



Forests of Ohio, 2017

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 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 2017 inventory, estimates for current variables such as area, volume, and biomass are based on 4,272 (1,646 forested) plot samples collected from 2011 to 2017. Change variables such as net growth, removals, and mortality are based on 4,125 (1,510 forested) samples collected from 2006–2011 and remeasured from 2011–2017. Estimates from previous inventories are shown for comparison. See Bechtold and Patterson (2005), Gormanson et al. (2018), and O’Connell et al. (2017) for definitions and technical details. A complete set of inventory tables is available at <https://doi.org/10.2737/FS-RU-171>.

Overview

Ohio’s forest land area is 8.0 million acres (Table 1) for 2017, the same as 2016 but a 2 percent decrease since 2012. Forest land occupies 30 percent of the State’s total area. Ninety-six percent of Ohio’s forest land, or 7.6 million acres, is classified as timberland. Four percent (292,000 acres) is publicly-owned reserved forest land. Less than 1 percent (51,000 acres) is other forest land, where minimum productivity standards are not met.

Net volumes are still increasing, though at a slower pace relative to years past. Annual net growth on timberland has also slowed, though it still outpaces annual removals by a factor of 1.3:1. A 37 percent increase in mortality over the 2012 estimate has been observed and is a major driver of decreased annual net growth and volume gains.

¹The 5-year cycle (1/5th of plots measured annually) was changed to a 7-year cycle in 2014, wherein 1/7th (14.3 percent) of the plots are measured annually.

Table 1.—Ohio forest statistics, 2017 and 2012. Volume estimates are for trees 5 inches and larger in diameter. Numbers of trees and biomass estimates are for trees 1 inch and larger in diameter. Sampling errors in tables and error bars in figures represent 68 percent confidence intervals.

	2017 Estimate	Sampling error (%)	2012 Estimate	Sampling error (%)	Change from 2012 (%)
Forest land					
Area (thousand acres)	7,986.7	1.0	8,147.6	1.1	-2.0
Number of live trees (million trees)	3,933.9	2.2	4,133.5	2.1	-4.8
Aboveground biomass of live trees (thousand oven-dry tons)	483,484.6	1.6	480,492.3	1.7	0.6
Net volume of live trees on (million ft ³)	16,687.0	1.7	16,499.1	1.8	1.1
Annual net growth of live trees (thousand ft ³ /yr)	347,587.8	5.0	470,728.7	4.0	-26.2
Annual mortality of live trees (thousand ft ³ /yr)	248,060.7	4.9	181,311.2	5.8	36.8
Annual harvest removals of live trees (thousand ft ³ /yr)	223,583.6	10.8	210,800.8	10.4	6.1
Annual other removals of live trees (thousand ft ³ /yr)	30,857.7	23.2	8,321.1	35.3	270.8
Timberland					
Area (thousand acres)	7,644.3	1.1	7,799.5	1.2	-2.0
Number of live trees (million trees)	3,780.5	2.3	3,985.9	2.2	-5.2
Aboveground biomass of live trees (thousand oven-dry tons)	461,249.3	1.7	459,464.5	1.7	0.4
Net volume of live trees (million ft ³)	15,921.5	1.8	15,775.5	1.8	0.9
Net volume of growing stock trees (million ft ³)	13,744.1	2.0	13,539.9	2.0	1.5
Annual net growth of growing stock trees (thousand ft ³ /yr)	279,261.8	4.3	360,505.4	3.5	-22.5
Annual mortality of growing stock trees (thousand ft ³ /yr)	157,258.9	5.7	114,737.3	6.4	37.1
Annual harvest removals of growing stock trees (thousand ft ³ /yr)	179,245.3	11.2	171,980.5	10.7	4.2
Annual other removals of growing stock trees (thousand ft ³ /yr)	36,968.8	23.0	27,372.1	30.1	35.1



Forest Area

Decades of growth in forest land area in Ohio made the estimate climb from 5.4 million acres in 1952 to 7.9 million in 1991 (Fig. 1). Forested area remains relatively stable since the beginning of annual inventory in the State with estimates ranging from a low of 7.9 million acres in the mid-2000s to the high of 8.2 million acres in 2013. The current estimate of 8.0 million acres, while 2 percent lower than the 2012 acreage, indicates a fairly stable forest land base that undergoes small year-to-year fluctuations. Analysis of land-use change on remeasured plots shows a net loss of 67,000 forested acres. Reversion from agricultural land netted 44,000 acres of forest land, offsetting the 87,000 net acres developed and the 23,000 acres lost to various other uses. This loss of forest land is largely responsible for the 271 percent increase in other removals (Table 1).

