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# Louisiana's Forests, 2013

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## About the Author

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Front cover: top left, *Echinacea pallida* wildflowers on the Kisatchie National Forest. (photo courtesy of the U.S. Forest Service); top right, sunset over Cameron Prairie National Wildlife Refuge, Louisiana. (photo by Steve Hillebrand, U.S. Fish and Wildlife Service); bottom, Louisiana black bear (*Ursus americanus luteolus*). (photo by Pam McIlhenny, U.S. Fish and Wildlife Service, Source: NCTC Image Library). Back cover: top left, nest site for red-cockaded woodpecker in Louisiana. (photo by Steve Hellebrand, U.S. Fish and Wildlife Service); top right, *Echinacea pallida* wildflowers on the Kisatchie National Forest. (photo courtesy of the U.S. Forest Service); bottom, dusky gopher frog, a species that relies on longleaf pine forests. (photo by John A. Tupy, U.S. Department of Agriculture).

Newborn Louisiana black bear cub. [photo by Darren Boudreaux, USDA Natural Resource Conservation Service (NRCS)]

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# Louisiana's

## Forests, 2013

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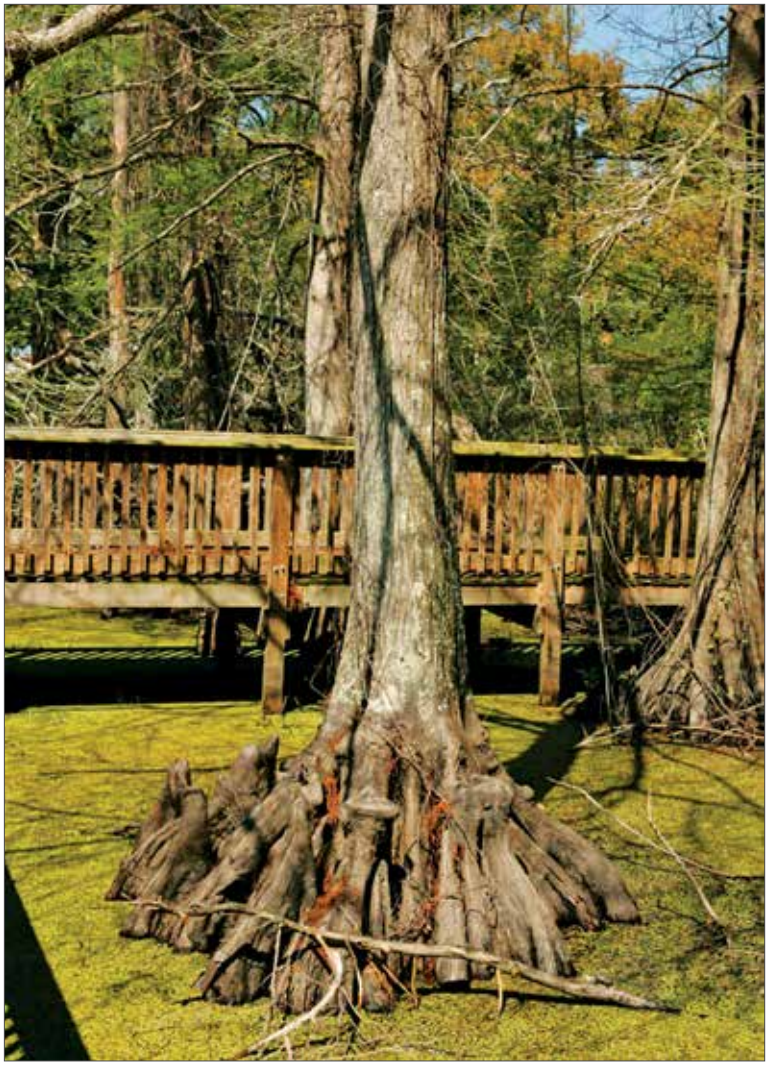

Baldcypress tree at Lacassine National Wildlife Refuge in Louisiana. (photo by Steve Hillebrand, U.S. Fish and Wildlife Service)

## FOREWORD

The Forest Inventory and Analysis (FIA) unit of the U.S. Department of Agriculture Forest Service, Southern Research Station (SRS) conducts continuous inventories of forest resources in 13 Southern States (Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia), as well as Puerto Rico and the U.S. Virgin Islands. It is a collaborative partnership with the Southern Group of State Foresters of these States, the Southern Region National Forest System, and State and Private forestry.

This bulletin presents the findings of the 2013 survey of Louisiana, which includes field data collected from 2001 to 2013 and includes 2,736 forested plots out of 5,582 total plots. A total of 3,848 plots from 2009 to 2013 were used to calculate growth, removals, mortality, and area change. Sixty-nine percent of the total plots were remeasured plots and these include 1,887 forested plots. While sample protocols, processing procedures, and definitions have changed over the decades since FIA sampling in Louisiana began, attempts have been made to harmonize the data when possible. This data represents the most comprehensive data collected on public and private lands in the State.

Tabular data collected by FIA is available to the public through various tools accessible via the Internet at http://srsfia2.fs.fed.us/. Data referenced in this report were obtained from the Forest Inventory and Analysis Database on May 11, 2015.

## ACKNOWLEDGMENTS

The SRS gratefully acknowledges FIA field personnel, Information Management, and Technical Publications for their dedication, hard work and assistance. We also appreciate the cooperation of other public agencies and private landowners for providing access to measurement plots.

Nest site for red-cockaded woodpecker in Louisiana. (photo by Steve Hellebrand, U.S. Fish and Wildlife Service)

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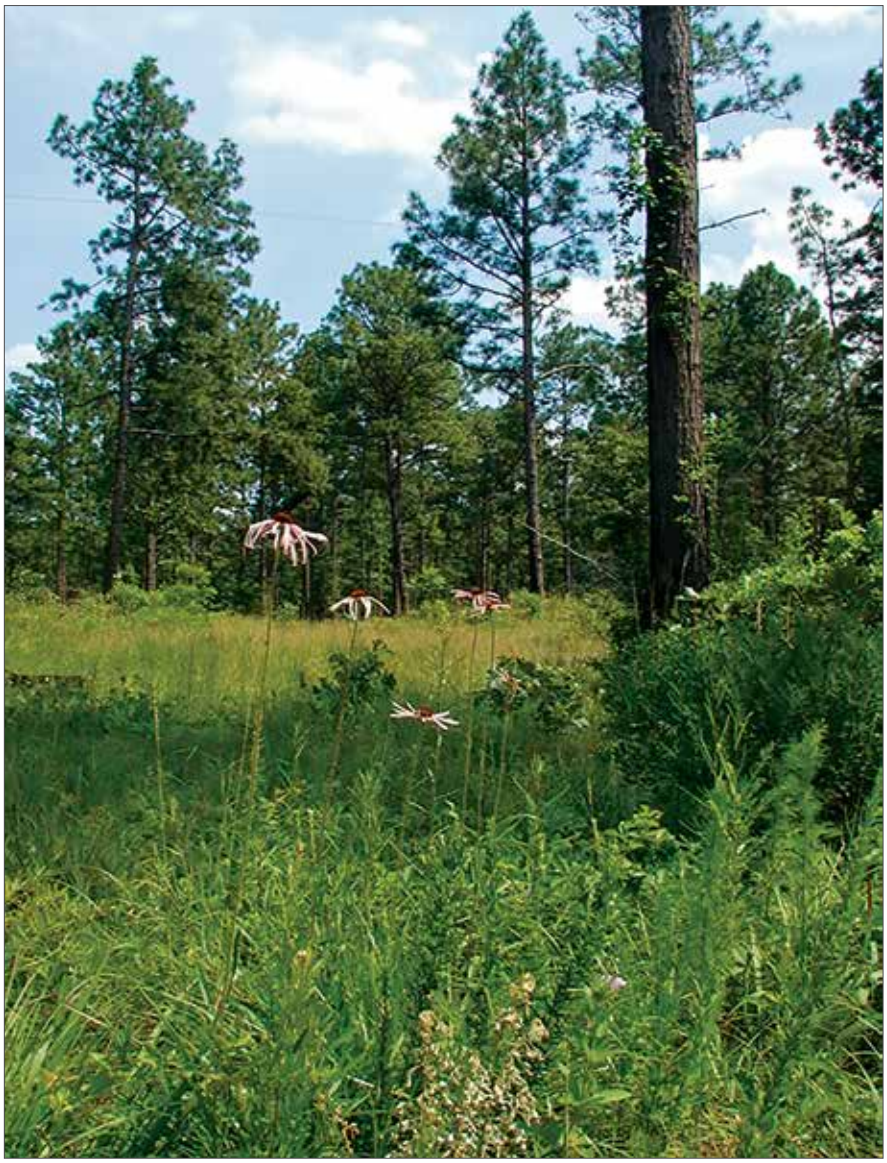
## INTRODUCTION

Forests and forestry-related activities represent an important part of Louisiana culture. In the 2012 Resources Planning Act (RPA) report (Oswalt and others 2014), Louisiana comprised 9 percent of all forest land in the eight States of the South Central United States. The importance of forests on water quality and the State's position of importance in the Lower Mississippi Alluvial Valley also necessitates a clear understanding of the forest resources in Louisiana. The need to understand, track, and practice knowledgeable stewardship in the forests of the 21st century landscape cannot be overstated. More than ever, landowners, policymakers, industries, and researchers are seeking information to feed into business development opportunities, forecasting models, and conservation goals as well as long-term economic development plans. The goal of this publication is to provide up-to-date information on the resources of Louisiana's forests to aid in landscape-level planning and policymaking, and to provide a starting point for those interested in learning about and researching Louisiana's forest landscape.



*Echinacea pallida* wildflowers on the Kisatchie National Forest. (photo courtesy of the U.S. Forest Service)

## AREA

In the 17th century, prior to European settlement, Louisiana was nearly 100 percent forested. Estimates suggest as much as 26 million acres of Louisiana's 27 million acres of terrestrial land were forested (Kellog 1909). Agricultural clearing from the late 1800s through the 1970s, combined with some clearing for development, led to consistent declines in forest acreage from early settlement through the 1990s. Today, forests cover 14.9 million acres (55 percent) of the Louisiana landscape. Virtually all of that (14.7 million acres) is available for timber production. The Northwest, Southwest, and Southeast units are most heavily forested, while the South and North Delta—the center of agricultural production in the State—remain least forested (fig. 1). There are about 3.5 forested acres for every nonforest acre in the Northwest unit, compared to 0.4 forested acres for every nonforest acre in the South Delta.

The area of oak-gum-cypress forests has remained stable since 1984, following a significant decrease in area in the mid-1970s in response to rising soybean prices. The 2005 survey showed a significant decline in area of wetland forests in Louisiana, but given the rapid recovery in 2013 to 1991 area levels, it seems most likely that the decline noted in 2008 was due in part to data collection issues noted in Oswalt and Bentley (2013). From 2008 to 2013, 70 percent of forest land classified as oak-gum-cypress remained in that forest type. Figure 2 shows gains (multiple colors) and losses in the remaining 30 percent of oak-gum-cypress forest land to and from other forest types, nonforest, and water. For example in figure 2, of the 30 percent of

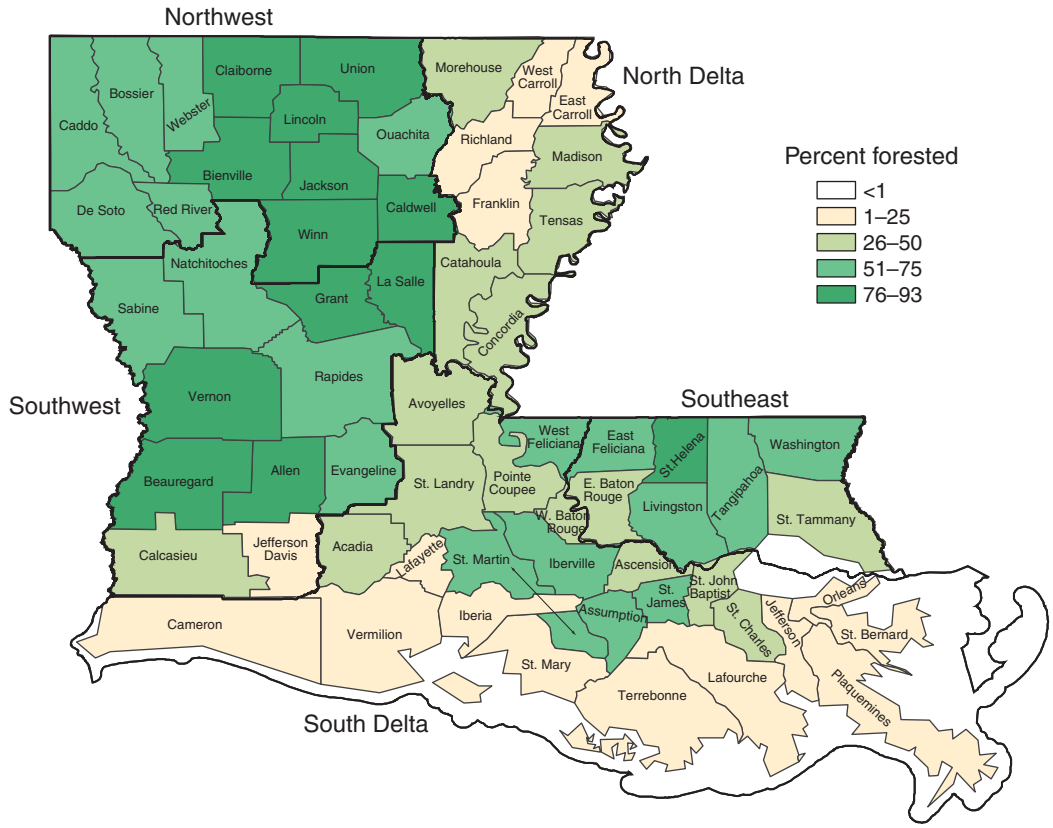



Figure 1—Louisiana parishes and survey units colored by forest area proportion, 2013.

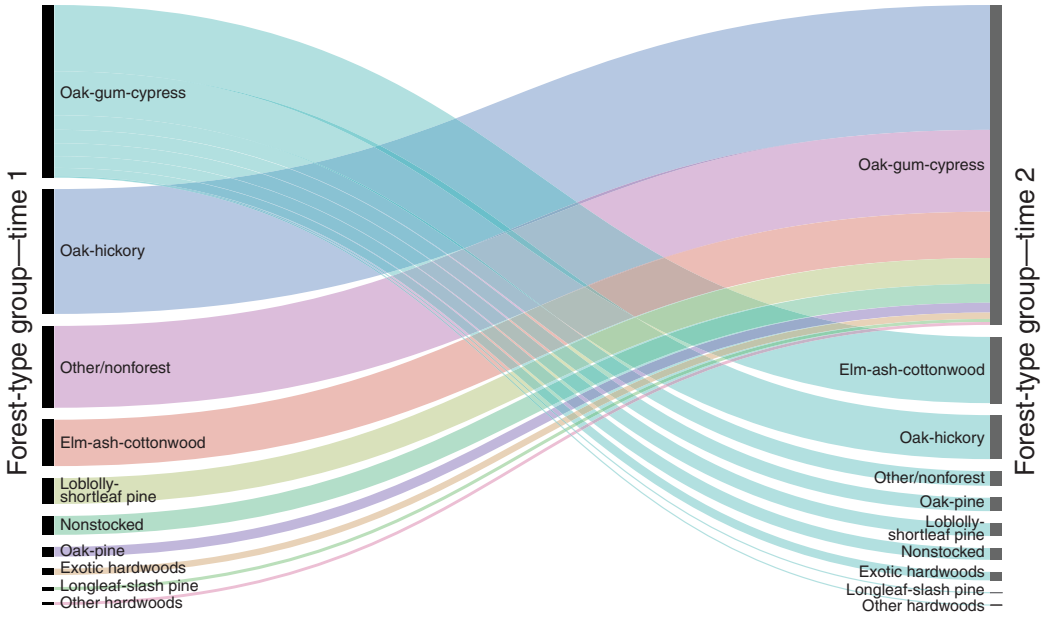



Figure 2—Forest area gains and losses from the oak-gum-cypress forest-type group, Louisiana, 2008–13.

oak-gum-cypress that converted to another forest type in 2013, the largest proportion went to elm-ash-cottonwood. Conversely, plots that were oak-hickory and nonforest in 2008 contributed the largest gains to the oak-gum-cypress forest type.

Mixed oak-hickory and mixed oak-pine forest areas have both declined significantly since 1991. Thirty-two percent of oak-pine forest land remained in the oak-pine forest-type group. Forty-two percent of forest acreage lost from the oak-pine forest-type group moved into the loblolly-shortleaf pine forest-type group (fig. 3). Oak-hickory contributed the greatest gains in forest area to the oak-pine forest-type group. Most losses out of oak-hickory went to oak-gum-cypress, followed by loblolly-shortleaf pine (fig. 4). Gains from other forest types were primarily divided between oak-pine, loblolly-shortleaf, and oak-gum-cypress.

