14940

Laurentian-Acadian Shrub-Herbaceous Wetland Systems

BpS Model/Description Version: Aug. 2020

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|  |  |  |  |

Vegetation Type

Herbaceous Wetland

Map Zones

64

Geographic Range

This systems group ranges over a large area across the northern tier of the United States and adjacent Canada from Maine and the Canadian Maritimes west to Minnesota and western Ontario. They occur throughout this glaciated landscape south to Ohio, Pennsylvania, and northern New Jersey (NatureServe 2007).

Biophysical Site Description

These systems encompass shrub swamps and wet meadows on mineral soils of the Northeast and upper Midwest. They are often associated with lakes and ponds, but they also frequently occur along the margins of lakes, ponds and streams where seasonal flooding or beaver-induced flooding is common (Reuter 1986, Curtis 1959). They are commonly flooded for part of the growing season but often do not have standing water throughout the season. The size of occurrences ranges from small pockets to extensive acreages.

This system occurs on glacial lakebeds, in channels of glacial outwash, and in depressions on glacial outwash and moraines (NatureServe 2007, Faber-Langendoen 2001, Reuter 1986, Curtis 1959).

This system may occur on organic soil such as well-decomposed sapric peat (Curtis 1959) or saturated mineral soil (NatureServe 2007, Faber-Langendoen 2001, Curtis 1959). Soil pH may range from strongly acid to circum-neutral (Warners 1993, Curtis 1959, Costello 1939).

Vegetation Description

These systems are highly variable and may encompass more than 25 different associations throughout their range (NatureServe 2007). Marshes, wet meadows and shrub swamps often occur as large complexes comprised of a mosaic of northern emergent marsh, northern wet meadow (sedge meadow), northern fen (boreal rich fen), northern shrub thicket, and swamp forest (rich conifer swamp, northern swamp, hardwood-conifer swamp). Northern wet meadow and northern fen (sedge meadow) may occur along streams and the grade into northern shrub thicket and swamp forest (Curtis 1959). On the edges of inland lakes, northern wet meadow often borders emergent marsh and less frequently northern fen.

Regarding species composition, shrub swamps may have a patchwork of shrub and graminoid dominance; typical species include *Salix* spp., *Cornus* spp., *Alnus incana*, *Spiraea alba*, *Myrica gale*, *Calamagrostis canadensis*, tall *Carex* spp., and *Juncus effusus*. Trees are generally sparse but may include stunted *Acer rubrum* or *Betula populifolia*.

Freshwater emergent and/or submergent marshes are dominated by herbaceous vegetation. They are common throughout the northeastern U.S. and adjacent Canadian provinces. Freshwater marshes occur in closed or open basins that are generally flat and shallow. They are associated with lakes, ponds, slow-moving streams, and/or impoundments or ditches. The herbaceous vegetation does not persist through the winter. Scattered shrubs are often present and usually total <25% cover. Trees are generally absent and, if present, are scattered. The substrate is typically muck over mineral soil. Frequent species include *Typha latifolia*, *Typha angustifolia*, *Phragmites australis*, *Schoenoplectus americanus*, *Thelypteris palustris*, *Impatiens capensis*, *Carex* spp., *Vallisneria americana*, *Potamogeton perfoliatus*, *Nuphar lutea* ssp. *advena*, and *Nymphaea odorata*

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| ALIN2 | *Alnus incana* | Gray alder |
| MYGA | *Myrica gale* | Sweetgale |
| SPAL2 | *Spiraea alba* | White meadowsweet |
| CAST8 | *Carex stricta* | Upright sedge |
| CACA4 | *Calamagrostis canadensis* | Bluejoint |
| ACRU | *Acer rubrum* | Red maple |

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

Disturbance Description

In addition to seasonal flooding, beaver-induced flooding also plays an important role in maintaining the community by occasionally raising water levels and limiting encroachment from trees and shrubs. Beaver may also help create new northern wet meadows by flooding swamp forests and shrub thickets and thus creating suitable habitat for the growth of shade-intolerant wet meadow species.

Unlike the Midwest, where evidence from wetland peat cores indicate that wet meadow is a fire-dependent natural community (Davis 1979, Curtis 1959), there is little evidence of this in the northeast.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 791 | 100 |  |  |
| Moderate (Mixed) |  |  |  |  |
| Low (Surface) |  |  |  |  |
| All Fires | 791 | 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 pine barrens and oak-pine barrens or, more frequently, by systems in which fire is very infrequent such as northern hardwood or spruce-fir forest. Ignition sources within these wetland types are very unlikely, so fire frequency within this system is strongly influenced by fire susceptibility of adjacent uplands.

