



# Forest Inventory & Analysis Factsheet

## North Carolina 2002

May 2006

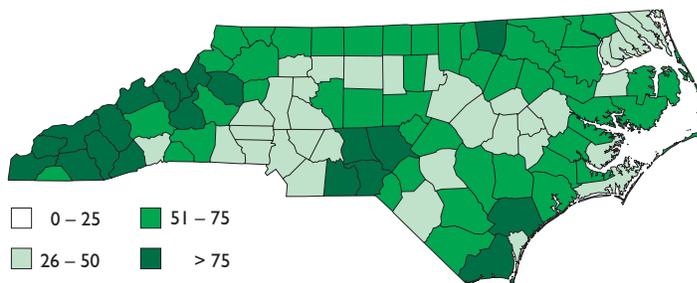


### Area

**Forestland.** North Carolina's forests covered 18.3 million acres, or 59 percent of the land area in 2002. Of the State's 100 counties, 67 were more than 50 percent forested, but only 20 were > 75 percent forested. Counties with the highest percentage of forestland were concentrated in the mountainous regions of the State.

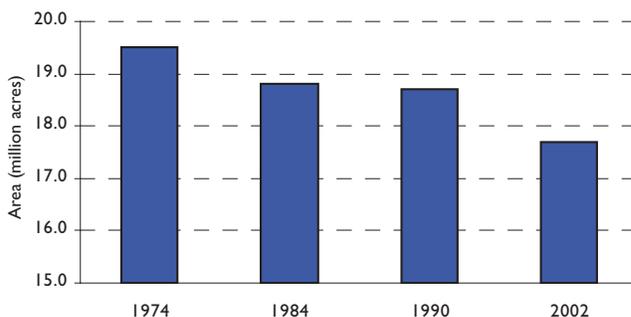
Most of the State's forestland, 97 percent or 17.7 million acres, were classified as timberland. The remaining 3 percent, or 552,000 acres, were classified as reserved forestland. Reserved forestland was mostly located in the Great Smoky Mountains National Park, national forest wilderness areas, and State parks.

Percent forestland by county, 2002



**Timberland.** The area of timberland in the State has decreased for the last 4 surveys. Timberland dropped 800,000 acres between 1974 and 1984. There was only a minimal decline between 1984 and 1990. However, between 1990 and 2002, timberland fell by 5 percent or 1.0 million acres. The resultant 17.7 million acres of timberland represent the smallest amount in North Carolina since the surveys began. The net loss was largely driven by conversion to urban and other land uses, conversion to agricultural uses was a far second.

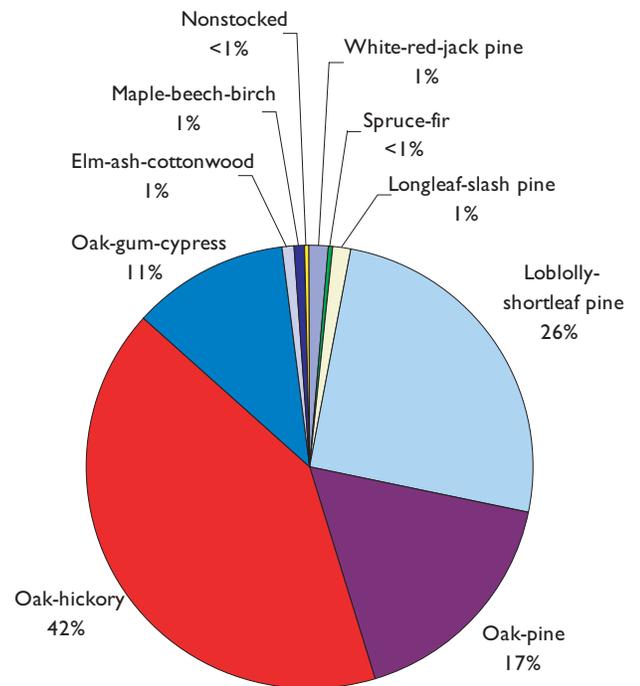
Area of timberland, 1974 to 2002



**Forest type.** Altogether, hardwood types comprised 72 percent of the State's timberland. Upland hardwood types made up 60 percent and lowland hardwood types 12 percent. Yellow pine types accounted for 27 percent of the timberland. White pine and nominal areas of spruce-fir combined for < 2 percent.

