



# FORESTS OF North Carolina, 2014

This periodic resource update provides an overview of forest resources in North Carolina based on an inventory conducted by the U.S. Forest Service, Forest Inventory and Analysis (FIA) program at the Southern Research Station in cooperation with the North Carolina Forest Service. Data estimates are based on field data collected using the FIA annualized sample design and are updated yearly. The estimates presented in this update are for the measurement year 2014 with comparisons made to data reported in 2013. The sample plot population in North Carolina consists of 5,800 plots distributed across the State, of which approximately 14 percent are collected annually from a 7-year cycle. Thus, the 2014 estimates included 7 years of data collection that measured the full sample of plots freshened by merging the 14 percent from 2014 to produce the updated estimates. Growth, removals, and mortality (GRM) estimates were derived from remeasurement data on 5,569 of the plots. The slightly smaller sample used for

GRM estimates is due to a combination of access denied and/or lost plots. The data used in this publication were accessed from the FIA database on May 2, 2016.

## Overview

North Carolina is home to 18.8 million acres of forest land (table 1). Forest land includes areas designated as reserved, whereas timberland is that portion, 18.1 million acres, not restricted from commercial timber production. The majority of this report is focused on timberland. The number of live trees on North Carolina’s timberland in 2014 was estimated at <14.6 billion trees, an increase of 0.8 percent from 2013. Net volume increased about 3.2 percent to <39.6 billion cubic feet. Average annual net growth increased 2.2 percent to >1.6 billion cubic feet, whereas average annual removals decreased by 2.6 percent since 2013 to 0.9 billion cubic feet (table 1).

Table 1—North Carolina forest statistics, change between 2013 and 2014<sup>a</sup>

Forest statistics	2013 estimate	Sampling error (percent)	2014 estimate	Sampling error (percent)	Change since 2013
<b>Forest land</b>					
Area (thousand acres)	18,610.7	0.61	18,814.4	0.60	203.7
Number of live trees ≥1.0 inch d.b.h. (million trees)	14,828.1	1.53	14,951.0	1.48	122.9
Net volume of live trees ≥5.0 inches d.b.h. (million cubic feet)	40,142.7	1.31	41,378.1	1.26	1,235.4
Live tree aboveground biomass (thousand oven-dry tons)	990,476.7	1.16	1,017,871.5	1.12	27,394.8
Net annual growth of live trees ≥5.0 inches d.b.h. (million cubic feet per year)	1,602.7	2.13	1,636.1	2.00	33.4
Annual removals of live trees ≥5.0 inches d.b.h. (million cubic feet per year)	917.3	5.53	898.7	5.48	-18.6
Annual mortality of live trees ≥5.0 inches d.b.h. (million cubic feet per year)	347.0	4.66	348.6	4.29	1.6
<b>Timberland</b>					
Area (thousand acres)	17,887.9	0.68	18,115.9	0.66	228.0
Number of live trees ≥1.0 inch d.b.h. (million trees)	14,443.1	1.57	14,565.2	1.53	122.1
Net volume of live trees ≥5.0 inches d.b.h. (million cubic feet)	38,353.2	1.36	39,578.8	1.32	1,225.6
Live tree aboveground biomass (thousand oven-dry tons)	947,796.0	1.22	974,733.0	1.17	26,937.0
Net annual growth of live trees ≥5.0 inches d.b.h. (million cubic feet per year)	1,583.9	2.14	1,618.7	2.02	34.8
Annual removals of live trees ≥5.0 inches d.b.h. (million cubic feet per year)	921.8	5.52	897.5	5.49	-24.3
Annual mortality of live trees ≥5.0 inches d.b.h. (million cubic feet per year)	321.9	4.92	324.0	4.52	2.1

<sup>a</sup> Estimates for 2014 represent a full sample comprised of seven panels (2007, 2009, 2010, 2011, 2012, 2013, and 2014), of which 14 percent are new data from 2014. The 2013 estimates used were reported in Resource Update FS-47.



