

Red maple

Acer rubrum

The volume of red maple has increased significantly since 1983. Red maple, like many other species groups, is aging. The volume in large trees has more than tripled in the last two decades. According to predictive models and using current mortality and removal rates, the volume of red maple could increase from 39% to 55% in the next forty years.

Along with volume, the rates of growth and mortality have also increased. But the ratio of mortality to volume for red maple is much lower than the average for all species. Whereas red maple makes up about 11.3% of volume and 13% of growth of trees in Wisconsin, it accounts for only 4 % of total mortality.

Red maple is an important timber species, making up 9.7% of roundwood production and 11.4% of all biomass.

- [How has the red maple resource changed?](#)
Volume and diameter class distribution:
- [Where is red maple found in Wisconsin?](#)
Growing stock volume by region with map
- [What kind of sites does red maple grow on?](#)
Habitat type and site index distribution
- [How fast is red maple growing?](#)
Average annual net growth: trends and ratio of growth to volume
- [How healthy is red maple in Wisconsin?](#)
Average annual mortality: trends and ratio of mortality to volume
- [How much red maple do we harvest?](#)
Roundwood production by product and ratio of growth to removals
- [How much red maple biomass do we have?](#)
Tons of aboveground biomass by region of the state
- [Can we predict the future of red maple?](#)
Modelling future volumes



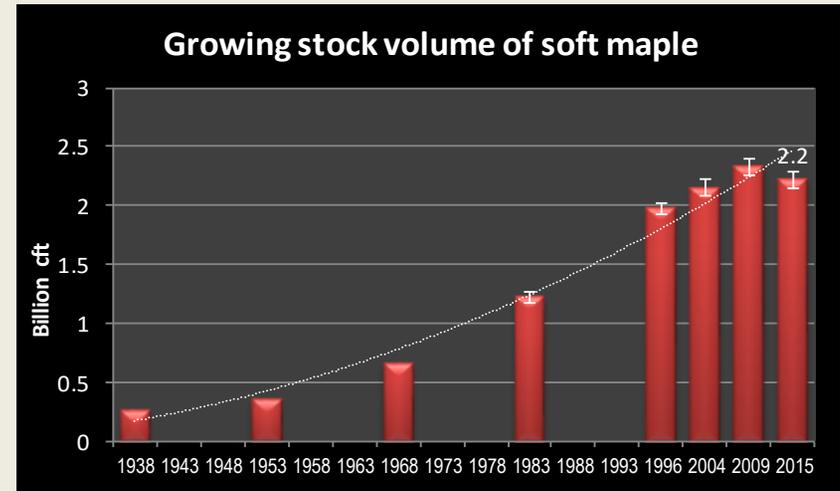
“How has the red maple resource changed?”

Growing stock volume and diameter class distribution by year

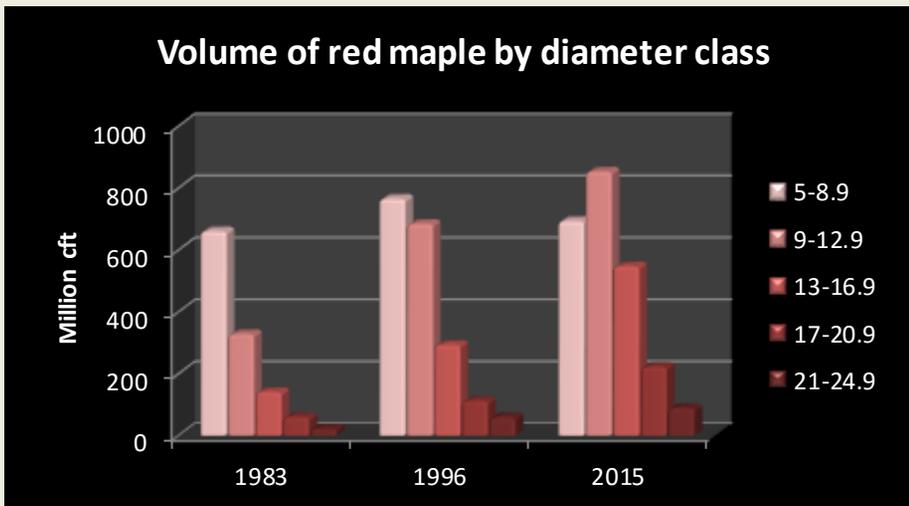
The [growing stock volume](#) of red maple in Wisconsin is approximately 2.2 billion cubic feet or about 10.2% of total statewide volume (chart on right). The volume of red maple is second only to sugar maple. Red maple volume has risen steadily since 1938, doubling after 1983 and increasing by 15% since 2004.

