



Forests of Ohio, 2014

This resource update provides an overview of the forest resources in Ohio based on inventories conducted by the U.S. Forest Service, Forest Inventory and Analysis (FIA) program of the Northern Research Station. Estimates are based on field data collected using the FIA annualized sample design and are updated yearly.¹ (See footnote on page 4.) Information about the national and regional FIA program is available online at <http://fia.fs.fed.us>. Since 2001, FIA has implemented an annual inventory in Ohio. For the 2014 inventory, estimates for current variables such as area, volume, and biomass are based on 4,281 plot samples (both forested and nonforest) collected from 2009 to 2014. Change variables such as net growth, removals, and mortality are based on 4,160 plots collected from 2005 to 2009 and remeasured from 2009 to 2014. Estimates from earlier annual and periodic inventories are shown for comparison.

See Bechtold and Patterson (2005) and O'Connell et al. (2014) for definitions and technical details.

Overview

Ohio's forest land area totals 8.1 million acres and occupies 31 percent of the State's land area (Table 1). Since 2009, there has been a small increase in forest land. Ninety-six percent of Ohio's forest land, or 7.8 million acres, is classified as timberland. Three percent is in public reserve status (279,000 acres), and 1 percent is other forest land (71,000 acres). The most recent inventory shows that the net volume of trees on timberland continued to increase, and the annual net growth in volume continued to outpace annual removals. Annual mortality on forest land averaged 1.2 percent of the current inventory volume.

Table 1.—Ohio forest statistics, 2014 and 2009. Volumes are for trees 5-inch and larger diameter. Numbers of trees and biomass are for trees 1-inch and larger diameter. Sampling errors reported represent 68 percent confidence intervals.

	2014 Estimate	Sampling error (percent)	2009 Estimate	Sampling error (percent)	Change since 2009 (percent)
Forest Land					
Area (thousand acres)	8,137	1.0	8,021	1.0	1.5
Number of live trees (million trees)	4,127	2.1	4,136	2.1	-0.2
Aboveground biomass of live trees (thousand oven-dry tons)	486,460	1.6	465,860	1.6	4.4
Net volume of live trees (million ft ³)	16,715	1.7	16,062	1.8	4.1
Annual net growth of live trees (thousand ft ³ /yr)	441,859	4.3	459,805	4.7	-3.9
Annual mortality of live trees (thousand ft ³ /yr)	193,829	5.6	176,604	6.9	9.8
Annual harvest removals of live trees (thousand ft ³ /yr)	206,774	10.9	223,810	11.8	-7.6
Annual other removals of live trees (thousand ft ³ /yr)	10,948	29.0	10,188	49.3	7.5
Timberland					
Area (thousand acres)	7,787	1.1	7,708	1.1	1.0
Number of live trees (million trees)	3,969	2.2	4,014	2.2	-1.1
Aboveground biomass of live trees (thousand oven-dry tons)	464,345	1.6	446,801	1.7	3.9
Net volume of live trees (million ft ³)	15,951	1.8	15,409	1.8	3.5
Net volume of growing-stock trees (million ft ³)	13,639	1.9	13,774	2.0	-1.0
Annual net growth of growing-stock (thousand ft ³ /yr)	336,325	3.8	365,082	4.2	-7.9
Annual mortality of growing-stock trees (thousand ft ³ /yr)	127,135	6.2	113,880	7.4	11.6
Annual harvest removals of growing-stock trees (thousand ft ³ /yr)	169,821	11.4	184,474	11.9	-7.9
Annual other removals of growing-stock trees (thousand ft ³ /yr)	31,160	25.9	21,224	44.6	46.8



Forest Area

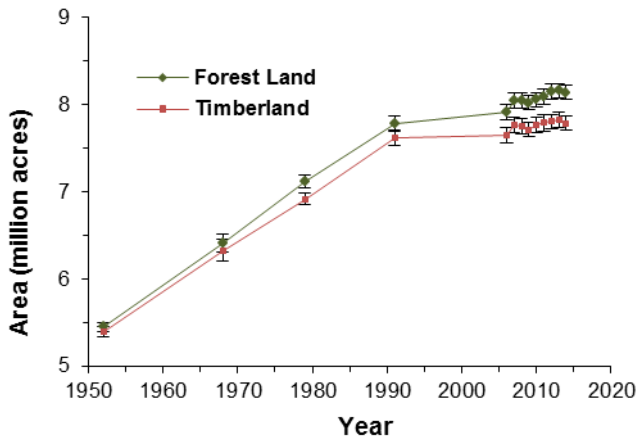


Figure 1.—Area of forest land and timberland by year, Ohio. Error bars shown in figures of this report represent 68 percent confidence intervals around the mean.