Ohio forest land is overwhelmingly privately owned, with 6.8 million acres (85 percent) of total forest land area. Families and individuals own 70 percent of all forest land,

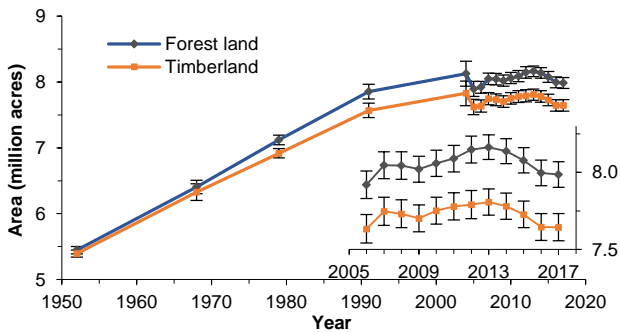


Figure 1.—Area of forest land and timberland by year, Ohio, 1952 to 2017.

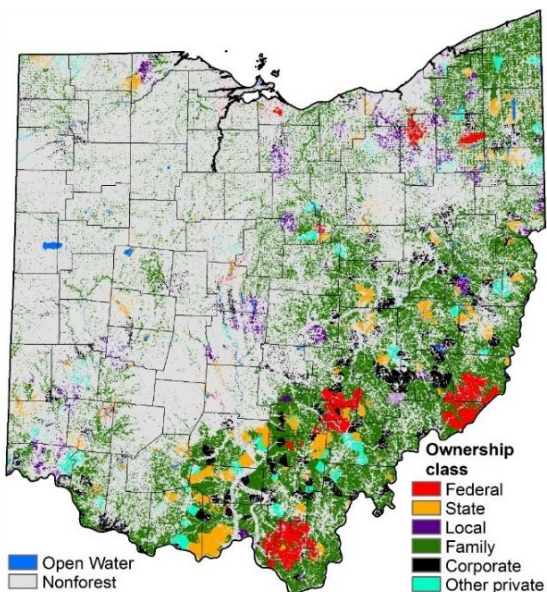


Figure 2.—Distribution of forest land by ownership class, Ohio, 2014.

and corporate ownership stands at 12 percent of forest land. Public ownership accounts for 1.2 million acres, or 15 percent of forest land. State ownership comprises the largest portion of public forest land with 527,000 acres. Federal ownership accounts for 355,000 acres of forest land and local governments own 317,000 acres. The bulk of federal forest land is held in the Wayne National Forest in the southeastern portion of the state (Fig. 2).

The area of large diameter stands² that roughly followed increases in forest land area have plateaued at 68 percent of timberland (Fig. 3). Similarly, decades of decline in the area of small diameter stands have stabilized, remaining at about 11 percent of timberland since 2009. Medium diameter stands account for 20 percent of timberland.

Oak/hickory is the most dominant forest-type group in the State, comprising 63 percent of forest land area (Fig. 4). Maple/beech/birch makes up 21 percent and elm/ash/cottonwood is 9 percent of forest land. Collectively, 70 percent of the area comprised by the top three forest-type groups are in large diameter stands.

² Small diameter stands (seedling/sapling): dominated by trees less than 5.0 inches d.b.h.; medium (poletimber): 5.0 to 8.9 inches d.b.h. for softwoods and 5.0 to 10.9 inches d.b.h. for hardwoods; large (sawtimber): ≥ 9.0 inches for softwoods and ≥ 11.0 d.b.h. for hardwoods.

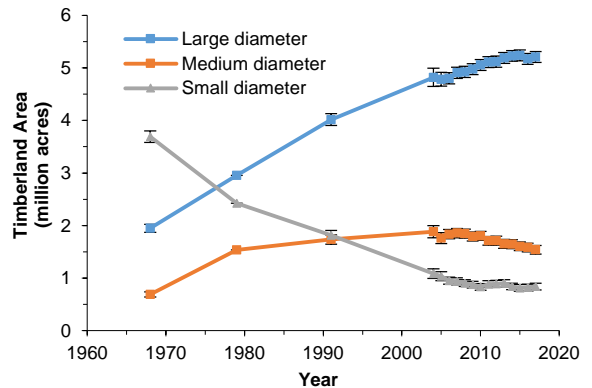


Figure 3.—Area of timberland by stand-size class² and inventory year, Ohio, 1968 to 2017.

