

Black walnut

Juglans nigra



5454059



UGA0008277

Black walnut, an important timber species, is increasing dramatically in number and volume in Wisconsin. The volume of black walnut has increased five-fold since 1983. The number of trees has doubled since 1996.

Growth rates of black walnut are almost double that of other species and mortality is much lower. Walnut accounts for 0.5% of all volume in the state but 1% of total growth and only 0.1% of mortality.

Black walnut is important for sawlog and fuelwood production. Although it only accounts for less than 1% of sawlogs, it is the most valuable sawtimber species with stumpage prices around \$1,000 per MBF.

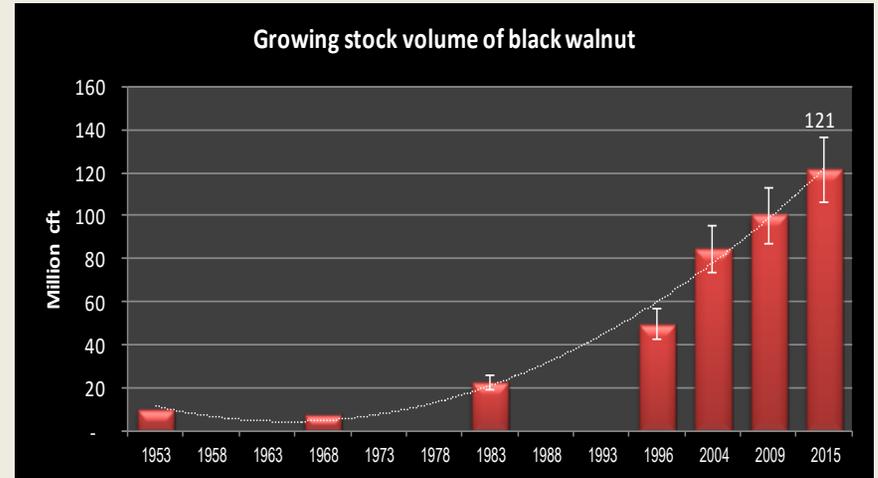
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“How has the black walnut resource changed?”
Growing stock volume and diameter class distribution

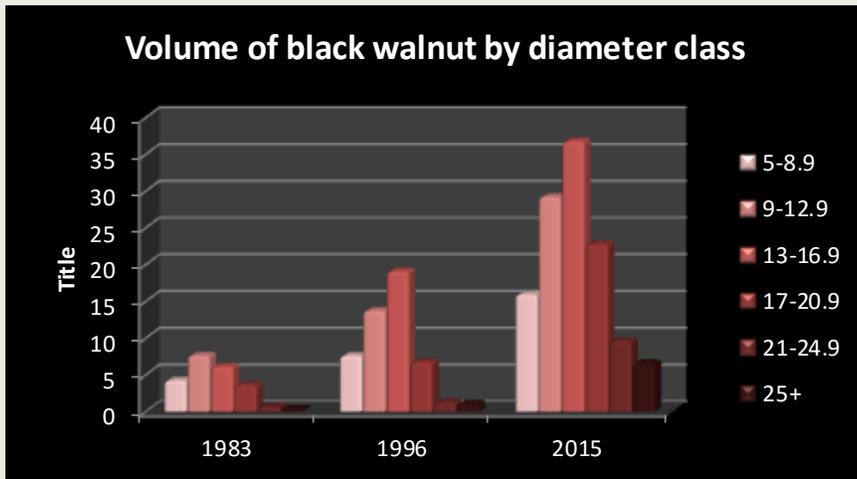
The [growing stock volume](#) of black walnut in 2015 was about 121 million cubic feet or about 0.5% of total statewide volume (chart on right). Volume has increased six-fold since 1983 and more than doubled since 1996.

The black walnut resource has aged. For instance, the volume in large trees (over 13 inches in diameter) has increased seven fold since 1983 and the volume of smaller trees has almost quadrupled in this time (chart left below).