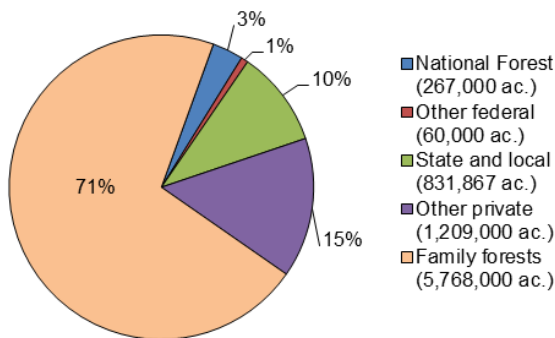


Figure 2.—Area of forest land ownership, Ohio, 2014.

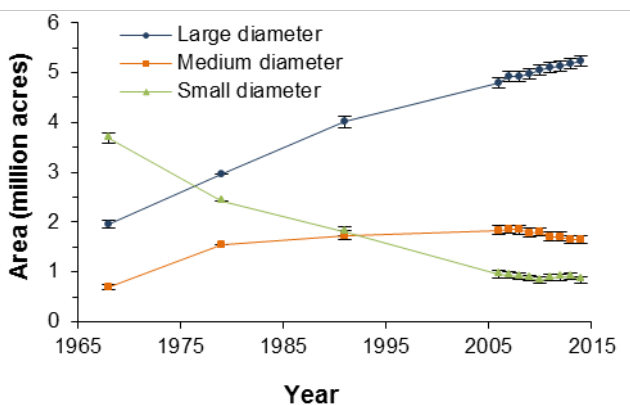


Figure 3.—Area of timberland by stand-size class and inventory year, Ohio.

Successive inventories have shown an upward trend in forest land area, although inventories since 1991 show a slowing in this trend. The 2014 inventory shows a slight decrease in forest land when compared to 2013 (Fig.1). Historically, losses of forest land due to development have been more than offset by gains in forest land because of abandoned farm land reverting to forest. Recently though, the area of farmland has stabilized while development of forest land to other uses has continued. These trends likely indicate that the area of forest land in Ohio is near a peak. Future changes in forest land will depend on the pace of land development and to a great extent on the economics of farming.

Eighty-six percent of Ohio’s forests are privately owned (7.0 million acres; Fig. 2). Private owners are a diverse group of families and individuals, corporations, and other private entities. The remaining 14 percent (1.1 million acres) is in public ownership. The largest public owner is the State, with 521,000 acres, followed by the Wayne National Forest with 267,000 acres of forest.

Ohio’s forests have been maturing as shown in the distribution of timberland by stand-size classes (Fig. 3). Since the 1968 inventory, acreage of large-diameter stands has been increasing while the area of small diameter stands has been decreasing. Acreage in large diameter stands now accounts for 67 percent of timberland whereas the area in small diameter stands is 12 percent.

Oak/hickory continues as the predominant forest-type group, occupying 63 percent of forest land (Fig. 4).

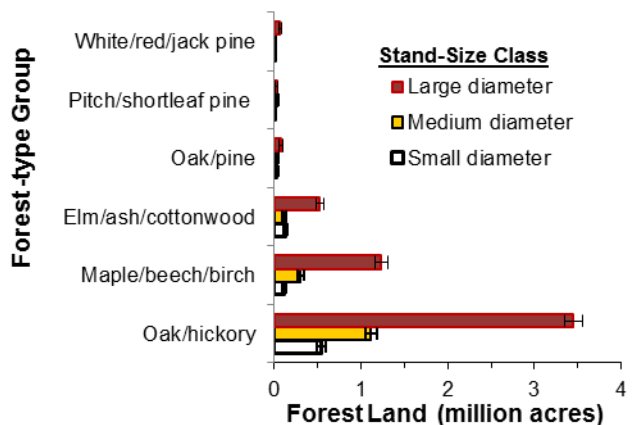


Figure 4.— Area of forest land by stand-size class (based on small, medium, and large trees) for the top six forest-type groups ranked by acres, Ohio, 2014.

