

Southern Mesic Forest (Global Rank G3?; State Rank S3)

Overview: Distribution, Abundance, Environmental Setting, Ecological Processes

Southern Mesic Forest occurs south of the Tension Zone on moist, well-drained, medium, or fine-textured soils with high nutrient availability. In the glaciated areas of Wisconsin, this community occurs on well-drained ground moraine, fine-textured end moraine, rich alluvial terraces above river floodplains, and lakeplain margins. In southwestern Wisconsin's Driftless Area, Southern Mesic Forest occupies sites that are well drained but not droughty, which were protected from fire by rivers, wetlands, bedrock escarpments, and slopes with cool, humid northern or eastern aspects. While the distribution of Southern Mesic Forest is primarily south of the Tension Zone, outliers that might be classified here do occur to the north and east.

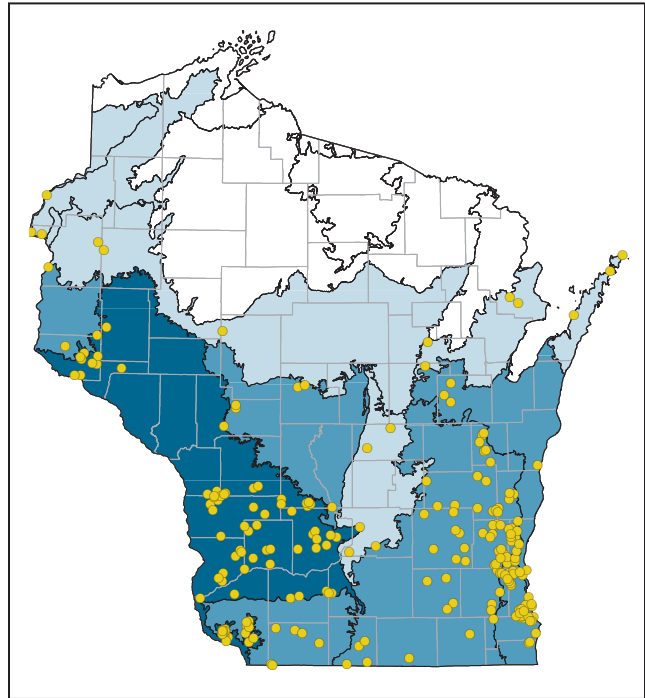
Historically this community was extensive in parts of glaciated southeastern Wisconsin (Finley 1976). It was also common, as were drier oak-dominated forests, in portions of southwestern Wisconsin's Driftless Area, especially in the heavily forested triangle formed by the Baraboo, Kickapoo, and Wisconsin rivers.

In glaciated and heavily developed southeastern Wisconsin, this community has been severely affected by outright destruction and habitat fragmentation. Much of the forest in the nearly level, fertile parts of Wisconsin was cleared to make way for farms, cities, and industries, leaving only scattered, small remnants. In the Western Coulees and Ridges Ecological Landscape of southwestern Wisconsin's unglaciated Driftless Area, the mesic hardwood forests are more common, less isolated, and may occur in a complex vegetation mosaic of drier oak-dominated forests on the rugged upland bluffs, conifer "relicts," and the lowland forests associated with large river floodplains.

Windstorms are the most important natural disturbance and may affect areas limited to the loss of single trees to much more extensive areas caused by tornadic storms or downbursts. Ice storms may also have extensive impacts. Gaps caused by these natural disturbances may set succession back, or when they occur at small scales of less than one to several acres, provide the conditions necessary for some of the less shade tolerant members of the community to persist or flourish.

Community Description: Composition and Structure

Southern Mesic Forest is dominated by hardwood trees, especially sugar maple (*Acer saccharum*) and American basswood (*Tilia americana*). In eastern Wisconsin near Lake Michigan, American beech (*Fagus grandifolia*) becomes an important canopy associate and may assume co-dominant status along with sugar maple and American basswood. The potential canopy associates comprise a diverse group and may include



Locations of Southern Mesic Forest in Wisconsin. The deeper hues shading the ecological landscape polygons indicate geographic areas of greatest abundance. An absence of color indicates that the community has not (yet) been documented in that ecological landscape. The dots indicate locations where a significant occurrence of this community is present, has been documented, and the data incorporated into the Natural Heritage Inventory database.

northern red oak (*Quercus rubra*), white oak (*Q. alba*), white ash (*Fraxinus americana*), red elm (*Ulmus rubra*), American elm (*U. americana*), red maple (*Acer rubrum*), black walnut (*Juglans nigra*), butternut (*J. cinerea*), bitternut-hickory (*Carya cordiformis*), and in the southwestern corner of the state, honey locust (*Gleditsia triacanthos*). Conifers are absent, although in a few areas, such as parts of the Driftless Area in the Western Coulees and Ridges Ecological Landscape, eastern white pine (*Pinus strobus*) and an occasional eastern hemlock (*Tsuga canadensis*) may occur.