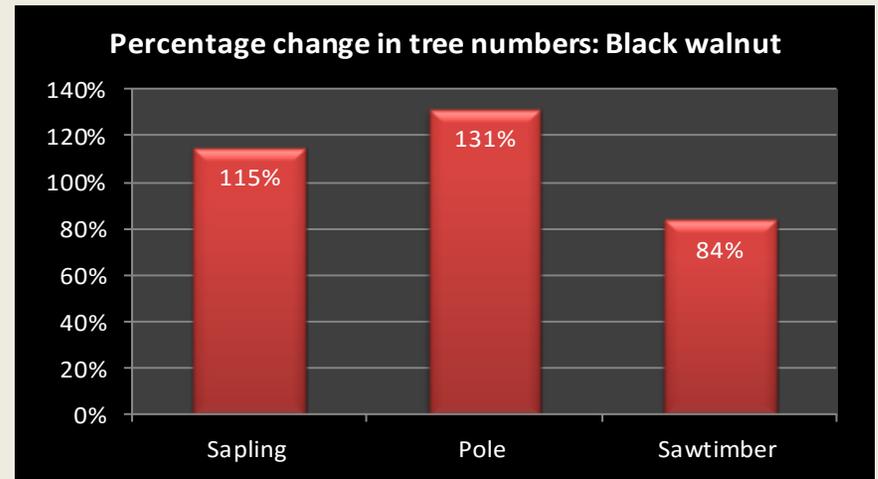
Since 1996 the number of walnut trees of all size classes has increased significantly (chart right below).



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



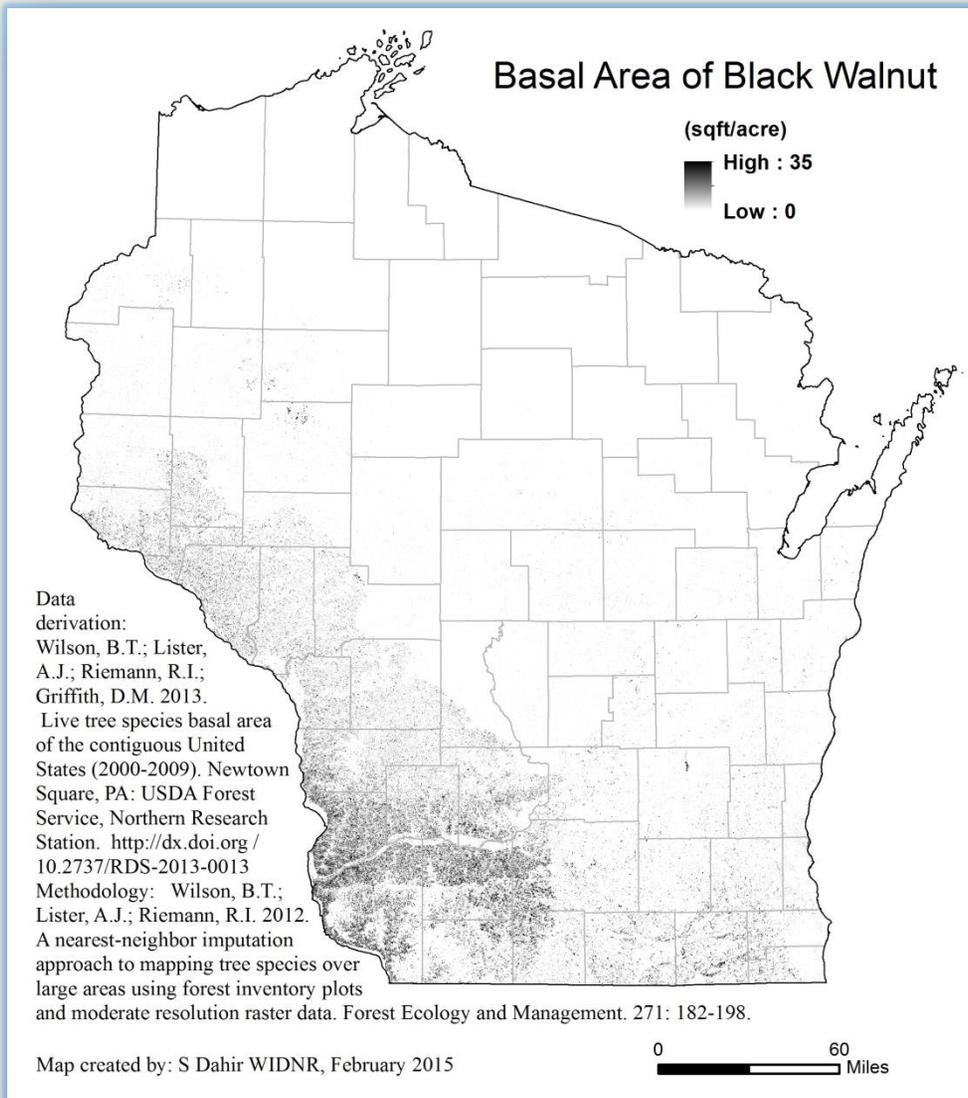
Growing stock volume (trees over 5 inches dbh) in million cubic feet by diameter class (inches).
 Source: USDA Forest Inventory and Analysis data



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 black walnut found in Wisconsin?"

