



# State Forests of Wisconsin

## WisCFI update 2015

Division of Forestry

WI Department of Natural Resources 2015



This resource update provides an overview of forest resources on Wisconsin's state forests. The WisCFI generally follows the methodology and techniques of the USDA Forest Service, Northern Research Station's Forest Inventory and Analysis (NRS-FIA) program annual inventory system. In the WisCFI, approximately one-fifth of all field plots are measured each year. The entire inventory is completed every 5 years. The WisCFI reports and analyzes results using a moving 5-year average. For example, WisCFI generates inventory results for 2007 through 2011 and from 2011 through 2015. New acquisitions to state forest lands occur almost yearly. Therefore some of the increases in figures described below may be the result of an increasing land base.

### Overview

There are ten state forest properties in Wisconsin (Figure 1) covering almost 519,000 total acres with over 478,000 acres of forest land. There are about 340 million live trees and 693 million cubic feet of volume in live trees over 5 inches in diameter (Table 1). Annual net growth, removals and mortality have been remeasured for four of the five inventory years allowing for estimates of change variables such as growth, removals and mortality.

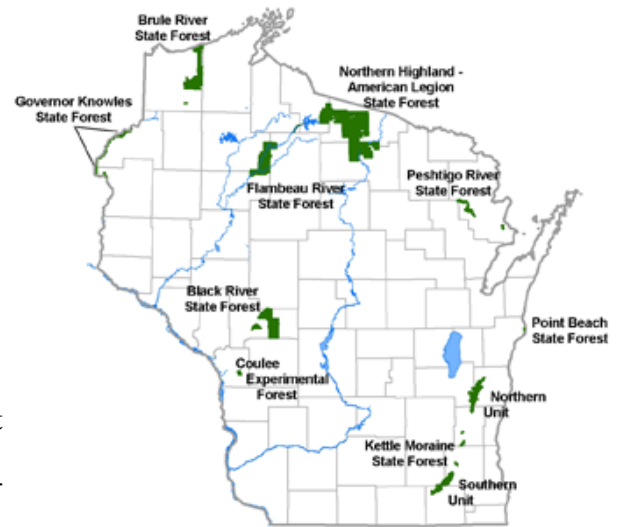


Figure 1. Map of state forest locations in Wisconsin.

Table 1. Acreage, number of trees, volume, removals and mortality in 2015 and 2011 on the forest land and timberland.

	2015 estimate	Sampling error <sup>1</sup>	2011 estimate	Sampling error <sup>1</sup>	Change 2011-2015	Significant change
<b>Forest land<sup>2</sup></b>						
Area (acres)	478,159	0.5%	466,824	0.5%	2.4%	Increase
Number live trees ≥1 inch diameter (million trees)	339.5	1.7%	321.8	1.8%	5.5%	Increase
Net volume live trees ≥5 inch diameter (million (ft <sup>3</sup> /yr))	692.9	1.7%	623.2	1.7%	11.2%	Increase
Annual net growth of live trees ≥5 inch dbh (ft <sup>3</sup> /yr)	13,353,592	2.5%				
Annual harvest removals of live trees ≥5 inch dbh (ft <sup>3</sup> /yr)	4,575,185	8.5%				
Annual mortality of live trees ≥5 inch dbh (ft <sup>3</sup> /yr)	2,785,454	6.0%				
<b>Timberland<sup>3</sup></b>						
Area (acres)	465,479	0.6%	454,969	0.6%	2.3%	Increase
Number live trees ≥1 inch diameter (million trees)	331.8	1.8%	314.7	1.8%	5.4%	Increase
Net volume live trees ≥5 inch diameter (million ft <sup>3</sup> )	686.2	1.7%	615.5	1.7%	11.5%	Increase
Annual net growth of live trees ≥5 inch dbh (ft <sup>3</sup> /yr)	13,471,125	2.6%				
Annual harvest removals of live trees ≥5 inch dbh (ft <sup>3</sup> /yr)	4,561,611	8.6%				
Annual mortality of live trees ≥5 inch dbh (ft <sup>3</sup> /yr)	2,751,217	6.3%				

<sup>1</sup> Sampling error is based on one standard error, that is, the chances are two in three that the results would have been within the limits indicated had a 100-percent inventory been conducted using these methods.

<sup>2</sup> Forest land - land that is at least 10 percent stocked by trees of any size or formerly having had such tree cover and not currently developed for nonforest use. Forest land must be at least 1 acre in size and 120 feet wide.

<sup>3</sup> Timberland - unreserved forest land that meets the minimum productivity requirement of 20 cubic feet per acre per year at its peak.

## Overview cont.

For instance, average annual net growth of live trees totaled over 13.3 million ft<sup>3</sup> per year from 2007-2011 to 2012-2015. The ratio of growth to volume is 1.9% on state forests compared to 2.9% on forest land statewide. Harvest removals averaged 4.6 million ft<sup>3</sup> per year in this period. The ratio of growth to removals was 2.9 on the state forests compared to 2.0 statewide. Growth and removals are lower on the state forests compared to the rest of the state. Average annual mortality was 2.9 million ft<sup>3</sup> on state forest land. The ratio of mortality to volume was 0.4% on the state forests compared to 1.3% statewide indicating that mortality per unit of volume is lower on state forests.



