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RESOURCE UPDATE FS-150

FORESTS OF Virginia, 2016

This resource update provides an overview of forest resources in Virginia 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 Virginia Department of Forestry.

These 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 2016 with comparisons made to data reported previously. Data collection in 2016 consisted of 896 plots out of 4,804, or about 19 percent of the sample population. Data from the remaining 81 percent were collected from 2012 through 2015. The data used in this publication was accessed from the FIA database (https://fia.fs.fed.us/tools-data/) from January to March of 2018 unless otherwise indicated.

Overview

The annualized forest inventories in Virginia have documented gradual overall increases in forest land and timberland acreage and increasing maturity of the trees and stands that comprise it (Rose 2007, Rose 2009, Rose 2013, Brandeis and others 2017). Increases in recent years, however, have been slight, reflecting overall stability. Net volume on both forest land and timberland has also been increasing as forest stands are more typically comprised of fewer, larger trees. This means that even with unchanged or slight increases in the total forest land acreage, stands are more fully stocked in terms of volume.

Net tree growth and mortality in terms of their volume has increased while removals from both harvesting and land clearing to nonforest land uses has shown fluctuations probably related to varying economic conditions like the recent recession (Brandeis and others 2017).

Table 1—Virginia forest statistics, change between 2015 and 2016

Forest statistics	2015 estimate	Sampling error (percent)	2016 estimate	Sampling error (percent)	Change since 2015
Forest land					
Area *(thousand acres)*	16,059.70	0.61	16,069.10	0.61	9.40
Number of live trees ≥1.0 inch d.b.h. *(million trees)*	11,444.70	1.60	11,383.60	1.60	-61.10
Net volume of live trees ≥5.0 inches d.b.h. *(million cubic feet)*	38,364.90	1.19	39,399.50	1.18	1,034.60
Live tree aboveground biomass *(thousand oven-dry tons)*	964,590.60	1.06	986,479.30	1.06	21,888.7
Net annual growth of live trees ≥5.0 inches d.b.h. *(million cubic feet per year)*	1,206.60	2.14	1,312.80	1.99	106.20
Annual mortality of live trees ≥5.0 inches d.b.h. *(million cubic feet per year)*	302.70	4.07	299.50	3.95	-3.20
Annual removals of live trees ≥5.0 inches d.b.h. *(million cubic feet per year)*	485.40	6.99	505.50	6.76	20.10
Timberland					
Area *(thousand acres)*	15,386.30	0.71	15,386.40	0.72	0.10
Number of live trees ≥1.0 inch d.b.h. *(million trees)*	11,094.60	1.67	11,020.10	1.67	-74.50
Net volume of live trees ≥5.0 inches d.b.h. *(million cubic feet)*	36,615.20	1.27	37,594.00	1.26	978.80
Live tree aboveground biomass *(thousand oven-dry tons)*	919,898.90	1.15	940,397.10	1.15	20,498.2
Net annual growth of live trees ≥5.0 inches d.b.h. *(million cubic feet per year)*	1,185.50	2.18	1,288.90	2.04	103.40
Annual mortality of live trees ≥5.0 inches d.b.h. *(million cubic feet per year)*	290.10	4.18	284.40	4.08	-5.70
Annual removals of live trees ≥5.0 inches d.b.h. *(million cubic feet per year)*	503.30	6.90	520.70	6.65	17.40

Forest area

Virginia's total land area is 27.4 million acres, 16.1 million (58.7 percent) of which are forested according to the results of the latest forest inventory completed in 2016 (table 1). The percent of forested land by county is shown in figure 1.

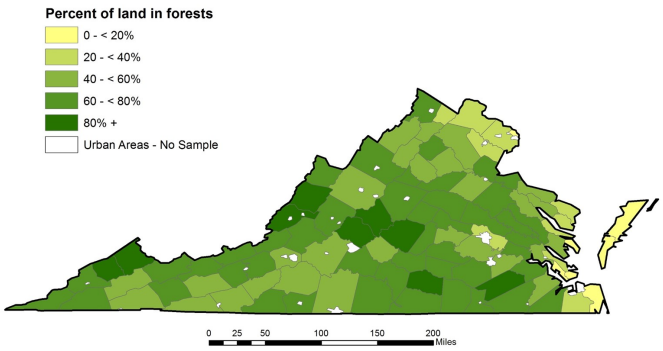

Figure 1—Percent of land in forests, Virginia, 2016.

This current estimate confirms that Virginia's forest land area has increased slightly or remained stable for at least the past two decades. The previous three, 5-year cycles of FIA data collection under the annualized forest inventory have estimates of forest land acreage in the State at 15.9 million in 2001, 15.8 million in 2006, and 15.9 million in 2011.

