



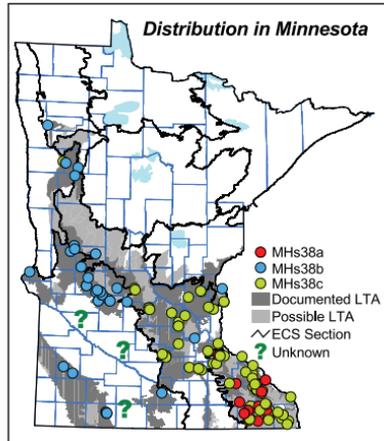
Southern Mesic Oak-Basswood Forest

Mesic hardwood or, occasionally, hardwood-conifer forests. Present on wind-deposited silt on bedrock bluffs, on calcareous till on rolling till plains, and, rarely, in association with natural fire breaks in prairie landscapes or on weakly calcareous till on stagnation moraines.

Vegetation Structure & Composition

Description is based on summary of vegetation data from 128 plots (relevés).

- Ground-layer** cover is patchy to interrupted (25–75%); important species include zigzag goldenrod (*Solidago flexicaulis*), large-flowered bellwort (*Uvularia grandiflora*), and Virginia waterleaf (*Hydrophyllum virginianum*). Other common species include Clayton's sweet cicely (*Osmorhiza claytonia*), Virginia creeper (*Parthenocissus* spp.), bloodroot (*Sanguinaria canadensis*), lopseed (*Phryma leptostachya*), common enchanter's nightshade (*Circaea lutetiana*), early meadow-rue (*Thalictrum dioicum*), wild sarsaparilla (*Aralia nudicaulis*), Pennsylvania sedge (*Carex pennsylvanica*), and honewort (*Cryptotaenia canadensis*).
- Shrub-layer** cover is patchy to interrupted (25–75%); common species include sugar maple, ironwood, prickly gooseberry (*Ribes cynosbati*), and chokecherry (*Prunus virginiana*).
- Subcanopy** cover is interrupted to continuous (50–100%); important species include ironwood, sugar maple, and basswood. American elm, red elm, and bitternut hickory are occasionally present, with blue beech occasional in southeastern and east-central Minnesota.
- Canopy** cover is interrupted to continuous (50–100%); the most common species are basswood, northern red oak, and sugar maple, with bur oak and green ash replacing northern red oak in importance in western Minnesota, especially in the CGP, and white oak abundant in some stands in eastern Minnesota. On rare occasions a supercanopy with abundant white pine is present.



Landscape Setting & Soils

- Loess-covered bedrock bluffs**—Common. Present mostly on middle and upper slopes on bedrock hills, with a strong affinity for north- and northeast-facing aspects on steeper slopes. Parent material is wind-deposited silt that is generally deeper than 60in (150cm) over sedimentary bedrock. Outcrops of bedrock and large colluvial boulders are common. Gravel-sized rock fragments are absent, while flagstone-sized rocks are common deeper in soils just above bedrock. Soils have dark, organic-rich surface horizons, indicating former occupation of these sites by oak woodland or prairie. Little clay is available for formation of subsoil horizons capable of perching snowmelt and rainfall. Soils are well drained. Soil moisture regime is fresh. (Blufflands in PPL)
- Till plains**—Common. Landscape is rolling to hummocky. Parent material is fine-textured, calcareous till with modest amounts of gravel and few stones. Soils have clayey subsoil horizons but lack evidence of prolonged saturation. Gray soil colors and deposits of free carbonates are common below the clay-loam horizon, indicating availability of water and nutrients below clay horizon. Soils are well drained. Soil moisture regime is fresh. (MIM; PPL; RRV; LAP; localized in Coteau Moraines and Minnesota River Prairie in CGP)
- Stagnation moraines**—Rare. Present on coarse-textured till near lakes. Parent material is gravelly, partially sorted, noncalcareous or weakly calcareous drift. Subsoil horizons capable of perching snowmelt or rainfall are absent. Soils are well drained. Soil moisture regime is moderately dry to moderately fresh. (MIM; Rochester Plateau in PPL)



Natural History

In the past, catastrophic disturbances were rare in MHs38. An analysis of Public Land Survey records indicates that the rotation of catastrophic fires was in excess of 1,000 years, and the rotation of catastrophic windthrow was about 360 years.¹ Events that resulted in partial loss of trees, especially light surface fires, were much more common, with an estimated rotation of 35 years. Based on the historic composition and age structure of these forests, MHs38 had two growth stages separated by a period of transition.

