



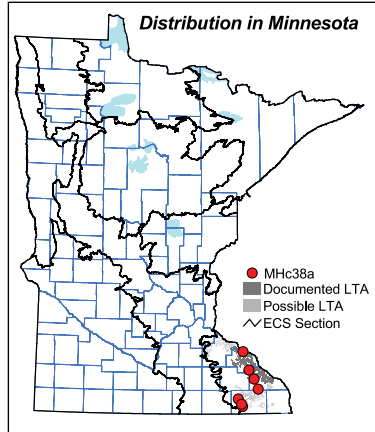
Central Mesic Cold-Slope Hardwood-Conifer Forest

Hardwood-conifer forests on steep north-facing bluffs, often associated with algific talus slopes where cold air vents enhance the cool, moist microclimate of the community. Characterized by northern species otherwise absent in southeastern Minnesota.

Vegetation Structure & Composition

Description is based on summary of vegetation data from 7 plots (relevés).

- **Moss layer** is variable; mosses and liverworts often form thick carpets over moist soil and rock. Northern species otherwise rare in southeastern Minnesota are often present.
- **Ground-layer** cover is generally patchy to interrupted (25–75%), with some of the patchiness due to presence of sparsely vegetated bedrock outcrops. Important species include nodding wild onion (*Allium cernuum*), bulblet fern (*Cystopteris bulbifera*), rose twistedstalk (*Streptopus roseus*), alpine enchanter's nightshade (*Circaea alpina*), columbine (*Aquilegia canadensis*), maidenhair fern (*Adiantum pedatum*), bunchberry (*Cornus canadensis*), and on bedrock outcrops, common polypody (*Polypodium virginianum*) and slender cliff brake (*Cryptogramma stelleri*). Other common species include early meadow-rue (*Thalictrum dioicum*), wild ginger (*Asarum canadense*), zigzag goldenrod (*Solidago flexicaulis*), Canada mayflower (*Maianthemum canadense*), and sharp-lobed hepatica (*Anemone acutiloba*).
- **Shrub-layer** cover is variable, ranging from patchy to continuous (25–100%). Important shrubs and tree saplings include balsam fir, Canada yew (*Taxus canadensis*), common and red-berried elders (*Sambucus canadensis* and *S. racemosa*), highbush cranberry (*Viburnum trilobum*), dwarf alder (*Rhamnus alnifolia*), and white pine. Other common species include sugar maple, basswood, blue beech, chokecherry (*Prunus virginiana*), and downy arrowwood (*Viburnum rafinesquianum*).
- **Subcanopy** cover is generally interrupted to continuous (50–100%). Balsam fir and yellow birch are strong indicators of the community. Other common species include sugar maple, ironwood, basswood, blue beech, and paper birch.
- **Canopy** cover is mostly patchy to interrupted (25–75%). White pine, yellow birch, and balsam fir are strong indicators of the community. Other common species include sugar maple, white oak, northern red oak, basswood, and paper birch.



Landscape Setting & Soils

- **Steep, loess-covered bedrock bluffs**—Rare. Restricted to extremely steep, northeast-to northwest-facing, lower to middle slopes of bedrock bluffs. Most occurrences are in deep, narrow valleys where the underlying bedrock is predominantly limestone or dolomite. Substrate is naturally eroding, and outcrops of bedrock (including cliffs) and talus (small to large colluvial boulders) are commonly present. Parent material is wind-deposited silt (loess) that is generally less than 30in (75cm) deep and locally often much shallower. Deeper soils are well drained. Soil moisture regime is fresh. (Blufflands in PPL)

Natural History

MHc38 is rare, with worldwide distribution limited to the Paleozoic Plateau of Minnesota, Wisconsin, Iowa, and Illinois. Because of its rarity and the small size of occurrences, few Public Land Survey records exist that apply directly to MHc38. Records for other



Mesic Hardwood Forest communities in similar settings in the Blufflands Subsection, however, indicate that in the past, catastrophic disturbances were rare in these settings. The rotation of catastrophic fires was in excess of 1,000 years, and the rotation of catastrophic windthrow was between 360 and 680 years. Events that result in partial loss of trees were much more common, with light surface fires possibly occurring as often as every 50 years, although the cool, moist microclimate and protected settings may have prevented these fires from having much impact. Little is known about the historic composition and age structure of these forests. Gap-phase dynamics—with small gaps filled by younger trees of canopy species—likely predominate in the naturally patchy to interrupted canopy and are perpetuated by the unstable nature of the extremely steep and moist substrate.