The loblolly-shortleaf pine forest-type group experienced significant increases in area from 1984 to 2013, with the most dramatic increase (24 percent) between the 1991 and 2005 survey periods (fig. 5). The increase in pine forests coincides with rising pine sawtimber prices in Louisiana beginning in the late 1980s and reaching record highs in 1997 and 1998. Rosson (1995) reported notable increases in removals from 1984 to 1991, which coincide with the increase in stumpage prices and, at the time, were concerning as removals were beginning to exceed growth in Louisiana pine forests. The potential for a good return on investments likely led to increased planting rates in that forest type and, in fact, planted loblolly and shortleaf pine acreage doubled from 1991 to 2013. Since 2008, most gains in loblolly-shortleaf came from oak-pine and oak-hickory (fig. 5).

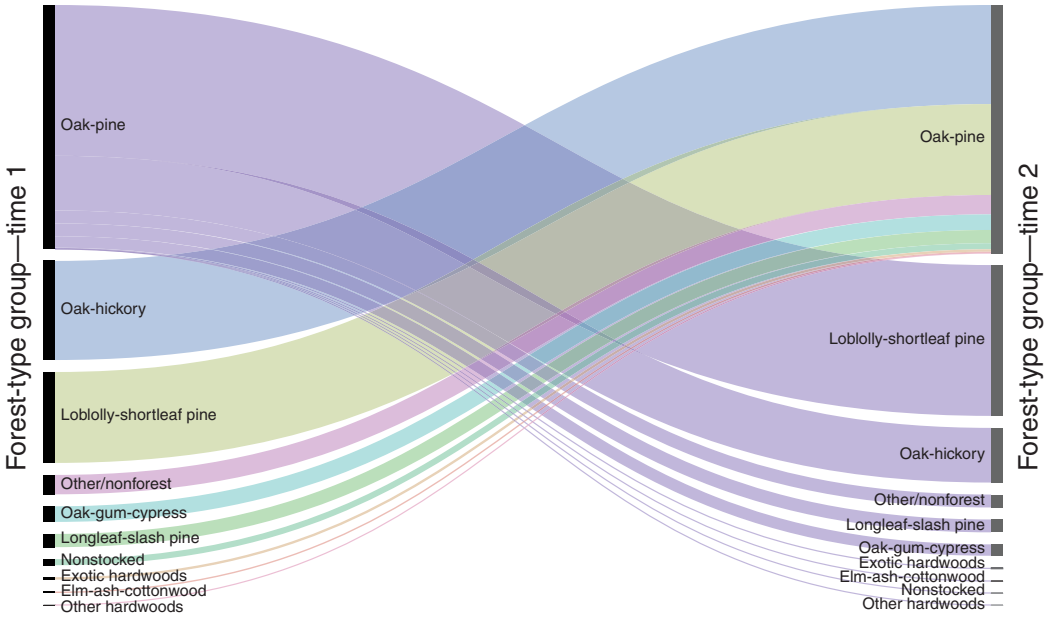



Figure 3—Forest area gains and losses from the oak-pine forest-type group, Louisiana, 2008–13.

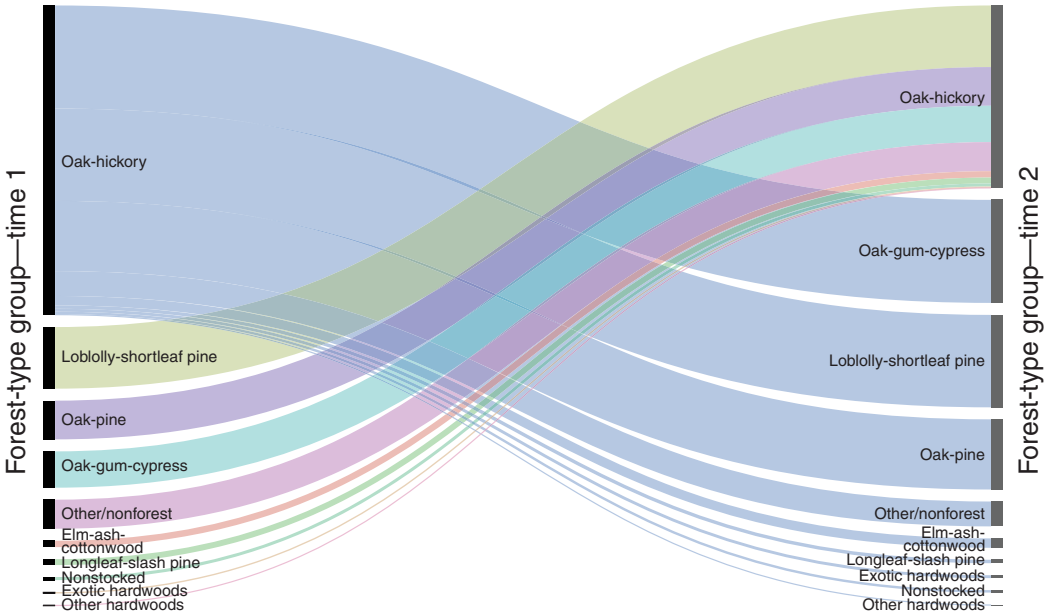



Figure 4—Forest area gains and losses from the oak-hickory forest-type group, Louisiana, 2008–13.

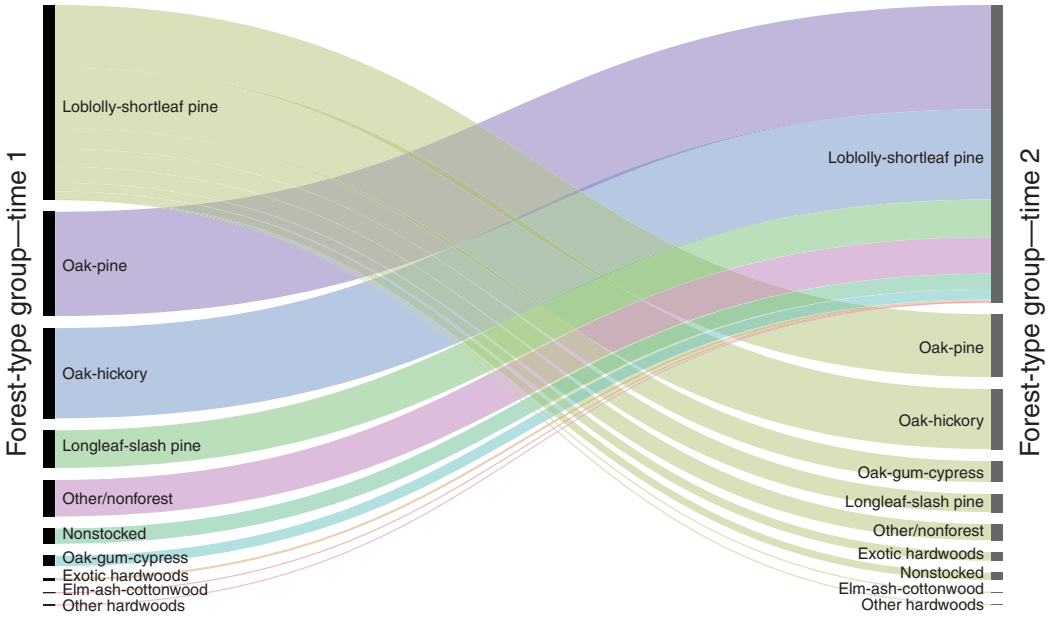



Figure 5—Forest area gains and losses from the loblolly-shortleaf pine forest-type group, Louisiana, 2008–13.

## Stand Origin

In survey year 2013, most (69 percent) of Louisiana forest land was naturally regenerated. Of the remaining planted forest land, 70 percent was categorized in the loblolly-shortleaf pine forest-type group. Since 1974, the area of planted loblolly-shortleaf pine timberland (forest land was not categorized in the 1970s) increased from 789,644 acres to 3.2 million acres—a four-fold increase (fig. 6). In contrast to softwood forest land, 90 percent of hardwood forest land in Louisiana is naturally regenerated. Only 10 percent of public forest land was planted in 2013, compared with 34 percent of privately owned land, and in fact, 96 percent of planted forest land is privately owned.

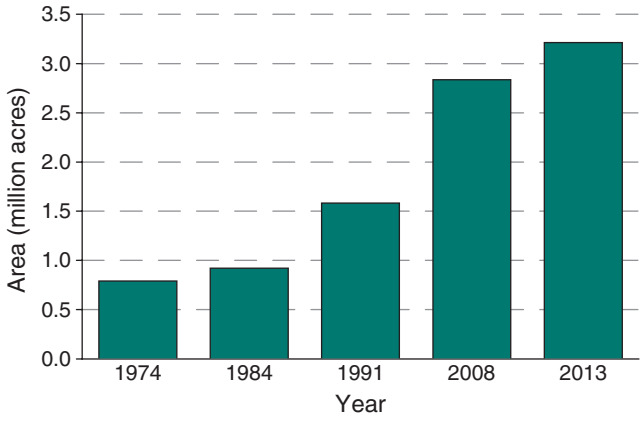



Figure 6—Change in timberland area by forest-type group and year, Louisiana, 1974–2013.

## Forest Ownership

Understanding ownership patterns and the motivations for owning forests can help decisionmakers and land managers tailor their services to the needs of the State. Additionally, in the case of privately owned forests, understanding landowner interests and weighing those in the context of ecological concerns and timber availability helps professionals develop sustainable forest practices.

In 2013, 87 percent of Louisiana's forest land was privately owned. About 2.6 million privately owned acres were forest industry, comprising 18 percent of total forest land (fig. 7). Forest land area owned by forest industry declined by roughly 40 percent (an area of 1.7 million acres) from 2005 to 2013. That decline in industry ownership mirrors a southwide decline in industry-owned land of roughly 50 percent since the early 2000s as much of the industry forest land in the South was sold to timber investment management organizations (TIMOs) and real estate investment trusts (REITs). Nonindustrial corporate land (such as TIMOs and REITs) accounted for 31 percent of forest land in 2013, an increase from 2.3 million acres in 2005 to 4.7 million acres in 2013.

Forest land owned by individuals did not change from 2005, and constituted 37 percent of total forest land. The National Woodland Owner Survey (NWOS) asks for feedback from family forest owners regarding their ownership intents and concerns, among other questions. In 2013, Louisiana family forests were typically owned by 5 or fewer owners, with most (40 percent) owned by 2 or fewer individuals. Seventy percent of family owned forest land was >75 percent forested.[1] The majority (76 percent) of ownerships consisted of <50 acres, while the overall average holding was approximately 68 acres.

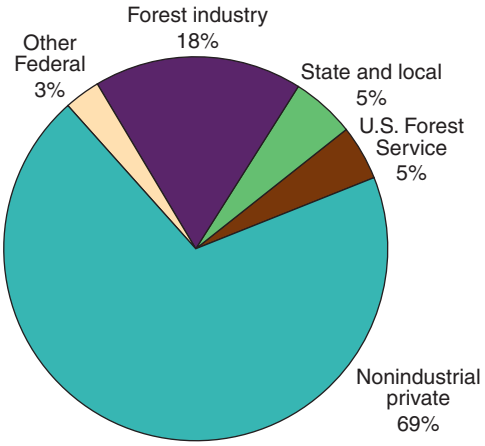



Figure 7—Area of forest land proportioned by ownership, Louisiana, 2013.

[1] Butler, B.J.; Hewes, J.H.; Dickinson, B.J. [and others]. Family forest ownerships of the United States, 2013: tabular results from the U.S. Department of Agriculture Forest Service, National Woodland Owner Survey. [Manuscript in preparation]. Author can be reached at: U.S. Department of Agriculture Forest Service, Northern Research Station, Newtown Square, PA 19073.

Louisiana forest land owners appear to care deeply about family heritage and the character of the State's forests and wildlife. The most commonly reported reason for owning forest land was to pass the land on to children or other heirs, followed by protection of water resources and wildlife habitat. Aesthetics and protection of biological diversity also ranked among the most important reasons for owning forest land, while firewood, vacationing, and nontimber forest products were among the least important reasons for Louisianans who own forest land. The desire to pass forest land on to children or other heirs appears to follow in the footsteps of previous generations, given that 69 percent of ownerships were reported to have been purchased or inherited from the current owners' parents or in-laws (table 1).

While enhancing natural resources is clearly important to Louisiana forest owners, only 5 percent of owners covering 35 percent of acres reported having a written management plan. When asked how they preferred to receive forest and woodland management information, 59 percent of owners (owning 63 percent of acreage) favored written materials such as brochures or other publications while only 33 percent (owning 34 percent of acres) preferred Internet resources. The desire for printed material over online material may, in part, reflect the age demographic of family forest owners. In 2013, 94 percent of primary family forest owners were over the age of 45, and 79 percent were over the age of 55.

**Table 1—Area and number of family forests by reason for owning forest land and woodland, Louisiana, 2013**

| | Totals | | | | Percentage | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Reason[a] | Acres | SE | Owner-ships | SE | Acres | SE | Owner-ships | SE | n |
| | *thousand* | | | | *percent* | | | | |
| To enjoy beauty or scenery | 2,869 | 233 | 49 | 9 | 56.9 | 5.1 | 64.6 | 14.4 | 81 |
| To protect nature or biological diversity | 2,484 | 229 | 44 | 9 | 49.7 | 5.0 | 58.0 | 13.5 | 70 |
| To protect water resources | 2,767 | 232 | 54 | 9 | 55.6 | 5.2 | 71.8 | 15.5 | 78 |
| To protect or improve wildlife habitat | 3,499 | 232 | 49 | 8 | 73.5 | 5.9 | 70.0 | 15.6 | 97 |
| For land investment | 3,674 | 230 | 45 | 8 | 70.9 | 5.1 | 59.2 | 12.8 | 101 |
| Part of my home site or primary residence | 1,854 | 214 | 35 | 8 | 37.3 | 4.6 | 47.1 | 12.0 | 53 |
| Part of cabin or vacation home site | 630 | 141 | 6 | 2 | 12.8 | 2.9 | 8.3 | 3.2 | 18 |
| Part of farm or ranch | 1,819 | 213 | 27 | 7 | 37.4 | 4.7 | 36.2 | 10.5 | 52 |
| Privacy | 2,449 | 229 | 33 | 5 | 49.3 | 5.0 | 43.1 | 9.2 | 70 |
| To raise my family | 1,994 | 218 | 33 | 7 | 41.6 | 4.9 | 44.8 | 11.7 | 57 |
| To pass land on to my children or other | 4,163 | 220 | 67 | 10 | 81.5 | 5.2 | 86.1 | 16.8 | 117 |
| For firewood | 665 | 145 | 10 | 3 | 13.7 | 3.0 | 14.1 | 5.1 | 19 |
| For timber products | 3,289 | 233 | 24 | 5 | 64.4 | 5.1 | 32.1 | 7.5 | 90 |
| For nontimber forest products | 315 | 103 | 6 | 3 | 6.4 | 2.1 | 7.7 | 3.7 | 9 |
| For hunting | 2,904 | 233 | 35 | 7 | 57.2 | 5.1 | 47.5 | 11.5 | 83 |
| For recreation, other than hunting | 2,064 | 220 | 27 | 6 | 40.7 | 4.6 | 36.1 | 9.1 | 59 |
| Other | 210 | 85 | <1 | <1 | 3.9 | 1.6 | <1.0 | <1.0 | 6 |

SE = standard error; n = sample size.

[a] Categories are not mutually exclusive.

## Age

Thirty-six percent of Louisiana's forest area was estimated to be ≤20 years old. Forty-eight percent of that young forest was loblolly-shortleaf pine. Unlike loblolly-shortleaf forest area where 50 percent of acreage was ≤20 years old, oak-gum-cypress acreage fell primarily within the 41–60 and 61–80 year age classes. Only 12 percent of oak-gum-cypress acreage was ≤20 years of age (fig. 8). Cypress regeneration in the altered hydrologic regimes of the Lower Mississippi Alluvial Valley, including Louisiana, is an ongoing concern for forestry and wetland professionals in Louisiana and Mississippi.