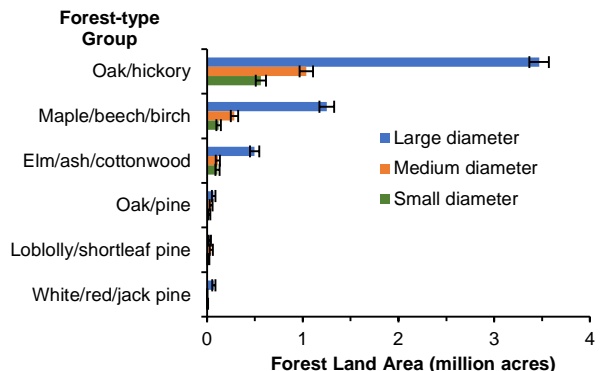


Figure 4.— Area of forest land by stand-size class for the top six forest-type groups ranked by total acres, Ohio, 2017.

Volume, Biomass, and Trends

The rate of increase in net volume of trees on Ohio’s forest land has been decreasing over the last several years. The 2017 estimate is 16.7 billion ft³, an increase of 1.1 percent over the 2012 estimate (Table 2). In contrast, net volume increased 3.8 percent from 2007 to 2012. Increased mortality and removals have contributed to keeping net volume at roughly the same level since 2014 (Figure 5). Volume increases for the top 10 species ranged from 0.1 percent in beech to 9.5 percent in red oak (Table 2). White oak and white ash continue to lose volume, decreasing 7.3 and 21.1 percent, respectively, from 2012.

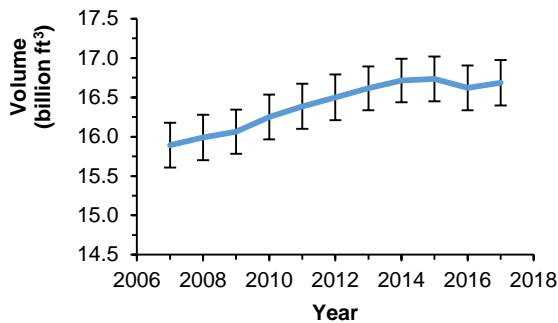


Figure 5.—Net volume on forest land by inventory year, Ohio 2007 to 2017.

Sawtimber volume, however, increased 3.6 percent overall since 2012, totaling 51.9 billion board feet on timberland. Individual species increases ranged from 4.0 percent in black oak to 13.2 percent in black cherry (Table 2). Beech, white oak, and white ash all lost sawtimber volume relative to 2012, dropping 0.7, 4.4, and 22.9 percent, respectively.

Net growth on timberland for 2017 was 342 million cubic feet per year, or 1.8 percent of net volume. This is a substantial decrease relative to 2012 and represents the lowest level since annual inventories in Ohio began. The net growth to removals ratio (G:R) for all species on timberland stands at 1.3:1. Four of the ten most voluminous species in the state have growth outpacing removals by a factor of 2:1 or more (Fig. 6). White oak and beech each continue to be removed at rates exceeding net growth. Mortality in ash continued to increase, leading to negative net growth.

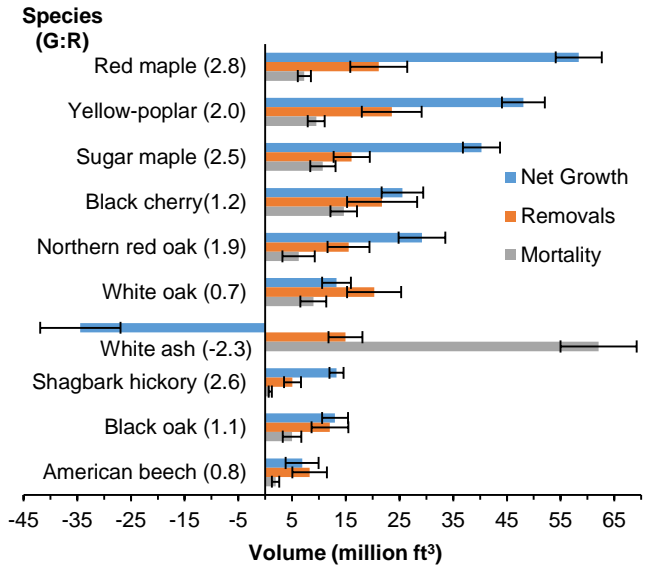


Figure 6.—Average annual net growth, removals, and mortality volume on timberland, with growth to removals ratios (G:R) in parentheses, for the top 10 species ranked by total net volume, Ohio, 2017.

