

Forest Habitats of the Long Lake Conservation Center

Habitat Type	Native Plant Community Code
<u>Northern Wet-Mesic Hardwood Forest</u>	MHn46
<u>Northern Mesic Hardwood Forest</u>	MHn35
<u>Northern Cedar Swamp</u>	FPn63
<u>Northern Dry-Mesic Mixed Woodland</u>	FDn33
<u>Northern Poor Conifer Swamp</u>	APn81
<u>Northern Poor Fen</u>	APn91
<u>Northern Alder Swamp</u>	FPn73
<u>Northern Wet Meadow/Carr</u>	WMn82

MHn46, Northern Wet-Mesic Hardwood Forest

General Description

Wet-Mesic lowland hardwood forests on level sites with clayey subsoils or high local water tables.

Disturbance Regime for MHn46: Northern Wet-mesic Hardwood Forest

Northern Wet-mesic Hardwood Forest occurs mostly on fine-textured calcareous soils in landscapes with high water tables. Such sites were occasionally subject to fires due mostly to their proximity to forests with conifers rather than any inherent site characteristics. Stand-regenerating mortality attributed to catastrophic fire is estimated* to have occurred on a rotation of 600 years. The rotation of catastrophic windthrow is estimated to be about 800 years. Approximately 2% of the presettlement landscape consisted of stands with evidence of catastrophic fire and about 2% showed signs of catastrophic windthrow.

Disturbances resulting in partial mortality of the canopy were more frequent and are presumed to have been mostly windthrow of disease-weakened trees. These stand-maintenance disturbances were evident on about 3% of the presettlement landscape and yielding a rotation of about 160 years. Disturbances of this scale or finer are believed to be responsible for most of the seral change in tree composition.

Two compositional growth-stages separated by a long transitional period are inferred from the historic landscape composition and age-structure of these forests:

Age 0-35 years-Young forests recovering from fire or wind were strongly dominated by quaking aspen. The aspen was mixed with minor amounts of paper birch, black ash, basswood and American elm.

Age 35-95 years-The first transition period is a long episode of rather constant change in tree abundance. Quaking aspen steadily declines. White spruce becomes established and increases dramatically. Paper birch, black ash, basswood and American elm increase significantly. White pine can become established at this stage if a seed source is nearby. Bur oak, red maple and balsam fir were minor components of the forest that peak during this transition.

Age > 95 years-Mature forests were characterized by mixed stands of quaking aspen and white spruce mixed with less paper birch, black ash, basswood and American elm. Once this composition is reached at about age 95 years, there is little change. Apparently these forests were maintained by events of mortality and regeneration that conferred no obvious advantage to one species over another.

* Estimates based upon the analysis of 3,267 Public Land Survey records for section and quarter-section corners. Catastrophic fire and wind rotations were calculated using a 15-year recognition window. Stand-maintenance disturbance was assumed to be mostly windthrow following disease. Stand-maintenance rotation was calculated using a 5-year recognition window.

Plants Found at Long Lake Conservation Center

Ground Layer: Lady Fern, Wild Sasparilla, Canada Mayflower, Dwarf Raspberry, Big-leaf Aster, Pennsylvania Sedge

Shrub Layer: Beaked Hazelnut, Black Ashm Red Maple, Basswood Seedlings,

Subcanopy: Black Ash, Basswood, Red Maple

Canopy: Black Ash, Basswood, Quaking Aspen, Northern Red Oak, Red Maple

MHn35, Northern Mesic Hardwood Forest

General Description

Mesic to dry-mesic hardwood forests on well-drained to moderately well-drained loamy soils, most often on stagnation moraines and till plains and less frequently on bedrock.

Disturbance Regime for MHn35: Northern Mesic Hardwood Forest

Northern Mesic Hardwood Forest occurs mostly on landforms with rugged topography and deep, moist, fine-textured soils. Catastrophic disturbance was rare on such sites in northern Minnesota. Stand-regenerating mortality attributed to catastrophic fire is estimated* to have occurred on a rotation of 970 years. The rotation of catastrophic windthrow is also estimated to be quite long, about 1,270 years. Approximately 2% of the presettlement landscape consisted of stands with evidence of catastrophic fire and less than 1% showed signs of catastrophic windthrow.