- **0–35 years**—Young forests recovering from fire or wind, dominated by northern red oak mixed with basswood, American elm, and some quaking aspen.
- **35–75 years**—A transition period marked by the gradual decline of northern red oak and its replacement by sugar maple. Basswood, American elm, and ironwood increase during this period, and white oak becomes established.
- **> 75 years**—Mature forests of sugar maple mixed evenly with basswood, American elm, ironwood, northern red oak, and white oak. (Green ash is more common in modern vegetation samples than in the historic records for MHs38.)

Similar Native Plant Community Classes

● MHs39 Southern Mesic Maple-Basswood Forest

MHs39 and MHs38 are very similar, and the ranges of the two classes overlap strongly. The presence of species adapted to dense shade—especially spring ephemerals such as Dutchman’s breeches (*Dicentra cucullaria*), cut-leaved toothwort (*Cardamine concatenata*), and white trout lily (*Erythronium albidum*)—and large patches of wood nettle (*Laportea canadensis*) help to differentiate MHs39 from MHs38.

MHs38 Indicator Species	(freq%)	
	MHs38	MHs39
Northern bedstraw (<i>Galium boreale</i>)	23	-
Poison ivy (<i>Toxicodendron rydbergii</i>)	57	2
Paper birch (C)	20	2
Canada mayflower (<i>Maianthemum canadense</i>)	37	4
Columbine (<i>Aquilegia canadensis</i>)	30	5
Pointed-leaved tick trefoil (<i>Desmodium glutinosum</i>)	47	7
Wild sarsaparilla (<i>Aralia nudicaulis</i>)	54	15
Wild grape (<i>Vitis riparia</i>)	39	12

* Stemless blue violets (*Viola sororia* and similar *Viola* spp.)

MHs39 Indicator Species	(freq%)	
	MHs38	MHs39
False rue anemone (<i>Enemion biternatum</i>)	2	25
Dutchman’s breeches (<i>Dicentra cucullaria</i>)	5	44
Cut-leaved toothwort (<i>Cardamine concatenata</i>)	4	36
White trout lily (<i>Erythronium albidum</i>)	4	30
Blue phlox (<i>Phlox divaricata</i>)	5	36
Puttyroot (<i>Aplectrum hyemale</i>)	3	15
Ostrich fern (<i>Matteuccia struthiopteris</i>)	3	15
Stemless blue violets*	11	38

● MHs49 Southern Wet-Mesic Hardwood Forest

MHs49 can be somewhat similar to MHs38 but occurs on level wet-mesic sites on siltly alluvium or glacial till and is more likely to have species adapted to high water tables or common on heavy, moist soils.

MHs38 Indicator Species	(freq%)	
	MHs38	MHs49
Shining bedstraw (<i>Galium concinnum</i>)	31	-
Wild sarsaparilla (<i>Aralia nudicaulis</i>)	54	3
Pointed-leaved tick trefoil (<i>Desmodium glutinosum</i>)	47	3
Canada mayflower (<i>Maianthemum canadense</i>)	37	3
Poison ivy (<i>Toxicodendron rydbergii</i>)	57	5
Red baneberry (<i>Actaea rubra</i>)	46	8
Hog peanut (<i>Amphicarpaea bracteata</i>)	44	8
Rattlesnake fern (<i>Botrychium virginianum</i>)	50	10