In the parlance of many foresters, all forests dominated by sugar maple tend to be classified and managed as "northern hardwoods." There are some differences in understory composition and in the proportional representation of some of the canopy associates. Also, in the vast forests of northern Wisconsin, hemlock was dominant or co-dominant in many stands from which it is now absent, and these are all considered northern hardwoods.

The deep shade created by the canopy trees in undisturbed stands of sugar maple, American beech, and American basswood typically suppresses the shrub/sapling stratum until a gap opens up. Cover values of shrubs and saplings are typically low, and by mid-summer, mature stands appear quite

open beneath the canopy. Gap-phase replacement, caused by windthrow, ice accumulation damage, pest infestation, or disease, is the characteristic natural disturbance regime of Southern Mesic Forest. Gaps may quickly fill with thickets of sapling trees or shrubs such as American hazelnut (*Corylus americana*), American witch-hazel (*Hamamelis virginiana*), and muscle-wood (*Carpinus caroliniana*).

Nutrient-rich stands support striking displays of spring wildflowers such as wild leek (*Allium tricoccum*), blue cohosh (*Caulophyllum thalictroides*), woodland phlox (*Phlox divaricata*), spreading Jacob's-ladder (*Polemonium reptans*), bloodroot (*Sanguinaria canadensis*), large-flowered trillium (*Trillium grandiflorum*), May-apple (*Podophyllum peltatum*), downy yellow violet (*Viola pubescens*), and Virginia water-leaf (*Hydrophyllum virginianum*). The spring ephemerals deserve special mention. This group is well known and widely appreciated for the vibrant colors it adds to the drab and seemingly lifeless post-winter woodland landscape. The spring ephemerals complete the above-ground portion of their life cycles early in the growing season in just a few weeks before the trees leaf out. Common members of this group are spring-beauty (*Claytonia virginica*), Dutchman's breeches (*Dicentra cucullaria*), false mermaid-weed (*Floerkea proserpinacoides*), false rue anemone (*Enemion biternatum*), cut-leaved toothwort (*Cardamine concatenata*), and the trout-lilies: white (*Erythronium albidum*) and yellow (*E. americanum*). By late spring, dense stands of Canadian wood-nettle (*Laportea canadensis*), maidenhair fern (*Adiantum pedatum*), and other ferns (e.g., *Osmunda* spp., *Athyrium* spp.) have become dominant, and evidence of the vibrant ephemerals is gone.

Plants strongly associated with, and in some cases restricted to, the mesic hardwood forests of southern Wisconsin include showy orchis (*Orchis spectabilis*), heart-leaved skullcap (*Scutellaria ovata*), putty-root (*Aplectrum hyemale*), rue-anemone (*Thalictrum thalictroides*), glade fern (*Diplazium pycnocarpon*), broad beech fern (*Phegopteris hexagonoptera*), ebony spleenwort (*Asplenium platyneuron*), and silvery spleenwort (*Debaria acrostichoides*).

Among the rare herbs associated with Southern Mesic Forest—and some of these are also limited to southern Wisconsin—include bluestem goldenrod (*Solidago caesia*), snow trillium (*Trillium nivale*), goldenseal (*Hydrastis canadensis*), Carey's sedge (*Carex careyana*), great water-leaf (*Hydrophyllum appendiculatum*), nodding pogonia (*Triphora trianthophora*), twinleaf (*Jeffersonia diphylla*), and reflexed trillium (*Trillium recurvatum*). Several rare woody plants also occur in Southern Mesic Forest; the shrub, smooth black-haw (*Viburnum prunifolium*), the Wisconsin Special Concern Kentucky coffee-tree (*Gymnocladus dioica*), and the Wisconsin Threatened blue ash (*Fraxinus quadrangulata*).

The rare animals found in southern Wisconsin hardwood forests include a number of area-sensitive species that are either absent from or of very limited distribution in the far more extensive forests of northern Wisconsin. This group includes Cerulean Warbler (*Setophaga cerulean*), Hooded



Remnant mesic hardwood forest in Milwaukee County is dominated by large oaks, maples, American basswood, and American beech. Few such remnants persist in the southeastern corner of the state, all are small and isolated, and most are fragments of formerly much more extensive forested areas. Southern Lake Michigan Coastal Ecological Landscape. Photo by Emmet Judziewicz.



