small diameter	Non-stocked
	thousand acres				
Softwood types					
Longleaf-slash pine	5,643.6	1,862.2	2,059.7	1,721.7	0.0
Loblolly-shortleaf pine	1,615.4	505.8	668.5	441.2	0.0
Other eastern softwoods group	3.0	3.0	0.0	0.0	0.0
Total softwoods	7,262.0	2,371.0	2,728.2	2,162.9	0.0
Hardwood types					
Oak-pine	1,461.3	614.2	299.4	547.6	0.0
Oak-hickory	2,726.6	1,082.9	553.3	1,090.3	0.0
Oak-gum-cypress	3,193.4	1,738.7	785.6	669.1	0.0
Elm-ash-cottonwood	96.4	20.2	23.6	52.6	0.0
Maple-beech-birch	6.4	6.4	0.0	0.0	0.0
Other hardwoods group	50.4	10.4	10.3	29.8	0.0
Tropical hardwoods	452.2	311.4	79.3	61.5	0.0
Exotic hardwood	81.3	0.0	10.2	71.2	0.0
Total hardwoods	8,067.9	3,784.1	1,761.6	2,522.2	0.0
Nonstocked	582.2	0.0	0.0	0.0	582.2
All groups	15,912.1	6,155.1	4,489.8	4,685.1	582.2

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

Table D.10—Number of live trees on timberland by species group and diameter class, Florida, 2007

Species group[a]	All classes	Diameter class 1.0–2.9	3.0–4.9	5.0–6.9	7.0–8.9	9.0–10.9	11.0–12.9	13.0–14.9	15.0–16.9	17.0–18.9	19.0–20.9	21.0–24.9	25.0–28.9	29.0–32.9	33.0–36.9	37.0+
	million trees															
Softwood																
Longleaf and slash pines	1,998.1	579.5	608.2	408.6	217.0	94.1	43.4	26.1	11.5	6.3	2.1	0.9	0.3	0.0	0.0	0.0
Loblolly and shortleaf pines	330.9	92.7	77.6	78.3	41.0	19.6	9.3	5.2	3.0	2.1	1.0	0.9	0.2	0.0	0.0	0.0
Other yellow pines	318.2	105.7	90.7	71.0	31.6	9.5	5.0	2.4	1.5	0.3	0.2	0.3	0.0	0.0	0.0	0.0
Cypress	582.4	254.6	126.1	69.0	48.8	33.3	21.3	13.9	7.1	3.9	2.5	1.4	0.4	0.1	0.0	0.1
Other eastern softwoods	42.1	27.0	5.3	3.5	1.9	1.3	1.3	0.6	0.4	0.2	0.3	0.1	0.0	0.0	0.0	0.0
Total softwoods	3,271.7	1,059.5	907.9	630.4	340.4	157.7	80.3	48.3	23.4	12.8	6.1	3.7	0.9	0.2	0.0	0.1
Hardwood																
Select white oaks	7.2	4.4	0.9	0.7	0.2	0.2	0.3	0.2	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0
Select red oaks	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	0.0	0.0	0.0
Other white oaks	351.8	191.7	76.6	29.1	17.0	10.4	6.9	6.1	3.7	2.3	2.7	2.4	1.2	0.9	0.4	0.4
Other red oaks	845.6	529.4	158.1	60.2	36.1	22.9	14.4	9.1	5.8	3.2	2.5	2.5	0.8	0.4	0.2	0.2
Hickory	30.3	18.1	4.4	1.9	2.1	1.2	1.0	0.5	0.6	0.1	0.3	0.3	0.0	0.0	0.0	0.0
Hard maple	1.9	1.3	0.0	0.3	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Soft maple	326.9	208.6	60.4	24.8	13.2	7.7	4.7	3.1	1.7	1.0	0.7	0.7	0.3	0.0	0.0	0.0
Beech	0.7	0.4	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
Sweetgum	214.0	121.6	47.9	17.6	9.3	6.9	4.0	2.5	2.0	0.8	0.5	0.6	0.2	0.0	0.0	0.0
Tupelo and blackgum	626.5	314.1	150.3	63.2	40.2	22.1	13.8	9.6	5.6	3.4	1.7	1.6	0.5	0.2	0.1	0.1
Ash	210.9	117.7	52.4	17.8	9.2	5.1	3.4	2.1	1.5	0.7	0.5	0.5	0.1	0.0	0.0	0.0
Cottonwood and aspen	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	0.0	0.0	0.0
Basswood	6.6	2.7	1.7	0.6	0.4	0.2	0.2	0.1	0.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0
Yellow-poplar	17.3	8.8	2.2	2.2	1.6	0.9	0.5	0.4	0.2	0.2	0.2	0.1	0.1	0.0	0.0	0.0
Black walnut	0.1	0.0	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
Other eastern soft hardwoods	565.6	371.4	109.2	39.8	22.1	10.5	5.9	3.1	1.9	0.8	0.5	0.4	0.1	0.1	0.0	0.0
Other eastern hard hardwoods	118.0	96.4	16.2	3.7	1.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eastern noncommercial hardwoods	798.7	460.6	133.3	53.6	36.2	42.6	37.4	19.8	9.6	3.7	1.1	0.8	0.1	0.0	0.0	0.0
Total hardwoods	4,122.3	2,447.3	813.6	315.6	188.9	131.0	92.6	56.7	33.1	16.3	10.7	10.2	3.4	1.6	0.7	0.7
All species	7,394.0	3,506.8	1,721.5	946.0	529.3	288.7	172.9	105.0	56.5	29.1	16.8	13.9	4.3	1.8	0.7	0.8

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.

[a] Palm species have been included (species 906 to 915).

Table D.11—Number of growing-stock trees on timberland by species group and diameter class, Florida, 2007

Species group[a]	All classes	Diameter class 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	784.7	393.3	211.7	91.2	42.5	25.5	11.4	6.1	2.0	0.9	0.2	0.0	0.0	0.0
Loblolly and shortleaf pines	154.3	75.0	39.7	18.7	8.9	5.1	2.9	1.9	1.0	0.9	0.2	0.0	0.0	0.0
Other yellow pines	105.6	62.3	27.8	7.3	4.2	2.1	1.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0
Cypress	173.6	55.4	41.3	29.4	20.1	13.1	6.7	3.6	2.3	1.4	0.3	0.1	0.0	0.0
Other eastern softwoods	6.8	2.6	1.3	0.8	0.9	0.4	0.3	0.1	0.2	0.1	0.0	0.0	0.0	0.0
Total softwoods	1,225.1	588.5	321.7	147.3	76.6	46.2	22.4	12.0	5.8	3.5	0.7	0.2	0.0	0.0
Hardwood														
Select white oaks	1.5	0.5	0.2	0.2	0.2	0.2	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0
Select red oaks	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	0.0
Other white oaks	11.4	3.8	1.8	1.8	0.7	0.8	0.5	0.4	0.5	0.6	0.3	0.2	0.1	0.0
Other red oaks	96.5	34.3	22.2	15.2	8.8	5.8	4.1	2.2	1.6	1.5	0.5	0.2	0.1	0.0
Hickory	5.4	1.2	1.2	0.8	0.8	0.4	0.5	0.1	0.2	0.3	0.0	0.0	0.0	0.0
Hard maple	0.4	0.2	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Soft maple	25.7	10.0	5.7	3.7	2.0	1.9	0.9	0.5	0.5	0.4	0.1	0.0	0.0	0.0
Beech	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	0.0
Sweetgum	34.4	12.8	7.0	5.4	3.4	2.1	1.8	0.7	0.5	0.5	0.2	0.0	0.0	0.0
Tupelo and blackgum	111.2	39.9	27.5	16.2	10.2	7.6	4.3	2.7	1.3	1.0	0.3	0.2	0.0	0.0
Ash	19.8	6.4	4.2	3.1	2.2	1.5	1.1	0.4	0.4	0.4	0.1	0.0	0.0	0.0
Cottonwood and aspen	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	0.0
Basswood	1.2	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0
Yellow-poplar	5.1	1.6	1.4	0.7	0.5	0.4	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0
Other eastern soft hardwoods	43.1	18.4	11.5	5.6	3.2	1.8	1.2	0.6	0.3	0.4	0.1	0.0	0.0	0.0
Other eastern hard hardwoods	1.4	1.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total hardwoods	357.4	130.4	83.3	53.0	32.1	22.5	14.8	7.9	5.4	5.4	1.5	0.6	0.2	0.1
All species	1,582.5	719.0	405.0	200.4	108.7	68.8	37.3	19.9	11.2	8.9	2.3	0.8	0.2	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] Palm species have been included (species 906 to 915).

Table D.12—Net[a] volume of live trees on timberland by forest-type group and stand-size class, Florida, 2007

Forest-type group[b]	All size classes	Stand-size class			
		Large diameter	Medium diameter	Small diameter	Non-stocked
	million cubic feet				
Softwood types					
Longleaf-slash pine	5,670.2	3,183.3	2,308.5	178.4	0.0
Loblolly-shortleaf pine	1,967.8	1,088.3	818.0	61.5	0.0
Other eastern softwoods group	4.5	4.5	0.0	0.0	0.0
Total softwoods	7,642.4	4,276.1	3,126.5	239.8	0.0
Hardwood types					
Oak-pine	1,582.5	1,108.5	317.3	156.7	0.0
Oak-hickory	2,607.9	1,990.1	431.1	186.7	0.0
Oak-gum-cypress	6,833.4	5,521.0	1,192.5	119.8	0.0
Elm-ash-cottonwood	92.1	57.3	27.0	7.8	0.0
Maple-beech-birch	24.8	24.8	0.0	0.0	0.0
Other hardwoods group	42.8	31.8	7.4	3.7	0.0
Tropical hardwoods	475.4	358.9	111.8	4.7	0.0
Exotic hardwood	16.0	0.0	7.4	8.6	0.0
Total hardwoods	11,674.8	9,092.3	2,094.6	488.0	0.0
Nonstocked	25.0	0.0	0.0	0.0	25.0
All groups	19,342.3	13,368.4	5,221.0	727.8	25.0

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

[b] Palm species have been included (species 906 to 915).

