Forest Inventory & Analysis Factsheet East Texas 2003

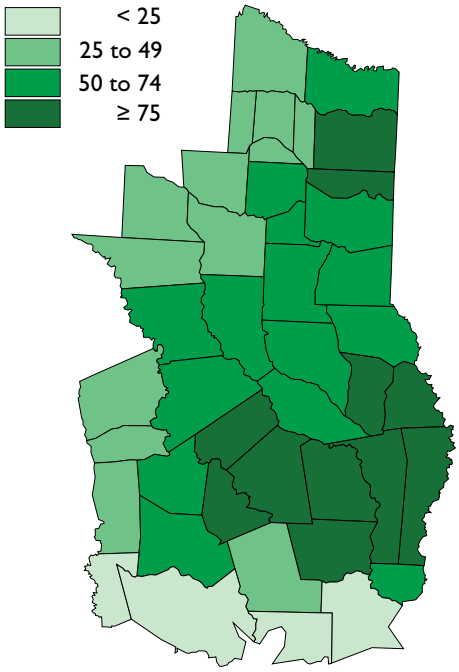
TEXAS FOREST SERVICE
The Texas A&M University System

March 2006

Five Panels of Plot Measurement in East Texas

The Southern Research Station's Forest Inventory and Analysis Program (FIA) and the Texas Forest Service initiated an inventory of 43 counties in east Texas in 2001. The information contained in the FIA Database (FIADB) represents the full complement (all five panels) for the first cycle of annualized inventory data collected in east Texas. The complete cycle consisted of 3,799 plots. About one-fifth of these plots were measured in each panel between 2001 and 2003. The sample contained 2,209 forested plots, 393 (18%) with multiple forest conditions, and 611 (28%) fragmented by nonforestland. There were 2,168 sample plots containing timberland, 26 with productive-reserved forestland, and 20 with other forestland.

Percent forestland by county, 2003



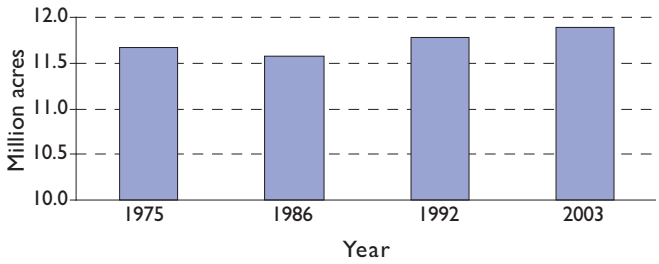
Area

Forestland. East Texas forestland is estimated at 57% of the region; pastureland, 23%; cropland and other agricultural land, 7%; and other developed land, 12%. Timberland represents 98% of the forestland, with the remaining forestland area of limited timber productivity (< 20 cubic feet/acre/year) or reserved from timber production by law.

One-third of the region's forestland is in 10 of 43 counties, with central southeastern counties more densely forested than elsewhere. Forests are fragmented chiefly by pastureland to the west and north, marsh land bordering the Gulf of Mexico, and other developed land in the Houston Metropolitan area.

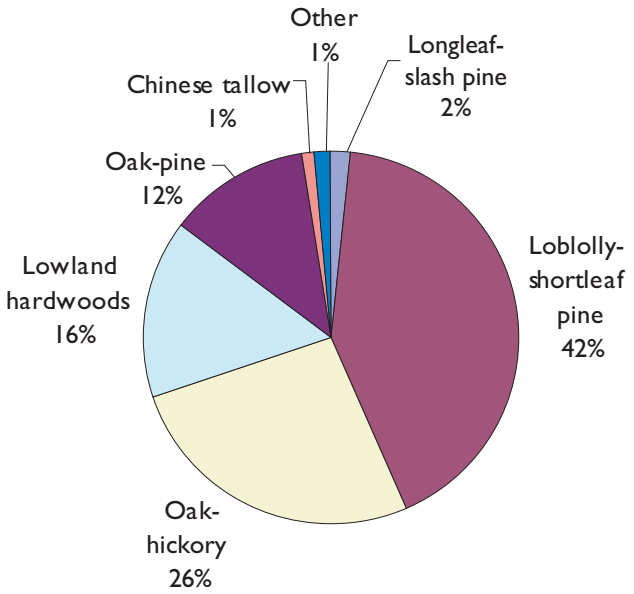
Timberland. The 11,884,800 acres estimated for 2003 is an 111,000 acre increase (< 1%) since the 1992 forest survey. Coupled with refinements to U.S. Census land area and FIA estimation procedures, the relative change in forestland area is likely negligible.