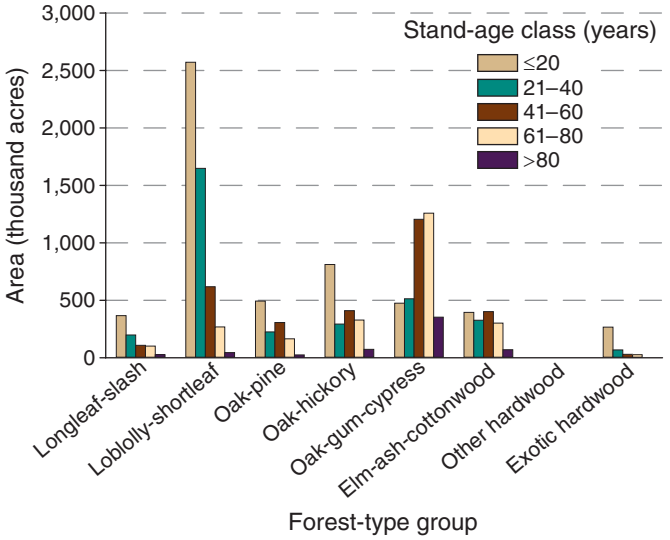



Figure 8—Area of forest land (excluding nonstocked area) by forest-type group and stand-age class (years), Louisiana, 2013.

## FOREST COMPOSITION

Tracking the number, diversity, and volume of trees in Louisiana's forests is important to understanding the availability of timber, wildlife habitat, and other ecosystem services. Knowing where volume is available aids in economic development planning as well as understanding whether or not timber supply can meet the demands placed on the resource.

### Diversity and Composition

Crews recorded 111 tree species in Louisiana during the 2013 survey (table 2). Loblolly pine was the most common, with over 25,000 observations—4 times the number of observations of the second most commonly recorded tree. Sweetgum was the next most commonly observed tree with 6,440 observations. The invasive Chinese tallowtree was the 7th most frequently recorded tree in Louisiana during 2013. Thirty-four species had 8 or fewer observations, and 14 were only recorded one time.

**Table 2—Common name, scientific name, and FIA species code of tree species, Louisiana, 2013**

| Common name | *Scientific name* | FIA species code | Observations |
|---|---|---|---|
| | | | *number* |
| Loblolly pine | *Pinus taeda* | 131 | 25,672 |
| Sweetgum | *Liquidambar styraciflua* | 611 | 6,440 |
| Water oak | *Quercus nigra* | 827 | 3,546 |
| Red maple | *Acer rubrum* | 316 | 3,186 |
| Slash pine | *Pinus elliottii* | 111 | 2,782 |
| Baldcypress | *Taxodium distichum* | 221 | 2,594 |
| Chinese tallowtree | *Triadica sebifera* | 994 | 2,358 |
| Water tupelo | *Nyssa aquatica* | 691 | 2,243 |
| Green ash | *Fraxinus pennsylvanica* | 544 | 1,670 |
| Sugarberry | *Celtis laevigata* | 461 | 1,667 |
| Blackgum | *Nyssa sylvatica* | 693 | 1,500 |
| Winged elm | *Ulmus alata* | 971 | 1,225 |
| American hornbeam, musclewood | *Carpinus caroliniana* | 391 | 1,142 |
| White oak | *Quercus alba* | 802 | 1,035 |
| Southern red oak | *Q. falcata* | 812 | 1,007 |
| American elm | *Ulmus americana* | 972 | 890 |
| Black willow | *Salix nigra* | 922 | 888 |
| Willow oak | *Quercus phellos* | 831 | 840 |
| Longleaf pine | *Pinus palustris* | 121 | 675 |
| Cherrybark oak | *Quercus pagoda* | 813 | 670 |
| Overcup oak | *Q. lyrata* | 822 | 657 |
| Post oak | *Q. stellata* | 835 | 587 |
| Boxelder | *Acer negundo* | 313 | 515 |
| Water hickory | *Carya aquatica* | 401 | 485 |
| Waterelm, planertree | *Planera aquatica* | 722 | 459 |
| Shortleaf pine | *Pinus echinata* | 110 | 452 |
| Eastern hophornbeam | *Ostrya virginiana* | 701 | 449 |
| Swamp tupelo | *Nyssa biflora* | 694 | 446 |
| Texas red oak | *Quercus texana* | 828 | 430 |

*continued*

**Table 2—Common name, scientific name, and FIA species code of tree species, Louisiana, 2013 (continued)**

| Common name | *Scientific name* | FIA species code | Observations |
|---|---|---|---|
| | | | *number* |
| Laurel oak | *Quercus laurifolia* | 820 | 429 |
| American holly | *Ilex opaca* | 591 | 424 |
| Mockernut hickory | *Carya alba* | 409 | 422 |
| Black cherry | *Prunus serotina* | 762 | 381 |
| Sweetbay | *Magnolia virginiana* | 653 | 362 |
| Pecan | *Carya illinoinensis* | 404 | 330 |
| American beech | *Fagus grandifolia* | 531 | 320 |
| Hawthorn spp. | *Crataegus* spp. | 500 | 299 |
| Common persimmon | *Diospyros virginiana* | 521 | 286 |
| Honeylocust | *Gleditsia triacanthos* | 552 | 254 |
| Southern magnolia | *Magnolia grandiflora* | 652 | 225 |
| Slippery elm | *Ulmus rubra* | 975 | 219 |
| Flowering dogwood | *Cornus florida* | 491 | 213 |
| American sycamore | *Platanus occidentalis* | 731 | 192 |
| Swamp chestnut oak | *Quercus michauxii* | 825 | 175 |
| Pondcypress | *Taxodium ascendens* | 222 | 148 |
| Sassafras | *Sassafras albidum* | 931 | 132 |
| Spruce pine | *Pinus glabra* | 115 | 124 |
| Yellow-poplar | *Liriodendron tulipifera* | 621 | 122 |
| Pignut hickory | *Carya glabra* | 403 | 119 |
| White ash | *Fraxinus americana* | 541 | 88 |
| Cedar elm | *Ulmus crassifolia* | 973 | 82 |
| Florida maple | *Acer barbatum* | 311 | 78 |
| Live oak | *Quercus virginiana* | 838 | 65 |
| Red bay | *Persea borbonia* | 721 | 60 |
| Eastern cottonwood | *Populus deltoides* | 742 | 59 |
| Eastern redcedar | *Juniperus virginiana* | 68 | 57 |
| Blackjack oak | *Quercus marilandica* | 824 | 54 |
| Shumard oak | *Q. shumardii* | 834 | 53 |
| Sourwood | *Oxydendrum arboreum* | 711 | 50 |
| Red mulberry | *Morus rubra* | 682 | 47 |
| Black oak | *Quercus velutina* | 837 | 43 |
| Bitternut hickory | *Carya cordiformis* | 402 | 43 |
| River birch | *Betula nigra* | 373 | 41 |
| Eastern redbud | *Cercis canadensis* | 471 | 41 |
| Chinaberry | *Melia azedarach* | 993 | 41 |
| Osage-orange | *Maclura pomifera* | 641 | 28 |
| Waterlocust | *Gleditsia aquatica* | 551 | 20 |
| Two-wing silverbell | *Halesia diptera* | 582 | 18 |
| Shagbark hickory | *Carya ovata* | 407 | 17 |
| Tungoil tree | *Vernicia fordii* | 995 | 16 |

*continued*

**Table 2—Common name, scientific name, and FIA species code of tree species, Louisiana, 2013 (continued)**

| Common name | *Scientific name* | FIA species code | Observations |
|---|---|---|---|
| | | | *number* |
| Black hickory | *Carya texana* | 408 | 16 |
| Chittamwood, gum bumelia | *Sideroxylon lanuginosum* | 381 | 13 |
| American plum | *Prunus americana* | 766 | 13 |
| Swamp white oak | *Quercus bicolor* | 804 | 12 |
| Camphortree | *Cinnamomum camphora* | 858 | 12 |
| Black locust | *Robinia pseudoacacia* | 901 | 12 |
| Mimosa, silktree | *Albizia julibrissin* | 345 | 11 |
| Bluejack oak | *Quercus incana* | 842 | 8 |
| Pawpaw | *Asimina triloba* | 367 | 8 |
| Black walnut | *Juglans nigra* | 602 | 8 |
| Shellbark hickory | *Carya laciniosa* | 405 | 7 |
| American basswood | *Tilia americana* | 951 | 7 |
| Bigleaf magnolia | *Magnolia macrophylla* | 654 | 6 |
| Southern crab apple | *Malus angustifolia* | 662 | 6 |
| Carolina ash | *Fraxinus caroliniana* | 548 | 5 |
| Sugar maple | *Acer saccharum* | 318 | 4 |
| Ginkgo, maidenhair tree | *Ginkgo biloba* | 561 | 4 |
| Delta post oak | *Quercus similis* | 836 | 4 |
| Silverbell spp. | *Halesia* spp. | 580 | 3 |
| White basswood | *Tilia americana* | 952 | 3 |
| Carolina basswood | *T. americana* | 953 | 3 |
| Other or unknown live tree | *Tree unknown* | 999 | 3 |
| Hackberry | *Celtis occidentalis* | 462 | 3 |
| Dwarf post oak | *Quercus margarettiae* | 840 | 3 |
| Hickory spp. | *Carya* spp. | 400 | 2 |
| Cucumbertree | *Magnolia acuminata* | 651 | 2 |
| Pin cherry | *Prunus pensylvanica* | 761 | 2 |
| Red hickory | *Carya ovalis* | 412 | 1 |
| Largeleaf geigertree | *Cordia sebestena* | 865 | 1 |
| Scarlet oak | *Quercus coccinea* | 806 | 1 |
| Turkey oak | *Q. laevis* | 819 | 1 |
| Bur oak | *Q. macrocarpa* | 823 | 1 |
| Weeping willow | *Salix sepulcralis* | 929 | 1 |
| Cockspur hawthorn | *Crataegus crus-galli* | 501 | 1 |
| Chokecherry | *Prunus virginiana* | 763 | 1 |
| Southern shagbark hickory | *Carya carolinae-septentrionalis* | 413 | 1 |
| Southern catalpa | *Catalpa bignonioides* | 451 | 1 |
| White mulberry | *Morus alba* | 681 | 1 |
| Sweet crab apple | *Malus coronaria* | 663 | 1 |
| Striped maple | *Acer pensylvanicum* | 315 | 1 |
| Serviceberry spp. | *Amelanchier* spp. | 356 | 1 |

Population estimates of hardwoods >1-inch d.b.h. outnumbered softwoods by more than double, despite the prevalence of loblolly pine. The sweetgum species group constituted 17 percent of hardwoods, only surpassed by Eastern noncommercial hardwoods (a catch-all group for a broad variety of species, including Chinese tallowtree). Red oak species, soft hardwood species (e.g., black cherry, sycamore), and soft maple (e.g., red maple) also composed large proportions of the Louisiana hardwood population. Ash trees, a species group of concern due to recent detections of the invasive Emerald Ash Borer insect, numbered 281 million trees in the State, mostly in the 1- to 3-inch diameter range.

Shortleaf pine populations in Louisiana have been declining since the 1974 inventory, and continued to decline in the State. In 1974, shortleaf populations numbered 359 million trees. In 2013 the species numbered just 25 million trees—a loss of 93 percent over just 40 years (fig. 9). Shortleaf pine is valuable economically and ecologically, providing pulp, plywood, veneer and sawtimber. While shortleaf is slower growing than loblolly pine, it uses water more efficiently and its slower growth and clear bole make it a better dimensional lumber option than either Virginia or loblolly pines (Mattoon 1915).

Shortleaf and loblolly hybridize easily. In older shortleaf populations, littleleaf disease (a fungal pathogen) can decimate stands. Fire suppression over the last 40–50 years combined with intentional replacement with faster-growing loblolly pine has resulted in the continuing declines in shortleaf pine, though more recently efforts are being made to restore shortleaf pine communities across the South.

## Volume, Productivity, and Biomass

Statewide live-tree volume equaled 24.9 billion cubic feet. Fourteen percent of live-tree volume was owned by forest industry in Louisiana, while nonindustrial private organizations and individuals owned 68 percent. Only 18 percent of volume was publicly owned (fig. 10).

On timberland, live-tree volume was 24.4 billion cubic feet. Loblolly pine accounted for 36 percent of all live-tree volume on timberland in Louisiana. Baldcypress, sweetgum, water oak, and water tupelo were also important from a volumetric standpoint though, unlike loblolly pine, each of those accounted for <10 percent of live-tree volume, individually.

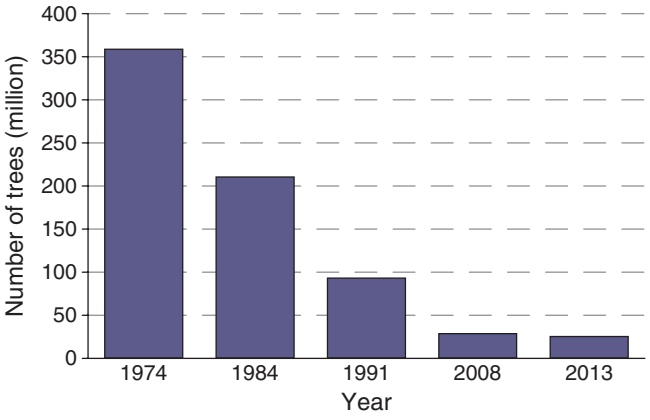



Figure 9—Number of live shortleaf pine trees (≥1-inch d.b.h.) on timberland by year, Louisiana.

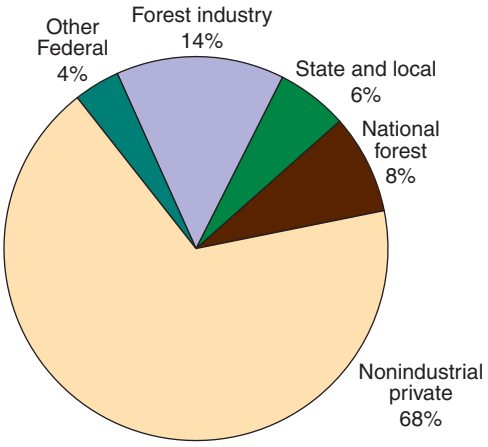



Figure 10—Proportion of live-tree volume on forest land by owner, Louisiana, 2013.

Softwood live-tree volume went from 10 billion cubic feet in 1991 to 12 billion cubic feet in 2013, a 21 percent increase. Ninety-seven percent of softwood volume was in growing stock. Hardwood live-tree volume went from 10.6 billion cubic feet in 1991 to 12.1 billion cubic feet in 2013, an increase of 14 percent. Seventy-eight percent of hardwood volume was in growing stock.

The Northwest survey unit had the largest area of high-productivity hardwood forest types, with 519,000 acres with site productivity estimated at 120 cubic feet per acre per year or higher (fig. 11). The North Delta had the least area of high-productivity hardwood forest types, but it was also one of the least forested units, in general. Oak-hickory acreage was highest in the northwest unit, along with absolute volume in the oak-hickory forest-type group, though per-acre oak-hickory volume was somewhat higher in the South Delta survey unit. Oak-gum-cypress absolute volume and acreage was highest in the South Delta, while the per-acre volume of oak-gum-cypress was comparable in the South Delta and the Southeast.

The Southwest survey unit had the largest area of high-productivity softwood forest types, with 1.2 million acres with site productivity estimated at 120 cubic feet per acre per year or higher (fig. 12). The South Delta, at 42,764 acres, had the least amount of high-productivity softwoods, followed by the North Delta. In terms of forest-type group, per-acre volume of loblolly-shortleaf pine was comparable among all survey units, though absolute volume was much higher in the Northwest and Southwest than any other unit. Acreage was highest in those units, as well. Longleaf-slash pine absolute volume and acreage was concentrated in the Southwest unit, though per-acre volume was highest in the Northwest unit.

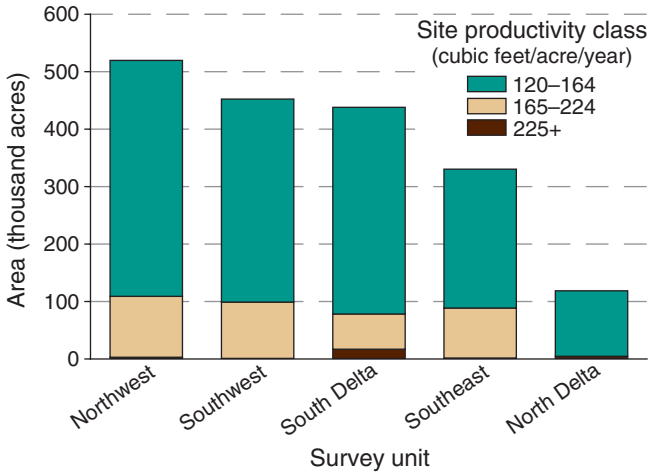



Figure 11—Area of hardwoods by survey unit and site productivity class, Louisiana, 2013.