## Forest Area

The total area of state forest timberland in 2015 was 465,479 acres. New acquisitions to state forest lands occur almost yearly. Therefore some of the increases in figures described below may be the result of an increasing land base. All of the state forests with the exception of the Coulee Experimental Forest and the Peshtigo River State Forest, experienced increases in timberland acreage. The largest increase, 5,300 acres, was in the white / red / jack pine forest type group.

White / red / jack pine and aspen forest type each account for slightly over 20% of total timberland area on state forests (Figure 2, left). This is a much higher percentage than in the rest of the state where the pine type makes up only 10% of timberland. Oak / hickory which accounts for 26% of statewide forest land, makes up only 14% of state forest acreage.

State forest stands, like forest land statewide, are aging (Figure 2, right). Between 2011 and 2015, there was a significant increase in acreage in stands over 80 years old with a 22% increase in stands over 100. This increase was mainly in the maple / beech / birch and oak / hickory types. Area in young stands remained unchanged.



**Figure 2.** *Left:* Timberland acres by forest type group and inventory year (forest typing was not complete in 2011 so 2012 is reported). *Right:* Timberland acres by stand age class and inventory year. Error bars represent the 68% confidence interval.

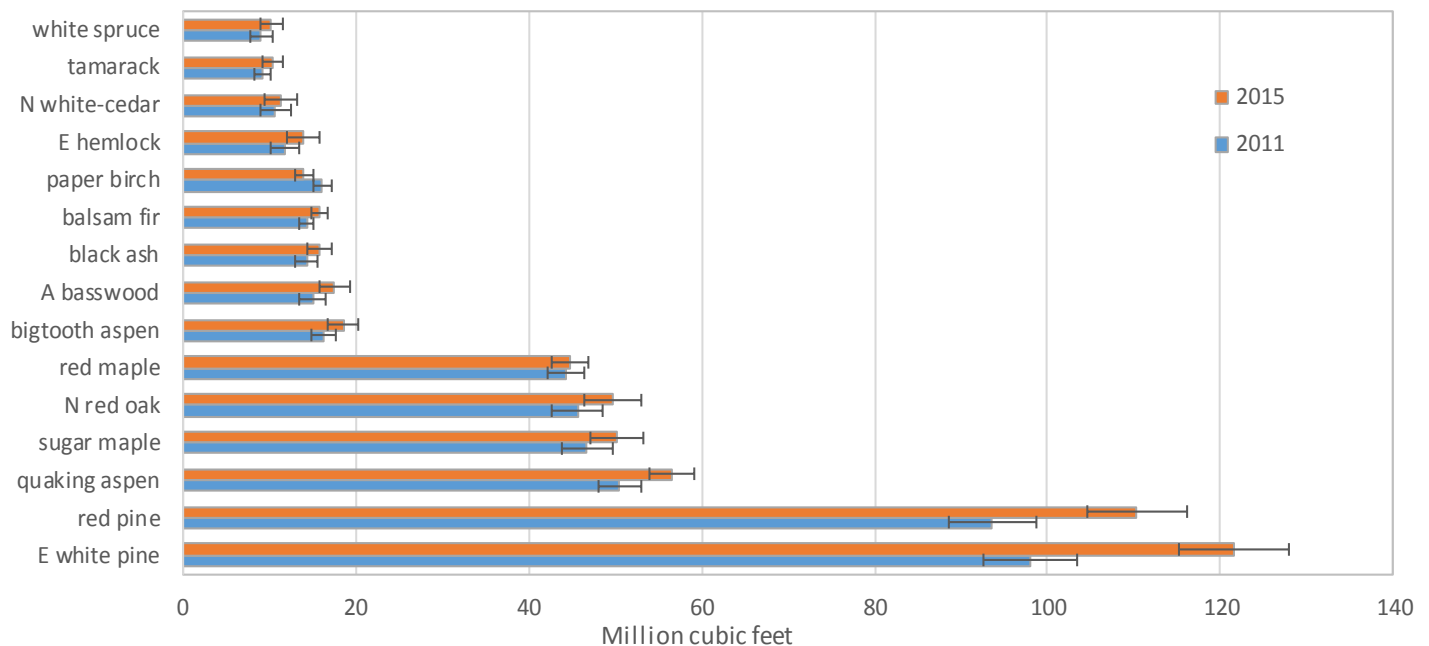
## Volume Trends on Timberland

Total growing stock volume on the state forests was 635 million cubic feet in 2015, a significant increase from 2011 (Table 2). Six species account for 2/3 of this volume: eastern white pine, red pine, quaking aspen, sugar maple, northern red oak and red maple (Figure 3). These are some of the most productive species in Wisconsin accounting for 62% of timber product output. The growing stock volume of eastern white pine, red pine and quaking aspen has increased significantly since 2011.

Quaking aspen, a species in decline elsewhere in the state is increasing in volume on the state forests. Part of this increase may be due to forest land acquisition.