The red maple resource is increasing and maturing in Wisconsin (chart below left). The volume in small trees (5 to 13 inches) has increased 59% since 1983 but the volume in large trees (over 13 inches) has more than tripled in the same period.

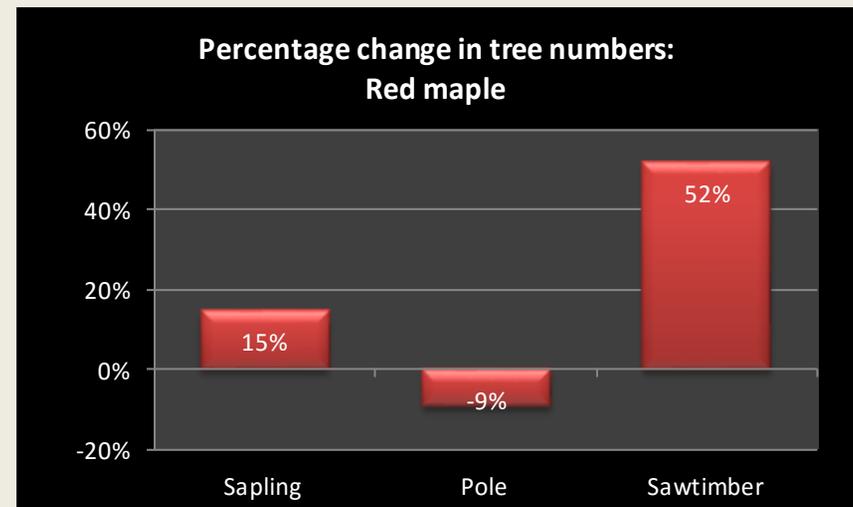
The number of red maple trees has increased substantially since 1996. Both the number of saplings and the number of sawtimber trees have increased but the number of pole-size trees has decreased (chart below right).



Growing stock volume (million cubic feet) by inventory year.
Source: USDA Forest Inventory and Analysis data



