

LANDFIRE Biophysical Setting Model

Biophysical Setting 7416300

Western North American Boreal Wet Black Spruce-Tussock Woodland

☐ This BPS is lumped with:

☐ This BPS is split into multiple models:

General Information

Contributors (also see the Comments field)

Date 3/11/2008

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Vegetation Type

Wetlands/Riparian

Map Zone

74

Model Zone

☒ Alaska

☐ N-Cent.Rockies

☐ California

☐ Pacific Northwest

☐ Great Basin

☐ South Central

☐ Great Lakes

☐ Southeast

☐ Northeast

☐ S. Appalachians

☐ Northern Plains

☐ Southwest

Dominant Species*

PIMA VAVI
BENA ERVA4
LEPAD CABI5
VAUL RUCH

General Model Sources

☒ Literature

☐ Local Data

☒ Expert Estimate

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).

Biophysical Site Description

This type is found on north-facing slopes, gentle hills, and inactive alluvial surfaces underlain by permafrost (NatureServe 2008). Soils are poorly drained and consist of tussocks over peat or mineral soil (Jorgenson et al. 2001, Boggs and Sturdy 2005).

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 chaememorus* (NatureServe 2008). Mosses may be abundant and include *Sphagnum* spp. and *Hylocomium splendens* (Jorgenson et al. 2001, Boggs and Sturdy 2005).

Disturbance Description

Fire is the primary disturbance in this system. Fire severity is generally sufficient to kill the overstory. Mean fire return interval estimates in boreal AK range from 25-130yrs (Rowe et al.1974, Yarie 1983, Heinselman 1978, Heinselman 1981, Viereck 1983, Viereck 1986).

*Dominant Species are from the NRCS PLANTS database. To check a species code, please visit <http://plants.usda.gov>.

**Fire Regime Groups are: I: 0-35 year frequency, surface severity; II: 0-35 year frequency, replacement severity; III: 35-100-year frequency, mixed severity; IV: 35-100+ year frequency, replacement severity; V: 200+ year frequency, replacement severity

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

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.

Native Uncharacteristic Conditions

Scale Description

Large patch (small patch)

Issues/Problems

Comments

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.

Vegetation Classes

Class A 5%

Early Development 1 All Structures

Upper Layer Lifeform

- ☒ Herbaceous
☐ Shrub
☐ Tree

Indicator Species* and Canopy Position

ERVA4 Upper
 CABI5 Upper
 RUCH Upper

Structure Data (for upper layer lifeform)

	Min	Max
Cover	Herbaceous	Herbaceous
Height	Herbaceous	Herbaceous
Tree Size Class	None	

☐ Upper layer lifeform differs from dominant lifeform.

Description

0-9yrs

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

Succession to class B. Replacement MFRI = 150yrs.

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Class B 20 %

Mid Development 1 All Structures

Structure Data (for upper layer lifeform)

	Min	Max
Cover	Open Shrub (25-74% shrub cover)	Open Shrub (25-74% shrub cover)
Height	Dwarf Shrub (< 20 cm)	Low Shrub (20 cm to 1.5 m)
Tree Size Class	Seedling/Sapling <5"	

Upper Layer Lifeform☐ Herbaceous☒ Shrub☐ Tree**Indicator Species* and Canopy Position**

BENA Upper

LEPAD Upper

VAUL Upper

VAVI Upper

☐ Upper layer lifeform differs from dominant lifeform.**Description**

10-49yrs

Shrubs resprout quickly after fire, becoming the dominant, upper-level canopy layer in 10-15yrs. Common species include *Betula nana*, *Ledum palustre* ssp. *decumbens.*, *Vaccinium uliginosum* and *V. vitis-idaea*.

Succession to class C. Replacement MFRI = 150yrs.

Class C 75 %

Late Development 1 Open

Structure Data (for upper layer lifeform)

	Min	Max
Cover	Woodland (10-24% tree cover)	Open (25-59% tree cover)
Height	Dwarf Tree (< 3 m)	Tree (> 3 m)
Tree Size Class	Pole 5–9" (swd)/5–11" (hwd)	

Upper Layer Lifeform☐ Herbaceous☐ Shrub☒ Tree**Indicator Species* and Canopy Position**

PIMA Upper

BENA Lower

LEPAD Lower

VAUL Lower

☐ Upper layer lifeform differs from dominant lifeform.**Description**

50yrs+

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.