Issues or Problems

This model is complicated by the fact that beaver activity in the northeast is likely more prevalent now (and has been for the past several decades) than in pre-settlement times, and fire suppression has probably diminished the occurrence of natural fires over the past 100yrs. The few known examples of fire in wet meadows and shrub swamps are cases in which the meadows are artificially burned (e.g., Cutler grasslands, Maine) to maintain open wildlife habitat.

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 | A | A | UN | UN | UN | UN | UN |
| Herb | 0.5-1.0 | B | B | B | B | B | UN | UN | UN | UN | UN |
| Herb | >1.0 | B | B | B | B | B | 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 | D | D | D | D | D |
| Tree | >50 | UN | UN | UN | UN | UN | D | 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 47 Early Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| NYOD | Nymphaea odorata | American white waterlily | Lower |
| POCO14 | Pontederia cordata | Pickerelweed | Lower |
| NULUV | Nuphar lutea ssp. variegata | Varigated yellow pond-lily | Lower |
| POTAM | Potamogeton | Pondweed | Lower |

Description

This class represents a beaver meadow with emergent marsh vegetation. This is an early seral stage with open water, floating aquatic plants (*Nuphar* spp. and *Nypmphaea* spp.) and emergent vegetation such as *Sagittaria latifolia* and *Pontedaria cordata*, *Carex stricta*, and *Typha latifolia*.

*Maximum Tree Size Class*  
None

Class B 29 Mid Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| CAST8 | Carex stricta | Upright sedge | Lower |
| CALA16 | Carex lacustris | Hairy sedge | Lower |
| CAUT | Carex utriculata | Northwest territory sedge | Lower |
| CACA4 | Calamagrostis canadensis | Bluejoint | Lower |

Description

This class represents sedge-dominated northern wet meadows, which are dominated by a variety of *Carex* species, bluejoint grass (*Calamagrostis canadensis*), and scattered forbs and shrubs. Replacement fires, seasonal flooding, and beaver activity maintain open conditions and structural and species diversity.

*Maximum Tree Size Class*  
None

Class C 11 Late Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| SPAL2 | Spiraea alba | White meadowsweet | Middle |
| MYGA | Myrica gale | Sweetgale | Middle |
| ALIN2 | Alnus incana | Gray alder | Lower |
| CORNU | Cornus | Dogwood | Lower |

Description

Northern shrub thicket, a type dominated by a variety of shrubs, depending on the region, substrate (mineral vs. peat) and acidity. *Salix* spp. are more frequent in northern parts of the region, while *Cephalanthus occidentalis* is more common in the southern portions. The ground layer is typically diverse with a mix of wet meadow and forested wetland vegetation. Many of the sedges abundant in the sedge meadow continue to be present but in a relatively suppressed condition due to the lower light levels under the cover of shrubs. In the absence of disturbance, shrubs colonize the open meadow and result in succession to shrub-swamp.

Seasonal flooding extremes in years of high water and drought will keep the system in this class.

*Maximum Tree Size Class*  
None

Class D 13 Late Development 2 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ACRU | Acer rubrum | Red maple | Upper |
| ALIN2 | Alnus incana | Gray alder | Middle |
| CAREX | Carex | Sedge | Lower |
| OSRE | Osmunda regalis | Royal fern | Lower |

Description

This class represents swamp forest or woodland, which is typically dominated by red maple and/or alder). In the northern portion of the region, northern white cedar and black ash may replace red maple, and in southern portions of the region, American elm may be more common. Beaver activity may reset the cycle. In the absence of beaver flooding, alder and trees (typically red maple) become established and the community succeeds to swamp forest. Seasonal flooding and beaver activity result in a return to open pond. Rare fires, spreading in from surrounding fire-prone systems, can kill the trees, setting the system back to wet meadow.

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

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:OPN | 0 | Mid1:OPN | 35 |
| Mid1:OPN | 36 | Late1:OPN | 70 |
| Late1:OPN | 71 | Late2:CLS | 120 |
| Late2:CLS | 121 | Late2: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 | Mid1:OPN | Mid1:OPN | 0.0025 | 400 | No | 0 |
| Optional 1 | Mid1:OPN | Early1:OPN | 0.04 | 25 | Yes | 0 |
| Replacement Fire | Late1:OPN | Mid1:OPN | 0.0025 | 400 | Yes | 0 |
| Optional 2 | Late1:OPN | Mid1:OPN | 0.01 | 100 | Yes | 0 |
| Optional 1 | Late1:OPN | Early1:OPN | 0.01 | 100 | Yes | 0 |
| Wind or Weather or Stress | Late1:OPN | Late1:OPN | 0.05 | 20 | No | 0 |
| Replacement Fire | Late2:CLS | Mid1:OPN | 0.002 | 500 | Yes | 0 |
| Optional 1 | Late2:CLS | Early1:OPN | 0.007 | 143 | Yes | 0 |

Optional Disturbances

Optional 1: severe beaver flooding

Optional 2: less severe beaver flooding

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