



Northern Wet-Mesic Boreal Hardwood-Conifer Forest

Wet-mesic or mesic hardwood and hardwood-conifer forests, most commonly on level, clayey sites with high local water tables on glacial lake deposits, stagnation moraines, and till plains.

Vegetation Structure & Composition

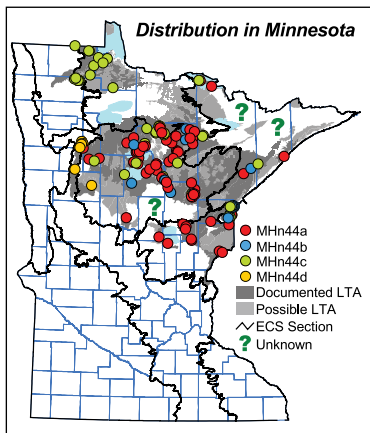
Description is based on summary of vegetation data from 153 plots (relevés).

- **Ground layer** is usually interrupted to continuous (50–100% cover), with Canada mayflower (*Maianthemum canadense*), wild sarsaparilla (*Aralia nudicaulis*), sweet-scented bedstraw (*Galium triflorum*), dwarf raspberry (*Rubus pubescens*), and large-leaved aster (*Aster macrophyllus*) most frequent.

- **Shrub layer** has variable cover and is composed primarily of deciduous species, especially beaked hazelnut (*Corylus cornuta*). Other important shrub species include chokecherry (*Prunus virginiana*), bush honeysuckle (*Diervilla lonicera*), juneberries (*Amelanchier* spp.), and mountain maple (*Acer spicatum*).

- **Subcanopy** is poorly developed. Balsam fir, black ash, quaking aspen, paper birch, and red maple are most important.

- **Canopy** cover is variable, usually dominated by quaking aspen, often with paper birch and balsam fir and less frequently with white spruce, red maple, black ash, or basswood. In the SSU, the canopy may be dominated by white pine, white spruce, and paper birch rather than quaking aspen.



Landscape Setting & Soils

- **Dissected glacial lake sediments**—Common. Present on slopes, alluvial bottoms, and old river oxbows. On slopes, the parent material is silty clay, and soils are saturated in the spring and dry slowly throughout the growing season but appear to receive some groundwater input throughout the year. These soils are moderately well drained, and the soil-moisture regime is very fresh. On bottomlands and oxbows, the parent material is sandy alluvium. Soil colors indicate that the water table is about 60in (150cm) deep. These soils are moderately well drained, and the soil-moisture regime is fresh. (SSU)

- **Stagnation moraines**—Common. Present on level areas within otherwise hummocky terrain. Parent material is fine-textured, calcareous till. Organic material on the soil surface can be up to 5in (13cm) thick and is well decomposed. Soils have firm, clayey subsoil horizons that perch snowmelt and rainwater just above the water table. Gray soil colors indicating prolonged saturation are present within 20–30in (50–75cm) of the soil surface. Soils are somewhat poorly drained. Soil-moisture regime is moderate to very moist. (MDL; WSU; Hardwood Hills in MIM; Littlefork Vermilion Uplands in MOP; Nashwauck Uplands and North Shore Highlands in NSU)

- **Till plains**—Common. Landscape is level to undulating. Parent material is fine-textured, calcareous till. Organic material on the soil surface can be up to 5in (13cm) thick and is well decomposed. Soils have firm, clayey subsoil horizons that perch snowmelt and rainwater just above the water table. Gray soil colors indicating prolonged saturation are present within 20–30in (50–75cm) of the soil surface. Soils are somewhat poorly or poorly drained. Soil-moisture regime is very moist. (MDL; WSU; Littlefork-Vermilion Uplands in MOP; Toimi Uplands and Nashwauck Uplands in NSU)