Table D.13—Net[a] volume of live trees on timberland by species group and ownership group, Florida, 2007

Species group[b]	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	6,178.7	720.3	343.1	1,040.2	510.9	3,564.2
Loblolly and shortleaf pines	1,441.2	15.3	12.7	137.1	224.0	1,052.1
Other yellow pines	854.0	202.5	136.1	88.8	41.2	385.4
Cypress	2,372.8	90.1	76.0	707.1	117.9	1,381.7
Other eastern softwoods	121.2	2.2	19.4	51.7	16.4	31.4
Total softwoods	10,967.9	1,030.4	587.4	2,024.9	910.3	6,414.9
Hardwood						
Select white oaks	29.9	0.1	0.0	1.3	0.0	28.5
Select red oaks	2.7	0.0	0.0	2.6	0.0	0.1
Other white oaks	1,053.0	22.5	46.0	185.6	43.0	755.9
Other red oaks	1,845.3	33.6	36.3	322.5	94.3	1,358.6
Hickory	124.6	5.4	1.1	23.5	0.1	94.5
Hard maple	5.7	0.0	0.0	0.0	0.1	5.6
Soft maple	537.8	10.1	13.9	143.6	46.7	323.5
Beech	3.6	0.0	0.0	0.0	0.0	3.6
Sweetgum	566.7	7.4	13.6	87.3	39.3	419.0
Tupelo and blackgum	1,694.7	79.9	61.3	511.7	150.3	891.5
Ash	404.9	37.3	30.7	171.2	30.7	135.0
Cottonwood and aspen	0.5	0.0	0.0	0.0	0.0	0.5
Basswood	37.1	0.0	0.0	2.9	7.3	26.9
Yellow-poplar	93.6	7.0	0.0	14.5	4.1	68.0
Black walnut	0.3	0.0	0.0	0.2	0.1	0.0
Other eastern soft hardwoods	627.5	71.8	13.7	127.0	49.6	365.4
Other eastern hard hardwoods	20.5	1.0	0.3	3.0	1.1	15.2
Eastern noncommercial hardwoods	1,326.2	58.4	33.7	347.7	80.8	805.5
Total hardwoods	8,374.4	334.5	250.4	1,944.5	547.7	5,297.3
All species	19,342.3	1,365.0	837.8	3,969.4	1,458.0	11,712.2

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.

[b] Palm species have been included (species 906 to 915).

Table D.14—Net[a] volume of live trees on timberland by species group and diameter class, Florida, 2007

Species group[b]	All classes	Diameter class												
		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 cubic feet													
Softwood														
Longleaf and slash pines	6,178.7	993.3	1,388.5	1,139.5	855.6	752.9	471.3	319.5	139.4	80.1	31.4	7.2	0.0	0.0
Loblolly and shortleaf pines	1,441.2	185.8	250.3	235.8	179.8	152.2	123.4	114.8	72.5	92.1	27.2	7.3	0.0	0.0
Other yellow pines	854.0	225.2	221.2	119.1	96.5	70.4	55.8	13.8	17.5	25.7	0.0	0.0	0.0	8.8
Cypress	2,372.8	202.5	319.7	378.0	368.9	347.2	242.8	175.3	143.6	119.2	48.9	15.2	4.6	6.7
Other eastern softwoods	121.2	10.6	11.3	13.3	20.4	13.4	13.3	10.3	18.6	9.9	0.0	0.0	0.0	0.0
Total softwoods	10,967.9	1,617.4	2,191.0	1,885.7	1,521.2	1,336.1	906.5	633.8	391.6	327.0	107.5	29.7	4.6	15.6
Hardwood														
Select white oaks	29.9	2.3	1.4	2.4	4.6	4.8	3.7	0.0	3.4	4.4	3.0	0.0	0.0	0.0
Select red oaks	2.7	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6	0.0	0.0	0.0	0.0
Other white oaks	1,053.0	60.7	68.6	73.4	75.5	95.2	78.6	62.7	97.7	123.1	94.3	94.4	57.2	71.4
Other red oaks	1,845.3	153.5	203.9	232.3	231.6	209.2	185.6	132.6	128.4	169.7	82.2	48.7	30.2	37.3
Hickory	124.6	4.4	12.0	12.0	16.5	12.6	20.5	4.8	15.4	26.4	0.0	0.0	0.0	0.0
Hard maple	5.7	0.5	0.6	0.3	0.5	1.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Soft maple	537.8	65.7	71.8	77.2	65.3	66.7	51.2	36.8	31.6	36.2	19.4	0.0	5.8	10.1
Beech	3.6	0.3	0.1	0.3	0.0	0.0	0.0	0.0	1.2	1.7	0.0	0.0	0.0	0.0
Sweetgum	566.7	38.3	57.7	81.3	77.4	71.6	77.8	40.8	37.0	62.5	22.2	0.0	0.0	0.0
Tupelo and blackgum	1,694.7	167.3	240.5	237.6	234.8	236.7	177.1	135.9	86.1	95.7	43.1	27.1	9.3	3.5
Ash	404.9	41.1	50.4	53.9	61.6	50.4	47.7	26.0	20.6	36.5	11.1	5.5	0.0	0.0
Cottonwood and aspen	0.5	0.0	0.1	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basswood	37.1	2.0	2.6	3.1	3.9	2.3	6.5	6.4	0.0	10.2	0.0	0.0	0.0	0.0
Yellow-poplar	93.6	6.1	10.2	9.6	9.3	9.8	8.4	10.3	9.8	11.7	8.4	0.0	0.0	0.0
Black walnut	0.3	0.0	0.3	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	627.5	92.6	113.1	99.2	89.4	68.4	55.0	37.1	23.7	28.7	12.1	8.1	0.0	0.0
Other eastern hard hardwoods	20.5	7.9	5.8	2.1	1.7	0.0	1.3	1.7	0.0	0.0	0.0	0.0	0.0	0.0
Eastern noncommercial hardwoods	1,326.2	120.5	167.8	272.4	302.7	184.7	115.5	67.7	37.4	42.6	10.0	4.9	0.0	0.0
Total hardwoods	8,374.4	763.4	1,007.0	1,157.3	1,175.1	1,013.2	831.7	563.0	492.3	652.0	305.8	188.8	102.5	122.3
All species	19,342.3	2,380.8	3,198.0	3,043.0	2,696.3	2,349.3	1,738.2	1,196.8	883.9	979.0	413.4	218.6	107.2	137.9

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.

[b] Palm species have been included (species 906 to 915).

Table D.15—Net[a] volume of live trees on timberland by forest-type group and stand origin, Florida, 2007

Forest-type group[b]	Total	Stand origin	
		Natural stands	Artificial regeneration
	million cubic feet		
Softwood types			
Longleaf-slash pine	5,670.2	2,670.8	2,999.4
Loblolly-shortleaf pine	1,967.8	870.8	1,096.9
Other eastern softwoods group	4.5	4.5	0.0
Total softwoods	7,642.4	3,546.1	4,096.3
Hardwood types			
Oak-pine	1,582.5	1,458.9	123.6
Oak-hickory	2,607.9	2,550.3	57.6
Oak-gum-cypress	6,833.4	6,831.7	1.7
Elm-ash-cottonwood	92.1	91.4	0.7
Maple-beech-birch	24.8	24.8	0.0
Other hardwoods group	42.8	42.3	0.5
Tropical hardwoods	475.4	475.4	0.0
Exotic hardwood	16.0	14.4	1.6
Total hardwoods	11,674.8	11,489.2	185.7
Nonstocked	25.0	24.5	0.5
All groups	19,342.3	15,059.8	4,282.5

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.

[b] Palm species have been included (species 906 to 915).

