



# FORESTS OF North Carolina, 2015

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 2015 with comparisons made to data reported in 2013 (the latest 5-year analytical report for the State). 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. The 2015 estimates concluded 7 years of data collection that measured the full sample of plots for the cycle to produce updated estimates. Growth, removals, and mortality (GRM) estimates were derived from remeasurement data on 5,651 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 June 20, 2016.

## Overview

North Carolina is home to 18.83 million acres of forest land (table 1). Forest land includes areas designated as reserved, whereas timberland is that portion, 18.14 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 2015 was estimated at 14.42 billion trees, a decrease of <1 percent from 2013. Net volume increased 5 percent to 40.30 billion cubic feet. Average annual net growth increased >3 percent to 1.63 billion cubic feet, whereas average annual removals decreased by <3 percent since 2013 to 0.90 billion cubic feet (table 1).

Table 1—North Carolina forest statistics, change between 2013 and 2015<sup>a</sup>

Forest statistics	2013 estimate	Sampling error (percent)	2015 estimate	Sampling error (percent)	Change since 2013
<b>Forest land</b>					
Area (thousand acres)	18,610.7	0.61	18,829.3	0.60	218.6
Number of live trees ≥1.0 inch d.b.h. (million trees)	14,828.1	1.53	14,796.7	1.47	-31.4
Net volume of live trees ≥5.0 inches d.b.h. (million cubic feet)	40,142.7	1.31	41,122.3	1.25	979.6
Live tree aboveground biomass (thousand oven-dry tons)	990,476.7	1.16	1,032,411.0	1.11	41,934.3
Net annual growth of live trees ≥5.0 inches d.b.h. (million cubic feet per year)	1,602.7	2.13	1,650.7	1.93	48.0
Annual removals of live trees ≥5.0 inches d.b.h. (million cubic feet per year)	917.3	5.53	898.9	5.48	-18.4
Annual mortality of live trees ≥5.0 inches d.b.h. (million cubic feet per year)	347.0	4.66	346.9	4.16	-0.1
<b>Timberland</b>					
Area (thousand acres)	17,887.9	0.68	18,138.6	0.66	250.7
Number of live trees ≥1.0 inch d.b.h. (million trees)	14,443.1	1.57	14,420.8	1.51	-22.3
Net volume of live trees ≥5.0 inches d.b.h. (million cubic feet)	38,353.2	1.36	40,295.9	1.31	1,942.7
Live tree aboveground biomass (thousand oven-dry tons)	947,796.0	1.22	988,689.1	1.17	40,893.1
Net annual growth of live trees ≥5.0 inches d.b.h. (million cubic feet per year)	1,583.9	2.14	1,634.4	1.94	50.5
Annual removals of live trees ≥5.0 inches d.b.h. (million cubic feet per year)	921.8	5.52	897.6	5.48	-24.2
Annual mortality of live trees ≥5.0 inches d.b.h. (million cubic feet per year)	321.9	4.92	324.1	4.36	2.2

<sup>a</sup> Estimates for 2015 represent a full sample comprised of seven panels (2009, 2010, 2011, 2012, 2013, 2014, and 2015), of which 100 percent are new data. 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 18.14 million acres. The Piedmont unit contained the largest portion with 5.47 million acres, or 30 percent (table 2). The Southern Coastal Plain had 28 percent, the Mountains 22 percent, and the Northern Coastal Plain almost 20 percent of the timberland.

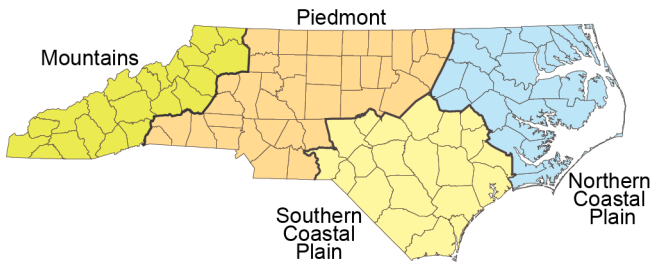


Figure 1—Forest survey regions in North Carolina.

Private individual ownerships accounted for most timberland with 11.06 million acres, or 61 percent (table 2). Other corporate ownerships combined for 20 percent, national forests for 6 percent, State/local governments for 6 percent, forest industry for 5 percent, and other Federal for 2 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 dominated with 6.93 million acres, or 38 percent, of all timberland (table 3). The loblolly-shortleaf pine forest-type group covered 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, 44 percent, was

**Table 2—Area<sup>a</sup> of timberland by ownership and survey unit, North Carolina, 2015**

Category	Southern Northern				State
	Coastal Plain	Coastal Plain	Pied-mont	Moun-tains	
<i>million acres</i>					
National forest	0.04	0.11	0.09	0.91	1.13
Other Federal	0.23	0.04	0.05	0.00	0.32
State and local government	0.42	0.20	0.27	0.15	1.04
Forest industry	0.24	0.53	0.12	0.03	0.92
Individual	2.73	1.96	4.14	2.22	11.06
Other corporate	1.49	0.76	0.81	0.61	3.67
<b>Total</b>	<b>5.15</b>	<b>3.60</b>	<b>5.47</b>	<b>3.92</b>	<b>18.14</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, 2015**