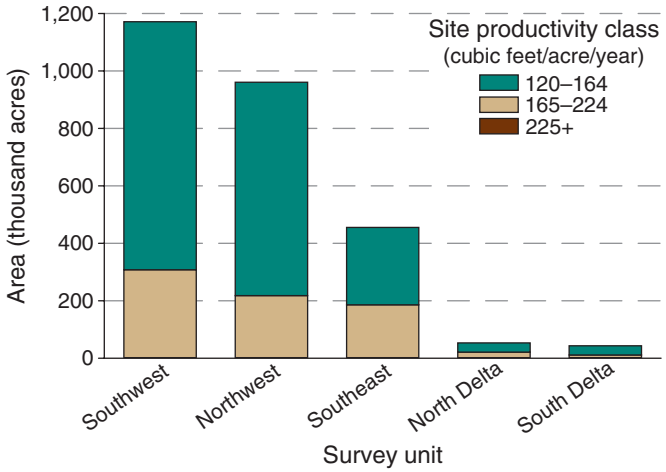



Figure 12—Area of softwoods by survey unit and site productivity class, Louisiana, 2013.

The dry weight of aboveground live-tree biomass totaled 668 million tons. Hardwoods comprise 56 percent of that total as a group, although loblolly and shortleaf pines (primarily loblolly) comprise 32 percent, independently. Translated to carbon, Louisiana forests contain 334 million tons (aboveground live trees).

## GROWTH, REMOVALS, AND MORTALITY

Components of change like tree growth, removals in the form of harvest or land use change, and tree mortality shed light on the sustainability of the resource in a given area. If net growth (growth minus mortality) exceeds removals then either productivity is high, planting or natural reversions from nonforest land uses have occurred, or management practices have helped to ensure that overharvesting is not occurring. Often, the reality is a combination of many factors. If removals exceed growth over a sustained period of time, there may have been a large mortality event (thereby lowering net growth), or there may be a need to assess harvesting practices, land use change, and the long term sustainability of the forest. Components of change are calculated on an average annual basis, and are only calculated on plots with multiple measurements through time. Standard errors can be slightly higher for these components because of a reduced sample size than for some other forest metrics; therefore, users are cautioned to limit analyses or inferences to large scales such as the unit or State. In Louisiana, the plot population used to calculate growth, removals, and mortality numbered 3,848 sampled plots.

Average annual net growth (gross growth minus mortality) of live trees on Louisiana forest land was 1.1 billion cubic feet from 2009–12. That equates to roughly 68 cubic feet per acre on average annually across the State (fig. 13). Per-acre growth rates were highest in the Northwest unit at an average of 87 cubic feet, annually, and were lowest in the South Delta unit at 28 cubic feet on average, annually. The loblolly-shortleaf pine managed forests in the Northwest and Southwest likely contribute to the high annual growth rates, while slower growing, older oak-gum-cypress forests in the South Delta result in lower total annual per-acre values in that unit.

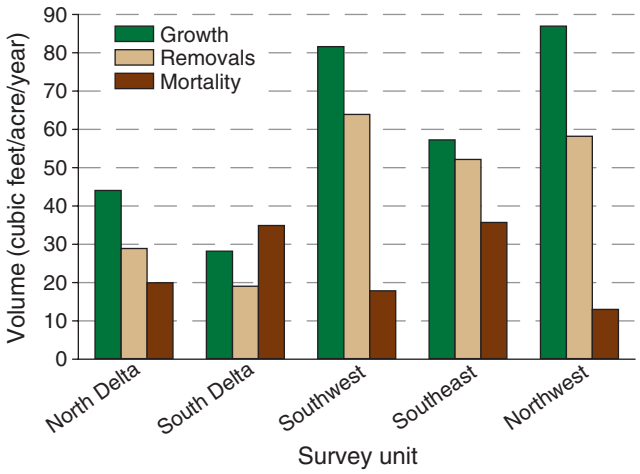



Figure 13—Average annual per-acre net growth, removals, and mortality by survey unit, Louisiana, 2013.

Average annual net forest land growth was about 1.4 times higher than removals during the survey period (fig. 13). Removals on forest land averaged 733 million cubic feet per year. These removals include harvests and diversions to other land uses, though harvest removals accounted for the majority of removal volume in Louisiana (727 million cubic feet). Removals on timberland in Louisiana appear higher than removals on forest land (which is counter-intuitive given that timberland is a smaller area), because removals from timberland include diversions on U.S. Fish and Wildlife Service property to reserved land—thus, some volume was removed from the available-to-harvest timber base into the unavailable-to-harvest reserved land base without any actual tree removal.

Softwood species group accounted for the largest proportion of forest land removals at 542 million cubic feet per year. The loblolly and shortleaf pine species group alone accounted for 60 percent of all removals volume, and 81 percent of softwood removals volume. The cypress species group which is often of concern in the State accounted for only about 2 percent of average annual removals volume on forest land. Most softwood removals came from nonindustrial private land; only 26 percent came from forest industry land.

Hardwood forest land removals averaged 191 million cubic feet on average, annually. The majority of removals in hardwoods were in the other red oaks (e.g., southern red oak, pin oak, water oak, etc.) and sweetgum species groups. Very little hardwood removal volume came from ownerships outside nonindustrial private land, which accounted for 84 percent of hardwood removals. Forest Industry accounted for about 10 percent of hardwood removal volume.

Mortality on Louisiana forest land averaged 299 million cubic feet of volume (or 23 million trees >5 inches d.b.h.) annually during the survey period (2009–13). Hardwood mortality averaged 17 million trees, annually, compared to 6 million softwood trees. Mortality rates were highest in the Southeast and South Delta, which lost 36 cubic feet per acre on average, annually. The average per-acre mortality rate was 22 cubic feet, annually, across all units. The largest per-acre mortality (in forest-types with a sample large enough to adequately report) occurred in the oak-gum-cypress forest-type group, which averaged 39 cubic feet annually across the State and 80 cubic feet per acre annually in the Southeast.

## FOREST HEALTH AND DISTURBANCE

Fire and weather events were the two biggest disturbance agents in Louisiana forests during the survey period. Weather damage was detected on 183,600 acres, with highest weather-related damage in the oak-gum-cypress and elm-ash-cottonwood forest type groups (table 3). Fire damage, in contrast, was highest in the loblolly-shortleaf pine forest type, and averaged 119 thousand acres, annually. Fire damage includes intentionally set prescribed fires for management purposes, as well as unintentional wildfire.

Weather-related damage in southern Louisiana is most likely hurricane and tropical storm-related damage. Besides lingering effects from Hurricane Katrina in 2005, southern Louisiana has experienced 10 named hurricanes, tropical storms, and tropical depressions including Hurricane Rita and Hurricane Gustav, both of which caused widespread damage. Other severe weather events in Louisiana that cause damage to trees can range from heavy straight-line winds to hail or ice storms, unusually heavy flooding, and tornadoes.

**Table 3—Area of forest land disturbed annually by forest-type group and disturbance class, Louisiana, 2013**

| | Disturbance class | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Forest-type group[a] | Insects | Disease | Weather | Fire | Domestic animals | Wild animals | Human | Other natural |
| | *thousand acres* | | | | | | | |
| Softwood types | | | | | | | | |
| Longleaf-slash pine | 0.0 | 0.0 | 5.4 | 29.2 | 0.0 | 0.0 | 1.6 | 0.0 |
| Loblolly-shortleaf pine | 0.0 | 0.8 | 14.7 | 62.7 | 0.7 | 0.0 | 4.4 | 2.0 |
| Total softwoods | 0.0 | 0.8 | 20.0 | 91.9 | 0.7 | 0.0 | 5.9 | 2.0 |
| Hardwood types | | | | | | | | |
| Oak-pine | 0.0 | 0.0 | 9.2 | 7.6 | 0.7 | 0.0 | 0.3 | 0.0 |
| Oak-hickory | 0.0 | 0.0 | 16.9 | 15.8 | 1.8 | 0.4 | 2.2 | 0.0 |
| Oak-gum-cypress | 0.0 | 0.0 | 81.3 | 0.4 | 2.1 | 7.4 | 3.4 | 0.0 |
| Elm-ash-cottonwood | 0.0 | 0.0 | 50.1 | 0.0 | 5.0 | 2.0 | 0.0 | 2.5 |
| Other hardwoods | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Exotic hardwoods | 0.0 | 0.0 | 3.7 | 0.6 | 1.7 | 0.0 | 0.9 | 0.0 |
| Total hardwoods | 0.0 | 0.0 | 161.2 | 24.4 | 11.4 | 9.9 | 6.9 | 2.5 |
| Nonstocked | 0.0 | 0.0 | 2.4 | 2.8 | 0.0 | 1.0 | 0.0 | 0.0 |
| All groups | 0.0 | 0.8 | 183.6 | 119.1 | 12.1 | 10.8 | 12.8 | 4.5 |

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] Based on past conditions.

## Emerald Ash Borer

Emerald ash borer (EAB) (*Agrilus planipennis*) has been found in many Southern States, including Tennessee, Missouri, Kentucky, Georgia, North Carolina, Arkansas, and was most recently detected in Webster Parish, Louisiana. This raises concerns for forestry professionals and landowners in Louisiana who own trees in the genus Fraxinus.

There are an estimated 285 million ash trees >1 inch d.b.h. in Louisiana. Ash species make up 3 percent of the species in the State and 4 percent of the hardwood species in the State. Seventy-six percent of ash trees are in bottomland hardwood forest-type groups (oak-gum-cypress and elm-ash-cottonwood). The largest number of ash trees (62 percent) occurs in the South Delta and Southwest survey units (fig. 14). Seventy-three percent of ash trees are <3 inches d.b.h.

Ash species contribute an estimated 613 million cubic feet of all-live volume and 1.7 billion board feet of sawtimber volume on forest land. Sixty-two percent of ash volume occurs in the South Delta survey unit, alone (fig. 15).

Net annual growth (growth minus mortality) on ash trees on Louisiana forest land was 6 million cubic feet, on average, while annual mortality was 12 million cubic feet on average. Average annual removals equaled 6 million cubic feet in 2013. Ash removals in Louisiana come primarily from privately owned timberland. Research indicates that small populations of EAB grow together, advancing the invasion front and increasing the overall spread (Herms and McCullough 2014). Assuming no change in the resource, EAB could impact over 2.2 billion cubic feet of ash volume should it infest the States of Alabama, Arkansas, Mississippi, and Louisiana.

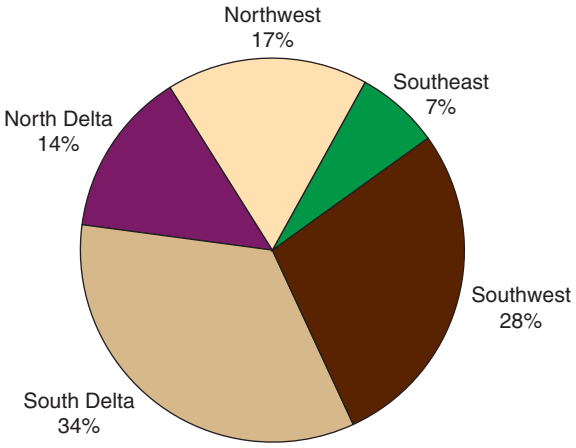



Figure 14—Proportion of live ash trees (≥1-inch d.b.h./d.r.c.) on forest land by survey unit, Louisiana, 2013.

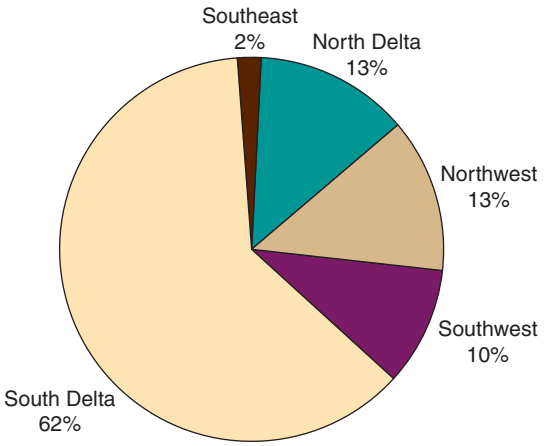



Figure 15—Proportion of live ash tree volume (≥5 inches d.b.h./d.r.c.) on forest land by survey unit, Louisiana, 2013.

## Invasive Plants

Invasive plants were found on 3,963 out of 8,689 forested subplots in Louisiana in 2013. That means that 46 percent of all subplots sampled contained at least one invasive plant—nearly half of all subplots. Chinese tallowtree (*Triadica sebifera*) was the most common tree species, and was detected on 1,501 subplots (17 percent). On 51 percent of the subplots on which it occurred, Chinese tallowtree covered between 1 and 10 percent. The tree occupied a trace amount of aerial cover on 24 percent of subplots, between 11 and 50 percent of area on 17 percent of subplots, and between 51 and 90 percent on 6 percent of subplots. Tallowtree only completely covered (91–100 percent aerial coverage) 13 subplots. Chinese tallowtree, as noted in previous studies, is progressively moving northward in States along the gulf coast. The tree, which was originally introduced as a species valued for its economic value in producing candles and soap, has converted former wet prairie to forest in many coastal counties (Bruce and others 1997). Tallowtree was most frequently noted in parishes occurring along the coast.

Privets (*Ligustrum* spp) were the most common shrub species, at >1,300 subplots. In comparison, the next most common species was *Nandina*, found on 54 subplots. On the subplots where it was detected, privet generally covered >1 percent of the subplot but <90 percent. Privet covered >90 percent of subplot area only 1 percent of the time (fig. 16).

Japanese honeysuckle (*Lonicera japonica*) was by far the most common invasive vine on subplots in Louisiana, and occurred on 23 percent of subplots, and 51 percent of subplots with invasive presence. In contrast, all other vines (including Kudzu), occurred on only 1 surveyed subplot.

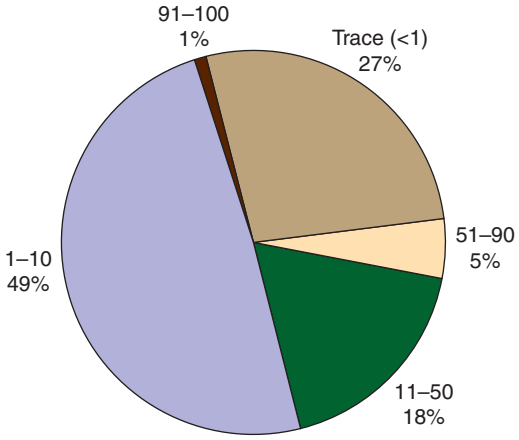



Figure 16—Proportion of subplots infested with privet by the percentage of the subplot covered, Louisiana, 2013.

## INVENTORY DESIGN

The following provides a very general description of the sample design used to derive forest resource estimates provided in this report. Only the current sample design is included. Users wishing to learn about how the current methodology differs from previous methodologies should refer to the inventory methods in previous State reports (Oswalt and Bentley 2013). Highly detailed explanations of current FIA sample design and estimation procedures are in Bechtold and Patterson (2005).

The Forest Inventory and Analysis (FIA) sampling design is based on a grid of hexagons superimposed on a map of the United States with each hexagon approximately 6,000 acres in size and at least one permanent plot established in each hexagon. In Phase 1 of FIA's multi-phase inventory, the population of interest is stratified and plots are assigned to each stratum to increase the precision of estimates. During Phase 2 (P2), tree and site attributes are measured for forested plots established in each hexagon. P2 plots consist of four 24-foot fixed-radius subplots on which standing trees are inventoried. During Phase 3, select forest health indicators (tree crown condition, forest soils, vegetation diversity, and down woody materials) are measured on $1/16^{th}$ of P2 plots so that each plot represents approximately 96,000 acres.

### Area Estimation

Forest area estimates for Louisiana 2013 were based on classifying National Land Cover Database points. Stratification of forest and nonforest was performed at the unit level. Area estimation of all lands and ownerships was based on the probability of selection of P2 plot locations. As a result, the known forest land area for specific ownerships will not always agree with area estimates based on probability of selection. For example, the acreage of national forests as published by the National Forest System will not agree exactly with the statistical estimate of national forest land generated by FIA. These numbers could differ substantially for very small areas.

Louisiana black bear (*Ursus americanus luteolus*). (photo by Pam McIlhenny, U.S. Fish and Wildlife Service, Source: NCTC Image Library)

## STATISTICAL RELIABILITY

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

### Measurement Error

There are three elements of measurement error: (1) bias, which is caused by instruments which are not properly calibrated; (2) compensating, which is caused by instruments of moderate precision; and (3) accidental, which is caused by human error in measuring and compiling. All of these are held to a minimum by a system that incorporates training, check plots, and editing and checking for consistency. Editing checks screen out logical and data entry errors for all plots. It is not possible to determine measurement error statistically, but it is possible to hold it to a minimum.