Area of timberland, 1975-2003



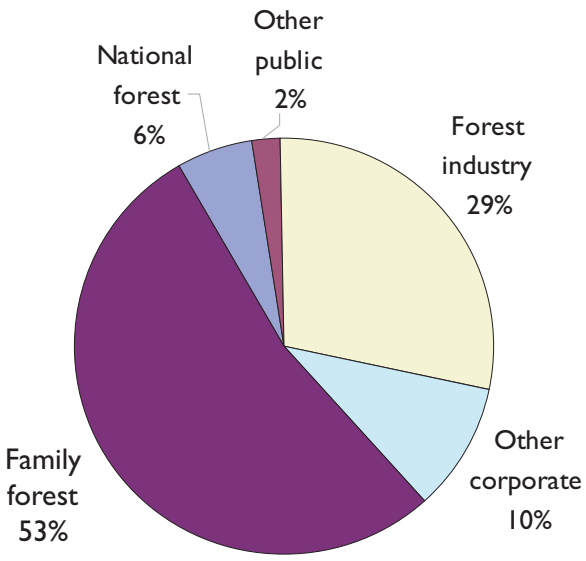
Forest type. Southern pine forest types, principally loblolly pine, account for 44% (one-half planted, one-half natural) of the timberland, chiefly to the south and east. The remainder consists of oak-hickory to the west and north, and oak-pine and lowland hardwood (11% oak-gum-cypress and 5% elm-ash-cottonwood) throughout the region.

Area of timberland, 2003



Ownership. Private owners control 92% of the timberland, with just over one-half in individual, rather than corporate, ownership. Forest industries control 29%, a decline of 3% since the 1992 survey. The family forest owner holds 6.5 million acres. Recent divestiture of forest industry land to other owner classes may not be reflected in these estimates.

Major timberland owner, 2003



Response by family forest owner, 2003

Timber activity	Area	
	million acres	*percent*
Timber harvest		
Yes	4.9	77
No	1.4	21
No answer	0.1	2
Professional consulted	2.7	42
Harvested past 5 years	2.8	43

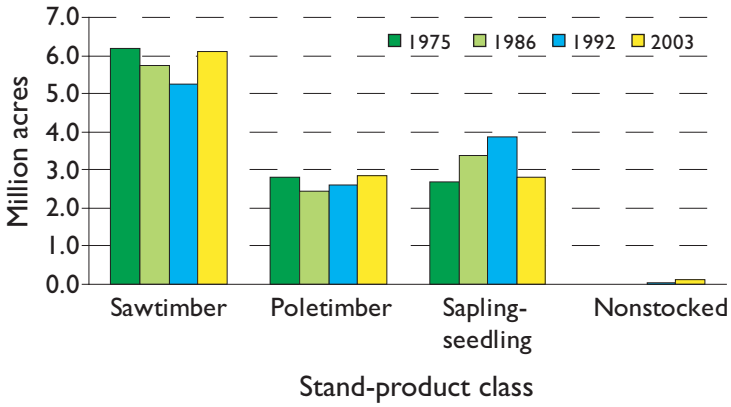
Questionnaires delivered to an area weighted sample of 534 owners during the 2002-2003 period asked about timber harvests. With a 47% return rate, respondents indicated 76% of the family forests associated with a timber harvest, and 42% with professional consultation. Responses also indicated that 43% of the family forests had been harvested in the past 5 years.

Stand structure. Stand-product class, a.k.a., stand-size class in timber reports, largely is calculated from all live tallied trees on timberland. Sawtimber stands constitute 51% of the region; poletimber, 24%; and sapling-seedlings, 24%. A comparison with previous surveys shows the 2003 area of sapling-seedling stands declined nearer to its 1975 estimate.

Stand-diameter by stand-product class, timberland, 2003

Stand-product class	Area	Not determined	Stand-diameter class (*inches d.b.h.*) 0 to <5	5 to <9	9 to <20	20 to <40
			thousand acres			
Sawtimber	6,095.9	—	122.3	1,079.1	4,533.9	360.7
Poletimber	2,857.4	5.7	130.7	2,234.9	470.7	15.3
Sapling-seedling	2,822.3	30.2	1,970.1	703.2	113.1	5.7
Nonstocked	109.2	18.3	71.8	8.3	10.8	—
Total	11,884.8	54.2	2,294.9	4,025.5	5,128.4	381.8