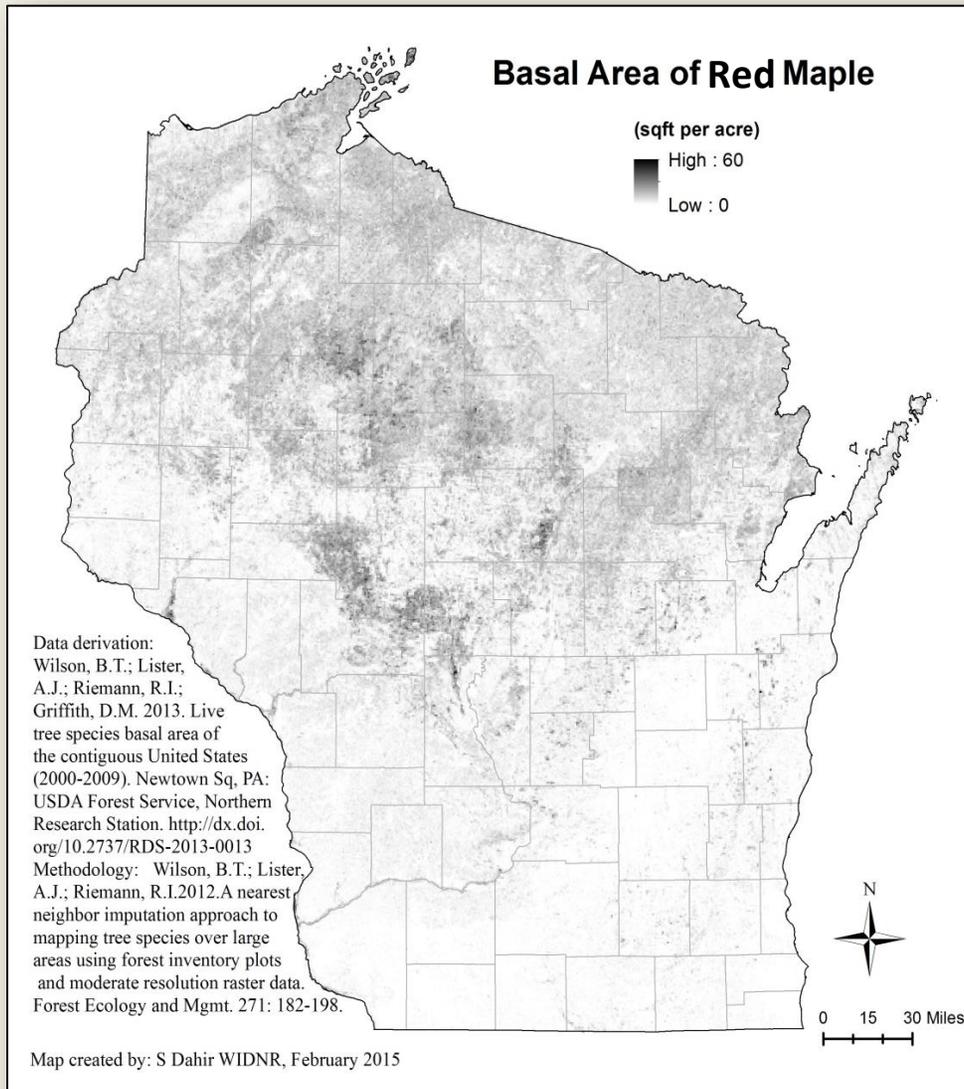
Growing stock volume (trees over 5 inches dbh) by diameter class (inches).
Source: USDA Forest Inventory and Analysis data



Percentage change in the number of live trees by size class between 1996 and 2015.
Source: USDA Forest Inventory and Analysis data 1996 and 2015.

"Where is red maple found in Wisconsin?"

Growing stock volume by region with map



The vast majority of red maple volume, 92%, is found in the northern and central parts of the state (Table 1).

In the south, most red maple volume occurs on the white oak / red oak / hickory, red maple / lowland and red maple / oak [forest types](#). In the north, most volume occurs on the sugar maple / beech / yellow birch, red maple / upland and aspen forest types.

Table 1. Growing stock volume (million cft) by species and region of the state.

Species	Central	North east	North west	South east	South west	Total
Red Maple	597	606	838	84	93	2,218
Percent of total	27%	27%	38%	4%	4%	100%

Source: USDA Forest Service, Forest Inventory and Analysis

For a table of **Volume by County** go to:

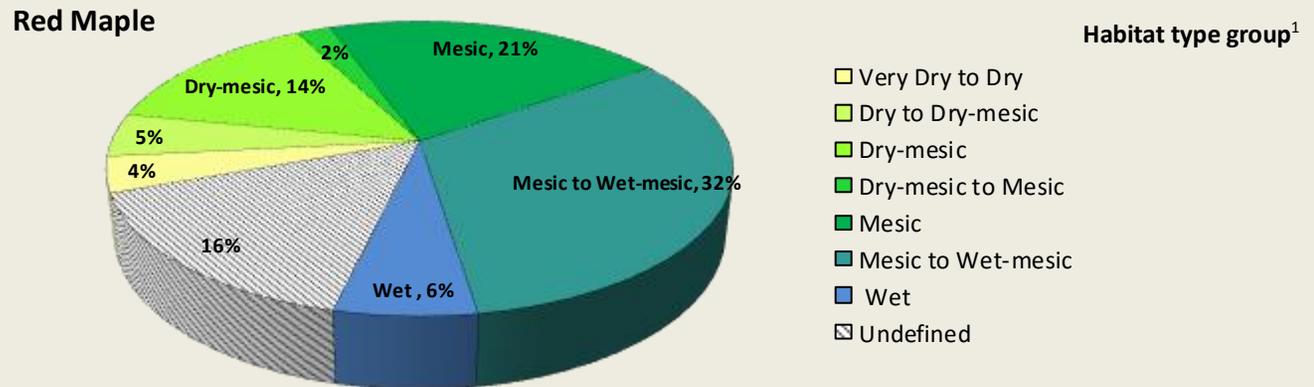
<http://dnr.wi.gov/topic/ForestBusinesses/documents/tables/VolumeCountySpecies.pdf>



