



# Forests of Maryland, 2013

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. Information about the national and regional FIA program is available online at <http://fia.fs.fed.us>. Since 2004, FIA has employed an annual inventory measuring data on a nominal 20 percent of sample plots each year in Maryland. For the 2013 inventory, estimates for current variables such as area, volume, and biomass, are based on 1009 plots sampled from 2009-2013. Change variables such as net growth, removals, and mortality are based on 961 samples collected in 2004-2008 and resampled in 2009-2013. 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

Maryland is home to over 2.4 million acres of forest land (Table 1). Since the 2008 inventory 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 2013 data, there are more than 1.4 billion trees on Maryland's forest land containing an all-live tree aboveground biomass of 185 million tons and a net volume of 6.8 billion cubic feet. Estimates of aboveground biomass and net volume on forest land have increased since 2008. Average annual net growth decreased while average annual mortality increased and there was little change in harvest removal levels since 2008.

**Table 1.—Maryland forest statistics, 2013 and 2008. Volumes are for trees 5-inch diameter and larger. Number of trees and biomass are for trees 1-inch diameter and larger. Sampling errors shown in tables in this report represent 68 percent confidence intervals.**

	2013 Estimate	Sampling error (%)	2008 Estimate	Sampling error (%)	Change since 2008 (%)
<b>Forest Land</b>					
Area (thousand acres)	2,463	2.1	2,493	2.3	-1.2
Number of live trees (million trees)	1,436	4.8	1,481	5.2	-3.0
Aboveground biomass of live trees (thousand oven-dry tons)	185,025	3.0	176,350	3.1	4.9
Net volume of live trees (million ft <sup>3</sup> )	6,800	3.4	6,469	3.3	5.1
Annual net growth of live trees (thousand ft <sup>3</sup> /yr)	159,429	7.5	196,100	5.9	-18.7
Annual mortality of trees (thousand ft <sup>3</sup> /yr)	67,591	9.2	57,042	9.6	18.5
Annual harvest removals of live trees (thousand ft <sup>3</sup> /yr)	62,300	23.9	62,449	18.1	-0.2
<b>Timberland</b>					
Area (thousand acres)	2,204	2.6	2,272	2.7	-3.0
Number of live trees (million trees)	1,331	5.3	1,379	5.6	-3.5
Aboveground biomass of live trees (thousand oven-dry tons)	163,120	3.6	159,492	3.5	2.3
Net volume of live trees (million ft <sup>3</sup> )	5,980	3.9	5,855	3.8	2.1
Net volume of growing stock trees (million ft <sup>3</sup> )	5,541	4.1	5,628	3.8	-1.5
Annual net growth of growing stock trees (thousand ft <sup>3</sup> /yr)	127,730	7.5	178,801	7.5	-28.6
Annual mortality of growing stock trees (thousand ft <sup>3</sup> /yr)	43,624	10.8	42,737	10.7	2.1
Annual harvest removals of growing stock trees (thousand ft <sup>3</sup> /yr)	54,603	24.0	54,247	18.7	0.7



# 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 90 percent of this forest land or 2.2 million acres. Slightly more than 10 percent of forest land is reserved from timber production and less than 1 percent is other forest land identified as not being able to meet minimum productivity standards.

Seventy-four percent of Maryland’s forests are privately owned (1.8 million acres) (Fig 2). These ownerships include families and individuals, corporations, and other private entities. The remaining 26 percent (650,000) is in public ownership. The largest public owner is the State, which holds 287,000 acres of timberland and 148,000 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 9 percent. Even within each major forest-type group, most forest land is classified in the large-diameter stand size class. (Fig. 4).

Oak/hickory is the dominant forest-type group in Maryland, covering 62 percent of the forest land (Fig. 4). In fact, the oak/hickory type group makes up more than 50 percent of the forest land area in all but the southern most counties where the loblolly pine/shortleaf pine forest-type group dominates. Loblolly pine/short leaf pine is the most abundant softwood forest-type group within the State, accounting for 13 percent of the forest land.