Growing stock volume by region with map



Black walnut is a southern species with 97% of volume in the southwest and southeast regions of the state.

It occurs mostly as part of the black walnut, mixed upland hardwoods and oak / hickory forest types.

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

Species	Central	North east	North west	South east	South west	Total
Black walnut	2	-	1	46	72	121
% of total	2%	0%	1%	38%	59%	100%

Source: USDA Forest Service, Forest Inventory and Analysis 2015 data

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

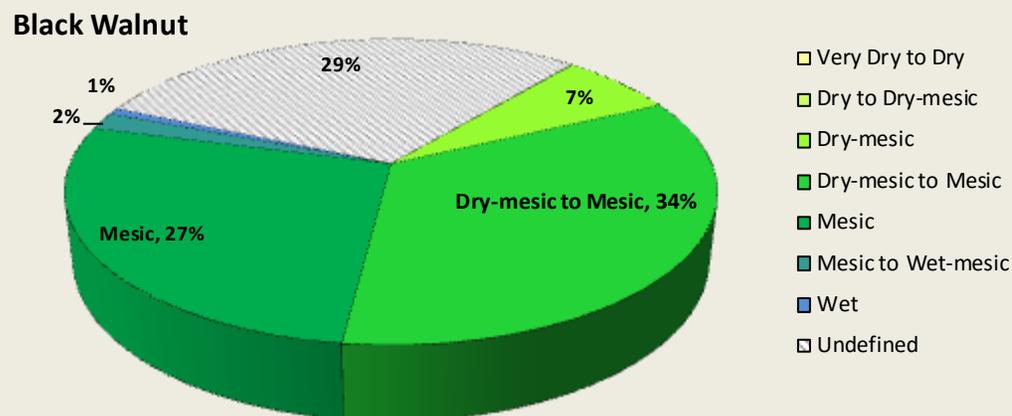
<http://dnr.wi.gov/topic/ForestBusinesses/documents/tables/VolumeCountySpecies.pdf>



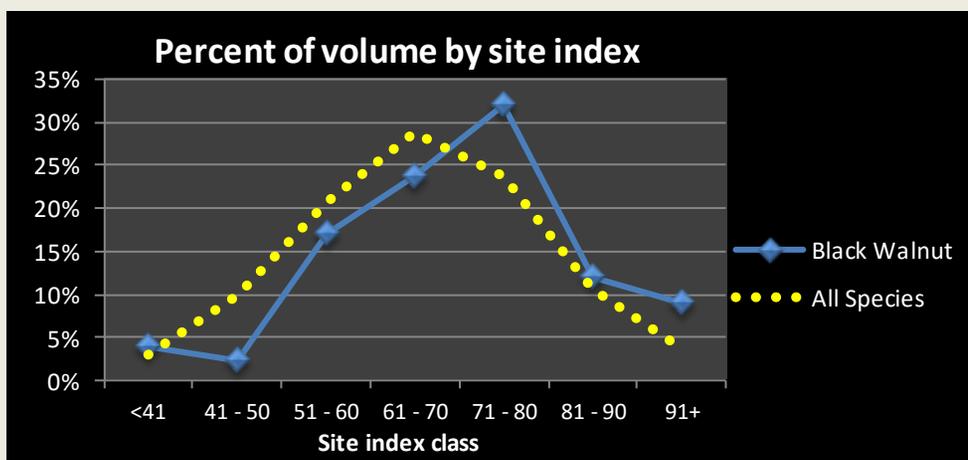
“What kind of sites does black walnut grow on?”

Habitat type and site index distribution

The majority (61%) of black walnut growing stock volume is found on dry- mesic to mesic and mesic habitat types (chart below). Only 7% occurs on drier sites and almost none on wetter sites.



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).

