

LANDFIRE Biophysical Setting Model

Biophysical Setting 6916822

**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

69

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 HYSPT0

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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**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

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

- ☒ 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 Hierochloa 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
☒ 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 (20 cm to 1.5 m)	Low Shrub (20 cm to 1.5 m)
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
☒ 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 (20 cm to 1.5 m)	Low Shrub (20 cm to 1.5 m)
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 %**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**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**:** 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 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.

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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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