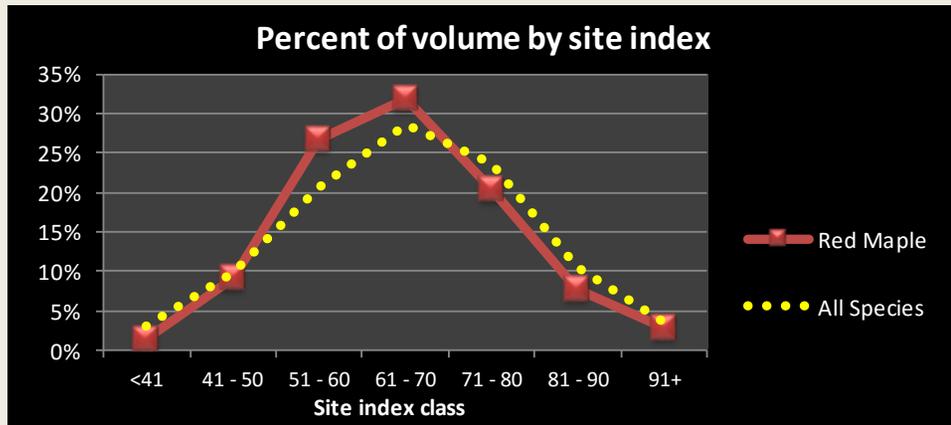
“What kind of sites does red maple grow on?”

Habitat type¹ and site index distribution

About 60% of red maple volume occurs on mesic, mesic to wet-mesic and wet habitat types. But this species also occurs on very dry to dry as well as dry to dry-mesic sites. Red maple can thrive in a broad range of sites types and soils.



Percent distribution of growing stock volume by habitat type group (USDA Forest Inventory & Analysis data).



Percent distribution of growing stock volume by site index class (USDA Forest Inventory & Analysis data).

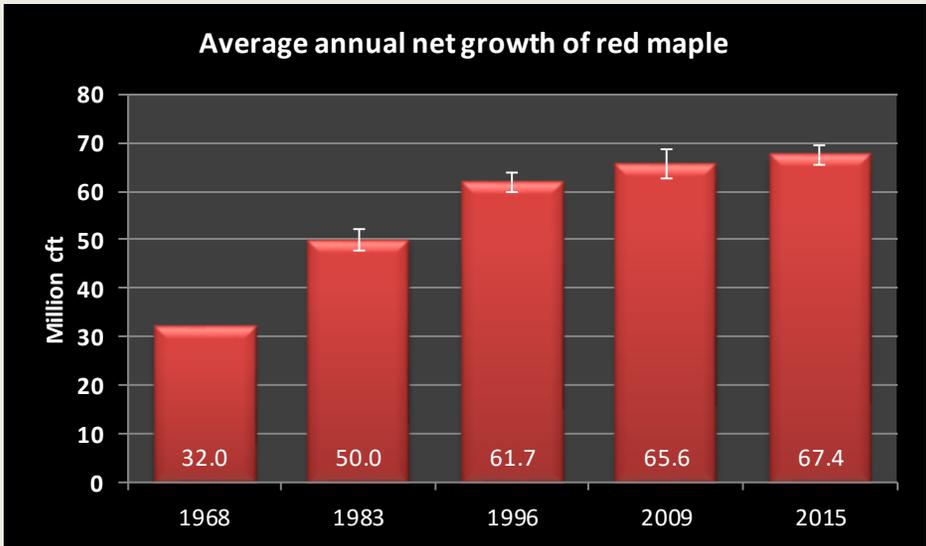
Red maple tends to occur on a slightly below average range of site indices (chart on left). The average site index by volume for red maple is 65, compared to the average for all species, 66.