The majority of black walnut growing stock volume is found in stands with site indices between 60 and 80 (chart on left). Over 75% of volume is located on sites with site index greater than 60.

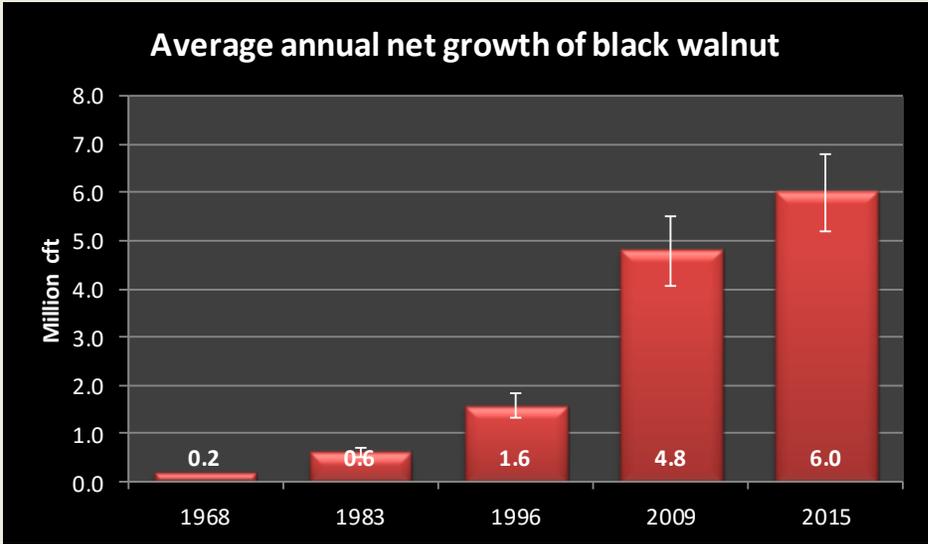
The average site index by volume for black walnut is 72, much higher than the average for all species, 66.



“How fast is black walnut growing?”

Average annual net growth: trends and ratio of growth to volume

Average annual net growth, about 6.0 million cubic feet per year for the period 2010-2015, accounts for 1% of total statewide growth (chart on right). The growth rate has more than tripled since 1996.



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

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

Region	Net growth	Percent of Total	Ratio of growth to volume
Northeast	0.0	0%	.
Northwest	0.0	0%	1.0%
Central	0.1	2%	5.6%
Southwest	3.2	53%	4.4%
Southeast	2.7	45%	5.8%
Statewide	6.0	100%	4.9%

Source: USDA Forest Inventory and Analysis

Almost all black walnut volume growth occurs in the southern part of the state.

The average ratio of net growth to volume for black walnut is 4.9%, much higher than the statewide average of 2.7% for all species.

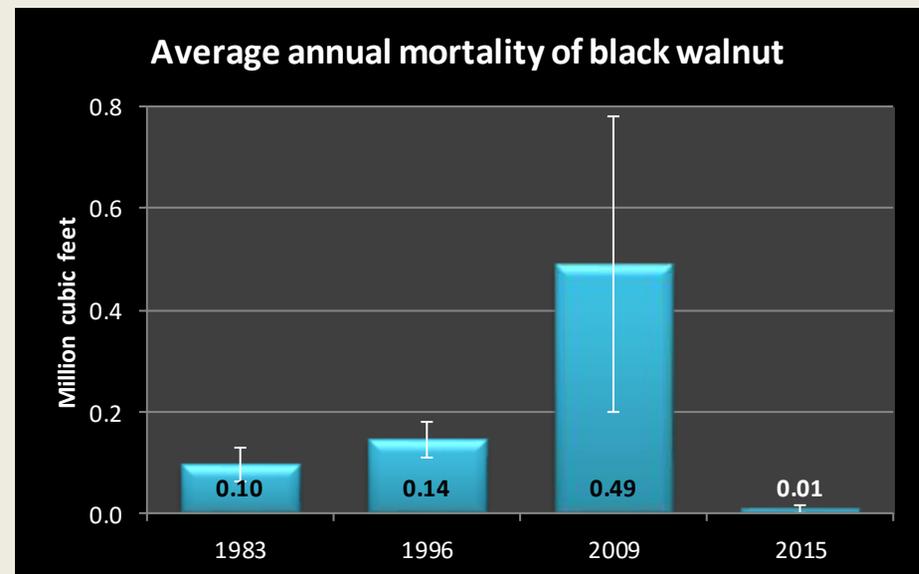
For a table of **Average annual growth, mortality and removals by region** go to:
<http://dnr.wi.gov/topic/ForestBusinesses/documents/tables/GrowthMortalityRemovals.pdf>



