



Southern Wet-Mesic Hardwood Forest

Rich, wet-mesic lowland hardwood forests on level silty alluvium in stream valleys and on level glacial till bordering lakes. Sites are protected from fire, and soils remain moist throughout the growing season.

Vegetation Structure & Composition

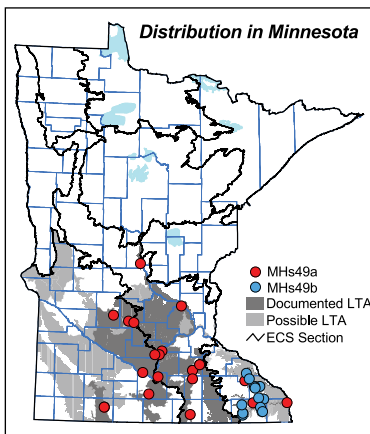
Description is based on summary of vegetation data from 39 plots (relevés).

- **Ground-layer** cover is mostly continuous (75–100%). Important species include false rue anemone (*Enemion biternatum*), blue phlox (*Phlox divaricata*), common blue violet (*Viola sororia*), hispid buttercup (*Ranunculus hispidus*), appendaged waterleaf (*Hydrophyllum appendiculatum*), Virginia spring beauty (*Claytonia virginica*), tall coneflower (*Rudbeckia laciniata*), white trout lily (*Erythronium albidum*), yellow trout lily (*E. americanum*), white bear sedge (*Carex albursina*), and hairy-leaved sedge (*C. hirtifolia*). Other common and often abundant species include Virginia waterleaf (*Hydrophyllum virginianum*), cleavers (*Galium aparine*), and wood nettle (*Laportea canadensis*).

- **Shrub-layer** cover is variable, ranging from sparse to continuous (5–100%); typical species are chokecherry (*Prunus virginiana*), Missouri gooseberry (*Ribes missouriensis*), basswood, sugar maple, black ash, hackberry, bitternut hickory, American elm, red elm, and rock elm.

- **Subcanopy** is generally patchy to continuous (25–100% cover), with sugar maple, basswood, hackberry, ironwood, black ash, and elms the most common species.

- **Canopy** cover is mostly interrupted to continuous (50–100%). Species composition is variable, but basswood, black ash, sugar maple, American elm, red elm, rock elm, green ash, hackberry, box elder, and bur oak are common. Butternut, black walnut, and black maple are present in some stands.



Landscape Setting & Soils

- **Stream valleys and stagnation moraines**—Common. Present on modern alluvium in rugged landscapes, including dissected sedimentary bedrock terrain, stagnation moraines, and deep tributary stream valleys of major rivers. Local relief is sufficiently high for alluvium to be deposited as terraces, fans, and benches at toes of slopes. Parent material is silty on the surface with complex stratification of silt, coarse sand, gravel, and buried organic matter below. Soil is typically leached of free carbonates. Soil colors 50–80in (125–200cm) deep indicate prolonged periods of saturation. Soils are moderately well drained. Soil moisture regime is moist to very moist. (Anoka Sand Plain, Big Woods, and Oak Savanna in MIM; PPL; Minnesota River Prairie in CGP)

- **Moraines and till plains**—Occasional. Present on lake peninsulas, benches along lakeshores, and as wet inclusions on low sites within larger areas of other Mesic Hardwood Forest communities. Parent material is clayey to loamy, calcareous till with free carbonates present below 30–40in (75–100cm). Clayey subsoil horizons and generally fine-textured parent material help to perch snowmelt and rainfall near the soil surface. Most soils have rather black surface horizons, suggesting a past history of prairie on these sites. Gray soil colors or mottles are commonly present but at depths greater than 30in (75cm). Soils are moderately well drained. Soil moisture regime is moist to very moist. (Big Woods and Oak Savanna in MIM; Minnesota River Prairie in CGP)



Natural History

In the past, catastrophic disturbances were rare in MHs49. An analysis of Public Land Survey records indicates the rotation of catastrophic windthrow was in excess of 1,000 years, and there were no references to fire.¹ Events that result in partial loss of trees, especially light surface fires, were much more common, with an estimated rotation of about 160 years. There are almost no compositional changes among historic age classes in the community. Young, mature, and old stands were all dominated by elm—probably including American, red, and rock elm—mixed with lesser amounts of basswood and sugar maple. Because of Dutch elm disease, elms (especially American elm) are less abundant today than historically. In contrast, black ash is common in modern forests across much of the range of the community, but was a minor component in historic records.