Table D.16—Net[a] volume of growing-stock trees on timberland by species group and diameter class, Florida, 2007

Species group[b]	All classes	Diameter class 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 cubic feet							
Softwood														
Longleaf and slash pines	6,038.5	965.2	1,358.9	1,110.4	842.2	740.2	467.7	311.2	136.1	76.2	23.1	7.2	0.0	0.0
Loblolly and shortleaf pines	1,401.9	178.9	242.9	226.5	173.6	150.2	122.2	110.6	72.5	90.1	27.2	7.3	0.0	0.0
Other yellow pines	741.3	200.6	196.3	95.7	83.4	62.4	46.0	9.8	17.5	20.7	0.0	0.0	0.0	8.8
Cypress	2,185.2	168.0	280.3	341.1	350.2	333.1	234.2	166.8	135.3	117.4	38.8	15.2	4.6	0.0
Other eastern softwoods	93.5	8.3	8.6	8.8	15.9	10.9	10.0	6.7	14.4	9.9	0.0	0.0	0.0	0.0
Total softwoods	10,460.3	1,521.0	2,087.0	1,782.5	1,465.3	1,296.8	880.1	605.1	375.8	314.3	89.2	29.7	4.6	8.8
Hardwood														
Select white oaks	24.7	1.6	1.4	2.4	3.5	4.2	3.7	0.0	3.4	4.4	0.0	0.0	0.0	0.0
Select red oaks	2.7	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6	0.0	0.0	0.0	0.0
Other white oaks	218.0	9.4	9.1	15.5	10.6	16.3	13.9	11.2	23.3	37.6	24.5	25.0	12.8	9.0
Other red oaks	1,250.8	96.0	136.7	167.8	154.3	142.8	136.5	101.9	91.2	114.2	57.5	31.1	13.9	7.0
Hickory	104.8	3.0	7.8	8.7	13.8	10.4	18.1	4.8	11.8	26.4	0.0	0.0	0.0	0.0
Hard maple	4.7	0.5	0.5	0.0	0.5	1.0	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Soft maple	307.4	29.0	35.3	41.7	33.2	45.1	30.6	19.0	25.6	22.6	9.4	0.0	5.8	10.1
Beech	0.6	0.1	0.1	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sweetgum	482.5	29.6	44.8	65.2	65.7	61.2	70.7	37.3	34.3	51.4	22.2	0.0	0.0	0.0
Tupelo and blackgum	1,293.9	113.0	173.4	181.3	180.3	193.8	144.1	114.1	69.3	70.6	30.1	23.9	0.0	0.0
Ash	281.7	18.7	27.1	37.2	43.4	38.3	38.9	20.4	18.7	31.7	7.4	0.0	0.0	0.0
Cottonwood and aspen	0.5	0.0	0.1	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basswood	25.5	0.8	1.3	3.1	3.4	1.2	4.0	4.9	0.0	6.7	0.0	0.0	0.0	0.0
Yellow-poplar	78.2	4.6	9.2	8.8	9.3	9.1	8.4	7.5	4.7	11.7	5.0	0.0	0.0	0.0
Other eastern soft hardwoods	389.3	48.1	66.4	59.5	52.6	43.2	38.5	30.9	17.6	25.7	6.8	0.0	0.0	0.0
Other eastern hard hardwoods	7.5	2.5	1.6	0.4	0.0	0.0	1.3	1.7	0.0	0.0	0.0	0.0	0.0	0.0
Total hardwoods	4,472.8	357.1	514.6	592.0	571.0	566.6	511.0	353.7	299.9	405.4	163.0	80.0	32.4	26.0
All species	14,933.1	1,878.1	2,601.7	2,374.4	2,036.4	1,863.4	1,391.1	958.8	675.7	719.7	252.2	109.8	37.1	34.8

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.

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

[b] Palm species have been included (species 906 to 915).

Table D.17—Net[a] volume of growing-stock trees on timberland by species group and ownership group, Florida, 2007

Species group[b]	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	6,038.5	711.2	337.2	1,010.5	505.2	3,474.3
Loblolly and shortleaf pines	1,401.9	15.2	12.0	135.0	220.2	1,019.4
Other yellow pines	741.3	174.4	114.9	79.3	34.6	338.1
Cypress	2,185.2	81.4	72.0	657.9	112.7	1,261.2
Other eastern softwoods	93.5	2.0	19.2	38.1	13.7	20.4
Total softwoods	10,460.3	984.3	555.4	1,920.9	886.4	6,113.3
Hardwood						
Select white oaks	24.7	0.0	0.0	0.6	0.0	24.0
Select red oaks	2.7	0.0	0.0	2.6	0.0	0.1
Other white oaks	218.0	5.3	3.7	72.2	12.4	124.4
Other red oaks	1,250.8	28.2	22.4	222.9	73.4	903.9
Hickory	104.8	2.0	1.1	21.9	0.1	79.7
Hard maple	4.7	0.0	0.0	0.0	0.1	4.6
Soft maple	307.4	8.0	8.9	82.5	25.2	182.8
Beech	0.6	0.0	0.0	0.0	0.0	0.6
Sweetgum	482.5	5.4	10.9	75.2	36.1	354.9
Tupelo and blackgum	1,293.9	56.2	43.7	392.7	120.8	680.5
Ash	281.7	28.9	18.7	118.6	26.0	89.6
Cottonwood and aspen	0.5	0.0	0.0	0.0	0.0	0.5
Basswood	25.5	0.0	0.0	2.6	5.4	17.4
Yellow-poplar	78.2	7.0	0.0	9.5	4.1	57.5
Other eastern soft hardwoods	389.3	52.9	7.2	72.8	34.5	221.8
Other eastern hard hardwoods	7.5	0.2	0.1	1.0	0.4	5.9
Total hardwoods	4,472.8	194.2	116.6	1,075.1	338.6	2,748.2
All species	14,933.1	1,178.5	672.0	2,996.1	1,225.1	8,861.5

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.

[b] Palm species have been included (species 906 to 915).

Table D.18—Net[a] volume of sawtimber trees on timberland by species group and diameter class, Florida, 2007

Species group[b]	All classes	Diameter class 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 board feet						
Softwood												
Longleaf and slash pines	18,131.3	4,133.1	3,919.9	3,905.8	2,683.8	1,894.2	869.1	511.3	161.5	52.6	0.0	0.0
Loblolly and shortleaf pines	5,042.5	816.6	782.5	776.1	693.4	667.7	461.6	599.7	192.4	52.4	0.0	0.0
Other yellow pines	1,707.8	369.9	387.2	327.8	260.4	58.3	109.0	133.2	0.0	0.0	0.0	62.1
Cypress	7,644.6	1,061.6	1,359.6	1,472.7	1,131.5	858.3	732.2	672.0	232.8	94.4	29.5	0.0
Other eastern softwoods	406.2	33.7	72.4	55.4	54.9	38.9	87.6	63.3	0.0	0.0	0.0	0.0
Total softwoods	32,932.4	6,414.9	6,521.6	6,537.8	4,824.0	3,517.4	2,259.5	1,979.5	586.7	199.4	29.5	62.1
Hardwood												
Select white oaks	88.3	0.0	11.7	17.9	16.4	0.0	18.0	24.3	0.0	0.0	0.0	0.0
Select red oaks	13.9	0.0	0.0	0.0	0.0	0.0	0.0	13.9	0.0	0.0	0.0	0.0
Other white oaks	909.6	0.0	37.1	65.2	60.3	50.7	110.8	191.9	133.1	136.8	71.8	51.9
Other red oaks	4,172.5	0.0	588.3	623.2	651.5	518.2	485.8	639.7	340.4	193.8	88.3	43.4
Hickory	401.4	0.0	48.1	42.3	81.2	23.3	60.9	145.6	0.0	0.0	0.0	0.0
Hard maple	15.3	0.0	1.6	4.0	9.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Soft maple	876.7	0.0	109.0	172.8	130.2	85.8	122.1	113.9	50.0	0.0	32.9	60.0
Beech	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sweetgum	1,669.9	0.0	236.9	261.7	341.5	193.5	190.4	307.4	138.5	0.0	0.0	0.0
Tupelo and blackgum	3,529.5	0.0	583.2	736.8	621.8	537.6	347.5	382.5	173.7	146.3	0.0	0.0
Ash	856.4	0.0	143.2	147.8	167.9	96.3	92.2	167.3	41.6	0.0	0.0	0.0
Cottonwood and aspen	1.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basswood	91.2	0.0	11.2	4.6	17.1	22.9	0.0	35.3	0.0	0.0	0.0	0.0
Yellow-poplar	287.8	0.0	33.9	39.7	41.5	40.8	26.9	72.1	32.9	0.0	0.0	0.0
Other eastern soft hardwoods	927.0	0.0	177.2	170.3	168.9	148.8	87.1	136.3	38.4	0.0	0.0	0.0
Other eastern hard hardwoods	13.0	0.0	0.0	0.0	5.4	7.6	0.0	0.0	0.0	0.0	0.0	0.0
Total hardwoods	13,853.5	0.0	1,982.6	2,286.2	2,313.5	1,725.4	1,541.8	2,230.2	948.7	476.9	192.9	155.3
All species	46,785.9	6,414.9	8,504.2	8,824.0	7,137.4	5,242.9	3,801.3	4,209.7	1,535.4	676.4	222.4	217.4

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

[b] Palm species have been included (species 906 to 915).

Table D.19—Net[a] volume of sawtimber trees on timberland by species group and ownership group, Florida, 2007

Species group[b]	All ownerships	Ownership group				
		U.S. Forest Service	Other Federal	State and local government	Forest industry	Nonindustrial private
	million board feet					
Softwood						
Longleaf and slash pines	18,131.3	2,862.3	1,523.5	3,524.6	991.4	9,229.5
Loblolly and shortleaf pines	5,042.5	87.9	66.2	628.7	427.5	3,832.2
Other yellow pines	1,707.8	386.8	393.2	231.6	31.6	664.6
Cypress	7,644.6	306.0	268.2	2,456.7	349.3	4,264.5
Other eastern softwoods	406.2	4.0	80.9	164.3	72.1	84.9
Total softwoods	32,932.4	3,647.0	2,331.9	7,006.0	1,871.8	18,075.7
Hardwood						
Select white oaks	88.3	0.0	0.0	0.0	0.0	88.3
Select red oaks	13.9	0.0	0.0	13.9	0.0	0.0
Other white oaks	909.6	22.7	6.0	333.4	52.4	495.0
Other red oaks	4,172.5	124.7	52.4	814.6	217.7	2,963.1
Hickory	401.4	6.4	0.0	105.7	0.0	289.3
Hard maple	15.3	0.0	0.0	0.0	0.0	15.3
Soft maple	876.7	25.7	21.6	267.7	63.3	498.4
Beech	0.0	0.0	0.0	0.0	0.0	0.0
Sweetgum	1,669.9	26.8	42.1	274.5	117.1	1,209.4
Tupelo and blackgum	3,529.5	178.7	106.2	1,400.0	258.9	1,585.7
Ash	856.4	100.0	66.2	388.1	66.7	235.4
Cottonwood and aspen	1.0	0.0	0.0	0.0	0.0	1.0
Basswood	91.2	0.0	0.0	11.7	13.2	66.2
Yellow-poplar	287.8	38.5	0.0	50.2	5.8	193.4
Other eastern soft hardwoods	927.0	128.1	21.3	192.4	76.7	508.4
Other eastern hard hardwoods	13.0	0.0	0.0	0.0	0.0	13.0
Total hardwoods	13,853.5	651.7	315.8	3,852.2	872.0	8,161.8
All species	46,785.9	4,298.7	2,647.7	10,858.2	2,743.8	26,237.5

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.

