16300

Western North American Boreal Wet Black Spruce-Tussock Woodland

Model Date: 03/11/08 Report Date: 9/11/15

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| --- | --- | --- | --- |
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Reviewer: Janet Fryer

Vegetation Type

Wetlands/Riparian

Map Zones

68, 69, 70, 71, 72, 73, 74

Geographic Range

Boreal Wet Black Spruce-Tussock Woodland is found throughout interior AK from the southern slopes of the Brooks Range to southcentral AK (but not including the Sub-boreal region) and west to the limit of tree growth (NatureServe 2008, Viereck 1983).

Biophysical Site Description

This type is found on north-facing slopes, gentle hills, and inactive alluvial surfaces underlain by permafrost (NatureServe 2008, Viereck et al. 1992). Soils are poorly drained and consist of tussocks over peat or mineral soil (Jorgenson et al. 2001, Boggs and Sturdy 2005). The live moss and organic soil layers may be up to 20 inches (50 cm) thick (Viereck 1973).

Vegetation Description

## Picea mariana is the dominant tree species and occurs in open stands. Tussock-forming sedges contribute at least 25% of the vegetation cover (NatureServe 2008). Common understory shrubs include Betula nana (including B. glandulosa), Ledum palustre ssp. decumbens., Vaccinium uliginosum and V. vitis-idaea. Herbaceous species include Eriophorum vaginatum, Carex bigelowii, and Rubus chamaemorus (NatureServe 2008, Foote 1983). Mosses and lichens are usually abundant in the ground layer (Jorgenson et al. 2001, Boggs and Sturdy 2005). Dominant mosses include Sphagnum spp., Hylocomium splendens, Pleurozium schreberi, Polytrichum juniperinum, and Ptilium crista-castrensis. Dominant lichens include Cladonia spp. and Peltigera aphthosa (Viereck 1983).

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| PIMA | Picea mariana | Black spruce |
| BENA | Betula nana | Dwarf birch |
| LEPAD | Ledum palustre ssp. decumbens | Marsh Labrador tea |
| VAUL | Vaccinium uliginosum | Bog blueberry |
| VAVI | Vaccinium vitis-idaea | Lingonberry |
| ERVA4 | Eriophorum vaginatum | Tussock cottongrass |
| CABI5 | Carex bigelowii | Bigelow's sedge |
| RUCH | Rubus chamaemorus | Cloudberry |

Disturbance Description

Fire is the primary disturbance in this system (Foote 1983). Fire severity is generally sufficient to kill the overstory (Foote 1983, Lutz 1956, Todd and Jewkes 2006). Lethal surface fire can occur alone but is most common in combination with crown fire. The soil organic layer is often consumed during crown and lethal surface fires (Johnstone 2003, Lutz 1960, Viereck 1983, Wein 1983). In a literature review Fryer (1994a) reported mean fire return intervals of 73-113 years from fire history studies in boreal Alaskan black spruce communities (Drury & Grissom 2008, Fastie et al. 2002, Kasischke et al. 2008, Kurkowski et al. 2008, Lloyd et al. 2005, Yarie 1981). Detailed information about fire disturbance in this BpS can be found in the “Fire regimes of Alaskan black spruce communities” (Fryer 2014a) and “Picea mariana” species review (Fryer 2014b).

Under appropriate conditions, this system can originate from a very late seral stage of the Boreal Black Spruce Dwarf-tree Peatland system.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Min FI** | **Max FI** | **Percent of All Fires** |
| Replacement | 115 |  |  |  |
| Moderate (Mixed) | 769 |  |  |  |
| Low (Surface) |  |  |  |  |
| **All Fires** | **100** |  |  |  |

Scale Description

Large patch (small patch)

Non-Fire Disturbances

Adjacency or Identification Concerns

This system tends to occur on a continuum between the Boreal Black Spruce Dwarf-tree Peatland system and the Boreal Low Shrub-Tussock Tundra system. Boreal Wet Black Spruce-Tussock Woodland occurs on sites that are slightly higher and drier than tussock-shrub sites and slightly lower and wetter than wet black spruce sites.

The herb and shrub classes of this system are similar in structure and composition to the herb and shrub classes of the Boreal Low Shrub-Tussock Tundra system, but the Boreal Low Shrub-Tussock Tundra system occurs where site conditions prevent trees from invading.