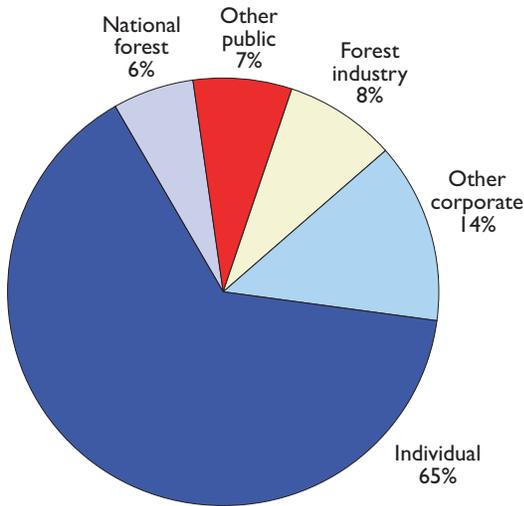
Planted stands occupied 15 percent, or 2.6 million acres, of the State's timberland, up by 17 percent since 1990. These planted stands consisted of 2.1 million acres in pine types and 0.5 million acres classified as oak-pine stands.

Area of timberland by forest-type group



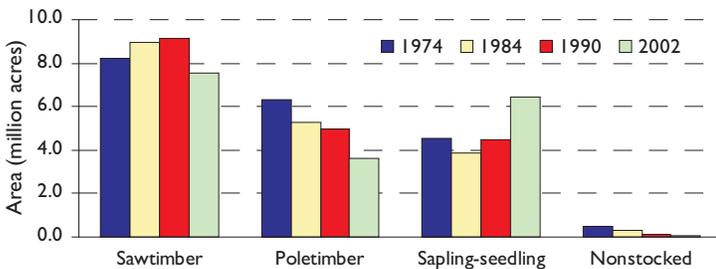
**Ownership.** Private individuals owned 65 percent, or 11.4 million acres, of North Carolina's timberland. Corporate ownership controlled 14 percent, or 2.4 million acres. Corporate ownership increased by 22 percent since 1990. Public agencies owned 13 percent, or nearly 2.4 million acres. Total public timberland increased by 401,000 acres since 1990. National forest lands, at 1.1 million acres, comprised 47 percent of all publicly owned timberland. Timberland owned by forest industry declined by one-third since 1990 to 1.5 million acres, 8 percent of the State total.

## Timberland by ownership, 2002



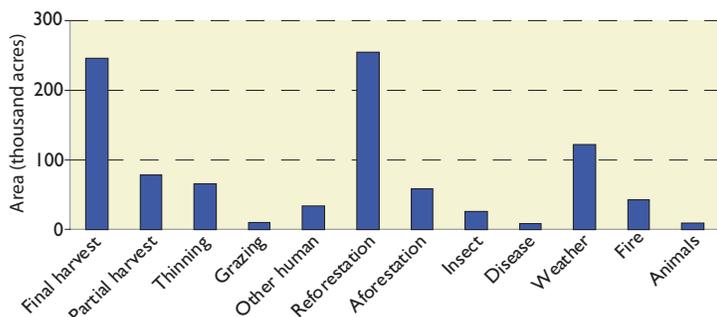
**Stand size.** Sawtimber-size stands covered more of the State's timberland than did other stand-sizes despite a 1.6 million acre decline in area. Sawtimber-size stands occupied 43 percent, or 7.6 million acres. Poletimber-size stands also decreased, by 1.3 million acres. Poletimber-size stands occupied 3.6 million acres and accounted for 20 percent of the State's timberland. In contrast, sapling-seedling size stands increased in area by 2.0 million acres. Sapling-seedling size stands made up 37 percent of total timberland.

### Stand-size class by survey year, timberland



**Disturbances.** Both natural and human induced disturbances impacted timberland. Between 1990 and 2002, an area equivalent to about 6 percent of the State's timberland acreage averaged being impacted annually. Of human induced impacts, final harvest affected the most acreage with an average of 246,000 acres annually. Reforestation, both natural and artificial means combined, involved an average of 255,000 acres each year. Of natural impacts to timberland, weather was greatest, followed by fire and then insects. Weather damaged an average of 122,000 acres annually, fire 43,000, and insects 26,000.

