16650

**Alaskan Pacific-Aleutian Coastal Dune, Beach, and Beach Meadow**

BpS Model/Description Version: Nov. 2024

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| --- | --- | --- | --- |
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Vegetation Type

Herbaceous

Map Zones

73, 75, 76, 77, 78, 80

Geographic Range

This Biophysical Setting (BpS) is found along the North Pacific coastline from the Cook Inlet Basin and Prince William Sound through southeast Alaska, the Alaska Peninsula, Aleutian Islands, and Kodiak Island.

Biophysical Site Description

This BpS includes communities associated with delta deposits, coastal sandy beaches, beach dunes, sand spits, as well as moist and wet meadows. Processes that define the system include sand deposition, wind and water erosion, long-shore transport, salt spray, and overwash from storm surges. Vegetation zonation in this system is related to exposure to salt spray and disturbance. Sandy soils may be periodically exposed to overwash from storm surges and exceptionally high tides, but they drain quickly, and precipitation rapidly leaches salt from the system (Boggs 2000). The sites may be unstable, due to coastal bluff erosion and isolated blowouts. Sites are slightly inclined to steep. The substrates are shallow to deep eolian sand deposits over bedrock. Other sites have loamy soils on colluvium that are nutrient enriched by seabirds. Soils are usually well-drained, though dune slacks may be poorly drained due to the deposition of fine-grained material during overflow events.

Vegetation Description

Plant communities on these coastal systems are dominated by a variety of grasses and forbs. Salt-tolerant forb communities featuring *Honckenya peploides,* *Glaux maritima* (not present in the Aleutians), and *Mertensia maritima var. asiatica* (not common in SE AK) often occur just above mean high tide. *Plantago maritima* and *Triglochin maritimum* occur within the same supratidal zone but are restricted to more sheltered locations where fine sands are deposited and retained. As dune height and distance from the ocean increases, vegetation transitions to a graminoid-forb community dominated by *Leymus mollis* with varying contributions of *Lathyrus maritimus* (*Lathyrus japonicus var. maritimus*) and *Senecio pseudo-arnica*. Also common are *Ligusticum scoticum, Angelica lucida, Angelica genuflecta, Galium aparine,* and *Potentilla egedii*.These sites are above the high tide line but still experience salt spray and storm surges. Tidally flooded dune slacks may be colonized by herbaceous communities dominated by *Equisetum variegatum*, *Eleocharis palustris, Poa macrantha, Carex lyngbyaei,* and *Ranunculus cymbalaria* may also occur (Boggs 2000). Rich forb types occur on dunes and back beaches even further removed from the ocean. Species composition is variable but may include: *Deschampsia beringensis*, *Festuca rubra,* *Heracleum maximum, Parnassia palustris, Lupinus nootkatensis, Carex mackenziei*, *Carex lyngbyei, Hordeum brachyantherum, Poa eminens, Achillea millefolium* ssp*. borealis, Fragaria chiloensis, Calamagrostis canadensis, Claytonia sibirica,* and *Chamerion angustifolium*. Outside of the influence of storm surges and salt spray, communities may eventually succeed to types dominated by the dwarf shrubs *Empetrum nigrun* and *Salix* *ovalifolium* (with *Salix ovalifolium* present in Aleutians, Alaska Peninsula and Kodiak only) or low shrubs *Alnus viridis* ssp. *sinuata* and *Salix sitchensis* (in SC and SE AK; *Myrica gale* may occur in SC AK back beach habitats), with the occurrence of *Sorbus sitcheniss*, *Alnus rubra,* and *Malus fusca* increasing down the SE AK panhandle.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| HOPE | *Honckenya peploides* | Seaside sandplant |
| LEMO8 | *Leymus mollis* | American dunegrass |
| LAJAM | *Lathyrus japonicus var. maritimus* | Beach pea |
| SEPS | *Senecio pseudoarnica* | seaside ragwort |
| POEM | *Poa eminens* | Largeflower speargrass |
| FERU2 | *Festuca rubra* | Red fescue |
| DESCH | *Deschampsia beringensis* | Hairgrass |
| LUNO | *Lupinus nootkatensis* | Nootka lupine |
| HEMA80 | *Heracleum maximum* | Common cowparsnip |
| LISC3 | *Ligusticum scoticum* | Scottish licorice-root |

Species names are from the NRCS PLANTS database. Check species codes at http://plants.usda.gov.

Disturbance Description

Vegetation dynamics in dunes and beach meadows are driven by salinity and frequency and duration of inundation, which typically decreases with distance from the shore. In areas of uplift or deposition, the vegetation community will gradually move out of the range of tidal influence allowing plant species with lower salt tolerance to establish. In areas of subsidence or erosion, the exposure to salt water may increase allowing halophytic herbs to regain dominance.

Dune perturbations include eroding coastal bluffs and isolated blowouts. Community self-replacement likely occurs. The disturbance processes on the mesic loamy-sandy substrates are not well documented but likely relate to storm surge events.

These communities are relatively stable over time. However, within the range of spruce, uplift related to isostatic rebound may allow spruce communities to eventually occupy what are now meadow sites (in the southern areas of SE Alaska, where the rate of isostatic rebound is much slower, this may not be so obvious). Conversely, subsidence due to earthquakes has historically had a major impact on coastal areas resulting in drowned forests that eventually develop into tidal flats, marshes, and meadows.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement |  |  |  |  |
| Moderate (Mixed) |  |  |  |  |
| Low (Surface) |  |  |  |  |
| All Fires |  |  |  |  |

Fire interval is expressed in years for each fire severity class and for all types of fire combined (All Fires). Average FI is the central tendency modeled. Percent of all fires is the percent of all fires modeled in that severity class. Minimum and Maximum FIs show the relative range of fire intervals as estimated by model contributors, if known.