## Forest Area

North Carolina is divided into four survey units (fig. 1). The total timberland in all survey units is 18.12 million acres. The Piedmont unit contains the largest portion with 5.49 million acres, or almost 30 percent (table 2). The Southern Coastal Plain has >28 percent, the Mountains 22 percent, and the Northern Coastal Plain 20 percent of the timberland.

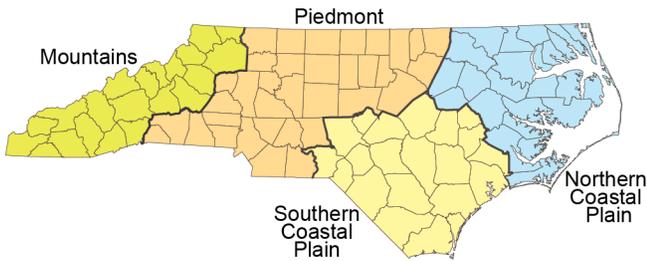


Figure 1—Forest survey regions in North Carolina.

Private individual ownerships account for most timberland with 11.14 million acres, or 61 percent (table 2). Other corporate ownerships combine for 20 percent, national forests for 6 percent, forest industry for 5 percent, and State/local governments for 6 percent of the timberland.

The largest portion of private individual ownerships, 37 percent, is located in the Piedmont. The Northern Coastal Plain contains the largest portion, 58 percent, of the forest industry timberland. The Mountains contain most, 81 percent, of the national forest timberland.

The oak-hickory forest-type group dominates with 7.03 million acres, or 39 percent, of all timberland (table 3). The loblolly-shortleaf pine forest-type group covers 31 percent, the oak-pine forest-type group 13 percent, and the oak-gum-cypress type group 9 percent of the timberland. The largest portion of the oak-hickory forest types, 43 percent, is located in the Mountains, and the Piedmont contains another 39 percent (table 3).

**Table 2—Area<sup>a</sup> of timberland by ownership and survey unit, North Carolina, 2014**

Category	Southern Coastal Plain	Northern Coastal Plain	Piedmont	Mountains	State
	million acres				
National forest	0.04	0.10	0.09	0.91	1.13
Other Federal	0.23	0.04	0.05	0.00	0.32
State and local government	0.41	0.19	0.27	0.15	1.03
Forest industry	0.25	0.53	0.11	0.02	0.92
Individual	2.75	1.98	4.16	2.24	11.14
Other corporate	1.45	0.73	0.82	0.59	3.59
<b>Total</b>	<b>5.14</b>	<b>3.57</b>	<b>5.49</b>	<b>3.91</b>	<b>18.12</b>

<sup>a</sup> Sum of components and totals may differ due to rounding.

**Table 3—Area of timberland by forest-type group and survey unit, North Carolina, 2014**

Forest-type group	Southern Coastal Plain	Northern Coastal Plain	Piedmont	Mountains	State
	million acres				
White-red-jack pine	0.00	0.00	0.00	0.10	0.10
Spruce-fir	0.00	0.00	0.00	0.02	0.02
Longleaf-slash	0.36	0.02	0.00	0.00	0.38
Loblolly-shortleaf <sup>a</sup>	2.26	1.69	1.54	0.13	5.63
Oak-pine	0.68	0.46	0.81	0.41	2.37
Oak-hickory	0.79	0.47	2.72	3.05	7.03
Oak-gum-cypress	0.85	0.74	0.11	0.00	1.70
Elm-ash-cottonwood	0.11	0.13	0.26	0.02	0.53
Maple-beech-birch	0.00	0.00	0.00	0.06	0.06
Other hardwoods <sup>b</sup>	0.00	0.00	0.02	0.12	0.14
Nonstocked	0.08	0.06	0.03	0.00	0.18
<b>Total</b>	<b>5.14</b>	<b>3.57</b>	<b>5.49</b>	<b>3.91</b>	<b>18.12</b>

<sup>a</sup> Includes other eastern softwoods.

<sup>b</sup> Includes aspen/birch and exotic hardwoods.