### Disturbances by type



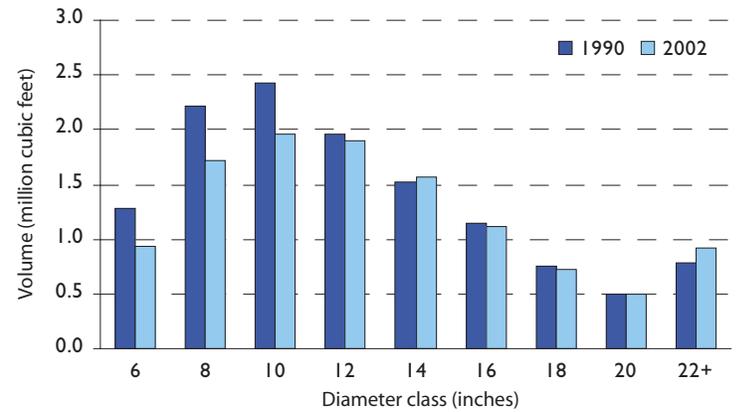
## Volume and Change

**Softwood trees.** Volume of softwood species accounted for 34 percent of the State's total tree volume. Softwood volume decreased by 10 percent since 1990 to 11.4 billion cubic feet. Most of the softwood volume decrease occurred in the 6-, 8-, and 10-inch diameter classes. Loblolly pine accounted for most of the softwood volume, with 59 percent or 6.7 billion cubic feet. Planted pine forest types made up 28 percent, or 3.1 billion cubic feet, of total softwood volume.

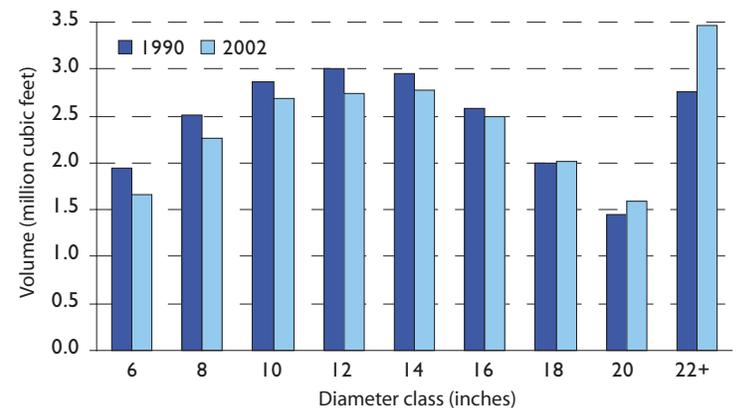
**Hardwood trees.** Volume of hardwood species made up 66 percent of the State's total tree volume. However, hardwood volume decreased 2 percent since 1990 to 21.6 billion cubic feet. The decrease in hardwood volume was somewhat evenly distributed across the diameter classes. Yellow-poplar was the predominant individual hardwood species with 4.1 billion cubic feet. Soft maple and sweetgum were next with 2.5 and 2.1 billion cubic feet, respectively.

### Volume in live trees by d.b.h., timberland

#### Softwoods



#### Hardwoods



**Growth.** Total or gross growth of all live trees averaged nearly 1.7 billion cubic feet annually in the State for the period 1990-2001. Softwoods accounted for 814 million cubic feet or 49 percent of gross growth. Hardwoods accounted for 837 million cubic feet or 51 percent. Gross growth of both hardwood and softwood trees increased 3 and 5 percent, respectively.

