



# Forests of Maryland, 2016

This publication provides an overview of forest resources in Maryland based on inventories conducted by the U.S. Forest Service, Forest Inventory and Analysis (FIA) program of the Northern Research Station. From 2004-2013, FIA employed an annual inventory measuring data on 20 percent of all sample plots each year in Maryland. Beginning in 2014, FIA is on a 7-year cycle, inventorying 14.3 percent of all plots annually. For the 2016 inventory, estimates for current variables such as area, volume, and biomass are based on 985 plots (432 forested) collected from 2011-2016. Change variables, such as net growth, removals, and mortality, are based on 940 plots (394 forested) collected in 2006-2011 and resampled in 2011-2016. Estimates from earlier annual and periodic inventories are shown for comparison. See Bechtold and Patterson (2005), O’Connell et al. (2013), and Gormanson et al (2017) for definitions and technical

details. A complete set of inventory tables is available at <https://doi.org/10.2737/FS-RU-136>.

## Overview

There are an estimated 2.5 million acres of forest land in Maryland (Table 1). Since 2011, there has been little change in the estimate of forest land area, however long-term data show decreases in forest land since the 1963 FIA inventory (Fig. 1). According to the 2016 results, there are an estimated 1.4 billion trees on Maryland’s forest land with an all-live tree aboveground biomass of 190 million tons and a net volume of 7 billion cubic feet. Estimates of aboveground biomass and net volume on forest land have increased since 2011. Total annual growth of all live trees on timberland outpaced total removals by a ratio (G:R) of 1.9:1 and annual mortality averaged 1 percent on timberland when calculated as a percentage of current volume.

**Table 1.—Maryland forest statistics, 2016 and 2011. Sampling errors in this and other tables represent 68 percent confidence intervals. Growth, removals, and mortality data for 2011 are not available (NA) because there are limited annual remeasurement data and estimates have a high degree of uncertainty.**

	2016 Estimate	Sampling error (percent)	2011 Estimate	Sampling error (percent)	Change since 2011 (percent)
<b>Forest Land</b>					
Area (thousand acres)	2,462	2.1	2,461	2.3	0.1
Number of live trees ≥ 1 in diameter (million trees)	1,413	5.0	1,442	5.1	-2.0
Aboveground biomass of live trees ≥ 1 in (thousand oven-dry tons)	190,029	3.0	178,880	3.0	6.2
Net volume of live trees ≥ 5 in diameter (million ft <sup>3</sup> )	6,995	3.3	6,562	3.2	6.6
Annual net growth live trees ≥ 5 in (thousand ft <sup>3</sup> /yr)	146,300	7.6	NA	NA	NA
Annual mortality of live trees ≥ 5 in (thousand ft <sup>3</sup> /yr)	76,892	8.8	NA	NA	NA
Annual harvest removals of live trees ≥ 5 in (thousand ft <sup>3</sup> /yr)	54,068	28.9	NA	NA	NA
Annual other removals of live trees ≥ 5 in (thousand ft <sup>3</sup> /yr)	16,480	33.7	NA	NA	NA
<b>Timberland</b>					
Area (thousand acres)	2,173	2.7	2,186	2.8	-0.6
Number of live trees ≥ 1 in diameter (million trees)	1,296	5.6	1,327	5.6	-2.3
Aboveground biomass of live trees ≥ 1 in (thousand oven-dry tons)	166,785	3.6	156,497	3.5	6.6
Net volume of live trees ≥ 5 in diameter (million ft <sup>3</sup> )	6,119	3.9	5,737	3.7	6.7
Net volume of growing stock trees (million ft <sup>3</sup> )	5,716	4.0	5,369	3.9	6.5
Annual net growth of growing stock trees (thousand ft <sup>3</sup> /yr)	121,583	7.4	NA	NA	NA
Annual mortality of growing stock trees (thousand ft <sup>3</sup> /yr)	45,015	11.1	NA	NA	NA
Annual harvest removals of growing stock trees (thousand ft <sup>3</sup> /yr)	44,132	30.8	NA	NA	NA
Annual other removals of growing stock trees (thousand ft <sup>3</sup> /yr)	16,835	32.6	NA	NA	NA



# Forest Area

Successive inventories since the early 1960s in Maryland have shown forest land area consistently decreasing, however there was little change in forest area since the first full annual inventory was completed in 2008 (Fig. 1). Timberland accounts for 88 percent of this forest land or 2.2 million acres. An estimated 12 percent of forest land is reserved from timber production and less than one-half percent is other forest land identified as not meeting minimum productivity standards.