Forest-type group	Southern Northern				State
	Coastal Plain	Coastal Plain	Pied-mont	Moun-tains	
<i>million acres</i>					
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	0.03	0.00	0.00	0.39
Loblolly-shortleaf <sup>a</sup>	2.31	1.70	1.55	0.12	5.68
Oak-pine	0.70	0.46	0.80	0.44	2.40
Oak-hickory	0.76	0.44	2.69	3.04	6.93
Oak-gum-cypress	0.82	0.77	0.11	0.00	1.71
Elm-ash-cottonwood	0.12	0.14	0.26	0.03	0.54
Maple-beech-birch	0.00	0.00	0.00	0.06	0.06
Other hardwoods <sup>b</sup>	0.00	0.00	0.02	0.11	0.13
Nonstocked	0.07	0.06	0.04	0.01	0.17
<b>Total</b>	<b>5.15</b>	<b>3.60</b>	<b>5.47</b>	<b>3.92</b>	<b>18.14</b>

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

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

located in the Mountains, and the Piedmont contained another 39 percent (table 3).

The Southern Coastal Plain contained the largest portion, 41 percent, of the loblolly-shortleaf pine forest types, and the Northern Coastal Plain contained another 30 percent. More of the oak-pine forest types, 33 percent, occurred in the Piedmont, and another 29 percent in the Southern Coastal Plain unit. Most, 48 percent, of the oak-gum-cypress forest types were in the Southern Coastal Plain unit, and 45 percent were in the Northern Coastal Plain unit.

Planted stands accounted for 18 percent, or 3.34 million acres, of the timberland (table 4). The Southern Coastal Plain contained 40 percent of the planted acres, the Northern Coastal Plain 34 percent, the Piedmont 24 percent, and 2 percent were in the Mountains.

**Table 4—Area<sup>a</sup> of timberland by stand origin and survey unit, North Carolina, 2015**

Stand origin	Southern Northern				State
	Coastal Plain	Coastal Plain	Pied-mont	Moun-tains	
<i>million acres</i>					
Planted	1.35	1.12	0.80	0.07	3.34
Natural	3.80	2.47	4.68	3.85	14.80
<b>Total</b>	<b>5.15</b>	<b>3.60</b>	<b>5.47</b>	<b>3.92</b>	<b>18.14</b>

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

## Volume, Biomass, and Trends

North Carolina timberland contained 40.30 billion cubic feet of total wood volume. Hardwood species comprised 25.90 billion cubic feet, or 64 percent, of the total inventory (table 5). Softwood species comprised 14.39 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 (39 percent) in the Mountains, and least (13 percent) in the Northern Coastal Plain.

Statewide, net growth of softwoods averaged 857.8 million cubic feet annually (table 5). Most of the softwood net growth, 39 percent, came from the Southern Coastal Plain. Another 29 percent came from the Northern Coastal Plain. The State averaged 549.0 million cubic feet of softwood removals annually, with 37 and 33 percent from the Northern and Southern Coastal Plain units, respectively. The softwood growth to removals ratio was highest (1.8) in both the Piedmont and Southern Coastal Plain units, it was least (1.1) in the Mountains unit.

**Table 5—All-live volume of net growth, removals, and total inventory for softwoods and hardwoods by survey unit, North Carolina, 2015**

Category	Southern Coastal Plain	Northern Coastal Plain	Piedmont	Mountains	State
<i>million cubic feet</i>					
<b>Softwood</b>					
Net growth	336.0	249.8	233.3	38.6	857.8
Removals	182.8	200.5	132.1	33.7	549.0
G/R ratio <sup>a</sup>	1.8	1.2	1.8	1.1	1.6
Total inventory	5,046.8	3,505.8	4,109.5	1,732.2	14,394.3
<b>Hardwood</b>					
Net growth	128.6	102.6	316.6	228.8	776.7
Removals	84.6	66.2	147.4	50.3	348.6
G/R ratio <sup>a</sup>	1.5	1.5	2.1	4.5	2.2
Total inventory	3,608.1	3,371.0	8,852.4	10,070.2	25,901.7
<b>All species</b>					
Net growth	464.7	352.4	550.0	267.4	1,634.4
Removals	267.4	266.7	279.5	84.0	897.6
G/R ratio <sup>a</sup>	1.7	1.3	2.0	3.2	1.8
Total inventory	8,654.9	6,876.7	12,961.9	11,802.4	40,295.9

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

The State’s net growth of hardwoods averaged 776.7 million cubic feet annually. Most of the hardwood net growth, 41 percent, came from the Piedmont unit. Another 29 percent came from the Mountains unit. The State’s hardwood removals averaged 348.6 million cubic feet annually. Most of the hardwood removals, 42 percent, came from the Piedmont unit. The hardwood growth to removals ratio was highest (4.5) in the Mountains unit and least (1.5) in both the Northern and Southern Coastal Plain units.

Biomass totaled 988.69 million tons in North Carolina. Hardwood species comprised 684.67 million tons, or 69 percent, of total biomass (table 6). Softwood species comprised 304.02 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 (38 percent) of the hardwood biomass.