Issues or Problems

With information dating back to the 1940s, Alaska’s fire history records provide limited information on recent fire history (Viereck and Schandelmeier 1980).

Native Uncharacteristic Conditions

Comments

More information on black spruce forest can be found in the Fire Effects Information System Synthesis: [Fire regimes of Alaskan black spruce communities](http://www.fs.fed.us/database/feis/fire_regimes/AK_black_spruce/all.html) (Fryer 2014a); and in the species review: [Picea mariana](http://www.fs.fed.us/database/feis/plants/tree/picmar/all.html) (Fryer 2014b).

Review questions include:

-Fryer (2014a) found little evidence of mixed-severity fire in black spruce forest: “Although mixed-severity fire occurs in Alaskan black spruce communities (Fastie et al. 2002), it is rare (Kasischke 2006, Lutz 1953, Lutz 1960) and usually occurs only on forest ecotones or near unburned patches (Johnstone and Kasischke 2005, Veireck 1983).” Does the use of mixed fire in the model represent the mix of crown and lethal surface fire or something else? Should mixed fire be removed or modified?

-What is the fire frequency in this BpS and how does that compare to other boreal black spruce BpS? In a review, Fryer noted that the original modeled All Fire MFRI of 124 years was outside of the range found in the literature (i.e. 73-113 years). Blankenship adjusted the replacement fire frequencies, resulting in an All Fire MFRI of 100 years.

During LANDFIRE National his model was created for the boreal region of AK and did not receive review for other parts of the state. This model was based on input from the experts who attended the LANDFIRE Fairbanks (Nov. 07) modeling meeting and refined by Robert Lambrecht. Torre Jorgenson provided some information on the relationships between this system and adjacent systems.

**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 | 9 |
| Late1:OPN | 50 | Late1:OPN | 9999 |
| Mid1:ALL | 10 | Late1:OPN | 49 |

**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 | Early1:ALL | Early1:ALL | 0.0087 | 115 | Yes | 0 |
| Replacement Fire | Late1:OPN | Early1:ALL | 0.0087 | 115 | Yes | 0 |
| MixedFire | Late1:OPN | Late1:OPN | 0.0020 | 500 | No | 0 |
| Replacement Fire | Mid1:ALL | Early1:ALL | 0.0087 | 115 | Yes | 0 |

Succession Classes

Class A 7 Early Development 1 - All Structures

Structural Information

Tree Size Class: None

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ERVA4 | Eriophorum vaginatum | Tussock cottongrass | Upper |
| CABI5 | Carex bigelowii | Bigelow's sedge | Upper |
| RUCH | Rubus chamaemorus | Cloudberry | Upper |

Description

This class is characterized by tussock forming sedges. Common species include Eriophorum vaginatum, Carex bigelowii and Rubus chamaemorus.

Class B 28 Mid Development 1 - All Structures

Structural Information

Tree Size Class: Seedling/Sapling <5"

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| BENA | Betula nana | Dwarf birch | Upper |
| LEPAD | Ledum palustre ssp. decumbens | Marsh Labrador tea | Upper |
| VAUL | Vaccinium uliginosum | Bog blueberry | Upper |
| VAVI | Vaccinium vitis-idaea | Lingonberry | Upper |

Description

Shrubs resprout quickly after fire, becoming the dominant, upper-level canopy layer in 6-25 years (Viereck 1983). Common species include Betula nana, Ledum palustre ssp. decumbens., Vaccinium uliginosum and V. vitis-idaea.

Class C 65 Late Development 1 - Open

Structural Information

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

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIMA | Picea mariana | Black spruce | Upper |
| BENA | Betula nana | Dwarf birch | Lower |
| LEPAD | Ledum palustre ssp. decumbens | Marsh Labrador tea | Lower |
| VAUL | Vaccinium uliginosum | Bog blueberry | Lower |

Description

This class is characterized by mature black spruce tussock forest (spruce cover generally 10-25%; tussock cover >25%). Overstory is dominated by Picea mariana. It is during this class when organic material begins to accumulate and a distinctive “active layer” appears, affecting fire behavior depending upon how dry it gets.

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