- **Sandy glacial lake sediments (including shoreline features and small outwash plains)**—Occasional. Landscape is flat to undulating. On lake plains, parent material is well-sorted fine sand. Organic material on the soil surface can be up to 6in (15cm) thick,



but soils dry seasonally to a depth of about 12in (30cm), preventing accumulation of peat. Gray soil colors present below 6–15in (15–40cm) indicate a high and apparently stable water table. Soils are poorly drained, and the soil-moisture regime is very moist. On shoreline features and outwash, parent material is stratified sand and gravel. Organic material on the surface is up to 4in (10cm) thick, but soils dry seasonally to depths of 12–60in (30–150cm), preventing accumulation of peat. Gray soil colors are usually present somewhere in the upper 60in (often above clayey lake sediments), indicating a high and somewhat stable water table perched on lake clays. Both gray and bright mottles are present in the sandy material between 12 and 24in (30–60cm), indicating seasonal soil saturation within the rooting zone. Soils are somewhat poorly drained to moderately well drained, and the soil-moisture regime is moderately moist to very moist. (MOP; LAP; Chippewa Plains and Tamarack Lowlands in MDL; North Shore Highlands in NSU)

Natural History

In the past, catastrophic disturbances were rare in MHn44. An analysis of Public Land Survey records indicates that the rotation of catastrophic fires was about 430 years, and the rotation of catastrophic windthrow was about 960 years.¹ Events that result in partial loss of trees, such as light surface fires and patchy windthrow, were much more common, with an estimated rotation of about 160 years. Based on the historic composition and age structure of these forests, MHn44 had three growth stages and one long period of transition.

- **0–35 years**—Young forests recovering from fire or wind, strongly dominated by quaking aspen with minor amounts of paper birch and balsam fir.
- **35–95 years**—A transition period marked by a steady decline in quaking aspen and its replacement by white spruce, paper birch, and balsam fir. Some white pine seedlings become established in the understory during this transition.
- **95–195 years**—Mature forests characterized by mixed canopies of white spruce, quaking aspen, paper birch, and balsam fir. (Modern mature forests can have considerable amounts of red maple and black ash, which were rarely documented in the historic records.)
- **> 195 years**—Very old forests similar in composition to mature forests but with more white pine and also with some basswood.

Similar Native Plant Community Classes

• MHn46 Northern Wet-Mesic Hardwood Forest

MHn46 when dominated by quaking aspen (MHn46a) can be similar to MHn44 when dominated by hardwoods (MHn44a, MHn44c, or MHn44d). MHn46 is more likely to have species indicative of richer sites and with affinity for black ash–dominated WFn communities. MHn44 is more likely to have species indicative of poorer sites and with affinity for conifer-dominated WFn communities.

MHn44 Indicator Species	(freq%)		MHn46 Indicator Species	(freq%)	
	MHn44	MHn46		MHn44	MHn46
False melic grass (<i>Schizachne purpurascens</i>)	15	-	Common enchanter's nightshade (<i>Circaea lutetiana</i>)	1	17
Kidney-leaved violet (<i>Viola renifolia</i>)	12	-	Sensitive fern (<i>Onoclea sensibilis</i>)	4	34
Twinnflower (<i>Linnaea borealis</i>)	11	-	Ostrich fern (<i>Matteuccia struthiopteris</i>)	4	20
Balsam fir (C)	42	5	Winterberry (<i>Ilex verticillata</i>)	5	27
Lowbush blueberry (<i>Vaccinium angustifolium</i>)	16	2	Erect, Smooth, or Illinois carrion-flower*	6	29
White spruce (C,U)	26	7	Virginia creeper (<i>Parthenocissus</i> spp.)	8	37
Skunk currant (<i>Ribes glandulosum</i>)	8	2	Nannyberry (<i>Viburnum lentago</i>)	11	34
Balsam poplar (U)	22	7	Jack-in-the-pulpit (<i>Arisaema triphyllum</i>)	19	54

* Erect, Smooth, or Illinois carrion-flower (*Smilax ecirrata*, *S. herbacea*, or *S. illinoensis*)

¹Forested communities that extend into the prairie regions of Minnesota tend to have shorter rotations of disturbance from fire (and often wind) on the western edge of their range compared with the eastern part. This probably results from drier climate in the west and being surrounded by prairie vegetation that burns frequently. Because estimated rotations of disturbance for forested communities are calculated from PLS bearing-tree records across the range of the community, and records in the prairie regions are often much sparser than those to the east, disturbance rotations may be much shorter for forest stands in the prairie regions than those presented for the class as a whole.