This class can persist in the absence of disturbance. Replacement MFRI = 150yrs. Mixed fire (MFRI = 500yrs) will maintain this class.

Class D 0 %

[Not Used] [Not Used]

Structure Data (for upper layer lifeform)

	Min	Max
Cover		
Height		
Tree Size Class		

Upper Layer Lifeform☐ Herbaceous☐ Shrub☐ Tree**Indicator Species* and Canopy Position**☐ Upper layer lifeform differs from dominant lifeform.**Description**

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Class E 0%

Structure Data (for upper layer lifeform)

[Not Used] [Not Used]

Upper Layer Lifeform

- ☐ Herbaceous
☐ Shrub
☐ Tree

**Indicator Species* and
Canopy Position**

	Min	Max
Cover		
Height		
Tree Size Class		

☐ Upper layer lifeform differs from dominant lifeform.

Description

Disturbances

Fire Regime Group:** IV

Historical Fire Size (acres)

Avg 0
Min 0
Max 0

Sources of Fire Regime Data

- ☐ Literature
☐ Local Data
☒ Expert Estimate

Fire Intervals

	Avg FI	Min FI	Max FI	Probability	Percent of All Fires
Replacement	152			0.00658	81
Mixed	667			0.0015	19
Surface					
All Fires	124			0.00809	

Fire Intervals (FI):

Fire interval is expressed in years for each fire severity class and for all types of fire combined (All Fires). Average FI is central tendency modeled. Minimum and maximum show the relative range of fire intervals, if known. Probability is the inverse of fire interval in years and is used in reference condition modeling. Percent of all fires is the percent of all fires in that severity class.

Additional Disturbances Modeled

- ☐ Insects/Disease ☐ Native Grazing ☐ Other (optional 1)
☐ Wind/Weather/Stress ☐ Competition ☐ Other (optional 2)

References

Boggs, K. and Sturdy, M. 2005. Plant associations and post-fire vegetation succession in Yukon-Charley Rivers National Preserve. Alaska Natural Heritage Program, Environment and Natural Resources Institute, University of Alaska Anchorage. Prepared For: National Park Service, Landcover Mapping Program, National Park Service-Alaska Support Office, Anchorage, AK 99501.

Heinselman, M.L. 1978. Fire in wilderness ecosystems. In: J. C. Hendee, G. H. Stankey, and R. C. Lucas. Wilderness Management. USDA Forest Service, Miscellaneous Publication 1365.

Heinselman, M.L. 1981. Fire and succession in the conifer forests of northern North America. In: West, D.C., H.H. Shugart, and D.B. Botkin. Forest succession: concepts and application. Springer-Verlag, New York. Chapter 23.

Jorgenson, M.T., J.E. Roth, M.D. Smith, S. Schlentner, W. Lentz and E.R. Pullman. 2001. An ecological land survey for Fort Greely, Alaska. U.S. Army Cold Regions Research and Engineering Laboratory, Hanover, NH. ERDC/CRREL TR-01-04. 85 pp.

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

Rowe, J.S., J.L. Bergsteinsson, G.A. Padbury and R. Hermesh. 1974. Fire Studies in the Mackenzie Valley.

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ALUR Report 73-74-61. Arctic Land Use Research Program, Department of Indian Affairs and Human Development, Ottawa, Canada. 123 pp.

Viereck, L.A. 1983. The effects of fire in black spruce ecosystems of Alaska and northern Canada. In: Wein, Ross W.; MacLean, David A., eds. The role of fire in northern circumpolar ecosystems. New York: John Wiley & Sons Ltd.: 201-220. Chapter 11.

Viereck, L.A. Van Cleve, K. and Dyrness, C.T. 1986. Forest Ecosystems in the Alaska Taiga. In: Van Cleve, K., Chapin F.S. III, Flanagan, P.W. (and others), eds. Forest Ecosystems in the Alaskan taiga: a synthesis of structure and function. New York: Springer-Verlag; 1986: 22-43.

Yarie J. 1983. Forest community classification of the Porcupine River drainage, interior Alaska, and its application to forest management. USDA Forest Service GTR PNW-154.

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