16142

Western North American Boreal Montane Floodplain Forest and Shrubland - Alaska Sub-boreal

Model Date: 04/14/08 Report Date: 9/11/15

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| --- | --- | --- | --- |
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Vegetation Type

Forest and Woodland

Map Zones

73, 74, 75

Model Splits or Lumps

This BpS is split into multiple models:

Western North American Boreal Montane Floodplain Forest and Shrubland was split into a boreal and sub-boreal variant for BpS modeling so that regional differences could be represented.

Geographic Range

This BpS is found throughout the AK sub-boreal region adjacent to rivers.

Biophysical Site Description

The following information was taken from the draft Boreal Ecological Systems description (NatureServe 2008):

The substrate is typically well-drained sand or cobble, although finer silts and clays can be found on higher terraces, in ponds, on distal floodplains, and in lower energy systems. Permafrost is usually absent. Oxbows and other wet depressions commonly form on the floodplains, and these sites commonly develop into wetlands.

Vegetation Description

Primary succession on floodplains begins when new alluvial surfaces are colonized by herbaceous, shrub, and tree, species. Common early seral woody species include Populus balsamifera (seedlings), Picea glauca (seedlings), Alnus viridis ssp. sinuata, Alnus incana ssp. Tenuifolia, Salix barclayi and Salix alaxensis (Boggs 2000, Scott 1974, Shephard 1995, Thilenius 1990, Viereck 1966). Herbaceous species may include Equisetum spp., Chamerion latifolium, Lupinus spp. and Hedysarum spp. The next seral stage includes communities dominated by Populus balsamifera and/or Picea glauca with an understory of Alnus viridis ssp. sinuata, Salix spp. and bryophytes. On dry sites the shrub layer may be dominated by Shepherdia canadensis, Dryas octopetala, D. integrifolia and fruticose lichens (Stereocaulon spp.). The tall shrub component of the early successional stages diminishes rapidly, probably because of decreased light from the dense tree overstory. Populus balsamifera does not regenerate in the understory and consequently, Picea glauca gains dominance in the overstory within 150yrs. Rosa acicularis and Viburnum edule are common understory shrubs on older surfaces.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| POBAB2 | Populus balsamifera ssp. balsamifera | Balsam poplar |
| PIGL | Picea glauca | White spruce |
| ALNUS | Alnus | Alder |
| SALIX | Salix | Willow |
| EQUIS | Equisetum | Horsetail |
| ROAC | Rosa acicularis | Prickly rose |
| VIED | Viburnum edule | Squashberry |
| SHCA | Shepherdia canadensis | Russet buffaloberry |

Disturbance Description

Flooding is the primary disturbance in this BpS. Flooding can be caused by snowmelt, precipitation, ice jams and glacial runoff. Different rivers or portions of rivers may be more prone to certain types of flooding. Frequent flooding and channel migration create a pattern of gravel bars and early successional stages across the valley bottom. Sediment deposition raises the surface of the floodplain over time. As the terrace becomes farther removed from the channel, flooding becomes less frequent. Water availability on terraces plays a major role in community structure and composition. Water inputs are from overbank flow (flooding), ground water, and precipitation. Deposits with high permeability become progressively drier as they are vertically and horizontally removed from the active channels.

As discussed in the Riparian Spruce Hardwood Kenai Potential Natural Vegetation Group (PNVG) model description (Murphy and Witten 2006), small, relatively infrequent, mixed severity fires characterize this system due to the sites’ proximity to rivers, which act as fire breaks (Viereck 1973, Barney 1971, Foote 1983). High moisture content of the vegetation, high percentage of deciduous species, and high relative humidity also contribute to making fires less frequent in this system than in typically adjacent upland vegetation types.

