16160

Western North American Boreal Riparian Stringer Forest and Shrubland

Model Date: 04/07/08 Report Date: 9/11/15

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| --- | --- | --- | --- |
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Reviewer: Ilana Abrahamson

Vegetation Type

Wetlands/Riparian

Map Zones

70, 71, 72, 73, 74, 75

Geographic Range

This system occurs along streams throughout the boreal and sub-boreal regions of AK.

Biophysical Site Description

The riparian forest and shrub stringer is found as a narrow band of vegetation along streams in low gradient and low volume drainages (NatureServe 2008). Although, seasonal overbank flooding may occur, it generally does not result in shifting channels or gravel bar formation (NatureServe 2008). The well-drained soils have moderately thick to thin organic horizons at the surface (indicative of infrequent flooding), are strongly acidic, lack permafrost, and have deep water tables (Jorgenson et al. 1999).

Vegetation Description

The mature phase of this system is dominated by Picea glauca, Betula papyrifera, and Picea mariana. Populus balsamifera and Populus tremuloides are common early seral species on some sites. Picea mariana is more common and more likely to be dominant in the northern parts of this system’s range. Common understory species include Alnus tenuifolia, Rosa acicularis, Calamagrostis canadensis, Cornus canadensis, Equisetum arvense, Hylocomium splendens and Rhytidiadelphus triquetrus (Jorgenson et al. 1999).

Immediately adjacent to the stream bank and in recently burned areas, tall shrubs including Alnus tenuifolia, Salix. alaxensis, S. bebbiana and S. lasiandra tend to dominate, with Carex spp. and Calamagrostis canadensis in the understory (NatureServe 2008, Jorgenson et al. 1999).

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| PIGL | Picea glauca | White spruce |
| BEPA | Betula papyrifera | Paper birch |
| PIMA | Picea mariana | Black spruce |
| POBA2 | Populus balsamifera | Balsam poplar |
| POTR5 | Populus tremuloides | Quaking aspen |
| SALIX | Salix | Willow |
| ALNUS | Alnus | Alder |

Disturbance Description

Fire is the primary disturbance influencing this system. However, riparian forest and shrub stringers typically burn less frequently than adjacent vegetation types and tend to act as fire breaks.

Because of the linear nature of this system, fire frequencies are strongly influenced by surrounding vegetation types. In the Sub-boreal region, surrounding vegetation is more likely to be white spruce and hardwood forest. In the northern boreal region, adjacent forest is more likely to be a black spruce type that burns more frequently. However, this system may also occur in tundra areas where there is a gap in the permafrost layer along the riparian corridor. The riparian stringer in this environment will have a very low fire frequency. As a result, fire frequencies are likely to be more variable in the boreal region compared with the Sub-boreal region.

For this model, the overall mean fire return interval was estimated at about 170yrs, somewhat longer than the MFRI for the white spruce-hardwood systems and substantially longer than the black spruce types. This reflects the observation that fires from the surrounding forest types frequently burn into the riparian stringer types, but often do not burn across the river or stream. Patchy, mixed severity fire is thought to be more common in this type than in most other spruce-hardwood types.

Seasonal overbank flooding may occur, but it generally does not result in shifting channels or gravel bar formation (NatureServe 2008). As a result, flooding typically only acts as a disturbance in a narrow zone along the bank. This zone will typically remain in a self-replacing shrub stage. This disturbance is modeled as Option 1 in the VDDT model. Beaver activity may play a role in the dynamics of this system, but it is not included in the model due to the limited scale of these impacts.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Min FI** | **Max FI** | **Percent of All Fires** |
| Replacement | 434 |  |  | 36 |
| Moderate (Mixed) | 243 |  |  | 64 |
| Low (Surface) |  |  |  |  |
| **All Fires** | **156** |  |  | **100** |

Scale Description

Linear

Non-Fire Disturbances

Other 1: Flooding

Adjacency or Identification Concerns

See the Disturbance Description for more information on adjacent types.

Issues or Problems

The main factor controlling the disturbance regime in this system is its ecological setting. Ideally, we would create a separate model for this system on sites where the adjacent systems are non-forested. If these sites cannot be distinguished, then it is probably not worth creating separate models for the boreal and Sub-boreal regions, as the FRI is probably similar for the two regions.

A reviewer noted that the age of transition from the shrub/sapling class to the forest class may vary widely depending on the tree species present. Hardwoods will begin to overtop the shrubs around age 15, but this stage will be very difficult to distinguish from the shrub stage using satellite imagery. Spruce-dominated stands may not transition from Class A to B for much longer, as it may take black spruce 30yrs to reach 3m in height.

Classes B and C may overlap in canopy composition. For the purposes of this model, it has been assumed that Class B will have >50% hardwoods in the canopy and Class C will have >50% spruce, but there will be exceptions to this rule in reality.

Native Uncharacteristic Conditions

Comments

Reviewer Ilana Abrahamson noted that she found no published fire history studies on this BpS in a 2014 literature review.

During LANDFIRE National this model was created for the AK boreal region and did not receive review for the arctic region. The draft version of this model was created by Nancy Fresco and Colleen Ryan based in part on input from the experts who attended the LANDFIRE Anchorage (Dec. 07) modeling meeting. Extensive review by the Alaska Dept. of Natural Resources Div. of Forestry led to extensive changes to the model. As a result, lead reviewer Douglas Hanson was added as a modeler. The other Div. of Forestry reviewers, Marc Lee, Northern Region Forest Manager, and Tom Kurkowski, GIS specialist, were listed as reviewers. Will Putnam (wputman@tananachiefs.org) reviewed an early draft of this model.