Similar Native Plant Community Classes

• MHs39 Southern Mesic Maple-Basswood Forest

MHs39 is present along many of the same stream valleys as MHs49 but occurs most often on lower north- to east-facing slopes, while MHs49 occurs most often on level bottomlands. Both communities have abundant spring ephemerals and often grade into one another.

MHs49 Indicator Species	(freq%)	
	MHs49	MHs39
Rock elm (C,U)	23	-
Appendaged waterleaf*	21	2
Stinging nettle (<i>Urtica dioica</i>)	46	5
Hackberry (C)	51	7
Hawthorn (<i>Crataegus</i> spp.)	33	6
Nannyberry (<i>Viburnum lentago</i>)	36	8
Tall coneflower (<i>Rudbeckia laciniata</i>)	38	10
Ambiguous sedge (<i>Carex amphibola</i>)	28	8

*Appendaged waterleaf (*Hydrophyllum appendiculatum*)

MHs39 Indicator Species	(freq%)	
	MHs49	MHs39
Northern red oak (C,U)	13	55
Lady fern (<i>Athyrium filix-femina</i>)	13	55
Hairy Solomon's seal (<i>Polygonatum pubescens</i>)	5	22
Rattlesnake fern (<i>Botrychium virginianum</i>)	10	41
Red baneberry (<i>Actaea rubra</i>)	8	30
Early meadow-rue (<i>Thalictrum dioicum</i>)	18	67
Wood anemone (<i>Anemone quinquefolia</i>)	13	45
Maidenhair fern (<i>Adiantum pedatum</i>)	15	45

• FFs59 Southern Terrace Forest

FFs59 also occurs on silty alluvium on stream terraces and like MHs49 may have dense patches of wood nettle in the ground layer. Unlike MHs49, FFs59 typically lacks sugar maple in the canopy or understorey.

MHs49 Indicator Species	(freq%)	
	MHs49	FFs59
Zigzag goldenrod (<i>Solidago flexicaulis</i>)	46	-
Large-flowered bellwort (<i>Uvularia grandiflora</i>)	36	-
Ironwood (C,U)	56	2
Blue beech (U)	26	2
Blue cohosh (<i>Caulophyllum thalictroides</i>)	64	7
Dutchman's breeches (<i>Dicentra cucullaria</i>)	46	7
White trout lily (<i>Erythronium albidum</i>)	44	7
Sugar maple (C,U)	69	14

FFs59 Indicator Species	(freq%)	
	MHs49	FFs59
White grass (<i>Leersia virginica</i>)	-	23
Swamp white oak (C,U)	-	19
Ontario aster (<i>Aster ontariensis</i>)	3	26
Silver maple (C,U)	5	51
Virginia wild rye (<i>Elymus virginicus</i>)	5	44
Virginia knotweed (<i>Polygonum virginianum</i>)	5	35
Poison ivy (<i>Toxicodendron rydbergii</i>)	5	23
Cottonwood (C)	8	30

• MHs38 Southern Mesic Oak-Basswood Forest

MHs38 is somewhat similar to MHs49 but is drier, occurring on mesic wind-deposited silt on steep slopes on bedrock bluffs or on mesic sites on rolling till plains and stagnation moraines. MHs49 is more likely to have prolific spring ephemeral species such as false rue anemone and white trout lily (*Erythronium albidum*) in the ground layer.

MHs49 Indicator Species	(freq%)	
	MHs49	MHs38
Rock elm (C,U)	23	1
False rue anemone (<i>Enemion biternatum</i>)	59	2
Ambiguous sedge (<i>Carex amphibola</i>)	28	2
Blue phlox (<i>Phlox divaricata</i>)	69	5
White trout lily (<i>Erythronium albidum</i>)	44	4
Dutchman's breeches (<i>Dicentra cucullaria</i>)	46	5
Hackberry (C)	51	5
Black ash (C,U)	64	14

MHs38 Indicator Species	(freq%)	
	MHs49	MHs38
Shining bedstraw (<i>Galium concinnum</i>)	-	31
Wild sarsaparilla (<i>Aralia nudicaulis</i>)	3	54
Pointed-leaved tick trefoil (<i>Desmodium glutinosum</i>)	3	47
Canada mayflower (<i>Maianthemum canadense</i>)	3	37
Poison ivy (<i>Toxicodendron rydbergii</i>)	5	57
Hog peanut (<i>Amphicarpaea bracteata</i>)	8	44
Rattlesnake fern (<i>Botrychium virginianum</i>)	10	50
Northern red oak (C)	13	60

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.



