14930

Central Interior and Appalachian Shrub-Herbaceous Wetland Systems

BpS Model/Description Version: Aug. 2020

Update: 6/22/2018

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Vegetation Type

Woody Wetland

Map Zones

52, 62

Model Splits or Lumps

This biophysical setting (BpS) is lumped with: 1494

Geographic Range

These systems occur throughout the upper Great Lakes region in Ontario, Canada, and Michigan, Minnesota, and Wisconsin, extending south to northern Ohio and Pennsylvania. In map zone (MZ) 62, these systems occur primarily in the glaciated landscapes of Subsections 222Ha, 222Hb, 221Fa, 221Fc, 221Fb, and 222Ia (Cleland et al. 2007).

Biophysical Site Description

These systems occur on glacial lakebeds, in channels of glacial outwash, and in depressions on glacial outwash and moraines (NatureServe 2007, NatureServe 2005b, Hoffman 2002, Faber-Langendoen 2001, Reuter 1986, Curtis 1959). They frequently occur along the margins of lakes, ponds and streams where seasonal flooding or beaver-induced flooding is common (Hoffman 2002, Reuter 1986, Curtis 1959).

These systems typically occur on organic soil such as well-decomposed sapric peat (Curtis 1959), but saturated mineral soil may also support these systems (NatureServe 2007, Hoffman 2002, Faber-Langendoen 2001, Curtis 1959). Soil pH may range from strongly acid to circumneutral (Warners 1993, Curtis 1959, Costello 1939).

These systems often occur as large wetland complexes comprising emergent marsh, wet meadow (sedge meadow), fen, shrub-dominated wetland, and swamp forest. Wet meadows and fens may occur along streams and grade into shrub thickets and swamp forest (Curtis 1959). On the edges of inland lakes, wet meadow often borders emergent marsh and less frequently fen. These wetland communities may also occur along the Great Lakes shoreline within extensive areas of Great Lakes marsh.

Vegetation Description

These broadly defined BpS cover a variety of graminoid- and shrub-dominated wetlands in the glaciated regions of MZ62. These include marsh, wet meadow, bog, fen, and shrub communities, each with characteristic vegetation and structure. Typical dominants of submergent marsh communities include pondweeds (*Potamogeton* spp.), naiads (*Najus* spp.), waterweeds (*Elodea* spp.), eelgrass (*Vallisneria americana*), bladderworts (*Utricularia* spp.), pond-lilies (*Nuphar* spp.), and water-lilies (*Nymphaea* spp.). Emergent marshes are typically dominated by cattails (*Typha latifolia* and *T. angustifolia*) or bulrushes (*Schoenoplectus* spp.), with some occurrences dominated by common reed (*Phragmites australis*). Wet meadows are dominated by sedges (including *Carex stricta* and *C. lacustris*) and blue-joint (*Calamagrostis canadensis*), associated with a variety of graminoids and forbs. Fens are dominated by sedges (including *Carex sterilis*, *C. lasiocarpa*, and *C. stricta*) and a variety of shrubs and forbs, including calciphiles on rich sites. Bogs are dominated by acidophiles, including ericaceous shrubs such as leatherleaf (*Chamaedaphne calyculata*). Shrub-dominated systems may be dominated by willows (*Salix* spp.), dogwoods (*Cornus* spp.), alder (*Alnus rugosa*), buttonbush (*Cephalanthus occidentalis*), or a variety of other shrubs (Anderson 1981, Fike 1999, NatureServe 2007).

