



Forests of Delaware, 2013

This publication provides an overview of forest resources in Delaware 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 Delaware. For the 2013 inventory, estimates for current variables such as area, volume, and biomass are based on 389 plots collected from 2009-2013. Change variables such as net growth, removals, and mortality are based on 374 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

Delaware is home to an estimated 362,000 acres of forest land (Table 1). Since 2008 there has been little change in forest land area, however long-term data show decreases in the amount of forest land since the 1986 FIA inventory (Fig. 1). According to the 2013 data, there are more than 240 million trees on Delaware's forest land containing an all live tree aboveground biomass of 25 million tons and a net volume of 936 million cubic feet. Estimates of aboveground biomass and net volume on forest land have increased since 2008. Average annual net growth has decreased sharply with an increase in mortality, while harvest removals levels are indeterminate because of large sampling errors.

Table 1.—Delaware 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 in this and other tables represent 68 percent confidence intervals.

	2013 Estimate	Sampling error (%)	2008 Estimate	Sampling error (%)	Change since 2008 (%)
Forest Land					
Area (thousand acres)	362	3.7	352	4.2	2.8
Number of live trees (million trees)	240	9.7	242	8.7	-0.9
Aboveground biomass of live trees (thousand oven-dry tons)	25,710	5.1	23,613	5.1	8.9
Net volume of live trees (million ft ³)	936	5.6	863	5.5	8.6
Annual net growth of live trees (thousand ft ³ /yr)	19,966	11.0	35,565	12.9	-43.9
Annual mortality of trees (thousand ft ³ /yr)	8,655	17.8	5,861	23.2	47.7
Annual harvest removals of live trees (thousand ft ³ /yr)	7,216	41.9	7,441	54.3	-3.0
Timberland					
Area (thousand acres)	347	4.1	338	4.6	2.6
Number of live trees (million trees)	233	9.9	230	9.0	1.0
Aboveground biomass of live trees (thousand oven-dry tons)	24,423	5.5	22,425	5.5	8.9
Net volume of live trees (million ft ³)	882	5.9	815	5.8	8.3
Net volume of growing stock trees (million ft ³)	811	6.3	787	5.9	3.2
Annual net growth of growing stock trees (thousand ft ³ /yr)	16,336	11.2	30,507	12.5	-46.5
Annual mortality of growing stock trees (thousand ft ³ /yr)	6,656	19.1	4,443	25.5	49.8
Annual harvest removals of growing stock trees (thousand ft ³ /yr)	6,185	42.2	6,805	55.1	-9.1



Forest Area

Successive inventories since the mid 1980s in Delaware have shown forest land area decreasing. However, since 2008, forest land estimates have been relatively stable. The 2013 estimate of 362,000 acres of forest land was 2.8 percent larger than the 2008 estimate and although this change isn't substantial, it may be an indication of a stabilizing forest land base. (Fig. 1). Timberland accounts for 96 percent of this forest land or 347,000 acres. Slightly more than 3 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-seven percent, or 279,000 acres of Delaware's forests are privately owned (Fig. 2). These ownerships include families and individuals, corporations, and other private entities. The remaining 23 percent (83,000 acres) is in public ownership. The largest public owner is the State, which holds 58,000 acres of timberland and 8,000 acres of reserved forest.

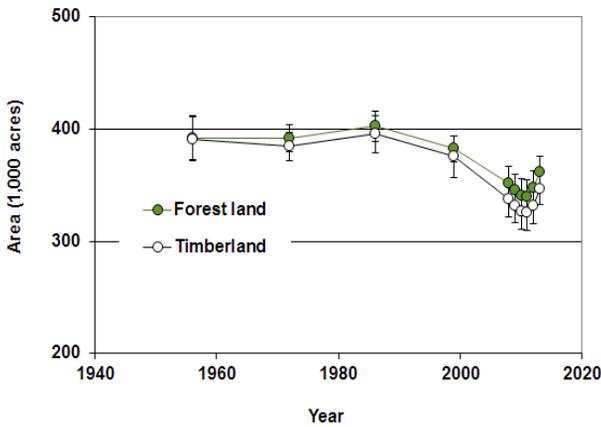


Figure 1.—Forest land and timberland area by year, Delaware, 1957-2013. Error bars shown in figures in this report represent 68 percent confidence intervals around the mean.