### Sampling Error

Sampling error is associated with the natural and expected deviation of the sample from the true population mean. This deviation is susceptible to a mathematical evaluation of the probability of error. FIA inventories supported by the full complement of sample plots are designed to achieve reliable statistics for the region. Sampling error increases as the area or volume considered decreases in magnitude. Sampling errors and associated confidence intervals are often unacceptably high for small components of the total resource. However, there may be instances where a smaller component does not have a proportionately larger sampling error. This can happen when the post-defined strata are more homogeneous than the larger strata, thereby having a smaller variance. For specific post-defined strata the sampling error is available from online retrievals using the Forest Inventory Data Online (FIDO II) at http://199.128.173.26/fido/mastf/index.html, or can be calculated using the following formula. (Note: Sampling errors obtained by this method are only approximations of reliability because this process assumes constant variance across all subdivisions of totals.)

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

where

$SE_S$ = sampling error for subdivision of 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

### Precautions

Users are cautioned to be aware of the highly variable accuracy and questionable reliability of small subsets of the data, e.g., volume estimates by parish. When summarizing statistics from the FIA database, users should familiarize themselves with the procedures used to compute sampling error as outlined above.

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Sunset over Cameron Prairie National Wildlife Refuge, Louisiana. (photo by Steve Hillebrand, U.S. Fish and Wildlife Service)

## GLOSSARY

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

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

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

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

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

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

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

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

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

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

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

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

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

*Net aboveground biomass*—Gross aboveground biomass minus deductions for missing cull, broken-top, and a reduction for a proportion of rotten cull

for live or standing dead trees ≥5.0 inches d.b.h (Rotten cull will have a factor to reduce specific gravity separately from sound wood). Live and standing dead trees 1.0 to 4.9 inches only have deductions for broken-top cull. Additional deductions are made for dead trees ≥1.0 inch using decay class.

*Belowground biomass*—Coarse roots only.

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

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

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

*Bole*—See: Merchantable stem.

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

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

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

**Census water**—See: Land use.

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

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

**Components of change**—Volume increment and decrement values that explain the change in inventory between two points in time. Components of change are usually expressed in terms of growing-stock or all-live merchantable volume. These components can be expressed as average annual values by dividing the component by the number of years in the measurement cycle. FIA inventories are designed to measure net change over time, as well as the individual components of change that constitute net change (e.g., growth, removals, mortality). Change estimates are computed for two sequential measurements of each inventory panel. Upon remeasurement, a new initial inventory is established for remeasurement at the next scheduled inventory. As such, computation of change components is not intended to span more than one inventory cycle. Rather, the change estimation process is repeated cycle by cycle. This simplifies field protocols and ensures that change estimation is based on short and relatively constant time intervals (e.g., 5 years). Change estimates for individual panels are combined across multiple panels in the same manner as panels are combined to obtain current inventory parameters such as total standing volume. FIA recognizes

the following components of change as prescribed core variables; they usually are expressed in terms of growing-stock or all-live volume, where *t* is the initial inventory of a measurement cycle, and *t* + 1 is the terminal inventory:

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

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

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

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

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

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

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

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

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

*Reversion growth*—The growth of reversion trees from the midpoint of the

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

**Cycle**—One sequential and complete set of panels.

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

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

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

**Diversion**—See: Components of change.

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

**Dry weight**—The oven-dry weight of biomass.

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

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

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

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

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

**Forest industry land**—See: Ownership.

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

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

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

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

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

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

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

*Oak-hickory*—Forests in which upland oaks or hickory, singly or in combination, constitute a plurality of the stocking, except where pines account for 25 to

50 percent, in which case the stand is classified oak-pine. (Common associates include yellow-poplar, elm, maple, and black walnut.)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Southern regional present land use categories are as follows:

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

*Accessible other forest land*—Land that meets the definition of accessible forest land, but is incapable of producing 20 cubic feet per acre per year of industrial wood under natural conditions because of adverse site

conditions. Adverse conditions include sterile soils, dry climate, poor drainage, high elevation, steepness and soil rockiness.

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

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

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

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

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

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

*Nonsampled*—Not sampled due to denied access, hazardous conditions, being outside the U.S. or other reasons.

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

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

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

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

**Medium-diameter tree—**Softwood timber species 5.0 to 8.9 inches d.b.h. and hardwood timber species 5.0 to 10.9 inches d.b.h. These trees were called poletimber-sized trees in prior surveys. See: Stand-size class.

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

**Mortality—**See: Components of change.

**National forest land—**See: Ownership.

**Noncensus water—**See: Land use.

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

**Nonindustrial private forest land—**See: Ownership.

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

*No problems.*

*Seasonal access due to water conditions in wet weather.*

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

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

*Year-round water problems (includes islands).*

*Slopes 20 to 40 percent.*

*Slopes >40 percent.*

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

**Other public land—**See: Ownership.

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

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

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

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

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

*Corporate*—Owned by corporations, including incorporated farm ownerships.

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

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

*Miscellaneous Federal land*—Federal land other than national forests.

*State, parish, and municipal land*—Land owned by States, parishes, and local public agencies or municipalities, or land leased to these governmental units for 50 years or more.

**Ozone ($O_3$)**—A gaseous air pollutant produced primarily through sunlight-driven chemical reactions of $NO_2$ and hydrocarbons in the atmosphere and causing foliar injury to deciduous trees, conifers, shrubs, and herbaceous species.

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

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

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

**Phase 3 (P3)**—A subset of Phase 2 plots where additional attributes related to forest health are measured.

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

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

**Private land**—See: Ownership.

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

**Quality assurance (QA)**—The total integrated program for ensuring that the uncertainties inherent in FIA data are known and do not exceed acceptable magnitudes, within a stated level of confidence. Quality assurance encompasses the plans, specifications, and policies affecting the collection, processing, and reporting of data. It is the system of activities designed to provide program managers and project leaders with independent assurance that total system quality control is being effectively implemented.

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

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

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

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

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

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

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

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

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

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

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

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

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

*Planted*—Planted or artificially seeded.

*Natural*—No evidence of artificial regeneration.

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

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

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

*Small-diameter stands*—Stands at least 10 percent stocked with live trees, in which small-diameter trees account for more than one-half of total stocking.

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

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

*Nonstocked*—The condition is <10 percent stocked.

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

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

**State, parish, and municipal land—** See: Ownership.

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

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

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

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

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

*None*—No observable treatment.

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

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

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

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

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

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

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

*Site preparation*—Clearing, slash burning, chopping, disking, bedding, or other practices clearly intended to prepare a site for either natural or artificial regeneration.

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

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

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

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

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

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

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

*Rough cull*—Trees that do not contain at least one 12-foot saw log or two 8-foot logs now or prospectively, primarily because of roughness or poor form. Less than ⅓ of its gross board-foot volume meets size, soundness, and grade requirements and <½ of the cubic-foot cull is rotten or unsound.

*Rotten cull*—Trees that do not contain at least one 12-foot saw log or two 8-foot logs now or prospectively and/or do not meet grade specifications for percent sound primarily because of rot. All species not having ⅓ or more of its gross board-foot volume meeting size, soundness, and grade requirements, and over ½ of the cubic-foot cull is rotten or unsound.

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

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

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

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

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

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

*Dusky gopher frog, a species that relies on longleaf pine forests. (photo by John A. Tupy, U.S. Department of Agriculture)*

## INVENTORY QUALITY ASSURANCE AND QUALITY CONTROL

The goal of the FIA quality assurance (QA) program is to provide a framework that ensures that forest assessments meet given standards for completeness, accuracy, and absence of bias. This program is organized in accordance with the protocols set forth in the American National Standard for Quality of Environmental Data collection (Part B of American Society for Quality Control 1994). One of the goals of the FIA program is to include data quality documentation in all nationally available reports, including State reports and national summary reports. This report includes a summary of phase 2 variables and measurement quality objective (MQO) analyses from FIA blind check measurements. Quality assessments of the phase 3 data will be addressed in future reports. Quality control procedures include feedback to field staff to provide assessment and improvement of crew performance. Additionally, data quality is assessed and documented using performance measurements and post survey assessments. These assessments then are used to identify areas of the data collection process that need improvement or refinement in order to meet quality objectives of the program.

### Quality Assurance and Quality Control Methods

FIA implements QA methods in several different ways. These methods include nationally standardized field manuals, portable data recorders (PDR), training and certification of field crews, and field audits. The PDRs help assure 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 return employees. Field crew members are certified via an *in situ* test plot. All crews are required to have at least one certified person present on the plot at all times.

### Field Audits

A hot check is an inspection normally done as part of the training process. The inspector is present with crew to document crew performance as they measure plots. 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 remeasurement is done without the previously recorded data. The first measurement of the plot is referred to as the field measurement and the second measurement as the QA measurement. The field crews do not know

in advance when or which of their plots will be measured by a QA crew. 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 be made within 2 weeks following completion of the field measurement. The recommended intensity for blind checks is 3 percent of the plots installed.

## Measurement Quality Objectives

Each variable collected by FIA is assigned a MQO with desired levels of tolerance for data analyses. The MQOs are documented in the FIA national field manual (http://www.fia.fs.fed.us/library/field-guides-methods-proc/). In some instances, the MQOs were established as a "best guess" of what experienced field crews should be able to consistently achieve. Tolerances are somewhat arbitrary and were based on the ability of crews to make repeatable measurements or observations within the assigned MQO. Evaluation of field crew performance is accomplished by calculation of the differences between the field crew and QA crew data collected on blind check plots. Results of these calculations are compared to the established MQOs.

In the analysis of blind check data, an observation is within tolerance when the difference between the field crew and QA crew observations does not exceed the assigned tolerance for that variable. For many categorical variables, the tolerance is "no error" allowed, so only observations that are identical are within the tolerance level.

**Table B.1—Number, volume, growth, removals, and mortality on forest land per species group, Louisiana, 2013**

| Species group | All live | Number growing-stock[a] | Volume all live | Volume growing-stock | Growth all live | Growth growing-stock | Removals all live | Removals growing-stock | Mortality all live | Mortality growing-stock |
|---|---|---|---|---|---|---|---|---|---|---|
| | *million trees* | | *million cubic feet* | | *million cubic feet per year* | | | | | |
| Longleaf and slash pines | 338.5 | 99.4 | 1,194.4 | 1,172.7 | 79.0 | 76.9 | 90.8 | 90.8 | 7.5 | 7.4 |
| Loblolly and shortleaf pines | 2,023.8 | 799.2 | 9,158.3 | 8,985.9 | 681.0 | 664.9 | 439.0 | 430.0 | 52.5 | 50.4 |
| Other yellow pines | 11.3 | 2.9 | 64.0 | 56.6 | -1.6 | -1.8 | 1.4 | 1.4 | 4.8 | 4.8 |
| Cypress | 132.5 | 77.5 | 1,955.8 | 1,837.0 | 27.6 | 29.9 | 10.4 | 10.4 | 7.2 | 4.9 |
| Other eastern softwoods | 11.5 | 0.6 | 7.3 | 4.5 | 0.4 | 0.3 | 0.2 | 0.1 | 0.0 | 0.0 |
| Select white oaks | 154.8 | 26.4 | 629.8 | 590.5 | 12.3 | 10.9 | 9.2 | 8.9 | 7.1 | 6.9 |
| Select red oaks | 91.5 | 16.8 | 489.9 | 458.6 | 12.4 | 11.3 | 6.5 | 6.4 | 5.3 | 4.6 |
| Other white oaks | 109.5 | 28.1 | 753.1 | 588.8 | 9.4 | 7.8 | 6.9 | 6.6 | 8.2 | 6.7 |
| Other red oaks | 961.9 | 122.4 | 3,040.7 | 2,664.6 | 71.5 | 66.2 | 57.2 | 52.6 | 65.2 | 55.2 |
| Hickory | 211.6 | 26.0 | 645.3 | 562.0 | 13.7 | 11.9 | 15.4 | 14.3 | 8.9 | 7.3 |
| Hard maple | 16.6 | 1.1 | 12.0 | 8.6 | 0.9 | 0.5 | 0.1 | 0.1 | 0.0 | 0.0 |
| Soft maple | 705.3 | 26.8 | 428.0 | 228.0 | 6.3 | 3.3 | 5.1 | 3.3 | 14.8 | 7.7 |
| Beech | 33.8 | 5.0 | 166.0 | 123.6 | -0.6 | -0.5 | 0.8 | 0.7 | 4.2 | 3.6 |
| Sweetgum | 1,110.9 | 115.2 | 1,798.8 | 1,571.9 | 41.0 | 37.9 | 46.7 | 44.6 | 29.8 | 23.9 |
| Tupelo and blackgum | 378.4 | 85.8 | 1,561.5 | 1,261.3 | 19.2 | 16.8 | 7.0 | 6.3 | 11.3 | 7.9 |
| Ash | 284.6 | 28.3 | 612.9 | 492.3 | 5.6 | 3.0 | 5.7 | 5.2 | 11.6 | 9.7 |
| Cottonwood and aspen | 10.0 | 1.1 | 61.1 | 56.8 | 2.2 | 1.8 | 2.3 | 2.3 | 2.4 | 2.3 |
| Basswood | 0.8 | 0.3 | 2.2 | 1.4 | -0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Yellow-poplar | 14.6 | 3.1 | 50.9 | 49.4 | 1.6 | 1.5 | 2.1 | 2.1 | 1.6 | 1.6 |
| Black walnut | 1.1 | 0.0 | 2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Other eastern soft hardwoods | 983.7 | 92.0 | 1,693.0 | 1,050.3 | 46.2 | 29.5 | 18.2 | 15.4 | 38.2 | 21.4 |
| Other eastern hard hardwoods | 300.0 | 9.5 | 177.6 | 109.8 | 3.9 | 1.9 | 3.0 | 1.8 | 4.1 | 2.6 |
| Eastern noncommercial hardwoods | 1,202.1 | 0.0 | 415.3 | 0.0 | 16.5 | 0.0 | 5.3 | 0.0 | 13.8 | 0.0 |
| All species | 9,088.7 | 1,567.5 | 24,920.1 | 21,874.6 | 1,048.2 | 974.0 | 733.3 | 703.1 | 298.7 | 228.8 |

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] For trees with diameter >5.0 inches.

**Table B.2—Percentage of area by land status, Louisiana, 2013**

| Land status | Area |
|---|---|
| | *percent* |
| Accessible forest land | |
| Unreserved forest land | |
| Timberland | 43.1 |
| Unproductive | 0.1 |
| Total | 43.2 |
| Reserved forest land | |
| Productive | 0.7 |
| Unproductive | 0.0 |
| Total | 0.7 |
| Total forest land | 44.0 |
| Nonforest and other area | |
| Nonforest land | 35.5 |
| Water | |
| Noncensus water | 0.7 |
| Census water | 18.8 |
| Total | 55.0 |
| Nonsampled area | |
| Access denied | 0.5 |
| Hazardous conditions | 0.6 |
| All area | 100.0 |
| Total area (*thousands of acres*) | 33,520.0 |

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 B.3—Area of forest land by forest-type group and ownership group, Louisiana, 2013**

| Forest-type group | All ownerships | U.S. Forest Service | Other Federal | State and local government | Forest industry | Nonindustrial private |
|---|---|---|---|---|---|---|
| | | | *thousand acres* | | | |
| Softwood types | | | | | | |
| Longleaf-slash pine | 797.2 | 156.7 | 35.0 | 7.2 | 158.4 | 439.9 |
| Loblolly-shortleaf pine | 5,150.2 | 319.4 | 68.1 | 63.3 | 1,440.8 | 3,258.7 |
| Total softwoods | 5,947.4 | 476.1 | 103.0 | 70.5 | 1,599.2 | 3,698.6 |
| Hardwood types | | | | | | |
| Oak-pine | 1,215.9 | 76.1 | 32.6 | 29.0 | 257.6 | 820.6 |
| Oak-hickory | 1,915.8 | 82.2 | 29.8 | 46.2 | 267.2 | 1,490.3 |
| Oak-gum-cypress | 3,806.5 | 57.3 | 196.5 | 464.6 | 365.1 | 2,723.1 |
| Elm-ash-cottonwood | 1,489.2 | 0.6 | 84.9 | 173.1 | 87.6 | 1,143.0 |
| Other hardwoods | 4.4 | 0.0 | 0.0 | 0.0 | 0.0 | 4.4 |
| Exotic hardwoods | 390.6 | 0.0 | 6.0 | 6.6 | 18.6 | 359.4 |
| Total hardwoods | 8,822.4 | 216.3 | 349.7 | 719.5 | 996.1 | 6,540.8 |
| Nonstocked | 195.3 | 0.0 | 0.0 | 12.9 | 32.0 | 150.4 |
| All groups | 14,965.1 | 692.4 | 452.8 | 802.9 | 2,627.2 | 10,389.8 |

