

# FORESTRY FACTS



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## How To Manage Northern Hardwoods

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### Species

Tree species that characterize the northern hardwoods forest type are sugar maple, yellow birch, basswood, white ash, eastern hemlock and American beech (minor in Wisconsin). See illustrations in Figure 1.

Often, associated species such as balsam fir, red maple, white pine, red oak, and paper birch are found in northern hardwood stands.

### Values and Uses

Northern hardwood species have a moderate to high value for wood products such as veneer, furniture and flooring. Sugar maple and yellow birch are species in greatest demand.

Northern hardwood forests are home to many interior songbirds and a wide variety of mammals. However, this type is not as valuable as oak and aspen for providing habitat for game species such as grouse and deer. The heavy shade typical in these stands keeps grass, shrubs and other food plants from growing well. Also the main trees of the northern hardwood forest do not produce highly nutritious nuts as do many trees in the oak-hickory forests.

### Regeneration and Growth

Regeneration is most commonly from seed, but most species also produce stump sprouts. Sugar maple and yellow birch produce good seed crops about every 3 years.

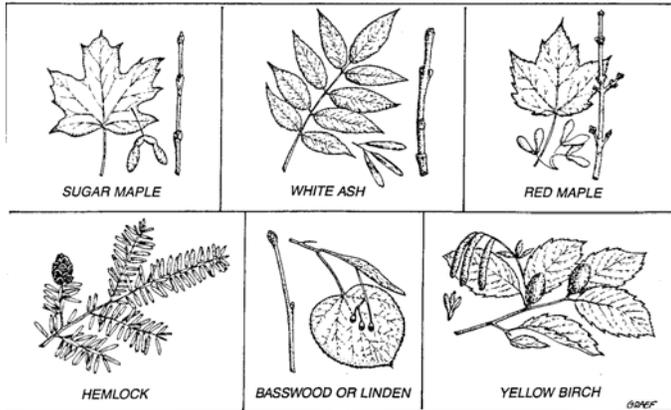
Sugar maple regenerates prolifically under a wide variety of conditions, and seedlings and saplings will survive under dense shade for many years. Sugar maple seedlings do not grow well on open or bare areas.

Some associated species, such as yellow birch and white ash, can tolerate light or moderate shade for just a few years after germination. After that they must receive direct overhead sunlight for adequate growth. Yellow birch and hemlock seedlings need exposed humus and surface soil for successful germination.

Sugar maple forest types are usually found on well-drained, upland loamy soils.

Northern hardwoods grow slowly. Even so, on average and good sites, we can expect northern hardwood stands to produce significant numbers of sawtimber trees after age 50. At this age, trees are growing about 1-2 inches in diameter per decade.

Northern hardwood species are long-lived and need not be cut at this age. There is little risk of loss from natural causes up to an age of 160 years, or about 20 inches in diameter.



**Figure 1. Common trees of northern hardwood forests.**

In managed stands of mature northern hardwoods, gross volume growth typically ranges from 65 to 75 cubic feet per acre per year. In young stands we can expect about 100 to 125 cubic feet per acre per year.

In terms of board foot growth, the maximum we can expect is about 300 board feet per acre per year from intensively managed stands. Long-term average yields from well-managed stands are closer to 200-250 board feet per acre per year.

### Hazards and Pests

The risk of serious insect and disease problems in northern hardwoods is small compared to that in most other forest types. Insect defoliators often cause some twig dieback, but mortality is usually minor. A fairly new insect problem is basswood defoliation, caused by the introduced basswood thrips; however, there are no direct controls available at this time.

A more common problem is canker diseases caused by fungi. Cankers usually do not kill trees but may reduce stem quality for wood products.

Fire risk is quite low in northern hardwoods. When fires do occur, they usually smolder and spread slowly along the ground.

### Managing Young Stands

What should you do if you have stands that were cut heavily 10-20 years ago, and are now made up of only seedlings and saplings? If the saplings are mostly maple, it is best to keep the stand fairly dense until it is about 40 years old, so early treatment may not be needed.

However, if you have a fair amount of yellow birch or ash, species that need more light, you may want a **release treatment** to reduce competition for the better individuals. Consider a release treatment only if the stand is well stocked (at least 1,000 saplings per acre, about 7 feet apart).

Identify about 75-100 of these *crop trees* per acre and release them by cutting (or killing) any other trees that appear to be touching or interfering with their freedom to grow. This should leave 5 to 7 foot gaps between the edges of the crop trees' crowns and the crowns of other remaining trees.