Stand-product class by survey year, timberland



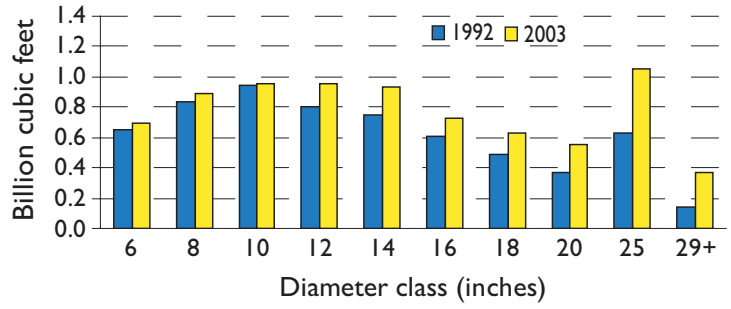
A new categorization based on field observations, stand-diameter class, references the perception of average tree diameter. Estimates show a plurality of timberland dominated by 9-to-20 inch d.b.h. trees. Stands with trees 20 inch d.b.h. and larger, regarded as optimal habitat for large-bodied birds and some mammals, represent 3% of the timberland. Stands with 1-to-5-inch d.b.h. trees, important for fauna in need of early successional habitats, represent 19%.

Volume and Change

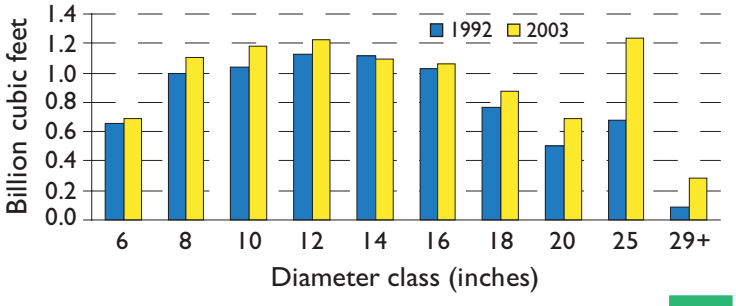
Volume in softwood trees for 2003 is 9.4 billion cubic feet for live trees (9.2 for growing-stock trees), an increase of 18 (17)% for softwoods since 1992. Volume in hardwood trees is 7.7 (6.4) billion cubic feet, up 25 (26)% for hardwoods since 1992.

Volume in live trees by d.b.h., timberland, 1992 and 2003

Softwoods



Hardwoods



The average annual net growth to average annual removals ratio is a closely watched attribute. If the ratio is >1, then wood volume is being added to the inventory. If it is <1, then the inventory is declining. The ratio for the 1992 to 2002 period varies by owner class: national forest land, 2.22 for live trees (2.27 for growing-stock trees); other public, 1.18 (1.16); forest industry, 1.24 (1.26); and other private land, 0.93 (0.94). Ratios and associated components of change differ as well between softwoods and hardwoods.

Growth to removals ratio and average annual live tree (growing stock) growth, removals, and mortality on timberland, 1992 to 2002

Item	Softwoods		Hardwoods	
Net growth-to-removals ratio	1.06	(1.06)	1.13	(1.22)
	million ft³			
Component of change				
Gross growth	618.8	(599.3)	356.3	(273.0)
Mortality	72.3	(66.7)	107.2	(62.1)
Net growth	546.5	(532.6)	249.1	(210.9)
Removals	515.9	(502.6)	221.4	(173.1)

Disturbances. On average, treatments and threshold disturbances occurred on no more than 8% of the timberland per year. The survey associated 42% of the timberland with silvicultural treatments since the prior assessment. These included final harvests, partial harvests, or commercial thinning, which accounted for the primary treatment on 15, 13, and 9% of the timberland, respectively.

For the same time period, the survey found 12% of the timberland with other threshold disturbances, i.e., those affecting ¼ or more of the trees in the stand and not a silvicultural treatment. The primary threshold disturbances included flooding, fire, ice damage, and other human-caused disturbances, each of which accounted for 2% of the timberland.

Nonthreshold disturbances such as occasional livestock grazing, prescribed fire, nonnative plant invasions, index management activities, and impact resource values. The survey found evidence of livestock grazing on 12% of the timberland, principally in western portions of the region. Evidence of fire, 11% of the timberland (2/3 associated with ground fires), had its largest frequency in pine-growing areas of the region.

Of 33 invasive plant taxa assessed, the survey found infestations on 41% of the timberland. The top three taxa included Japanese honeysuckle (infesting 23% of the timberland and covering a total of 165,000 acres), Chinese tallow (infesting 14%, covering 155,000 acres), and privet (infesting 9%, covering 60,000 acres).