[b] Palm species have been included (species 906 to 915).

Table D.20—Aboveground dry weight of live trees on timberland by species group and diameter class, Florida, 2007

Species group[a]	All classes	Diameter class 1.0–2.9	3.0–4.9	5.0–6.9	7.0–8.9	9.0–10.9	11.0–12.9	13.0–14.9	15.0–16.9	17.0–18.9	19.0–20.9	21.0–24.9	25.0–28.9	29.0–32.9	33.0–36.9	37.0+
	thousand tons															
Softwood																
Longleaf and slash pines	166,955.5	3,094.4	16,799.5	26,460.7	33,075.7	26,394.8	19,706.3	17,315.1	10,857.2	7,343.8	3,193.3	1,840.6	711.5	162.5	0.0	0.0
Loblolly and shortleaf pines	34,541.0	329.2	1,403.0	5,016.4	5,834.6	5,252.9	3,938.0	3,309.5	2,673.6	2,481.5	1,563.3	1,974.9	592.7	171.4	0.0	0.0
Other yellow pines	21,106.7	600.1	2,540.7	5,079.1	4,538.3	2,422.8	1,976.0	1,442.3	1,142.8	286.3	361.3	535.2	0.0	0.0	0.0	181.8
Cypress	57,261.0	1,027.2	2,898.0	3,914.1	6,226.9	7,826.0	8,139.1	8,028.0	5,755.7	4,340.7	3,596.6	3,037.7	1,245.0	398.3	150.9	676.9
Other eastern softwoods	3,058.5	75.5	112.3	263.3	259.4	302.9	481.4	316.8	317.4	239.5	456.4	233.6	0.0	0.0	0.0	0.0
Total softwoods	282,922.7	5,126.4	23,753.5	40,733.6	49,935.0	42,199.5	34,240.8	30,411.6	20,746.7	14,691.8	9,171.0	7,621.9	2,549.2	732.2	150.9	858.7
Hardwood																
Select white oaks	908.5	10.2	14.8	56.3	35.3	64.5	124.3	137.9	101.1	0.0	97.8	133.8	132.6	0.0	0.0	0.0
Select red oaks	78.7	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	76.2	0.0	0.0	0.0	0.0
Other white oaks	38,398.6	818.0	1,786.9	1,806.9	2,045.4	2,244.1	2,378.2	3,020.9	2,601.6	2,096.5	3,438.8	4,282.8	3,340.2	3,567.2	2,121.9	2,849.1
Other red oaks	57,983.2	2,554.2	4,046.0	4,692.3	5,762.1	6,354.8	6,262.5	5,748.2	5,087.4	3,676.9	3,548.1	4,681.1	2,284.5	1,368.8	810.5	1,105.6
Hickory	3,608.2	78.0	118.0	121.2	309.3	310.6	440.4	343.1	556.1	132.5	429.9	769.0	0.0	0.0	0.0	0.0
Hard maple	201.2	7.5	0.0	16.8	18.1	8.1	27.0	27.9	95.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Soft maple	16,267.6	977.3	1,520.8	1,708.1	1,814.4	1,914.9	1,671.8	1,656.3	1,296.9	933.6	824.6	1,010.6	543.9	0.0	145.6	248.7
Beech	171.6	2.5	0.0	7.1	3.4	8.2	0.0	0.0	0.0	0.0	72.8	77.7	0.0	0.0	0.0	0.0
Sweetgum	14,292.4	425.3	1,057.7	1,013.0	1,288.5	1,765.2	1,693.4	1,573.2	1,736.6	910.8	836.7	1,469.4	522.7	0.0	0.0	0.0
Tupelo and blackgum	43,153.4	1,544.5	3,721.5	3,495.8	4,836.9	4,795.9	4,908.4	5,214.7	4,092.3	3,184.1	2,129.4	2,537.3	1,237.7	892.8	302.2	259.9
Ash	9,886.8	495.3	1,119.4	1,098.1	1,138.8	1,108.8	1,197.3	965.1	902.3	531.3	452.5	607.5	186.9	83.4	0.0	0.0
Cottonwood and aspen	9.5	0.0	0.0	1.1	1.9	0.0	6.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basswood	841.7	14.3	47.3	34.8	51.6	62.9	80.5	46.4	143.4	136.1	0.0	224.5	0.0	0.0	0.0	0.0
Yellow-poplar	2,106.6	39.3	49.3	133.6	209.3	194.1	187.1	205.5	174.6	227.9	229.4	262.3	194.1	0.0	0.0	0.0
Black walnut	9.5	0.0	0.0	0.0	9.5	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	17,319.5	1,354.4	2,351.8	2,098.3	2,394.9	2,045.7	1,848.1	1,457.6	1,203.4	811.1	529.2	718.6	260.4	246.0	0.0	0.0
Other eastern hard hardwoods	1,291.2	410.0	332.0	206.8	144.1	57.4	55.8	0.0	40.4	44.6	0.0	0.0	0.0	0.0	0.0	0.0
Eastern noncommercial hardwoods	33,535.8	1,867.6	2,716.4	2,833.2	3,742.7	6,026.5	6,318.8	3,891.5	2,497.7	1,514.8	804.4	986.8	221.0	114.3	0.0	0.0
Total hardwoods	240,064.1	10,598.6	18,881.8	19,326.0	23,806.3	26,961.8	27,200.1	24,288.3	20,529.6	14,200.2	13,393.8	17,837.6	8,924.0	6,272.5	3,380.3	4,463.2
All species	522,986.9	15,725.1	42,635.3	60,059.6	73,741.3	69,161.3	61,440.9	54,700.0	41,276.3	28,891.9	22,564.8	25,459.5	11,473.2	7,004.7	3,531.2	5,321.9

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] Palm species have been included (species codes 906 to 915).

Table D.21—Aboveground green weight of live trees on timberland by species group and diameter class, Florida, 2007

Species group[a]	All classes	Diameter class 1.0–2.9	3.0–4.9	5.0–6.9	7.0–8.9	9.0–10.9	11.0–12.9	13.0–14.9	15.0–16.9	17.0–18.9	19.0–20.9	21.0–24.9	25.0–28.9	29.0–32.9	33.0–36.9	37.0+
	thousand tons															
Softwood																
Longleaf and slash pines	333,911.0	6,188.8	33,599.0	52,921.4	66,151.4	52,789.6	39,412.6	34,630.1	21,714.4	14,687.6	6,386.7	3,681.2	1,423.1	325.1	0.0	0.0
Loblolly and shortleaf pines	69,082.1	658.4	2,805.9	10,032.8	11,669.3	10,505.8	7,876.0	6,619.1	5,347.3	4,962.9	3,126.7	3,949.8	1,185.4	342.7	0.0	0.0
Other yellow pines	42,213.4	1,200.3	5,081.4	10,158.2	9,076.7	4,845.6	3,951.9	2,884.6	2,285.6	572.6	722.6	1,070.3	0.0	0.0	0.0	363.6
Cypress	114,522.0	2,054.4	5,796.0	7,828.2	12,453.8	15,652.0	16,278.2	16,055.9	11,511.4	8,681.3	7,193.3	6,075.3	2,490.0	796.6	301.8	1,353.8
Other eastern softwoods	6,117.0	150.9	224.6	526.6	518.9	605.8	962.8	633.5	634.8	479.1	912.8	467.2	0.0	0.0	0.0	0.0
Total softwoods	565,845.5	10,252.9	47,506.9	81,467.2	99,870.0	84,398.9	68,481.5	60,823.3	41,493.5	29,383.5	18,342.0	15,243.8	5,098.5	1,464.4	301.8	1,717.3
Hardwood																
Select white oaks	1,817.0	20.3	29.5	112.6	70.7	129.1	248.6	275.8	202.1	0.0	195.6	267.6	265.1	0.0	0.0	0.0
Select red oaks	157.4	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	152.3	0.0	0.0	0.0	0.0
Other white oaks	76,797.1	1,636.1	3,573.7	3,613.8	4,090.7	4,488.3	4,756.3	6,041.9	5,203.1	4,193.1	6,877.6	8,565.6	6,680.5	7,134.4	4,243.9	5,698.2
Other red oaks	115,966.3	5,108.5	8,092.0	9,384.6	11,524.2	12,709.5	12,525.1	11,496.5	10,174.9	7,353.9	7,096.2	9,362.2	4,569.0	2,737.6	1,621.1	2,211.1
Hickory	7,216.4	156.1	236.0	242.4	618.5	621.2	880.8	686.2	1,112.2	265.0	859.9	1,538.0	0.0	0.0	0.0	0.0
Hard maple	402.4	15.1	0.0	33.6	36.3	16.3	54.1	55.7	191.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Soft maple	32,535.2	1,954.6	3,041.6	3,416.2	3,628.9	3,829.9	3,343.7	3,312.5	2,593.8	1,867.1	1,649.2	2,021.2	1,087.9	0.0	291.3	497.3
Beech	343.3	5.0	0.0	14.1	6.8	16.3	0.0	0.0	0.0	0.0	145.7	155.3	0.0	0.0	0.0	0.0
Sweetgum	28,584.8	850.7	2,115.4	2,025.9	2,576.9	3,530.4	3,386.9	3,146.3	3,473.2	1,821.5	1,673.4	2,938.7	1,045.3	0.0	0.0	0.0
Tupelo and blackgum	86,306.9	3,089.0	7,443.0	6,991.7	9,673.7	9,591.9	9,816.7	10,429.5	8,184.7	6,368.1	4,258.9	5,074.6	2,475.3	1,785.6	604.3	519.9
Ash	19,773.6	990.5	2,238.8	2,196.3	2,277.6	2,217.7	2,394.7	1,930.1	1,804.7	1,062.7	904.9	1,215.1	373.8	166.7	0.0	0.0
Cottonwood and aspen	19.0	0.0	0.0	2.3	3.9	0.0	12.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basswood	1,683.4	28.7	94.5	69.6	103.1	125.8	160.9	92.8	286.9	272.2	0.0	448.9	0.0	0.0	0.0	0.0
Yellow-poplar	4,213.2	78.7	98.5	267.2	418.6	388.2	374.2	411.0	349.2	455.8	458.9	524.6	388.3	0.0	0.0	0.0
Black walnut	19.0	0.0	0.0	0.0	19.0	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	34,639.1	2,708.8	4,703.6	4,196.5	4,789.9	4,091.4	3,696.1	2,915.2	2,406.8	1,622.2	1,058.4	1,437.2	520.8	492.1	0.0	0.0
Other eastern hard hardwoods	2,582.5	820.0	664.0	413.7	288.3	114.8	111.7	0.0	80.9	89.2	0.0	0.0	0.0	0.0	0.0	0.0
Eastern noncommercial hardwoods	67,071.7	3,735.2	5,432.7	5,666.4	7,485.4	12,053.0	12,637.7	7,783.1	4,995.5	3,029.6	1,608.9	1,973.7	442.1	228.5	0.0	0.0
Total hardwoods	480,128.3	21,197.2	37,763.7	38,652.0	47,612.6	53,923.6	54,400.3	48,576.7	41,059.2	28,400.4	26,787.5	35,675.2	17,847.9	12,545.0	6,760.5	8,926.5
All species	1,045,973.7	31,450.1	85,270.6	120,119.1	147,482.6	138,322.5	122,881.8	109,399.9	82,552.7	57,783.9	45,129.6	50,919.0	22,946.4	14,009.4	7,062.3	10,643.8