¹ For more information on habitat types see Schmidt, Thomas L. 1997. Wisconsin forest statistics, 1996. Resource Bulletin NC-183. St. Paul, MN: U.S. Dept. of Agriculture, Forest Service, North Central



“How fast is red maple growing?”
Average annual net growth and the ratio of growth to volume

Average annual net growth of red maple is about 67.4 million cubic feet/year, representing 11.7% of statewide volume growth (chart on right). Growth has increased 35% since 1983 and 9% since 1996.



Average annual net growth (million cubic feet).
 Source: USDA Forest Inventory & Analysis data

Table 2. Average annual net growth (million cft/year) of growing stock and the ratio of growth to volume by region of the state.

Region	Net growth	Percent of Total	Ratio of growth to volume
Northeast	17.5	26%	2.8%
Northwest	21.6	32%	2.5%
Central	20.5	30%	3.1%
Southwest	4.3	6%	2.8%
Southeast	3.5	5%	2.2%
Statewide	67.4	100%	2.7%

Source: USDA Forest Inventory and Analysis

The highest volume growth for red maple occurs in central and northern Wisconsin but the highest growth to volume ratio occurs in the central part of the state (Table 2).

The average statewide ratio of net growth to volume for red maple is 2.7%, the same as the statewide average of 2.7% for all species.

For a table of **Average annual growth, mortality and removals by region** go to:
<http://dnr.wi.gov/topic/ForestBusinesses/documents/tables/GrowthMortalityRemovals.pdf>

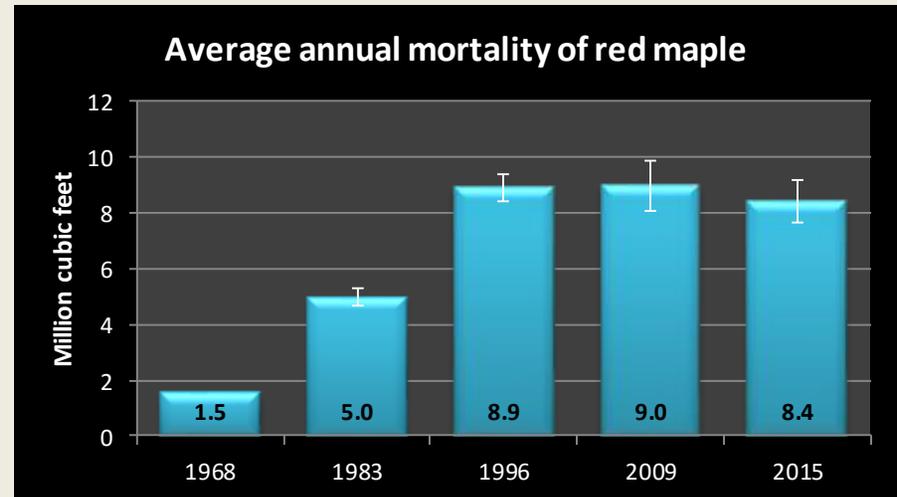


“How healthy is red maple in Wisconsin?”

Average annual mortality: trends and the ratio of mortality to volume

Average annual mortality of red maple, about 8.4 million cubic feet per year from 2010 to 2015, has increased 85% since 1983 but has remained statistically unchanged since 1996 (chart on right). Red maple accounts for about 10.2% of total growing stock volume in the state but only 3.6% of total mortality.

The ratio of mortality to volume is 0.4% for red maple, much lower than the statewide average of 1.1% (Table 3).



Average annual mortality (million cubic feet) by inventory year.
Source: USDA Forest Inventory & Analysis data

Table 3. Mortality, volume and the ratio of mortality to volume.

Species	Average annual mortality (cft)	Growing stock volume (cft)	Mortality / volume
Red Maple	8,417,320	2,217,899,728	0.4%

