13023

**Laurentian-Acadian Northern Hardwoods Forest - Northern Sugar Maple-Basswood**

BpS Model/Description Version: Aug. 2020

|  |  |  |  |
| --- | --- | --- | --- |
| **Modelers** |  | **Reviewers** |  |
| Peggy Burkman | peggy\_burkman@nps.gov | Dave Cleland | dcleland@fs.fed.us |
| Doug Pearsall | dpearsall@tnc.org | Bredan Ward | bward@fs.fed.us |
| Brad Slaughter | slaughterb@michigan.gov | None | None |

Vegetation Type

Forest and Woodland

Map Zones

51

Model Splits or Lumps

This BpS is split into multiple models:

Laurentian-Acadian Northern Hardwoods Forest (BpS 1302) was split into two models: 1302-2 Laurentian Acadian Northern Hardwoods Forests-Hemlock and 1302-3-Laurentian-Acadian Northern Hardwoods Forest - Northern Sugar Maple-Basswood.

Geographic Range

This system occurs in western Upper Peninsula of MI, in Subsections 212Tb, 212Ya, 212Jb, 212Sq, 212Jo and 212Sn.

Biophysical Site Description

This type occurs principally on moraines of coarse and fine texture, on lacustrine silts and clays, and on medium-textured till over bedrock -- areas of consistent moisture and nutrient availability that are protected from fire. 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

This system is a mixture of mesophyllic hardwood species and is typified by Acer saccharum, Tilia americana, Fagus grandifolia (restricted to MZ51 and eastern MZ50), Betula allegheniensis and Ulmus americana. Populus tremuloides, Populus grandidentata and Betula papyrifera are early seral species in this system. Acer rubrum and Abies balsamea occasional species found in mid-seral stands, especially on less productive soils. Occasional Pinus strobus individuals were present in early and mid-seral stands that were in proximity to seed sources, but their presence in contemporary forests likely indicates a site that would have formerly been occupied more strongly by pine under the natural disturbance regime. Tsuga canadensis was an occasional late-seral species on more poor soils; however, its presence today likely suggests that the Laurentian-Acadian Pine-Hemlock-Hardwood Forest is a more appropriate BpS.

Structurally, these uneven-aged forests were characterized by large volumes of coarse structurally complex woody debris arranged both vertically and horizontally beneath multi-storied canopies of different-aged cohorts, with super canopies composed of trees centuries old (Tyrell and Crow 1994). The dominant tree species are among the most moisture and nutrient-demanding species in the eastern US, and their distribution is confined to glacial landforms underlain by fertile soils (Woods 2000, Whitney 1986). Composition of the ground flora and understory varies along a moisture-nutrient gradient, and typically consists of high densities of shade-tolerant tree species and mesophilic herbaceous species including blue cohosh, yellow violet, sweet cicely, various ferns and ginseng. The shrub layer includes Canada yew, beaked hazel, moose wood and Amelanchier species.

In the mid-1800s, there were 5.8 million acres of northern hardwood ecosystems in the Upper Peninsula of MI (Cleland et al. 2003). Sugar maple, hemlock, yellow birch, balsam fir, cedar in swales, spruce and beech were the dominant late-successional species recorded along section lines by GLO surveyors. Early-successional aspen and white birch comprised only two percent of the GLO line trees. Large openings likely occurred on less than one percent of the landscape.

In the mid-1800’s, there were 8.4 million acres of northern hardwood ecosystems within the 17.8 million acres of forest lands in northern WI (Cleland et al. 2003). Yellow birch, sugar maple, hemlock, white pine, elm and basswood were the dominant late-successional species. Early-successional aspen, white birch and oak species comprised 4.8% of the GLO corner trees. Large openings likely occurred on less than one percent of the landscape.

**Description**

Class A 4 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| POTR5 | Populus tremuloides | Quaking aspen | Upper |
| BEPA | Betula papyrifera | Paper birch | Upper |

Description

Class A contains early-seral stands characterized by aspen and paper birch. It occurs due to the combination of blowdown followed by fire. Forty percent of blowdown areas burn and revert to this class.

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

Class B 7 Early Development 2 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ACSA3 | Acer saccharum | Sugar maple | Upper |
| TIAM | Tilia americana | American basswood | Upper |
| BEAL2 | Betula alleghaniensis | Yellow birch | Upper |
| POTR5 | Populus tremuloides | Quaking aspen | Upper |

Description

Class B contains regenerating stands dominated by mid-tolerant northern hardwood species. Windthrow of mature stands (without subsequent fire) generally results in this class. Includes a combination of new recruits and sprouts.

