

# Black walnut

*Juglans nigra*



5454059



UGA0008277

**B**lack walnut, an important timber species, is increasing dramatically in number and volume in Wisconsin. The volume of black walnut has increased six-fold since 1983 and has nearly tripled since 1996.

**G**rowth rates of black walnut are almost double that of other species and mortality is much lower. Walnut accounts for 0.6% of all volume in the state but 1.1% of total growth and only 0.1% of mortality.

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

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

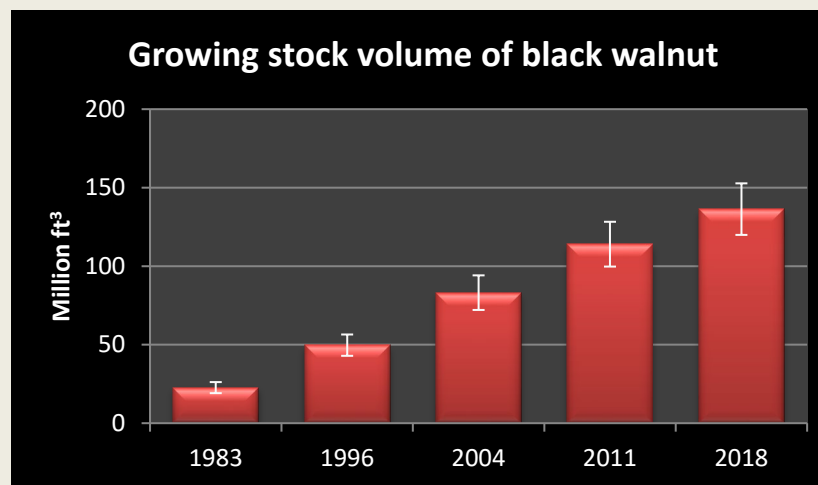
## *"How has the black walnut resource changed?"*

### Growing stock volume and diameter class distribution

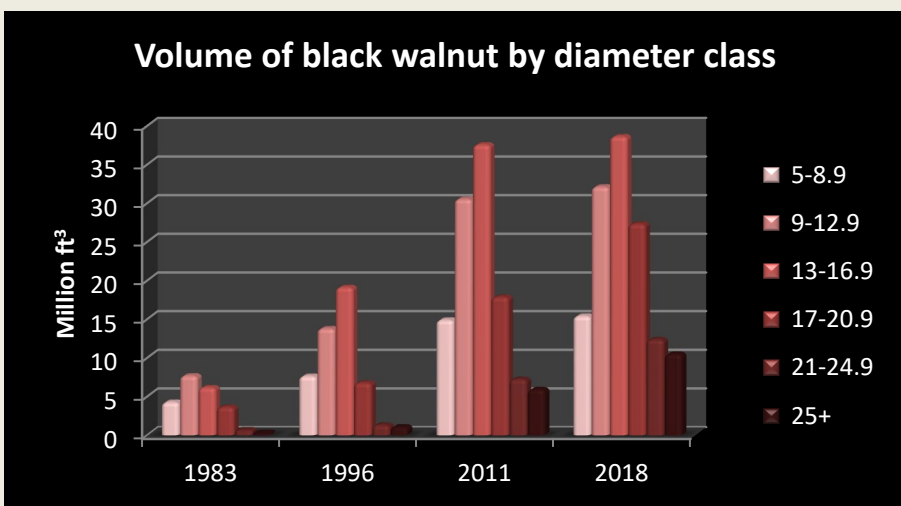
The [growing stock volume](#) of black walnut in 2016 was about 136 million cubic feet or about 0.6% of total statewide volume (chart on right). Volume has increased six-fold since 1983 and nearly tripled since 1996.