Estimates and Statistical Reliability

FIA provides the 2003 estimates for land area, and on timberland for inventory volume and 1992-2002 components of change, along with their confidence interval and sampling error, expressed in percent. The confidence interval refers to the two-out-of-three (67 percent) chance that the true population value is within the limits indicated.

Sampling 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. Statistical confidence may be computed for any subdivision of the region using the following formula:

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

where

SE_s = sampling error for the subdivision of the region,
SE_t = sampling error for the region,
X_s = sum of values for the variable of interest (area or volume) for subdivision of the region,
X_t = total area or volume for the region.

Estimates for East Texas, 2003, components of change between 1992 and 2002, and statistical reliability

Item	Sample estimate and confidence interval			Sampling error
				percent
Land area (1,000 acres)				
Forestland	12,129.9	±	46.1	0.38
Timberland	11,884.8	±	45.1	0.38
Reserved forestland	137.7	±	4.9	3.56
Other forestland	107.4	±	4.3	4.03
Nonforestland	9,336.9	±	40.0	0.43
Cropland	873.0	±	12.2	1.42
Pastureland	4,896.0	±	28.9	0.60
Other agricultural land	616.3	±	10.3	1.68
Other developed	2,560.7	±	21.0	0.83
Marsh	268.7	±	6.8	2.55
Noncensus water	122.0	±	4.6	3.79
All live on timberland (*million ft³*)				
Inventory	17,177.6	±	314.4	1.83
Net annual growth	795.5	±	22.0	2.77
Annual removals	737.3	±	29.8	4.04
Annual mortality	179.5	±	8.2	4.59
Growing stock on timberland (*million ft³*)				
Inventory	15,621.1	±	308.5	1.97
Net annual growth	743.5	±	21.2	2.85
Annual removals	675.7	±	28.2	4.17
Annual mortality	128.7	±	7.0	5.41
Sawtimber on timberland (*million fbm*)				
Inventory	61,610.3	±	1,707.8	2.77
Net annual growth	2,943.8	±	91.2	3.10
Annual removals	2,500.2	±	123.4	4.94
Annual mortality	482.3	±	30.4	6.30

For example, Chinese tallow forest type on timberland is estimated at 133.8 thousand acres. The sampling error is calculated as:

$$SE_s = 0.38 \frac{\sqrt{11{,}844.8}}{\sqrt{133.8}} = 3.58$$

The confidence interval of one standard error is 133.8 ± 4.8 thousand acres. For 95% confidence, one multiplies by 1.96 or 133.8 ± 9.4 thousand acres. (Note: Sampling errors obtained from this method are only approximations of reliability because this process assumes constant variance across all subdivisions of regional totals.)

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 county. When summarizing statistics from the FIADB, users should familiarize themselves with the procedures to compute sampling error as outlined above.

Definition of Terms

Component of change. References the change in the volume of (live or growing-stock) trees 5.0 inches d.b.h. and larger and averaged over the years of the intersurvey period, specifically:

Average annual gross growth. Change in the volume of trees in the absence of cutting and mortality.

Average annual mortality. Volume of trees that died from natural causes.

Average annual net growth. Net change in volume in the absence of removals, and calculated as average annual gross growth minus average annual mortality.

Average annual removal. Volume of trees removed from the inventory by harvesting, cultural operations, (e.g., timber-stand improvement), land clearing, or change in land use and averaged over the years of the intersurvey period.

D.b.h. Tree stem diameter in inches measured outside the bark and 4.5 feet above the ground (breast height).

Forestland. Land at least 10% stocked by forest trees of any size, or formerly having had such tree cover, and not currently developed for nonforest use. The minimum dimensions are 1 acre in size and 120 feet in width.

Timberland. Forestland capable of producing 20 cubic feet of wood volume per acre annually and not withdrawn from timber utilization.

Reserved forestland. Public forestland capable of producing 20 cubic feet of wood volume per acre annually, but withdrawn from timber utilization through statute or administrative regulation.

Other forestland. Forestland that is incapable of producing 20 cubic feet of wood volume per acre annually under natural conditions due to adverse site conditions such as sterile soils, dry climate, poor drainage, high elevation, steepness, or rockiness. The term is synonymous with woodland in earlier FIA reports.

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

Forest type. Forestland classification of the species forming a plurality of live tree stocking, and largely based on an algorithm of tallied trees.

