USDA
United States Department of Agriculture

RESOURCE UPDATE FS-99

Forests of Maryland, 2015

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 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 2015 inventory, estimates for current variables such as area, volume, and biomass, are based on 944 plots sampled from 2009-2015. Change variables such as net growth, removals, and mortality are based on 953 samples collected in 2005-2009 and resampled in 2009-2015. Estimates from earlier annual and periodic inventories are shown for comparison. See Bechtold and Patterson (2005) and O'Connell et al. (2013) for definitions and technical details.

Overview

There are an estimated 2.5 million acres of forest land in Maryland (Table 1). Since 2010, 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 2015 results, there are more than 1.4 billion trees on Maryland's forest land with an aboveground biomass of 188 million tons and a net volume of 6.9 billion cubic feet (for all live trees). Estimates of aboveground biomass and net volume on forest land have increased since 2010. Total annual growth of all live trees on timberland outpaced total removals by a ratio (G:R) of 1.8:1 and annual mortality averaged 1 percent on timberland when calculated as a percentage of current volume.

Table 1.—Maryland forest statistics, 2015 and 2010. Volumes are for trees 5 inches in diameter and larger. Number of trees and biomass are for trees 1 inches in diameter and larger. Sampling errors in this and other tables represent 68 percent confidence intervals. Growth, removals, and mortality data for 2010 are not available (NA) because there are limited annual remeasurement data and estimates have a high degree of uncertainty.

	2015 Estimate	Sampling error (percent)	2010 Estimate	Sampling error (percent)	Change since 2010 (percent)
Forest Land					
Area (thousand acres)	2,463	2.1	2,482	2.2	-0.8
Number of live trees (million trees)	1,409	4.7	1,463	4.9	-3.6
Aboveground biomass of live trees (thousand oven-dry tons)	187,749	3.0	180,585	3.0	4.0
Net volume of live trees (million ft^3)	6,890	3.3	6,617	3.2	4.1
Annual net growth of live trees (thousand ft^3/yr)	151,596	7.2	NA	NA	NA
Annual mortality of trees (thousand ft^3/yr)	71,696	9.0	NA	NA	NA
Annual harvest removals of live trees (thousand ft^3/yr)	57,384	27.4	NA	NA	NA
Timberland					
Area (thousand acres)	2,180	2.7	2,218	2.7	-1.7
Number of live trees (million trees)	1,296	5.2	1,351	5.4	-4.1
Aboveground biomass of live trees (thousand oven-dry tons)	164,839	3.6	160,061	3.4	3.0
Net volume of live trees (million ft^3)	6,024	3.9	5,853	3.6	2.9
Net volume of growing stock trees (million ft^3)	5,595	4.0	5,514	3.8	1.5
Annual net growth of growing stock trees (thousand ft^3/yr)	123,177	7.1	NA	NA	NA
Annual mortality of growing stock trees (thousand ft^3/yr)	43,314	11.0	NA	NA	NA
Annual harvest removals of growing stock trees (thousand ft^3/yr)	47,353	28.9	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 89 percent of this forest land or 2.2 million acres. An estimated 11 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 (680,000) is in public ownership. The largest public owner is the State of Maryland, which holds 299,000 acres of timberland and 150,000 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 77 percent of timberland whereas the area in small diameter stands is 8 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 61 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 among the most prevalent. Loblolly pine/short leaf pine is the most abundant softwood forest-type group within the State, accounting for 13 percent of the forest land. The maple/beech/birch forest-type group is prevalent in the western counties of Garrett and Allegany.

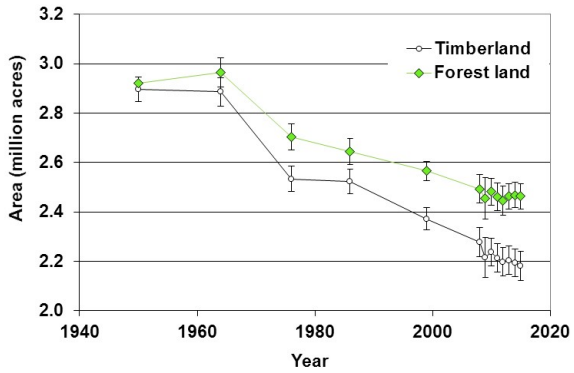

Figure 1.—Forest land and timberland area by year, Maryland. Error bars shown in figures in this report represent a 68 percent confidence interval around the mean.