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

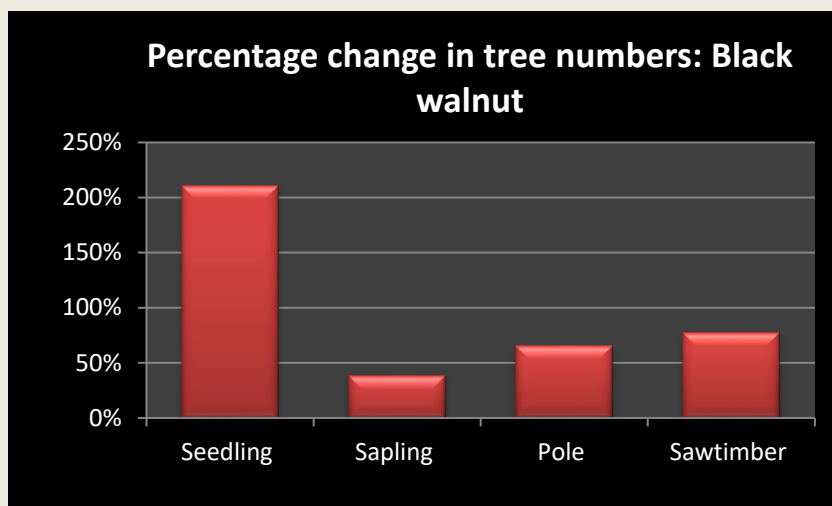
Since 2004 the number of walnut trees of all size classes has increased significantly (chart right below).



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



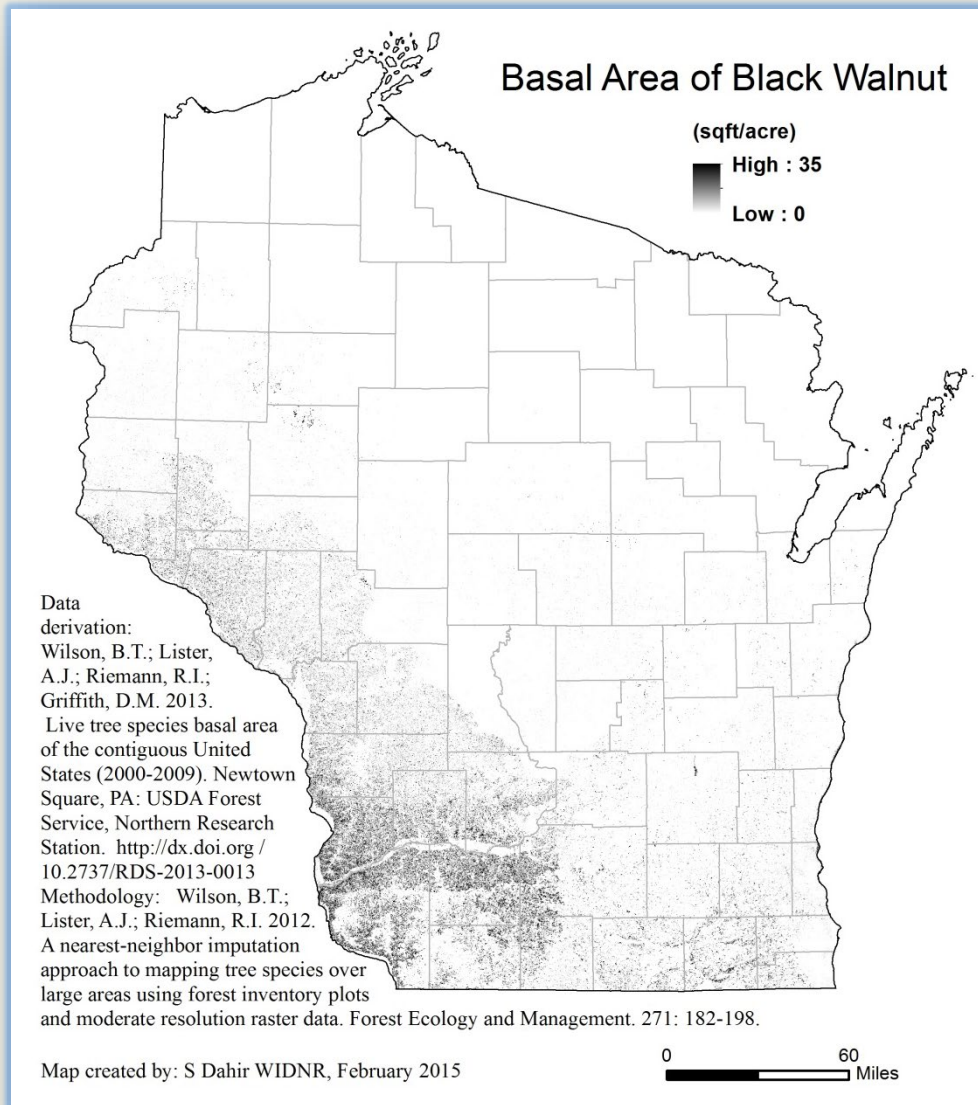
Growing stock volume (trees over 5 inches dbh) in million cubic feet by diameter class (inches).  
Source: USDA Forest Inventory and Analysis data