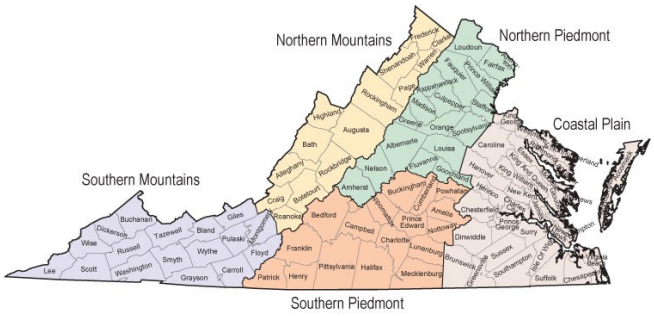

Figure 2—Counties and forest survey units in Virginia.

Virginia is divided into five survey units (fig. 2). In 2016, of the five survey units (fig. 3) the Coastal Plain had the lowest percentage of forest cover at 45.7 percent. The Southern and Northern Piedmont units were 67.6 and 56.7 percent forested, respectively. The Southern and Northern Mountain units were 65.4 and 66.2 percent.

The diversity of Virginia's forest types are represented in figure 4. Forest types in which oaks predominate are the most common across the State, with the oak-hickory (60.4 percent) and oak-pine (10.5 percent) comprising over 70 percent of the forest. In the forests of Virginia we see the beginnings of the transition from forest types typical of the Southern U.S. to those found in the more northern States.

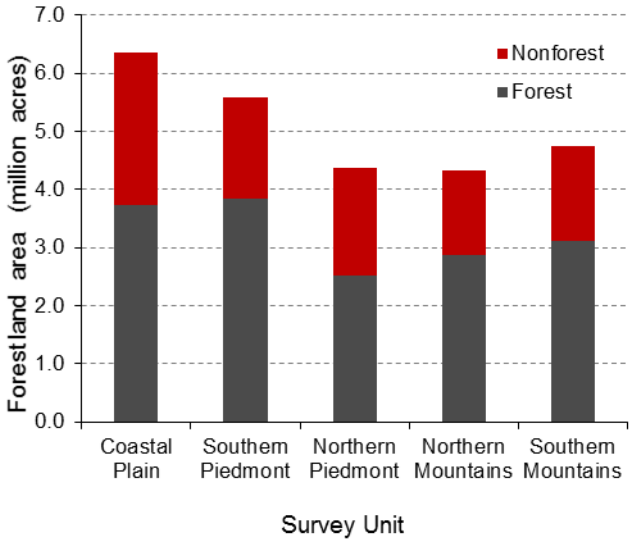

Figure 3—Forest and nonforest land area by survey unit, Virginia, 2016.

Loblolly-shortleaf pine, a forest type very common across the South, still covers a considerable area (almost 20 percent), but we also see small areas of conifer forest types more typical of the North such as spruce-fir and white-red-jack pine (which is primarily eastern white pine in Virginia).

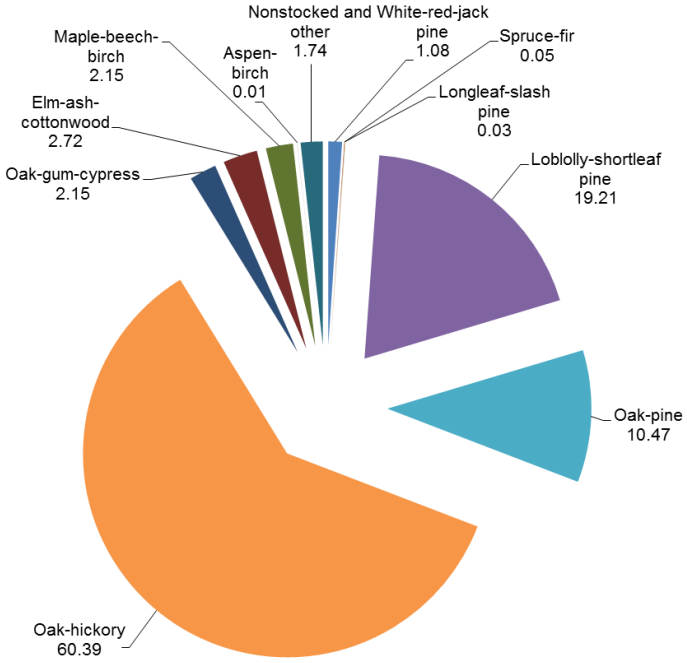

Figure 4—Percent of forest land area by forest-type group, Virginia, 2016.

