USDA
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RESOURCE UPDATE FS-43

# Forests of Wisconsin, 2014

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 2014. 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. The sample plot population for Wisconsin in 2014 consists of 12,141 plots using the annualized sampling and estimation procedures, collected across a period of 6 years (part of 2009, plus all of 2010-2014). Growth, removals, and mortality estimates are based on 6 years of data from 11,588 resampled plots. The data used in this publication were accessed from the FIA's national information management system in January and February, 2015.

## Overview

Wisconsin is home to 17.1 million acres of forest land. Forested area has increased by about 2.1 percent (349,000 acres) since 2009 (Table 1). The number of live trees on Wisconsin's forest land in 2014 was estimated at 11.4 billion trees, an increase of 4.2 percent from 2009. Net volume experienced an increase of about 6.9 percent. Average annual net growth and average annual mortality increased by 12.8 and 8.6 percent, respectively, since 2009, but average annual harvest removals changed by only 0.1 percent (Table 1). Similar trends were observed on Wisconsin's timberlands (Table 1).

**Table 1.—Wisconsin forest statistics, change between 2009 and 2014**

| | 2009 Estimate | Sampling error (percent) | 2014 Estimate | Sampling error (percent) | Change since 2009 |
|---|---|---|---|---|---|
| **Forest Land** | | | | | |
| Area (thousand acres) | 16,743.1 | 0.5 | 17,092.1 | 0.4 | 2.1 |
| Number of live trees ≥1 in. diameter (million trees) | 10,966.3 | 1.1 | 11,428.4 | 1.1 | 4.2 |
| Net volume in live trees ≥5 in. diameter (million cubic feet) | 23,481.4 | 0.9 | 25,111.1 | 0.9 | 6.9 |
| Live tree (≥1 in. diameter) aboveground biomass (thousand oven-dry tons) | 609,425.6 | 0.8 | 649,059.7 | 0.8 | 6.5 |
| Annual net growth live trees ≥5 in. diameter (million $ft^3$/yr) | 598.3 | 1.9 | 674.9 | 1.9 | 12.8 |
| Annual harvest removals of live trees ≥5 in. diameter (million $ft^3$/yr) | 344.9 | 4.7 | 345.3 | 4.6 | 0.1 |
| Annual mortality of live trees ≥5 in. diameter (million $ft^3$/yr) | 284.6 | 2.4 | 309.1 | 2.3 | 8.6 |
| **Timberland** | | | | | |
| Area (thousand acres) | 16,236.9 | 0.5 | 16,559.2 | 0.5 | 2.0 |
| Number of live trees ≥1 in. diameter (million trees) | 10,651.2 | 1.1 | 11,089.7 | 1.1 | 4.1 |
| Net volume live trees ≥5 in. diameter (million cubic feet) | 22,770.5 | 1.0 | 24,343.2 | 0.9 | 6.9 |
| Live tree (≥1 in. diameter) aboveground biomass (thousand oven-dry tons) | 591,355.0 | 0.9 | 629,632.3 | 0.8 | 6.5 |
| Net growth of growing-stock trees (million $ft^3$/yr) | 542.2 | 1.9 | 575.8 | 1.9 | 6.2 |
| Annual harvest removals of growing-stock trees (million $ft^3$/yr) | 295.3 | 4.9 | 300.5 | 4.8 | 1.8 |
| Annual mortality of growing-stock trees (million $ft^3$/yr) | 207.9 | 2.6 | 233.0 | 2.5 | 12.1 |

# Forest Area

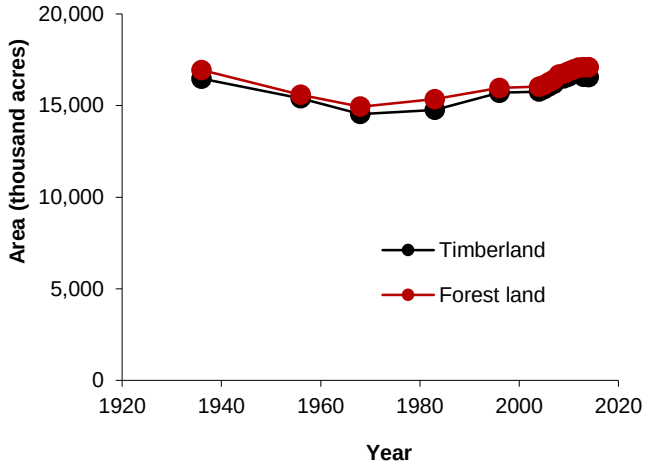


**Figure 1.—Area of forest land and timberland by year, Wisconsin.**

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

Some forest-type groups are much more common than others. Oak/hickory is the single most common forest-type group (4.4 million acres) and it is found primarily in the large stand-size class (Fig. 2). The maple/beech/birch forest-type group is slightly less common (3.9 million acres) and it is similarly distributed across stand-size classes (Fig. 2). The aspen/birch forest-type group is also abundant (3.0 million acres), but it occurs largely in medium and small stand-size classes (Fig. 2).