This operation will typically produce little or no income; therefore remove only the direct competitors. You do not want to spend any more time or money than is necessary. A release treatment will improve species composition and keep the crop trees growing at high rates.

If you have older "pole stands," in which trees average 5-9 inches in diameter, a **commercial thinning**, that generates income, may be appropriate. Ideally, you would thin your stand every 10-15 years. The procedure is similar to a release treatment, pick your crop trees, about 75-100 per acre, and cut the competing trees and some of the other non-competitors. You will want to remove enough trees to make the thinning commercially attractive to prospective buyers. Your crop trees should be tall, straight trees with sizable crowns exposed to direct sunlight. The following chart shows how many trees should be retained after thinning in stands of different average diameter:

Average stand diameter (in) of overstory trees only	Trees per acre (for 85% crown cover)	Ave. spacing between overstory trees (ft.) after thinning
6	278	12
8	186	15
10	133	18
12	99	21
14	78	24

**Harvesting  
Mature Stands**

When northern hardwood stands mature, you can harvest them by using either the selection or shelterwood method (Figure 2). The selection method maintains or results in an uneven-aged stand, whereas the shelterwood maintains or develops even-aged conditions. In Wisconsin, a selection harvest is usually preferred.

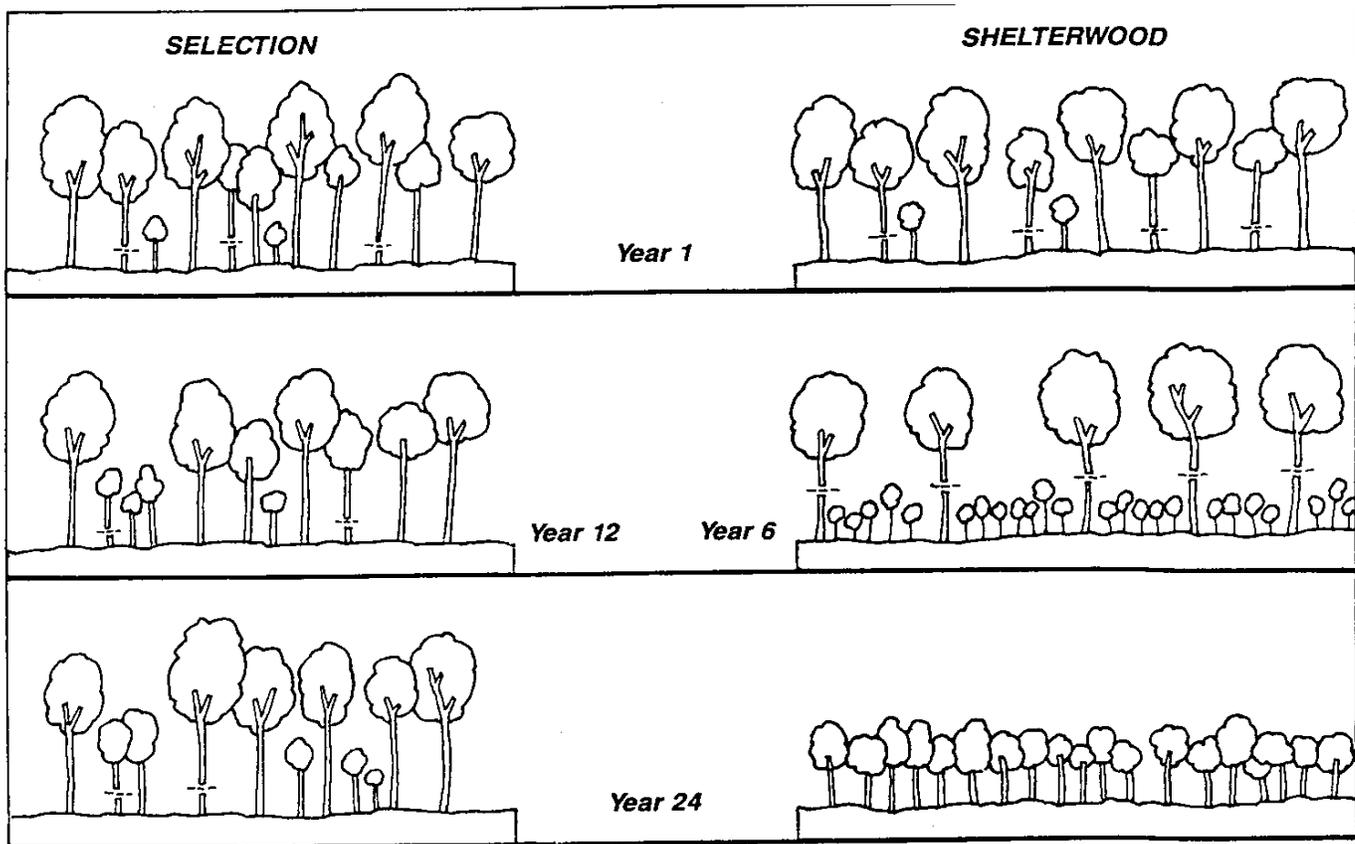
With a **selection harvest**, scattered individual trees are cut at periodic intervals such as every 10 or 15 years. Each cut is fairly light, removing no more than 30-35% of the trees.