Percentage change in the number of live trees by size class between 2004 and 2018.  
Source: USDA Forest Inventory and Analysis data 2004 and 2018.

*“Where is black walnut found in Wisconsin?”*

**Growing stock volume by region with map**



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

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

Growing stock volume (million ft<sup>3</sup>) by species and region of the state.

Species	Central	North east	North west	South east	South west	Total
<b>Black walnut</b>	<b>2</b>	<b>-</b>	<b>1</b>	<b>52</b>	<b>82</b>	<b>136</b>
<b>% of total</b>	<b>2%</b>	<b>0%</b>	<b>1%</b>	<b>38%</b>	<b>60%</b>	<b>100%</b>

Source: USDA Forest Service, Forest Inventory and Analysis 2018 data

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

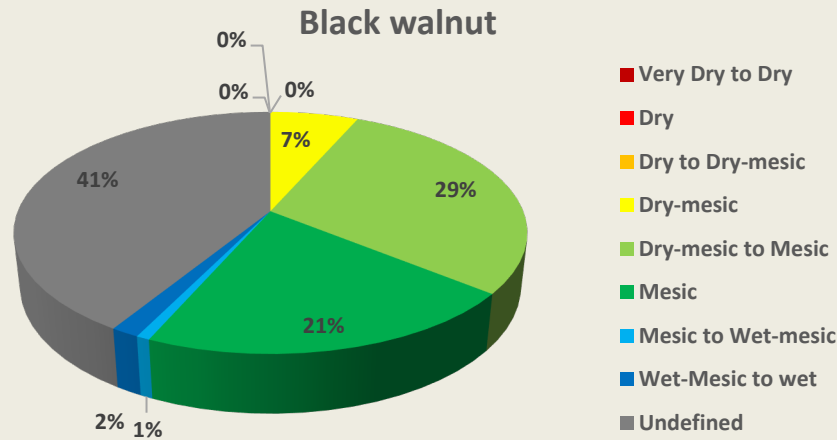
<http://dnr.wi.gov/topic/ForestBusinesses/documents/tables/VolumeCountySpecies.pdf>



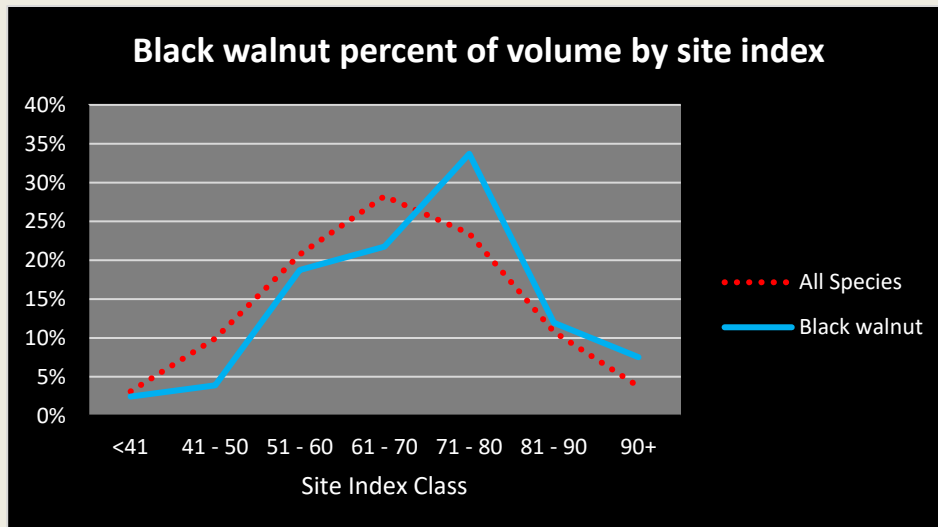
*“What kind of sites does black walnut grow on?”*