MHs49 Indicator Species	(freq%)	
	MHs38	MHs49
False rue anemone (<i>Enemion biternatum</i>)	2	59
Blue phlox (<i>Phlox divaricata</i>)	5	69
White trout lily (<i>Erythronium albidum</i>)	4	44
Dutchman’s breeches (<i>Dicentra cucullaria</i>)	5	46
Hackberry (C)	5	51
Hispid buttercup (<i>Ranunculus hispidus</i>)	5	41
Virginia spring beauty (<i>Claytonia virginica</i>)	5	38
Black ash (C,U)	14	64

● MHc37 Central Mesic Hardwood Forest (Western)

The ranges of MHc37 and MHs38 overlap only in west-central Minnesota, where MHc37 is more likely to occur on stagnation moraines, and MHs38 is more likely on till plains.

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.



MHs38 Indicator Species	(freq%)	
	MHs38	MHc37
Stary sedge (<i>Carex rosea</i>)	44	1
Hackberry (U)	42	1
Wild grape (<i>Vitis riparia</i>)	44	2
Virginia waterleaf (<i>Hydrophyllum virginianum</i>)	77	4
Canada moonseed (<i>Menispermum canadense</i>)	26	2
Cleavers (<i>Galium aparine</i>)	47	4
Jack-in-the-pulpit (<i>Arisaema triphyllum</i>)	65	10
Stary false Solomon's seal (<i>Smilacina stellata</i>)	42	7

MHc37 Indicator Species	(freq%)	
	MHs38	MHc37
Leatherwood (<i>Dirca palustris</i>)	2	68
Round-lobed hepatica (<i>Anemone americana</i>)	2	62
Beaked hazelnut (<i>Corylus cornuta</i>)	5	49
Rose twistedstalk (<i>Streptopus roseus</i>)	5	43
Downy arrowwood (<i>Viburnum rafinesquianum</i>)	7	55
Paper birch (C,U)	9	65
Sugar maple (C,U)	19	93
Quaking aspen (C,U)	9	47

• MHc36 Central Mesic Hardwood Forest (Eastern)

The ranges of MHc36 and MHs38 overlap in west-central Minnesota, where MHc36 is more likely to occur on stagnation moraines, and MHs38 is more common on till plains.

MHs38 Indicator Species	(freq%)	
	MHs38	MHc36
Shining bedstraw (<i>Galium concinnum</i>)	26	-
Canada moonseed (<i>Menispermum canadense</i>)	24	1
Missouri gooseberry (<i>Ribes missouriense</i>)	28	2
Hackberry (U)	28	2
Giant Solomon's seal (<i>Polygonatum biflorum</i>)	26	2
Cleavers (<i>Galium aparine</i>)	37	5
Sharp-lobed hepatica (<i>Anemone acutiloba</i>)	34	9
Wild grape (<i>Vitis riparia</i>)	36	10

MHc36 Indicator Species	(freq%)	
	MHs38	MHc36
Red maple (C,U)	1	50
Rose twistedstalk (<i>Streptopus roseus</i>)	2	56
Round-lobed hepatica (<i>Anemone americana</i>)	5	61
Large-leaved aster (<i>Aster macrophyllus</i>)	7	77
Pale bellwort (<i>Uvularia sessilifolia</i>)	5	54
Beaked hazelnut (<i>Corylus cornuta</i>)	6	62
Large-flowered trillium (<i>Trillium grandiflorum</i>)	6	52
Leatherwood (<i>Dirca palustris</i>)	6	38

• MHs37 Southern Dry-Mesic Oak Forest

MHs37 and MHs38 can be very similar, and the ranges of the two classes overlap in east-central and southeastern Minnesota. MHs37 usually occurs on drier sites than MHs38 and is much less likely to have abundant sugar maple in the canopy.

