Forest Types of Michigan

MICHIGAN STATE UNIVERSITY | Extension

NORTHERN HARDWOOD FOREST TYPES

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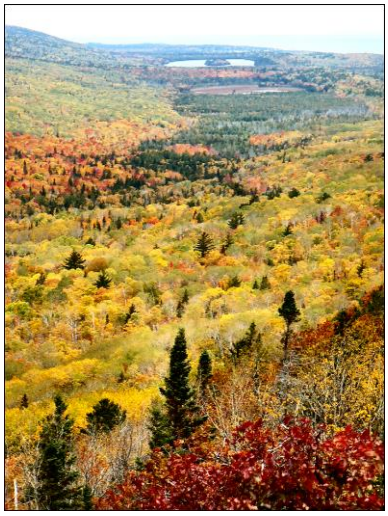
Northern hardwoods have been the most common forest type in Michigan for centuries. Currently, there are about five million acres and the area is increasing.[1] Around 1800, there were about 7.5 million acres. Northern hardwoods are not "just hardwoods that grow in the north". In Michigan, the term specifically applies to stands dominated by sugar maple. Associates are shade tolerant trees, including some conifers. Sun-loving species, such as aspen and paper birch, are sometimes present. Usually these species become established after the prior stand was disturbed and more sunlight was available.



High quality logs, especially sugar maple, command some of the highest prices in the region. Logs that have birds-eye or curly grain patterns are particularly valuable. Low quality material makes excellent pulp for paper-making and energy, where markets are available.

The Trees

Sugar maple, red maple, hemlock, basswood, and yellow birch are the most common trees in Michigan's northern hardwood (NH) forest. Typical secondary species are beech, black cherry, quaking aspen, and white ash. Later successional trees of the NH type have the ability to reproduce themselves under the shade of the forest canopy. The ability varies with species, but sugar maple is, perhaps, the most shade tolerant. Shade tolerant species usually have longer life spans.

The composition of NH stands varies widely, based on seed source, soil type, water conditions, stand history, etc. There are several NH variations; such as sugar maple-beech-yellow birch, sugar maple-basswood, sugar maple-beech, and others. In the western Upper Peninsula, beech disappears from the forest. In southern Michigan, central hardwood species appear, such as more oaks, hickories, and walnut. Northern hardwoods contain Michigan's single largest component of hemlock and a substantial portion of the white pine volume. The maples are most noted for their beautiful fall colors. They comprise over a quarter of all the forest volume in the state and continue to grow in abundance and size.[2]

Distribution

NH stands occur from Minnesota/Manitoba to New England and the Maritime Provinces, with a band running down the Appalachian Mountains. Some of the best developed and largest contiguous blocks grow in the Upper Peninsula and New York.

Ecology

The type has the highest level of tree diversity in Michigan, especially in the southern Lower Peninsula where central hardwood species blend in. A good share of the NH type tree diversity also comes from species common to earlier successional stages that persist in the stand. Generally, these species are shorter-lived and, over time, will drop out of the composition. Eventually, sugar maple tends to dominate NH stands because new seedlings can survive lower light levels and roots can penetrate leaf layers. Most other tree species require ground disturbance and more light. This dynamic is why some ecologists label NH stands as the successional "climax" on many sites.

Much of Michigan's NH type is even-aged, primarily due to past cutting practices. Management and natural succession trend toward an increasing amount of uneven-aged forest, which is preferred by most foresters on higher quality sites, as it better reflects stand ecology and produces higher quality timber. Relatively small gaps in the forest canopy provide the major mechanism for the natural reproduction of NH species. Gaps are usually created by wind and/or the death of large dominant trees or groups of trees. Higher levels of disturbance generally promote greater tree species diversity. NHs are fairly fire resistant; although records show a history of rare stand-replacing wildfires.

Management & Silviculture

Northern hardwoods can be managed using either even-aged or uneven-aged systems. On better sites, uneven-aged management is typical using the selection system (incorrectly called the "select" system or "select" cutting) and yields the highest monetary gains. A range of diameter classes is "marked" for removal in order to achieve a prescribed balance of size and age classes. The level of light plays a key role in the natural reproduction and growth rate of NH species. Stand density (the combination of tree size and number of trees) determines the amount of light available within and below the canopy. Stand density is measured using the number of square feet of tree trunks per acre. This is called "basal area". Harvesting stands on a 10-

Northern Hardwood Size Targets and Harvest Priorities

Classic Size Class Distribution		
dbh	Number of Trees/Acre	Basal Area
6	25.7	5.1
8	19.8	6.9
10	15.2	8.4
12	11.7	9.2
14	9.0	9.6
16	6.9	9.7
18	5.3	9.4
20	4.1	8.9
22	3.3	8.7
24	2.5	7.9

Sample Marking Removal Order
1. High risk trees 2. Highly defective trees 3. Trees with poor form 4. Crown position/favor crop trees 5. Tree diameter *The order of removal will vary with stand condition and landowner objectives.*

15 year cycle is typical, with the objective of manipulating stand density to maximize tree growth, health, and quality. Selection harvest prescriptions can vary widely. The services of a professional forester are especially important to balance stand capability with landowner objectives.