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

References

Bormann, F.H. and Likens, G.E. 1979. Catastrophic disturbance and the steady state in northern hardwood forests. American Scientist. 67: 660-669.

Braun, E.L. 1950. Deciduous Forests of Eastern North America. Blackburn Press. 596 pp.

Canham, C.D. and Loucks, O.L. 1984. Catastrophic windthrow in the presettlement forests of Wisconsin. Ecology. 65: 803-809.

Cleland, D.T., S.C. Saunders, T.R. Crow, D.I. Dickmann, A.L. Maclean, J.K. Jordan, R.L. Watson and A.M. Sloan. 2004. Characterizing historical and modern fire regimes in the Lake States: a landscape ecosystem approach. Landscape Ecology. 19: 311–325.

Cleland, D.T., S.C. Saunders, K.M. Brosofske, A.L. Maclean, J.K. Jordan, R.L. Watson, A.M. Sloan, T.M. Scupien, T.R. Crow and D.I. Dickmann. 2003. Ongoing project to determine historical and modern wind and fire regimes, fire risk, and historical landscape and community composition and structure in the Lake States and R-9 National Forests. North Central Research Station of the USDA Forest Service.

Davis, M.B., S. Sugita, R.R. Calcote, J.B. Ferrari and L.E. Frelich. 1994. Historical development of alternate communities in a hemlock hardwood forest in northern Michigan, USA. In Large Scale Ecology and Conservation Biology: The 35th Symposium of the British Ecological Society with the Society for Conservation Biology, 19-39. Edited by P.J. Edwards, R.M. May and N.R. Webb. University of Southampton. Blackwell Scientific Publications: Boston, MA.

Dunn, Christopher P., Glenn R. Guntenspergen and John R. Dorney. 1983. Catastrophic wind disturbance in an old-growth hemlock-hardwood forest, Wisconsin. Canadian Journal of Botany. 61: 211-217.

Foster, David R. and Emery R. Boose. 1992. Patterns of forest damage resulting from

catastrophic wind in central New England, USA. Journal of Ecology. 80: 79-98.

Frelich, L.E. and C.G. Lorimer. 1991. Natural disturbance regimes in hemlock hardwood forests of the Upper Great Lakes Region. Ecological Monographs. 61(2): 159-162.

Grimm, E.C. 1984. Fire and other factors controlling the Big Woods vegetation of Minnesota in the mid-nineteenth century. Ecological Monographs. 54: 291-311.

Maclean, A.L. and D.T. Cleland. 2003. Determining the spatial extent of historical fires with geostatistics in northern Lower Michigan. In: Omi, P.N. and L.A. Joyce, tech. eds. Fire, fuel treatments, and ecological restoration conference proceedings, April 16-18 2002. Fort Collins, CO. Proc. RMRS-P-29. Fort Collins, CO: USDA Forest Service, Rocky Mountain Research Station: 289-300.

Runkle, James Reade. 1982. Patterns of disturbance in some old growth mesic forests of eastern North America. Ecology. 63(5): 1533-1546.

Stearns, F.W. 1949. Ninety years change in a northern hardwood forest in Wisconsin. Ecology. 30: 350-358.

Stearns, F.W. 1949. Ninety years of change in a northern hardwood forest in Wisconsin. Ecology. 30: 350-358.

Tyrell, L.E. and T.R. Crow. 1994. Structural characteristics of old-growth hemlock-hardwood forests in relation to age. Ecology. 75: 370-386.

Webb, S.L. 1989. Contrasting windstorm consequences in two forests, Itasca State Park, Minnesota. Ecology. 70(4): 1167-1180.

White, P.S. and S.T.A. Pickett. 1985. Natural disturbance and patch dynamics: an introduction. In: Pickett, S.T.A. and P.S. White, eds. The Ecology of Natural Disturbance and Patch Dynamics. Academic Press, New York, NY: 3-13.

Whitney, G.G. 1986. Relation of Michigan's presettlement pine forests to substrate and

disturbance history. Ecology. 67(6): 1548-1559.

Woods, K.D. 2000. Long-term change and spatial pattern in a late-successional hemlock-northern hardwood forest. Journal of Ecology. 88: 267-282.

USDA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. Fire Effects Information. 2002, December.