MHs38 Indicator Species	(freq%)	
	MHs38	MHs37
Bladdernut (<i>Staphylea trifolia</i>)	16	-
Wild leek (<i>Allium tricoccum</i>)	27	2
Long-stalked sedge (<i>Carex pedunculata</i>)	27	2
Blue beech (U)	23	2
Canada moonseed (<i>Menispermum canadense</i>)	21	2
Nodding trillium (<i>Trillium cernuum</i>)	19	2
Sharp-lobed hepatica (<i>Anemone acutiloba</i>)	38	7
Wild ginger (<i>Asarum canadense</i>)	43	14

MHs37 Indicator Species	(freq%)	
	MHs38	MHs37
Shagbark hickory (C,U)	1	33
Clearweed (<i>Pilea</i> spp.)	3	28
Spinulose shield fern or Glandular wood fern*	3	26
Tall blackberries**	4	28
Black raspberry (<i>Rubus occidentalis</i>)	5	30
Bracken (<i>Pteridium aquilinum</i>)	9	40
Woodland sunflower (<i>Helianthus strumosus</i>)	6	26
White snakeroot (<i>Eupatorium rugosum</i>)	19	65

* Spinulose shield fern or Glandular wood fern (*Dryopteris carthusiana* or *D. intermedia*) ** Tall blackberries (*Rubus allegheniensis* and similar *Rubus* spp.)

• MHc38 Central Mesic Cold-Slope Hardwood-Conifer Forest

The range of MHc38 overlaps with MHs38 in southeastern Minnesota, and the two communities can appear similar when MHs38 has white pine in the canopy (MHs38a). MHc38 is restricted to sites with cool microclimates maintained by subterranean ice and is more likely to have species most commonly found in northern Minnesota.

MHs38 Indicator Species	(freq%)	
	MHs38	MHc38
Heart-leaved aster (<i>Aster cordifolius</i>)	61	-
Maryland black snakeroot (<i>Sanicula marilandica</i>)	61	-
Nannyberry (<i>Viburnum lentago</i>)	56	-
Blond sedge (<i>Carex blanda</i>)	56	-
Spreading Jacob's ladder (<i>Polemonium reptans</i>)	44	-
Rattlesnake fern (<i>Botrychium virginianum</i>)	39	-
Wild geranium (<i>Geranium maculatum</i>)	94	17
Lopseed (<i>Phryma leptostachya</i>)	50	17

MHc38 Indicator Species	(freq%)	
	MHs38	MHc38
Balsam fir (C,U)	-	50
Rose twistedstalk (<i>Streptopus roseus</i>)	-	50
Slender cliff brake (<i>Cryptogramma stelleri</i>)	-	33
Hairy Solomon's seal (<i>Polygonatum pubescens</i>)	-	33
Yellow birch (C,U)	6	50
Red-berried elder (<i>Sambucus racemosa</i>)	6	50
Canada yew (<i>Taxus canadensis</i>)	6	50
Highbush cranberry (<i>Viburnum trilobum</i>)	6	50

Native Plant Community Types in Class

• MHs38a White Pine - Oak - Sugar Maple Forest

Mesic hardwood-conifer forests, mostly on steep north-facing slopes on thin, windblown silty soil over bedrock. Canopy is dominated by northern red oak, often with sugar maple and occasionally with smaller amounts of basswood, paper birch, white oak, and other hardwood species. Most often a supercanopy of white pine is present. Subcanopy has abundant ironwood and sugar maple. MHs38a is distinguished from other types in this class by the presence of white pine in the canopy or understory; other species that can help to distinguish MHs38a include bush honeysuckle (*Diervilla lonicera*), elm-



leaved goldenrod (*Solidago ulmifolia*), starry campion (*Silene stellata*), and Virginia thimbleweed (*Anemone virginiana*). MHs38a is restricted to The Blufflands Subsection in the PPL. Description is based on summary of vegetation data from 18 plots.