“How healthy is black walnut in Wisconsin?”
Average annual mortality: trends and ratio of mortality to volume

Average annual mortality of black walnut from 2010 to 2015 was about 8,478 cubic feet, or 0.6% of statewide mortality (chart on right). Mortality has decreased since 2009 along with volume but error rates are extremely high. For instance, there was only one plot with walnut mortality in 2010-2015.

The ratio of mortality to volume is about 0.01% for black walnut. This is significantly lower than the average for all species in Wisconsin which is 1.1%.



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

Mortality, volume and the ratio of mortality to volume.

Species	Average annual mortality (cft)	Volume of growing stock (cft)	Mortality / volume
Black walnut	8,478	121,266,803	0.01%

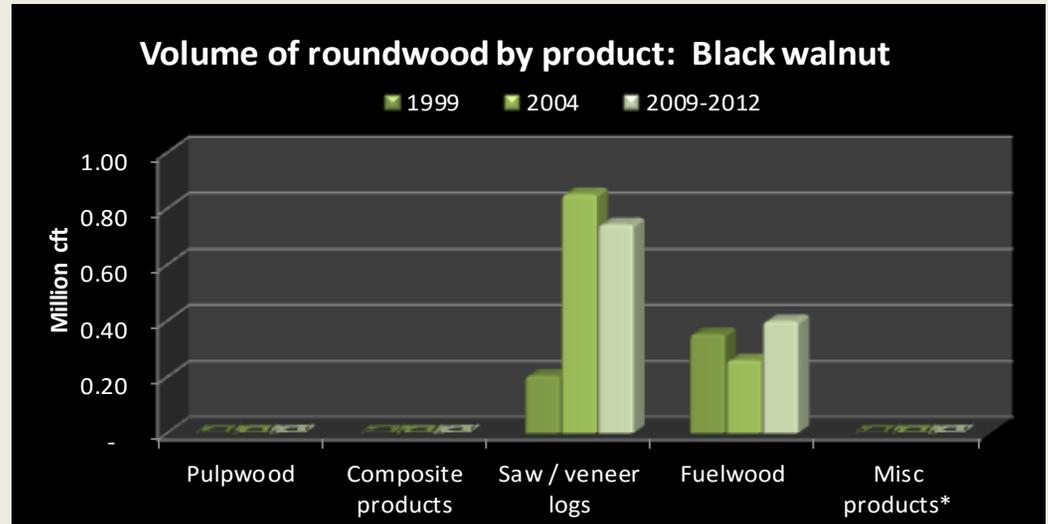
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"How much black walnut do we harvest?"
Roundwood production by product and year

In 2009-2012, Wisconsin produced about 1.1 million cubic feet of black walnut roundwood, or about 0.3% of the total production (chart on right). Sawlogs and veneer accounted for about 65% and fuelwood for 30%.

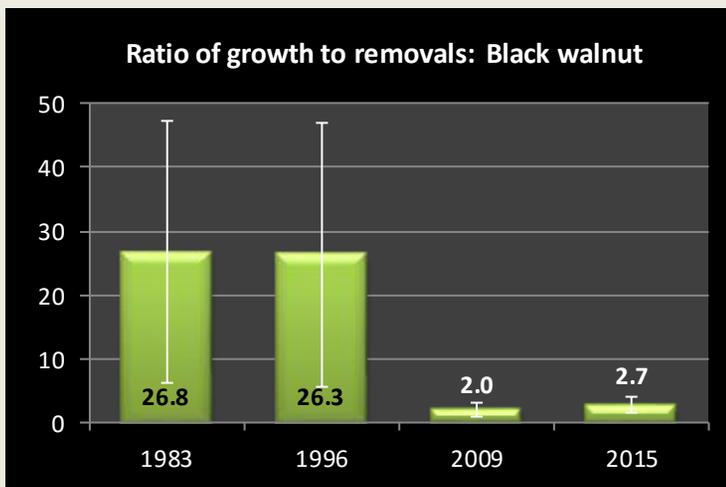
Black walnut sawlogs and veneer account for less than 1% of statewide production.