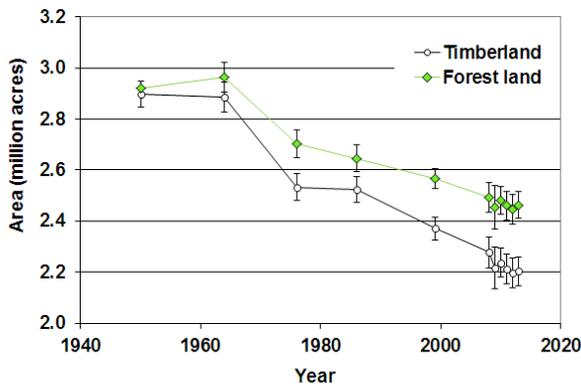


Figure 1.—Forest land and timberland area by year, Maryland. Error bars shown in figures in this report represent a 68 percent confidence interval around the mean.

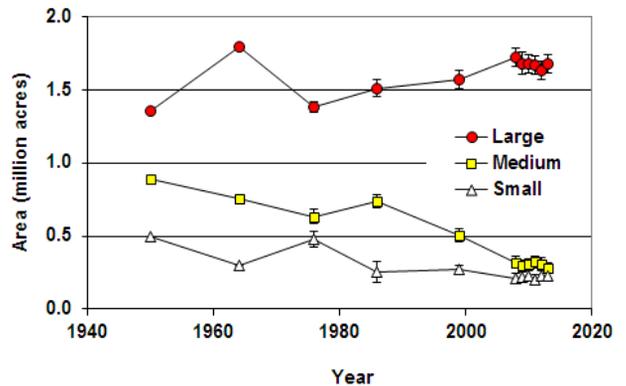
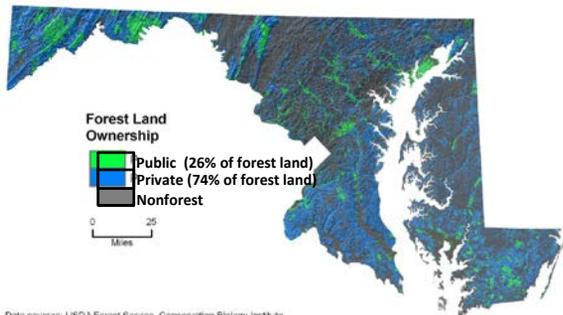


Figure 3.—Timberland area by stand-size class and year, Maryland.



Data sources: USDA Forest Service, Conservation Biology Institute, Protected Areas Database, National Land Cover Database 2001, Geographic base data provided by the National Atlas of the USA.

Figure 2.—Distribution of forest land by major owner group, Maryland 2013.

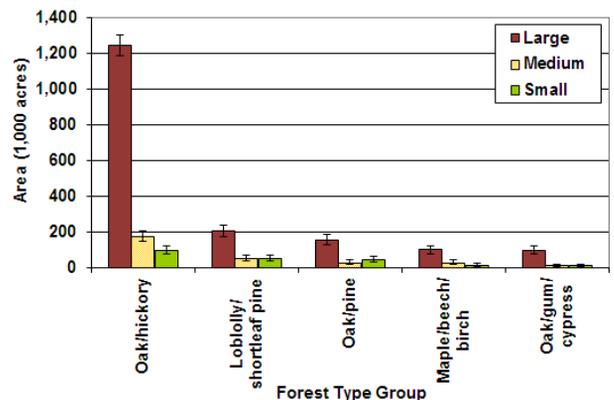


Figure 4.—Forest land area by stand-size diameter class for top five forest-type groups, Maryland, 2013.

## Volume, Biomass, and Trends

Across all forest land the net volume of trees increased by 5.1 percent to 6.8 billion cubic feet. Yellow-poplar continues to be the most voluminous species followed by red maple, loblolly pine, and white oak (Table 2). Changes in live volume since 2008 varied across species. Loblolly pine, black cherry, and yellow-poplar had the largest increases in net volume, all increasing by more than 13 percent.