● **MHs38b Basswood - Bur Oak - (Green Ash) Forest**

Mesic hardwood forests on hummocky topography or near lakes on till plains and stagnation moraines; slopes are generally not steep. Canopy most often is dominated by basswood, bur oak, or green ash, with northern red oak abundant in a few stands. Subcanopy and shrub layer have abundant ironwood with occasional basswood. In general, MHs38b can often be distinguished from the other types in this class by the presence of abundant green ash in the canopy and abundant Virginia waterleaf in the ground layer. It is further distinguished from MHs38c by lower frequency of northern red oak and almost complete lack of sugar maple in the canopy. Additional species that can help to distinguish MHs38b include snowberry or wolfberry (*Symphoricarpos albus* or *S. occidentalis*), starry false Solomon's seal (*Smilacina stellata*), and nodding trillium (*Trillium cernuum*). MHs38b has been documented in the MIM, CGP, and RRV. Description is based on summary of vegetation data from 43 plots.

● **MHs38c Red Oak - Sugar Maple - Basswood - (Bitternut Hickory) Forest**

Mesic hardwood forests on steep, mostly north-facing slopes on thin silt over bedrock and also on till plains with hummocky topography. Northern red oak and sugar maple are the most abundant canopy trees; basswood is also common. Ironwood and sugar maple are the most abundant subcanopy and shrub-layer species; bitternut hickory is common in both the subcanopy and shrub layers. When present, mayapple (*Podophyllum peltatum*) distinguishes MHs38c from MHs38a in the PPL; the absence of white pine also differentiates MHs38c from MHs38a. Farther north, MHs38c can be differentiated from MHs38b by the significantly higher abundance of northern red oak. Other species that can help to differentiate MHs38c from MHs38a and MHs38b include rue anemone (*Thalictrum thalictroides*) and hairy Solomon's seal (*Polygonatum pubescens*). MHs38c has been documented mainly in the PPL and the southern half of the MIM. Description is based on summary of vegetation data from 67 plots.