Similar Native Plant Community Classes

• MHs38 Southern Mesic Oak-Basswood Forest

Occurrences of MHs38 with white pine in the canopy (MHs38a) can be similar to MHc38. MHs38 also occurs on steep north-facing bluffs in southeastern Minnesota, and the two communities grade into one another, especially on the upslope margins of MHc38. MHs38 lacks the northern species characteristic of MHc38.

MHc38 Indicator Species	(freq%)		MHs38 Indicator Species	(freq%)	
	MHc38	MHs38		MHc38	MHs38
Balsam fir (C,U)	50	-	Heart-leaved aster (<i>Aster cordifolius</i>)	-	61
Rose twistedstalk (<i>Streptopus roseus</i>)	50	-	Maryland black snakeroot (<i>Sanicula marilandica</i>)	-	61
Slender cliff brake (<i>Cryptogramma stelleri</i>)	33	-	Nannyberry (<i>Viburnum lentago</i>)	-	56
Hairy Solomon's seal (<i>Polygonatum pubescens</i>)	33	-	Bland sedge (<i>Carex blanda</i>)	-	56
Yellow birch (C,U)	50	6	Spreading Jacob's ladder (<i>Polemonium reptans</i>)	-	44
Red-berried elder (<i>Sambucus racemosa</i>)	50	6	Rattlesnake fern (<i>Botrychium virginianum</i>)	-	39
Canada yew (<i>Taxus canadensis</i>)	50	6	Wild geranium (<i>Geranium maculatum</i>)	17	94
Highbush cranberry (<i>Viburnum trilobum</i>)	50	6	Lopseed (<i>Phryma leptostachya</i>)	17	50

• MHs39 Southern Mesic Maple-Basswood Forest

The range of MHs39 overlaps with MHc38 in southeastern Minnesota (MHs39a and MHs39b), and MHs39 occurs on steep north-facing bluffs in the same stream valleys as MHc38. The two communities grade into one another, especially on the downslope margins of MHc38.

MHc38 Indicator Species	(freq%)		MHs39 Indicator Species	(freq%)	
	MHc38	MHs39		MHc38	MHs39
Balsam fir (C,U)	50	-	Cleavers (<i>Galium aparine</i>)	-	63
Round-leaved dogwood (<i>Cornus rugosa</i>)	50	-	Stemless blue violets*	-	53
Canada yew (<i>Taxus canadensis</i>)	50	-	Dutchman's breeches (<i>Dicentra cucullaria</i>)	-	49
Northern bedstraw (<i>Galium boreale</i>)	50	-	Cut-leaved toothwort (<i>Cardamine concatenata</i>)	-	43
Yellow birch (C,U)	50	1	Blue phlox (<i>Phlox divaricata</i>)	-	42
White pine (C,U)	67	3	Rattlesnake fern (<i>Botrychium virginianum</i>)	-	40
Canada mayflower (<i>Maianthemum canadense</i>)	100	6	White trout lily (<i>Erythronium albidum</i>)	-	40
Paper birch (C,U)	50	3	Yellow violet (<i>Viola pubescens</i>)	17	79

* Stemless blue violets (*Viola sororia* and *V. missouriensis*)

• CTs46 Southern Algific Talus

CTs46 also occurs on many of the same steep north-facing bluffs as MHc38. The algific system that directly supports the cold, moist microclimate of CTs46 often also contributes to the similar (although less extreme) microclimate of MHc38. Although the two communities share many northern species, CTs46 is distinguished by the presence of cold air vents and generally lacks a tree canopy, with shading only from trees on the margins of the community. MHc38 does not typically have cold air vents in the community itself and has a patchy to interrupted tree canopy.