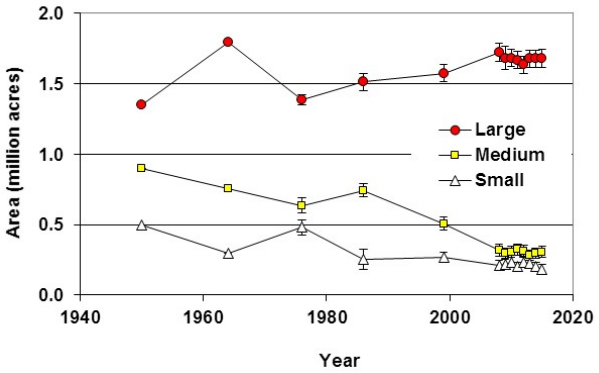

Figure 3.—Timberland area by stand-size class and year, Maryland.

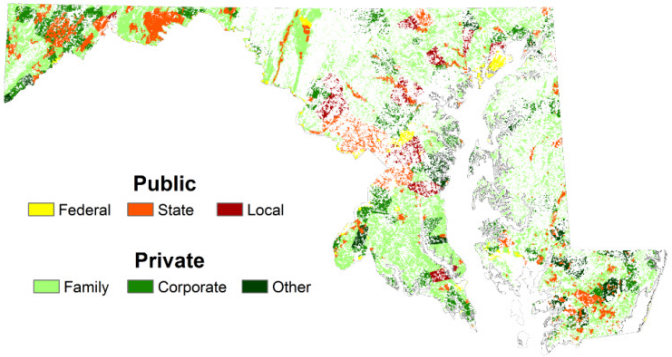

Figure 2.—Distribution of forest land by major owner group, Maryland.

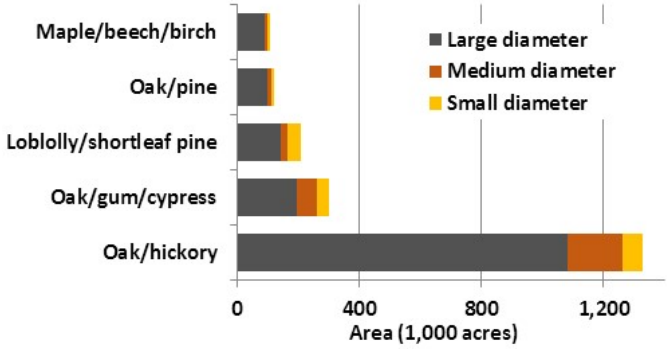

Figure 4.—Area of timberland by selected forest type groups and stand size classes, Maryland 2015.

Volume, Biomass, and Trends

The net volume of trees on forest land increased by 4 percent to 6.9 billion cubic feet since 2010 (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 2010 varied across species. Loblolly pine showed the largest change in net volume, increasing by more than 23 percent.

The sawtimber volume on timberland increased by 4 percent to total 22.7 billion board feet since 2010. Yellow-poplar was the leading sawtimber species by volume, followed by loblolly pine, white oak, and red maple. Since 2010 the sawtimber volume of loblolly pine increased by 20 percent.

Aboveground biomass on forest land totaled 188 million dry tons. This was a 4 percent increase since 2010. Eighty-eight percent of biomass was contained in trees on timberland. Aboveground biomass on forest land averaged 76 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 combined accounted for 48 percent of the total growth and 40 percent of all removals.

Total annual growth outpaced total removals by a ratio of 1.8:1 in 2015, although ratios varied considerably among species (Fig. 5). Across the most voluminous species, loblolly pine had the largest growth-to-removals (G:R) ratio (3.1:1) and red maple had the smallest (1.0:1). 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 1.6 percent per year.

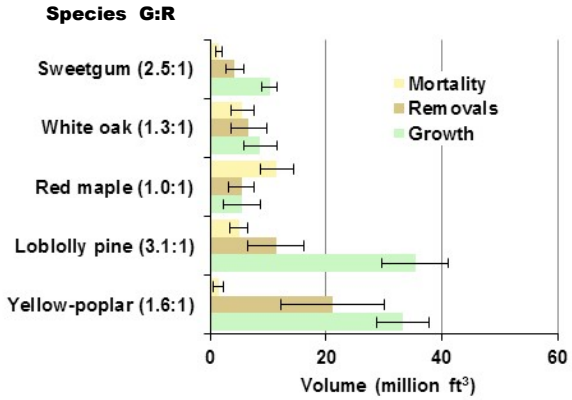

Figure 5.—Average annual net growth, removals, and mortality of net volume on timberland, and growth-to-removals ratio (G:R) for select species, Maryland, 2015.