Volume, Biomass and Trends

Of the 11.4 billion trees with a d.b.h. ≥1 inch estimated to be on forest land in Virginia, red maple was the most common hardwood and loblolly pine was the most commonly encountered softwood (table 2). The trees with d.b.h. ≥5 inches hold 39.4 billion cubic feet (bcf) of volume and 2.1 billion tons of aboveground live-tree biomass. While the soft maple species group has the greatest number of trees, they only account for 6.4 percent of total wood volume in Virginia's forests. There was greater volumes of wood in yellow poplar (16.3 percent of total volume) and oak trees (30.9 percent to total volume).

Table 2—Number of live trees (≥1.0 inch and ≥5.0 inches d.b.h.) and volume of live trees ≥5.0 inches d.b.h. (top 10 species for number) on forest land, Virginia 2016

Species	Number		Volume
	d.b.h ≥1 in	d.b.h ≥5 in	
	million trees		*million cubic feet*
Red maple	1,411	237	2,517
Loblolly pine	1,241	575	6,263
Yellow-poplar	894	261	6,430
Sweetgum	794	107	1,311
Blackgum	626	60	473
American holly	552	22	93
Virginia pine	429	121	1,321
White oak	397	147	3,342
Chestnut oak	319	237	3,569
American hornbeam	295	9	28
Other	4,426	917	14,051
Total	11,384	2,693	39,399

How this wood volume is distributed across diameter classes has important implications for forest management and the wood products industries. While total volume on timberland has increased over time, most of that increase has occurred in the larger diameter classes while the smaller diameter classes have remained relatively unchanged (fig. 5). For softwoods, there has been a slight downward trend in the smallest diameter class (5.0-6.9 inches) while trees with diameters of 9.0 inches and greater hold an increasing proportion of the total volume. For hardwoods, trees with diameters of 15.0 inches and greater have held an increasing proportion of the total volume over time. Generally, hardwood trees with d.b.h. ≥11 inches and softwood trees 9 inches or more are considered to have the potential for producing sawn lumber. As volume in the larger diameter classes increases, the amount of volume in sawtimber trees increases for both hardwoods and softwoods.

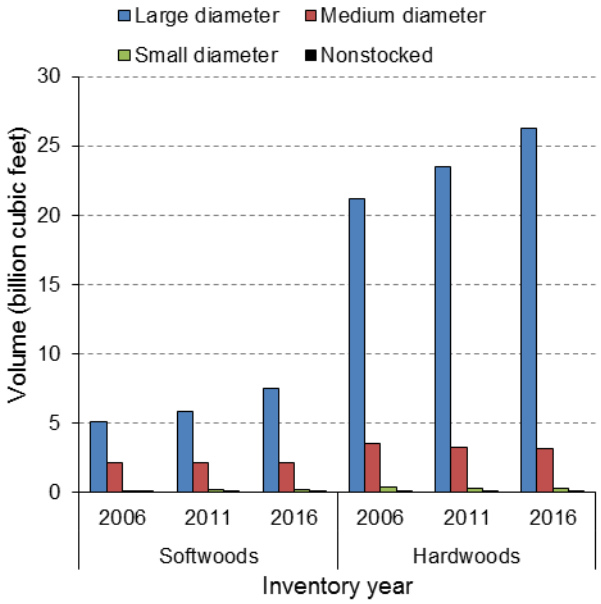

Figure 5—Volume of all-live trees on forest land by stand size class and major species group, Virginia 2006-2016.

Both softwood and hardwood average annualized growth have been increasing during the last three periods of annualized forest inventory, with a notable increase from 2011 to 2016 (fig. 6). Softwood and hardwood removals, on the other hand, have been decreasing, probably in part due to the inclusion of plots measured pre– and post-economic downturn. Softwood and hardwood mortality have remained consistently low over the three survey periods.