Disturbances resulting in partial mortality of the canopy were more frequent and probably involved both light surface fires and small areas of windthrow. These stand-maintenance disturbances were evident on about 4% of the presettlement landscape and believed to have had a rotation of about 130 years. Fine-scale mortality involving individual trees or small groups of trees are believed to be responsible for most of the seral change in tree composition.

Three compositional growth-stages separated by two periods of transition are inferred from the historic landscape composition and age-structure of these forests:

Age 0-55 years-Young forests recovering from fire or wind were dominated by paper birch and quaking aspen, with less sugar maple, red oak, and basswood.

Age 55-95 years-The first transition period is marked by the gradual decline of paper birch, aspen and red oak; slow replacement of these species by sugar maple, white spruce, and basswood; and the arrival of white pine.

Age 95-205 years-A mature forest is characterized by mixed stands of paper birch, sugar maple and white spruce, with less basswood and white pine; some old aspen and red oak persisted in this stage. These mature forests were all-aged and were maintained by fine-scale events of mortality and regeneration.

Age 205 to 295-The transition to very old forests is marked by a significant increase in white spruce and white pine and a marked decline of paper birch.

Age > 295-The resulting very old forest was dominated by white pine and white spruce with modest amounts of paper birch. The apparent succession to white pine is the result of the fact that white pine is about the only tree that we often calculated to be over 200 years old. Very old forest and the transition leading up to it accounted for just 2% of the presettlement landscape, and it is probably best described as rare, scattered groves of very large white pine mixed with younger white spruce and paper birch.

* Estimates based upon the analysis of 5,887 Public Land Survey records for section and quarter-section corners. Catastrophic fire and wind rotations were calculated using a 15-year recognition window. Stand-maintenance disturbance was assumed to be a combination of surface fires and wind. Stand-maintenance rotation was calculated using a 5-year recognition window.

Plants Found at Long Lake Conservation Center

Ground layer: Wild Sasparilla, Large-leafed Aster, Mountain Rice Grass, Rose Twistedstalk, Pennsylvania Sedge, Sweet-scented Bedstraw, Large-flowered Bellwort, Bluebead Lily

Shrub-layer: Sugar Maple, Beaked Hazelnut, Chokecherry, Dogwood, Fly Honeysuckle, Balsam Fir

Subcanopy: Sugar Maple

Tree Canopy: Sugar Maple, Basswood, Northern Red Oak, Paper Birch, Quaking Aspen

FPn63, Northern Cedar Swamp

General Description

White cedar-dominated swamps on wet peat soils. Often present in areas influenced by mineral-rich subsurface flow or groundwater seepage along the margins of uplands and peatlands.

Disturbance Regime for FPn63: Northern Cedar Swamp

Northern Cedar Swamp occurs on deep *Sphagnum* peats in wet landscapes across northern Minnesota. Such sites rarely burned. Such sites have structurally weak soils and the trees are shallowly rooted, making them susceptible to windthrow. Stand-regenerating mortality attributed to catastrophic fire is estimated* to have occurred on a rotation of 920 years. The rotation of catastrophic windthrow is estimated to be about 600 years. About 1% of the presettlement landscape consisted of stands with evidence of catastrophic fire and about 2% showed signs of catastrophic windthrow.

Disturbances resulting in partial mortality of the canopy were also rather rare and are presumed to have been patchy windthrow. These stand-maintenance disturbances were evident on about 1% of the presettlement landscape, resulting in a rotation of about 380 years. Fine-scale disturbances are believed to be responsible for most of the seral change in tree abundance.

Three compositional growth stages are inferred from the historic landscape composition and age-structure of these forests:

- **Age 0-55 years**-Young forests recovering from fire or wind were mixed forests of balsam fir, white cedar and tamarack. Black spruce is present at low abundance.
- **Age 55-115 years**-Mature forests were strongly dominated by white cedar mixed with some tamarack, black spruce and balsam fir.
- **Age >115 years**-Old forests return to a rather mixed condition dominated by white cedar and tamarack with some balsam fir and black spruce. The resurgence of tamarack and some balsam fir is believed to be related to structural change in the canopy of white cedar. Mature forests probably had a rather continuous canopy of white cedar, which breaks apart as stands age with tamarack and some fir filling the gaps.

