LANDFIRE Biophysical Setting Model

Biophysical Setting 6817040 Alaska Arctic Permafrost Plateau Dwarf-Shrub Lichen Tundra

☐ *This BPS is lumped with:*
☐ *This BPS is split into multiple models:*

General Information

Contributors (also see the Comments field **Date** 10/9/2008

Modeler 1	Kori Blankenship	kblankenship@tnc.org	**Reviewer**	Janet Jorgenson	Janet_Jorgenson@fws.gov
Modeler 2	Keith Boggs	Ankwb@uaa.alaska.edu	**Reviewer**		
Modeler 3			**Reviewer**		

Vegetation Type
Upland Shrubland

Map Zone
68

Model Zone
☑ Alaska ☐ N-Cent.Rockies
☐ California ☐ Pacific Northwest
☐ Great Basin ☐ South Central
☐ Great Lakes ☐ Southeast
☐ Northeast ☐ S. Appalachians
☐ Northern Plains ☐ Southwest

Dominant Species*
CLADI3 EMNI
CLADO3 CHCA2
BENA VAUL
LEPAD SAPU15

General Model Sources
☐ Literature
☐ Local Data
☑ Expert Estimate

Geographic Range
This BpS is found in arctic AK on the Yukon-Kuskokwim Delta and the Kotzebue Sound lowlands ecoregions (Nowacki et al. 2001) but not on the Beaufort Coastal Plain.

Biophysical Site Description
This system occurs on flat permafrost plateaus and gently sloping terrain (Talbot et al. 1985, Jorgenson et al. 1997, Boggs et al. 2008). Soils are poorly drained and acidic, typically with a well-developed peat layer (Boggs et al. 2008). Permafrost is present.

Vegetation Description
Dwarf and low-shrub cover is >25% and lichen cover is >25%. Fruticose lichen species (e.g. Cladina and Cladonia spp.) codominate with Betula nana and Ledum palustre ssp. decumbens. Other possible shrubs include Empetrum nigrum, Chamaedaphne calyculata, Vaccinium uliginosum, Salix pulchra, Spiraea stevenii, Vaccinium vitis-idaea and Arctostaphylos spp. Graminoids usually have <10% cover and may include Eriophorum spp., Carex aquatilis and Carex microchaeta.

Disturbance Description
This system generally occurs as a late-seral stage created by permafrost uplift within the thaw pond cycle (described below) but it occasionally occurs outside of this cycle (Boggs et al. 2008). Experts at the Arctic Modeling Meeting (April 08) recommended modeling this type independent from the thaw pond cycle because of the long duration of the seral stages within the cycle and because it can occur outside of that cycle.

The following information was taken from the draft Arctic Ecological Systems description with minor

*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 seve

modifications (Boggs et al. 2008):
This is a late-seral stage in the thaw pond cycle which starts with the collapse of a permafrost plateau resulting in a wet depression often with open water. This is colonized by marsh species or Sphagnum species or a combination of both. Sedges eventually invade, and the wet sedge-Sphagnum system develops. If organic matter buildup or permafrost uplift the surface, then this system may be seral to the dwarf-shrub-Sphagnum system. This system, in turn, may be seral to the permafrost plateau-dwarf-shrub-lichen system. The seral sequence may not be unidirectional, and the timeframe is unclear, possibly taking hundreds of years.

Adjacency or Identification Concerns

Native Uncharacteristic Conditions

Scale Description
Small to large patch.

Issues/Problems

Comments
This model was created by Kori Blankenship and Keith Boggs based input from experts who attended the LANDFIRE Arctic Modeling Meeting (April 2008) and the draft Arctic Ecological Systems description (Boggs et al. 2008).

Vegetation Classes

Class A 100 %

Mid Development 1 All Structures

Upper Layer Lifeform
- ☐ Herbaceous
- ☑ Shrub
- ☐ Tree

Indicator Species* and Canopy Position

CLADI3	Upper
CLADO3	Upper
BENA	Upper
LEPAD	Upper

Structure Data (for upper layer lifeform)

	Min	Max
Cover	Open Shrub (25-74% shrub cover)	Closed Shrub (> 75% shrub cover)
Height	Dwarf Shrub (< 20cm)	Low Shrub (20cm to 1.5m)
Tree Size Class	None	

☐ Upper layer lifeform differs from dominant lifeform.

Description

Zero plus years

This class represents the Permafrost Plateau Dwarf-Shrub Lichen community.

This class persists overtime. No disturbances modeled.

---

*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 seve

Class B **0%**

[Not Used] [Not Used]

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☐ Tree

Indicator Species* and Canopy Position

Structure Data (for upper layer lifeform)

	Min	*Max*
Cover		
Height		
Tree Size Class		

☐ Upper layer lifeform differs from dominant lifeform.

Description

Class C **0%**

[Not Used] [Not Used]

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☐ Tree

Indicator Species* and Canopy Position

Structure Data (for upper layer lifeform)

	Min	*Max*
Cover		
Height		
Tree Size Class		

☐ Upper layer lifeform differs from dominant lifeform.

Description

Class D **0 %**

[Not Used] [Not Used]

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☐ Tree

Indicator Species* and Canopy Position

Structure Data (for upper layer lifeform)

	Min	*Max*
Cover		
Height		
Tree Size Class		

☐ Upper layer lifeform differs from dominant lifeform.

Description

Class E **0%**

[Not Used] [Not Used]

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☐ Tree

Indicator Species* and Canopy Position

Structure Data (for upper layer lifeform)

	Min	*Max*
Cover		
Height		
Tree Size Class		

☐ Upper layer lifeform differs from dominant lifeform.

Description

Disturbances

*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 seve

Fire Regime Group:** NA

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					
Mixed					
Surface					
All Fires					

Fire Intervals (FI):

Fire interval is expressed in years for each fire severity class and for all types of fir combined (All Fires). Average FI is central tendency modeled. Minimum and maximum show the relative range of fire intervals, if known. Probability is the inver 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
- ☐ Wind/Weather/Stress
- ☐ Native Grazing
- ☐ Competition
- ☐ Other (optional 1)
- ☐ Other (optional 2)

References

Boggs et al. 2008. International Ecological Classification Standard: Terrestrial Ecological Classifications. Draft Ecological Systems Description for the Alaska Arctic Region.

Nowacki, G., P. Spencer, M. Fleming, T. Brock and T. Jorgenson. 2001. Unified ecoregions of Alaska. U.S. Department of the Interior, U.S. Geological Survey. Open file-report 02-297. 2 page map.

Jorgenson, T.M., J.E. Roth, E.R. Pullman, R.M. Burgess, M.K. Raynolds, A.A. Stickney, M.D. Smilh and T.M. Zimmer. 1997. An ecological land survey for the Colville River Delta, Alaska, 1996. ABR, Inc. Fairbanks, AK. 141 p.

Talbot, S.S., M.D. Fleming and C.J. Markon. 1985. U.S. Fish and Wildlife Service LANDSAT-Facilitated vegetation map and vegetation reconnaissance of Yukon Delta National Wildlife Refuge, Alaska. Resource Support, U.S. Fish and Wildlife Service, Anchorage, Alaska.

*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 seve