Source: USDA Forest Inventory & Analysis data

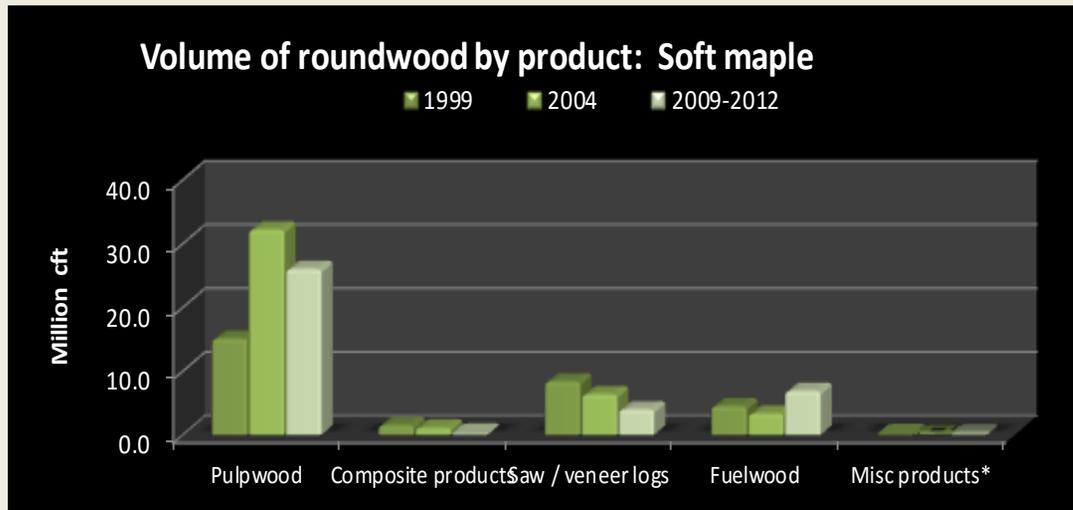
For a table of **Average annual growth, mortality and removals by region** go to:
<http://dnr.wi.gov/topic/ForestBusinesses/documents/tables/GrowthMortalityRemovals.pdf>



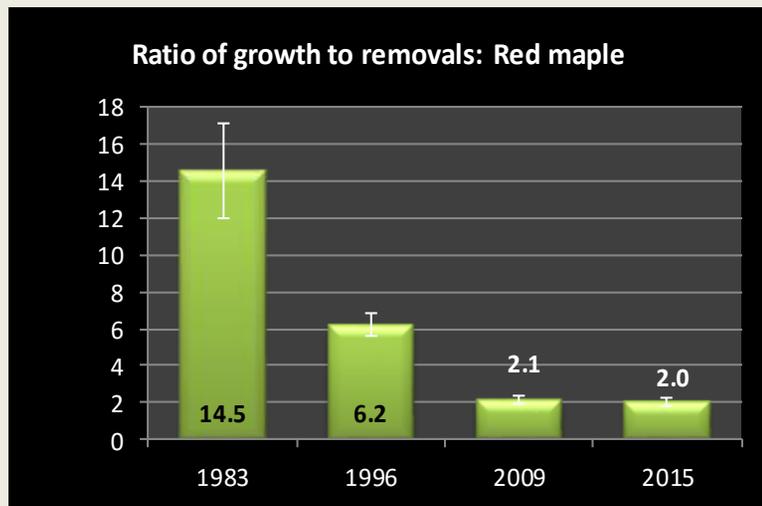
“How much red maple do we harvest?”
Roundwood production and the ratio of growth to removals

In 2009-2012, red maple accounted for 37.1 million cubic feet or about 9.7% of Wisconsin’s total roundwood, down 14% from 2004 (chart on right). Pulpwood accounts for 70% of red maple roundwood and 15.3% of total statewide pulpwood production. Sawlogs and veneer make up 11% and fuelwood 19%.

From 2004 to 2012, pulpwood production decreased by 19%. Only fuelwood has increased.



Volume of roundwood. Most recent figures for pulpwood and composite products are from 2012 while other product volumes are from 2009. * Miscellaneous products include poles, posts and pilings.
 Source: Ronald Piva, USDA Forest Service, Northern Research Station, St. Paul MN

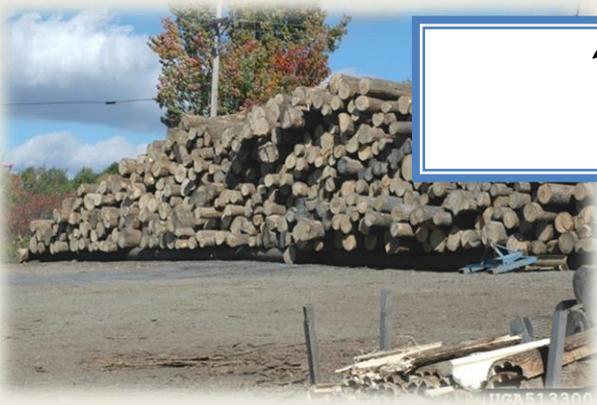


Source: USDA Forest Inventory & Analysis data.