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 B.4—Area of forest land by forest-type group and stand-size class, Louisiana, 2013**

| Forest-type group | All size classes | Stand-size class | | | Non-stocked |
|---|---|---|---|---|---|
| | | Large diameter | Medium diameter | Small diameter | |
| | *thousand acres* | | | | |
| Softwood types | | | | | |
| Longleaf-slash pine | 797.2 | 395.0 | 231.7 | 170.5 | 0.0 |
| Loblolly-shortleaf pine | 5,150.2 | 2,452.2 | 1,649.8 | 1,048.3 | 0.0 |
| Total softwoods | 5,947.4 | 2,847.2 | 1,881.5 | 1,218.8 | 0.0 |
| Hardwood types | | | | | |
| Oak-pine | 1,215.9 | 605.2 | 174.6 | 436.2 | 0.0 |
| Oak-hickory | 1,915.8 | 869.1 | 280.0 | 766.8 | 0.0 |
| Oak-gum-cypress | 3,806.5 | 2,800.1 | 517.0 | 489.3 | 0.0 |
| Elm-ash-cottonwood | 1,489.2 | 840.2 | 282.0 | 367.0 | 0.0 |
| Other hardwoods | 4.4 | 0.0 | 0.0 | 4.4 | 0.0 |
| Exotic hardwoods | 390.6 | 16.7 | 77.4 | 296.5 | 0.0 |
| Total hardwoods | 8,822.4 | 5,131.2 | 1,331.0 | 2,360.2 | 0.0 |
| Nonstocked | 195.3 | 0.0 | 0.0 | 0.0 | 195.3 |
| All groups | 14,965.1 | 7,978.4 | 3,212.5 | 3,578.9 | 195.3 |

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 B.5—Area of forest land by forest-type group and stand origin, Louisiana, 2013**

| Forest-type group | Total | Stand origin | |
|---|---|---|---|
| | | Natural stands | Artificial regeneration |
| | *thousand acres* | | |
| Softwood types | | | |
| Longleaf-slash pine | 797.2 | 313.6 | 483.6 |
| Loblolly-shortleaf pine | 5,150.2 | 1,932.3 | 3,218.0 |
| Total softwoods | 5,947.4 | 2,245.9 | 3,701.5 |
| Hardwood types | | | |
| Oak-pine | 1,215.9 | 906.4 | 309.6 |
| Oak-hickory | 1,915.8 | 1,692.4 | 223.4 |
| Oak-gum-cypress | 3,806.5 | 3,601.0 | 205.5 |
| Elm-ash-cottonwood | 1,489.2 | 1,388.8 | 100.4 |
| Other hardwoods | 4.4 | 4.4 | 0.0 |
| Exotic hardwoods | 390.6 | 370.9 | 19.7 |
| Total hardwoods | 8,822.4 | 7,963.8 | 858.6 |
| Nonstocked | 195.3 | 148.6 | 46.7 |
| All groups | 14,965.1 | 10,358.3 | 4,606.8 |

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 B.6—Number of live trees on forest land by species group and diameter class, Louisiana, 2013**

| Species group | All classes | Diameter class (*inches*) 1.0–2.9 | 3.0–4.9 | 5.0–6.9 | 7.0–8.9 | 9.0–10.9 | 11.0–12.9 | 13.0–14.9 | 15.0–16.9 | 17.0–18.9 | 19.0–20.9 | 21.0–24.9 | 25.0–28.9 | 29.0–32.9 | 33.0–36.9 | 37.0+ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | *million trees* | | | | | | | | | |
| Softwood | | | | | | | | | | | | | | | | |
| Longleaf and slash pines | 338.5 | 167.6 | 67.0 | 43.9 | 27.7 | 11.6 | 7.7 | 5.3 | 4.0 | 2.2 | 0.8 | 0.4 | 0.1 | 0.0 | 0.0 | 0.0 |
| Loblolly and shortleaf pines | 2,023.8 | 744.8 | 453.1 | 347.2 | 221.0 | 112.2 | 61.2 | 35.2 | 20.5 | 12.4 | 7.4 | 6.4 | 1.6 | 0.5 | 0.3 | 0.0 |
| Other yellow pines | 11.3 | 5.2 | 2.4 | 1.2 | 0.7 | 0.7 | 0.3 | 0.2 | 0.3 | 0.2 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Cypress | 132.5 | 27.1 | 18.7 | 17.1 | 14.9 | 14.0 | 11.6 | 8.4 | 7.0 | 5.4 | 4.0 | 2.7 | 0.9 | 0.5 | 0.2 | 0.3 |
| Other eastern softwoods | 11.5 | 8.1 | 2.3 | 0.6 | 0.3 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total softwoods | 2,517.6 | 952.8 | 543.5 | 410.0 | 264.6 | 138.6 | 80.8 | 49.2 | 31.9 | 20.2 | 12.1 | 9.6 | 2.5 | 1.0 | 0.5 | 0.3 |
| Hardwood | | | | | | | | | | | | | | | | |
| Select white oaks | 154.8 | 97.8 | 26.3 | 9.3 | 6.1 | 4.7 | 3.1 | 2.2 | 1.5 | 1.5 | 0.5 | 1.1 | 0.4 | 0.2 | 0.0 | 0.1 |
| Select red oaks | 91.5 | 56.8 | 16.0 | 5.4 | 3.6 | 2.4 | 1.3 | 1.6 | 1.0 | 0.8 | 0.8 | 1.0 | 0.4 | 0.1 | 0.2 | 0.1 |
| Other white oaks | 109.5 | 56.8 | 15.6 | 9.2 | 8.2 | 4.8 | 3.7 | 2.8 | 2.3 | 1.7 | 1.0 | 2.0 | 0.8 | 0.3 | 0.1 | 0.1 |
| Other red oaks | 961.9 | 676.3 | 132.4 | 53.5 | 30.1 | 18.5 | 12.3 | 10.5 | 8.2 | 5.5 | 4.5 | 5.4 | 2.7 | 1.1 | 0.5 | 0.4 |
| Hickory | 211.6 | 147.4 | 28.8 | 11.1 | 6.7 | 5.5 | 3.6 | 2.4 | 1.8 | 1.4 | 1.2 | 0.7 | 0.5 | 0.2 | 0.0 | 0.1 |
| Hard maple | 16.6 | 13.5 | 1.4 | 0.7 | 0.5 | 0.2 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Soft maple | 705.3 | 539.3 | 102.6 | 32.3 | 15.6 | 7.5 | 3.2 | 2.2 | 1.2 | 0.5 | 0.3 | 0.3 | 0.1 | 0.0 | 0.0 | 0.0 |
| Beech | 33.8 | 22.5 | 3.7 | 1.8 | 1.2 | 1.1 | 0.7 | 0.5 | 0.7 | 0.5 | 0.5 | 0.3 | 0.2 | 0.0 | 0.0 | 0.0 |
| Sweetgum | 1,110.9 | 776.9 | 189.0 | 60.7 | 31.8 | 18.9 | 12.7 | 8.0 | 5.4 | 3.5 | 1.6 | 1.4 | 0.8 | 0.1 | 0.0 | 0.0 |
| Tupelo and blackgum | 378.4 | 205.1 | 51.4 | 32.6 | 27.4 | 21.1 | 17.5 | 11.5 | 6.1 | 2.4 | 1.5 | 1.1 | 0.4 | 0.1 | 0.0 | 0.0 |
| Ash | 284.6 | 207.7 | 34.3 | 14.7 | 8.6 | 6.5 | 4.2 | 3.0 | 2.0 | 1.5 | 0.7 | 0.8 | 0.5 | 0.1 | 0.0 | 0.0 |
| Cottonwood and aspen | 10.0 | 6.8 | 1.8 | 0.2 | 0.1 | 0.1 | 0.2 | 0.2 | 0.3 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Basswood | 0.8 | 0.5 | 0.0 | 0.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Yellow-poplar | 14.6 | 6.9 | 4.3 | 1.5 | 0.9 | 0.3 | 0.2 | 0.1 | 0.0 | 0.1 | 0.1 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 |
| Black walnut | 1.1 | 0.0 | 0.9 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Other eastern soft hardwoods | 983.7 | 660.2 | 153.8 | 71.5 | 37.5 | 22.5 | 15.0 | 8.6 | 5.6 | 3.4 | 2.2 | 2.2 | 0.8 | 0.3 | 0.0 | 0.1 |
| Other eastern hard hardwoods | 300.0 | 226.0 | 52.0 | 12.1 | 4.5 | 2.0 | 1.0 | 0.9 | 0.7 | 0.5 | 0.1 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 |
| Eastern noncommercial hardwoods | 1,202.1 | 883.7 | 217.7 | 63.6 | 23.9 | 8.7 | 2.7 | 1.1 | 0.3 | 0.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total hardwoods | 6,571.1 | 4,584.1 | 1,032.1 | 380.6 | 206.7 | 125.1 | 81.7 | 55.7 | 37.1 | 23.6 | 15.2 | 16.8 | 7.8 | 2.7 | 1.0 | 1.0 |
| All species | 9,088.7 | 5,536.9 | 1,575.6 | 790.6 | 471.3 | 263.7 | 162.5 | 104.9 | 68.9 | 43.8 | 27.3 | 26.4 | 10.3 | 3.7 | 1.4 | 1.3 |

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 B.7—Net[a] volume of live trees on forest land by forest-type group and stand-size class, Louisiana, 2013**

| Forest-type group | All size classes | Stand-size class: Large diameter | Stand-size class: Medium diameter | Stand-size class: Small diameter | Non-stocked |
|---|---|---|---|---|---|
| | *million cubic feet* | | | | |
| Softwood types | | | | | |
| Longleaf-slash pine | 1,222.7 | 918.1 | 286.6 | 18.0 | 0.0 |
| Loblolly-shortleaf pine | 8,895.8 | 6,713.5 | 2,076.4 | 105.9 | 0.0 |
| Total softwoods | 10,118.5 | 7,631.6 | 2,363.0 | 123.9 | 0.0 |
| Hardwood types | | | | | |
| Oak-pine | 1,940.1 | 1,638.5 | 206.4 | 95.2 | 0.0 |
| Oak-hickory | 2,336.2 | 1,948.8 | 263.7 | 123.7 | 0.0 |
| Oak-gum-cypress | 8,294.4 | 7,635.7 | 578.3 | 80.4 | 0.0 |
| Elm-ash-cottonwood | 2,038.7 | 1,702.1 | 292.2 | 44.4 | 0.0 |
| Other hardwoods | 1.1 | 0.0 | 0.0 | 1.1 | 0.0 |
| Exotic hardwoods | 183.3 | 21.5 | 101.4 | 60.4 | 0.0 |
| Total hardwoods | 14,793.9 | 12,946.6 | 1,442.0 | 405.3 | 0.0 |
| Nonstocked | 7.7 | 0.0 | 0.0 | 0.0 | 7.7 |
| All groups | 24,920.0 | 20,578.1 | 3,805.1 | 529.1 | 7.7 |

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

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

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

**Table B.8—Net[a] volume of live trees on forest land by species group and ownership group, Louisiana, 2013**

| Species group | All ownerships | Ownership group | | | | |
|---|---|---|---|---|---|---|
| | | U.S. Forest Service | Other Federal | State and local government | Forest industry | Nonindustrial private |
| | *million cubic feet* | | | | | |
| Softwood | | | | | | |
| Longleaf and slash pines | 1,194.4 | 412.3 | 51.6 | 6.3 | 156.8 | 567.4 |
| Loblolly and shortleaf pines | 9,158.3 | 1,065.4 | 172.2 | 178.9 | 1,988.1 | 5,753.7 |
| Other yellow pines | 64.0 | 0.0 | 0.0 | 2.5 | 11.7 | 49.8 |
| Cypress | 1,955.8 | 36.4 | 98.3 | 251.6 | 92.9 | 1,476.6 |
| Other eastern softwoods | 7.3 | 0.2 | 0.0 | 0.3 | 0.4 | 6.4 |
| Total softwoods | 12,379.8 | 1,514.4 | 322.1 | 439.5 | 2,250.0 | 7,853.8 |
| Hardwood | | | | | | |
| Select white oaks | 629.8 | 68.1 | 2.8 | 10.9 | 91.0 | 457.2 |
| Select red oaks | 489.9 | 20.3 | 7.5 | 19.4 | 78.3 | 364.5 |
| Other white oaks | 753.1 | 40.6 | 58.2 | 184.3 | 59.7 | 410.4 |
| Other red oaks | 3,040.7 | 183.0 | 148.3 | 209.2 | 319.6 | 2,180.6 |
| Hickory | 645.3 | 33.8 | 23.3 | 115.7 | 46.3 | 426.1 |
| Hard maple | 12.0 | 0.0 | 0.0 | 0.2 | 1.6 | 10.2 |
| Soft maple | 428.0 | 10.5 | 26.8 | 22.8 | 32.0 | 335.9 |
| Beech | 166.0 | 13.5 | 0.0 | 0.5 | 30.3 | 121.6 |
| Sweetgum | 1,798.8 | 105.6 | 104.0 | 68.7 | 283.5 | 1,236.9 |
| Tupelo and blackgum | 1,561.5 | 42.9 | 92.4 | 108.5 | 125.8 | 1,191.9 |
| Ash | 612.9 | 13.5 | 56.4 | 73.3 | 42.1 | 427.7 |
| Cottonwood and aspen | 61.1 | 0.0 | 1.2 | 5.6 | 2.2 | 52.1 |
| Basswood | 2.2 | 0.0 | 0.0 | 0.0 | 0.7 | 1.5 |
| Yellow-poplar | 50.9 | 0.0 | 0.0 | 4.3 | 4.6 | 42.0 |
| Black walnut | 2.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.0 |
| Other eastern soft hardwoods | 1,693.0 | 24.9 | 93.2 | 186.8 | 115.0 | 1,273.1 |
| Other eastern hard hardwoods | 177.6 | 7.0 | 24.2 | 19.8 | 15.2 | 111.4 |
| Eastern noncommercial hardwoods | 415.3 | 10.7 | 10.2 | 27.1 | 31.4 | 335.8 |
| Total hardwoods | 12,540.3 | 574.3 | 648.5 | 1,057.1 | 1,279.3 | 8,981.0 |
| All species | 24,920.0 | 2,088.7 | 970.6 | 1,496.6 | 3,529.3 | 16,834.9 |