The sawtimber volume on timberland increased by 4.9 percent to total 22.6 billion board feet. Yellow-poplar was the leading sawtimber species by volume, followed by loblolly pine, white oak, and red maple. Since 2008, black cherry, yellow-poplar, and loblolly pine had the largest increases in board foot volume, 18.7, 16.1 and 15.6 percent, respectively.

Aboveground biomass on forest land totaled 185 million dry tons. This was a 4.9 percent increase since 2008. Eighty-eight percent of biomass is contained in trees on timberland. Aboveground biomass on timberland averaged 74 dry tons per acre.

In terms of average annual growth and removals on timberland, yellow-poplar experienced the largest annual volume growth and also the largest estimated removals of all tree species in Maryland. (Fig. 5).

Together yellow-poplar and loblolly pine account for 44 percent of growth and 38 percent of removals. Total annual growth outpaced total removals by a ratio of 1.8:1 from 2008 to 2013, although ratios varied considerably between species (Fig. 5). Among the most voluminous species, black cherry had the largest growth to removals ratio (9.8:1) and northern red oak 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, averaging 1.4 percent per year.

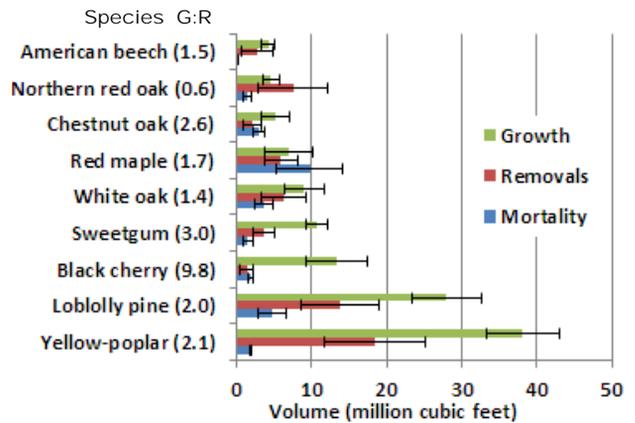


Figure 5.—Average annual net growth, removals, and mortality of net volume on timberland, and growth to removals ratio (G:R), Maryland, 2008-2013.

Table 2.—Net volume, and percent change in net volume on forest land; sawtimber volume and percent change on timberland, and biomass on forest land, Maryland, 2013, (top 10 species by net volume).

	Volume of live trees on forest land (1,000,000 ft <sup>3</sup> )	Sampling error (%)	Change since 2008 (%)	Volume of sawtimber trees on timberland (1,000,000 board feet)	Sampling error (%)	Change since 2008 (%)	Aboveground biomass on forest land (million tons)	Sampling error (%)
Yellow-poplar	1,375.1	11.1	13.9	6,380.9	13.1	16.1	27.9	10.9
Red maple	737.6	8.5	-0.4	1,896.5	11.7	-8.0	20.9	7.9
Loblolly pine	688.0	11.5	14.6	2,125.1	11.9	15.6	15.2	11.3
White oak	515.8	10.8	4.9	1,978.6	13.3	7.2	16.6	10.7
Sweetgum	443.2	11.9	-6.7	1,368.1	14.4	-2.6	11.5	11.1
Chestnut oak	300.6	15.9	5.5	927.6	19.5	11.7	9.9	15.5
Black cherry	258.1	16.7	14.3	627.6	24.5	18.7	6.8	16.0
Northern red oak	243.9	13.7	2.9	840.1	18.3	-6.0	7.9	13.2
Black oak	214.6	14.1	3.9	835.1	16.4	9.4	6.6	14.1
American beech	171.2	16.6	-8.4	494.9	23.3	-15.3	5.3	15.6
Other softwood species	251.1	18.3	-17.3	719.7	21.4	-13.7	5.0	15.3
Other hardwood species	1,601.1	6.1	6.1	4,360.3	8.4	-1.5	51.4	5.1
All species	6,800.3	3.4	5.1	22,554.5	5.0	4.9	185.0	3.0

## Reserve Status — Improved Implementation

In an effort to increase consistency among states and across inventory years, a refined set of procedures for determining reserve status has been implemented with version 6.0 of the FIA field manual which took effect with the 2013 inventory year. (U.S. Forest Service 2012).