**Habitat type and site index distribution**

The majority of black walnut growing stock volume is found on dry- mesic to mesic and mesic habitat types 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). About 75% of volume is located on sites with site index greater than 60.

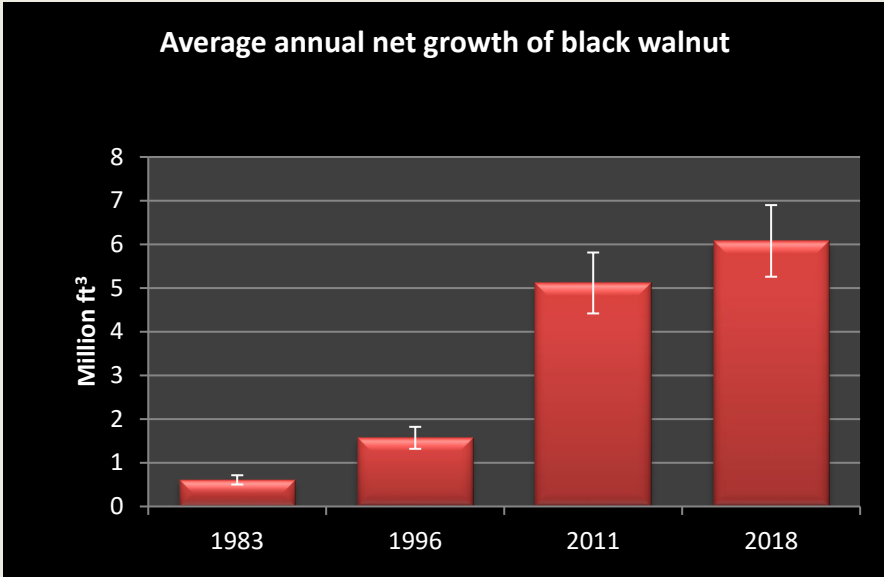
The average site index by volume for black walnut is 72, much higher than the average for all species, 66.



*“How fast is black walnut growing?”*

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

Average annual net growth, about 6.1 million cubic feet per year for the period 2012-2018, accounts for 1.1% of total statewide growth (chart on right). The growth rate has almost quadrupled since 1996.



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

Average annual net growth (million ft<sup>3</sup>/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%	0.7%
Central	0.2	3%	7.2%
Southwest	3.0	50%	3.7%
Southeast	2.9	47%	5.6%
Statewide	6.1	100%	4.5%

Source: USDA Forest Inventory and Analysis

**A**lmost all black walnut volume growth occurs in the southern part of the state.

**T**he average ratio of net growth to volume for black walnut is 4.5%, much higher than the statewide average of 2.6% 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>