This rich maple-basswood forest on slopes above the Rush River in Pierce County supports a high diversity of herbs, including snow trillium (Wisconsin Threatened), putty-root (Wisconsin Special Concern) and Dutchman's breeches. Western Coulees and Ridges Ecological Landscape. Photo by Eric Epstein, Wisconsin DNR.

Warbler (*Setophaga citrina*), Kentucky Warbler (*Geothlypis formosa*), Yellow-throated Warbler (*Setophaga dominica*), Worm-eating Warbler (*Helmitheros vermivorum*), Louisiana Waterthrush (*Parkesia motacilla*), and Acadian Flycatcher (*Empidonax virescens*). Other birds breeding in southern Wisconsin's mesic hardwood forests are Wood Thrush (*Hylocichla mustelina*), Scarlet Tanager (*Piranga olivacea*), Pileated Woodpecker (*Dryocopus pileatus*), Blue-gray Gnatcatcher (*Poliophtila caerulea*), Barred Owl (*Strix varia*), and Red-shouldered Hawk (*Buteo lineatus*).

When other habitats, such as ephemeral ponds, seeps and spring runs, streams, cliffs, or talus slopes, are embedded within Southern Mesic Forest, additional species (amphibians, aquatic invertebrates, wetland plants), which may include rare or sensitive habitat specialists, will find suitable

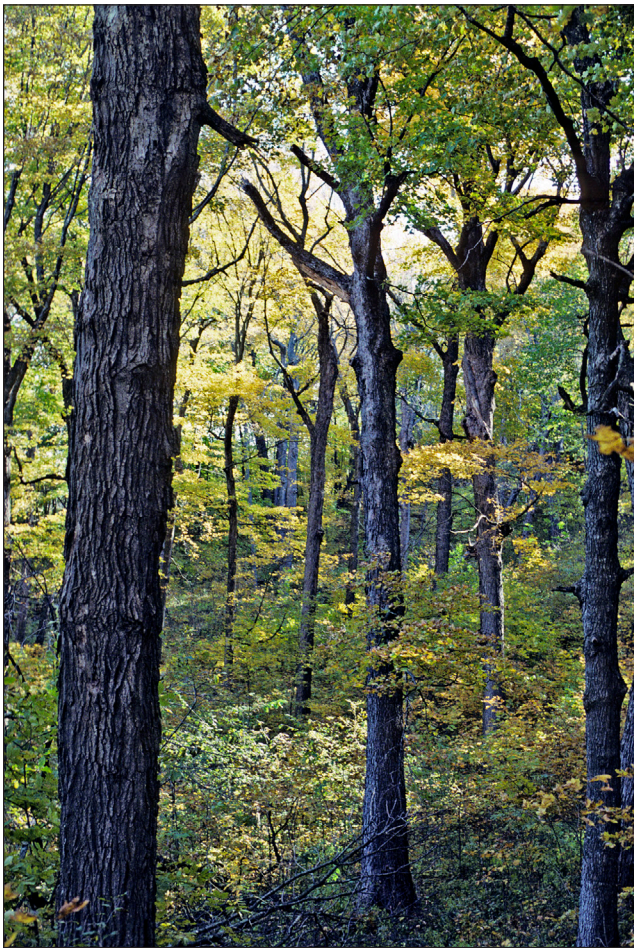
living conditions. Older stands, for example, those with deep humus and abundant coarse woody debris, are important for frogs and salamanders and some invertebrates.

Conservation and Management Considerations

Critical management issues include severe fragmentation (especially in the southeast), infestations of invasive plants, which can be overwhelming in the case of garlic mustard (*Alliaria petiolata*), exotic earthworms (the issue of soil and understory damage due to the activities of exotic earthworms is well documented and very serious in mesic hardwood forests of northern Wisconsin; the situation in the south is less clear), and negative grazing and browsing impacts due to the activities of domestic livestock and white-tailed deer (*Odocoileus virginianus*). Dutch elm disease, caused by several species of fungi but especially *Ophiostoma ulmi*, has devastated mesic forests in which red or American elm were important components. Beech bark disease (beech scale), caused by interactions of a scale insect (*Cryptococcus fagisuga*) and fungi (several

species in the genus *Neonectria*) has been documented in Door County and seems likely to spread throughout the Wisconsin range of American beech. Infested stands may include resistant individuals, so there is some hope that these can be propagated and used to repopulate infested stands. An exotic beetle, the emerald ash borer (*Agrilus planipennis*), has been spreading rapidly, especially in southern Wisconsin, and will alter the composition and structure of infested stands in which ash occurs by killing most of them.