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.

[a] Palm species have been included (species codes 906 to 915).

Table D.22—Merchantable dry weight of live trees on timberland by species group and diameter class, Florida, 2007

Species group[a]	All classes	Diameter class 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+
	thousand tons													
Softwood														
Longleaf and slash pines	122,745.0	18,974.9	27,226.6	22,660.9	17,247.8	15,279.5	9,603.6	6,515.9	2,831.8	1,618.8	639.0	146.1	0.0	0.0
Loblolly and shortleaf pines	27,510.4	3,585.5	4,778.4	4,484.3	3,424.0	2,901.3	2,351.4	2,188.2	1,382.3	1,757.2	519.6	138.3	0.0	0.0
Other yellow pines	14,464.5	3,522.2	3,677.4	2,058.3	1,720.4	1,265.8	1,012.2	254.2	320.1	472.8	0.0	0.0	0.0	161.1
Cypress	42,190.9	2,651.3	4,805.2	6,264.4	6,616.4	6,537.9	4,724.4	3,518.7	2,934.4	2,508.3	1,043.7	328.2	101.3	156.8
Other eastern softwoods	2,416.4	202.4	213.6	254.4	403.2	267.4	271.7	206.9	394.7	202.2	0.0	0.0	0.0	0.0
Total softwoods	209,327.3	28,936.2	40,701.2	35,722.3	29,411.8	26,251.9	17,963.4	12,684.0	7,863.2	6,559.3	2,202.2	612.6	101.3	317.9
Hardwood														
Select white oaks	655.0	38.7	27.0	51.1	98.3	106.3	81.8	0.0	79.6	102.0	70.2	0.0	0.0	0.0
Select red oaks	64.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	62.3	0.0	0.0	0.0	0.0
Other white oaks	27,429.6	1,210.1	1,538.6	1,739.5	1,861.6	2,393.0	2,022.9	1,649.9	2,622.8	3,337.1	2,600.9	2,697.6	1,656.7	2,098.8
Other red oaks	38,862.4	2,980.3	4,218.2	4,825.1	4,851.0	4,452.2	3,976.2	2,844.3	2,759.0	3,644.7	1,783.4	1,066.0	632.2	829.9
Hickory	2,713.7	77.4	233.6	244.0	346.0	271.9	453.2	108.4	353.4	625.8	0.0	0.0	0.0	0.0
Hard maple	126.8	10.4	13.5	6.3	10.9	22.5	63.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Soft maple	10,410.3	1,183.3	1,389.8	1,502.2	1,276.3	1,314.4	1,011.1	725.4	620.5	710.4	376.5	0.0	110.9	189.5
Beech	84.6	4.8	2.5	6.4	0.0	0.0	0.0	0.0	29.7	41.2	0.0	0.0	0.0	0.0
Sweetgum	10,751.6	683.5	1,034.4	1,478.6	1,435.2	1,356.4	1,500.4	799.6	734.9	1,271.9	456.7	0.0	0.0	0.0
Tupelo and blackgum	30,018.7	2,469.6	3,835.3	3,928.0	4,040.7	4,324.9	3,347.2	2,622.8	1,709.5	1,968.9	907.0	588.0	198.8	77.9
Ash	6,482.2	743.0	885.5	899.5	989.0	793.6	730.6	389.5	301.4	522.5	154.0	73.6	0.0	0.0
Cottonwood and aspen	7.7	0.7	1.5	0.0	5.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basswood	655.1	24.7	40.4	53.0	66.9	38.8	118.5	117.8	0.0	195.2	0.0	0.0	0.0	0.0
Yellow-poplar	1,694.0	100.0	173.1	166.0	163.8	176.2	155.1	192.2	183.6	222.0	162.0	0.0	0.0	0.0
Black walnut	7.0	0.0	7.0	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	10,948.1	1,469.7	1,899.0	1,687.5	1,557.8	1,224.4	1,011.4	697.3	453.3	566.6	218.9	162.2	0.0	0.0
Other eastern hard hardwoods	385.8	131.8	107.2	44.0	37.1	0.0	29.5	36.2	0.0	0.0	0.0	0.0	0.0	0.0
Eastern noncommercial hardwoods	23,257.9	1,989.8	2,972.5	4,860.1	5,149.8	3,200.9	2,049.9	1,239.8	691.9	812.0	194.0	97.1	0.0	0.0
Total hardwoods	164,554.6	13,119.8	18,379.0	21,491.4	21,889.8	19,675.5	16,550.7	11,423.2	10,539.7	14,082.5	6,923.5	4,684.6	2,598.6	3,196.1
All species	373,881.9	42,056.0	59,080.3	57,213.7	51,301.6	45,927.4	34,514.1	24,107.2	18,403.0	20,641.8	9,125.8	5,297.2	2,700.0	3,514.0

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] Palm species have been included (species codes 906 to 915).

Table D.23—Total carbon[a] of live trees on forest land by ownership class and land status, Florida, 2007

Ownership class[b]	All forest land	Unreserved			Reserved		
		Total	Timberland	Unproductive	Total	Productive	Unproductive
	thousand tons						
U.S. Forest Service							
National forest	18,209.9	17,474.1	17,346.2	127.9	735.8	731.9	3.9
Other Forest Service	119.5	119.5	119.5	0.0	0.0	0.0	0.0
Total	18,329.5	17,593.6	17,465.7	127.9	735.8	731.9	3.9
Other Federal							
National Park Service	5,488.0	0.0	0.0	0.0	5,488.0	4,625.6	862.4
U.S. Fish and Wildlife Service	3,460.6	2,057.0	1,971.9	85.1	1,403.6	1,379.0	24.6
Dept. of Defense/Dept. of Energy	5,067.0	5,067.0	5,038.5	28.5	0.0	0.0	0.0
Other Federal	3,689.7	3,689.7	3,689.7	0.0	0.0	0.0	0.0
Total	17,705.2	10,813.6	10,700.0	113.6	6,891.6	6,004.6	887.1
State and local government							
State	50,489.1	45,973.8	45,925.1	48.7	4,515.4	4,451.1	64.2
Local	5,672.0	5,515.4	5,397.9	117.5	156.6	149.6	7.0
Total	56,161.1	51,489.1	51,322.9	166.2	4,672.0	4,600.7	71.3
Nonindustrial private							
Undifferentiated private	182,592.7	182,592.7	182,004.8	588.0	0.0	0.0	0.0
Total	182,592.7	182,592.7	182,004.8	588.0	0.0	0.0	0.0
All classes	274,788.6	262,489.1	261,493.4	995.7	12,299.4	11,337.2	962.3

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

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

[a] Estimates of carbon calculated by multiplying aboveground dry tree biomass by 0.5.

[b] Palm species have been included (species 906 to 915).