Volume, Biomass, and Trends

Since 2009, the net volume of trees on forest land increased by 4.1 percent to 16.7 billion cubic feet. Red maple continued to be the most voluminous species followed by yellow-poplar, sugar maple, and black cherry (Table 2). Changes in volume since 2009 differed between species. Red maple, yellow-poplar and sugar maple increased by 6.9, 8.8, and 9.0 percent, respectively. White ash, white oak, beech, and black oak decreased in volume -9.1, -5.9, -2.5, and -0.8 percent, respectively.

Sawtimber volume on timberland increased by 1.9 percent to 51.0 billion board feet. Yellow-poplar is the leading sawtimber species by volume, followed by red maple, northern red oak, sugar maple, and white oak. Since 2009, many species decreased in sawtimber volume. White ash, beech, white oak, black oak, and black cherry decreased by -15.8, -9.2, -9.0, -7.4, and -3.8 percent, respectively.

Aboveground biomass of live trees on forest land totaled 486 million dry tons. This was a 4.4 percent increase since 2009. Sixty-nine percent of the live tree biomass is contained in the merchantable boles of timber species on timberland. Aboveground biomass on timberland averaged 60 dry tons per acre.

In terms of average annual growth and removals on timberland, red maple and yellow-poplar experienced the largest annual growth in volume since 2009, and yellow-poplar, followed closely by black cherry, had the largest removals (Fig. 5).

Yellow-poplar alone accounts for 13 percent of the growth and 10 percent of removals. Total annual growth

outpaced total removals by a ratio of 1.8:1 from 2009 to 2014, although ratios varied considerably among species. Red maple's growth-to-removals ratio was 3.3:1, whereas the ratios for the white oak (0.8:1), beech (0.6:1), elm (0.1:1), and ash (-0.2:1) were less (ratios less than 1 signify that removals exceed net growth). As a portion of the current inventory, gross growth was 3.8 percent; mortality, 1.1 percent; net growth, 2.7 percent; and removals, 1.5 percent. These result in an average annual net increase in total volume of 1.2 percent on timberland.

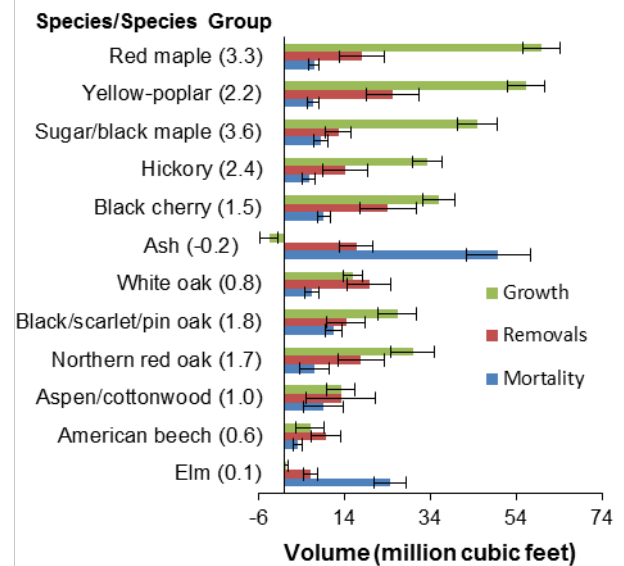


Figure 5.—Average annual net growth, removals, and mortality of net sound volume on timberland, and growth to removals ratio (G/R), Ohio, 2009-2014.

Table 2.— Net volume, and percent change on forest land; sawtimber volume and percent change on timberland, and aboveground biomass on forest land for the top 10 species based on net volume of live trees on forest land Ohio, 2014

