USDA
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RESOURCE UPDATE FS-97

Forests of Ohio, 2015

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 footnotes 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 2015 inventory, estimates for current variables such as area, volume, and biomass are based on 4,145 (1,664 forested) plot samples collected from 2009 to 2015. Change variables such as net growth, removals, and mortality are based on 4,160 samples collected from 2005 to 2009 and remeasured from 2009 to 2015. 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 2010, there has been a small increase in forest land. Ninety-six percent of Ohio's forest land, or 7.7 million acres, is classified as timberland. Three percent is in public reserve status (281,000 acres), where the commercial harvesting of trees is restricted by law or public policy. All reserved forest land is in public ownerships. Less than 1 percent is other forest land (62,000 acres). Other forest land consists of forest land with low productivity. 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 timberland averaged 1.2 percent of the current inventory volume.

Table 1.—Ohio forest statistics, 2015 and 2010. Volumes are for trees 5-inch diameter and larger. Numbers of trees and biomass are for trees 1 inch diameter and larger. Sampling errors reported represent 68 percent confidence intervals.

	2015 Estimate	Sampling error (percent)	2010 Estimate	Sampling error (percent)	Change since 2010 (percent)
Forest Land					
Area (thousand acres)	8,077	1.0	8,059	1.0	0.2
Number of live trees (million trees)	4,049	2.1	4,155	2.1	-2.5
Aboveground biomass of live trees (thousand oven-dry tons)	487,043	1.6	472,245	1.6	3.1
Net volume of live trees (million ft^3)	16,734	1.7	16,251	1.7	3.0
Annual net growth of live trees (thousand ft^3/yr)	417,955	4.5	496,038	4.3	-15.7
Annual mortality of live trees (thousand ft^3/yr)	212,394	5.5	176,495	6.0	20.3
Annual harvest removals of live trees (thousand ft^3/yr)	222,517	10.9	202,956	10.8	9.6
Annual other removals of live trees (thousand ft^3/yr)	17,755	30.9	9,919	39.6	79.0
Timberland					
Area (thousand acres)	7,734	1.1	7,757	1.1	-0.3
Number of live trees (million trees)	3,892	2.2	4,038	2.2	-3.6
Aboveground biomass of live trees (thousand oven-dry tons)	464,799	1.7	454,269	1.7	2.3
Net volume of live trees (million ft^3)	15,965	1.8	15,636	1.8	2.1
Net volume of growing-stock trees (million ft^3)	13,676	2.0	13,754	2.0	-0.6
Annual net growth of growing-stock (thousand ft^3/yr)	318,826	3.9	378,909	3.7	-15.9
Annual mortality of growing-stock trees (thousand ft^3/yr)	136,363	6.2	113,177	6.7	20.5
Annual harvest removals of growing-stock trees (thousand ft^3/yr)	182,428	11.3	167,118	11.0	9.2
Annual other removals of growing-stock trees (thousand ft^3/yr)	33,189	24.6	15,996	41.9	107.5

Forest Area

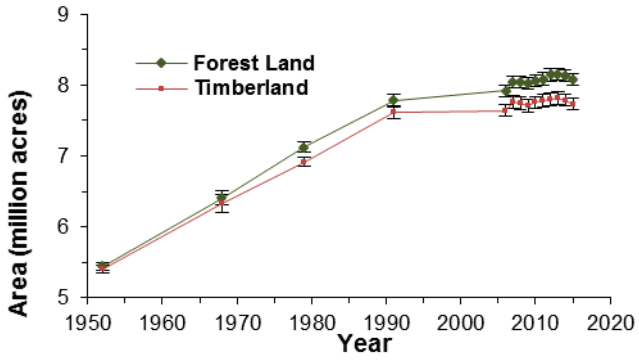

Figure 1.—Area of forest land and timberland by year, Ohio. Error bars shown in figures of this report represent 68 percent confidence intervals around the mean.

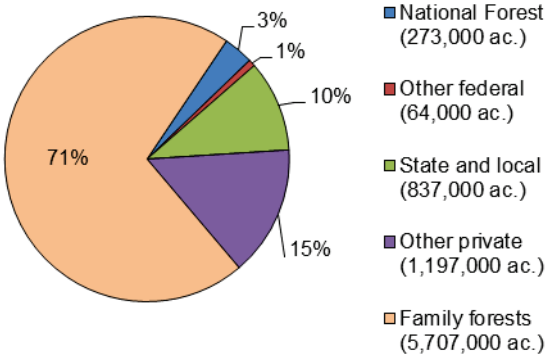

Figure 2.—Area of forest land ownership, Ohio, 2015.