Single-tree selection creates many small gaps and generally favors sugar maple. Group selection creates larger gaps to encourage regeneration of more tree species, especially when mineral soil is exposed. However, gaps too large may result in heavy brush that might impede tree reproduction.

Harvest operations need to be carried out by experienced loggers. A good logger will provide good service with any kind of harvesting system, from horses to large processors. Special care needs to be taken to avoid damage to the residual stand. Ruts and soil compaction should be avoided. Winter logging will often eliminate negative soil impacts but will seldom expose mineral soil needed by many trees for regeneration. Timing of operations should be discussed with a forester.

On poorer sites, clearcutting or shelterwood systems may be desirable. Where NH types grow poorly, conversion to another forest type should be considered.

Maple syrup production is a management option. Crop trees and future crop trees should be given enough crown space to grow without competition. Large-crown trees will produce more sap. Keep in mind that the wounds from taps will introduce defect and stain, rendering a low value log. A sugar maple tree can provide either syrup or a quality log, but not both.

Tree Health Issues

Northern hardwoods are host to a large number of insects and diseases but serious damage is uncommon. Forest tent caterpillar populations reach epidemic levels on a 10-12 year cycle. The sugar maple borer may be the most serious insect pest of sugar maple. Other common damaging insects include the fall cankerworm, spring cankerworm, gypsy moth, bronze birch borer, and some aphids and scales. Common diseases include *Armillaria* root rot, *Eutypella* and *Nectria* cankers, brown and white rots, and *Anthracnoses*. Beech bark disease, a combination of a "scale" insect and several fungi, has had major impacts on the beech component of NH stands. High populations of deer, porcupines, squirrels, and rodents can seriously impact regeneration and survival of trees. Invasive species such as buckthorn, garlic mustard, ironwood, and Pennsylvania sedge can overtake an area precluding forest regeneration, especially in heavily browsed areas. Along with the emerald ash borer, Asian long-horned beetle, and exotic earthworms, a number of exotic pests will likely threaten NH forests in the future.

Sugar Maple Borer

The best defense against natural and exotic insects and diseases is a stand of healthy trees. High tree vigor, achieved through good management, will reduce the impact of tree-stressing events. NH species growing on low quality sites will be more readily impacted by drought, wet seasons, and other weather-related events.

Wildlife Habitat

NH stands are host to a wide range of wildlife species, some of which are rare or special species. Many species of "neotropical migrants", or migrating forest birds, utilize NH forests. NH types do not provide the best game species habitat.

Red Oak and Beech

Maintaining nut-producing trees can be important. This "hard mast" provides food for many species. It is a good idea to leave 6-8 large "snags" per acre for cavity-nesting species such as woodpeckers, flying squirrels, wood ducks, owls, and others. A few large logs per acre rotting on the ground provide habitat for other groups of wildlife, such as salamanders, small mammals, and insects. Conifers in NH stands offer protection from harsh weather. Small spring ponds (large puddles), springs, rock outcrops, and other interesting elements should be protected. This might mean a limited harvest or trail rerouting. Group selection harvest will likely increase the number of wildlife species in a stand. Forests along lakes and streams are particularly important for wildlife corridors. Steep slopes need to be considered in harvest operations due to erosion potential.

Eastern Hemlock

Well-managed NH stands are sometimes mistaken for "old growth" stands. On public lands, these stands are sometimes placed in "old growth" management programs, where timber harvest is restricted or eliminated.

Landowner Tips

- Develop a management plan
- Often the most complicated management of all forest types
- Prescriptions will vary considerably with stand composition, landscape, history, and other factors
- Consider planting hemlock and other conifers
- Hire a forester for volume estimation, marking, etc.
- Selection system based on stand condition
- Don't confuse selection harvesting with diameter-limit cutting, cutting all trees above a certain diameter
- NH types are usually maintained at 70-110 square feet of basal area/acre, with a prescribed distribution of size classes
- Weigh alternatives of single-tree selection, group selection, and even-aged management

See http://michigansaf.org for Forest Management Guidelines from the Michigan Society of American Foresters.

[1] Relative volumes of species are derived from the USDA Forest Service, Forest Inventory and Analysis Data [*http://www.fia.fs.fed.us/tools-data*].

[2] Ibid.