* Estimates based upon the analysis of 923 Public Land Survey records for section and quarter-section corners. Catastrophic fire and wind rotations were calculated using a 15-year recognition window. Stand-maintenance disturbance was assumed to be patchy windthrow. Stand-maintenance rotation was calculated using a 5-year recognition window.

Plants Found at Long Lake Conservation Center

Forb Layer: Starflower, Goldthread, Naked Miterwort

Low-shrub layer: Labrador Tea

Canopy: Balsam Fir, Black Spruce

FDn33, Northern Dry-Mesic Mixed Woodland

General Description:

Dry-Mesic conifer, conifer-hardwood, or hardwood woodlands dominated by red pine, white pine, jack pine, black spruce, quaking aspen, or paper birch. Most common on sandy soils but also present on shallow, loamy soils over bedrock. Crown and surface fires were common historically.

Disturbance Regime for FDn33: Northern Dry-mesic Mixed Woodland

Northern Dry-mesic Mixed Woodland occurs on sandy and gravelly soils that are prone to occasional drought. Such sites are subject to severe summer and fall fires and milder spring fires. Stand-regenerating mortality attributed to catastrophic fires is estimated* to have occurred on a rotation of 220 years. The rotation of moderate surface fires is estimated to be 77 years. Approximately 7% of the presettlement landscape consisted of stands with evidence of recent catastrophic fire and 7% with evidence of milder surface fire.

Windthrow seems to have played a minor role in regenerating stands of Northern Dry-mesic Mixed Woodland. Less than 1% of the presettlement landscape consisted of stands with evidence of catastrophic windthrow, resulting in a calculated rotation of 1,130 years.

Three compositional growth-stages and one transitional period are inferred from the historic landscape composition and age-structure of these forests:

- **Age 0-35 years**-Young forests recovering from fire or wind were dominated by quaking aspen mixed with red pine, jack pine and paper birch.
- **Age 35-55 years**-The first transition period is marked by a precipitous decline of quaking aspen and steady decline of jack pine; replacement of these species by red pine and paper birch; and the arrival of white pine and some white spruce and balsam fir.
- **Age 55-125 years**-A mature forest is characterized by mixed stands of red pine, paper birch, and white pine with some old quaking aspen persisting. These mature forests were probably multiple aged with cohorts of red pine, white pine and paper birch dating to surface fire(s).
- **Age ~125**-The transition to very old forests seems to happen rather quickly with no age class intermediate between mature and old forests. It is marked by a significant decline in red pine mirrored by a similar increase in white pine and some white spruce.
- **Age > 125**-The resulting old forest was dominated by white pine and mixed with some red pine, paper birch, and white spruce. Such old forests probably approached an all-aged structure as white pine, white spruce and some fir were continuously recruited into stands until they burned catastrophically.

* Estimates based upon the analysis of 6,807 Public Land Survey records for section and quarter-section corners. Catastrophic fire and wind rotations were calculated using a 15-year recognition window. Stand-maintenance disturbance was assumed to be mostly surface fires. Stand-maintenance rotation was calculated using a 5-year recognition window.

Plants Found at Long Lake Conservation Center

Ground layer: Canada Mayflower, Wild Sasparilla, Large-leaved Aster, Bracken, Mountain Rice Grass

Shrub Layer: Beaked Hazelnut, Juneberries, Bush Honeysuckle, Balsam Fir, Red Maple

Subcanopy: Red Maple, Balsam Fir, Paper Birch

Canopy Cover: Paper Birch, Red Maple, Red Pine, Quaking Aspen

APn91, Northern Poor Fen

General Description

Open Sphagnum peatlands with variable development of hummocks and hollows. Dominated either by fined-leaved sedges or low shrubs. Present in small basins, on floating mats near lakes and ponds, and in large peatlands

Plants Found at Long Lake Conservation Center

Forb: Pitcherplant, Round-leaved Sundew, Scheuchzeria

Graminoid layer: Fen Wiregrass Sedge

Low Shrub layer: Leatherleaf, Bog Rosemary, Bog Laurel, Small Cranberry

Tree: Black Spruce, Tamarack

APn81, Northern Poor Conifer Swamp

General Description

Conifer dominated peatlands with sparse canopy of stunted trees. Understory is depauperate and dominated by ericaceous shrubs, fine-leaved graminoids, and low hummocks of Sphagnum moss. Minerotrophic plant species are present.