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, 2015

	Volume of live trees on forest land (million ft3)	Sampling error (percent)	Percent change since 2010	Volume of sawtimber trees on timberland (million board feet)	Sampling error (percent)	Percent change since 2010	Aboveground biomass on forest land (million tons)	Sampling error (percent)
Yellow-poplar	1,293	11.3	3.6	5,785	13.8	2.7	26	11.1
Loblolly pine	771	11.2	22.8	2,344	11.8	20.4	17	11.0
Red maple	739	8.6	1.4	1,878	12.0	-4.3	21	8.0
White oak	538	10.9	0.9	2,114	13.4	3.4	17	10.8
Sweetgum	443	12.4	-6.7	1,358	15.3	-6.4	11	11.5
Chestnut oak	316	15.7	19.4	977	19.2	29.0	10	15.3
Northern red oak	280	14.0	17.5	1,044	17.8	24.1	9	13.6
Black cherry	230	17.7	-2.1	538	25.8	-1.2	6	17.1
Black oak	212	14.6	-1.9	821	16.8	-2.0	7	14.5
American beech	205	17.3	12.9	666	22.1	25.5	6	16.4
All species	6,890	3.3	4.1	22,724	5.0	4.3	188	3.0

Future Species Composition in Maryland's Forests

A comparison of species composition by diameter class and seedling data can provide information about the possible composition of Maryland's future forest. In the current inventory, oaks and yellow-poplar are better represented in the larger diameter classes than in the smaller diameter classes. Respectively, oaks and yellow-poplar represent 35 and 29 percent of the trees 20 inches and larger in diameter, but only 9 and 3 percent of trees less than 5 inches in diameter (Figs. 6). Conversely, sweetgum, American holly, and blackgum have disproportionate shares of trees less than 5 inches in diameter, amounting to 13, 11, and 8 percent of saplings, respectively, compared to their presence in trees 20 inches d.b.h. and larger at 2, 0, and 1 percent, respectively. Red maple is ubiquitous and occurs in large numbers across all diameter class. Other major species such as loblolly pine, hickory, black cherry, and beech are fairly well distributed across diameter classes.

In the seedling size class (trees less than 1 inch diameter), red maple is the most numerous species followed by sweetgum and pawpaw (Fig. 7). Although pawpaw ranks high in seedling size trees, this species rarely grows to large size and is usually confined to the understory. Since 2010, the total number of seedlings on forest land decreased by 19 percent and red maple has replaced sweetgum as the most numerous seedling species.

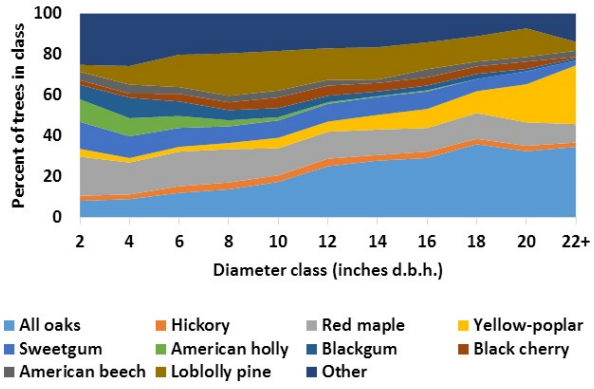

Figure 6.—Species composition as a percent of all trees in each diameter class on forest land, Maryland, 2015.

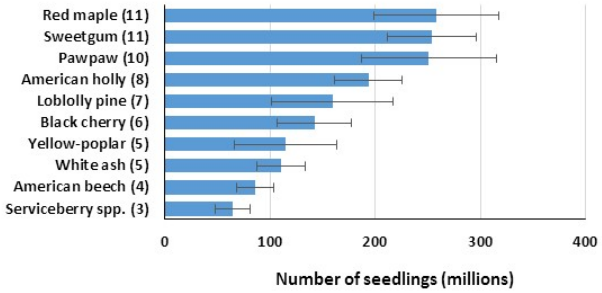

Figure 7.—Top 10 species by numbers of seedlings (less than 1-inch d.b.h. and at least 1 foot tall), on forest land, Maryland, 2015. Percent of total seedlings is shown in parentheses.

Yellow-poplar and white oak are intolerant of shade. In the smaller size classes, these species occur less than they do in the larger size class and this may pose a challenge for regeneration as older trees of these species reach maturity and die off.

In addition to shade tolerance, browsing by white-tailed deer (*Odocoileus virginianus*) is also a contributing factor in determining which species regenerate successfully in Maryland. American holly, blackgum, red maple, American beech, black birch, and pawpaw are not preferred browse for white-tail deer and these species have all increased in number in the understory. Oak species, which are more favored browse, are poorly represented in seedling and sapling size classes. Some forestry practices do not promote the regeneration of oaks, and silvicultural tools (fencing to exclude deer, controlled fires to inhibit oak competition, and use of oak seed trees) to promote oak regeneration may not be used. Contributing factors to poor oak regeneration are lack of fire, understory growing conditions that favor shade-tolerant hardwoods, and low intensity harvesting practices that leave only small gaps in the canopy.

Literature Cited

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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. [DVD included].

How to Cite This Publication

Lister, T.W.; Widmann, R.H. 2016. **Forests of Maryland, 2015.** Resource Update FS-99. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 4 p.

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