

LANDFIRE Biophysical Setting Model

Biophysical Setting 7616540

Alaskan Pacific Maritime Sitka Spruce Beach Ridge

☐ This BPS is lumped with:

☐ This BPS is split into multiple models:

General Information

Contributors (also see the Comments field) **Date** 9/18/2008

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Vegetation Type

Forest and Woodland

Map Zone

76

Model Zone

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

Dominant Species*

PISI VACCI
OPHO ALVIS
TSHE RUSP
VIED RUPE

General Model Sources

- ☒ Literature
☐ Local Data
☒ Expert Estimate

Geographic Range

This system is found along the Alaska Gulf Coast in the following areas: Copper River Delta, Cape Yakataga, Yakutat forelands and the outer coast of Glacier Bay National Park. On the Yakutat foreland the beach ridge formations are found between Dry Bay and Dangerous River (Shephard 1993, Shephard 1995). It also occurs on Kodiak Island.

Biophysical Site Description

This type is found on sub-parallel sandy ridges oriented parallel to the coast that form as a result of longshore transport, riverine processes and tectonic or isostatic uplift following glacial retreat which allows upland species to colonize (Shephard 1995). These processes are still active allowing the formation of new beach ridges and an expansion of the area occupied by the beach ridge community (Shephard 1995). The age of the beach ridges increases with distance from the coast (Shephard 1995). On the Yakutat Foreland this type is found on well drained sandy soils within 10 kilometers of the coast (Shephard 1993). The height of beach ridges varies from 5 meters near the coast to 35 meters further inland (Shephard 1993). Salt spray is a primary factor influencing this community and helps to maintain the dominance of Sitka spruce which seems to be more salt tolerant than other tree species found in the area. Limited species diversity in the surrounding area also contributes to low species diversity in this BpS.

Vegetation Description

Picea sitchensis is usually dominant in the canopy, but Tsuga heterophylla can be codominant especially on older sites (Shephard 1993). Oplopanax horridus is usually the most abundant understory shrub but other common shrubs include Vaccinium ovalifolium, Viburnum edule and Rubus spectabilis. Other

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species include *Circea alpina*, *Rubus pedatus*, *Streptopus amplexifolius*, *Tiarella trifoliata*, *Athyrium filix-femina*, *Dryopteris expansa*, and *Gymnocarpium dryopteris* (Shephard 1993). Common moss species include *Hylocomium splendens*, *Rhytidiadelphus loreus* and *Dicranum* spp (Shephard 1993). Mature forests usually have very little downed wood or snags (NatureServe 2008).

Disturbance Description

The non-forested beach meadow is likely the early sere of the forested beach ridge community prior to tectonic or isostatic uplift (Shephard 1993), although it is considered a separate BpS for LANDFIRE. Spruce can become established about 130yrs after beach ridges form (Shephard 1993). As the spruce stands age, understory recruitment decreases. *Tsuga heterophylla* may codominate in the later seral stages (Shephard 1993) and/or this type may succeed to *Tsuga heterophylla* forest (Shephard 1995 p.36). Succession to *Tsuga heterophylla* forest is most likely after a wind disturbance and would depend on available seed source. Eventually, peatlands may replace the forested community but that is not considered in this model.

Wind is the primary disturbance in this system. Beach ridges tend to have a distinct edge with younger trees on the outside that tend to make them somewhat resistant to windthrow; however, if the young tree buffer is lost, possibly as a result of flooding, they become susceptible to windthrow. The annual probability of wind disturbance for modeling is unclear. In this model it is set to 0.003 to achieve the approximate class percents that likely occur in a "naturally" functioning system.

Insects and disease play a minor role in beach ridge communities. A reviewer noted that spruce beetle and inadequate nitrogen levels were the cause of disturbance of similar even aged spruce stands in deglaciated areas of Glacier Bay; although these are different substrates, it is conceivable that the same processes could play out between Glacier Bay and these ridges. There is some evidence of fire in this system but it appears to be human-caused, very infrequent and limited in extent.

Adjacency or Identification Concerns

Fen and bog communities can be found in the interspaces between the linear beach ridges (Shephard 1995). Along the coast, the adjacent non-forest vegetation is primarily comprised of a rye-grass dune community and a strawberry-yarrow beach meadow community which forms further inland on higher ground (Shephard 1995).

Native Uncharacteristic Conditions

Scale Description

Matrix

Issues/Problems

Comments

This system was created for the AK Maritime region and did not receive review for other regions in the state.