Wisconsin is divided into five survey units (Fig. 3). Statewide, there are 17.1 million acres of forest land area with nearly 60 percent of all forest land found in the northern two survey units. There are 4.4 million acres of forest land in the northeastern unit and 5.7 million acres of forest land in the northwestern unit. Additional details on forest land ownership are discussed in this report's special issue found on page 4.

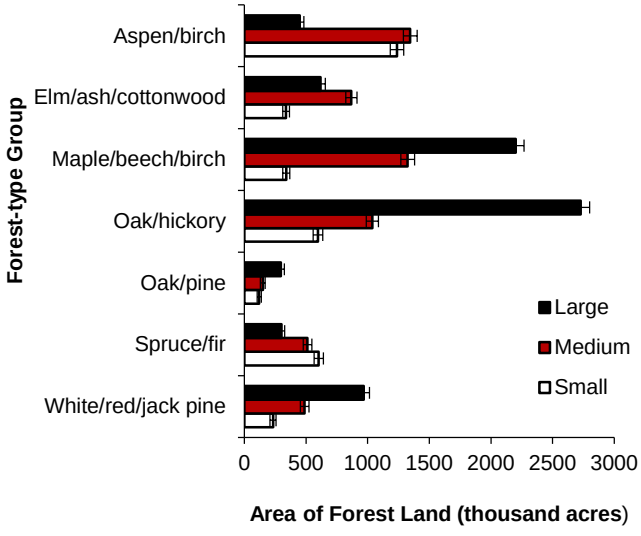


**Figure 2.—Area of forest land by forest-type group and stand-size class, Wisconsin, 2014. Error bars represent one standard error, the 68 percent confidence interval.**

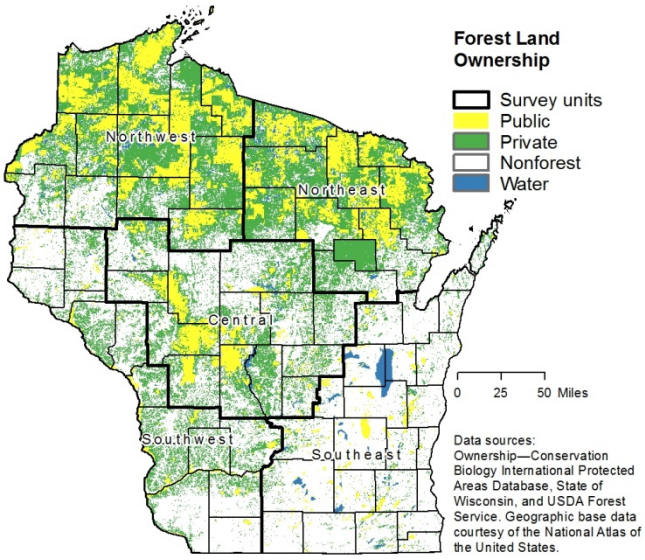


**Figure 3.—Distribution of public and private forest ownership in Wisconsin.**

## Volume, Biomass, and Trends

Crews recorded 85 species (including unknowns collected to the genus level) on Wisconsin forest land in the measurement years included in the 2014 dataset. Quaking aspen (*Populus tremuloides*) (Fig. 4) is by far the most numerous tree in Wisconsin with an estimated 1.6 billion individual trees (Table 2); red maple (*Acer rubrum*) is close behind with an estimated 1.3 billion trees in Wisconsin (Table 2).

Interestingly, the most numerous species, quaking aspen, is not the most voluminous species in the state. That distinction belongs to sugar maple (*Acer saccharum*) (Fig. 4) with a total volume of nearly 2.7 billion cubic feet. These sugar maples also store approximately 85 million tons of woody biomass in their tissues.

Of the top 10 most voluminous species, red maple, eastern white pine, and red pine are all growing vigorously with each accumulating nearly 80 million cubic feet per year (Table 2). Quaking aspen mortality dwarfs that of other major species in Wisconsin (Table 2). Several species are removed in harvests, but, of the top 10 species by volume, quaking aspen remains the most highly sought (Table 2).

