



Forests of Wisconsin, 2016

This resource update provides an overview of forest resources in Wisconsin based on an inventory conducted by the U.S. Forest Service, Forest Inventory and Analysis (FIA) program at the Northern Research Station in cooperation with the Wisconsin Department of Natural Resources (WDNR). Data estimates are based on field data collected using the FIA annualized sample design and are updated yearly. The estimates presented in this update are for the measurement year 2016. For annual inventory years in Wisconsin 2001-2013, the cycle length was equal to 5 years; beginning in 2014, the cycle length was changed to 7 years with 1/7 (14.3 percent) of the plots measured annually. This report includes inventory years 2011-2016 (2016) with comparisons made to 2007-2011 (2011). The current data was collected from 6,417 forested field plots.

Overview

Wisconsin is home to 17.1 million acres of forest land. Forested area has increased by about 0.4 percent (75,000 acres) since 2011 (Table 1). The number of live trees on Wisconsin's forest land in 2016 was estimated at 11.5 billion trees, an increase of 3.0 percent from 2011. Live tree net volume and aboveground biomass increased by 5.9 and 5.4 percent, respectively. Average annual net growth and average annual mortality increased by 9.0 and 5.4 percent, respectively, since 2011. Harvest removals increased 1.1 percent, though it is important to note that this change is within the sampling error (Table 1). Similar trends were observed on Wisconsin's timberlands (Table 1).

Table 1.—Wisconsin forest statistics, change between 2011 and 2016

	2016 Estimate	Sampling error (percent)	2011 Estimate	Sampling error (percent)	Change since 2011
Forest Land					
Area (thousand acres)	17,055.1	0.4	16,980.1	0.5	0.4
Number of live trees ≥1 inch diameter (million trees)	11,460.6	1.1	11,125.1	1.1	3.0
Net volume in live trees ≥5 inch diameter (million ft ³)	25,546.7	0.9	24,130.5	0.9	5.9
Live tree (≥1 in. diameter) aboveground biomass (million oven-dry tons)	658.9	0.8	624.9	0.8	5.4
Annual net growth live trees ≥5 in. diameter (million ft ³ /yr)	674.9	1.7	619.2	2.0	9.0
Annual harvest removals of live trees ≥5 inches diameter (million ft ³ /yr)	339.4	4.6	335.6	4.7	1.1
Annual mortality of live trees ≥5 inches diameter (million ft ³ /yr)	312.6	2.4	296.4	2.3	5.4
Timberland					
Area (thousand acres)	16,529.9	0.5	16,462.3	0.5	0.4
Number of live trees ≥1 inch diameter (million trees)	11,129.2	1.1	10,806.0	1.2	3.0
Live tree (≥1 inch diameter) aboveground biomass (million oven-dry tons)	638.9	0.8	605.9	0.9	5.4
Net volume live trees ≥5 inch diameter (million ft ³)	24,753.9	0.9	23,377.6	1.0	5.9
Net volume of growing growing-stock trees (million ft ³)	21,905.8	1.0	20,999.7	1.0	4.3
Annual net growth of growing-stock trees (million ft ³ /yr)	574.6	1.7	539.8	2.0	6.4
Annual harvest removals of growing-stock trees (million ft ³ /yr)	291.9	4.8	293.7	4.9	-0.6
Annual mortality of growing-stock trees (million ft ³ /yr)	233.1	2.6	226.3	2.5	3.0



Forest Area

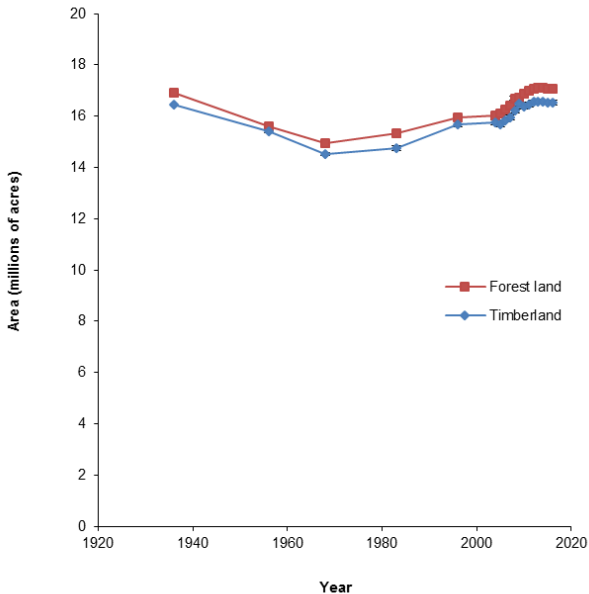


Figure 1.—Area of forest land and timberland by year, Wisconsin. Error bars represent one standard error, the 68 percent confidence interval.

