14750

Laurentian-Acadian Floodplain Systems

BpS Model/Description Version: Aug. 2020

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| **Modelers** |  | **Reviewers** |  |
| Jim Drake | jim\_drake@natureserve.org | Chris Dunham | cdunham@tnc.org |
| Alan Tepley | tepleya@onid.orst.edu | Dave Cleland | dcleland@fs.fed.us |
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Vegetation Type

Mixed Upland and Wetland

Map Zones

41, 50, 51, 63, 64, 65, 66

Geographic Range

This systems group occurs across the glaciated Northeast from New England, NY, and New Brunswick west to MN (NatureServe 2007).

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 complex includes floodplain forests, with *Acer saccharinum* characteristic, as well as herbaceous sloughs and shrub wetlands. Most areas are underwater each spring; microtopography determines how long the various habitats are inundated. Associated trees include *Acer rubrum* and *Carpinus caroliniana*, the latter frequent but never abundant. On terraces or in more calcareous areas, *Acer saccharum* or *Quercus rubra* may be locally prominent, with *Betula alleghaniensis* and *Fraxinus* spp. *Salix nigra* is characteristic of the levees adjacent to the channel. Common shrubs include *Cornus amomum* and *Viburnum* spp. The herb layer in the forested portions often features abundant spring ephemerals, giving way to a fern-dominated understory in many areas by mid-summer. Non-forested wetlands associated with these systems include shrub-dominated and graminoid-herbaceous vegetation.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| ACSA2 | *Acer saccharinum* | Silver maple |
| FRPE | *Fraxinus pennsylvanica* | Green ash |
| CEOC | *Celtis occidentalis* | Common hackberry |
| ULAM | *Ulmus americana* | American elm |
| ACNEI2 | *Acer negundo var. interius* | Boxelder |
| FRNI | *Fraxinus nigra* | Black ash |

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, Hughes 1994) caused by natural hydrological variation (Richter and Richter 2000). Regeneration of the dominant species (silver maple and willow) 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) | 442 | 14 |  |  |
| Low (Surface) | 69 | 86 |  |  |
| All Fires | 60 | 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

Today, bank stabilization, dams, and water diversion have significantly altered these floodplains.

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 (two to 20yr frequency); and Option 2 – major flooding/scouring (20-100yr frequency). Flood frequency for a class is based on location on the floodplain, with higher terraces being subject to longer flood cycles (up to 100yrs). 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 | UN | A | A | A | A |
| Shrub | 0.5-1.0 | UN | UN | UN | UN | UN | UN | A | A | A | A |
| Shrub | 1.0-3.0 | UN | UN | UN | UN | UN | UN | A | A | A | A |
| Shrub | >3.0 | UN | UN | UN | UN | UN | UN | A | A | A | A |
| Tree | 0-5 | B | B | B | B | B | B | C | C | C | C |
| Tree | 5-10 | B | B | B | B | B | B | C | C | C | C |
| 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 16 Early Development 1 - All Structures

DBH

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ALIN2 | Alnus incana | Gray alder | Upper |
| SALIX | Salix | Willow | Upper |

Description

Early successional stage created by scouring and deposition following seasonal flooding and stream meander changes. A mix of pioneer shrubs (usually alders and willows), and herbaceous species.

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

Class B 23 Mid Development 1 - Open

DBH

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ACSA2 | Acer saccharinum | Silver maple | Upper |
| FRPE | Fraxinus pennsylvanica | Green ash | Upper |
| FRNI | Fraxinus nigra | Black ash | Upper |
| SALIX | Salix | Willow | Mid-Upper |

Description

This stage develops as the stand starts to mature. Low diversity stands. Dominant species are willow (sandbar, peach-leaved), green ash, black ash, and silver maple.

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

Class C 44 Mid Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ACSA2 | Acer saccharinum | Silver maple | Upper |
| ACRU | Acer rubrum | Red maple | Upper |
| FRPE | Fraxinus pennsylvanica | Green ash | Upper |

Description

Mixed canopy composition. Overstory is dominated by a mix of American elm, silver maple, box elder, red maple, green ash, and sometimes conifers such as hemlock, white cedar, and white pine.

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

Class D 17 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ACSA2 | Acer saccharinum | Silver maple | Upper |
| TIAM | Tilia americana | American basswood | Upper |
| QURU | Quercus rubra | Northern red oak | Upper |
| CEOC | Celtis occidentalis | Common hackberry | Upper |

Description

Found along upper terraces or areas protected from frequent flooding. Species diversity increases towards the south and east within the region. Overstory species include basswood, white pine, red oak, hackberry, hemlock, and sugar maple. Understory cover is often higher than in other classes in this model.

*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 | 9 |
| Mid1:OPN | 10 | Mid1:CLS | 29 |
| Mid1:CLS | 30 | 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 | 0.01 | 100 | No | 0 |
| Optional 1 | Early1:ALL | Early1:ALL | 0.2 | 5 | Yes | 0 |
| Mixed Fire | Mid1:OPN | Mid1:OPN | 0.01 | 100 | No | 0 |
| Optional 2 | Mid1:OPN | Early1:ALL | 0.02 | 50 | Yes | 0 |
| Optional 1 | Mid1:OPN | Mid1:OPN | 0.25 | 4 | No | 0 |
| Optional 2 | Mid1:CLS | Mid1:OPN | 0.02 | 50 | Yes | 0 |
| Surface Fire | Mid1:CLS | Mid1:CLS | 0.022 | 45 | No | 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 | 0.02 | 50 | No | 0 |

Optional Disturbances

Optional 1: Minor Flooding 5-20 yr.

Optional 2: Minor Flooding 20-500 yr.

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