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| CAST8 | *Carex stricta* | Upright sedge |
| CACA4 | *Calamagrostis canadensis* | Bluejoint |
| TYLA | *Typha latifolia* | Broadleaf cattail |
| NYOD | *Nymphaea odorata* | American white waterlily |
| COAM2 | *Cornus amomum* | Silky dogwood |
| COSE16 | *Cornus sericea* | Redosier dogwood |
| THPA | *Thelypteris palustris* | Eastern marsh fern |
| SALIX | *Salix* | Willow |

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

Disturbance Description

These wetland systems are groundwater-dependent. Water levels fluctuate seasonally, reaching their peak in spring and lows in late summer (Warners 1993, Costello 1936,). However, water levels typically remain at or near the soil’s surface throughout the year (Eggers and Reed 1997, Warners 1993, Curtis 1959, Costello 1936). In addition to seasonal flooding, beaver-induced flooding may also play an important role in maintaining open and shrub-dominated wetland communities by occasionally raising water levels and killing encroaching trees and shrubs. Beaver may also help create new wet meadows by flooding shrub- or tree-dominated wetlands and thus creating suitable habitat for the growth of shade-intolerant wet meadow species.

Evidence from wetland peat cores and circa 1800 vegetation maps indicate that wet meadow is a fire-dependent natural community (Davis 1979, Curtis 1959). Analysis of wetland peat cores shows that charcoal fragments are consistently associated with sedge and grass pollen (Davis 1979). Conversely, charcoal fragments are lacking from sections of peat cores dominated by shrub pollen. Fires typically occur in sedge meadows during dry conditions of early spring or late fall (White 1965). By reducing leaf litter and allowing light to reach the soil surface and stimulate seed germination, fire can play an important role in maintaining wet meadow seed banks (Kost and De Steven 2000, Warners 1997). Fire also plays a critical role in preventing declines in species richness in many community types by creating micro-niches for small species (Leach and Givnish 1996). In the absence of fire, a thick layer of leaf litter can develop that stifles seedling establishment and seed bank expression. Another critically important attribute of fire for maintaining open sedge meadow is its ability to temporarily reduce shrub cover (Hoffman 2002, Reuter 1986, White 1965). In the absence of fire or flooding, all but the wettest sedge meadows typically convert to shrub thicket and eventually swamp forest (Curtis 1959). Because many of the species that inhabit wet meadow are shade-intolerant, species richness usually declines following shrub and tree invasion (Reuter 1986, White 1965, Curtis 1959).

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 17 | 100 |  |  |
| Moderate (Mixed) |  |  |  |  |
| Low (Surface) |  |  |  |  |
| All Fires | 17 | 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

None

Adjacency or Identification Concerns

These communities may occur within depressions surrounded by either fire-dependent uplands such as oak forests or systems in which fire is thought to be very infrequent such as beech-maple forest. Thus, fire frequency within the graminoid-dominated wetlands is strongly influenced by vegetation composition of adjacent uplands.

Issues or Problems

The timeframe of the model (1,000yrs) does not allow for an adequate description of hydrarch succession. Also, the diversity of herbaceous wetland communities is not fully described within the models created for this map zone.

Native Uncharacteristic Conditions

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 | A | A | A | UN | UN | UN | UN | UN | UN | UN |
| Herb | 0.5-1.0 | B | B | B | UN | UN | UN | UN | UN | UN | UN |
| Herb | >1.0 | B | B | B | UN | UN | UN | UN | UN | UN | UN |
| Shrub | 0-0.5 | UN | UN | UN | UN | UN | C | C | C | C | C |
| Shrub | 0.5-1.0 | UN | UN | UN | UN | UN | C | C | C | C | C |
| Shrub | 1.0-3.0 | UN | UN | UN | UN | UN | C | C | C | C | C |
| Shrub | >3.0 | UN | UN | UN | UN | UN | C | C | C | C | C |
| Tree | 0-5 | UN | UN | UN | UN | UN | D | D | D | D | D |
| Tree | 5-10 | UN | UN | UN | UN | UN | D | D | D | D | D |
| Tree | 10-25 | UN | UN | UN | UN | UN | D | D | D | D | D |
| Tree | 25-50 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | >50 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |

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 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| SALA2 | Sagittaria latifolia | Broadleaf arrowhead | Lower |
| POCO14 | Pontederia cordata | Pickerelweed | Lower |
| TYLA | Typha latifolia | Broadleaf cattail | Lower |
| CAST8 | Carex stricta | Upright sedge | Lower |

Description

This class represents a beaver meadow with emergent marsh vegetation. This is an early seral stage with open water and emergent vegeation such as *Sagittaria latifolia*, *Pontedaria cordata*, *Nuphar variegata*, *Carex stricta*, and *Typha latifolia*. Absence of flooding can be caused by periodic drought or local extirpation of beaver due to trapping or predation by wolves.