Table D.24—Average annual net growth of live trees on timberland by forest-type group and stand-size class, Florida, 2007

Forest-type group[a]	All size classes	Stand-size class			
		Large diameter	Medium diameter	Small diameter	Non-stocked
	million cubic feet				
Softwood types					
Longleaf-slash pine	357.4	276.8	151.7	128.8	0.0
Loblolly-shortleaf pine	123.3	15.4	51.1	56.9	0.0
Total softwoods	480.7	92.2	202.8	185.7	0.0
Hardwood types					
Oak-pine	62.5	26.2	10.3	26.1	0.0
Oak-hickory	70.0	32.4	17.0	20.6	0.0
Oak-gum-cypress	108.6	68.4	28.8	11.4	0.0
Elm-ash-cottonwood	9.8	7.1	0.4	2.3	0.0
Tropical hardwoods	8.9	6.1	2.7	0.1	0.0
Exotic hardwood	0.4	0.0	0.1	0.3	0.0
Total hardwoods	260.2	140.0	59.4	60.8	0.0
Nonstocked	2.6	0.0	0.0	0.0	2.6
All groups	743.5	232.3	262.2	246.5	2.6

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.

[a] Palm species have been included (species 906 to 915).

Table D.25—Average annual net growth of live trees on timberland by species group and ownership group, Florida, 2007

Species group[a]	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	376.9	14.4	9.2	148.0	50.9	254.4
Loblolly and shortleaf pines	102.4	-0.4	0.8	4.1	23.5	74.3
Other yellow pines	40.1	4.1	6.0	4.1	3.3	22.7
Cypress	47.3	0.6	1.8	10.7	1.0	33.2
Other eastern softwoods	0.6	0.0	0.1	1.0	-0.8	0.3
Total softwoods	567.2	18.7	17.9	68.0	77.9	384.9
Hardwood						
Select white oaks	0.4	0.0	0.0	0.1	0.0	0.3
Select red oaks	0.0	0.0	0.0	0.0	0.0	0.0
Other white oaks	31.0	0.0	1.1	4.4	1.1	24.4
Other red oaks	50.9	-0.3	1.8	8.5	2.0	38.9
Hickory	2.3	-0.2	0.0	0.4	0.2	1.8
Hard maple	0.2	0.0	0.0	0.0	0.0	0.2
Soft maple	7.0	0.1	-1.1	3.1	0.4	4.5
Beech	-0.1	0.0	0.0	0.0	-0.1	0.0
Sweetgum	6.9	0.0	0.2	0.3	0.8	5.6
Tupelo and blackgum	24.2	2.0	1.9	7.0	0.8	12.6
Ash	3.6	0.2	0.1	2.4	0.9	0.1
Cottonwood and aspen	0.0	0.0	0.0	0.0	0.0	0.0
Basswood	0.1	0.0	0.0	0.0	-0.2	0.2
Yellow-poplar	3.7	0.1	0.0	0.3	-0.3	3.6
Black walnut	0.1	0.0	0.0	0.1	0.0	0.0
Other eastern soft hardwoods	15.5	1.5	0.9	1.5	2.7	8.9
Other eastern hard hardwoods	2.1	0.8	0.1	0.3	0.0	0.8
Eastern noncommercial hardwoods	28.5	0.1	-0.7	7.8	1.5	19.7
Total hardwoods	176.2	4.4	4.4	36.2	9.7	121.6
All species	743.5	23.1	22.2	104.1	87.5	506.5

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] Palm species have been included (species 906 to 915).

Table D.26—Average annual net growth of growing-stock trees on timberland by species group and ownership group, Florida, 2007

Species group[a]	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	368.9	13.9	28.9	46.6	49.7	249.7
Loblolly and shortleaf pines	99.4	-0.4	0.7	3.9	22.9	72.1
Other yellow pines	36.4	3.7	5.6	3.7	3.1	20.5
Cypress	43.8	0.4	1.9	10.1	1.0	30.3
Other eastern softwoods	-0.1	0.0	0.2	0.3	-0.8	0.2
Total softwoods	548.5	17.7	17.4	64.7	76.0	372.7
Hardwood						
Select white oaks	0.4	0.0	0.0	0.1	0.0	0.3
Select red oaks	0.0	0.0	0.0	0.0	0.0	0.0
Other white oaks	6.4	0.0	0.2	1.4	0.5	4.2
Other red oaks	36.6	-0.1	1.2	6.7	1.6	27.2
Hickory	1.8	-0.2	0.0	0.4	0.2	1.3
Hard maple	0.2	0.0	0.0	0.0	0.0	0.2
Soft maple	2.1	0.1	-1.1	1.0	0.3	1.8
Beech	-0.1	0.0	0.0	0.0	0.0	-0.1
Sweetgum	6.0	0.0	0.1	0.4	0.7	4.8
Tupelo and blackgum	17.6	2.1	1.5	5.1	0.3	8.6
Ash	4.0	0.2	0.2	2.8	0.5	0.3
Cottonwood and aspen	0.1	0.0	0.0	0.0	0.0	0.1
Basswood	-0.1	0.0	0.0	0.0	-0.1	0.0
Yellow-poplar	3.5	0.1	0.0	0.2	-0.3	3.5
Black walnut	0.0	0.0	0.0	0.0	0.0	0.0
Other eastern soft hardwoods	10.1	1.1	0.6	1.0	2.3	5.1
Other eastern hard hardwoods	0.4	0.0	0.0	0.1	0.0	0.3
Eastern noncommercial hardwoods	8.7	0.4	0.0	1.3	1.2	5.8
Total hardwoods	97.7	3.8	2.8	20.4	7.2	63.5
All species	646.2	21.5	20.1	85.1	83.2	436.2

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] Palm species have been included (species 906 to 915).

Table D.27—Average annual net growth of sawtimber on timberland by species group and ownership group, Florida, 2007

Species group[a]	All ownerships	Ownership group				
		U.S. Forest Service	Other Federal	State and local government	Forest industry	Nonindustrial private
	million board feet					
Softwood						
Longleaf and slash pines	978.5	47.8	42.7	158.6	109.1	620.2
Loblolly and shortleaf pines	282.5	-4.0	4.7	15.7	46.8	219.4
Other yellow pines	57.7	8.9	18.8	10.2	2.1	17.7
Cypress	193.8	4.2	8.4	51.4	5.1	124.8
Other eastern softwoods	1.5	0.1	0.6	1.6	-3.1	2.3
Total softwoods	1,514.0	56.9	75.3	237.4	159.9	984.4
Hardwood						
Select white oaks	1.0	0.0	0.0	0.7	0.0	0.3
Select red oaks	0.0	0.0	0.0	0.0	0.0	0.0
Other white oaks	24.7	0.1	1.4	5.1	0.1	18.0
Other red oaks	137.4	0.7	2.8	28.7	3.6	101.5
Hickory	7.1	-0.9	0.2	2.3	1.2	4.3
Hard maple	0.2	0.0	0.0	0.0	0.0	0.2
Soft maple	6.4	0.2	-4.8	4.5	0.9	5.7
Beech	-0.2	0.0	0.0	0.0	0.0	-0.2
Sweetgum	28.0	0.2	0.7	7.3	1.5	18.3
Tupelo and blackgum	88.6	11.0	7.3	25.9	5.6	38.8
Ash	19.4	0.3	1.3	13.0	0.6	4.2
Cottonwood and aspen	0.4	0.0	0.0	0.0	0.0	0.4
Basswood	0.4	0.0	0.0	0.1	-0.4	0.7
Yellow-poplar	14.0	0.5	0.0	1.5	-1.5	13.5
Black walnut	0.0	0.0	0.0	0.0	0.0	0.0
Other eastern soft hardwoods	28.2	4.8	0.1	4.3	3.3	15.6
Other eastern hard hardwoods	1.7	0.0	0.0	1.2	0.0	0.5
Eastern noncommercial hardwoods	31.1	1.4	1.5	2.8	3.9	21.6
Total hardwoods	388.4	18.3	10.4	97.4	18.8	243.5
All species	1,902.4	75.2	85.7	334.8	178.8	1,227.9

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] Palm species have been included (species 906 to 915).

Table D.28—Average annual mortality of live trees on timberland by forest-type group and stand-size class, Florida, 2007

Forest-type group[a]	All size classes	Stand-size class			
		Large diameter	Medium diameter	Small diameter	Non-stocked
	million cubic feet				
Softwood types					
Longleaf-slash pine	45.4	21.7	20.0	3.7	0.0
Loblolly-shortleaf pine	21.1	11.1	7.8	2.2	0.0
Total softwoods	66.6	32.8	27.9	5.9	0.0
Hardwood types					
Oak-pine	23.9	15.3	4.7	3.8	0.0
Oak-hickory	28.9	18.8	6.1	4.0	0.0
Oak-gum-cypress	90.7	70.3	18.4	2.0	0.0
Elm-ash-cottonwood	9.9	7.8	1.6	0.5	0.0
Tropical hardwoods	6.7	5.2	1.5	0.0	0.0
Exotic hardwood	0.0	0.0	0.0	0.0	0.0
Total hardwoods	160.0	117.4	32.4	10.3	0.0
Nonstocked	0.2	0.0	0.0	0.0	0.2
All groups	226.8	150.2	60.2	16.1	0.2

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] Palm species have been included (species 906 to 915).