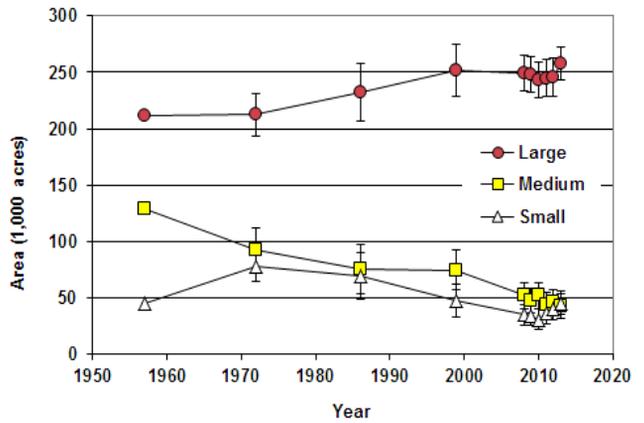
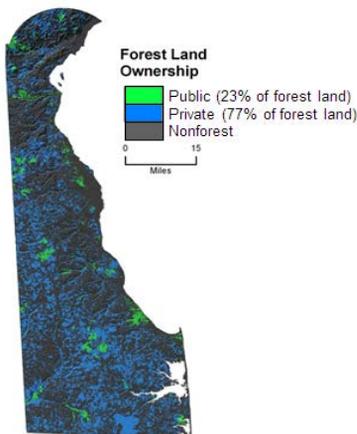


Figure 3.—Timberland area by stand-size class and year, Delaware, 1957-2013.



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, Delaware, 2013.

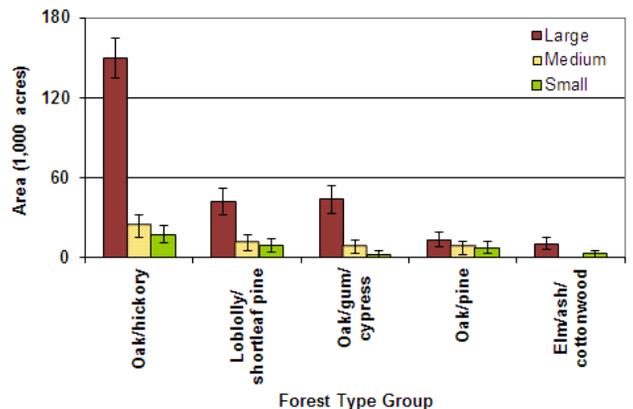


Figure 4.—Forest land area by stand-size class for top five forest-type groups, Delaware, 2013.

Volume, Biomass, and Trends

Across all forest land the net volume of trees increased by 8.6 percent to 936,000 cubic feet. Red maple continues to be the most voluminous species followed by yellow-poplar, loblolly pine, and sweetgum (Table 2). Changes in live volume since 2008 varied across species and interpretation is difficult given the high sampling errors for most species. Yellow-poplar and loblolly pine were the only two species to post marked increases.

The sawtimber volume on timberland increased by 12.6 percent to a total of 3 billion board feet. Red maple was the leading sawtimber species by volume, followed by loblolly pine and yellow-poplar. Again, yellow-poplar and loblolly pine were the only two species to post discernible increases since 2008.

Aboveground biomass on forest land totaled 26 million dry tons. This was a 5.1 percent increase since 2008. Ninety-five percent of biomass is contained in trees on timberland. Aboveground biomass on timberland averaged 70 dry tons per acre.

In terms of average annual growth and removals on timberland, loblolly pine had the largest growth numbers and also the largest estimated removals of all tree species in Delaware (Fig. 5). Loblolly pine and red maple combined account for 42 percent of the total growth and 39 percent of all removals.

Total annual growth outpaced total removals by a ratio of 2.5:1 from 2008 to 2013, although ratios varied considerably among species (Fig. 5). Among the most voluminous species, yellow-poplar had the largest growth to removals ratio (7.3:1) and southern red oak had the smallest (0.8:1). As a percentage of current volume, annual mortality averaged 0.9 percent on timberland. Of the prominent species, sweetgum had the highest mortality rate (1.3 percent per year).