The Southern Coastal Plain contains the largest portion, 40 percent, of the loblolly-shortleaf pine forest types, and the Northern Coastal Plain contains another 30 percent. More of the oak-pine forest types, 34 percent, occur in the Piedmont, and another 29 percent in the Southern Coastal Plain unit. The majority (50 percent) of the oak-gum-cypress forest types are in the Southern Coastal Plain unit, and 44 percent are in the Northern Coastal Plain unit.

Planted stands account for 18 percent, or 3.3 million acres, of the timberland (table 4). The Southern Coastal Plain contains 40 percent of the planted acres, the Northern Coastal Plain 34 percent, the Piedmont 24 percent, and 2 percent are in the Mountains.

**Table 4—Area<sup>a</sup> of timberland by stand origin and survey unit, North Carolina, 2014**

Stand origin	Southern Coastal Plain	Northern Coastal Plain	Piedmont	Mountains	State
	million acres				
Planted	1.34	1.11	0.80	0.07	3.31
Natural	3.80	2.46	4.69	3.84	14.81
<b>Total</b>	<b>5.14</b>	<b>3.57</b>	<b>5.49</b>	<b>3.91</b>	<b>18.12</b>

<sup>a</sup> Sum of components and totals may differ due to rounding.

## Volume, Biomass, and Trends

North Carolina timberland contains 39.6 billion cubic feet of total wood volume. Hardwood species comprise 25.5 billion cubic feet, or 64 percent, of the total inventory (table 5). Softwood species comprise <14.1 billion cubic feet, or 36 percent, of the total volume in the State. Total softwood inventory was highest (35 percent) in the Southern Coastal Plain, and least (12 percent) in the Mountains unit. Total hardwood inventory was highest (38 percent) in the Mountains, and least (13 percent) in the Northern Coastal Plain.

Statewide, net growth of softwoods averaged 842 million cubic feet annually (table 5). Most of the softwood net growth, 39 percent, came from the Southern Coastal Plain. Another 30 percent came from the Northern Coastal Plain. The State averaged 545 million cubic feet of softwood removals annually, with 37 and 36 percent from the Northern and Southern Coastal Plain units, respectively. The softwood growth to removals ratio was highest (1.9) in the Piedmont and least (1.2) in the Northern Coastal Plain unit.

**Table 5—All-live volume of net growth, removals, and total inventory for softwoods and hardwoods by survey unit, North Carolina, 2014**

Category	Southern Coastal Plain	Northern Coastal Plain	Piedmont	Mountains	State
<i>million cubic feet</i>					
<b>Softwood</b>					
Net growth	326.7	251.7	222.2	41.2	841.8
Removals	194.2	203.6	115.0	32.2	544.9
G/R ratio <sup>a</sup>	1.7	1.2	1.9	1.3	1.5
Total inventory	4,873.1	3,440.9	4,032.6	1,710.7	14,070.7
<b>Hardwood</b>					
Net growth	119.4	102.0	323.3	232.1	776.9
Removals	77.0	74.7	153.1	47.8	352.6
G/R ratio <sup>a</sup>	1.6	1.4	2.1	4.9	2.2
Total inventory	3,589.7	3,300.5	8,723.7	9,806.4	25,508.1
<b>All species</b>					
Net growth	446.1	353.7	545.5	273.4	1,618.7
Removals	271.2	278.3	268.1	79.9	897.5
G/R ratio <sup>a</sup>	1.6	1.3	2.0	3.4	1.8
Total inventory	8,462.8	6,741.4	12,756.2	11,517.1	39,578.8

<sup>a</sup> Net growth/removals ratio.

The State’s net growth of hardwoods averaged 777 million cubic feet annually. Most of the hardwood net growth, 42 percent, came from the Piedmont unit. Another 30 percent came from the Mountains unit. The State’s hardwood removals averaged <353 million cubic feet annually. Most of the hardwood removals, 43 percent, came from the Piedmont unit. The hardwood growth to removals ratio was highest (4.9) in the Mountains unit and least (1.4) in the Northern Coastal Plain unit.

