13140

North-Central Interior Maple-Basswood Forest

BpS Model/Description Version: Aug. 2020

|  |  |  |  |
| --- | --- | --- | --- |
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Vegetation Type

Forest and Woodland

Map Zones

49

Geographic Range

The distribution of this mesic forest type is concentrated in the prairie border states of MN, WI and IA, ranging into northern MN and WI and south to southern IL and eastern KS (NatureServe 2007). In MZ49, this BpS likely occurred throughout IL, but was concentrated in regions where topographic variation favored the development of maple-basswood forest on fire-protected slopes and moraines. The following Ecoregions likely supported BpS 1314: 52 (Driftless Area, including 52a and 52b Level IV Ecoregions), 53 (Southern Wisconsin Till Plains, primarily in 53a), 54 (Central Corn Belt Plains, primarily in 54f and 54g and likely localized in ravines in the other Level IV Ecoregions), and 72 (Interior River Valleys and Hills) (Woods et al. 2006). This system is replaced by BpS 1321 in Ecoregion 71 (Interior Plateau). Although maple-basswood forest may have occurred throughout IL, Braun (1950) maps only the driftless northwestern corner of the state as part of the Maple-Basswood Forest Region, but states that the community is not confined to the region. In WI, this system occupied fire-protected areas in the Southeastern Wisconsin Till Plains Level III Ecoregion (53a and 53b) (Omernik et al. 2000).

Biophysical Site Description

Within MZ49, BpS 1314 occupies moderately well-drained soils on valley slopes and bottoms, primarily with northerly or easterly aspects, where occurrences are protected from fire (NatureServe 2007). Soils are medium to deep loams derived from glacial till or loess.

Plants in these communities have access to predictable supplies of water and nutrients, but they are often limited by light because of the dense forest canopy. Typical sites are buffered from seasonal drought by fine-textured moisture-retaining soils or dense subsoil layers. Essential nutrients are mineralized from decaying organic matter at twice the rate of that in fire-dependent forest or wet forest communities.

Vegetation Description

Sites are characterized by continuous, often dense, canopies of deciduous trees and understories of shade-adapted shrubs and herbs. Dominant trees species in the canopy and subcanopy typically include sugar maple (Acer saccharum), basswood (Tilia americana), slippery elm (Ulmus rubra), American elm (U. americana), and northern red oak (Quercus rubra). Canopy associates include white oak (Quercus alba), ironwood (Ostrya virginiana), muscle wood (Carpinus caroliniana), bitternut hickory (Carya cordiformis), shagbark hickory (C. ovata), green ash (Fraxinus pennsylvanica), and black walnut (Juglans nigra) (Braun 1950, NatureServe 2007). The scattered shrub layer is characterized by alternate-leaved dogwood (Cornus alternifolia), gooseberries (Ribes spp.), elderberry (Sambucus spp.), and prickly-ash (Zanthoxylum americanum) (NatureServe 2007).

The ground flora is dominated by spring-flowering herbs, including ephemerals, which complete their life cycle in the spring before the canopy trees have leafed out and cast a dense shade on the understory. Common ground cover species include maidenhair fern (Adiantum pedatum), silvery spleenwort (Athyrium thelypteroides), lady fern (Athyrium filix-femina), interrupted fern (Osmunda claytoniana), rattlesnake-fern (Botrychium virginianum), jack-in-the-pulpit (Arisaema triphyllum), large white trillium (Trillium grandiflorum), yellow bellwort (Uvularia grandiflora), wild ginger (Asarum canadense), rue-anemone (Anemonella thalictroides), sharp-lobed hepatica (Hepatica acutiloba), bloodroot (Sanguinaria canadensis), blue cohosh (Caulophyllum thalictroides), spikenard (Aralia racemosa), wood phlox (Phlox divaricata), lopseed (Phryma leptostachya), wood anemone (Anemone quinquefolia), spring beauty (Claytonia virginiana), Dutchman’s-breeches (Dicentra cucullaria), hairy Solomon’s seal (Polygonatum pubescens), black snakeroot (Sanicula gregaria), and white snakeroot (Eupatorium rugosum) (Braun 1950, NatureServe 2007).

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| ACSA3 | *Acer saccharum* | Sugar maple |
| TIAM | *Tilia americana* | American basswood |
| QURU | *Quercus rubra* | Northern red oak |
| QUAL | *Quercus alba* | White oak |
| CARYA | *Carya* | Hickory |
| CACA18 | *Carpinus caroliniana* | American hornbeam |
| OSVI | *Ostrya virginiana* | Hophornbeam |
| COAL2 | *Cornus alternifolia* | Alternateleaf dogwood |

Species names are from the NRCS PLANTS database. Check species codes at http://plants.usda.gov.

