LANDFIRE Biophysical Setting Model

Biophysical Setting 6816822 Alaska Arctic Scrub Birch-Ericaceous Shrubland - Frequent Fire

☐ *This BPS is lumped with:*
☑ *This BPS is split into multiple models: The Arctic Birch Ericaceous Shrub system was split into a frequent and an infrequent fire model.*

General Information

Contributors (also see the Comments field **Date** 6/10/2008

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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*

BENA	SABA3
VAUL	EMNIN
LEPAD	VAVI
SAPU15	HYSP70

General Model Sources
☐ Literature
☐ Local Data
☑ Expert Estimate

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

Biophysical Site Description
This system is found on mesic mountain and hill slopes and flats predominantly above treeline. The soils are mesic and generally mineral with a well-decomposed organic layer (Viereck et al. 1992, II.C.2.c). Permafrost is normally present (Viereck et al. 1992, II.C.2.c).

Vegetation Description
The following information was slightly modified from the draft Arctic Ecological Systems description (Boggs et al. 2008):
The total low- and tall-shrub cover is >25%, and Betula nana, Vaccinium uliginosum, or Ledum palustre ssp. decumbens typically dominate or codominate. Salix spp. (such as Salix pulchra) do not dominate but may codominate. This system does not include tussock-dominated (>35% tussocks) sites. Dwarf-shrubs such as Empetrum nigrum and Vaccinium vitis-idaea may be common under the low-shrub layer. Herbaceous species are sparse but include Arctagrostis latifolia, Poa arctica, Senecio congestus and Carex bigelowii. Feathermosses (Hylocomium splendens and Pleurozium schreberi) and lichens may be common.

Disturbance Description
Fire return interval estimates for this BpS include:
-There is little information about fire regimes in the arctic region of Alaska (Viereck and Schandelmeier

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1980).
-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)

Racine et al. (1987) studied low shrub tundra post-fire vegetation recovery on the Noatak and Seward Peninsulas and found the following:
-Postfire increases in soil thaw in tussock tundra stabilized or returned to prefire levels within 5-6yrs.
-Bryophyte cover increased rapidly, reaching 75-100% in 2-3 yrs.
-Dominant species, not present in unburned low shrub tundra, included Ceratodon purpureus, Marchantia polymorpha, Polytricum spp., Arctagrostis latifolia, Poa arctica, Senecio congestus and Carex bigelowii became established.
-Shrub recovery ranged from nearly 0-100% within in eight years, with willows recovering at one site.

This community appears to be stable over time according to Viereck et al. (1992, II.C.2.c) but this model includes successional dynamics related to fire.

Adjacency or Identification Concerns

This type tends to grade into tussock shrub communities as moisture increases or dwarf shrub fellfields as moisture decreases with wind exposure (Viereck et al. 1992, II.C.2.c).

Native Uncharacteristic Conditions

The current conditions should be similar to the reference condition.

Scale Description

Large patch or matrix forming.

Issues/Problems

Experts at the Arctic meeting agreed on the model classes, but they noted that there is no solid data to support either fire frequencies or the frequency of open vs. closed classes. In this draft model, alternate succession probabilities were set to create a ratio of open to closed classes that approximately matched Torre Jorgenson's estimate that this type would be 20% closed in the Seward/Yukon-Kuskokwim Delta regions (frequent fire model) and 5% closed on the North Slope (infrequent fire model).

Comments

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

Vegetation Classes

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Class A 5 %

Early Development 1 All Structures

Upper Layer Lifeform
- [x] Herbaceous
- [ ] Shrub
- [ ] Tree

Indicator Species* and Canopy Position

FEAL	Upper
HIAL3	Upper
CACA4	Upper
CHAN9	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

0-4yrs

After fire, herbaceous species such as Festuca altaica and Hierochloe alpina typically dominate. Low shrubs can resprout following fire, quickly regaining dominance of a site. This class may persist for more than 5yrs if fire severity is high enough to remove the organic layer.

Succession to class B. Replacement fire (MFRI = 250yrs) resets age to 0.

Class B 75 %

Late Development 1 Open

Upper Layer Lifeform
- [ ] Herbaceous
- [x] Shrub
- [ ] Tree

Indicator Species* and Canopy Position

BENA	Upper
VAUL	Upper
LEPAD	Upper
SALIX	Upper

Structure Data (for upper layer lifeform)

	Min	Max
Cover	Open Shrub (25-74% shrub cover)	Open Shrub (25-74% 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

Five plus years

This class represents an open shrub stage. Under appropriate conditions, the canopy can close around age 25, causing a transition to class C, but most sites will remain open indefinitely. This class is dominated by shrubs, often Betula nana, Vaccinium uliginosum, Ledum decumbens, Salix pulchra, S. barclayi or other Salix spp. may also be common (Viereck 1979, Viereck et al. 1992). Dwarf shrubs such as Empetrum nigrum and Vaccinium vitis-idaea may be common under the low shrub layer.

This class can persist in the absence of disturbance or follow an alternate succession pathway to class C (probability = 0.0012). Replacement MFRI = 250yrs causes a transition to A.

Class C 20 %

Late Development 2 Closed

Upper Layer Lifeform
- [ ] Herbaceous
- [x] Shrub
- [ ] Tree

Indicator Species* and Canopy Position

BENA	Upper
VAUL	Upper
LEPAD	Upper
SALIX	Upper

Structure Data (for upper layer lifeform)

	Min	Max
Cover	Closed Shrub (> 75% 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.

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Description

25yrs+

This class represents a mature closed canopy shrub class that may occur on a minority of sites where conditions are appropriate. The canopy will close in around age 25. This class is dominated by shrubs, often Betula nana, Vaccinium uliginosum, Ledum decumbens, Salix pulchra, S. barclayi or other Salix spp. may also be common (Viereck 1979, Viereck et al. 1992). Dwarf shrubs such as Empetrum nigrum and Vaccinium vitis-idaea may be common under the low shrub layer.

This class persists in the absence of disturbance. Replacement MFRI = 250yrs cause a transition to A.

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	251.6			0.00397	99
Mixed					
Surface					
All Fires	251			0.00399	

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.

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Additional Disturbances Modeled

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

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