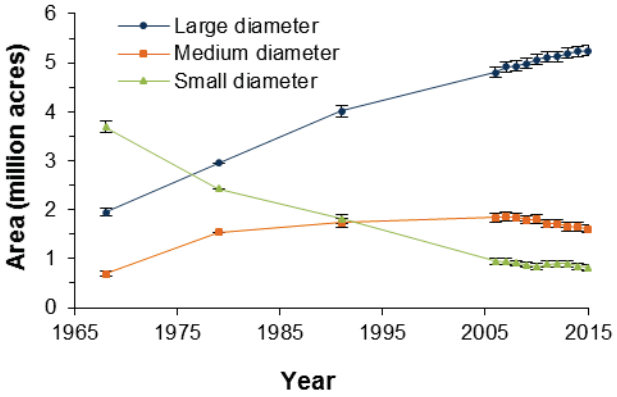

Figure 3.—Area of timberland by stand-size class and inventory year, Ohio.

Up until 2013, successive inventories have shown an upward trend in forest land area, although increases since 1991 show a slowing in this trend. The 2014 and 2015 inventories show slight decreases 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. Recent data indicates that the area of forest land in Ohio is likely 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-five percent of Ohio's forests are privately owned (6.9 million acres; Fig. 2). Private owners are a diverse group of families and individuals, corporations, and other private entities. The remaining 15 percent (1.2 million acres) is in public ownership. The largest public owner is the State, with 521,000 acres, followed by the Wayne National Forest with 273,000 acres of forest.

Ohio's forests have been maturing as shown in the distribution of timberland by stand-size classes[2] (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 68 percent of timberland whereas the area in small diameter stands is 11 percent.

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

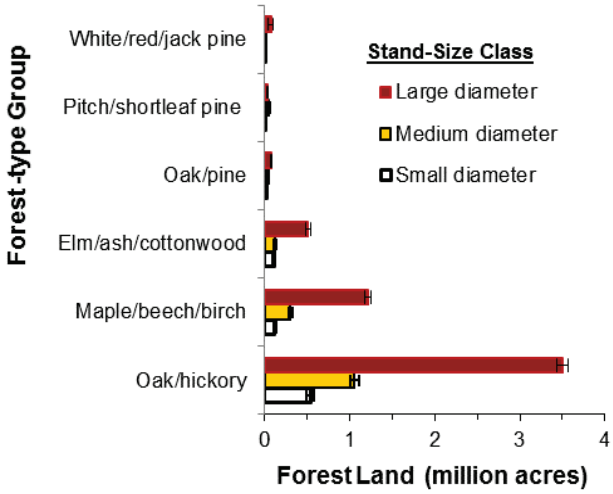

Figure 4.— Area of forest land by stand-size class (based on small, medium, and large trees) for the top six forest-type groups ranked by acres, Ohio, 2015.

Volume, Biomass, and Trends

Since 2010, the net volume of trees on forest land increased by 3.0 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 2010 differed between species. Red maple, yellow-poplar and sugar maple increased by 5.8, 7.6, and 10.7 percent, respectively. White ash, white oak, and beech decreased in volume 10.0, 5.8, and 3.2 percent, respectively.

Sawtimber volume on timberland increased by 2.0 percent to 51.2 billion board feet. Yellow-poplar is the leading species by sawtimber volume, followed by red maple, sugar maple, northern red oak, and white oak. Since 2010, many species decreased in sawtimber volume. White ash, white oak, beech, black oak, and black cherry decreased by 16.0, 6.8, 6.5, 1.9, and 1.5 percent, respectively.

Aboveground biomass of live trees on forest land totaled 487 million dry tons. This was a 3.1 percent increase since 2010. 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 2010, and yellow-poplar, black cherry, and white oak, had the largest removals (Fig. 5). Total annual growth outpaced total removals by a ratio of 1.6:1.

As a portion of the current inventory, gross growth was 3.8 percent; mortality, 1.2 percent; net growth, 2.6 percent; and removals, 1.6 percent. These result in an average annual net increase in total volume of 0.9 percent on timberland. In recent years increased mortality has lowered annual increases in volume. Since 2010, the mortality rate has increased by 20 percent. Increased mortality of ash due to the spread of emerald ash borer is the leading cause for this increase. The annual mortality rate for ash increased from 1.7 percent in 2010 to 5.0 percent in 2015.

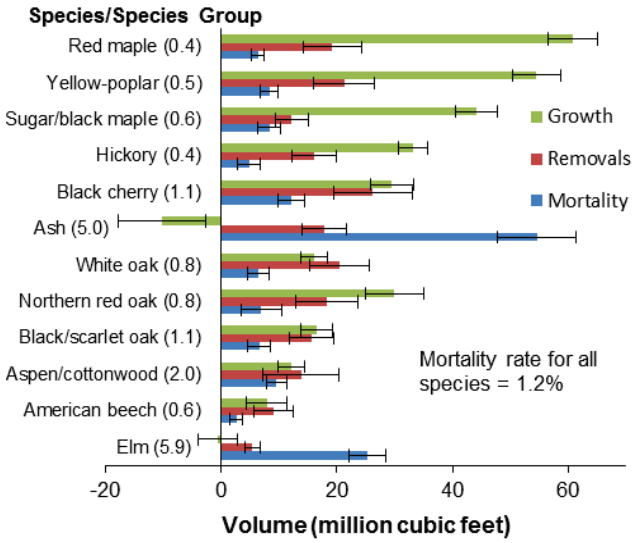

Figure 5.—Average annual net growth, removals, and mortality of net sound volume on timberland, and mortality rate expressed as a percentage of total volume (%), Ohio, 2015.