Disturbance Description

Fire Regime V characterizes this system, dominated by high-intensity, low-frequency fires that occur in greater than 1000yr intervals. Low-intensity surface fires may have been more frequent in the mid-seral stages of this BpS when more fire-prone species (such as oak) comprise a larger component of the tree canopy. Light surface fires would result in the partial loss of trees.

Historically, this forest type, composed of fire-sensitive species, was not disturbed by fire except during periods following catastrophic wind events or extreme drought. Grimm (1984) states “The fire regimes of deciduous forests, such as bigwoods, are much different from the commonly perceived model of fire regime, in which fuels and fire danger increase with time and in which intense crown fires cause great destruction of the forest.” In maple-basswood forests, decomposition of potential fuels is rapid, and is particularly rapid on base-rich soils (Bormann and Likens 1979). Because of the dense shade, the cover of herbs and shrubs is sparse. Thus little fuel exists at the ground level, tree trunks are not very flammable, and the open tree crowns do not carry fire very well. Moreover, low solar radiation, high humidity, and low wind speeds prolong the moisture retention of ground-level fuels (Kucera 1952), thereby inhibiting the ignition and spread of fire. These forests are sometimes referred to as the “asbestos forests” because of their fireproof character (Vogl 1967). Ordinarily, only the leaf litter ever reaches a flammable state, and only patchy creeping ground fires occur (Niering et al. 1970, Barden and Woods 1973).

Two primary disturbance factors are used to model this system. Catastrophic windthrow affects mature stands and occurs on an approximately 600-700yr rotation (MNDNR 2005). Replacement fire occurs primarily in young and windthrown stands and occurs on a rotation of approximately 1000yrs. In addition, surface fires occur in young stands <100yrs of age which contain a significant component of oak. The disturbance probabilities by class applied in the model are contained in the VDDT documentation section.

Per the IL Fire Needs Assessment survey, Fire Return Intervals for this system (currently) are on average 7 years to maintain good quality habitat in this system and 3 years to restore degraded habitats back to this system. No information on burn severity was provided.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 1042 | 45 |  |  |
| Moderate (Mixed) |  |  |  |  |
| Low (Surface) | 854 | 55 |  |  |
| All Fires | 469 | 100 |  |  |

Fire interval is expressed in years for each fire severity class and for all types of fire combined (All Fires). Average FI is the central tendency modeled. Percent of all fires is the percent of all fires modeled in that severity class. Minimum and Maximum FIs show the relative range of fire intervals as estimated by model contributors, if known.

Scale Description

1314 was likely a small patch BpS in MZ49, where it was largely restricted to ravine slopes or moraines protected from fire.

Adjacency or Identification Concerns

Historically, elm was a canopy component within the maple-basswood forest (Grimm 1981). However, this species has been largely eliminated from this system due to Dutch elm disease. American elm (Ulmus americana) is now generally only present in the understory and midstory in contemporary forests, whereas historically it would have been the occasional canopy dominant.

Uncharacteristic conditions in this setting include infestation by exotic earthworms of European species that have affected or begun to affect soil conditions, herb/forb species representation, and tree regeneration (Hale et al. 1999). Some of the mesic forests occupying ravine slopes have greater frequency of oaks and may lack sugar maple and/or basswood. However, this BpS is the most suitable type to map through much of Illinois, outside of the far southern part of the state where it is replaced by BpS 1321 and a few eastern counties where beech-maple forest (BpS 1313) occurs.

Issues or Problems

Native Uncharacteristic Conditions

Post-settlement lumbering and disturbance have converted a number of maple-basswood woodlots to dominance by oaks or early successional species.

Comments

Succession Classes

**Mapping Rules**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Upper Layer Lifeform** | **Height (m)** | **Canopy Cover (%)** | | | | | | | | | |
| **0-10** | **11-20** | **21-30** | **31-40** | **41 - 50** | **51-60** | **61-70** | **71-80** | **81-90** | **91-100** |
| Herb | 0-0.5 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Herb | 0.5-1.0 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Herb | >1.0 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Shrub | 0-0.5 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Shrub | 0.5-1.0 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Shrub | 1.0-3.0 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Shrub | >3.0 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | 0-5 | A | A | A | A | A | A | A | A | A | A |
| Tree | 5-10 | B | B | B | B | B | B | B | B | B | B |
| Tree | 10-25 | UN | UN | UN | UN | UN | UN | C | C | C | C |
| Tree | 25-50 | UN | UN | UN | UN | UN | UN | D | D | D | D |
| Tree | >50 | UN | UN | UN | UN | UN | UN | D | D | D | D |

Succession class letters A-E are described in the Succession Class Description section. Some classes use a leafform distinction where a qualifier is added to the class letter: Brdl (broadleaf), Con (conifer), or Mix (mixed conifer and broadleaf). UN refers to uncharacteristic native or a combination of height and cover that would not be expected under the reference condition. NP refers to not possible or a combination of height and cover which is not physiologically possible for the species in the BpS.