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

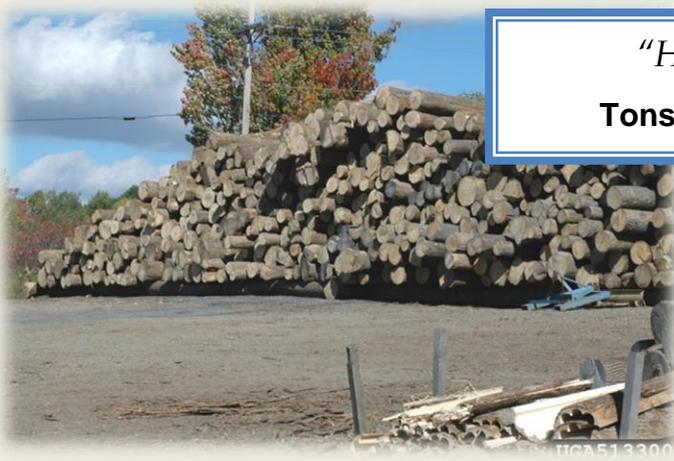
Removals of black walnut totaled 2.2 million cubic feet per year from 2010 to 2015. This is less than 1% of total removals in the state.

The ratio of average annual net growth to removals is 2.7 for black walnut, much higher than the statewide average ratio of 1.7 (chart on left). This is mostly due to exceptionally high growth rates.



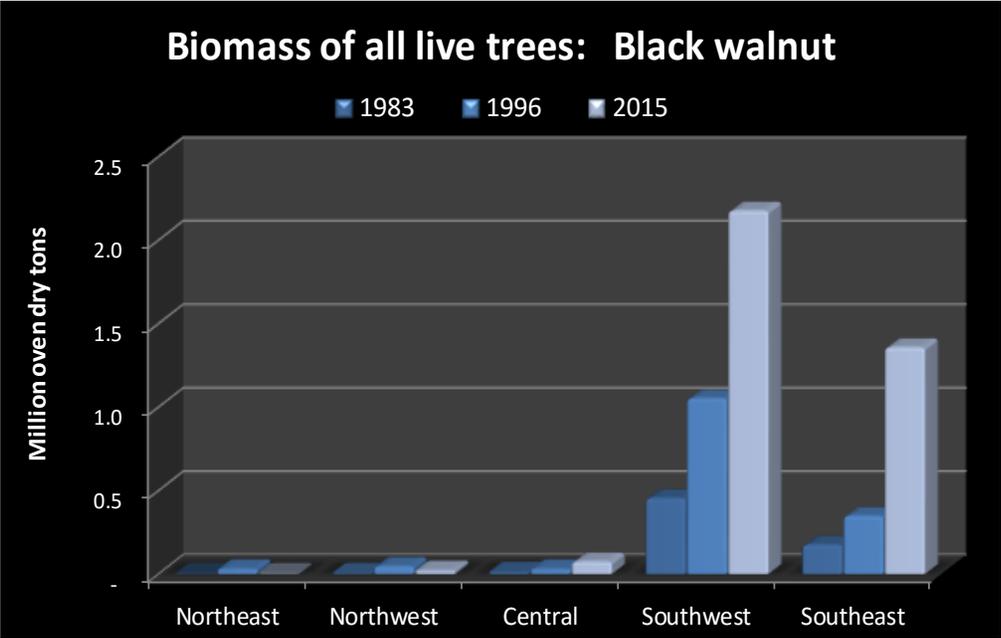
Source: USDA Forest Inventory & Analysis data.

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“How much black walnut biomass do we have?”
Tons of aboveground biomass by region of the state

There were 3.6 million short tons of aboveground **biomass** in live black walnut trees in 2015, up from about 0.6 million tons in 1983, a six-fold increase. This is equivalent to approximately 1.8 million tons of carbon and represents 0.5% of all aboveground biomass statewide. As with volume, most black walnut is located in southern Wisconsin (chart below).



Black walnut wood has a fairly high specific gravity and oven-dry weight. The specific gravity is 0.55 compared to 0.51 for all species and the oven-dry weight is 34.3 pounds per cubic foot compared to 31.4 lbs/cft for all species.

Approximately 72% of biomass is in the merchantable bole, 10% in bark and 18% in tops and limbs.