• MHn35 Northern Mesic Hardwood Forest

MHn35 can be similar to MHn44, especially when quaking aspen is abundant in the canopy (MHn35a). MHn35 is more likely to have species with affinity for well-drained soils and generally lacks the wet depressions common in MHn44. MHn44 is more likely to have species with affinity for WFn communities, indicating moister soil conditions or the presence of wet depressions.

MHn44 Indicator Species		(freq%)		MHn35 Indicator Species		(freq%)	
	MHn44	MHn35		MHn44	MHn35		
Balsam poplar (U)	24	2	Leatherwood (<i>Dicra palustris</i>)	3	44		
White spruce (C)	31	5	Ironwood (C,U)	15	74		
Swamp red currant (<i>Ribes triste</i>)	27	6	Big-toothed aspen (C,U)	3	16		
Naked miterwort (<i>Mitella nuda</i>)	55	14	Northern red oak (C)	8	31		
Balsam fir (C)	41	11	Common false Solomon's seal (<i>Smilacina racemosa</i>)	5	17		
American hazelnut (<i>Corylus americana</i>)	20	6	Basswood (C)	20	55		
Palmette sweet coltsfoot (<i>Petasites frigidus</i>)	49	14	Sugar maple (C,U)	32	90		
Black ash (U)	68	22	Large-flowered bellwort (<i>Uvularia grandiflora</i>)	31	78		

• Fdn43 Northern Mesic Mixed Forest

Fdn43 can be similar to MHn44 when dominated by quaking aspen, paper birch, white pine, white spruce, or balsam fir (Fdn43a or Fdn43b). The ranges of the two classes overlap mainly along the western edge of the NSU and in the northern half of the WSU. Fdn43 is more likely to have species with affinity for poorer soils developed from noncalcareous drift, while MHn44 is more likely to have species with affinity for richer soils developed from calcareous drift.

MHn44 Indicator Species		(freq%)		Fdn43 Indicator Species		(freq%)	
	MHn44	Fdn43		MHn44	Fdn43		
Wild ginger (<i>Asarum canadense</i>)	62	1	Mountain ashes (U)	5	51		
Clayton's sweet cicely (<i>Osmorhiza claytonii</i>)	68	2	Velvet-leaved blueberry (<i>Vaccinium myrtilloides</i>)	5	40		
Large-flowered bellwort (<i>Uvularia grandiflora</i>)	31	1	Black spruce (U)	3	20		
Pennsylvania sedge (<i>Carex pensylvanica</i>)	72	4	Thimbleberry (<i>Rubus parviflorus</i>)	5	27		
Early meadow-rue (<i>Thalictrum dioicum</i>)	59	3	Red pine (C)	5	27		
Prickly gooseberry (<i>Ribes cynosbati</i>)	44	3	Twinflower (<i>Linnaea borealis</i>)	12	62		
Maryland black snakeroot (<i>Sanicula marilandica</i>)	64	5	Running clubmoss (<i>Lycopodium clavatum</i>)	6	30		
Round-lobed hepatica (<i>Anemone americana</i>)	42	5	White pine (C,U)	15	47		

Native Plant Community Types in Class

• MHn44a Aspen - Birch - Red Maple Forest

Wet-mesic to mesic forests dominated by quaking aspen, paper birch, or red maple, often with balsam fir. Less frequent canopy species are basswood, bur oak, white spruce, black ash, green ash, northern red oak, and sugar maple. Subcanopy composition is variable, with red maple, balsam fir, quaking aspen, black ash, and paper birch most common. When present, red maple in the canopy helps to differentiate MHn44a from the other types in this class. MHn44a has been documented primarily in the MDL and the northern half of the WSU. Description is based on summary of vegetation data from 68 plots.