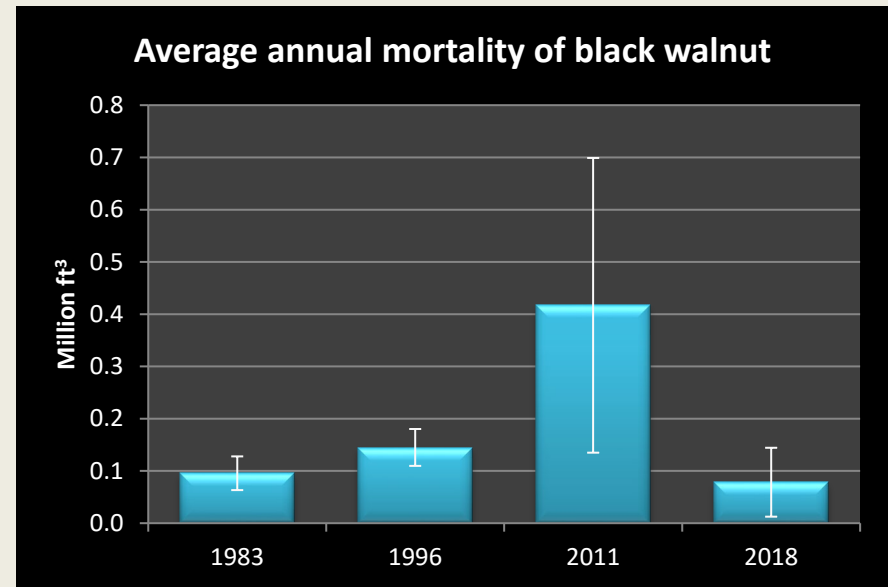


*“How healthy is black walnut in Wisconsin?”*

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

**A**verage annual mortality of black walnut from 2012 to 2018 was about 78,412 cubic feet, or <0.1% of statewide mortality (chart on right), however, error rates are extremely high and mortality figures for black walnut should be looked at with caution.

**T**he ratio of mortality to volume is about 0.1% 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 (ft <sup>3</sup> )	Volume of growing stock (ft <sup>3</sup> )	Mortality / volume
Black walnut	78,412	136,344,451	<0.1%

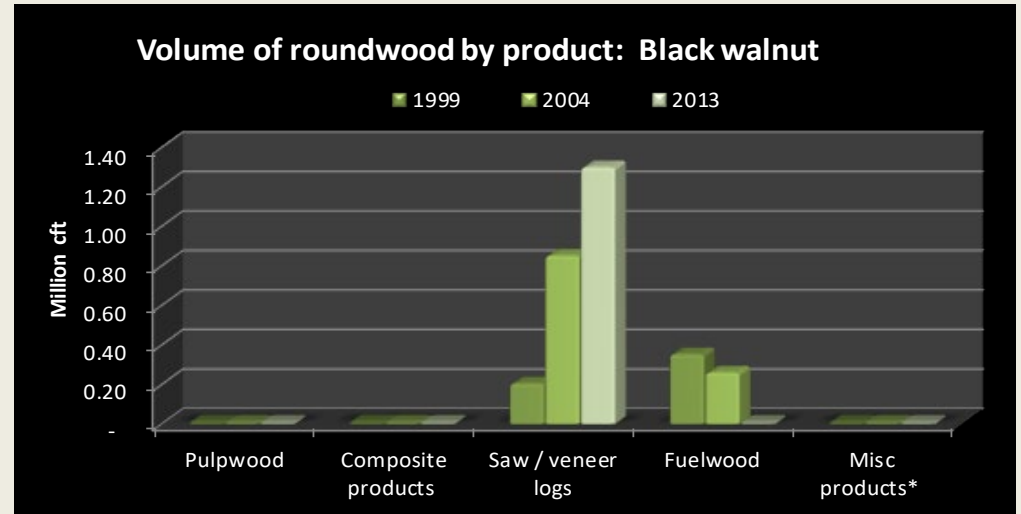
For a table of **Average annual growth, mortality and removals by region** go to:  
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*“How much black walnut do we harvest?”*  
**Roundwood production by product and year**

In 2013, Wisconsin produced about 1.3 million cubic feet of black walnut roundwood, or about 0.4% of the total production (chart on right). Sawlogs and veneer accounted for almost all of this.