Scale Description

Small to large patch, can be linear.

Adjacency or Identification Concerns

For mapping, the outer Aleutians and the Gulf of Alaska side of the Alaska Peninsula should be mapped as this BpS, and the more sheltered Bristol Bay side of the Alaska Peninsula should be mapped to the North American Arctic-Subarctic Coastal Dune and Beach BpS.

There is some conceptual overlap between this BpS and the early successional phases of the Alaskan Pacific Sitka Spruce Forest and Beach Ridge - Beach Ridge BpS. The latter is restricted to uplifted terrains.

Issues or Problems

The state-and-transition model for this BpS is conceptual. There was no information to support the probabilities in the model.

Native Uncharacteristic Conditions

Recent research has shown that the abundance of graminoids in the Aleutian Islands can be reduced due to a reduction in nutrient inputs from seabird colonies; where seabirds have been impacted by introduced predators, the cover of graminoid species is lower (Croll et al. 2005; Byrd 1984).

Comments

10/2021 This description was updated by NatureServe staff and Kori Blankenship based on the updated Ecological Systems classification for Alaska. Edits focused on adjusting the Geographic Range, Biophysical Site Descriptions, and Vegetation Description sections.

In 2021 NatureServe merged Alaskan Pacific Maritime Coastal Meadow and Slough-Levee (16650) and Aleutian American Dunegrass Grassland (16710) into one system called Alaskan Pacific-Aleutian Coastal Dune, Beach, and Beach Meadow. Kori Blankenship merged the BpS concepts into this unified description. BpS 16650 was created by Amy Miller and Karen Dillman and reviewed by Tom DeMeo. BpS 16710 was created by Kori Blankenship and Keith Boggs and reviewed by Jeff Williams. Blankenship also modified the model to include an early successional herbaceous state and a later successional state where shrubs could establish.

Succession Classes

**Mapping Rules**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Upper Layer Lifeform** | **Height (m)** | **Canopy Cover (%)** | | | | | | | | | |
| **0-10** | **11-20** | **21-30** | **31-40** | **41 - 50** | **51-60** | **61-70** | **71-80** | **81-90** | **91-100** |
| Herb | 0-0.5 | A | A | A | A | A | A | A | A | A | A |
| Herb | 0.5-1.0 | A | A | A | A | A | A | A | A | A | A |
| Herb | >1.0 | A | A | A | A | A | A | A | A | A | A |
| Shrub | 0-0.5 | B | B | B | B | B | B | B | B | B | B |
| Shrub | 0.5-1.0 | B | B | B | B | B | B | B | B | B | B |
| Shrub | 1.0-3.0 | B | B | B | B | B | B | B | B | B | B |
| Shrub | >3.0 | B | B | B | B | B | B | B | B | B | B |
| Tree | 0-5 | B | B | B | B | B | B | B | B | B | B |
| Tree | 5-10 | B | B | B | B | B | B | B | B | B | B |
| Tree | 10-25 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | 25-50 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | >50 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |

Succession class letters A-E are described in the Succession Class Description section. Some classes use a leafform distinction where a qualifier is added to the class letter: Brdl (broadleaf), Con (conifer), or Mix (mixed conifer and broadleaf). UN refers to uncharacteristic native or a combination of height and cover that would not be expected under the reference condition. NP refers to not possible or a combination of height and cover which is not physiologically possible for the species in the BpS.

**Description**

Class A 50 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| LEMO8 | *Leymus mollis* | American dunegrass | Upper |
| HOPE | *Honckenya peploides* | Seaside sandplant | Upper |
| LAJAM | *Lathyrus japonicus var. maritimus* | Beach pea | Upper |

Description

Pioneer herbaceous communities establish. Beach meadows that are exposed to the open ocean are more likely to be buried or flooded compared to inland areas due to the proximity to severe weather in outer coast areas. Pioneer species must tolerate heat, salt spray, low nutrients, and water. Storm surge can deposit sediment and bury existing vegetation.

*Maximum Tree Size Class*  
None

Class B 50 Late Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| DESCH | *Deschampsia beringensis* | Hairgrass | Upper |
| SEPS | *Senecio pseudoarnica* | seaside ragwort | Upper |
| LUNO | *Lupinus nootkatensis* | Nootka lupine | Upper |
| LISC3 | *Ligusticum scoticum* | Scottish licorice-root | Upper |

Description

Over time pioneer species build up the foredune and less stress-tolerant species can establish on dunes and back beaches further removed from the ocean. Shrubs, including *Alnus rubra* and *Salix* spp., may eventually establish in southeast AK. Wind disturbance is common and isolated blowouts occur. Extreme weather or storm surge events might reset succession.

*Maximum Tree Size Class*  
None

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Early1:ALL | 999 |
| Late1:ALL | 1 | Late1:ALL | 999 |

Probabilistic Transitions

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Disturbance Type** | **Disturbance occurs In** | **Moves vegetation to** | **Disturbance Probability** | **Return Interval (yrs)** | **Reset Age to New Class Start Age After Disturbance?** | **Years Since Last Disturbance** |
| Alternative Succession | Early1:ALL | Late1:ALL | 0.002 | 500 | Yes | 0 |
| Optional 1 | Early1:ALL | Early1:ALL | 0.02 | 50 | Yes | 0 |
| Wind or Weather or Stress | Late1:ALL | Late1:ALL | 0.01 | 100 | No | 0 |
| Wind or Weather or Stress | Late1:ALL | Early1:ALL | 0.002 | 500 | Yes | 0 |

Optional Disturbances

Optional 1: storm surge

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