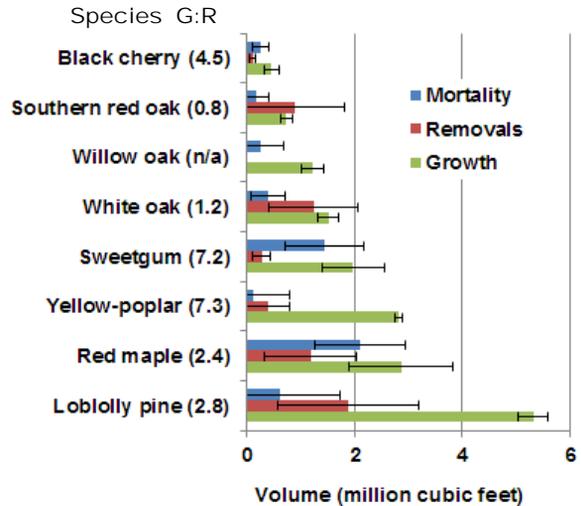


Figure 5.—Average annual net growth, removals, and mortality of net volume on timberland, and growth to removals ratio (G:R), Delaware, 2008-2013.

Table 2.—Top 10 species by net volume and percent change on forest land; sawtimber volume and percent change on timberland; and biomass on forest land, Delaware, 2013.

	Volume of live trees on forest land (1,000,000 ft3)	Sampling error (%)	Change since 2008 (%)	Volume of sawtimber trees on timberland (1,000,000)	Sampling error (%)	Change since 2008 (%)	Aboveground biomass on forest land (thousand tons)	Sampling error (%)
Red maple	195.9	12.2	3.8	557.0	16.3	-0.4	5,504.7	11.3
Yellow-poplar	128.8	23.8	36.0	436.2	24.8	47.8	2,634.0	23.2
Loblolly pine	122.5	18.6	24.5	452.9	20.3	38.9	2,759.6	17.9
Sweetgum	112.8	13.3	-1.5	355.6	16.9	-1.0	2,868.9	12.7
White oak	72.4	17.9	11.0	292.5	21.2	9.6	2,358.2	17.6
Willow oak	50.1	32.7	24.3	257.9	33.9	29.2	1,493.4	32.4
Blackgum	34.2	19.1	1.2	94.5	27.0	5.0	962.8	17.4
Southern red oak	32.9	26.3	11.1	113.2	30.4	8.5	1,015.5	25.9
Black cherry	21.2	28.1	-11.3	38.4	58.6	9.1	601.4	25.4
Scarlet oak	18.9	35.4	-15.2	69.5	39.5	-21.1	668.7	34.3
Other softwood species	16.6	28.2	-37.1	55.5	35.2	-41.9	397.7	17.1
Other hardwood species	130.0	12.4	4.3	389.3	17.5	12.6	4,444.7	12.3
All species	936.3	5.6	8.6	3,112.5	7.8	12.6	25,709.5	5.1

Reserve Status — Improved Implementation

In an effort to increase consistency among states and across inventory years, a refined set of procedures 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. This includes 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, Delaware, 2012. Volumes are for trees 5-inch diameter and larger.

Timberland	2012 improved estimate	2012 previous estimate	Difference	Difference (percent)
Area (thousand acres)	332	337	-5	-1.5
Number of live trees ≥ 1 in diameter (million trees)	221	225	-4	-1.8
Aboveground biomass of live trees ≥ 1 in (thousand oven-dry tons)	22,894	23,056	-162	-0.7
Net volume of live trees ≥ 5 in diameter (million ft ³)	832	835	-3	-0.4
Net volume of growing stock trees ≥ 5 in diameter (million ft ³)	766	768	-2	-0.3
Annual net growth of growing stock trees (thousand ft ³ /yr)	15,259	15,845	-586	-3.7
Annual mortality of growing stock trees (thousand ft ³ /yr)	5,548	5,626	-78	-1.4
Annual removals of growing stock trees (thousand ft ³ /yr)	8,286	14,521	-6,235	-42.9

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More information on Delaware Forests

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