Species	Volume of live trees on forest land (million ft ³)	Sampling error (percent)	Percent change since 2009	Volume of sawtimber trees on timberland (million bdf)	Sampling error (percent)	Percent change since 2009	Aboveground biomass on forest land (million tons)	Sampling error (percent)
Red maple	1,740	5.3	6.9	4,112	7.5	5.0	49	5.0
Yellow-poplar	1,703	7	8.8	6,775	8.5	10.8	36	6.7
Sugar maple	1,467	5.4	9.0	3,798	7.2	4.3	50	5.0
Black cherry	1,181	5.8	3.8	2,706	8.9	-3.8	32	5.6
Northern red oak	923	7.9	9.1	3,805	9.5	10.1	30	7.7
White ash	919	6.5	-9.1	2,660	9.1	-15.8	28	6.2
White oak	898	6.8	-5.9	3,490	7.9	-9.0	29	6.8
Shagbark hickory	559	7.7	15.1	1,662	9.6	16.6	20	7.5
American beech	503	9.8	-2.5	1,681	13.5	-9.2	16	9.4
Black oak	481	10.3	-0.8	1,798	12.6	-7.4	15	10.1
Other softwoods	634	11.4	8.1	1,983	14.1	13.5	13	10.7
Other hardwoods	5,707	2.9	3.7	16,547	4.3	2.5	169	2.7
All Species	16,715	1.7	4.1	51,016	2.5	1.9	486	1.6

Tree Mortality has Increased in Ohio

The mortality of trees in Ohio has increased by nearly 10 percent since 2009 (Table 1). As a percentage of current volume, the annual mortality rate averages 1.2 percent on forest land, which is similar to mortality rates in Indiana, Michigan, New York, and West Virginia. The highest mortality rates are for species of elm (5.7 percent) and ash (4.4 percent) (Fig. 6). Together, ash and elm species account for 41 percent of tree mortality in Ohio, but only 10 percent of the total volume in the State. These species are being attacked by Dutch elm disease and the emerald ash borer (EAB), respectively. Since 2009 elm mortality has decreased while ash mortality has increased (Fig 7). Currently about 3 million ash trees, 5-inches and large in diameter, are dying each year. In addition to increased mortality, the annual harvest of ash trees has increased by 52 percent since 2009 to 15.4 million cubic feet. The increase in the ash harvest is likely due to landowners preemptively harvesting ash trees threatened by EAB. Mortality and removals combined has resulted in a decrease in ash volume of 9.6 percent statewide, since 2009. Most affected are counties in northwest Ohio, where ash volume has decreased by 47 percent.

Species/Species Group

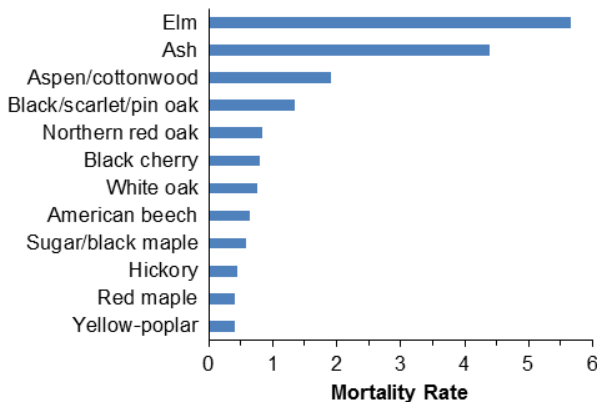


Figure 6.—Average annual mortality rate (percentage of current net sound volume) by species on timberland, Ohio, 2014.

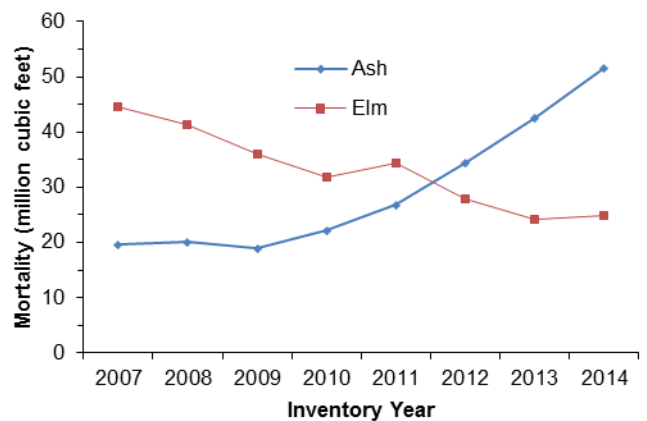


Figure 7.—Average annual mortality of net sound volume on forest land, ash and elm species, Ohio, 2007 to 2014.

¹One-fifth of the plots was measured annually from 2007 thru 2013 resulting in a complete set of samples for every 5 years of data collection. In 2014, this 5-year cycle was changed to 7 years, wherein 1/7th (14.3 percent) of the plots are measured annually.

References

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