**Description**

Class A 8 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PRSE2 | Prunus serotina | Black cherry | Upper |
| TIAM | Tilia americana | American basswood | Upper |
| QURU | Quercus rubra | Northern red oak | Upper |
| ACSA3 | Acer saccharum | Sugar maple | Upper |

Description

Characterized by early-seral young forest following a catastrophic wind or fire event. Young forest dominated by canopy species that respond rapidly to increased light availability, including northern red oak, basswood, and black cherry. Sugar maple is not likely to establish immediately following fire, but regeneration may be heavy following windthrow events.

*Maximum Tree Size Class*  
Pole 5-9" DBH

Class B 8 Mid Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ACSA3 | Acer saccharum | Sugar maple | Upper |
| TIAM | Tilia americana | American basswood | Upper |
| QURU | Quercus rubra | Northern red oak | Upper |
| CARYA | Carya | Hickory | Upper |

Description

Characterized by mid-succession maturing forests. In this stage there is the gradual decline of northern red oak and it is replaced by sugar maple. American elm and basswood increase.

*Maximum Tree Size Class*  
Medium 9-21"DBH

Class C 14 Mid Development 2 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ACSA3 | Acer saccharum | Sugar maple | Upper |
| TIAM | Tilia americana | American basswood | Upper |
| QURU | Quercus rubra | Northern red oak | Upper |
| CARYA | Carya | Hickory | Upper |

Description

Characterized by late-successional maturing forest. Forest dominated by sugar maple, beech, basswood, white ash, tulip-poplar, black cherry, ironwood, northern red oak.

*Maximum Tree Size Class*  
Large 21-33"DBH

Class D 70 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ACSA3 | Acer saccharum | Sugar maple | Upper |
| TIAM | Tilia americana | American basswood | Upper |
| QURU | Quercus rubra | Northern red oak | Upper |
| CARYA | Carya | Hickory | Upper |

Description

These old late-seral forests (>150yrs) are the end point of succession. Forest dominated by sugar maple, basswood, white ash, tulip-poplar, ironwood, northern red oak. Small gap disturbances predominate to maintain a high proportion of the acreage in this class.

Upper Layer Lifeform is not the dominant lifeform. In this late seral stage there would be a multi-layer canopy and sub-canopy (created through small-scale windthrow). Therefore, although the min tree height is set at 25m in order to make this class exclusive from class C tree height would range from 10-50m.

*Maximum Tree Size Class*  
Very Large >33"DBH

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Mid1:ALL | 35 |
| Mid1:ALL | 36 | Mid2:CLS | 75 |
| Mid2:CLS | 76 | Late1:CLS | 150 |
| Late1:CLS | 151 | Late1:CLS | 999 |

Probabilistic Transitions

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Disturbance Type** | **Disturbance occurs In** | **Moves vegetation to** | **Disturbance Probability** | **Return Interval (yrs)** | **Reset Age to New Class Start Age After Disturbance?** | **Years Since Last Disturbance** |
| Replacement Fire | Early1:ALL | Early1:ALL | 0.001 | 1000 | Yes | 0 |
| Replacement Fire | Mid1:ALL | Early1:ALL | 0.001 | 1000 | Yes | 0 |
| Surface Fire | Mid1:ALL | Mid1:ALL | 0.014 | 71 | No | 0 |
| Replacement Fire | Mid2:CLS | Early1:ALL | 0.001 | 1000 | Yes | 0 |
| Wind or Weather or Stress | Mid2:CLS | Early1:ALL | 0.0015 | 667 | Yes | 0 |
| Replacement Fire | Late1:CLS | Early1:ALL | 0.001 | 1000 | Yes | 0 |
| Wind or Weather or Stress | Late1:CLS | Early1:ALL | 0.0015 | 667 | Yes | 0 |
| Wind or Weather or Stress | Late1:CLS | Late1:CLS | 0.2 | 5 | No | 0 |

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