Seventy-two percent of Maryland’s forest land (1.8 million acres) is privately owned (Fig 2). Private owners include individuals, families, corporations, and other private entities. The remaining 28 percent (694,000 acres) is in public ownership. The largest public owner is the state of Maryland, which holds 302,000 acres of timberland and 153,000 acres of reserved forest.

Maryland’s forests have been maturing as illustrated by the distribution of timberland by stand-size class (Fig. 3). Since the 1973 inventory, there has been a general

trend of increasing acreage in large-diameter stands and decreasing acreage in medium- and small-diameter stands. Acreage in large-diameter stands now accounts for 78 percent of timberland whereas the area in small-diameter stands is 7 percent. Even within each major forest-type group, most forest land is classified in the large-diameter stand size class.

Oak/hickory is the dominant forest-type group in Maryland, covering 60 percent of the forest land (Fig. 4). The oak/hickory group makes up more than 50 percent of the forest land area in all but the southern most counties of Dorchester, Somerset, St. Mary’s, Talbot, Wicomico, and Worcester, where the loblolly pine/shortleaf pine forest-type group is one of the most prevalent. Loblolly pine/short leaf pine is the most abundant softwood forest-type group within the State, accounting for 15 percent of the forest land. The maple/beech/birch forest-type group is prevalent in the western counties of Garrett and Allegany.

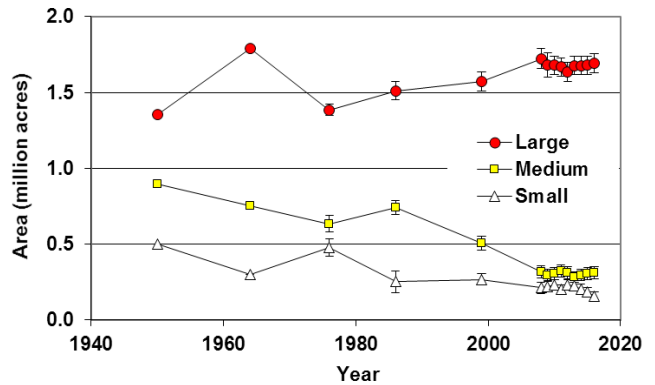
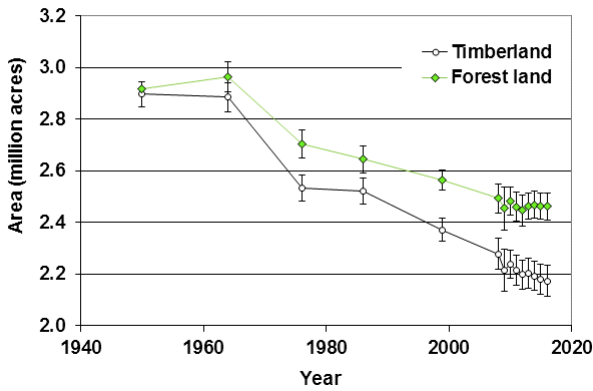


Figure 1.—Forest land and timberland area by year, Maryland. Error bars shown in figures in this report represent a 68 percent confidence interval around the mean.

Figure 3.—Timberland area by stand-size class and year, Maryland.

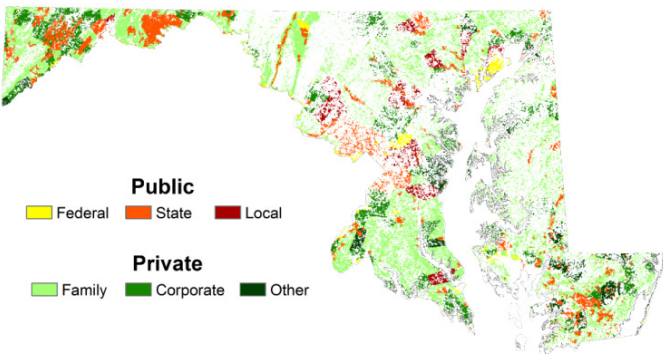


Figure 2.—Distribution of forest land by major owner group, Maryland.

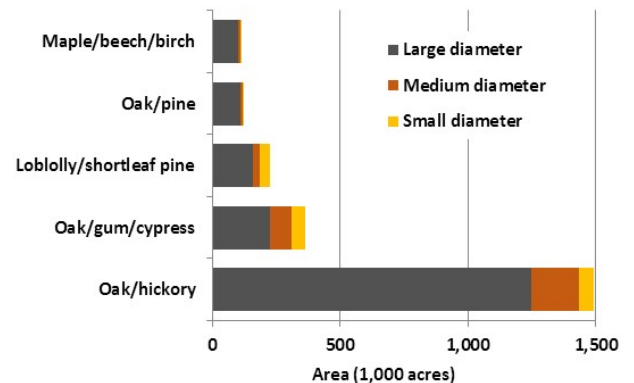


Figure 4.—Area of forest land by selected forest-type groups and stand size classes, Maryland, 2016.