• MHc47 Central Wet-Mesic Hardwood Forest

MHc47 tends to occur in the same kinds of settings as MHs49, including alluvial bottomlands and low, level sites adjacent to lakes or wetlands. MHc47 is present mostly to the north of MHs49, although the ranges of the two classes may overlap in east-central Minnesota.

MHs49 Indicator Species	(freq%)		MHc47 Indicator Species	(freq%)	
	MHs49	MHc47		MHs49	MHc47
Cleavers (<i>Galium aparine</i>)	77	-	Large-leaved aster (<i>Aster macrophyllus</i>)	-	83
Box elder (U)	45	-	Wild sarsaparilla (<i>Aralia nudicaulis</i>)	-	70
Red-berried elder (<i>Sambucus racemosa</i>)	41	-	Side-flowering aster (<i>Aster lateriflorus</i>)	-	70
False rue anemone (<i>Eranion bitermatum</i>)	41	-	Red maple (C,U)	-	61
Sprengel's sedge (<i>Carex sprengelii</i>)	41	-	Beaked hazelnut (<i>Corylus cornuta</i>)	-	57
White trout lily (<i>Erythronium albidum</i>)	32	-	Rose twistedstalk (<i>Streptopus roseus</i>)	-	57
Hackberry (C,U)	91	4	Graceful sedge (<i>Carex gracillima</i>)	-	52
Blue phlox (<i>Phlox divaricata</i>)	68	9	Canada mayflower (<i>Maianthemum canadense</i>)	5	78

Native Plant Community Types in Class

• MHs49a Elm - Basswood - Black Ash - (Hackberry) Forest

Wet-mesic hardwood forests, most often with abundant basswood and elm in the canopy; other occasionally abundant species are black ash, sugar maple, and bitternut hickory. Hackberry and green ash are present in the canopy in many stands but are seldom abundant. Hackberry is more important in MHs49a, especially in the understory and seedling layers, than in MHs49b. Other species that help to distinguish MHs49a from MHs49b include greenbrier (*Smilax hispida*), starry false Solomon's seal (*Smilacina stellata*), carrion-flowers (*Smilax ecirrata* and *S. herbacea*), Pennsylvania sedge (*Carex pensylvanica*), and starry sedge (*C. rosea*). Documented in the PPL, southern MIM, and eastern CGP. Description is based on summary of vegetation data from 22 plots.

• MHs49b Elm - Basswood - Black Ash - (Blue Beech) Forest

Wet-mesic hardwood forests. Sugar maple is the most common and abundant canopy species, often present with basswood, black ash, elms, and hackberry. Some stands are strongly dominated by bur oak. Blue beech is much more important in all height layers in MHs49b than in MHs49a. Other species that help to distinguish MHs49b from MHs49a include black walnut, nannyberry (*Viburnum lentago*), cut-leaved toothwort (*Cardamine concatenata*), appendaged waterleaf, two-leaved miterwort (*Mitella diphylla*), woodmint (*Blephilia hirsuta*), cow parsnip (*Heracleum lanatum*), squirrel corn (*Dicentra canadensis*), silvery spleenwort (*Deparia acrostichoides*), white bear sedge, Wood's sedge (*Carex woodii*), and graceful sedge (*C. gracillima*). Documented only in the Blufflands Subsection in the PPL. Description is based on summary of vegetation data from 17 plots.