Biomass totaled 975 million tons in North Carolina. Hardwood species comprised 677 million tons, or 69 percent, of total biomass (table 6). Softwood species comprised <298 million tons, or 31 percent, of total biomass.

The Southern Coastal Plain contained the largest portion (36 percent) of the softwood biomass. The Mountains contained the largest portion (37 percent) of the hardwood biomass.

**Table 6—Aboveground biomass and carbon estimates on timberland for softwoods and hardwoods by survey unit, North Carolina, 2014**

Category	Southern Coastal Plain	Northern Coastal Plain	Piedmont	Mountains	State
<i>million tons</i>					
<b>Softwood</b>					
Biomass	106.29	73.40	87.06	30.76	297.52
Carbon	53.15	36.70	43.53	15.38	148.76
<b>Hardwood</b>					
Biomass	102.28	90.23	231.45	253.25	677.21
Carbon	51.14	45.12	115.72	126.63	338.61
<b>Total</b>					
Biomass	208.57	163.64	318.51	284.02	974.73
Carbon	104.29	81.82	159.26	142.01	487.37



Thinned yellow-poplar stand (photo by USDA Forest Service, Bugwood.org)

## Shortleaf Pine Trends in North Carolina

In 2014, shortleaf pine forest type classified as timberland covered 119.36 thousand acres in North Carolina, down 71 percent from the 405.79 thousand acres it occupied at the time of the 1990 inventory (table 7). However, most of the decline occurred between 1990 and 2002 where it dropped by 62 percent.

Like changes in area, the total number of shortleaf pine trees decreased from 205.83 million trees in 1990 to 77.84 million trees in 2014, a drop of 62 percent. Most of the decline occurred between 1990 and 2002 where it dropped by 50 percent. However, the number of trees increased about 6 percent between 2007 and 2014 from 73.59 to 77.84 million.

Net volume changed as well and decreased 47 percent from 1,292.93 million cubic feet in 1990 to 691.15 million cubic feet in 2014. Again, most of the decrease occurred between 1990 and 2002 where it dropped by 44 percent. Similar to change in tree numbers, net volume increased between 2007 and 2014, but by < 1 percent from 688.95 to 691.15 million cubic feet.

**Table 7—Changes in shortleaf pine on timberland by year, North Carolina, 1990–2014**

Year	Area of shortleaf pine forest type <i>thousand acres</i>	Number of live trees ≥1 inch d.b.h. <i>- million -</i>	Net volume of live trees ≥5 inches d.b.h. <i>- million ft<sup>3</sup>-</i>
1990	405.79	205.83	1,292.93
2002	153.45	103.76	728.67
2007	123.77	73.59	688.95
2014	119.36	77.84	691.15

Source: Evaluator, accessed online May 2, 2016.

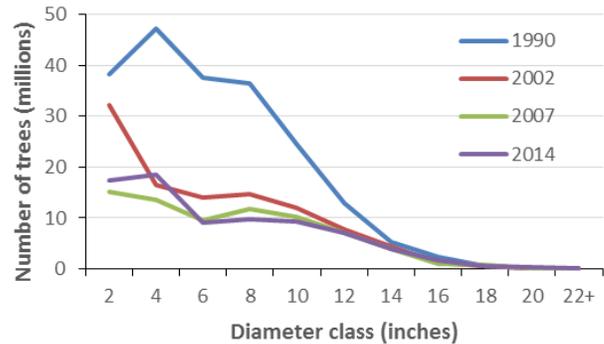


Figure 2—Number of shortleaf pine trees ≥1 inch diameter class on timberland, North Carolina, 1990–2014.

The number of shortleaf pine trees by diameter class distribution changed as well (fig. 2). Between 1990 and 2002, shortleaf pine decreased in tree numbers for all diameter classes <18 inches. The decrease was dramatic from the 4– through 10– inch classes. The decrease continued from 2002 to 2007. By 2014, the decrease slowed and was mostly limited to the 6– to 10– inch classes. The 2-, 4-, and 16– inch classes increased.



Shortleaf pine needles and cones. (photo by Chris Evans, Bugwood.org)

### How to Cite This Publication

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