**An important key to properly conducting a selection harvest is that trees of various sizes (6-30 inches in diameter) should be cut - not just the larger trees. This latter approach, a diameter-limit cut, can lead to a progressive lowering of stand quality and has rendered many stands almost worthless for timber production.**

That way you can make periodic selection cuts indefinitely. The following chart indicates what a stand should contain after a selection harvest (each stand should contain all of the size classes shown):

Some poor quality trees are removed as well to improve the stand. Often, it is possible to regulate the amount cut so that it equals the forest's growth. That way you can make periodic selection cuts indefinitely. The following chart indicates what a stand should contain after a selection harvest (each stand should contain all of the size classes shown):

Size in class (DBH in inches)	Trees per acre	Basal area (sq. ft. per A)
Sapling (2-4)	202	8
Poles (5-9)	65	16
Sawtimber (10-12)	18	12
Sawtimber (13-15)	14	15
Sawtimber (26+)	21	41
Stand Total	320	92



**Figure 2. A comparison of recommended harvest and regeneration methods for northern hardwoods. Horizontal lines indicate trees to be cut in a given year.**

Selection cutting in a stand where the trees are not fully mature (for example, a pole stand) requires a few modifications. If there are too many pole-sized trees compared to the recommendation in the chart above, mark the poles more heavily for cutting than in the other size classes.

Although a selection cut should not be too heavy, cuts that are too light will not be economical for a logger to harvest. Talk with your forester about the best intensity for your property.

With **shelterwood cutting**, all trees are removed in two or more steps. The first cut should leave about 60% of the ground shaded. This partial canopy provides seed for a new stand and also will "shelter" seedlings from too much exposure in the early years.

## Pros and Cons

### Selection

- good for small woodlots.
- provides periodic income.
- little site disturbance.
- favors sugar maple.
- range of tree sizes always present.
- little visual impact.

### Shelterwood

- greater variety of tree species.
- better wildlife habitat in first 20 years.
- poorer habitat in later years for some wildlife.
- long time before more harvest income.

To encourage yellow birch and white ash, be sure that you retain a number of good seed trees of these species on each acre. To promote yellow birch, scarify about 50% of the ground surface, preferably just after leaf fall.

Once the young trees are well established and about 45 feet tall (usually after 5-6 years), the partial overstory should be harvested. The young stand will now have room to grow.

## **Wildlife and Aesthetics**

Pole-sized northern hardwoods are not very good habitat for many wildlife species. Any type of cutting that lets in more light and encourages shrubs and herbs will improve conditions for many animals.

Mature stands with a good range of tree sizes provide excellent habitat for a number of interior bird species, including some neotropical migrants. Selection cutting that maintains this stand structure should have little negative impact on habitat for these animals. Leaving a few scattered snags (easy to do with a selection harvest) will provide homes for many cavity-nesting birds

To improve habitat for many game species of wildlife, species that require "edge" conditions, you may need to open up the forest by cutting some irregular patches. Narrow, irregular openings are better for most wildlife than a single large patch.

Northern hardwoods have great aesthetic appeal. A mix of tree sizes, including several large trees, on each acre pleases the eye of most people. In the autumn, when fall colors abound, it is hard to beat the beauty of sugar and red maple in northern hardwood forests.

Thinnings and selection harvests can actually enhance the aesthetic quality of northern hardwoods by hastening the growth of large stately trees while increasing visibility, reducing the impenetrable look, increasing the diversity of tree species and improving wildlife habitat.

For more information about forest management techniques and terminology, visit:

<https://woodlandinfo.org/publications/>

Also, contact a professional forester in your area for management advice and information. Find them on the Forestry Assistance Locator:

<https://dnr.wi.gov/fal/>

For more Forestry Facts: <https://forestandwildlifeecology.wisc.edu/forestry-facts/>