• MHn44b White Pine - White Spruce - Paper Birch Forest

Mesic forests dominated by white pine, paper birch, or white spruce. White spruce is the most common subcanopy species, but paper birch, balsam fir, black ash, sugar maple, and other conifer and hardwood species may also be present. When present, white pine, red pine, thimbleberry (*Rubus parviflorus*), one-flowered pyrola (*Moneses uniflora*), wild comfrey (*Cynoglossum virginianum*), rough hawkweed (*Hieracium umbellatum*), green-flowered pyrola (*Pyrola chlorantha*), and white baneberry (*Actaea pachypoda*), help to distinguish MHn44b from the other types in this class. MHn44b often occurs on slopes > 10% that are influenced by groundwater seepage, as well as on level terrain. MHn44b is the only community type in the Mesic Hardwood Forest System that is usually dominated by conifers. MHn44b is most common in the SSU but also occurs occasionally in the MDL and in the North Shore Highlands Subsection in the NSU. Description is based on summary of vegetation data from 23 plots.

• MHn44c Aspen - Fir Forest

Wet-mesic forests, typically with quaking aspen, paper birch, balsam fir, or white spruce



as canopy dominants, and occasionally with black ash or balsam poplar as dominants. MHn44c also includes some forests dominated by white cedar and balsam fir, or by white spruce and balsam fir. Black ash and balsam fir are generally the most important subcanopy species. When present, red-stemmed aster (*Aster puniceus*) helps to differentiate MHn44c from the other types in this class; dwarf alder (*Rhamnus alnifolia*), northern bedstraw (*Galium boreale*), American vetch (*Vicia americana*), and big-leaf white or northern white violet (*Viola blanda* or *V. macloskeyi*) are also somewhat more likely to occur in MHn44c than in other types in this class. MHn44c is the wettest of the four types in this class. It is most common in the MOP and the northern portion of the MDL. Description is based on summary of vegetation data from 51 plots.

● MHn44d Aspen - Birch - Fir Forest

Mesic forests dominated by quaking aspen, balsam fir, and paper birch. Basswood, sugar maple, bur oak, white spruce, American elm, and black ash are also sometimes present in the canopy. Subcanopy is dominated by balsam fir, often with black ash, paper birch, or quaking aspen. Species useful in differentiating MHn44d from the other types in this class include tall coneflower (*Rudbeckia laciniata*), climbing bittersweet (*Celastrus scandens*), blue cohosh (*Caulophyllum thalictroides*), American spikenard (*Aralia racemosa*), wild black currant (*Ribes americanum*), and Virginia creeper (*Parthenocissus* spp.). MHn44d appears to be limited to the extreme northern portion of the MIM (and adjacent portions of the MDL), where it typically occurs on concave, lower portions of slopes. Description is based on summary of vegetation data from 11 plots.





MHn44 Northern Wet-Mesic Boreal Hardwood-Conifer Forest — Species Frequency & Cover