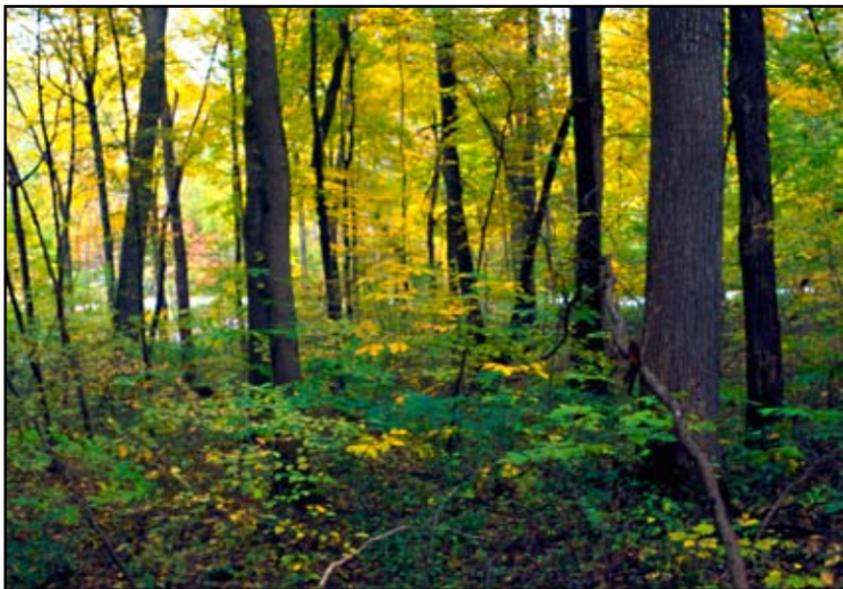


photo by S.C. Zager, MN DNR



MHs38 Southern Mesic Oak-Basswood Forest — Species Frequency and Cover

	freq % cover		freq % cover		freq % cover	
Forbs, Ferns & Fern Allies						
Zigzag goldenrod (<i>Solidago flexicaulis</i>)	84	••	Bland sedge (<i>Carex blanda</i>)	31	••	80
Clayton's sweet cicely (<i>Osmorhiza clyttonii</i>)	81	••	Bottlebrush grass (<i>Elymus hystrix</i>)	28	••	31
Bloodroot (<i>Sanguinaria canadensis</i>)	77	••	Long-stalked sedge (<i>Carex pedunculata</i>)	27	••	27
Large-flowered bellwort (<i>Uvularia grandiflora</i>)	73	••	Nodding rescue (<i>Festuca subverticillata</i>)	20	••	20
Lopseed (<i>Phryma leptostachya</i>)	65	••	Bearded storkshuck (<i>Brachyelytrum erectum</i>)	19	••	19
Common enchanter's nightshade (<i>Circaea lutehana</i>)	64	••	Woody Vines			
Early meadow-rue (<i>Thalictrum dioicum</i>)	63	••	Virginia creeper (<i>Parthenocissus</i> spp.)	80	••	80
Virginia waterleaf (<i>Hydrophyllum virginianum</i>)	63	•••	Wild grape (<i>Vitis riparia</i>)	39	••	39
Jack-in-the-pulpit (<i>Arisaema triphyllum</i>)	56	••	Shrubs			
Erect, Smooth, or Illinois carrion-flower*	55	••	Prickly gooseberry (<i>Ribes cynosbati</i>)	71	••	71
Wild geranium (<i>Geranium maculatum</i>)	55	••	Chokeberry (<i>Prunus virginiana</i>)	64	••	64
Homewort (<i>Cryphaea canadensis</i>)	54	••	Prickly ash (<i>Zanthoxylum americanum</i>)	57	••	57
Wild sarsaparilla (<i>Aralia nudicaulis</i>)	54	••	Poison Ivy (<i>Toxicodendron rydbergii</i>)	57	••	57
Blue cohosh (<i>Caulophyllum thalictroides</i>)	53	••	Pagoda dogwood (<i>Cornus alternifolia</i>)	53	••	53
Rattlesnake fern (<i>Botrychium virginianum</i>)	50	••	Missouri gooseberry (<i>Ribes missouriense</i>)	30	••	30
Lady fern (<i>Athyrium filix-femina</i>)	50	••	Nannyberry (<i>Viburnum lentago</i>)	23	••	23
Yellow violet (<i>Viola pubescens</i>)	50	••	Downy arrowwood (<i>Viburnum rafinesquianum</i>)	22	••	22
Common false Solomon's seal (<i>Smilacina racemosa</i>)	48	••	American hazelnut (<i>Corylus americana</i>)	21	••	21
Maryland black snakeroot (<i>Sanicula marilandica</i>)	48	••	Trees			
Pointed-leaved tick trefoil (<i>Desmodium glutinosum</i>)	47	••	Basswood	82	•••	73
Red banberry (<i>Actaea rubra</i>)	46	••	Northern red oak	60	•••	52
Maidenhair fern (<i>Adiantum pedatum</i>)	44	••	Sugar maple	59	•••	60
Hog peanut (<i>Ampelicarpa bracteata</i>)	44	••	Ironwood	42	•••	84
Wild ginger (<i>Asarum canadense</i>)	43	•••	Green ash	36	•••	16
Wood anemone (<i>Anemone quinquefolia</i>)	41	••	Bur oak	33	•••	18
Sweet-scented bedstraw (<i>Galium triflorum</i>)	38	••	White oak	30	•••	9
Sharp-lobed hepatica (<i>Anemone acutiloba</i>)	38	••	White oak	27	•••	21
White avens (<i>Geum canadense</i>)	37	••	American elm	20	••	32
Canada mayflower (<i>Maianthemum canadense</i>)	37	••	Paper birch	20	••	46
Cleavers (<i>Galium aparine</i>)	34	••	Bitternut hickory	18	••	26
Shining bedstraw (<i>Galium concinnum</i>)	31	••	Red elm	16	••	19
Grasses & Sedges						
Pennsylvania sedge (<i>Carex pensylvanica</i>)	57	•••	White pine	12	••••	-
Starry sedge (<i>Carex rossa</i>)	41	•••	Black cherry	9	••	9
			Blue beech	-	-	20

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