Table D.29—Average annual mortality of live trees on timberland by species group and ownership group, Florida, 2007

Species group[a]	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	48.9	7.2	1.8	9.5	2.7	27.6
Loblolly and shortleaf pines	10.0	1.2	0.1	0.6	1.4	6.9
Other yellow pines	15.2	4.9	1.6	1.6	0.2	6.7
Cypress	15.4	0.7	0.4	5.8	0.9	7.6
Other eastern softwoods	3.0	0.0	0.5	0.4	1.2	0.9
Total softwoods	92.4	14.0	4.4	18.0	6.4	49.7
Hardwood						
Select white oaks	0.5	0.0	0.0	0.0	0.0	0.5
Select red oaks	0.0	0.0	0.0	0.0	0.0	0.0
Other white oaks	5.2	0.1	0.6	1.1	0.0	3.4
Other red oaks	38.1	1.2	0.9	6.8	0.9	28.2
Hickory	1.2	0.2	0.0	0.1	0.0	0.9
Hard maple	0.2	0.0	0.0	0.0	0.0	0.2
Soft maple	16.5	0.0	2.0	5.3	0.3	8.9
Beech	0.2	0.0	0.0	0.0	0.1	0.1
Sweetgum	11.3	0.0	0.1	2.5	0.3	8.3
Tupelo and blackgum	14.8	1.2	0.9	2.8	1.9	8.0
Ash	7.5	0.3	0.2	3.2	0.3	3.4
Cottonwood and aspen	0.1	0.0	0.0	0.0	0.0	0.1
Basswood	0.5	0.0	0.0	0.0	0.3	0.2
Yellow-poplar	1.1	0.0	0.0	0.0	0.5	0.6
Black walnut	0.0	0.0	0.0	0.0	0.0	0.0
Other eastern soft hardwoods	16.1	2.7	0.2	4.9	1.2	6.9
Other eastern hard hardwoods	0.9	0.0	0.1	0.4	0.0	0.4
Eastern noncommercial hardwoods	20.4	0.8	2.7	4.1	1.2	11.5
Total hardwoods	134.4	6.6	7.9	31.1	7.0	81.8
All species	226.8	20.5	12.3	49.1	13.4	131.5

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] Palm species have been included (species 906 to 915).

Table D.30—Average annual mortality of growing-stock trees on timberland by species group and ownership group, Florida, 2007

Species group[a]	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	48.5	7.2	1.8	9.2	2.7	27.6
Loblolly and shortleaf pines	9.9	1.2	0.1	0.6	1.4	6.7
Other yellow pines	15.0	4.8	1.6	1.6	0.2	6.6
Cypress	14.7	0.7	0.2	5.4	0.9	7.5
Other eastern softwoods	2.7	0.0	0.3	0.4	1.2	0.8
Total softwoods	90.7	13.9	4.0	17.3	6.4	49.1
Hardwood						
Select white oaks	0.4	0.0	0.0	0.0	0.0	0.4
Select red oaks	0.0	0.0	0.0	0.0	0.0	0.0
Other white oaks	1.2	0.0	0.1	0.4	0.0	0.7
Other red oaks	28.1	0.7	0.3	4.4	0.6	22.0
Hickory	1.0	0.2	0.0	0.1	0.0	0.7
Hard maple	0.1	0.0	0.0	0.0	0.0	0.1
Soft maple	10.9	0.0	1.6	3.5	0.2	5.5
Beech	0.1	0.0	0.0	0.0	0.0	0.1
Sweetgum	9.6	0.0	0.1	2.2	0.3	7.0
Tupelo and blackgum	11.9	0.6	0.7	2.1	1.8	6.8
Ash	3.9	0.2	0.1	1.4	0.3	1.9
Cottonwood and aspen	0.0	0.0	0.0	0.0	0.0	0.0
Basswood	0.3	0.0	0.0	0.0	0.2	0.1
Yellow-poplar	1.0	0.0	0.0	0.0	0.4	0.6
Black walnut	0.0	0.0	0.0	0.0	0.0	0.0
Other eastern soft hardwoods	10.5	2.1	0.1	3.6	0.8	3.9
Other eastern hard hardwoods	0.1	0.0	0.0	0.1	0.0	0.0
Eastern noncommercial hardwoods	5.2	0.2	0.7	0.9	0.6	2.9
Total hardwoods	84.3	3.9	3.7	18.8	5.2	52.7
All species	175.1	17.8	7.8	36.1	11.6	101.9

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] Palm species have been included (species 906 to 915).

Table D.31—Average annual mortality of sawtimber on timberland by species group and ownership group, Florida, 2007

Species group[a]	All ownerships	Ownership group				
		U.S. Forest Service	Other Federal	State and local government	Forest industry	Nonindustrial private
	million board feet					
Softwood						
Longleaf and slash pines	133.5	22.5	5.9	34.0	5.7	65.4
Loblolly and shortleaf pines	36.4	7.1	0.9	2.7	2.3	23.9
Other yellow pines	51.4	11.9	5.7	6.5	1.1	25.6
Cypress	41.8	1.7	0.6	17.4	0.6	21.6
Other eastern softwoods	11.1	0.0	1.8	1.8	5.3	2.2
Total softwoods	274.3	43.3	14.9	62.4	15.0	138.7
Hardwood						
Select white oaks	1.6	0.0	0.0	0.0	0.0	1.6
Select red oaks	0.0	0.0	0.0	0.0	0.0	0.0
Other white oaks	5.4	0.0	0.0	2.1	0.0	3.3
Other red oaks	102.8	2.7	1.1	16.3	3.8	78.9
Hickory	5.5	1.0	0.0	0.5	0.0	4.0
Hard maple	0.4	0.0	0.0	0.0	0.0	0.4
Soft maple	30.6	0.0	7.1	8.1	1.0	14.5
Beech	0.4	0.0	0.0	0.0	0.0	0.4
Sweetgum	28.7	0.0	0.6	5.5	0.6	22.0
Tupelo and blackgum	26.0	0.8	1.9	5.6	2.5	15.2
Ash	10.4	1.0	0.0	4.6	1.1	3.8
Cottonwood and aspen	0.0	0.0	0.0	0.0	0.0	0.0
Basswood	1.2	0.0	0.0	0.0	0.7	0.5
Yellow-poplar	4.5	0.0	0.0	0.0	1.7	2.8
Black walnut	0.0	0.0	0.0	0.0	0.0	0.0
Other eastern soft hardwoods	28.9	3.9	0.6	10.8	1.3	12.3
Other eastern hard hardwoods	0.0	0.0	0.0	0.0	0.0	0.0
Eastern noncommercial hardwoods	14.1	0.4	1.6	2.6	1.9	7.5
Total hardwoods	260.6	9.8	12.9	56.0	14.6	167.2
All species	534.8	53.0	27.9	118.4	29.6	306.0

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] Palm species have been included (species 906 to 915).

Table D.32—Average annual removals of live trees on timberland by forest-type group and stand-size class, Florida, 2007

Forest-type group[a]	All size classes	Stand-size class: Large diameter	Medium diameter	Small diameter	Non-stocked
	million cubic feet				
Softwood types					
Longleaf-slash pine	300.4	100.6	175.7	24.0	0.0
Loblolly-shortleaf pine	85.7	33.5	41.5	10.8	0.0
Total softwoods	386.1	134.1	217.2	34.8	0.0
Hardwood types					
Oak-pine	42.7	26.2	8.8	7.7	0.0
Oak-hickory	36.7	19.0	13.6	4.1	0.0
Oak-gum-cypress	88.8	68.7	16.6	3.5	0.0
Elm-ash-cottonwood	2.4	0.8	1.5	0.0	0.0
Tropical hardwoods	6.8	5.1	1.3	0.4	0.0
Exotic hardwood	0.0	0.0	0.0	0.0	0.0
Total hardwoods	177.3	119.8	41.8	15.7	0.0
Nonstocked	0.2	0.0	0.0	0.0	0.2
All groups	563.6	253.9	259.0	50.5	0.2

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] Palm species have been included (species 906 to 915).

Table D.33—Average annual removals of live trees on timberland by species group and ownership group, Florida, 2007

Species group[a]	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	315.0	5.8	3.8	33.5	65.1	206.8
Loblolly and shortleaf pines	69.5	0.0	2.3	2.5	8.4	56.2
Other yellow pines	26.0	6.8	3.3	5.2	0.0	10.8
Cypress	31.8	1.2	4.4	2.3	0.6	23.3
Other eastern softwoods	1.8	0.0	0.0	0.2	0.1	1.6
Total softwoods	444.1	13.8	13.8	43.6	74.2	298.7
Hardwood						
Select white oaks	0.3	0.0	0.0	0.0	0.0	0.3
Select red oaks	0.1	0.0	0.0	0.0	0.0	0.1
Other white oaks	13.4	0.3	0.6	1.1	0.2	11.1
Other red oaks	29.3	0.0	0.8	3.3	3.0	22.2
Hickory	1.5	0.0	0.0	0.0	0.0	1.5
Hard maple	0.7	0.0	0.0	0.0	0.0	0.7
Soft maple	4.5	0.0	0.1	0.4	0.8	3.3
Beech	0.1	0.0	0.0	0.0	0.0	0.1
Sweetgum	13.2	0.0	0.0	0.5	0.8	11.9
Tupelo and blackgum	19.9	0.0	3.8	2.1	0.3	13.6
Ash	3.4	0.0	0.2	0.1	0.1	3.0
Cottonwood and aspen	0.0	0.0	0.0	0.0	0.0	0.0
Basswood	0.6	0.0	0.0	0.0	0.0	0.6
Yellow-poplar	1.1	0.0	0.0	0.0	0.0	1.1
Black walnut	0.0	0.0	0.0	0.0	0.0	0.0
Other eastern soft hardwoods	13.6	0.6	0.1	1.0	1.9	10.0
Other eastern hard hardwoods	0.9	0.0	0.0	0.3	0.0	0.6
Eastern noncommercial hardwoods	17.0	0.2	0.1	2.5	0.6	13.6
Total hardwoods	119.5	1.1	5.7	11.2	7.6	93.8
All species	563.6	14.9	19.5	54.9	81.9	392.4

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] Palm species have been included (species 906 to 915).