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, 2015.

Species	Volume of live trees on forest land (million ft^3)	Sampling error (pecent)	Percent change since 2010	Volume of sawtimber trees on timberland (million bdft)	Sampling error (percent)	Percent change since 2010	Aboveground biomass on forest land (million tons)	Sampling error (percent)
Red maple	1,756	5.4	5.8	4,187	7.6	6.2	49	5.1
Yellow-poplar	1,699	7	7.6	6,782	8.5	9.6	36	6.8
Sugar maple	1,515	5.4	10.7	3,963	7.2	7.6	51	5.1
Black cherry	1,168	5.8	1.7	2,710	8.8	-1.5	31	5.6
Northern red oak	943	8	8.1	3,886	9.5	9.4	30	7.8
White oak	899	6.8	-5.8	3,566	7.8	-6.8	29	6.8
White ash	876	6.6	-10.0	2,497	9.3	-16.0	27	6.3
Shagbark hickory	573	7.7	14.8	1,734	9.6	17.1	20	7.6
American beech	506	9.9	-3.2	1,698	13.8	-6.5	16	9.5
Black oak	488	10.2	1.2	1,834	12.5	-1.9	15	10.0
Softwood species	612	11.3	2.2	1,864	14.3	4.2	12	11.2
Other hardwoods	5,699	2.9	1.9	16,510	4.4	1.0	169	2.8
All Species	16,734	1.7	3.0	51,231	2.5	2.0	487	1.6

Most Cut Stands Retain Large Volumes of Wood

Cutting activity in Ohio's forests impacts the composition, structure, and health of the future forest. Cutting activity is defined as a stand treatment that covers an acre or more, but excludes stands with occasional stumps of unknown origin or sparse removals for firewood. Cutting was observed on 501,000 acres of timberland in Ohio during the latest measurement period. This was an average of 99,000 acres per year receiving treatment, equal to 1.2 percent of the State's timberland. Where cutting was observed in stands that were previously classified as sawtimber size[2], an average volume of 2,206 ft^3 per acre of net live volume was retained. This compares to 2,633 ft^3 per acre for sawtimber-size stands where no cutting was observed. In sawtimber-size stands with observed cutting, an average of 370 ft^3 per acre was removed, with 73 percent of this volume coming from trees that were in diameter classes 16 inches and larger. In the majority of stands where cutting was observed (60 percent), the stand-size class remained the same as previously measured, and in 23 percent the stand size was reduced to the sapling/seedling/nonstocked class (Table 3). Additionally, 76 percent of cut stands retained at least a medium level of live-tree stocking. In cut stands, 73 percent of growth occurred on previously measured trees (accretion) and 27 percent was on ingrowth (new trees that reach the 5-inch threshold for volume measurement). This means that on average, cutting activity appears to be a level comparable to a thinning rather than a stand-initiation harvest.

To summarize, most harvests were light, stands retained a large volume of residual trees, and cutting infrequently reduced stand to an early succession stage of development Although some early successional stands were created by cutting, this was probably not enough to reverse the steady loss in young stands and increases in sawtimber-size stands due to maturing shown in Figure 3. These light harvests influence future species composition, and wildlife habitat. Future growth will continue to be dominated by accretion of residual trees filling canopy gaps, rather than on the ingrowth of new trees. Regeneration will favor more shade-tolerant species at the expense of shade intolerant species. This places increased importance on practicing good forest management that will retain quality trees for the future, as most growth is occurring on trees left behind after harvesting with little ingrowth of new trees.

Table 3.—Area of timberland with observed cutting activity by current and previous stand-size class, Ohio, 2015. Average years between previous and current measurements was 5.1 years.

		Current Stand-size Class			
		Sawtimber	Poletimber	Sapling/Seedling/ Nonstocked	Total
		Area (thousands of acres of timberland)			
Previous Stand-size Class	Sawtimber	253	50	99	401
	Poletimber	33	50	15	97
	Sapling/Seedling/ Nonstocked	0	0	2	2
	Total	286	99	115	501

[1]One-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.

[2] Small diameter stands (sapling/seedling): 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 (saw timber): ≥ 9.0 inches for softwoods and 11.0 d.b.h. for hardwoods.

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