Table 2.—Net volume and percentage change on forest land; sawtimber volume and percentage 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, 2017. Volume estimates are for trees 5 inches and larger in diameter. Biomass estimates are for trees 1 inch and larger in diameter.

	Net volume of live trees (million ft ³)				Net volume of sawtimber trees (million bd.ft.)				Aboveground biomass on (million dry tons)	
	Net volume of live trees (million ft ³)	Sampling error (percent)	Percent change since 2012	2012 estimate	Net volume of sawtimber trees (million bd.ft.)	Sampling error (percent)	Percent change since 2012	2012 estimate	Net volume of live trees (million ft ³)	Sampling error (percent)
Red maple	1,787.6	5.6	3.3	1,730.0	4,424.9	7.8	7.7	4,107.3	50.0	5.3
Yellow-poplar	1,697.7	7.1	3.1	1,647.2	6,821.1	8.7	5.2	6,483.7	35.8	6.9
Sugar maple	1,543.3	5.5	7.0	1,442.3	4,118.9	7.4	9.5	3,762.1	51.8	5.2
Black cherry	1,202.9	5.9	5.1	1,144.5	2,913.2	8.8	13.2	2,573.7	32.0	5.7
Northern red oak	960.4	8.2	9.5	876.7	3,982.7	9.8	11.5	3,572.5	30.8	8.1
White oak	889.5	7.0	-7.3	959.7	3,607.4	8.3	-4.4	3,772.3	29.0	6.9
White ash	740.7	7.1	-21.1	938.5	2,173.8	10.0	-22.9	2,817.9	22.8	6.7
Shagbark hickory	563.4	7.8	4.9	537.0	1,726.3	9.7	9.7	1,573.3	19.8	7.7
American beech	510.4	9.9	0.1	510.0	1,712.0	13.9	-0.7	1,723.9	15.8	9.5
Black oak	492.2	10.3	1.2	486.5	1,885.0	12.5	4.0	1,812.5	15.6	10.1
Other softwood species	627.5	11.5	1.1	620.7	1,991.2	14.2	3.3	1,927.6	12.3	10.9
Other hardwood species	5,671.6	2.9	1.2	5,606.0	16,560.0	4.4	3.6	15,987.8	167.9	2.8
All species	16,687.0	1.7	1.1	16,499.1	51,916.5	2.6	3.6	50,114.5	483.5	1.6

Spotted Lanternfly: Another Threat from the East

Spotted lanternfly (SLF, *Lycorma delicatula*) is a planthopper native to China. First detected in North America in Berks County, Pennsylvania, in September 2014, populations have since spread to 13 counties in southeastern Pennsylvania where a quarantine is in place to slow further spread of this invasive insect (Fig. 7).