FIA defines reserved forest land as forest land withdrawn by law(s) prohibiting the management of land for the production of wood products (not merely controlling or prohibiting wood-harvesting methods). All private forest land, regardless of conservation easements that may restrict harvesting, is defined as not reserved. The FIA definition of timberland excludes reserved forest land. With the new procedures, certain publicly owned forest land may be classified as reserved including local parks, State parks, and National Wildlife Refuges.

All previously collected annual inventory have been updated using the new standardized interpretation. These changes have no affect on estimates of forest land.

Timberland estimates generated for earlier annual inventories may differ from previously published estimates. The 2012 inventory was the last inventory in which all data were available under the previous and improved implementations (Table 3). Small changes in the timberland estimates are minor given the inherent variability in the associated estimates.

The improved implementation of the reserve status definition increases the spatial and temporal precision of timberland estimates allowing for higher quality trend analyses and potentially better forest management decisions.

**Table 3.—Comparison of timberland estimates calculated using previous and improved reserve status implementations, Maryland 2012. Volumes are for trees 5-inch diameter and larger.**

	2012 improved estimate	2012 previous estimate	Difference	Difference (percent)
Timberland				
Area (thousand acres)	2,198	2,312	-114	-4.9
Number of live trees ≥1 in diameter (million trees)	1,303	1,358	-55	-4.1
Aboveground biomass of live trees ≥1 in (thousand oven-dry tons)	159,432	169,600	-10,168	-6.0
Net volume of live trees ≥5 in diameter (million ft <sup>3</sup> )	5,851	6,231	-380	-6.1
Net volume of growing stock trees ≥5 in diameter (million ft <sup>3</sup> )	5,450	5,815	-365	-6.3
Annual net growth of growing stock trees (thousand ft <sup>3</sup> /yr)	123,997	139,324	-15,327	-11.0
Annual mortality of growing stock trees (thousand ft <sup>3</sup> /yr)	44,272	50,317	-6,045	-12.0
Annual removals of growing stock trees (thousand ft <sup>3</sup> /yr)	75,714	74,316	1,398	1.9

## Literature Cited

- Bechtold, W.A.; Patterson, P.L., eds. 2005. **The enhanced Forest Inventory and Analysis program: national sampling design and estimation procedures**. Gen. Tech. Rep. SRS-80. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 85 p.
- O'Connell, B.M.; LaPoint, E.B.; Turner, J.A.; et al. 2013. **The Forest Inventory and Analysis database: database description and users manual version 5.16 for Phase 2**. Washington, DC: U.S. Department of Agriculture, Forest Service. (<http://www.fia.fs.fed.us/library/database-documentation/>)
- U.S. Forest Service. 2012. **Forest inventory and analysis national core field guide, Vol. 1, field data collection procedures for Phase 2 plots, Ver. 6.0**. Washington, DC: U.S. Department of Agriculture, Forest Service. Available at [www.fia.fs.fed.us/library/field-guides-methods-proc](http://www.fia.fs.fed.us/library/field-guides-methods-proc) (verified Sept 2014).
- More information on Maryland Forests**
- Lister, T.W.; Perdue, J. 2013. **Maryland's forest resources, 2012**. Res. Note. NRS-191. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 4 p.
- 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.; Pugh, S.A. 2014.

**Forests of Maryland, 2013.**

Resource Update FS-24. Newtown Square, PA: U.S.

Department of Agriculture, Forest Service,

Northern Research Station. 4 p.

Northern FIA: <http://nrs.fs.fed.us/fia/>

National FIA: <http://fia.fs.fed.us>

### Contact Information

Tonya Lister, Research Forester

USDA Forest Service, Northern Research Station

11 Campus Blvd., Ste. 200

Newtown Square, PA 19073

Phone: 610-557-4033 / Fax: 610-557-4250

Email: [tlister01@fs.fed.us](mailto:tlister01@fs.fed.us)

USDA is an equal opportunity provider and employer

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