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

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

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

**Table B.9—Net[a] volume of live trees on forest land by species group and diameter class, Louisiana, 2013**

| Species group | All classes | Diameter class (*inches*) 5.0–6.9 | 7.0–8.9 | 9.0–10.9 | 11.0–12.9 | 13.0–14.9 | 15.0–16.9 | 17.0–18.9 | 19.0–20.9 | 21.0–24.9 | 25.0–28.9 | 29.0–32.9 | 33.0–36.9 | 37.0+ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | *million trees* | | | | | | | |
| Softwood | | | | | | | | | | | | | | |
| Longleaf and slash pines | 1,194.4 | 116.0 | 172.9 | 145.1 | 165.7 | 173.5 | 183.2 | 131.6 | 54.9 | 41.0 | 10.3 | 0.0 | 0.0 | 0.0 |
| Loblolly and shortleaf pines | 9,158.3 | 826.5 | 1,334.3 | 1,327.3 | 1,231.2 | 1,099.8 | 906.2 | 738.0 | 585.2 | 663.8 | 246.4 | 114.2 | 85.5 | 0.0 |
| Other yellow pines | 64.0 | 4.1 | 5.1 | 9.4 | 6.2 | 4.7 | 12.8 | 11.0 | 0.0 | 10.5 | 0.0 | 0.0 | 0.0 | 0.0 |
| Cypress | 1,955.8 | 52.8 | 99.5 | 171.2 | 213.7 | 216.2 | 260.2 | 252.2 | 242.4 | 219.5 | 98.7 | 58.2 | 28.4 | 42.9 |
| Other eastern softwoods | 7.3 | 1.5 | 1.3 | 1.2 | 0.4 | 1.5 | 1.3 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total softwoods | 12,379.8 | 1,001.0 | 1,613.0 | 1,654.3 | 1,617.1 | 1,495.7 | 1,363.6 | 1,132.9 | 882.7 | 934.8 | 355.4 | 172.4 | 113.9 | 42.9 |
| Hardwood | | | | | | | | | | | | | | |
| Select white oaks | 629.8 | 25.6 | 38.8 | 54.8 | 59.5 | 61.9 | 59.1 | 74.3 | 30.5 | 103.2 | 47.5 | 39.2 | 8.5 | 26.9 |
| Select red oaks | 489.9 | 17.7 | 24.1 | 28.9 | 25.5 | 44.8 | 35.8 | 46.1 | 53.0 | 87.0 | 52.1 | 12.8 | 38.5 | 23.6 |
| Other white oaks | 753.1 | 23.5 | 45.3 | 48.9 | 57.9 | 68.7 | 67.9 | 73.0 | 51.8 | 149.8 | 76.3 | 38.5 | 23.5 | 28.0 |
| Other red oaks | 3,040.7 | 147.9 | 186.2 | 211.4 | 219.2 | 270.3 | 297.1 | 267.7 | 279.1 | 441.9 | 295.9 | 171.1 | 126.6 | 126.5 |
| Hickory | 645.3 | 25.1 | 37.9 | 59.2 | 63.6 | 62.1 | 65.7 | 68.5 | 74.6 | 64.1 | 59.1 | 33.6 | 10.4 | 21.2 |
| Hard maple | 12.0 | 1.5 | 3.4 | 2.5 | 3.2 | 0.0 | 0.0 | 1.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Soft maple | 428.0 | 84.5 | 84.9 | 70.1 | 44.5 | 47.7 | 33.2 | 17.8 | 16.0 | 15.2 | 8.2 | 5.9 | 0.0 | 0.0 |
| Beech | 166.0 | 4.5 | 7.1 | 12.1 | 12.0 | 11.4 | 23.6 | 19.1 | 30.4 | 25.5 | 16.8 | 3.4 | 0.0 | 0.0 |
| Sweetgum | 1,798.8 | 137.6 | 190.8 | 219.0 | 246.0 | 228.4 | 214.7 | 187.9 | 109.7 | 122.7 | 105.2 | 23.3 | 7.0 | 6.5 |
| Tupelo and blackgum | 1,561.5 | 87.5 | 162.4 | 228.3 | 297.4 | 273.6 | 199.2 | 96.2 | 78.2 | 71.2 | 43.3 | 15.2 | 0.0 | 8.9 |
| Ash | 612.9 | 39.6 | 52.1 | 71.4 | 67.6 | 76.1 | 69.3 | 68.5 | 39.9 | 53.7 | 57.9 | 10.0 | 6.7 | 0.0 |
| Cottonwood and aspen | 61.1 | 0.4 | 1.2 | 1.4 | 3.2 | 5.1 | 10.8 | 2.0 | 2.0 | 9.9 | 7.2 | 5.5 | 0.0 | 12.4 |
| Basswood | 2.2 | 0.7 | 0.4 | 0.5 | 0.0 | 0.0 | 0.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Yellow-poplar | 50.9 | 4.5 | 5.9 | 3.9 | 3.3 | 3.3 | 2.0 | 5.6 | 8.7 | 13.7 | 0.0 | 0.0 | 0.0 | 0.0 |
| Black walnut | 2.0 | 0.3 | 0.0 | 0.2 | 0.1 | 0.0 | 0.0 | 1.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Other eastern soft hardwoods | 1,693.0 | 175.0 | 200.2 | 217.2 | 224.5 | 180.2 | 167.5 | 132.7 | 106.6 | 154.5 | 76.0 | 39.6 | 0.0 | 19.1 |
| Other eastern hard hardwoods | 177.6 | 27.9 | 23.2 | 19.2 | 15.2 | 18.9 | 19.3 | 20.5 | 8.2 | 18.4 | 0.0 | 6.8 | 0.0 | 0.0 |
| Eastern noncommercial hardwoods | 415.3 | 136.0 | 116.4 | 76.6 | 36.7 | 23.4 | 9.7 | 6.4 | 6.3 | 0.0 | 3.9 | 0.0 | 0.0 | 0.0 |
| Total hardwoods | 12,540.3 | 939.7 | 1,180.3 | 1,325.7 | 1,379.5 | 1,375.9 | 1,275.5 | 1,089.1 | 895.2 | 1,330.8 | 849.5 | 404.9 | 221.1 | 273.2 |
| All species | 24,920.0 | 1,940.7 | 2,793.3 | 2,980.0 | 2,996.6 | 2,871.6 | 2,639.1 | 2,222.0 | 1,777.9 | 2,265.6 | 1,204.9 | 577.3 | 335.0 | 316.1 |

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

**Table B.10—Net[a] volume of live trees on forest land by forest-type group and stand origin, Louisiana, 2013**

| Forest-type group | Total | Stand origin | |
|---|---|---|---|
| | | Natural stands | Artificial regeneration |
| | *million cubic feet* | | |
| Softwood types | | | |
| Longleaf-slash pine | 1,222.7 | 581.7 | 641.0 |
| Loblolly-shortleaf pine | 8,895.8 | 4,768.4 | 4,127.3 |
| Total softwoods | 10,118.5 | 5,350.1 | 4,768.3 |
| Hardwood types | | | |
| Oak-pine | 1,940.1 | 1,830.1 | 110.0 |
| Oak-hickory | 2,336.2 | 2,280.5 | 55.7 |
| Oak-gum-cypress | 8,294.4 | 8,268.2 | 26.2 |
| Elm-ash-cottonwood | 2,038.7 | 2,027.2 | 11.5 |
| Other hardwoods | 1.1 | 1.1 | 0.0 |
| Exotic hardwoods | 183.3 | 181.4 | 1.9 |
| Total hardwoods | 14,793.9 | 14,588.5 | 205.3 |
| Nonstocked | 7.7 | 7.4 | 0.3 |
| All groups | 24,920.0 | 19,946.1 | 4,974.0 |

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.

**Table B.11—Aboveground dry weight[a] of live trees on forest land by ownership class and land status, Louisiana, 2013**

| Ownership class | All forest land | Ownership class | | | | | |
|---|---|---|---|---|---|---|---|
| | | Unreserved | | | Reserved | | |
| | | Total | Timberland | Un-productive | Total | Productive | Un-productive |
| | | *thousand tons* | | | | | |
| U.S. Forest Service | | | | | | | |
| National Forest | 51,626.8 | 50,279.2 | 50,279.2 | 0.0 | 1,347.7 | 1,347.7 | 0.0 |
| Total | 51,626.8 | 50,279.2 | 50,279.2 | 0.0 | 1,347.7 | 1,347.7 | 0.0 |
| Other Federal | | | | | | | |
| National Park Service | 355.3 | 0.0 | 0.0 | 0.0 | 355.3 | 355.3 | 0.0 |
| U.S. Fish and Wildlife Service | 13,585.3 | 0.0 | 0.0 | 0.0 | 13,585.3 | 13,585.3 | 0.0 |
| Dept. of Defense/Dept. of Energy | 11,622.9 | 11,622.9 | 11,622.9 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total | 25,563.5 | 11,622.9 | 11,622.9 | 0.0 | 13,940.6 | 13,940.6 | 0.0 |
| State and local government | | | | | | | |
| State | 29,697.5 | 29,697.5 | 29,697.5 | 0.0 | 0.0 | 0.0 | 0.0 |
| Local | 10,481.0 | 10,481.0 | 10,481.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Other nonfederal public | 689.2 | 689.2 | 689.2 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total | 40,867.7 | 40,867.7 | 40,867.7 | 0.0 | 0.0 | 0.0 | 0.0 |
| Forest industry | | | | | | | |
| Corporate | 91,398.6 | 91,398.6 | 91,398.6 | 0.0 | 0.0 | 0.0 | 0.0 |
| Individual | 2,428.7 | 2,428.7 | 2,428.7 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total | 93,827.3 | 93,827.3 | 93,827.3 | 0.0 | 0.0 | 0.0 | 0.0 |
| Nonindustrial private | | | | | | | |
| Miscellaneous[b] | 456,501.2 | 456,501.2 | 456,415.0 | 86.2 | 0.0 | 0.0 | 0.0 |
| Total | 456,501.2 | 456,501.2 | 456,415.0 | 86.2 | 0.0 | 0.0 | 0.0 |
| All classes | 668,386.5 | 653,098.3 | 653,012.1 | 86.2 | 15,288.3 | 15,288.3 | 0.0 |

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

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

[a] Calculations based on TREE_REGIONAL_BIOMASS.REGIONAL_DRYBIOT table in FIADB users guide.

[b] Includes amounts gathered from corporations, conservation/natural resource organizations, unincorporated local partnerships/associations/clubs, Native Americans, and individuals.

**Table B.12—Aboveground dry weight[a] of live trees on forest land by species group and diameter class, Louisiana, 2013**

| Species group | All classes | Diameter class (*inches*) 1.0–2.9 | 3.0–4.9 | 5.0–6.9 | 7.0–8.9 | 9.0–10.9 | 11.0–12.9 | 13.0–14.9 | 15.0–16.9 | 17.0–18.9 | 19.0–20.9 | 21.0–24.9 | 25.0–28.9 | 29.0–32.9 | 33.0–36.9 | 37.0+ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | *million trees* | | | | | | | | |
| Softwood | | | | | | | | | | | | | | | | |
| Longleaf and slash pines | 31,185.3 | 873.3 | 1,814.5 | 3,055.7 | 4,139.9 | 3,385.3 | 3,893.3 | 4,092.6 | 4,313.0 | 3,123.2 | 1,282.9 | 969.1 | 242.4 | 0.0 | 0.0 | 0.0 |
| Loblolly and shortleaf pines | 217,160.7 | 2,405.4 | 8,122.6 | 22,310.8 | 31,140.4 | 29,563.7 | 27,027.2 | 23,985.0 | 19,745.6 | 16,004.1 | 12,683.3 | 14,478.1 | 5,340.7 | 2,481.2 | 1,872.5 | 0.0 |
| Other yellow pines | 1,367.6 | 21.2 | 41.7 | 76.5 | 99.9 | 192.5 | 128.1 | 97.8 | 265.6 | 227.5 | 0.0 | 216.9 | 0.0 | 0.0 | 0.0 | 0.0 |
| Cypress | 47,155.0 | 116.0 | 365.0 | 882.7 | 1,809.2 | 3,355.8 | 4,515.3 | 4,836.7 | 6,051.0 | 5,990.5 | 5,913.4 | 5,472.0 | 2,637.6 | 1,782.0 | 755.9 | 2,672.0 |
| Other eastern softwoods | 253.3 | 23.6 | 29.9 | 42.2 | 32.0 | 28.1 | 8.0 | 32.0 | 27.6 | 0.0 | 30.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total softwoods | 297,122.0 | 3,439.5 | 10,373.8 | 26,368.0 | 37,221.4 | 36,525.3 | 35,571.8 | 33,044.1 | 30,402.9 | 25,345.2 | 19,909.6 | 21,136.1 | 8,220.7 | 4,263.2 | 2,628.4 | 2,672.0 |
| Hardwood | | | | | | | | | | | | | | | | |
| Select white oaks | 19,401.0 | 450.7 | 683.7 | 687.1 | 1,021.4 | 1,459.4 | 1,617.6 | 1,757.7 | 1,682.6 | 2,195.9 | 933.8 | 3,039.3 | 1,463.2 | 1,233.7 | 264.9 | 910.0 |
| Select red oaks | 15,630.2 | 246.0 | 431.0 | 420.6 | 603.1 | 767.3 | 691.9 | 1,289.9 | 1,035.3 | 1,365.8 | 1,648.0 | 2,699.3 | 1,685.8 | 408.4 | 1,224.6 | 1,113.3 |
| Other white oaks | 23,945.7 | 243.4 | 384.8 | 654.9 | 1,249.4 | 1,340.9 | 1,616.2 | 1,970.1 | 2,106.5 | 2,196.1 | 1,644.6 | 4,817.5 | 2,599.5 | 1,306.5 | 738.5 | 1,076.7 |
| Other red oaks | 95,333.4 | 3,265.5 | 3,384.3 | 4,230.3 | 5,091.5 | 5,688.7 | 6,014.6 | 7,656.8 | 8,480.8 | 7,711.9 | 8,142.4 | 13,264.5 | 9,120.3 | 5,457.3 | 3,689.8 | 4,134.6 |
| Hickory | 19,696.3 | 659.1 | 656.6 | 706.7 | 989.2 | 1,531.0 | 1,675.5 | 1,665.4 | 1,840.4 | 1,915.6 | 2,129.0 | 1,881.6 | 1,757.4 | 1,207.3 | 318.8 | 762.8 |
| Hard maple | 431.6 | 55.0 | 41.6 | 42.3 | 94.6 | 70.0 | 88.8 | 0.0 | 0.0 | 39.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Soft maple | 16,084.1 | 2,195.9 | 2,645.1 | 2,223.5 | 2,169.1 | 1,805.5 | 1,156.3 | 1,224.3 | 887.0 | 439.9 | 483.7 | 463.1 | 256.2 | 134.4 | 0.0 | 0.0 |
| Beech | 5,517.5 | 104.3 | 89.8 | 117.3 | 179.1 | 308.3 | 352.3 | 321.4 | 724.6 | 652.5 | 943.3 | 820.5 | 684.5 | 219.7 | 0.0 | 0.0 |
| Sweetgum | 48,881.8 | 2,681.3 | 4,056.1 | 3,622.8 | 4,338.9 | 4,877.0 | 5,444.0 | 5,212.0 | 4,929.5 | 4,408.6 | 2,561.9 | 3,058.7 | 2,665.6 | 602.1 | 252.0 | 171.4 |
| Tupelo and blackgum | 37,737.8 | 895.4 | 1,222.4 | 1,790.1 | 3,308.0 | 4,721.8 | 6,425.3 | 6,260.0 | 4,750.2 | 2,426.1 | 1,977.7 | 1,918.5 | 1,378.6 | 405.6 | 0.0 | 258.0 |
| Ash | 13,550.9 | 793.5 | 723.3 | 997.8 | 1,151.7 | 1,457.6 | 1,392.7 | 1,460.8 | 1,251.2 | 1,265.0 | 757.0 | 1,003.3 | 1,003.5 | 188.4 | 105.2 | 0.0 |
| Cottonwood and aspen | 1,475.5 | 36.4 | 23.9 | 8.3 | 24.6 | 28.4 | 66.9 | 110.1 | 242.8 | 44.2 | 60.9 | 226.1 | 171.6 | 128.9 | 0.0 | 302.3 |
| Basswood | 59.5 | 0.5 | 0.0 | 12.3 | 7.2 | 9.2 | 0.0 | 0.0 | 30.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Yellow-poplar | 1,249.6 | 23.9 | 147.2 | 99.3 | 121.6 | 78.3 | 68.4 | 67.4 | 41.9 | 119.8 | 189.5 | 292.3 | 0.0 | 0.0 | 0.0 | 0.0 |
| Black walnut | 107.5 | 0.0 | 35.7 | 8.9 | 0.0 | 6.7 | 5.6 | 0.0 | 0.0 | 50.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Other eastern soft hardwoods | 45,602.0 | 2,491.5 | 3,633.3 | 3,833.1 | 4,325.1 | 4,732.6 | 5,038.6 | 4,175.3 | 3,941.4 | 3,361.5 | 2,632.1 | 3,968.0 | 2,019.9 | 965.0 | 0.0 | 484.7 |
| Other eastern hard hardwoods | 7,430.1 | 1,006.7 | 1,324.2 | 751.2 | 610.7 | 521.8 | 417.6 | 571.8 | 600.5 | 584.2 | 257.8 | 569.0 | 0.0 | 214.4 | 0.0 | 0.0 |
| Eastern noncommercial hardwoods | 19,129.9 | 3,978.5 | 5,031.9 | 3,803.9 | 2,771.5 | 1,656.1 | 788.5 | 513.0 | 209.2 | 151.6 | 136.5 | 0.0 | 89.2 | 0.0 | 0.0 | 0.0 |
| Total hardwoods | 371,264.6 | 19,127.6 | 24,514.9 | 24,010.4 | 28,056.7 | 31,060.5 | 32,860.9 | 34,256.0 | 32,754.2 | 28,928.6 | 24,498.3 | 38,021.8 | 24,895.4 | 12,471.7 | 6,593.8 | 9,213.7 |
| All species | 668,386.5 | 22,567.1 | 34,888.7 | 50,378.3 | 65,278.1 | 67,585.9 | 68,432.7 | 67,300.2 | 63,157.1 | 54,273.8 | 44,407.9 | 59,157.9 | 33,116.1 | 16,734.9 | 9,222.2 | 11,885.7 |

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

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

[a]Calculations based on TREE_REGIONAL_BIOMASS.REGIONAL_DRYBIOT table in FIADB users guide.