Table D.34—Average annual removals of growing-stock trees on timberland by species group and ownership group, Florida, 2007

Species group[a]	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	314.7	5.8	3.8	33.5	65.0	206.6
Loblolly and shortleaf pines	69.4	0.0	2.3	2.5	8.4	56.2
Other yellow pines	25.6	6.8	3.3	5.2	0.0	10.3
Cypress	30.0	0.9	4.1	2.2	0.4	22.4
Other eastern softwoods	1.7	0.0	0.0	0.1	0.1	1.6
Total softwoods	441.5	13.5	13.5	43.4	73.9	297.1
Hardwood						
Select white oaks	0.3	0.0	0.0	0.0	0.0	0.3
Select red oaks	0.1	0.0	0.0	0.0	0.0	0.1
Other white oaks	5.9	0.3	0.3	0.6	0.1	4.7
Other red oaks	24.8	0.0	0.8	2.4	2.5	19.1
Hickory	1.5	0.0	0.0	0.0	0.0	1.5
Hard maple	0.6	0.0	0.0	0.0	0.0	0.6
Soft maple	3.7	0.0	0.1	0.1	0.6	2.9
Beech	0.0	0.0	0.0	0.0	0.0	0.0
Sweetgum	12.8	0.0	0.0	0.5	0.8	11.5
Tupelo and blackgum	17.4	0.0	3.0	2.0	0.3	12.1
Ash	2.3	0.0	0.1	0.1	0.1	2.0
Cottonwood and aspen	0.0	0.0	0.0	0.0	0.0	0.0
Basswood	0.3	0.0	0.0	0.0	0.0	0.3
Yellow-poplar	1.1	0.0	0.0	0.0	0.0	1.1
Black walnut	0.0	0.0	0.0	0.0	0.0	0.0
Other eastern soft hardwoods	10.2	0.6	0.0	0.8	1.8	7.0
Other eastern hard hardwoods	0.0	0.0	0.0	0.0	0.0	0.0
Eastern noncommercial hardwoods	4.6	0.0	0.0	0.0	0.3	4.4
Total hardwoods	85.7	0.9	4.3	6.6	6.4	67.6
All species	527.2	14.4	17.8	50.0	80.4	364.6

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.

[a] Palm species have been included (species 906 to 915).

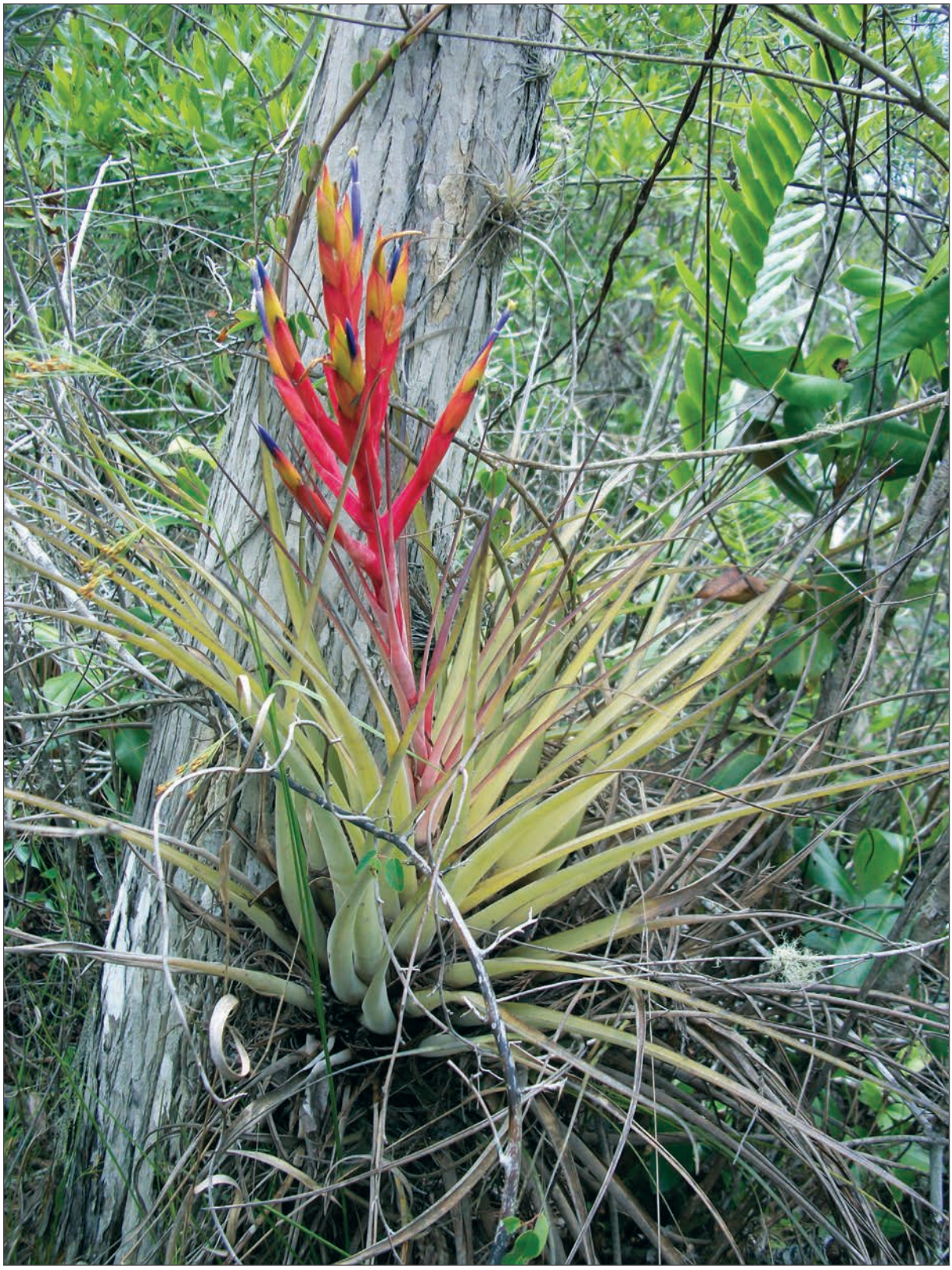
Table D.35—Average annual removals of sawtimber on timberland by species group and ownership group, Florida, 2007

Species group[a]	All ownerships	Ownership group				
		U.S. Forest Service	Other Federal	State and local government	Forest industry	Nonindustrial private
	million board feet					
Softwood						
Longleaf and slash pines	726.5	19.3	10.6	92.5	131.8	472.4
Loblolly and shortleaf pines	229.0	0.0	11.2	5.3	24.0	188.6
Other yellow pines	66.1	16.7	5.7	14.5	0.0	29.1
Cypress	80.9	2.1	11.7	6.2	0.0	60.9
Other eastern softwoods	8.5	0.0	0.0	0.0	0.0	8.5
Total softwoods	1,111.0	38.1	39.2	118.5	155.8	759.5
Hardwood						
Select white oaks	0.9	0.0	0.0	0.0	0.0	0.9
Select red oaks	0.7	0.0	0.0	0.0	0.0	0.7
Other white oaks	19.2	0.3	0.0	0.6	0.3	18.0
Other red oaks	65.5	0.0	0.0	6.1	4.2	55.2
Hickory	3.0	0.0	0.0	0.0	0.0	3.0
Hard maple	1.5	0.0	0.0	0.0	0.0	1.5
Soft maple	10.0	0.0	0.0	0.7	1.0	8.3
Beech	0.0	0.0	0.0	0.0	0.0	0.0
Sweetgum	31.1	0.0	0.0	1.0	1.8	28.3
Tupelo and blackgum	45.6	0.0	12.2	4.8	0.5	28.0
Ash	3.9	0.0	0.5	0.0	0.0	3.4
Cottonwood and aspen	0.0	0.0	0.0	0.0	0.0	0.0
Basswood	1.1	0.0	0.0	0.0	0.0	1.1
Yellow-poplar	3.3	0.0	0.0	0.0	0.0	3.3
Black walnut	0.0	0.0	0.0	0.0	0.0	0.0
Other eastern soft hardwoods	18.2	0.6	0.0	1.5	4.0	12.0
Other eastern hard hardwoods	0.0	0.0	0.0	0.0	0.0	0.0
Eastern noncommercial hardwoods	10.6	0.0	0.0	0.0	0.5	10.1
Total hardwoods	214.6	1.0	12.8	14.7	12.3	173.8
All species	1,325.6	39.1	51.9	133.2	168.1	933.4

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] Palm species have been included (species 906 to 915).



Cardinal air plant. (photo by Jay Frost, U.S. Forest Service)

Brown, Mark J.; Nowak, Jarek; Johnson, Tony G. [and others]. 2012. Florida's forests, 2007. Resour. Bull. SRS–188. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 132 p.

The principal findings of the eighth forest survey of Florida are presented. This survey marks a major change in the Forest Inventory and Analysis sampling protocol from a periodic prism sample to an annualized fixed-plot sample. Topics examined include forest area, ownership, forest-type groups, stand origin, timber volume, growth, removals, and mortality, timber product output, nontimber forest products, and forest health factors ranging from down woody material, insects and disesases, to invasive species.

Keywords: FIA, Florida, forest inventory, forest survey, forest type, timberland, TPO, volume.

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September 2012

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Sunset. (photo by Barbara Bowen, Florida State Forest Photo Contest)

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September 2012