Forest-type groups. A combination of forest types that share closely associated species or site requirements. For this report, groups are: longleaf-slash, loblolly-shortleaf, oak-pine, oak-hickory, lowland hardwood (oak-gum-cypress, elm-ash-cottonwood), Chinese tallow (exotic hardwood), and other (pinyon-juniper, nonstocked, other western hardwoods).

Growing-stock trees. Live trees that contain at least one 12-foot or two 8-foot logs in the saw-log portion, either currently or potentially, if too small to qualify as a sawlog. The log(s) must meet dimension and merchantability standards to qualify. Trees must have one-third of the gross board-foot volume in sound wood, either currently or potentially.

Growth-to-removals ratio. The ratio of net growth in volume divided by the volume removed by human activity, including harvesting, land clearing, and changes in land use.

Hardwoods. Dicotyledonous trees, usually broadleaf and deciduous.

Nonforestland. Land that either has never supported forests, e.g., marsh, noncensus water, or land formerly forested that has been developed for agricultural or urban uses. The minimum dimensions are 1 acre in size and 120 feet in width. Categories are:

Cropland. Agricultural land under cultivation within the past 24 months, including orchards and land in soil-improving crops, but excluding pastureland.

Marsh. Low, wet areas characterized by heavy growth of forbs, grasses, and shrubs, and an absence of trees.

Noncensus water. Bodies of water from 1 to 4.5 acres in size and water courses from 30 to 200 feer wide.

Pastureland. Agricultural land currently maintained and used for grazing.

Other agricultural. Agricultural land excluding cropland and pastureland. Evidence includes geometric field and road patterns, fencing, and the traces produced by livestock or mechanized equipment.

Other developed. Land associated with anthropogenic uses other than agricultural land use, e.g., buildings, right-of-ways, roads, and other urban uses.

Other private land: Family forest or other corporate land.

Family forest. Private land owned by individuals and families, including farms, where the owner does not own a primary wood-using plant or is not a formally incorporated company or organization.

Other corporate land. Private land owned by companies or organizations, including farms, other than forest industry land, e.g., hunt club-owned land, nongovernment organizations, real estate investment trusts, timber investment management organizations.

Poletimber. Softwood species 5.0 to 8.9 inches d.b.h. and hardwoods 5.0 to 10.9 inches d.b.h.

Saplings. Live trees 1.0 to 4.9 inches d.b.h.

Sawtimber. Softwood species 9.0 inches d.b.h and larger and hardwoods 11.0 inches d.b.h. and larger.

Seedlings. Live trees < 1.0 inch d.b.h. and ≥ 1 foot tall for hardwoods, ≥ 6 inches tall for softwoods.

Softwoods. Coniferous trees, usually evergreen, having needles or scale-like leaves.

Stand. Vegetation of a specific area (≥1 acre in size and ≥ 120 feet in width) and sufficiently uniform in species composition, age arrangement, structure, and condition as to be distinguished from the vegetation on adjoining areas.

Stand-diameter class. A classification of forestland based on the diameter class distribution of live trees in the stand, and based on field estimates: 1 to < 5, 5 to < 9, 9 to < 20, and 20 to < 40 inches d.b.h.

Stand-product (stand-size) class. A classification of forestland based on the diameter class distribution of live trees in the stand, and largely based on an algorithm of tallied trees. Categories are:

Sawtimber. A forest condition at least 10% stocked with live trees, with half or more of total stocking in sawtimber and poletimber trees, and with sawtimber stock ing at least equal to poletimber stocking.

Poletimber. A forest condition at least 10% stocked with live trees, of which half or more of total stocking is in poletimber and sawtimber trees, and with poletimber stocking exceeding that of sawtimber.

Sapling-seedling. A forest condition at least 10% stocked with live trees of which more than half of total stocking is saplings and seedlings.

Nonstocked. A forest condition < 10% stocked with live trees.

Stocking. Stem density assigned to a sampled tree, expressed as a percent of the total density required to utilize the growth potential of the land.

Tree. Woody plants having one erect perennial stem or trunk at least 3 inches d.b.h., a more or less definitely formed crown of foliage, and a height of at least 13 feet at maturity.

Volume. The amount of sound wood in live trees at least 5.0 inches d.b.h. from a 1-foot stump to a minimum 4.0-inch top diameter outside bark of the central stem.

For more information, contact:

Victor A. Rudis, Research Forester
Forest Inventory and Analysis Unit
Southern Research Station, USDA Forest Service
4700 Old Kingston Pike, Knoxville, TN 37919
Phone (865) 862-2000 FAX (865) 862-0262
Email: vrudis@fs.fed.us
http://srsfia2.fs.fed.us/