**Table B.13—Total carbon[a] of live trees on forest land by ownership class and land status, Louisiana, 2013**

| Ownership class | All forest land | Land status | | | | | |
|---|---|---|---|---|---|---|---|
| | | Unreserved | | | Reserved | | |
| | | Total | Timberland | Un-productive | Total | Productive | Un-productive |
| | | *thousand tons* | | | | | |
| U.S. Forest Service | | | | | | | |
| National Forest | 25,813.4 | 25,139.6 | 25,139.6 | 0.0 | 673.8 | 673.8 | 0.0 |
| Total | 25,813.4 | 25,139.6 | 25,139.6 | 0.0 | 673.8 | 673.8 | 0.0 |
| Other Federal | | | | | | | |
| National Park Service | 177.6 | 0.0 | 0.0 | 0.0 | 177.6 | 177.6 | 0.0 |
| U.S. Fish and Wildlife Service | 6,792.7 | 0.0 | 0.0 | 0.0 | 6,792.7 | 6,792.7 | 0.0 |
| Dept. of Defense/Dept. of Energy | 5,811.5 | 5,811.5 | 5,811.5 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total | 12,781.8 | 5,811.5 | 5,811.5 | 0.0 | 6,970.3 | 6,970.3 | 0.0 |
| State and local government | | | | | | | |
| State | 14,848.8 | 14,848.8 | 14,848.8 | 0.0 | 0.0 | 0.0 | 0.0 |
| Local | 5,240.5 | 5,240.5 | 5,240.5 | 0.0 | 0.0 | 0.0 | 0.0 |
| Other nonfederal public | 344.6 | 344.6 | 344.6 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total | 20,433.9 | 20,433.9 | 20,433.9 | 0.0 | 0.0 | 0.0 | 0.0 |
| Forest industry | | | | | | | |
| Corporate | 45,699.3 | 45,699.3 | 45,699.3 | 0.0 | 0.0 | 0.0 | 0.0 |
| Individual | 1,214.3 | 1,214.3 | 1,214.3 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total | 46,913.6 | 46,913.6 | 46,913.6 | 0.0 | 0.0 | 0.0 | 0.0 |
| Nonindustrial private | | | | | | | |
| Miscellaneous[b] | 228,250.6 | 228,250.6 | 228,207.5 | 43.1 | 0.0 | 0.0 | 0.0 |
| Total | 228,250.6 | 228,250.6 | 228,207.5 | 43.1 | 0.0 | 0.0 | 0.0 |
| All classes | 668,386.5 | 653,098.3 | 653,012.1 | 86.2 | 15,288.3 | 15,288.3 | 0.0 |

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

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

[a] Estimates of carbon calculated by multiplying aboveground dry tree biomass by 0.5. Calculations based on TREE_REGIONAL_BIOMASS. REGIONAL_DRYBIOT table in FIADB users guide.

[b] Includes amounts gathered from corporations, conservation/natural resource organizations, unincorporated local partnerships/associations/clubs, Native Americans, and individuals.

**Table B.14—Average annual net growth of live trees on forest land by forest-type group and stand-size class, Louisiana, 2013 (2001–08 to 2009–13)**

| Forest-type group | All size classes | Stand-size class: Large diameter | Medium diameter | Small diameter | Non-stocked |
|---|---|---|---|---|---|
| | *million cubic feet per year* | | | | |
| Softwood types | | | | | |
| Longleaf-slash pine | 79.6 | 27.0 | 26.5 | 26.0 | 0.0 |
| Loblolly-shortleaf pine | 594.0 | 221.7 | 205.7 | 166.6 | 0.0 |
| Total softwoods | 673.6 | 248.7 | 232.2 | 192.7 | 0.0 |
| Hardwood types | | | | | |
| Oak-pine | 103.6 | 43.4 | 15.8 | 44.4 | 0.0 |
| Oak-hickory | 105.0 | 43.3 | 20.1 | 41.6 | 0.0 |
| Oak-gum-cypress | 90.5 | 60.3 | 19.5 | 10.6 | 0.0 |
| Elm-ash-cottonwood | 57.0 | 30.7 | 18.6 | 7.7 | 0.0 |
| Other hardwoods | 0.9 | 0.7 | 0.0 | 0.2 | 0.0 |
| Exotic hardwoods | 10.7 | 1.7 | 5.1 | 3.8 | 0.0 |
| Total hardwoods | 367.7 | 180.1 | 79.1 | 108.4 | 0.0 |
| Nonstocked | 6.9 | 0.0 | 0.0 | 0.0 | 6.9 |
| All groups | 1,048.2 | 428.8 | 311.3 | 301.1 | 6.9 |

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 B.15—Average annual net growth of sawtimber on timberland by species group and ownership group, Louisiana, 2013 (2001–08 to 2009–13)**

| Species group[a] | All ownerships | Ownership group | | | | |
|---|---|---|---|---|---|---|
| | | U.S. Forest Service | Other Federal | State and local government | Forest industry | Nonindustrial private |
| | *million board feet[b] per year* | | | | | |
| Softwood | | | | | | |
| Longleaf and slash pines | 288.5 | 68.0 | 4.7 | 2.3 | 37.5 | 175.9 |
| Loblolly and shortleaf pines | 2,509.8 | 194.1 | 24.8 | 35.5 | 540.3 | 1,715.2 |
| Other yellow pines | -12.6 | 0.0 | 0.0 | 0.0 | 3.4 | -16.1 |
| Cypress | 160.8 | 1.3 | 4.4 | 4.7 | 11.8 | 138.6 |
| Other eastern softwoods | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.6 |
| Total softwoods | 2,947.1 | 263.4 | 33.8 | 42.5 | 593.0 | 2,014.3 |
| Hardwood | | | | | | |
| Select white oaks | 40.4 | 4.3 | 0.2 | -4.5 | 1.8 | 38.7 |
| Select red oaks | 47.4 | -2.9 | 0.5 | 4.3 | 13.7 | 31.7 |
| Other white oaks | 37.0 | 2.4 | 2.1 | 4.1 | 3.5 | 24.9 |
| Other red oaks | 254.5 | -1.6 | 3.3 | 18.7 | 20.2 | 213.9 |
| Hickory | 53.8 | 3.8 | 0.7 | 11.2 | 1.9 | 36.2 |
| Hard maple | 1.4 | 0.0 | 0.0 | 0.0 | 0.0 | 1.4 |
| Soft maple | 11.8 | -0.1 | 3.4 | 1.7 | 0.3 | 6.4 |
| Beech | -4.0 | -5.7 | 0.0 | 0.0 | 1.2 | 0.4 |
| Sweetgum | 137.5 | 10.6 | -0.7 | 7.8 | 31.4 | 88.4 |
| Tupelo and blackgum | 58.0 | 0.9 | 2.5 | 7.5 | 7.7 | 39.4 |
| Ash | 8.2 | 2.4 | 1.7 | -0.5 | 2.9 | 1.7 |
| Cottonwood and aspen | 9.6 | 0.0 | 0.0 | -9.2 | 1.4 | 17.4 |
| Basswood | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Yellow-poplar | 2.0 | 0.0 | 0.0 | 0.5 | 1.1 | 0.4 |
| Black walnut | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Other eastern soft hardwoods | 76.3 | 1.8 | 1.1 | 9.8 | 19.9 | 43.6 |
| Other eastern hard hardwoods | 5.7 | 0.1 | 1.1 | 0.7 | 0.4 | 3.4 |
| Eastern noncommercial hardwoods | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total hardwoods | 739.5 | 16.1 | 15.9 | 52.2 | 107.4 | 547.9 |
| All species | 3,686.6 | 279.5 | 49.8 | 94.7 | 700.5 | 2,562.2 |

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] Based on current conditions.

[b] International ¼-inch rule.

**Table B.16—Average annual mortality of live trees on forest land by forest-type group and stand-size class, Louisiana, 2013 (2001–08 to 2009–13)**

| Forest-type group[a] | All size classes | Stand-size class: Large diameter | Medium diameter | Small diameter | Non-stocked |
|---|---|---|---|---|---|
| | *million cubic feet per year* | | | | |
| Softwood types | | | | | |
| Longleaf-slash pine | 8.4 | 6.5 | 1.4 | 0.5 | 0.0 |
| Loblolly-shortleaf pine | 54.1 | 42.6 | 9.9 | 1.6 | 0.0 |
| Total softwoods | 62.5 | 49.1 | 11.3 | 2.1 | 0.0 |
| Hardwood types | | | | | |
| Oak-pine | 19.1 | 16.9 | 1.5 | 0.7 | 0.0 |
| Oak-hickory | 40.9 | 35.7 | 3.3 | 2.0 | 0.0 |
| Oak-gum-cypress | 127.5 | 120.3 | 5.2 | 2.0 | 0.0 |
| Elm-ash-cottonwood | 42.3 | 34.6 | 6.9 | 0.8 | 0.0 |
| Other hardwoods | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 |
| Exotic hardwoods | 5.3 | 0.8 | 3.0 | 1.5 | 0.0 |
| Total hardwoods | 235.2 | 208.4 | 19.8 | 7.0 | 0.0 |
| Nonstocked | 0.9 | 0.0 | 0.0 | 0.0 | 0.9 |
| All groups | 298.7 | 257.5 | 31.1 | 9.1 | 0.9 |

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] Based on past conditions.

**Table B.17—Average annual mortality of sawtimber on timberland by species group and ownership group, Louisiana, 2013 (2001–08 to 2009–13)**

| Species group[a] | All ownerships | Ownership group | | | | |
|---|---|---|---|---|---|---|
| | | U.S. Forest Service | Other Federal | State and local government | Forest industry | Nonindustrial private |
| | *million board feet[b] per year* | | | | | |
| Softwood | | | | | | |
| Longleaf and slash pines | 30.2 | 6.7 | 0.0 | 0.0 | 2.6 | 20.9 |
| Loblolly and shortleaf pines | 203.5 | 14.7 | 1.2 | 14.0 | 15.1 | 158.6 |
| Other yellow pines | 29.1 | 0.0 | 0.0 | 0.0 | 0.0 | 29.1 |
| Cypress | 16.7 | 0.0 | 0.0 | 0.9 | 0.0 | 15.7 |
| Other eastern softwoods | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total softwoods | 279.5 | 21.4 | 1.2 | 14.9 | 17.7 | 224.4 |
| Hardwood | | | | | | |
| Select white oaks | 34.0 | 1.7 | 0.0 | 5.8 | 4.7 | 21.9 |
| Select red oaks | 25.1 | 6.7 | 0.0 | 0.0 | 0.0 | 18.4 |
| Other white oaks | 21.3 | 0.0 | 0.0 | 13.3 | 0.0 | 7.9 |
| Other red oaks | 271.3 | 26.8 | 0.0 | 23.8 | 31.0 | 189.6 |
| Hickory | 31.2 | 0.0 | 0.0 | 3.2 | 1.6 | 26.4 |
| Hard maple | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Soft maple | 15.5 | 0.0 | 0.0 | 0.3 | 0.2 | 15.0 |
| Beech | 14.6 | 6.2 | 0.0 | 0.0 | 0.0 | 8.4 |
| Sweetgum | 75.1 | 2.8 | 0.0 | 5.8 | 4.5 | 62.1 |
| Tupelo and blackgum | 22.9 | 4.7 | 0.0 | 0.0 | 1.1 | 17.1 |
| Ash | 30.9 | 0.0 | 0.0 | 0.3 | 1.6 | 28.9 |
| Cottonwood and aspen | 12.8 | 0.0 | 0.0 | 12.8 | 0.0 | 0.0 |
| Basswood | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Yellow-poplar | 7.1 | 0.0 | 0.0 | 0.0 | 0.0 | 7.1 |
| Black walnut | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Other eastern soft hardwoods | 72.2 | 0.0 | 0.7 | 5.6 | 3.3 | 62.6 |
| Other eastern hard hardwoods | 6.9 | 0.0 | 0.0 | 1.9 | 0.0 | 5.0 |
| Eastern noncommercial hardwoods | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total hardwoods | 640.8 | 48.9 | 0.7 | 72.9 | 47.9 | 470.4 |
| All species | 920.3 | 70.3 | 1.9 | 87.8 | 65.6 | 694.8 |

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] Based on current conditions.
[b] International ¼-inch rule.

**Table B.18—Average annual removals of live trees on forest land by forest-type group and stand-size class, Louisiana, 2013 (2001–08 to 2009–13)**

| Forest-type group[a] | All size classes | Stand-size class: Large diameter | Medium diameter | Small diameter | Non-stocked |
|---|---|---|---|---|---|
| | *million cubic feet per year* | | | | |
| Softwood types | | | | | |
| Longleaf-slash pine | 89.1 | 71.1 | 16.8 | 1.2 | 0.0 |
| Loblolly-shortleaf pine | 438.0 | 295.4 | 131.1 | 11.5 | 0.0 |
| Total softwoods | 527.1 | 366.6 | 147.8 | 12.7 | 0.0 |
| Hardwood types | | | | | |
| Oak-pine | 47.3 | 33.6 | 8.8 | 4.9 | 0.0 |
| Oak-hickory | 48.0 | 38.1 | 6.0 | 4.0 | 0.0 |
| Oak-gum-cypress | 86.6 | 81.0 | 5.5 | 0.1 | 0.0 |
| Elm-ash-cottonwood | 22.6 | 20.0 | 2.6 | 0.0 | 0.0 |
| Other hardwoods | 0.5 | 0.5 | 0.0 | 0.0 | 0.0 |
| Exotic hardwoods | 1.1 | 0.0 | 0.3 | 0.7 | 0.0 |
| Total hardwoods | 206.1 | 173.1 | 23.2 | 9.8 | 0.0 |
| Nonstocked | 0.1 | 0.0 | 0.0 | 0.0 | 0.1 |
| All groups | 733.3 | 539.7 | 171.0 | 22.5 | 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] Based on past conditions.

**Table B.19—Average annual removals of sawtimber on timberland by species group and ownership group, Louisiana, 2013 (2001–08 to 2009–13)**

| Species group[a] | All ownerships | Ownership group | | | | |
|---|---|---|---|---|---|---|
| | | U.S. Forest Service | Other Federal | State and local government | Forest industry | Nonindustrial private |
| | *million board feet[b] per year* | | | | | |
| Softwood | | | | | | |
| Longleaf and slash pines | 411.9 | 39.1 | 0.8 | 13.1 | 70.9 | 288.0 |
| Loblolly and shortleaf pines | 1,645.8 | 6.8 | 32.8 | 23.9 | 362.3 | 1,220.1 |
| Other yellow pines | 8.6 | 0.0 | 0.0 | 0.0 | 0.0 | 8.6 |
| Cypress | 59.6 | 0.0 | 9.4 | 0.0 | 5.4 | 44.9 |
| Other eastern softwoods | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 |
| Total softwoods | 2,126.2 | 45.8 | 43.0 | 37.0 | 438.6 | 1,561.8 |
| Hardwood | | | | | | |
| Select white oaks | 29.1 | 2.1 | 0.0 | 0.0 | 6.5 | 20.6 |
| Select red oaks | 26.6 | 0.0 | 0.0 | 0.0 | 3.8 | 22.9 |
| Other white oaks | 26.4 | 0.0 | 0.5 | 0.0 | 1.2 | 24.7 |
| Other red oaks | 228.4 | 0.0 | 5.5 | 10.8 | 21.4 | 190.7 |
| Hickory | 64.0 | 0.0 | 1.6 | 2.2 | 0.0 | 60.1 |
| Hard maple | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Soft maple | 4.1 | 0.0 | 0.0 | 0.0 | 0.0 | 4.1 |
| Beech | 2.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.0 |
| Sweetgum | 175.6 | 4.0 | 23.5 | 3.0 | 1.2 | 143.9 |
| Tupelo and blackgum | 16.7 | 0.0 | 0.0 | 0.0 | 3.3 | 13.4 |
| Ash | 21.0 | 0.0 | 2.2 | 2.6 | 1.0 | 15.2 |
| Cottonwood and aspen | 11.9 | 0.0 | 0.0 | 9.2 | 0.0 | 2.6 |
| Basswood | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Yellow-poplar | 10.5 | 0.0 | 0.0 | 0.0 | 0.8 | 9.7 |
| Black walnut | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Other eastern soft hardwoods | 53.1 | 0.0 | 9.2 | 1.3 | 0.7 | 41.9 |
| Other eastern hard hardwoods | 18.7 | 0.0 | 13.6 | 2.1 | 0.0 | 3.1 |
| Eastern noncommercial hardwoods | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total hardwoods | 688.1 | 6.1 | 56.1 | 31.1 | 40.0 | 554.9 |
| All species | 2,814.3 | 51.9 | 99.0 | 68.1 | 478.6 | 2,116.6 |

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] Based on current conditions.

[b] International ¼-inch rule.

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The principle findings of the 2013 forest survey in the State of Louisiana and changes that have occurred since previous surveys are presented. Topics examined include forest area, ownership, forest-type groups, stand structure, timber volume, growth, removals, and mortality. Emerald ash borer and invasive plants are also discussed in the context of Louisiana's forests.

**Keywords:** Components of change, forest inventory, FIA, forest survey, forest trends, Louisiana, plantations.



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Oppossum. (photo courtesy of the U.S. Fish and Wildlife Service)

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