This model was developed by Michael Shephard and is largely based on his work (Shephard 1993) on the Yakutat Ranger District. Review comments resulted in minor additions to the description.

Vegetation Classes

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Class A 30 %

Early Development 1 Closed

Upper Layer Lifeform

- ☐ Herbaceous
☐ Shrub
☒ Tree

Indicator Species* and Canopy Position

PISI Upper
 OPHO Lower

Structure Data (for upper layer lifeform)

	Min	Max
Cover	Closed (60-100% tree cover)	Closed (60-100% tree cover)
Height	Dwarf Tree (< 3 m)	Tree (> 3 m)
Tree Size Class	Med. 9-20" (swd)/11-20" (hwd)	

☐ Upper layer lifeform differs from dominant lifeform.

Description

0-129yrs

Early, ecotone community between the non-forested beach and the beach ridge-Picea sitchensis/Oplopanax horridus community. Found on beach formations < 130yrs old (Shephard 1993). This ecotonal community is characterized by young, very dense stands of sitka spruce with a moss understory (Shephard 1993).

Succession to class B.

Class B 30 %

Mid Development 1 All Structures

Upper Layer Lifeform

- ☐ Herbaceous
☐ Shrub
☒ Tree

Indicator Species* and Canopy Position

PISI Upper
 OPHO Lower
 VIED Lower
 VACCI Lower

Structure Data (for upper layer lifeform)

	Min	Max
Cover	Open (25-59% tree cover)	Closed (60-100% tree cover)
Height	Tree (> 3 m)	Tree (> 3 m)
Tree Size Class	Large 20" – 40"	

☐ Upper layer lifeform differs from dominant lifeform.

Description

130-299

Young. Picea sitchensis/Oplopanax horridus community. Found on beach ridge formations 130-300yrs old (Shephard 1993). Cover of Viburnum edule and Vaccinium ssp. is typically higher during this stage than later seral stages (Shephard 1993). Common moss species include Hylocomium splendens, Rhytidiadelphus loreus and Dicranum spp (Shephard 1993).

Succession to class C. Wind disturbance (probability = 0.0033) causes a transition to class A.

Class C 40 %

Late Development 1 All Structures

Upper Layer Lifeform

- ☐ Herbaceous
☐ Shrub
☒ Tree

Indicator Species* and Canopy Position

PISI Upper
 OPHO Lower
 ALVIS Lower
 RUSP Lower

Structure Data (for upper layer lifeform)

	Min	Max
Cover	Open (25-59% tree cover)	Closed (60-100% tree cover)
Height	Tree (> 3 m)	Tree (> 3 m)
Tree Size Class	Very Large 40.0"+	

☐ Upper layer lifeform differs from dominant lifeform.

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Description

300+

Middle-Aged and Old. This class combines the Middle-Aged and Old stages defined by Shephard (1993) because they could not be distinguished for mapping using LANDFIRE's methods. *Picea sitchensis*/*Oplopanax horridus* community which can range from 300 to well over 500yrs old. With age, the stand tends to become more open. *Tsuga heterophylla* can eventually be codominant (Shephard 1993). *Alnus viridis* ssp. *sinuata* and *Rubus spectabilis* tend to be more prevalent in the middle and old stages than in the early and young stages (Shephard 1993). *Climacium dendroides* can be found in addition to those moss species listed in the young stage (Shephard 1993).

This class will persist in the absence of disturbance. Wind disturbance (probability = 0.0033) causes a transition to class A.

Class D 0 %

[Not Used] [Not Used]

Structure Data (for upper layer lifeform)

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 %

[Not Used] [Not Used]

Structure Data (for upper layer lifeform)

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:** 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 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)

References

NatureServe. 2008. International Ecological Classification Standard: Terrestrial Ecological Classifications. Draft Ecological Systems Description for the Alaska Maritime Region.

Shephard, M. E. 1993. Structure and Composition of a Forested Beach Ridge Chronosequence on the Yakutat Foreland, Alaska. Proceedings of the Third Glacier Bay Science Symposium. Dr. Engstrom (ed.), National Park Service, Alaska, 1993. p. 129-136.

Shephard, M.E. 1995. Plant community ecology and classification of the Yakutat Foreland, Alaska. Technical Report R10-TP-56. Juneau, AK: USDA Forest Service, Alaska Region. 206 p.

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