Disturbance Regime for APn81: Northern Poor Conifer Swamp

Northern Poor Conifer Swamp occurs on deep *Sphagnum* peats across the forested portions of Minnesota. Such sites burned rarely, perhaps because of their tendency to occupy wet landscapes or areas where the upland forests are mostly hardwoods. These sites have structurally weak soils and the trees are shallowly rooted, making them susceptible to some windthrow. Stand-regenerating mortality attributed to catastrophic fire is estimated* to have occurred on a rotation of 570 years. The rotation of catastrophic windthrow is estimated to be about 520 years. About 1% of the presettlement landscape consisted of stands with evidence of catastrophic fire and about 3% showed signs of catastrophic windthrow.

Disturbances resulting in partial mortality of the canopy were more frequent and are presumed to have been patchy windthrow and light surface fires. These stand-maintenance disturbances were evident on about 6% of the presettlement landscape, resulting in a rotation of about 90 years.

This community is very strongly dominated by tamarack, which averages 71% of the PLS bearing trees in all age classes. Black spruce is the co-dominant tree (about 25% of PLS bearing trees) and it too shows little change in relative abundance among age-classes. Thus, there is no clear succession of trees. The historic abundance of tamarack differs from the modern condition where black spruce more abundant in this community. This shift in dominance in historic times is seen across northern Minnesota and is due in part to large, successive outbreaks of larch sawfly in the 20th century.

* Estimates based upon the analysis of 3,818 Public Land Survey records for section and quarter-section corners. Catastrophic fire rotations were estimated with a 5-year recognition window. Catastrophic wind rotations were calculated using a 15-year recognition window. Stand-maintenance disturbance was assumed to be patchy windthrow and light surface fires. Stand-maintenance rotation was calculated using a 5-year recognition window.

Plants Found at Long Lake Conservation Center

Forb: Three-leaved false Salmon's seal, Pitcherplant

Graminoid: Three-fruited bog sedge

Low Shrub: Labrador tea, Leatherleaf

Tall Shrub: Speckled Alder, Bog Birch, Willow

Understory: Black Spruce, Tamarack

Canopy: Black Spruce, Tamarack

FPn73, Northern Alder Swamp

General Description

Tall shrub wetlands dominated by speckled alder on mineral, muck, or peat soils. Present in wetland basins on glacial moraines and till plains, along streams and drainage ways, or in lags along peatland and upland borders.

Plants Found at Long Lake Conservation Center

Graminoid layer: Bluejoint, Bristle-stalked Sedge

Forb layer: Dwarf Raspberry, Crested Fern, Spinulose Shield Fern, Canada Mayflower

Low-Shrub layer: Red Raspberry

Tall-Shrub layer: Speckled Alder

Trees: Paper Birch, Red Maple

WFn55, Northern Wet Ash Swamp

General Description

Wet hardwood forests on mucky mineral soils in shallow basins and groundwater seepage areas or on low, level terrain near rivers, lakes, or wetlands. Typically with standing water in the spring but draining by late summer.

Disturbance Regime for WFn55: Northern Wet Ash Swamp

Northern Wet Ash Swamp occurs mostly on wet mucky soils across northern Minnesota. Such sites rarely burn because they are too wet. Such sites have structurally weak soils and the trees are shallowly rooted, making them susceptible to windthrow. Stand-regenerating mortality attributed to catastrophic fire is estimated* to have occurred on a rotation of 1,650 years. The rotation of catastrophic windthrow is estimated to be about 370 years. Less than 1% of the presettlement landscape consisted of stands with evidence of catastrophic fire and about 4% showed signs of catastrophic windthrow.

Disturbances resulting in partial mortality of the canopy were more frequent and are presumed to have been patchy windthrow. These stand-maintenance disturbances were evident on about 4% of the presettlement landscape, resulting in a rotation of about 140 years. Disturbances of this scale or finer are believed to be responsible for most of the seral change in tree composition.