**Figure 4.—Quaking aspens (left, *Populus tremuloides*) are the most numerous tree in Wisconsin. Sugar maples (right, *Acer saccharum*) have the most volume and biomass in Wisconsin's forests. Photos courtesy of Jason Sharman and Steven Katovich, bugwood.org**

**Table 2.—Number, volume, biomass, growth, mortality, and removals of live trees on forest land by species of the top 10 tree species by net volume, Wisconsin, 2010-2014.**

| Common Name | Latin Name | Million Trees[a] | Net Volume[b] (million ft³) | Aboveground Biomass[a] (thousand dry tons) | Average Annual Net Growth[b] (thousand ft³) | Average Annual Mortality[b] (thousand ft³) | Average Annual Harvest Removals[b] (thousand ft³) |
|---|---|---|---|---|---|---|---|
| Sugar maple | *Acer saccharum* | 884.2 | 2,709.3 | 85,188.9 | 60,465.7 | 10,806.2 | 30,391.7 |
| Red maple | *Acer rubrum* | 1,271.3 | 2,614.6 | 73,272.1 | 80,989.2 | 12,971.2 | 39,151.0 |
| Northern red oak | *Quercus rubra* | 226.3 | 2,067.7 | 61,855.6 | 58,997.0 | 11,372.2 | 21,556.1 |
| Eastern white pine | *Pinus strobus* | 358.4 | 1,837.3 | 31,323.4 | 79,088.0 | 6,131.2 | 12,529.9 |
| Quaking aspen | *Populus tremuloides* | 1,602.2 | 1,785.7 | 43,105.8 | 46,390.9 | 63,922.5 | 50,217.1 |
| Red pine | *Pinus resinosa* | 257.9 | 1,747.9 | 31,813.2 | 77,177.3 | 3,157.7 | 37,267.5 |
| American basswood | *Tilia americana* | 260.9 | 1,284.8 | 21,779.1 | 26,735.1 | 9,048.6 | 14,375.4 |
| Northern white-cedar | *Thuja occidentalis* | 249.1 | 888.8 | 13,849.4 | 18,427.7 | 2,677.4 | 2,428.9 |
| White oak | *Quercus alba* | 100.5 | 870.2 | 26,310.6 | 16,328.8 | 4,924.7 | 8,330.8 |
| Black ash | *Fraxinus nigra* | 467.1 | 684.5 | 20,053.0 | 15,615.7 | 5,553.2 | 2,285.9 |

[a] *Trees ≥ 1 inch diameter*
[b] *Trees ≥ 5 inch diameter*

# Impacts of Managed Forest Law on Harvest Levels

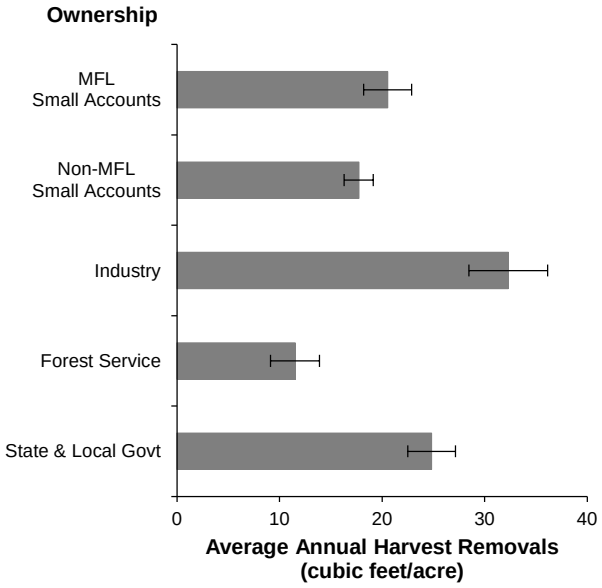


**Figure 5.—Harvest rates by ownership, Wisconsin, 2014. Error bars represent one standard error, the 68 percent confidence interval.**

The 2014 inventory estimate of statewide average annual harvest removals of live trees (at least 5 inches d.b.h.) on forest land staying forest land is 20.4 cubic feet per acre; looking just at private lands, the average remains 20.4 cubic feet per acre.

There are 11.94 million acres of privately owned forest land in Wisconsin with 3.28 million acres registered with the Managed Forest Law (MFL). Approximately 2.6 million acres of MFL lands are enrolled as "small accounts," and we assume WDNR's small accounts represent the same ownership category as FIA's individual or family ownerships.

WDNR collaborated with the Forest Service to estimate the impact of the Managed Forest Law without jeopardizing landowner privacy, comparing the harvest removal rates of those forest lands enrolled in MFL against other forest land ownerships. Harvest removals clearly differ by ownership, and the Managed Forest Law appears to affect harvest rates on small accounts (Fig. 5). A more detailed analysis is underway.

# 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].

**Wisconsin's forests are a critical part of the character and beauty of the state. Photo courtesy of Paul Bolstad, bugwood.org.**

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