Removals of red maple were 32.9 million cubic feet per year from 2010 to 2015 or 10.8% of total removals.

The ratio of removals to growth for red maple is 2.0 higher than the average of 1.7 for all species in the state (chart on left). Growth has increased since 1996 but not as much as removals which have almost doubled.

For a table of **Average annual growth, mortality and removals by region** go to:
<http://dnr.wi.gov/topic/ForestBusinesses/documents/tables/GrowthMortalityRemovals.pdf>



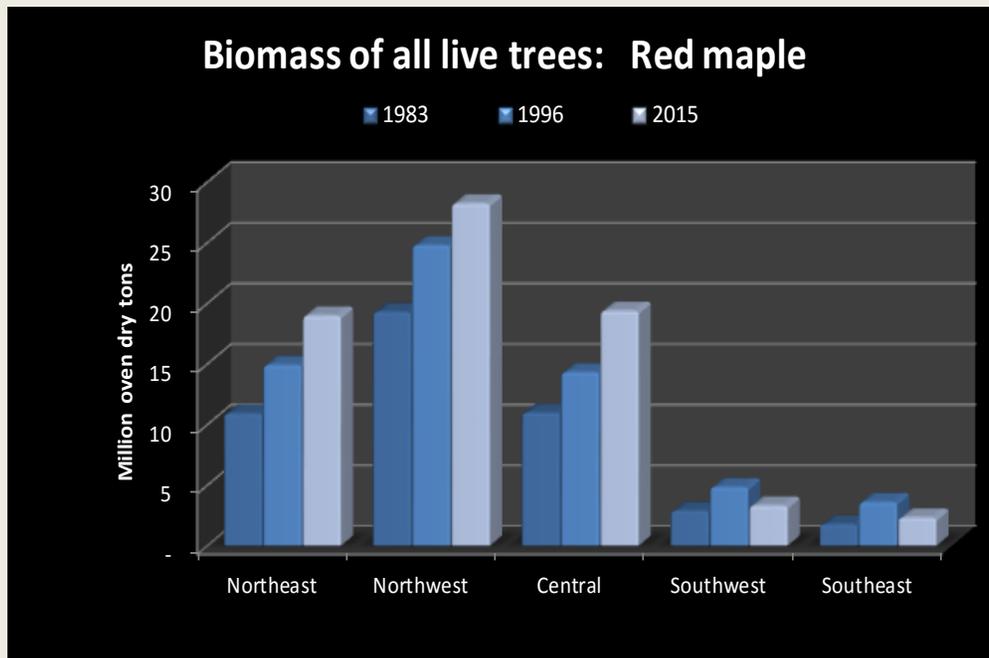
“How much red maple biomass do we have?”

Aboveground biomass by region of the state

There were 72.3 million short tons of aboveground [biomass](#) in live red maple trees in 2015, an increase of 58% since 1983. This is equivalent to approximately 36.1 million tons of carbon and represents 11.4% of all aboveground biomass statewide. As with volume, most red maple is located in central and northern Wisconsin (chart below).

The density of red maple wood is slightly lower than average for hardwoods with a ratio of biomass to volume of 34 oven-dry lbs. per cubic foot (ODP/cft). The average for all hardwoods is about 36 ODP/cubic feet and for all species is 33 ODP/cubic feet.

Approximately, 74% of all red maple biomass is located in the main stem and 22% in the branches.