photo by M.D. Lee MN DNR



MHs49 Southern Wet-Mesic Hardwood Forest — Species Frequency and Cover

freq% cover

freq% cover

Forbs, Ferns & Fern Allies

Virginia waterleaf (<i>Hydrophyllum virginianum</i>)	90	•••
Cleavers (<i>Galium aparine</i>)	85	•••
Wood nettle (<i>Laportea canadensis</i>)	82	•••
Blue phlox (<i>Phlox divaricata</i>)	69	•
Blue cohosh (<i>Caulophyllum thalictroides</i>)	64	•
White avens (<i>Geum canadense</i>)	64	•
Wild geranium (<i>Geranium maculatum</i>)	64	••
False rue anemone (<i>Eranium biernatum</i>)	59	•••
Wild ginger (<i>Asarum canadense</i>)	56	•
Wild leek (<i>Allium tricoccum</i>)	56	••
Stemless blue violets*	56	••
Clayton's sweet cicely (<i>Osmorhiza claytonii</i>)	54	••
Yellow violet (<i>Viola pubescens</i>)	51	•
Homewort (<i>Cryptotaenia canadensis</i>)	49	••
Jack-in-the-pulpit (<i>Amseema triphyllum</i>)	49	•
Dutchman's breeches (<i>Dicentra cucullaria</i>)	46	•
Bloodroot (<i>Sanguinaria canadensis</i>)	46	•
Stinging nettle (<i>Urtica dioica</i>)	46	•
Common false Solomon's seal (<i>Smilacina racemosa</i>)	46	•
Zigzag goldenrod (<i>Solidago flexicaulis</i>)	46	•
White trout lily (<i>Erythronium albidum</i>)	44	••
Aniseroet (<i>Osmorhiza longistylis</i>)	44	••
Erect, Smooth, or Illinois cartoon-flower**	41	•
Hispid buttercup (<i>Ranunculus hispidus</i>)	41	••
Tall cornflower (<i>Rudbeckia laciniata</i>)	38	•
Virginia spring beauty (<i>Claytonia virginica</i>)	38	•
Sharp-lobed hepatica (<i>Anemone acutiloba</i>)	36	•
Large-flowered bellwort (<i>Uvularia grandiflora</i>)	36	•
Touch-me-not (<i>Impatiens</i> spp.)	33	•
Mayapple (<i>Podophyllum peltatum</i>)	31	•
Common enchanter's nightshade (<i>Circaea lutetiana</i>)	31	•
Cut-leaved toothwort (<i>Cardamine concatenata</i>)	26	•
Drooping trillium (<i>Trillium flexipes</i>)	26	•
Appendaged waterleaf (<i>Hydrophyllum appendiculatum</i>)	21	••

Grasses & Sedges

Bottlebrush grass (<i>Elymus hystrix</i>)	38	••
Hairy-leaved sedge (<i>Carex hirtifolia</i>)	36	•
Sprengel's sedge (<i>Carex sprengelii</i>)	36	••
White bear sedge (<i>Carex albursina</i>)	31	•
Bland sedge (<i>Carex blanda</i>)	31	•
Ambiguous sedge (<i>Carex amphibia</i>)	28	•
Woody Vines		
Virginia creeper (<i>Parthenocissus</i> spp.)	36	•

Shrubs

Chokeberry (<i>Prunus virginiana</i>)	72	•
Missouri gooseberry (<i>Ribes missouriense</i>)	67	••
Prickly ash (<i>Zanthoxylum americanum</i>)	38	••
Nannyberry (<i>Viburnum lentago</i>)	36	•
Prickly gooseberry (<i>Ribes cynosbati</i>)	36	••
Hawthorn (<i>Crataegus</i> spp.)	33	•
Pagoda dogwood (<i>Cornus alternifolia</i>)	33	•
Red-berried elder (<i>Sambucus racemosa</i>)	28	••

Trees

	Canopy freq% cover	Subcanopy freq% cover	Shrub Layer freq% cover
Basswood	87	56	49
Black ash	64	•••	•
Sugar maple	62	•••	38
American elm	59	•••	41
Hackberry	51	••	23
Red elm	46	••	36
Green ash	41	•••	26
Box elder	33	•	••
Bur oak	31	•••	15
Rock elm	23	•••	18
Ironwood	21	•••	15
Butternut	21	•	8
Bitternut hickory	18	••	23
Blue beech	18	•••	•
	15	•	36
		26	15

*Stemless blue violets (*Viola sororia* and similar *Viola* spp.), **Erect, Smooth, or Illinois cartoon-flower (*Smilax ecirata*, *S. herbacea*, or *S. illinoensis*)