Conservation and management of Southern Mesic Forest will be most effective, especially for associated vertebrates, where this type occurs in a mosaic of other, more extensive hardwood forest communities. Public ownership of mesic hardwood forests is limited and unlikely to increase appreciably; partnerships involving NGOs and other private entities are essential if the best remaining examples are to be maintained, restored, and managed. Additional incentives, focused on the conservation of whole forest communities rather than on exploitation or resource extraction, are needed



Floristically rich southern mesic forest dominated by sugar maple, American basswood, and red oak occupies this moist cove opening to the Kickapoo River in south central Monroe County. Wilton Hemlock-Hardwoods, Western Coulees and Ridges Ecological Landscape. Photo by Eric Epstein, Wisconsin DNR.



Diverse old stands of sugar maple-basswood forest on an alluvial terrace just above the floodplain of the Black River. This stand supports not only a diverse herbaceous layer but several rare animals as well. Black River State Forest, Jackson County, Central Sand Plains Ecological Landscape. Photo by Eric Epstein, Wisconsin DNR.

for private landowners if the loss of diversity in southern forests is to be reversed or even abated (Rogers et al. 2008, Waller and Rooney 2008).

Some of the best and most extensive conservation opportunities are within the Driftless Area (e.g., in the Baraboo Hills and along the lower Wisconsin River), but there are important stands elsewhere, especially in the southeastern quadrant of the state (the most intact of these are in the northern part of the Kettle Moraine region) and in west central Wisconsin, near the Mississippi and St. Croix rivers. Mesic forests in these areas differ from one another in their post-Pleistocene histories, soils, landforms, and to some degree, in their composition. In most of southern Wisconsin, but especially in the east, this type has been greatly reduced because of outright destruction and the conversion of forested land on fertile, well-drained ground moraine with gentle topography to agricultural or residential uses. Fragmentation pressures are very high, and many remnants are in poor condition because of past grazing, overabundant white-tailed deer, the explosive spread of invasive plants, high-grading, and the influence of activities in the surrounding landscape. Intact mesic hardwood forests are scarce now and becoming increasingly more so.

The classification of forest communities has sometimes been an issue that has presented additional challenges to conservation as resource management agencies do not always differentiate the mesic hardwood forests of southern Wisconsin from the much broader and widely used category of “northern hardwoods.” The latter type is still represented by millions of acres in northern Wisconsin and the Upper Peninsula of Michigan and has been considered by some as not worthy of conservation attention because of its abundance. We would emphasize that many of the unique attributes of Southern Mesic Forest, including a high percentage of the

rare species mentioned in the “Community Description” section above, are not duplicated or even present in the northern hardwood forests. In addition, there are climatic, geological, and hydrological differences between the mesic hardwood forest of the north and south. The vegetation mosaic and context of the southern hardwood forests is very different from those of the north.

It has become increasingly difficult to find intact examples of Southern Mesic Forest in good condition. The acreage of this community occurring on public lands is limited, and it is important to avoid taking the type for granted. Better incentives are needed for private landowners if they are to focus on the conservation of southern Wisconsin’s forest communities to ensure that they can be better protected from the negative impacts of incompatible or short-sighted land uses.

Additional Information

For related information, see the natural community descriptions for Northern Mesic Forest, Southern Dry-mesic Forest, and Southern Hardwood Swamp. The U.S. National Vegetation Classification type most closely corresponding to Southern Mesic Forest is CEG002062 North-central Maple – Basswood Forest (Faber-Langendoen 2001). It is likely that CEG005013 Beech - Maple Glaciated Forest would apply to a limited acreage of mesic hardwood forests in southeastern Wisconsin. It would also apply to beech-maple hardwood forests north of the Tension Zone in close proximity to Lake Michigan though at least a few of these stands also support coniferous tree species such as eastern white pine, eastern hemlock, and northern white-cedar (*Thuja occidentalis*).

Also see:
Grimm (1984)

FROM: Epstein, E.E. Natural communities, aquatic features, and selected habitats of Wisconsin. Chapter 7 in *The ecological landscapes of Wisconsin: An assessment of ecological resources and a guide to planning sustainable management*. Wisconsin Department of Natural Resources, PUB-SS-1131H 2017, Madison.

For a list of terms used, please visit the [Glossary](#).

For a reference list, please see the [Literature Cited](#).