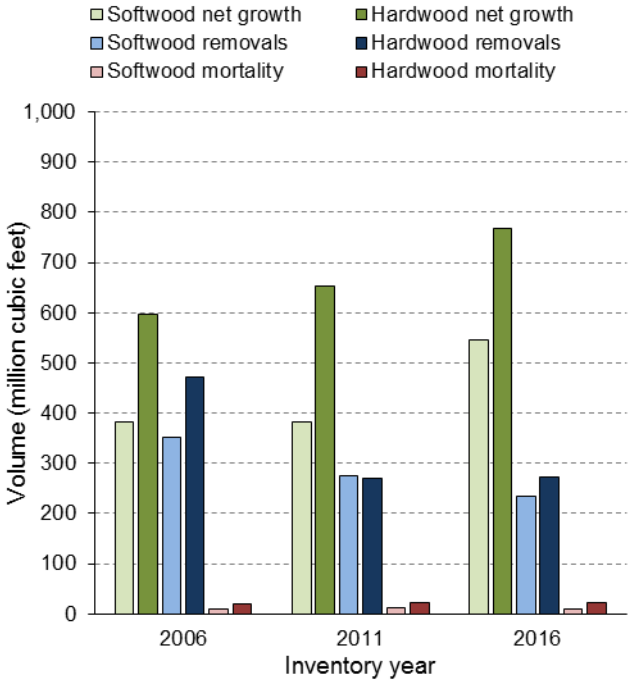

Figure 6— Average annual net growth, removals and mortality of live trees on forest land by major species group, Virginia 2006-2016.

Hemlock Woolly Adelgid

First observed in Virginia in the 1950s, the hemlock woolly adelgid is an aphid-like insect that feeds off eastern and Carolina hemlock eventually causing death (McClure and others 1996). Hemlock woolly adelgid is now found in almost all of hemlock's range in Virginia. Statewide, the number of live hemlock trees ≥5.0 inches d.b.h. steadily declined from 18.3 million in 2001 to 14.0 million in 2016 (fig. 7). In contrast, volume of live hemlock trees increased by 3.7 percent between 2011 and 2016, largely due to growth on larger trees. In 2016, the number of standing dead hemlock trees, though much greater than in 2001, remained relatively unchanged from 2011. Across survey units, the proportion of live and standing dead hemlock trees has shifted over time (fig. 8). The proportional shift for live hemlocks between 2001 and 2016 is due to a reduction in live hemlocks in the Northern Mountains and a relatively stable inventory of live hemlocks in the Southern Mountains. A continued shift of the proportion of standing dead trees between the Northern and Southern Mountains is likely to occur as the hemlock woolly adelgid progresses through the western-most part of the State.

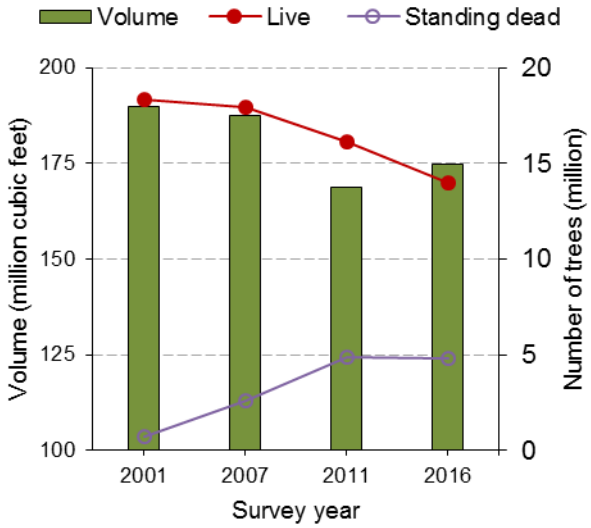

Figure 7—Volume and number of live and standing dead hemlock trees ≥5.0 inches d.b.h. on forest land by survey year, Virginia, 2001 to 2016.

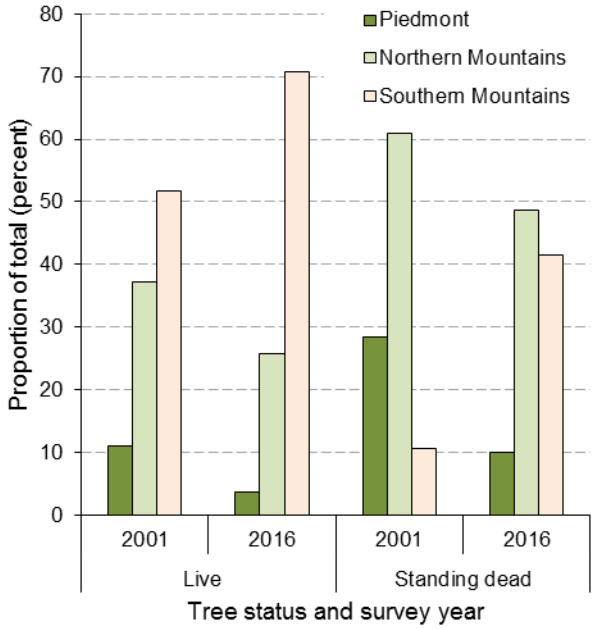

Figure 8—Proportion of the total number of live and standing dead hemlock trees ≥5.0 inches d.b.h. on forest land for survey years 2001 and 2016, by survey unit, Virginia. (Piedmont = Northern Piedmont and Southern Piedmont combined.)

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