Forbs, Ferns & Fern Allies		freq%		cover
Canada mayflower (<i>Maianthemum canadense</i>)	95	•		
Wild sarsaparilla (<i>Aralia nudicaulis</i>)	93	•••		
Sweet-scented bedstraw (<i>Galium triflorum</i>)	85	•		
Dwarf raspberry (<i>Rubus pubescens</i>)	85	•••		
Large-leaved aster (<i>Aster macrophyllus</i>)	84	•••		
Rose twistedstalk (<i>Streptopus roseus</i>)	79	•		
Common strawberry (<i>Fragaria virginiana</i>)	75	•		
Red baneberry (<i>Actaea rubra</i>)	74	•		
Wood anemone (<i>Anemone quinquefolia</i>)	73	•		
Lady fern (<i>Athyrium filix-femina</i>)	71	••		
Bluebead lily (<i>Clintonia borealis</i>)	69	•		
Clayton's sweet cicely (<i>Osmorhiza claytonii</i>)	68	•		
Bunchberry (<i>Cornus canadensis</i>)	66	•		
Maryland black snakeroot (<i>Sanicula marilandica</i>)	64	•		
Starflower (<i>Trientalis borealis</i>)	64	•		
Wild ginger (<i>Asarum canadense</i>)	62	••		
Bracken (<i>Pteridium aquilinum</i>)	61	••		
Early meadow-rue (<i>Thalictrum dioicum</i>)	59	•		
Naked meadow (<i>Mitella nuda</i>)	55	•		
Palmarie sweet coltsfoot (<i>Petasites frigidus</i>)	49	•		
Round-lobed hepatica (<i>Anemone americana</i>)	42	•		
Spinnulose shield fern or Glandular wood fern*	41	•		
Lindley's aster (<i>Aster ciliolatus</i>)	40	•		
Pale vetchling (<i>Lathyrus ochroleucus</i>)	37	•		
Rattlesnake fern (<i>Botrychium virginianum</i>)	37	•		
Pale bellwort (<i>Uvularia sessilifolia</i>)	34	•		
Large-flowered bellwort (<i>Uvularia grandiflora</i>)	31	••		
Nodding trillium (<i>Trillium cernuum</i>)	31	•		
Woodland horsetail (<i>Equisetum sylvaticum</i>)	29	•		
Side-flowering aster (<i>Aster lateriflorus</i>)	29	•		
Grasses & Sedges				
Mountain rice grass (<i>Oryzopsis asperifolia</i>)	73	••		
Pennsylvania sedge (<i>Carex pensylvanica</i>)	72	•••		
Long-stalked sedge (<i>Carex pedunculata</i>)	63	••		
Bearded shorttusk (<i>Brachyelytrum erectum</i>)	41	•		
Pointed woodrush (<i>Luzula acuminata</i>)	33	•		
Drooping wood sedge (<i>Carex arcuata</i>)	27	•		
Graceful sedge (<i>Carex gracillima</i>)	26	•		
Bladder sedge (<i>Carex intumescens</i>)	20	•		
Low Shrubs				
Red raspberry (<i>Rubus idaeus</i>)	29	•		
Lowbush blueberry (<i>Vaccinium angustifolium</i>)	18	•		
Tail Shrubs				
Beaked hazelnut (<i>Corylus cornuta</i>)	86	•••		
Chokeberry (<i>Prunus virginiana</i>)	67	•		
Bush honeysuckle (<i>Diervilla lonicera</i>)	62	••		
Junberries (<i>Amelanchier</i> spp.)	58	•		
Mountain maple (<i>Acer spicatum</i>)	58	•••		
Fly honeysuckle (<i>Lonicera canadensis</i>)	56	•		
Downy arrowwood (<i>Viburnum rafinesquianum</i>)	52	•		
Prickly gooseberry (<i>Ribes cynosbati</i>)	44	•		
Pagoda dogwood (<i>Cornus alternifolia</i>)	37	•		
Trees				
Quaking aspen	70	freq% ••••	cover 40	freq% 59
Paper birch	65	•••	•	22
Balsam fir	41	•••	•••	60
White spruce	31	•••	••	25
Red maple	27	•••	•••	48
Black ash	22	••	••	60
Basswood	20	•••	•	28
Bur oak	16	•••	••	25
White pine	15	••	-	-
Balsam poplar	12	•••	9	18
Sugar maple	10	•••	18	••
Green ash	10	•	16	33
White cedar	9	••••	-	-
Northern red oak	8	•••	-	27

* Spinnulose shield fern or Glandular wood fern (*Dryopteris carthusiana* or *D. intermedia*)