# Volume, Biomass, and Trends

The net volume of trees on forest land increased by nearly 7 percent to an estimated 7 billion cubic feet since 2011 (Table 1). Yellow-poplar continued to be the most voluminous species followed by loblolly pine, red maple, and white oak (Table 2). Changes in live volume since 2011 varied across species. Loblolly pine exhibited the largest change in net volume, increasing by more than 26 percent.

The sawtimber volume on timberland increased by nearly 10 percent to total 23.4 billion board feet since 2011. Yellow-poplar was the leading sawtimber species by volume, followed by loblolly pine, white oak, and red maple. Of these species, loblolly pine exhibited the largest increase in sawtimber volume since 2011 (25 percent).

Aboveground biomass on forest land totaled 190 million dry tons. This was a 5 percent increase since 2011. Eighty-eight percent of biomass was contained in trees on timberland. Aboveground biomass on forest land averaged 77 dry tons per acre.

In terms of average annual growth and removals on timberland, loblolly pine and yellow-poplar had the largest growth and also the largest estimated removals of all tree species in Maryland. (Fig. 5). Yellow-poplar and loblolly pine collectively accounted for 50 percent of the total growth and 40 percent of all removals.

Total annual growth outpaced total removals by a ratio of 1.9:1 in 2015, although ratios varied considerably among species (Fig. 5). Among the most voluminous

species, loblolly pine had the largest growth-to-removals (G:R) ratio (4.4:1) and red maple had the smallest (0.6:1). As a percentage of current volume, annual mortality averaged 1.0 percent on timberland. Red maple had the highest mortality rate among the top five most voluminous species, averaging 2 percent per year.

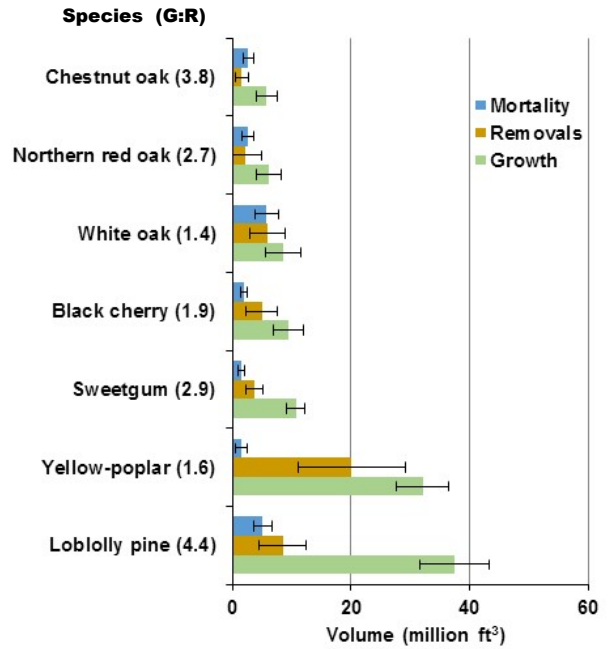


Figure 5.—Average annual net growth, removals, and mortality of net volume on timberland, and growth-to-removals ratio (G:R) for select species, Maryland, 2016.

Table 2.—Top 10 species by net volume and percent change on forest land; sawtimber volume and percentage change on timberland; and biomass on forest land, Maryland, 2016.

	Volume of live trees on forest land			Volume of sawtimber trees on timberland			Percent change since 2011		Aboveground biomass on forest land	
	(million ft <sup>3</sup> )	Sampling error (percent)	Percent change since 2011	(million board feet)	Sampling error (percent)	Percent change since 2011	(million tons)	Sampling error (percent)		
Yellow-poplar	1,352	11.2	6.8	6,140	13.7	7.4	27	11.0		
Loblolly pine	819	11.1	26.2	2,459	11.8	24.5	18	10.8		
Red maple	721	8.9	1.3	1,849	12.5	-0.4	20	8.3		
White oak	540	10.9	0.7	2,146	13.5	4.5	17	10.8		
Sweetgum	454	12.5	2.6	1,402	15.3	6.3	12	11.6		
Chestnut oak	323	15.8	23.7	1,006	19.5	33.6	10	15.6		
Northern red oak	282	14.2	25.2	1,107	17.7	43.6	9	13.9		
Black cherry	221	18.1	-9.9	527	26.3	-8.2	6	17.4		
American beech	213	17.1	24.6	684	22.4	39.0	6	14.8		
Black oak	206	14.8	1.4	805	17.3	8.2	7	16.2		
Other softwoods	255	18.0	-7.4	749	20.9	1.6	5	9.2		
Other hardwoods	1,609	6.2	2.1	4,523	8.6	5.0	52	3.5		
All species	6,995	3.3	6.6	23,398	5.1	9.9	190	3.0		