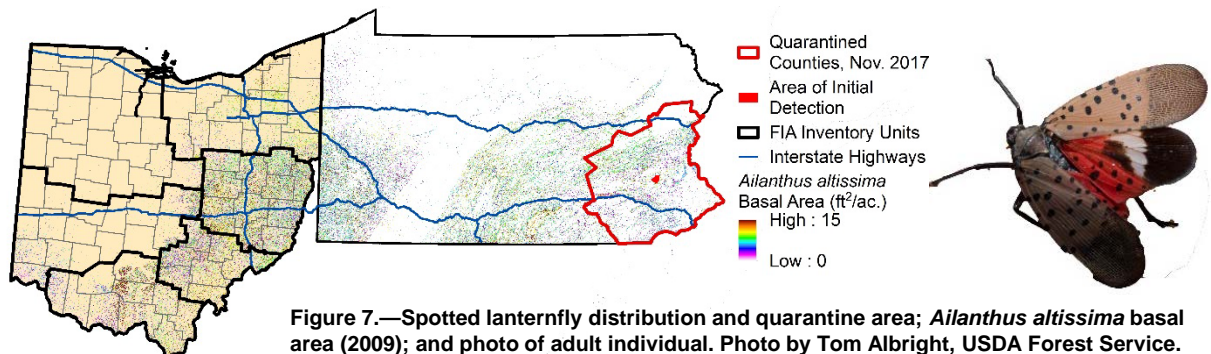
The adults, as well as nymphs, use their piercing and sucking mouthparts to feed from the phloem of a large variety of plants, including fruit trees and many timber species such as oaks, maples, and pines, that together comprise over 40 percent of available timber volume in Ohio. SLFs, particularly as adults, are known to prefer another invasive species, ailanthus (tree-of-heaven, *Ailanthus altissima*), as a host (PA Dept. of Agriculture 2018). While there is some evidence that ailanthus is necessary for successful completion of the life cycle, wild grape (*Vitis spp.*) may serve as a suitable secondary host, allowing for sustained populations in an absence of ailanthus (Pugh et al. 2016). This threatens \$32 million in annual vineyard and orchard production in Ohio (USDA 2018).

SLFs congregate in large numbers to feed on host plants, producing honeydew secretions and weeping wounds that subsequently attract ancillary insects to wound sites. These wounds can weaken trees and will likely have more significant impacts on trees already under stress, though widespread mortality in forest settings is unknown at this point. Ailanthus comprises at least 1 percent of all tree abundance in each of the South-Central, Southeastern, and East-Central inventory units in Ohio, suggesting there are plenty of suitable host trees in the state for SLF to thrive (Fig. 7). Females lay egg masses on host plants and nearly any available surface nearby, making control very

difficult, as egg masses can be readily transported on objects stored outdoors. Major travel corridors leading from already infested regions into areas of Ohio with substantial ailanthus populations could provide a route for this invasive insect to arrive and spread in the state (Fig. 7).

References

- 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. <https://doi.org/10.2737/SRS-GTR-80>.
- Gormanson, D.D.; Pugh, S.A.; Barnett, [et al.]. 2018. **Statistics and quality assurance for the Northern Research Station Forest Inventory and Analysis Program**. Gen. Tech. Rep. NRS-178. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 25 p. <https://doi.org/10.2737/NRS-GTR-178>.
- O'Connell, B.M.; Conkling, B.L.; Wilson, A.M. [et al.]. 2017. **The Forest Inventory and Analysis database: Database description and user guide version 7.0 for Phase 2**. Washington, DC: U.S. Dept. of Agriculture, Forest Service. 830 p. <http://www.fia.fs.fed.us/library/database-documentation/>.
- Pennsylvania Department of Agriculture. 2018. **Spotted lanternfly program information**. Harrisburg, PA: Pennsylvania Dept. of Agriculture. http://www.agriculture.pa.gov/Plants_Land_Water/PlantIndustry/Entomology/spotted_lanternfly/program-information/Pages/default.aspx (accessed July 2018).
- Pugh, C.V.; Johnson, C.B.; Toolan, M.; Setliff, G. 2016. **Suitability of twenty North America tree species as secondary hosts of the invasive spotted lanternfly, *Lycorma delicatula* (White) (Hemiptera: Fulgoridae)**. Internat'l Congress of Entomology. [poster session]. <https://doi.org/10.1603/JCE.2016.114879>.
- U.S. Department of Agriculture. 2018. **2017 state agriculture overview**. Washington, DC: U.S. Department of Agriculture, National Agricultural Statistics Service. https://www.nass.usda.gov/Quick_Stats/Ag_Overview/stateOverview.php?state=OHIO (accessed July 2018).



How to Cite This Publication

Albright, Thomas A. 2018. **Forests of Ohio, 2017**. Resource Update FS-171. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 4 p. <https://doi.org/10.2737/FS-RU-171>.

Contact Information

Thomas A. Albright, Forester
 USDA Forest Service, Northern Research Station
 Ph: 412-523-0103
talbright@fs.fed.us
 Northern FIA: <http://nrs.fs.fed.us/fia/>
 National FIA: <http://fia.fs.fed.us>

USDA is an equal opportunity provider and employer

The published report is available online at <http://doi.org/10.2737/FS-RU-171>