**Table 6—Aboveground biomass and carbon estimates on timberland for softwoods and hardwoods by survey unit, North Carolina, 2015**

Category	Southern Coastal Plain	Northern Coastal Plain	Piedmont	Mountains	State
<i>million tons</i>					
<b>Softwood</b>					
Biomass	109.91	74.67	88.57	30.87	304.02
Carbon	54.96	37.34	44.29	15.43	152.01
<b>Hardwood</b>					
Biomass	102.27	91.46	233.97	256.97	684.67
Carbon	51.13	45.73	116.99	128.48	342.33
<b>Total</b>					
Biomass	212.18	166.13	322.54	287.83	988.69
Carbon	106.09	83.06	161.27	143.92	494.34



Longleaf pine regeneration (photo by William D. Boyer, USDA Forest Service, Bugwood.org)

# Longleaf Pine Trends in North Carolina

In 2015, longleaf pine forest type classified as timberland covered 330.83 thousand acres in North Carolina, down 25 percent from the 438.23 thousand acres it occupied at the time of the 1974 inventory (table 7). However, most of the decline occurred between 1984 and 2002 where it dropped by 45 percent.

Like changes in area, the total number of longleaf pine trees decreased from 92.62 million trees in 1974 to 87.96 million trees in 2015, a drop of 5 percent. Most of the decline occurred between 1984 and 2002 where it dropped by 36 percent. However, the number of trees increased by 62 percent between 2002 and 2015 from a low of 54.26 to 87.96 million. Concerted efforts to reestablish longleaf on many of its former sites were behind the turnaround.

Net volume changed as well, but increased 16 percent from 454.96 million cubic feet in 1974 to 527.31 million cubic feet in 2015. However, between 1984 and 2002 net volume dropped by 6 percent. Related to change in tree numbers, net volume increased between 2002 and 2015, by 26 percent from a low of 417.38 to 527.31 million cubic feet.

**Table 7—Changes in longleaf pine on timberland by year, North Carolina, 1974–2015**

Year	Area of longleaf 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>
1974	438.23	92.62	454.96
1984	375.77	84.95	444.85
1990	255.30	71.35	419.88
2002	207.41	54.26	417.38
2007	225.17	73.70	451.01
2015	330.83	87.96	527.31

Source: Evaluator, accessed online June 20, 2016.

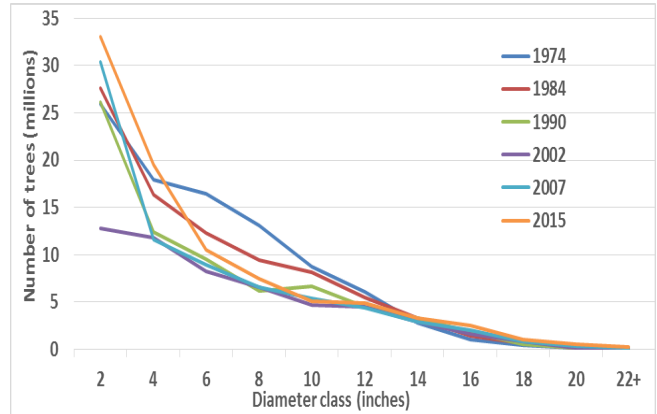


Figure 2—Number of longleaf pine trees ≥1 inch diameter class on timberland, North Carolina, 1974–2015.

Figure 2 shows the change in number of longleaf pine trees by diameter class distribution over time. Between 1974 and 2002, longleaf pine trees decreased dramatically in the 4– through 10– inch diameter classes. Between 1990 and 2002 the number of trees 2– inches and smaller decreased as well. However, regeneration efforts show a marked increase in number of small trees from 2007 forward, with gains up to the 6– and 8– inch classes beginning to show by 2015.



Longleaf pine needles and cones. (photo by William D. Boyer, USDA Forest Service, Bugwood.org)

**How to Cite This Publication**

Brown, M.J. 2017. Forests of North Carolina, 2015. Resource Update FS–133. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 4 p.



www.fia.fs.fed.us

**Contact Information**

Mark J. Brown, Forester  
Forest Inventory and Analysis  
Southern Research Station  
USDA Forest Service  
4700 Old Kingston Pike  
Knoxville, TN 37919  
Phone: 865-862-2033 / Fax: 865-862-0262  
Email: mbrown03@fs.fed.us  
Southern FIA: <http://srsfia2.fs.fed.us>  
National FIA: <http://fia.fs.fed.us>

Barry D. New, Program Head  
Technical Development, Planning and Utilization  
North Carolina Forest Service  
NC Department of Agriculture and Consumer Services  
1616 Mail Service Center  
Raleigh, NC 27699-1600  
Phone: 919-857-4843 / Fax: 919-857-4805  
Email: [Barry.New@ncagr.gov](mailto:Barry.New@ncagr.gov)  
[www.ncforestservice.gov](http://www.ncforestservice.gov)

USDA is an equal opportunity provider and employer

The published report is available online at <http://treesearch.fs.fed.us>