**Model Parameters**

*Using Track Changes in Word you may suggest changes to any of the parameters indicated in the following tables. If you wish to see how those changes impact model results, go to the “Simulation Model Review Instructions” section on* <http://www.landfirereview.org/models.html>*. If you do not wish to edit and run the actual model, the TNC LANDFIRE will do so and if requested provide the reviewer with the results.*

**Deterministic Transitions**

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Mid1:ALL | 15 |
| Late1:ALL | 120 | Late1:ALL | 999 |
| Mid1:ALL | 16 | Late1:ALL | 119 |

**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** |
| Optional1 | Early1:ALL | Early1:ALL | 0.1000 | 10 | No | 0 |
| ReplacementFire | Early1:ALL | Early1:ALL | 0.0030 | 333 | No | 0 |
| ReplacementFire | Late1:ALL | Early1:ALL | 0.0025 | 400 | Yes | 0 |
| MixedFire | Late1:ALL | Mid1:ALL | 0.0045 | 222 | Yes | 0 |
| ReplacementFire | Mid1:ALL | Early1:ALL | 0.0020 | 500 | Yes | 0 |
| MixedFire | Mid1:ALL | Mid1:ALL | 0.0045 | 222 | No | 0 |

Succession Classes

Class A 10 Early Development 1 - All Structures

Structural Information

Tree Size Class: Seedling/Sapling <5"

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| SALIX | Salix | Willow | Upper |
| ALNUS | Alnus | Alder | Upper |
| CAREX | Carex | Sedge | Lower |
| CACA4 | Calamagrostis canadensis | Bluejoint | Low-Mid |

Description

Shrub-sapling. This stage is dominated by shrubs but trees begin to sprout and saplings may be present. Around age 15, the hardwood saplings will begin to overtop the shrubs, though the spruce saplings will still be in the understory.

Common shrub species include a variety of Salix spp. and Alnus tenuifolia. Herbs frequently include Calamagrostis canadensis, Equisetum arvense and Carex spp.

This class includes those areas immediately adjacent to the stream bank that are dominated by shrubs maintained by frequent flooding. These areas are unlikely to burn. Flooding in this class is meant to represent these areas.

Class B 40 Mid Development 1 - All Structures

Structural Information

Tree Size Class: Pole 5–9" (swd)/5–11" (hwd)

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| BEPA | Betula papyrifera | Paper birch | Upper |
| PIGL | Picea glauca | White spruce | Upper |
| PIMA | Picea mariana | Black spruce | Upper |
| ALNUS | Alnus | Alder | Middle |

Description

White spruce-hardwood mix. This is a mixed white spruce (black spruce) hardwood forest. Black spruce is more common, and hardwoods are less common in the northern boreal region. Early in this age range, hardwoods will dominate the overstory. Spruce species typically will not overtop the shrub layer until age 30-50. By the end of this age range, the canopy will typically be dominated by a mixture of birch and spruce.

Species composition is highly variable in this class, depending on landscape context, site characteristics, disturbance history and available seed sources. Picea glauca, Betula papyrifera, Populus balsamifera, Alnus spp. and Salix spp. typically dominate the overstory, though Picea mariana may be common, especially in the northern boreal region. The understory commonly includes Rosa acicularis, Carex spp. and Calamagrostis canadensis. Though species composition is highly variable, this class can be distinguished for mapping purposes by canopy composition (>50% hardwoods).

Class C 50 Late Development 1 - All Structures

Structural Information

Tree Size Class: Med. 9–20" (swd)/11–20" (hwd)

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIGL | Picea glauca | White spruce | Upper |
| BEPA | Betula papyrifera | Paper birch | Upper |
| POBA2 | Populus balsamifera | Balsam poplar | Upper |
| PIMA | Picea mariana | Black spruce | Upper |

Description

Mature spruce forest. This class is typically dominated by mature spruce (>50% spruce in the canopy). More northern sites will have more black spruce, while more southern sites will be mostly white spruce. However, when these stands extend to the far north of the Boreal region, such as the south slopes of the Brooks Range, white spruce will dominate over black spruce. Birch frequently persists in the canopy but typically will constitute <50% of the canopy.

Understory plants include Alnus tenuifolia, Rosa acicularis, Cornus canadensis, Equisetum arvense, Hylocomium splendens and Rhytidiadelphus triquetrus (Jorgenson et al. 1999).

References

Foote, M. Joan. 1983. Classification, description, and dynamics of plant communities after fire in the Taiga of Interior Alaska. Res. Pap. PNW-307. Portland, OR: USDA Forest Service, Pacific Northwest Forest and Range Experiment Station. 108 pp.

Jorgenson, M. T., J. E. Roth, M. K. Raynolds, M. D. Smith, W. Lentz, A. L. Zusi-Cobb, and C. H. Racine. 1999. An ecological land survey for Fort Wainwright, Alaska. U.S. Army Cold Regions Research and Engineering Laboratory, Hanover, NH. CRREL TR-99-9. 92 pp.

NatureServe. 2008. International Ecological Classification Standard: Terrestrial Ecological Classifications. Draft Ecological Systems Description for Alaska Boreal and Sub-boreal Regions.

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