# Maryland Forests Continue to Mature but Age and Size Structure Differ Regionally

Maryland’s forests have continued to mature as illustrated by the distribution of timberland by stand-size class through time (Fig. 3). Mature forests provide habitat for a host of wildlife species, however these forests are not well suited for species that require early successional forest habitat, including the golden-winged warbler (*Vermivora chrysoptera*), American woodcock (*Scolopax minor*), and cottontail rabbit (*Sylvilagus floridanus*). With this trend of increasing forest area in larger-sized, mature stands and decreasing area in smaller, younger stands, there has been concern that the region is losing early successional forest land which may threaten the species that rely on this habitat.

Overall in Maryland only 8 percent of forest land is considered young (classified as 0- to 20-year-old stands), and 7 percent is in stands that fall in the small-diameter class. However, stand size and age class distributions vary spatially. Figure 6 summarizes stand- and age-class data by Maryland’s management regions. Age class distribution is generally skewed toward older stands in all but the Eastern region of the state. The Central region has the greatest percentage forest area in large diameter stands (90 percent) and this region also has the greatest proportion of stands categorized as 100 years old and greater (22 percent). The central region includes some of the more urbanized and developed areas of the state, where there is generally less forest land area and timber management is limited.

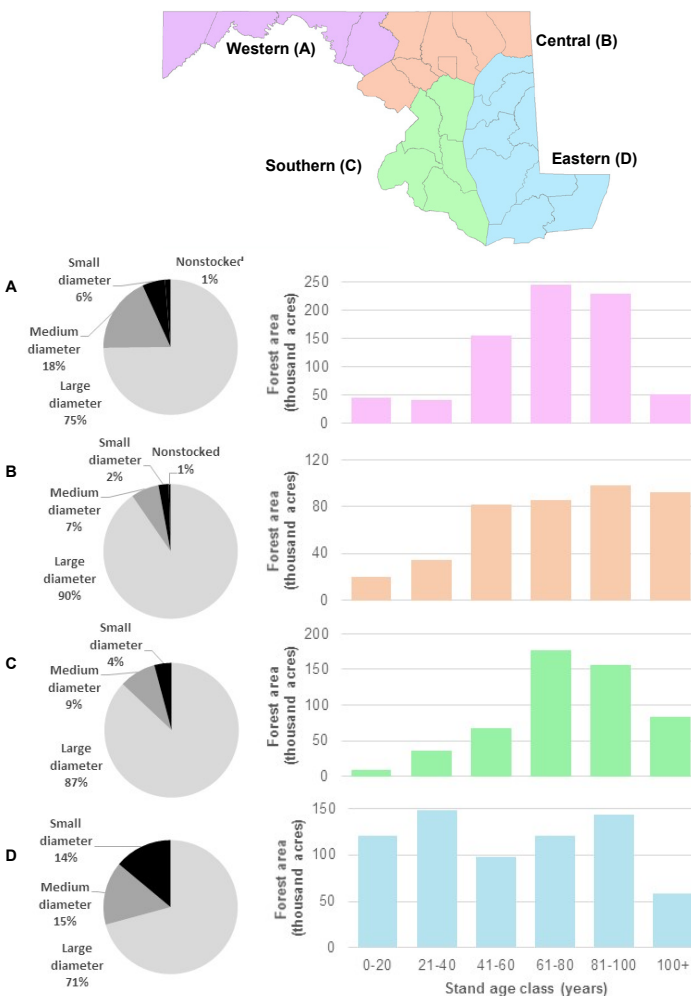
Forest land in the Eastern Region has a fairly even distribution among stand-age classes. Small- and medium-sized stands make up over 29 percent of forest land in this region. The forest land here has a large softwood component including the majority of the state’s loblolly pine (*Pinus taeda*) resource, and forest management plays a role in the age and size structure of stands in this region.

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Figure—6. Stand-size class (left) and stand-age class (right) distribution on forest land by region, Maryland, 2016.

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### More information on Maryland Forests

Lister, T.W.; Perdue, J.L.; Barnett, C.J. [et al.]. 2011. **Maryland's forests 2008**. Resour. Bull. NRS-58. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 60 p. <https://doi.org/10.2737/NRS-RB-58>.

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