**Table 2.** Volume and change in volume of the most common growing stock trees and sawtimber on timberland, 2011 to 2015.

Species	Growing stock volume on timberland (million ft <sup>3</sup> )		Change since 2011	Significant change	Volume of sawtimber on timberland (million bdf)		Change since 2011	Significant change
	2015	2011			2015	2011		
Eastern white pine	121.6	98	24%	Increase	600.2	476.5	26%	Increase
Red pine	110.3	93.6	18%	Increase	525.9	437.4	20%	Increase
Quaking aspen	56.6	50.5	12%	Increase	67.7	57.2	18%	
Sugar maple	50.3	46.8	7%		153.1	135.6	13%	
Northern red oak	49.8	45.7	9%		200.9	180.4	11%	
Red maple	44.8	44.3	1%		84.1	76.1	10%	
Bigtooth aspen	18.6	16.2	15%		34.8	33.9	3%	
American basswood	17.5	15.1	16%		62.4	51.9	20%	
Other softwoods	81.3	73.3	11%		217.3	186.1	17%	
Other hardwoods	84.6	83.6	1%		237	228.6	4%	
<b>Total</b>	<b>635.3</b>	<b>567.1</b>	<b>12%</b>	<b>Increase</b>	<b>2,183.50</b>	<b>1,863.80</b>	<b>17%</b>	<b>Increase</b>

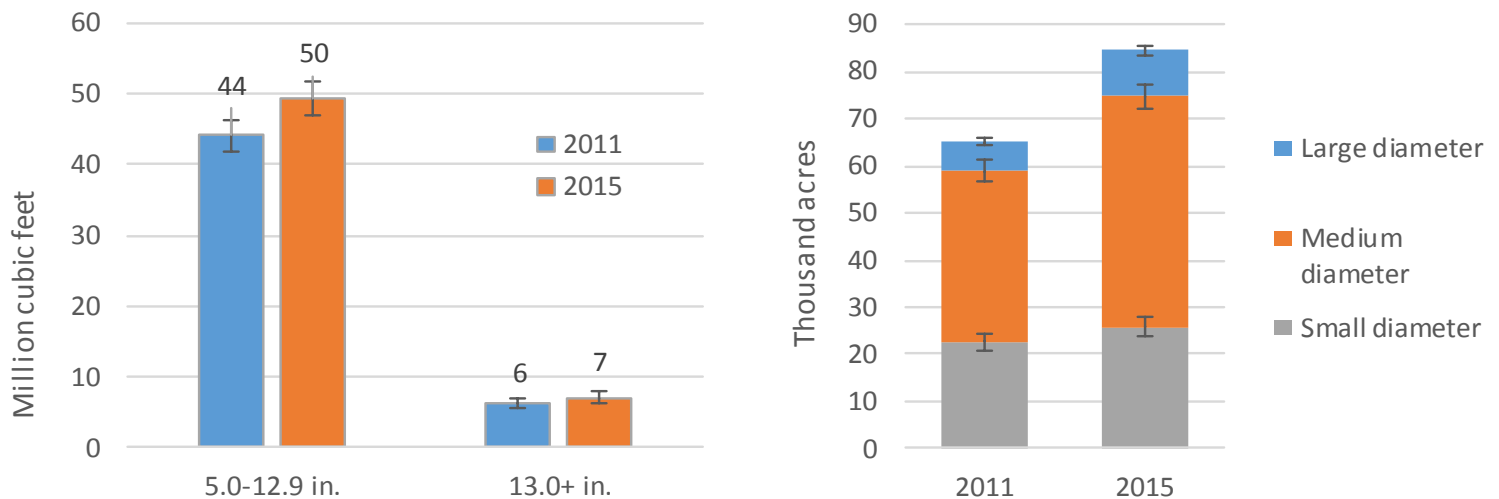


**Figure 3.** Volume of growing stock by forest inventory year for the state forests. Error bars represent the 68% confidence level.

## Increasing volume of quaking aspen on the state forests

Quaking aspen is a valuable timber species in Wisconsin. However, since the later part of the past century, growing stock volume of quaking aspen has been declining statewide. This is probably the result of forest succession to more shade tolerant species.

Quaking aspen, however, is not declining on our state forests where volume has increased by 12% between 2011 and 2015. Part of this increase is due to forest land acquisition. This increase was significant, especially in trees under 13 inches in diameter (Figure 4, left). Statewide the volume of quaking aspen decreased 6% since 1996 and remained unchanged between 2011 and 2015.



**Figure 4.** *Left:* volume of aspen growing stock by diameter class and inventory year. *Right:* acres of aspen forest type by stand size class and inventory year. Error bars represent the 68% confidence interval.

In the state as a whole, acreage in aspen forest type is also in decline and has fallen 11% since 1996 and 3% since 2011. Again this is not the case on the state forests where acreage of aspen forest type increased 30% between 2011 and 2015 (Figure 4, right). Three state forests account for the bulk of this increase: the Northern Highlands American Legion State Forest, the Brule River State Forest and the Flambeau River State Forest.

### How to Cite this Publication

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The published report is available online at <http://dnr.wi.gov/topic/ForestPlanning/forestInventory.html>