Biomass (above ground dry weight of live trees >1 in dbh, short tons) by year and region of the state.
Source: USDA Forest Inventory & Analysis data

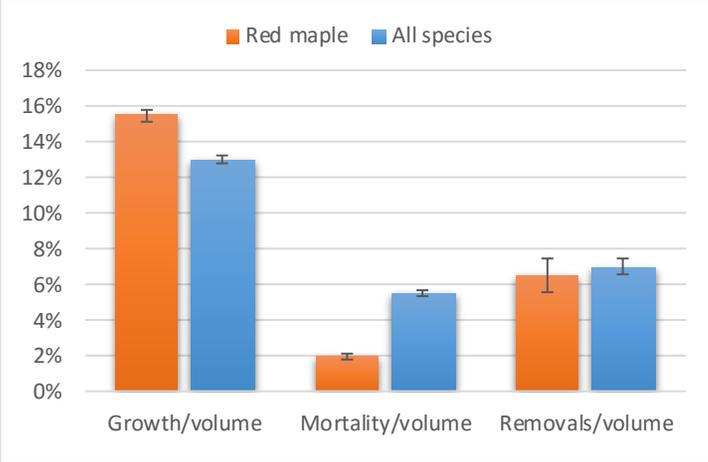
For a table of **Biomass by County** go to:

<http://dnr.wi.gov/topic/ForestBusinesses/documents/tables/BiomassByCounty.pdf>

“Can we predict the future of red maple?”
Predicted volumes based on current rates of mortality and harvest

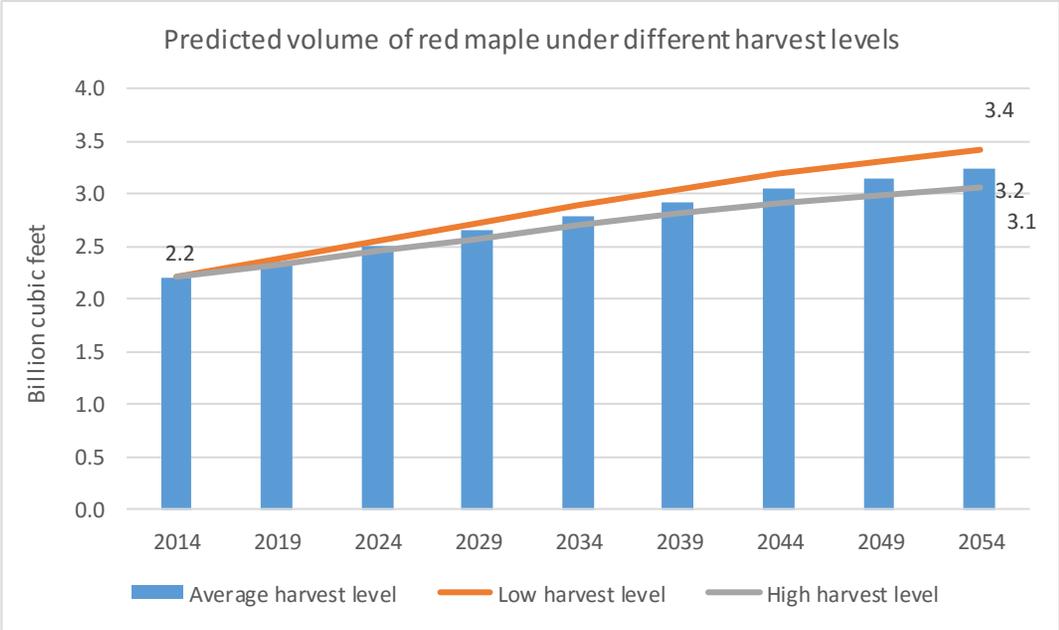
The 5-year ratio of growth to volume is significantly higher and the ratio of mortality to volume significantly lower for red maple compared to all species in the state (chart on right). These two trends could indicate an increase in the volume of red maple in the future.

The Forest Vegetation Simulator (FVS¹) was used to predict future volumes of red maple through 2054. Three scenarios are forecast. One with current rates of mortality and removals (i.e. average annual mortality and removals for 2009 to 2014). Another with current mortality rates and the lower 67% confidence interval for current removals and another with the upper 67% confidence interval for removals.



Five year ratios of mortality, removals and growth to volume.
 Source: USDA Forest Inventory & Analysis data

As expected, by 2054 volume increases in all three scenarios, 47% for current removal levels, 55% for low removals and 39% for high removals. If volume or removals were to increase substantially over current levels, these predictions would certainly change.



The Forest Vegetation Simulator is a forest growth and yield simulation model created by the USDA Forest Service, see <http://www.fs.fed.us/fmcs/fvs/>.