Native Plant Community Types in Class

• MHc38a White Pine - Sugar Maple - Basswood Forest (Cold Slope)

MHc38a is the only type recognized in this class. Collection of additional data, including bryophyte and lichen sampling, would improve the understanding of this community and may result in recognition of distinct community types or subtypes.



photo by H. Texler, MN DNR

Whitewater Wildlife Management Area, Winona County, MN



MHC38 Central Mesic Cold-Slope Hardwood-Conifer Forest – Species Frequency & Cover

Forbs, Ferns & Fern Allies		freq%	cover
Maidenhair fern (<i>Adiantum pedatum</i>)	100	•	
Early meadow-rue (<i>Thalictrum dioicum</i>)	100	•	
Canada mayflower (<i>Maianthemum canadense</i>)	100	•	
Zigzag goldenrod (<i>Solidago flexicaulis</i>)	100	•	
Wild ginger (<i>Asarum canadense</i>)	100	••	
Red haneberry (<i>Actaea rubra</i>)	100	•	
Bulblet fern (<i>Cystopteris bulbifera</i>)	86	••••	
Two-leaved miterwort (<i>Mitella diphylla</i>)	86	•	
Sharp-lobed hepatica (<i>Anemone acutiloba</i>)	86	•	
Columbine (<i>Aquilegia canadensis</i>)	86	•	
Large-flowered bellwort (<i>Uvularia grandiflora</i>)	86	•	
Bloodroot (<i>Sanguinaria canadensis</i>)	86	•	
Wood anemone (<i>Anemone quinquefolia</i>)	71	•	
Jack-in-the-pulpit (<i>Arisaema triphyllum</i>)	71	•	
Wild sarsaparilla (<i>Aralia nudicaulis</i>)	57	•	
Rose twistedstalk (<i>Streptopus roseus</i>)	57	•	
Virginia waterleaf (<i>Hydrophyllum virginianum</i>)	57	•	
Northern bedstraw (<i>Galium boreale</i>)	57	•	
Blue cohosh (<i>Caulophyllum thalictroides</i>)	43	•	
Shining bedstraw (<i>Galium concinnum</i>)	43	•	
Sweet-scented bedstraw (<i>Galium triflorum</i>)	43	•	
Clayton's sweet cicely (<i>Osmorhiza claytonii</i>)	43	•	
Lady fern (<i>Adiantum filix-ferina</i>)	43	•	
Common false Solomon's seal (<i>Smilacina racemosa</i>)	43	•	
Slender cliff brake (<i>Cryptogramma stelleri</i>)	29	•	
Common polypody (<i>Polypodium virginianum</i>)	29	•	
Dwarf raspberry (<i>Falvus pubescens</i>)	29	••	
Touch-me-not (<i>Impatiens</i> spp.)	29	••	
Nodding wild onion (<i>Allium cernuum</i>)	29	••	
Grasses & Sedges			
Long-stalked sedge (<i>Carex pedunculata</i>)	71	•	
Bearded shorthusk (<i>Brachyelytrum erectum</i>)	57	•	
Climbing Plants			
Virginia creeper (<i>Parthenocissus</i> spp.)	86	•	

Shrubs		freq%	cover
Chokeberry (<i>Prunus virginiana</i>)	86	••	
Downy arrowwood (<i>Viburnum rafinesquianum</i>)	86	••	
Canada yew (<i>Taxus canadensis</i>)	57	•••	
Highbush cranberry (<i>Viburnum trilobum</i>)	57	••	
Bush honeysuckle (<i>Diervilla lonicera</i>)	57	••	
Pagoda dogwood (<i>Cornus alternifolia</i>)	57	•••	
Poison ivy (<i>Toxicodendron rydbergii</i>)	57	••	
Round-leaved dogwood (<i>Cornus rugosa</i>)	57	••	
Prickly gooseberry (<i>Ribes cynosbati</i>)	43	•	
Common elder (<i>Sambucus canadensis</i>)	43	•	
Red-berried elder (<i>Sambucus racemosa</i>)	43	•	
American hazelnut (<i>Corylus americana</i>)	43	•	
Leatherwood (<i>Dicra palustris</i>)	43	•	
Beaked hazelnut (<i>Corylus cornuta</i>)	43	••	
Missouri gooseberry (<i>Ribes missouriense</i>)	43	•	
Bladdernut (<i>Staphylea trifolia</i>)	29	•••	

Trees				
	Canopy	Subcanopy	Shrub Layer	
	freq%	freq%	freq%	freq%
	cover	cover	cover	cover
Sugar maple	100	••••	100	•••
Northern red oak	86	••••	14	••
Ironwood	71	•••	86	•••
White pine	71	••••	-	-
Basswood	57	•••	57	••
White oak	43	••	14	••
Paper birch	43	•••	43	••
Yellow birch	43	•••	43	••
Bitternut hickory	29	•	-	-
Balsam fir	29	•••	43	•••
Green ash	29	••	29	••
Black ash	14	•	14	•
Blue beech	-	-	43	••
American elm	-	-	14	•