This model includes two successional pathways: one with a hardwood stage that succeeds to an open spruce stand and the other in which spruce establishes on mineral soil following a flood. Either of these pathways could result in an open or closed mature spruce stand. The successional classes in this model were defined by canopy cover classes in order to make them mappable. As a result, the system may move back and forth between the open and closed successional classes regardless of age.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Min FI** | **Max FI** | **Percent of All Fires** |
| Replacement | 5000 |  |  | 13 |
| Moderate (Mixed) | 769 |  |  | 87 |
| Low (Surface) |  |  |  |  |
| **All Fires** | **666** |  |  | **100** |

Scale Description

Linear

Non-Fire Disturbances

Insects/Disease

Other 1: Flooding

Adjacency or Identification Concerns

This model applies to forest and shrub systems in the active and inactive portions of the floodplain, but not abandoned floodplains. Oxbows and other wet depressions commonly form on the floodplains. Floodplain Wetlands are a separate ecological system and a separate BpS.

Issues or Problems

Wetlands that occur on the floodplain are not considered in this model.

Native Uncharacteristic Conditions

Comments

This model was based on the FRCC Guidebook PNVG model for Riparian Spruce Hardwood Kenai (RSHK; Murphy and Witten 2006) and input from the experts who attended the LANDFIRE Anchorage (Dec. 07) modeling meeting. The relative age function used in the RSHK model was not used in any class except A to comply with LANDFIRE modeling rules. Because changes to the VDDT model were relatively minor, Karen Murphy and Evie Witten were retained as modelers and Kori Blankenship's name was added.

In the first draft of the model, Classes D and E were indistinguishable for mapping (because both could be open or closed canopy forest). Tina Boucher reviewed an early draft of this model and confirmed that both successional pathways could lead to either open or closed stands. To correct this, Colleen Ryan defined Class D as open and Class E as closed and added an alternative succession pathway from Class E to Class D. This is meant to represent the possibility that some closed stands could open up over time (after age 150). This change did not substantially change the class landscape percentages.

**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:CLS | 4 |
| Late1:CLS | 30 | Late1:CLS | 999 |
| Late1:OPN | 150 | Late1:OPN | 999 |
| Mid1:CLS | 5 | Mid1:OPN | 29 |
| Mid1:OPN | 30 | Late1:OPN | 149 |

**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 |
| Optional1 | Late1:CLS | Early1:ALL | 0.0020 | 500 | Yes | 0 |
| ReplacementFire | Late1:CLS | Early1:ALL | 0.0003 | 3,333 | Yes | 0 |
| AltSuccession | Late1:CLS | Late1:OPN | 0.0050 | 200 | Yes | 0 |
| Insect/Disease | Late1:CLS | Late1:OPN | 0.0200 | 50 | Yes | 0 |
| MixedFire | Late1:CLS | Late1:OPN | 0.0012 | 833 | Yes | 0 |
| Optional1 | Late1:OPN | Early1:ALL | 0.0050 | 200 | Yes | 0 |
| ReplacementFire | Late1:OPN | Early1:ALL | 0.0003 | 3,333 | Yes | 0 |
| AltSuccession | Late1:OPN | Late1:CLS | 0.0050 | 200 | Yes | 0 |
| MixedFire | Late1:OPN | Mid1:OPN | 0.0012 | 833 | Yes | 0 |
| Optional1 | Mid1:CLS | Early1:ALL | 0.0300 | 33 | Yes | 0 |
| AltSuccession | Mid1:CLS | Late1:CLS | 0.0100 | 100 | Yes | 0 |
| Optional1 | Mid1:OPN | Early1:ALL | 0.0100 | 100 | Yes | 0 |
| MixedFire | Mid1:OPN | Mid1:OPN | 0.0025 | 400 | No | 0 |

Succession Classes

Class A 5 Early Development 1 - All Structures

Structural Information

Tree Size Class: Seedling/Sapling <5"

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| EQUIS | Equisetum | Horsetail | Upper |
| SALIX | Salix | Willow | Upper |
| ALNUS | Alnus | Alder | Upper |

