14440

Eastern Boreal Floodplain

BpS Model/Description Version: Aug. 2020

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| --- | --- | --- | --- |
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|  |  |  |  |

Vegetation Type

Mixed Upland and Wetland

Map Zones

41, 50, 51

Geographic Range

This system is largely found in eastern Canada with limited occurrences in northern Minnesota, northern Michigan and northern Maine.

Biophysical Site Description

River valleys are linear depressions that contain a river channel and its floodplain, often embedded within a series of higher terraces. River valleys, formed by the meltwater of glaciers, occur in glacial outwash channels. The river floodplain is the low-lying area adjacent to the river that was formed under the present drainage system and is subject to periodic flooding and cycles of erosion and deposition. In contrast, terraces are former floodplain surfaces at higher elevations than the floodplain that were abandoned when the river channel incised lower into the valley floor. Within the broader landscape, river valleys represent an unusually diverse mosaic of landforms, physical environmental factors, species and biological communities because of their abrupt environmental gradients and complex ecological processes (Naiman et al. 1993, Gregory et al. 1991, Brinson 1990). Floodplain forests occur along streams or rivers that are third order or greater (Strahler 1952).

Vegetation Description

This system includes floodplain forests dominated by black ash and balsam poplar as well as herbaceous sloughs and shrubby wetlands. Alders, dogwood, mountain maple, bluejoint and sedges are common in the understory or in non-forested areas.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| FRNI | *Fraxinus nigra* | Black ash |
| POBA2 | *Populus balsamifera* | Balsam poplar |

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

Disturbance Description

Floodplain systems are produced and maintained by active hydrologic and geomorphic processes such as channel meandering, sedimentation and erosion (Gregory, et al. 1991) caused by natural hydrological variation (Richter and Richter 2000). Regeneration of the dominant species (balsam poplar and black ash) is dependent on flooding and movement of river channels, which creates bare, moist soil needed for seedling establishment (Scott et al. 1997). Oxbow and slough development also influence the floodplain system and create variability in plant community composition. Deposits of sand and other sediments can create low ridges that influence vegetation establishment (Weaver 1960). The flood frequency in a given area is dependent upon its location on the floodplain, with upper terraces having infrequent flooding and scouring events, while the lower terraces nearest the river flood frequently. Scouring caused by ice jams during the winter, channel meandering, and oxbow and slough development greatly influence this system.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement |  |  |  |  |
| Moderate (Mixed) | 590 | 35 |  |  |
| Low (Surface) | 317 | 65 |  |  |
| All Fires | 206 | 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

Patches must be adequate in size to contain natural variation in vegetation and disturbance regime. This system is often widespread on medium or larger rivers and should be at least 0.5 miles long and 100m wide.

Adjacency or Identification Concerns

Issues or Problems

Assumptions: This system is most affected by flooding, scouring and channel movement. We modeled the floodplain valley including forested and non-forested areas. The model does include wetlands, sloughs or oxbows. We used two flooding regimes in the model: Option 1 – minor flooding/scouring; and Option 2 – major flooding/scouring. Flood frequency for a class is based on location on the floodplain, with higher terraces being subject to longer flood cycles. We modeled attributes such as channel migration, oxbow and slough development, and sedimentation. Fire activity had a minor impact, due to low intensity, infrequent intervals, small size and low fuel loads.

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 | 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 | A | A | A | A | A |
| Shrub | 0.5-1.0 | UN | UN | UN | UN | UN | A | A | A | A | A |
| Shrub | 1.0-3.0 | UN | UN | UN | UN | UN | A | A | A | A | A |
| Shrub | >3.0 | UN | UN | UN | UN | UN | A | A | A | A | A |
| Tree | 0-5 | UN | UN | UN | UN | UN | B | B | B | B | B |
| Tree | 5-10 | UN | UN | UN | UN | UN | B | B | B | B | B |
| Tree | 10-25 | UN | UN | UN | UN | UN | C | C | C | D | D |
| Tree | 25-50 | UN | UN | UN | UN | UN | UN | UN | UN | D | D |
| Tree | >50 | UN | UN | UN | UN | UN | UN | UN | UN | 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 14 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ALIN2 | Alnus incana | Gray alder | Upper |
| COSE16 | Cornus sericea | Redosier dogwood | Upper |

Description

Primary successional stage after significant flooding/scouring events. This class is usually dominated by shrubs and small trees. Common canopy species include *Alnus incana*, *Cornus sericea*, *Fraxinus nigra*, *Populus balsamifera*, and sometimes *Abies balsamea*.