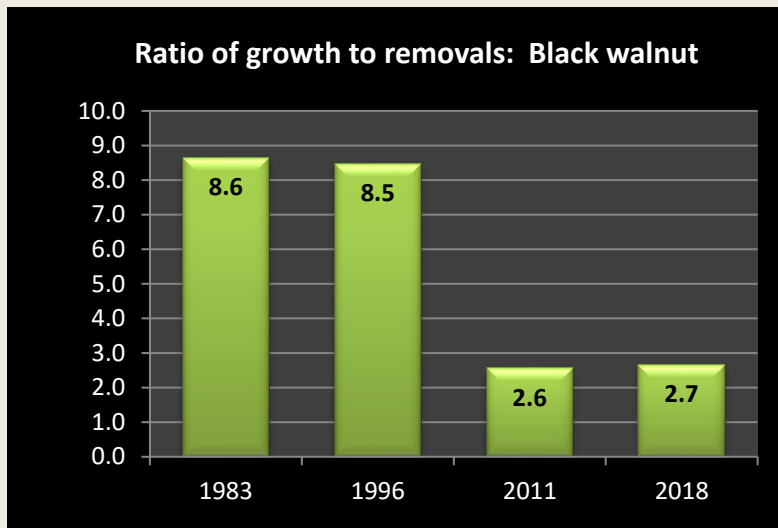
Black walnut sawlogs and veneer account for about 1.4% of statewide production.



Volume of roundwood. \* Miscellaneous products include poles, posts and pilings.  
 Source: Ronald Piva, USDA Forest Service, Northern Research Station, St. Paul MN

Removals of black walnut totaled 2.3 million cubic feet per year from 2012 to 2018. This is 0.8% 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 1.9 (chart on left). This is mostly due to exceptionally high growth rates.



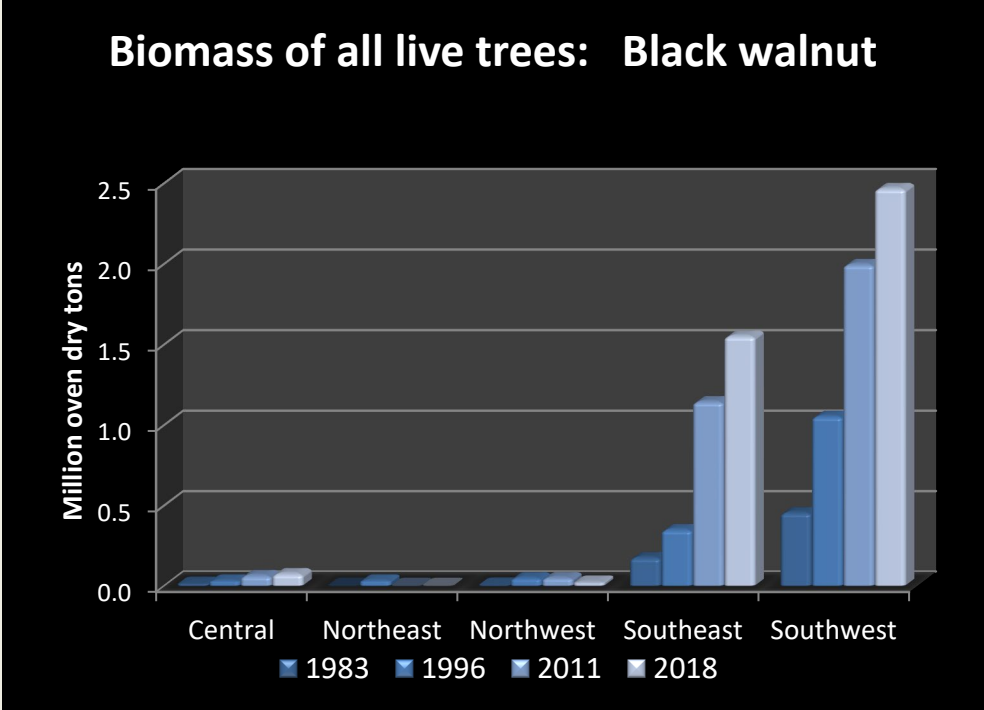
Source: USDA Forest Inventory & Analysis data.

For a table of **Average annual growth, mortality and removals by region** go to:  
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*“How much black walnut biomass do we have?”*  
**Tons of aboveground biomass by region of the state**

There were 4.1 million short tons of aboveground biomass in live black walnut trees in 2018, up from about 0.6 million tons in 1983, a six-fold increase. This is equivalent to approximately 2.1 million tons of carbon and represents 0.6% of all aboveground biomass statewide. As with volume, nearly all black walnut is located in southern Wisconsin (chart below).