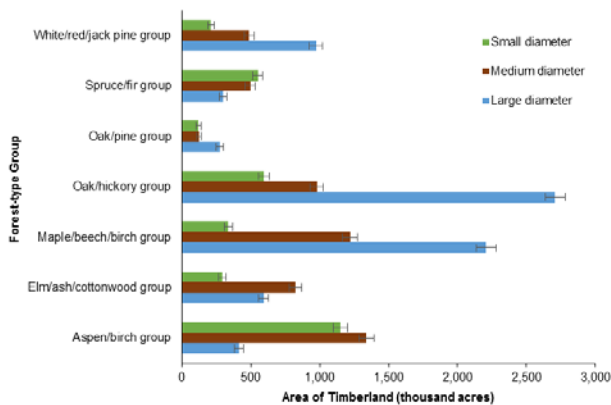
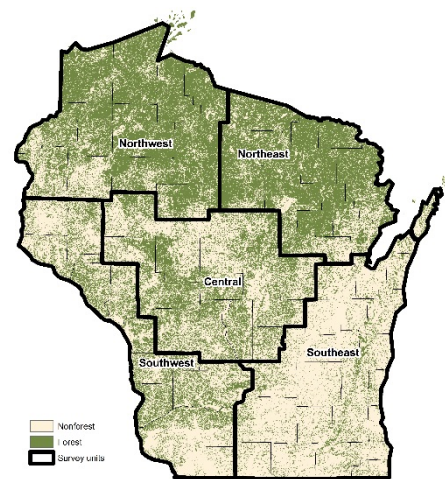


Figure 2.—Area of timberland by forest-type group and stand-size class, Wisconsin 2016. Error bars represent one standard error, the 68 percent confidence interval.

The total area of Wisconsin's forest land and timberland has remained relatively stable, with modest increases over the last decade (Fig. 1).

Across Wisconsin's timberland, some forest-type groups are much more common than others. The oak/hickory forest-type group is the single most common forest-type group (4.3 million acres of timberland) and it is found primarily in the large stand-size class. The maple/beech/birch forest-type group is slightly less common (3.8 million acres) and it is similarly distributed across stand-size classes (Fig. 2). The aspen/birch forest-type group is also abundant (2.9 million acres), but it occurs largely in medium and small stand-size classes.

Wisconsin's 17.1 million acres of forest land area are divided into five survey units (Fig. 3). Of the FIA survey units, the highest percentage of forest occurs in the Northeastern Unit where 74.5 percent of the region is forest. The Southeast Unit has the lowest percentage of forested area at 16.3 percent. The southern part of the State represents areas with more agriculture and development.



Data source: National Land Cover Database 2006; C10 Data and Access 9.5

Figure 3.—Forest area by FIA survey unit, Wisconsin.

Volume Trends on Forest Land and Timberland

As an annual inventory, the data collected by FIA offer the chance to document and evaluate forest trends.

Looking at live-tree volume of the State's most common trees on forest land, eastern white pine (*Pinus strobus*) had the greatest increase in volume between 2011 and 2016 (Table 2; 17.3 percent). Northern red oak (*Quercus rubra*) and red pine (*Pinus resinosa*) also underwent double digit gains. Overall Wisconsin's live tree volume increased to 25.5 billion cubic feet, a 5.9 percent gain since 2011.

Of the 10 most common trees in Wisconsin, the patterns in sawtimber volume are slightly different. Eastern white pine still posted the largest gain since 2011, but the second biggest gain was made by red maple (*Acer rubrum*). Five different species in the top 10 had double digit increases in sawtimber volume. By contrast, quaking aspen (*Populus tremuloides*) actually underwent a decline in total sawtimber volume of 0.7 percent, though this change was within the sampling error. Overall Wisconsin's sawtimber volume increased to 62.8 billion board feet, an 8.6 percent gain since 2011.



Eastern white pine and red pine growing among a mix of hardwoods. Both of these pine species underwent double digit increases in volume on forest land and timberland in 2016. Photo by Chris Kurtz, used with permission.

Table 2.—Top tree species by statewide volume estimates for forest land and timberland, Wisconsin, 2016.

