

Northern Hardwoods

Minnesota Silvicultural Guidelines

This document is adapted from the Minnesota DNR, Division of Forestry's Cover Type Guidelines. This fact sheet provides a brief overview of silvicultural considerations for northern hardwoods in Minnesota.

About the northern hardwoods community

Northern hardwoods occur on relatively rich, moist sites in northern Minnesota. Best growth will occur on sites with medium to fine soil textures, moderately well to well drained soil, constant moisture supply, good soil aeration, and a rooting zone (above bedrock) greater than 2 feet.

On good sites, northern hardwood stands can produce high quality red oak, sugar maple, and other sawtimber.

Major tree species

Sugar maple (*Acer saccharum*), paper birch (*Betula papyrifera*) yellow birch (*Betula alleghaniensis*), northern red oak (*Quercus rubra*), basswood (*Tilia americana*), trembling aspen (*Populus tremuloides*), white spruce (*Picea glauca*), and white pine (*Pinus strobus*).

Range in Minnesota

Northern hardwood communities are found on the right soil conditions throughout the Laurentian Mixed Forest province (right).



The Laurentian Mixed Forest province in Minnesota. (MNDNR image)

Silviculture

In most cases, northern hardwood stands should be managed with shelterwood, group selection, or selection silviculture. Clearcutting will produce even-aged stands with intolerant species such as aspens and oak well represented. All-aged systems require more intensive management with harvesting on a relatively short cycle. Tolerant species will dominate. In saw log stands, cut when basal area reaches 95 sq. ft. for all trees 10"+. Cut back to approximately 65 sq. ft. basal area, taking care to maintain quality genetic stock in the stand for future development.

Rotation ages

Optimal rotation age depends upon the silvicultural system used and the desired product. An all-aged (e.g. selection) system doesn't really have a rotation age but would require an 8 to 20 year cutting cycle between thinnings. Even-aged silviculture could require a rotation as short as 50 years for fiber products or wildlife habitat or as long as 120 years or more for aesthetics or large sawlogs. Quality hardwoods should be grown on fertile, well-drained soils with no heavy clay layer or bedrock within 2 feet of the surface.

Regeneration considerations

Regeneration will depend on the silviculture system chosen. Clearcut stands will regenerate from stump and root sprouts and seedlings established prior to harvest

(advanced regeneration). A shelterwood cut would regenerate from advanced regeneration, stump sprouts and/or planted seedlings. All-aged systems favor shade tolerant species, leading to a gradual loss of shade intolerant species.

Disease and pest considerations

Widespread mortality in the northern hardwood type is not common. Growth losses and periodic declines can occur following insect defoliation or adverse climatic conditions. The greatest volume losses in northern hardwood species are the result of disease organisms which discolor, decay, or deform standing timber.

Numerous defoliating insects cause minor damage through infrequent outbreaks. Canker diseases caused by *Nectria galligena* and *Eutypella parasitica* can reduce yields, cause minor mortality in young trees, and serve as openings for decay organisms. Occasional tree mortality can be caused by shoestring root rot, *Armillaria* spp., and sapstreak disease, caused by *Ceratocystis coerulea*, in wounded or stressed trees.

Management recommendations to reduce losses: Most of the insect and disease threats to the northern hardwood type are minor enough that they do not lead to widespread mortality. New insect and disease introductions such as Gypsy moth (*Lymantria dispar*) and emerald ash borer (*Agrilus planipennis*) have potential to change the dynamic in these systems. However, in most cases maintaining overall stand vigor will adequately protect northern hardwood stands from widespread insect and disease damage.

Wildlife considerations

Heavily stocked northern hardwood stands make relatively poor habitat for most game species because of lack of browse and mast. However, some non-game species will benefit from northern hardwoods, especially old stands. Northern hardwood stands can provide excellent interior forest habitat required by some native wildlife. However, extensive northern hardwood acreage can be enhanced for game wildlife through age class diversity and creation of openings.

Special silvicultural considerations for northern hardwoods

1. Leave quality timber in the residual stand. In any partial harvest, it's important to maintain quality timber in the stand for future harvest. Trees that are suppressed and stunted for extended periods generally do not improve after release. In order to maintain stand quality, be sure to leave trees in a dominant canopy position and with good form. Failure to do this will lead to stagnant, less productive stands with reduced future potential value.

2. Protect site quality. Take special care to avoid compaction, rutting, and erosion. Northern hardwood stands tend to grow on soils that are vulnerable to compaction and rutting due to their texture, moisture, and uneven topography. Extensive damage of this type can lead to long-term degradation of site quality, leading to reduced stand vigor, insect and disease problems, and poor regeneration.

References for more detail

Field Guide to the Native Plant Communities of Minnesota: The Laurentian Mixed Forest Province. 2003. MNDNR, St. Paul, MN.

Field Guide to the Native Plant Communities of Minnesota: The Eastern Broadleaf Forest Province. 2005. MNDNR, St. Paul, MN.

Sustaining Minnesota Forest Resources: Voluntary Site-Level Forest Management Guidelines for Landowners, Loggers, and Resource Managers. 2005. Minnesota Forest Resources Council, St. Paul, MN.

Silvics of North America. Agriculture Handbook 654. Online at http://www.na.fs.fed.us/spfo/pubs/silvics_manual/table_of_contents.htm. 1990. USDA, Washington, DC.