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

**B**lack 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/ft<sup>3</sup> for all species.

**A**pproximately 73% of biomass is in the merchantable bole, 4% in saplings, 5% in stumps, and 18% in tops and limbs.

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

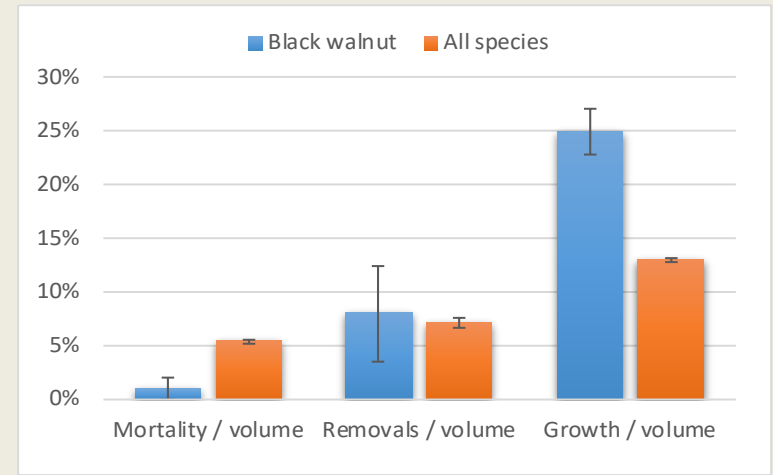


*“Can we predict the future of black walnut?”*

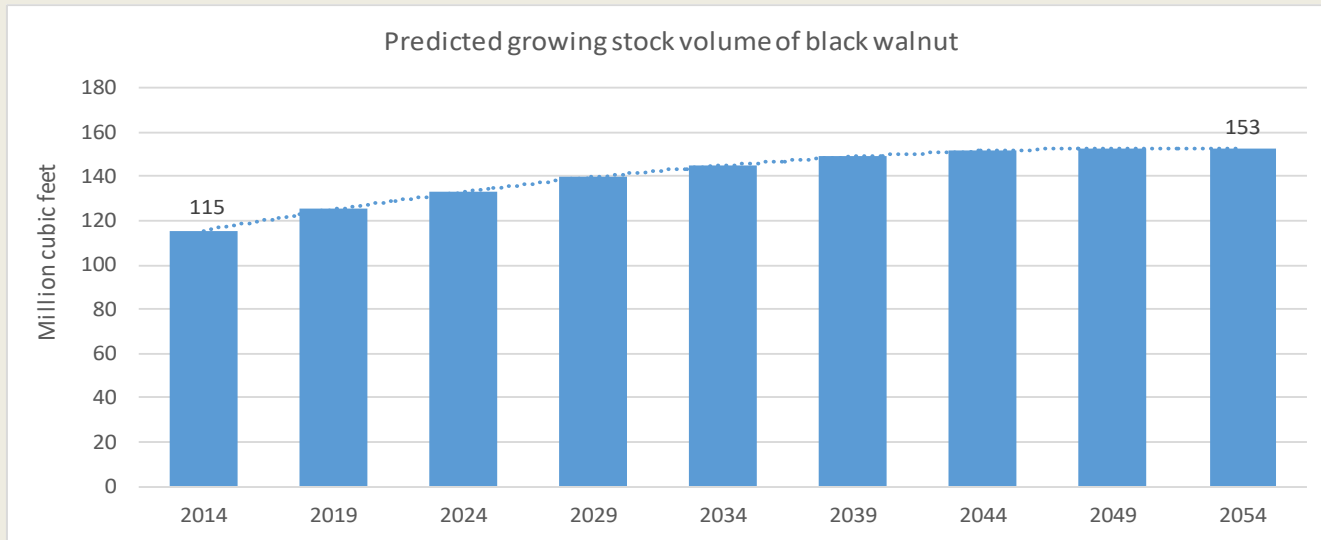
**Predicted volumes based on current rates of mortality and harvest**

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 (FVS<sup>1</sup>) 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



<sup>1</sup>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/>.