Species	Volume of live trees on forest land (million ft ³)	Sampling error (%)	Change since 2011	Sawtimber volume on timberland (million bd ft)	Sampling error (%)	Change since 2011	Previous live tree volume on forest land (million ft ³)	Previous sawtimber volume on timberland (million bd ft)
Sugar maple	2,742.4	3.2	4.9	6,579.4	4.3	8.7	2,615.1	6,051.5
Red maple	2,679.3	2.6	7.0	5,102.5	4.0	15.1	2,504.3	4,432.0
Northern red oak	2,140.8	3.9	11.1	8,054.7	4.5	14.3	1,926.6	7,045.9
Eastern white pine	1,954.3	5.3	17.3	8,864.4	6.0	17.5	1,666.8	7,541.4
Quaking aspen	1,803.7	3.2	0.9	3,181.4	4.9	-0.7	1,787.6	3,202.5
Red pine	1,798.6	5.0	10.1	7,093.7	5.7	10.5	1,633.6	6,419.5
American basswood	1,292.4	3.9	3.7	3,972.2	4.7	6.6	1,245.8	3,725.9
Northern white-cedar	902.4	6.4	7.4	2,401.3	7.6	11.1	840.6	2,162.3
White oak	873.0	4.8	3.8	2,604.1	5.9	2.3	840.7	2,545.4
Black ash	685.1	4.9	6.2	909.8	7.9	5.8	645.0	859.6
Other softwoods	2,171.8	2.9	3.3	5,361.4	4.4	2.9	2,103.1	5,209.7
Other hardwoods	6,502.8	1.7	2.9	14,048.6	2.6	3.3	6,231.4	13,602.9
Total	25,546.7	0.9	5.9	68,173.6	1.5	8.6	24,130.5	62,798.7

Changing Abundance of Eastern White Pine

Eastern white pine, which was previously a significant component of northern forests, is making a comeback due to planting and changes in management. Over the last 30 years, eastern white pine volume has increased substantially. In the past 5 years, white pine volume has increased 17.3 percent on forest land between 2011 and 2016 years (Table 2). Looking at the changes in white pine on timberland since 1983, there has been a 212 percent increase in net volume of white pine 5 inches diameter and greater and a 232 percent increase in sawtimber volume on timberland. Given these trends, there is some concern with respect to the increasing volume of white pine, especially in the largest size classes which are considered by many mills in Wisconsin to be difficult to utilize.

While the FIA data cannot predict the future, it does offer some clues. Data show that eastern white pine volume has increased across all diameter classes and trends upwards for the last 30 years (Fig. 4). Additionally the mortality and removal rate for eastern white pine is lower than most other species in the state. In 2016, the removal rate for all species is about 2.2 times greater and the annual mortality to growth rate is about 4.3 times greater in comparison to white pine. Taken together, these data suggest that the volume of white pine is increasing and will continue to grow in the coming years. This means, by looking at growth, removal, and mortality trends, that white pine will likely increase in species rank in the near future. These data support the concerns expressed and a more detailed analysis should be undertaken to elucidate the trend more clearly.

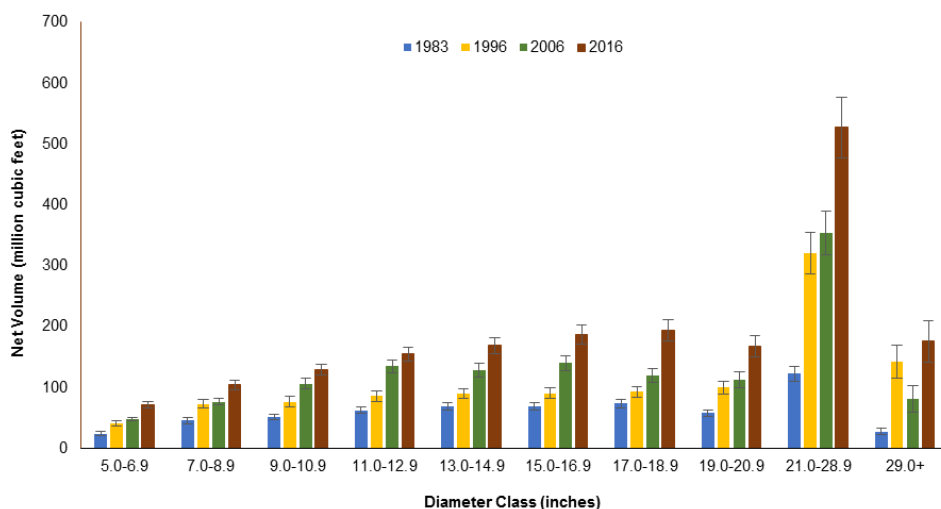


Figure 4.—Volume of eastern white pine on timberland by diameter class and inventory year, Wisconsin. Error bars represent one standard error, the 68 percent confidence interval.

Additional Inventory Resources

Hansen, M.H.; Perry, C.H.; Brand, G.; McRoberts, R.E. 2008. **Wisconsin's forest, 2004: statistics and quality assurance**. Resour. Bull. NRS-24. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 98 p.

Perry, C.H.; Everson, V.A.; Brown, I.K.; Cummings-Carlson, J.; Dahir, S.E. [et al.]. 2008. **Wisconsin's forests, 2004**. Resour. Bull. NRS-23. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 104 p.

Perry, C.H.; Everson, V.A.; Butler, B.J.; Crocker, S.J.; Dahir, S.E. [et al.]. 2012. **Wisconsin's Forests 2009**. Resour. Bull. NRS-67. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 62 p. [includes DVD].

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