LANDFIRE Biophysical Setting Model

Biophysical Setting 6816942 Alaska Arctic Tussock Tundra - Infrequent Fire

☑ *This BPS is lumped with: see below*

☑ *This BPS is split into multiple models: Alaska Arctic Tussock Tundra, Alaska Arctic Shrub-Tussock Tundra and Alaska Arctic Tussock-Lichen Tundra were lumped and then split into two models based on differences in the FRI.*

General Information

Contributors (also see the Comments field **Date** 9/30/2008

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Vegetation Type

Upland Shrubland

Map Zone

68

Model Zone

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

Dominant Species*

ERVA4 SAPU15
VAUL LEPAD
CABI5 EMNI
BENA

General Model Sources

☑ Literature
☐ Local Data
☑ Expert Estimate

Geographic Range

This BpS is found in arctic AK except within ecoregions (Nowakii et al. 2001) 4, 5, 7 and south of the Brooks Range in ecoregion 3.

Biophysical Site Description

This type is common in valleys and slopes. These sites are cold, poorly drained, and underlain by mesic, silty mineral soils with a shallow surface organic layer surrounding the tussocks (Viereck et al. 1992). Permafrost is present.

Vegetation Description

Eriophorum vaginatum is the primary tussock-former in most sites, but Carex bigelowii may dominate some sites. Calamagrostis canadensis, Arctagrostis latifolia and Chamerion latifolium may be common. Shrubs include Betula nana, Salix pulchra, Ledum palustre ssp. decumbens, and Vaccinium spp. (e.g. Vaccinium vitis-idaea and Vaccinium uliginosum) and Empetrum nigrum. Mosses (Sphagnum spp., Polytrichum strictum and Hylocomium splendens) may form a nearly continuous mat between tussocks. Lichens are more common on the drier tussock tundra sites in western Alaska and may include Flavocetraria cucullata, Cetraria islandica, Cladonia spp., Cladina rangiferina and Thamnolia subuliformis.

Acidic sites have more ericaceous shrubs and Sphagnum and less Eriophorum spp, Betula nana and Carex bigelowii. Acidic sites also have more organic matter buildup and the tussocks tend to be larger.

*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

Disturbance Description

There is little information about fire regimes in the arctic region of Alaska (Viereck and Schandelmeier 1980). Mean fire return interval estimates for tussock tundra ecosystems include:
-50-300yrs (personal communication FRCC experts' workshop March 2004)
-According to lake-core records, the fire-return interval is approximately 240yrs on the Seward Peninsula, and 1,000yrs+ on the Beaufort Coastal Plain (Jennifer Allen pers. comm.).
-260yr (s.d. 170) fire return interval for past 1500yrs for Noatak National Preserve (preliminary data from Higuera et al. 2008)
-612yrs for Noatak River watershed (all vegetation types) (Racine et al 1983)
-611yr fire rotation for Noatak River watershed (all vegetation below 600m which is predominantly tundra) (Racine et al 1985)
-Rapid recovery following fire makes fire frequency difficult to determine (Wein 1971)
-The fire regime of tundra systems are likely quite variable from one region to another making generalizations difficult (Viereck and Schandelmeier 1980).

Frost action, polygonal ground and thermokarst dynamics are widespread, small-scale and continuous disturbances within the Tussock Tundra type. Change in the arctic and subarctic climate is another source of disturbance that is currently affecting tundra ecosystems.

Adjacency or Identification Concerns

This type can be found adjacent to most other BpS in the arctic.

Native Uncharacteristic Conditions

Scale Description

This type can be found in large or small patches and is sometimes matrix forming.

Issues/Problems

The modelers were not sure what percent of the landscape should be in each succession class.

Comments

This model was based on input from the experts who attended the LANDFIRE Fairbanks, Arctic (April 08) modeling meeting and was refined by Colleen Ryan, Kori Blankenship and Keith Boggs.

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
CACA4	Upper
ARCTA	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.

Classes A and C should be mapped based on EVT if possible. Class C represents Alaska Arctic Tussock-Lichen Tundra.

Description

0-14yrs

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This class is characterized by tussock forming sedges. Common species include Eriophorum vaginatum, Carex bigelowii and Rubus chamaemorus. Cottongrass and sedges regrow from rhizomes. Grasses, including Calamagrostis canadensis, Arctagrostis latifolia and Chamerion latifolium (= Epilobium latifolium), may be common, especially for the first 5-10yrs. Mosses (Sphagnum spp., Polytrichum strictum and Hylocomium splendens) may form a nearly continuous mat between tussocks.

Succession to class B. Replacement MFRI = 1000yrs.

Class B 50 %

Late Development 1 All Structures

Upper Layer Lifeform

- ☐ Herbaceous
- ☑ Shrub
- ☐ Tree

Indicator Species* and Canopy Position

BENA	Upper
SALIX	Upper
ERVA4	Upper
CABI5	Upper

Structure Data (for upper layer lifeform)

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

☐ Upper layer lifeform differs from dominant lifeform.

Description

15yrs+

Low shrub-tussock. Tussock shrub tundra has >35% cover of sedges in a tussock growth form, and the combined cover of dwarf and low shrubs is >25% (Boggs et al. 2008). Tussocks are dominated by Eriophorum (cottongrass) and Carex spp. (sedges). Common shrub species include Betula nana, Salix spp., Ledum palustre ssp. decumbens, Vaccinium vitis-idaea and V. uliginosum. Lichens begin to re-establish but do not reach former abundance until 50-120yrs following fire. Former abundances of all species are typically reached 50-120yrs post fire. Lichens, if present, have < 25% cover.

This class can persist in the absence of disturbance or follow an alternate succession pathway to class C (probability = 0.001). Replacement MFRI = 1000yrs.

Class C 45 %

Late Development 2 All Structures

Upper Layer Lifeform

- ☑ Herbaceous
- ☐ Shrub
- ☐ Tree

Indicator Species* and Canopy Position

CLADO3	Upper
ERVA4	Upper
CABI5	Upper
	Lower

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.

Classes A and C should be mapped based on EVT if possible. Class C represents Alaska Arctic Tussock-Lichen Tundra.

Description

80yrs+

This class is characterized by >35% cover of sedges in a tussock growth form, <25% shrub cover, and >25% lichen cover. Dwarf-shrubs may be common. Eriophorum vaginatum is the primary tussock-former in most

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stands, but Carex bigelowii may dominate some sites. Lichens may include Flavocetraria cucullata (= Cetraria cucullata), Cetraria islandica, Cladonia spp., Cladina rangiferina and Thamnolia subuliformis. This class tends to occur on drier sites. Permafrost is present, and sphagnum is an important component of the ground cover on these acidic sites.

This class can persist in the absence of disturbance. Replacement MFRI = 1000yrs.

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

Fire Regime Group:** **V**

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	1023			0.00098	98
Mixed					
Surface					
All Fires	1021			0.001	

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)

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