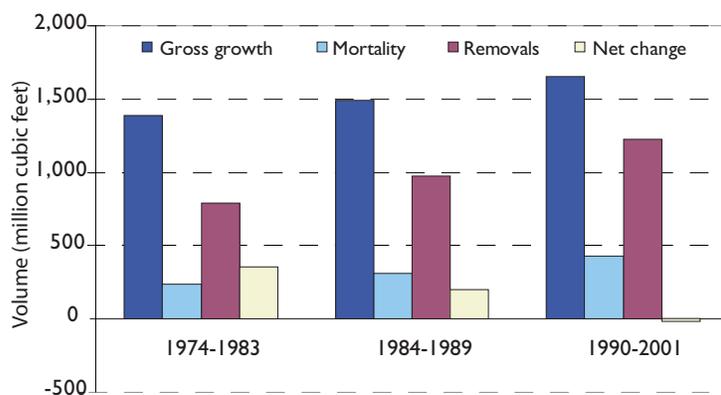
**Mortality.** Total mortality of all live trees averaged 426 million cubic feet annually for the period 1990-2001. Hardwoods accounted for 235 million cubic feet or 55 percent of the mortality. Softwoods accounted for 191 million cubic feet or 45 percent. Total mortality of both hardwood and softwood trees increased, but the change was much greater for softwoods. Hardwood mortality increased 40 million cubic feet annually, whereas softwood mortality rose 72 million cubic feet annually.

**Removals.** Total removals of all live trees averaged more than 1.2 billion cubic feet annually for the period 1990-2001. Softwoods accounted for 59 percent, or 729 million cubic feet of the removals. Hardwoods accounted for 41 percent or 498 million cubic feet. Total removals of both hardwood and softwood trees increased, but the total increase was primarily driven by softwood removals. Hardwood removals increased 37 million cubic feet annually, whereas softwood removals rose 216 million cubic feet annually.

**Net change.** Net change is determined by the interaction of gross growth, mortality, and removals. Gross growth, the sum of all growth components, is reduced by mortality. The deduction of mortality from gross growth leaves net growth. The resultant net growth is further reduced by removals. The deduction of removals yields a remainder referred to as net change.

For the survey periods 1974-1983 and 1984-1989, net change in volume was positive, resulting in an accumulating resource. For the survey period 1990-2001, the net change was slightly negative.

**Average annual live tree gross growth, mortality, removals, and net change on timberland by survey**



## Statistical Reliability

A measure of reliability of inventory statistics is provided by sampling errors. These sampling errors mean that the chances are two out of three that the true population value is within the limits indicated by a confidence interval. Sampling errors (in percent) and associated confidence intervals around the sample estimates for timberland area, inventory volumes, and components of change are presented in the following table.

## Statistical Reliability for North Carolina, 2002

Item	Sample estimate and confidence interval		Sampling error percent
<b>Timberland (1,000 acres)</b>	17,684.4	± 60.1	0.34
<b>All live (million ft<sup>3</sup>)</b>			
Inventory	33,011.9	± 544.7	1.65
Net annual growth	1,225.4	± 28.7	2.34
Annual removals	1,227.0	± 45.2	3.68
Annual mortality	425.8	± 15.2	3.56

More detailed data about North Carolina's timberland, associated sampling errors and their calculation, and further definitions of terms is available in Southern Research Station Resource Bulletin SRS-88, titled "Forest Statistics for North Carolina, 2002." The publication can be found on the Web at: <http://www.srs.fs.usda.gov/pubs/6274>.

## Definition of Terms

**Average annual gross growth.** Average annual increase in volume of trees 5.0 inches d.b.h. and larger in the absence of cutting and mortality. Gross growth includes survivor growth, ingrowth, growth on ingrowth, growth on removals before removal, and growth on mortality before death.

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

**Average annual net growth.** Average annual net change in volume of trees 5.0 inches d.b.h. and larger in the absence of removals during the intersurvey period. Average annual net growth is equal to average annual gross growth minus average annual mortality.

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

**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, oak-gum-cypress, elm-ash-cottonwood, maple-beech-birch, white-red-jack pine, and spruce-fir.

**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.

**Nonstocked.** A forest condition < 10 percent stocked with live trees.

**Private land:** Individual or other corporate land.

*Individual.* 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  $\geq$  1 foot tall for hardwoods,  $\geq$  6 inches tall for softwoods.

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

**Stand.** Vegetation of a specific area ( $\geq$  1 acre in size and  $\geq$  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-size class.** A classification of forestland based on the diameter class distribution of live trees in the stand. Largely based on an algorithm of tallied trees and stocking.

**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.



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