This community shows slight but constant succession of tree dominance, which means that the growth-stages and transition period are somewhat arbitrary. For convenience, three compositional growth-stages are tentatively inferred from the historic landscape composition and age-structure of these forests:

- **Age 0-75 years**-Young forests recovering from wind or fire were strongly dominated by black ash. Yellow birch, paper birch, quaking aspen and balsam fir are present at low abundance and peak in this growth-stage.
- **Age 75-195 years**-Mature forests are dominated by black ash. Longer-lived conifers such as white cedar, tamarack and white spruce partly replace yellow birch, paper birch, quaking aspen and balsam fir.
- **Age > 195 years**-Very old forests were still dominated by black ash, but the ash is more evenly mixed with tamarack, white spruce, balsam fir and white cedar.

“Succession” in this community amounts to modest changes in tree abundance around a constant base of black ash which dominates all age-classes. Younger age-classes have more deciduous trees and older age-classes have more conifers.

* Estimates based upon the analysis of 1,382 Public Land Survey records for section and quarter-section corners. Catastrophic fire and wind rotations were calculated using a 15-year recognition window. Stand-maintenance disturbance was assumed to be mostly windthrow following disease. Stand-maintenance rotation was calculated using a 5-year recognition window.

Plants Found at Long Lake Conservation Center

Ground layer: Lady Fern, Dwarf Raspberry

Shrub layer: Black Ash, Beaked Hazelnut

Sub-Canopy: Red Maple, American Elm, Quaking Aspen

Canopy: Black Ash, Red Maple, Quaking Aspen

WMn82, Northern Wet Meadow/Carr

General Description

Open wetlands dominated by dense cover of broad-leaved graminoids or tall shrubs. Present on mineral to sapric peat soils in basins and along streams.

Disturbance Regime for WFn55: Northern Wet Ash Swamp

WMn82 is subjected to moderate inundation following spring runoff and heavy rains, and periodic drawdowns during summer. Peak water levels are high enough and persistent enough to prevent trees (and often shrubs) from becoming established, although there may be little or no standing water much of the growing season. As a result of water-level fluctuations, the surface substrate alternates between aerobic and anaerobic conditions. Any organic matter that may accumulate over time is usually oxidized during drawdowns following drought or is removed by fire. Where deep peat is present in the community, it likely was formed previously on the site by a peat-producing community—such as a forested rich peatland—that was flooded by beaver activity and ultimately converted to a wet meadow. Deep peat may also develop from debris settling into basins with standing water, forming sedimentary peat. Because surface water in WMn82 is derived from runoff, stream flow, and groundwater sources, it has circumneutral pH (6.0–8.0) and high mineral and nutrient content. Although mosses are typically sparse in WMn82 because of alternating flooding and drawdown, moss cover can be relatively

high in settings where water levels have become stabilized. In these situations, it appears that Sphagnum can quickly invade the community, especially on floating mats that are completely above the water surface. The water chemistry in these sites can be rapidly converted by Sphagnum to rich fen or even poor fen conditions before characteristic wet meadow species, especially wide-leaved sedges, have been replaced by plants of rich or poor fens such as narrow-leaved sedges. The process of succession of WMn82 to rich or poor fens is readily reversed by return of higher or more variable water levels, such as from beaver activity or variation in precipitation.

Landscape Setting & Soils

WMn82 occurs in wetland basins on a variety of landforms. It is also associated with streams and drainageways, drained beaver ponds, shallow bays, and semifloating mats on lakes. Soils range from mineral or muck soil to sapric peat. Organic sediments are typically shallow but can be deep (> 15in [40cm]) in basins filled by sedimentary peat or where WMn82 has succeeded an Open Rich Peatland community following changes to the hydrology of the basin.

Plants Found at Long Lake Conservation Center

Ground layer: Brown Mosses, Sphagnum Species, Bluejoint Grass, Lake Sedge, Tussock Sedge, And Beaked Sedge, Marsh Bellflower, Bog Willowherb, Grasping Marsh Bedstraw, Northern Bugleweed, Great Water Dock, White Meadowsweet, Eastern Marsh Fern, Small White Violet

Shrub layer: Alder Species, Willow Species, Bog Birch, Dwarf Red Raspberry, Red Osier Dogwood

Sub-Canopy: Red Maple, Paper Birch, Blash Ash

Canopy: Tamarack