*Maximum Tree Size Class*  
None

Class B 59 Late Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| CAST8 | Carex stricta | Upright sedge | Lower |
| CACA4 | Calamagrostis canadensis | Bluejoint | Lower |
| CALA16 | Carex lacustris | Hairy sedge | Lower |
| EUMA6 | Eupatorium maculatum | Spotted joepyeweed | Lower |

Description

This class represents sedge-dominated southern wet meadow which is dominated by *Carex stricta* or *Carex lacustris* and other sedges along with bluejoint grass (*Calamagrostis canadensis*), and other grasses, rushes, and forbs. Frequent replacement fires and seasonal flooding help to maintain open conditions and structural and species diversity.

*Maximum Tree Size Class*  
None

Class C 30 Late Development 2 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| COSE16 | Cornus sericea | Redosier dogwood | Middle |
| COAM2 | Cornus amomum | Silky dogwood | Middle |
| ILVE | Ilex verticillata | Common winterberry | Middle |
| CACA4 | Calamagrostis canadensis | Bluejoint | Lower |

Description

Shrub-carr dominated by dogwoods (*Cornus* spp.) Other shrubs such as Michigan holly (*Ilex veticillata*) and meadow sweet (*Spirea alba*) are common. The ground layer of shrub-carr is typically diverse with a mix of wet meadow and forested wetland vegetation. Many of the sedges abundant in sedge meadows continue to be present but in a relatively suppressed condition due to the lower light levels under the cover of dogwoods and other shrubs. In the absence of beaver flooding, trees become established and the community succeeds to swamp forest.

*Maximum Tree Size Class*  
None

Class D 3 Late Development 3 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ACRU | Acer rubrum | Red maple | Upper |
| FRNI | Fraxinus nigra | Black ash | Upper |
| ULAM | Ulmus americana | American elm | Upper |
| CORNU | Cornus | Dogwood | Middle |

Description

This class represents swamp forest, which is typically dominated by hardwoods, especially red maple, American elm, and black ash. Seasonal flooding as well as years of high water and drought maintain this class.

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

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:OPN | 0 | Late1:OPN | 50 |
| Late1:OPN | 51 | Late1:OPN | 999 |
| Late2:CLS | 51 | Late3:CLS | 151 |
| Late3:CLS | 152 | Late3: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** |
| Alternative Succession | Early1:OPN | Late1:OPN | 0.05 | 20 | Yes | 0 |
| Alternative Succession | Late1:OPN | Late2:CLS | 1 | 1 | Yes | 60 |
| Optional 1 | Late1:OPN | Early1:OPN | 0.005 | 200 | Yes | 0 |
| Replacement Fire | Late1:OPN | Late1:OPN | 0.1 | 10 | No | 0 |
| Wind or Weather or Stress | Late1:OPN | Late1:OPN | 0.5 | 2 | No | 0 |
| Optional 1 | Late2:CLS | Early1:OPN | 0.005 | 200 | Yes | 0 |
| Optional 2 | Late2:CLS | Late1:OPN | 0.02 | 50 | Yes | 0 |
| Wind or Weather or Stress | Late2:CLS | Late2:CLS | 0.1 | 10 | No | 0 |
| Optional 1 | Late3:CLS | Early1:OPN | 0.005 | 200 | Yes | 0 |
| Optional 2 | Late3:CLS | Late1:OPN | 0.02 | 50 | Yes | 0 |
| Wind or Weather or Stress | Late3:CLS | Late3:CLS | 0.1 | 10 | No | 0 |

Optional Disturbances

Optional 1: severe beaver flooding

Optional 2: less severe beaver flooding

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