*Maximum Tree Size Class*  
Seedling <4.5ft

Class B 35 Mid Development 1 - Open

DBH

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| POBA2 | Populus balsamifera | Balsam poplar | Upper |
| FRNI | Fraxinus nigra | Black ash | Upper |

Description

Young forests after trees have become established and dominate most areas. Limited canopy diversity. Dominant trees are *Populus balsamifera* and *Fraxinus nigra*.

*Maximum Tree Size Class*  
Sapling >4.5ft; <5" DBH

Class C 38 Mid Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| FRNI | Fraxinus nigra | Black ash | Upper |
| POBA2 | Populus balsamifera | Balsam poplar | Upper |

Description

Mature forests subject to moderately frequent long-term flooding. Dominant species are *Fraxinus nigra* and *Populus balsamifera*.

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

Class D 13 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ABBA | Abies balsamea | Balsam fir | Upper |
| ACRU | Acer rubrum | Red maple | Upper |
| PIMA | Picea mariana | Black spruce | Upper |
| POBA2 | Populus balsamifera | Balsam poplar | Upper |

Description

Forests in the floodplain that are very rarely subject to significant flooding. Diversity increases and mesic species increase in importance. Dominant species include *Abies balsamea*, *Acer rubrum*, *Populus balsamifera*, *Picea mariana*, and *Pinus strobus*.

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

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Mid1:OPN | 14 |
| Mid1:OPN | 15 | Mid1:CLS | 39 |
| Mid1:CLS | 40 | Late1:CLS | 149 |
| Late1:CLS | 150 | 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** |
| Surface Fire | Early1:ALL | Early1:ALL | 0.005 | 200 | No | 0 |
| Optional 1 | Early1:ALL | Early1:ALL | 0.025 | 40 | Yes | 0 |
| Mixed Fire | Mid1:OPN | Mid1:OPN | 0.005 | 200 | No | 0 |
| Optional 1 | Mid1:OPN | Mid1:OPN | 0.02 | 50 | No | 0 |
| Optional 2 | Mid1:OPN | Early1:ALL | 0.025 | 40 | Yes | 0 |
| Surface Fire | Mid1:CLS | Mid1:CLS | 0.005 | 200 | No | 0 |
| Optional 2 | Mid1:CLS | Mid1:OPN | 0.025 | 40 | Yes | 0 |
| Optional 1 | Mid1:CLS | Mid1:CLS | 0.25 | 4 | No | 0 |
| Optional 2 | Late1:CLS | Mid1:OPN | 0.005 | 200 | Yes | 0 |
| Surface Fire | Late1:CLS | Late1:CLS | 0.005 | 200 | No | 0 |

Optional Disturbances

Optional 1: Minor flooding 5-20yrs.

Optional 2: Minor flooding 5-20yrs.

References

Brinson, M.M. 1990. Riverine forests. Pp. 87-141 in D.Goodall, A. Lugo, M. Brinson, and S. Brown (eds.), Ecosystems of the World, Forested Wetlands, Vol. 15. Elsevier, New York. 527 pp.

Forest Cover Types of the United States and Canada, SAF 1980, F.H. Eyre, Editor.

Gregory, S.V., F.J. Swanson, W.A. McKee and K.W. Cummins. 1991. An ecosystem perspective of riparian zones. Bioscience 41: 540-551.

Naiman, R.J., Decamps, H. and Pollock, M. 1993. The role of riparian corridors in maintaining regional biodiversity. Ecological Applications. 3: 209–212.

Richter, B.D. and H.E. Richter. 2000. Prescribing flood regimes to sustain riparian ecosystems along meandering rivers. Conservation Biology 14: 1467-1478.

Scott, M. L., G. T. Auble and J.M. Friedman. 1997. Flood dependency of cottonwood establishment along the Missouri River, Montana, USA. Ecological Applications 7: 677–690.

Strahler, A.N. 1952. Dynamic Basis of Geomorphology. Geological Society of America Bulletin 63: 923-938.

Tepley, A.J., J.G. Cohen and L. Huberty. 2004. Natural community abstract for southern floodplain forest. Michigan Natural Features Inventory, Lansing, MI. 14 pp.

Weaver, J.E. 1960. Flood plain vegetation of the central Missouri Valley and contacts of woodland with prairie. Ecological Monographs. 30(1): 37-64.