Description

Silt is deposited on the inside of river meanders following flood events. Flooding deposits seeds which germinate and take root. Equisetum spp. and Salix spp. colonize in the first year. Within five years Salix spp and balsam poplar seedlings are abundant. Plant cover is 1-2% first year. Shrub cover increases up to 40% by the fifth year, with a diverse herbaceous layer underneath. Occasionally white (or Lutz) spruce will germinate in large numbers on mineral soil after flooding, resulting in a dense, even-aged stand. Common woody species include Alnus viridis ssp. sinuata, Alnus incana ssp. tenuifolia, Salix barclayi and Salix alaxensis (Boggs 2000, Scott 1974, Shephard 1995, Thilenius 1990, Viereck 1966). Herbaceous species may include Equisetum spp., Chamerion latifolium, Lupinus spp. and Hedysarum spp. On dry sites the shrub layer may be dominated by Shepherdia canadensis, Dryas octopetala, D. integrifolia and fruticose lichens (Stereocaulon spp.).

Class B 15 Mid Development 1 - Closed

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 |
| ROAC | Rosa acicularis | Prickly rose | Upper |
| VIED | Viburnum edule | Squashberry | Upper |

Description

This class is typically dominated by tall shrubs (Salix spp., Alnus spp.) and saplings with a closed canopy (>60%). Common woody species include Alnus viridis ssp. Sinuata, Alnus incana ssp. Tenuifolia, Salix barclayi, and Salix alaxensis. On dry sites the shrub layer may be dominated by Shepherdia canadensis, Dryas octopetala, D. integrifolia, and fruticose lichens (Steroucaulon spp.). Saplings may consist of balsam poplar with white (or Lutz) spruce in the understory (succession to class C), or saplings may consist of pure, even-aged spruce (succession to class E). Saplings overtop shrubs at 20-40yrs, when shade-intolerant pioneer shrub species decline and shade-tolerant shrubs (Rosa acicularis (prickly rose), Viburnum edule (high bush cranberry)) become more common and have a canopy cover of 10%.

The alternate succession pathway to E represents possibility that white spruce will germinate in large numbers on mineral soil after flooding, resulting in a dense, even-aged stand.

Class C 30 Mid Development 1 - Open

Structural Information

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

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| POBAB2 | Populus balsamifera ssp. balsamifera | Balsam poplar | Upper |
| PIGL | Picea glauca | White spruce | Middle |
| ROAC | Rosa acicularis | Prickly rose | Lower |
| VIED | Viburnum edule | Squashberry | Lower |

Description

Balsam poplar is the dominant overstory species. White spruce (or Lutz) is commonly in the understory. Shade-tolerant shrub species persist in the understory. If spruce is present, at approximately 100-150yrs the transition from balsam poplar to white spruce dominance begins (succession to class D). If white spruce is not present poplar persists, the stand ages and individual trees are lost to wind, disease or rot. Shrub cover commonly increases as the overstory canopy declines.

Class D 35 Late Development 1 - Open

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 |
| ROAC | Rosa acicularis | Prickly rose | Lower |
| VIED | Viburnum edule | Squashberry | Lower |
| ALNUS | Alnus | Alder | Lower |

Description

Spruce gains dominance over poplar and a mixed age, open stand develops. If enough young spruce establishes as poplar declines, the canopy closes again (succession to class E). Alternatively, the stand may remain open with shrubs in the understory.

Class E 15 Late Development 1 - Closed

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 | Lower |
| ROAC | Rosa acicularis | Prickly rose | Lower |
| VIED | Viburnum edule | Squashberry | Lower |
| ALNUS | Alnus | Alder | Lower |

Description

This class contains closed stands of white (or Lutz) spruce. These stands may be even-aged (resulting from spruce establishment on mineral soil after a flood event (succession from class A) or mixed age (succession from class D). If succession is from class D, occasional mature balsam poplar may persist in the overstory. As the spruce canopy closes feathermoss becomes dominant on the forest floor, reaching 80% cover. Rosa acicularis, Viburnum edule, and Alnus spp. may be scattered in the stand. A low shrub and herb layer may also occupy the forest floor. This class may persist in the absence of disturbance, or the canopy may open up as the stand matures on some sites, causing a transition back to class D.

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