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

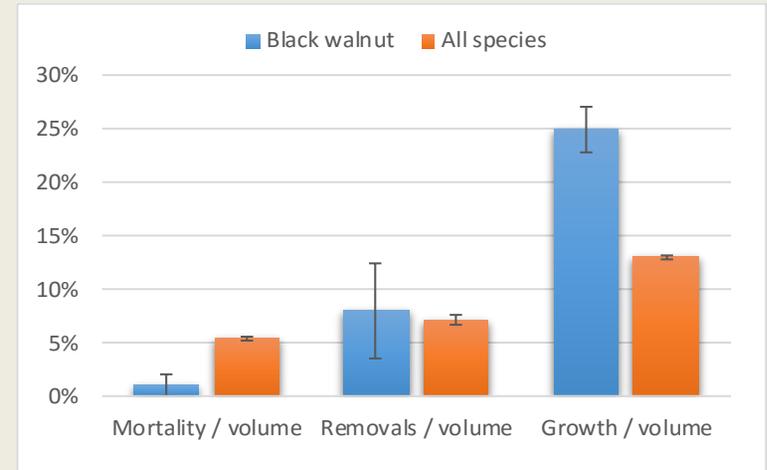
For a table of **Biomass by County** go to:
<http://dnr.wi.gov/topic/ForestBusinesses/documents/tables/BiomassByCounty.pdf>

“Can we predict the future of black walnut?”

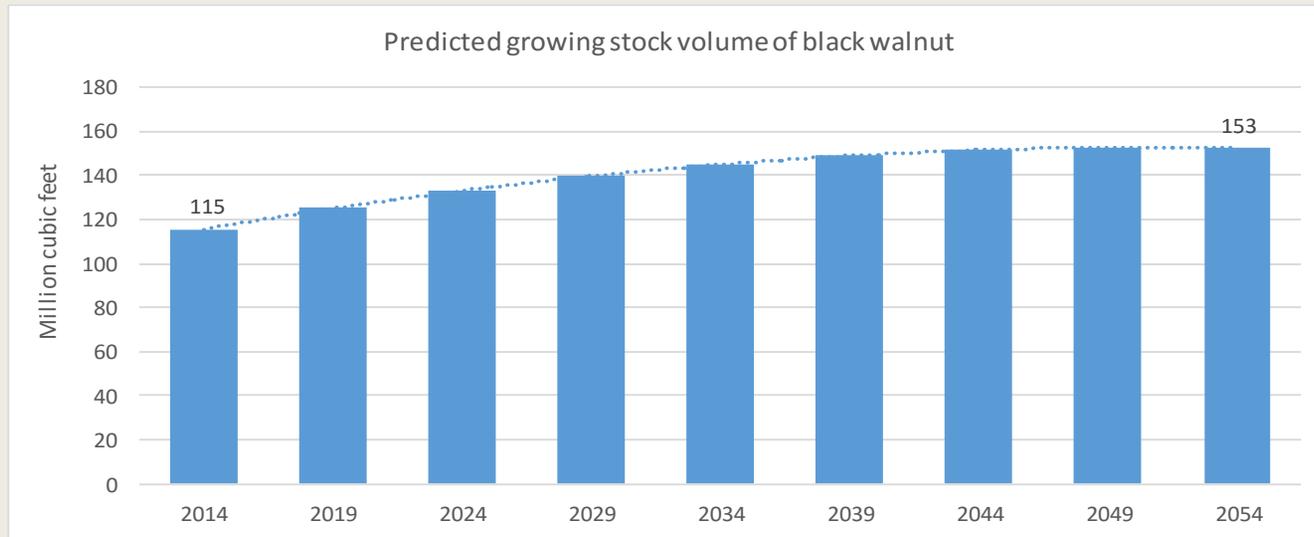
Predicted volumes based on current rates of mortality and harvest

For black walnut, the ratio of growth to volume is significantly higher, the ratio of mortality to volume is significantly lower and the ratio of removals to volume is about average compared to all species in the state (chart on right).

The Forest Vegetation Simulator (FVS¹) was used to predict future volumes of black walnut through 2054 using current rates of mortality and removals. Volume increases 32% by 2054 but starts to level out around 2050.



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



¹ The Forest Vegetation Simulator is a forest growth and yield simulation model created by the USDA Forest Service, see <http://www.fs.fed.us/fmnc/fvs/>.