17090

North American Arctic-Subarctic Coastal Dune and Beach

Model Date: 10/17/08 Report Date: 9/11/15

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| **Modelers** |  | **Reviewers** |  |
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| None | None | None | None |

Reviewer: Robin Innes

Vegetation Type

Upland Grassland/Herbaceous

Map Zones

67, 68, 72, 76

Geographic Range

This BpS is found along the coastline of arctic AK including along the Beaufort Sea, Chuckchi Sea, and the Bearing Sea.

Biophysical Site Description

This system consists of coastal beaches, beach dunes, and vegetation that has stabilized the sand or cobble deposits. Soils are dry to mesic (Boggs et al. 2008). Exposure to salt spray and periodic overwash is common and creates vegetation zoneation.

Vegetation Description

Bare sand or cobble are common. Three existing vegetation map classes may dominate the BpS:

1-Salt-tolerant forb communities occur just above mean high tide and are dominated or codominated by Cochlearia groenlandica (= Cochlearia officinalis), Achillea millefolium var. borealis, Honckenya peploides and/or Mertensia maritima.

2-As dune height and distance from the ocean increase, sites are dominated by the Leymus mollis. This class that may include near-monocultures of Leymus mollis to more species-rich associations, including Leymus mollis, Lathyrus japonicus var. maritimus (= Lathyrus maritimus), Achillea millefolium var. borealis, Festuca rubra, Fragaria chiloensis, Senecio pseudoarnica, Deschampsia beringensis, Heracleum maximum, and Poa eminens.

3-The Empetrum nigrum class often grows in narrow stringers on the older beach ridges behind the Leymus mollis map class. Herbaceous species are common, including Cornus suecica. Lathyrus japonicus var. maritimus, Conioselinum chinense, and Cnidium cnidiifolium are uncommon east of Cape Lisburne.

The Leymus mollis and Empetrum nigrum classes are above the high tide line but still experience storm surges, high winds and salt spray.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| LEMO8 | Leymus mollis | American dunegrass |
| COGR6 | Cochlearia groenlandica | Danish scurvygrass |
| EMNI | Empetrum nigrum | Black crowberry |
| LAJAM | Lathyrus japonicus var. maritimus | Beach pea |
| MEMA3 | Mertensia maritima | Oysterleaf |
| POEM | Poa eminens | Largeflower speargrass |
| HOPE | Honckenya peploides | Seaside sandplant |
| COCH2 | Conioselinum chinense | Chinese hemlockparsley |
| CNCN | Cnidium cnidiifolium | Jakutsk snowparsley |

Disturbance Description

Processes that define the system include sand deposition, wind erosion, long-shore transport, dune formation and water erosion such as overwash from storm surges. Herbaceous species stabilize the sand deposits (dunes, beaches), and the older deposits support dwarf-shrubs mixed with herbaceous species. Vegetation dynamics are driven by salinity and sand deposition both of which vary depending on distance from the water and the possibility of inundation. Beach succession is not always unidirectional; shifting sand or beach subsidence may cause less salt tolerant species to die and halophytic herbs to regain dominance.

In June of 2013 an extensive search was done by Fire Effects Information System staff to locate information for a synthesis on [Fire regimes of Alaskan coastal herbaceous communities and active inland dunes](http://www.fs.fed.us/database/feis/fire_regimes/AK_coastal/all.html), with few results (Innes 2013). The lack of contemporary fire records suggests that fire in Arctic and sub-Arctic marine beach and beach meadows is rare. No studies reported fire frequency and fire is believed to have been rare in coastal herbaceous communities (Innes 2013).

Fire Frequency

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

Scale Description

Patch size is small to moderate and often linear.

Non-Fire Disturbances

Adjacency or Identification Concerns

This type is found adjacent to the coastline.

Issues or Problems

Native Uncharacteristic Conditions

This type is not departed from its “Reference Condition.”

Comments

Review Needed:

* Need review of the two successional states defined for this BpS. Do they capture the dynamics of the system? Are the indicator species accurate? Are the disturbance transitions appropriate?
* How would the model for this BpS differ from the model for Alaskan Pacific-Aleutian Coastal Dune, Beach and Beach Meadow (1665)?

In 2021 NatureServe merged the Alaska Arctic Marine Beach and Beach Meadow (BpS 1709) and Aleutian Marine Beach and Beach Meadow (BpS 1725) Ecological Systems. Kori Blankenship merged the BpS concepts into this unified description. Blankenship also modified the state-and-transition model to include an early successional herbaceous state and a later successional state where shrubs could establish.

For LANDFIRE National this model was created by Kori Blankenship and Keith Boggs. Jeff Williams reviewed theAleutian Marine Beach and Beach Meadow BpS (17250).

Succession Classes

Class A 50 Early Development 1 - All Structures

Structural Information

Upper Layer Lifeform: Herb

Tree Size Class: None

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| COGR6 | Cochlearia groenlandica | Danish scurvygrass | Upper |
| LEMO8 | Leymus mollis | American dunegrass | Upper |
| LAJAM | Achillea millefolium var. borealis | Boreal yarrow | Upper |
| HEMA80 | Heracleum maximum | Common cowparsnip | Upper |

Description

Pioneer herbaceous communities establish. Bare sand or cobbles are common. Coastal herbaceous communities 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. Storm surge can deposit sediment and bury existing vegetation.

Class B 50 Late Development 1 - All Structures

Structural Information

Upper Layer Lifeform: Shrub/herb

Tree Size Class: None

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| EMNI | Empetrum nigrum | Black crowberry | Upper |
| COSU4 | Cornus suecica | Lapland cornel | Upper |
| LAJAM | Lathyrus japonicus var. maritimus | Beach pea | Upper |
|  |  |  |  |

Description

Over time pioneer species build up the foredune and less stress-tolerant species can establish on dunes further removed from the ocean. Dwarf shrubs may eventually establish. Wind disturbance is common and isolated blowouts occur. Extreme weather or storm surge events might reset succession.

References

Boggs et al. 2008. International Ecological Classification Standard: Terrestrial Ecological Classifications. Draft Ecological Systems Description for the Alaska Arctic Region.

Boggs, K. 2000. Classification of community types, successional sequences, and landscapes of the Copper River Delta, Alaska. Gen Tech. Rep. PNW-GTR-469. Portland, OR: USDA Forest Service, Pacific Northwest Research Station. 244p.

Byrd, G.V. 1984. Vascular vegetation of Buldir Island, Aleutian Islands, Alaska, compared to another Aleutian island. Arctic 37(1):37-48.

Croll, D.A., J.L. Maron, J.A. Estes, E.M. Danner and G.V. Byrd. 2005. Introduced predators transform subarctic islands from grassland to tundra. Science 307:1959-1961.

DeVelice, R.L., Hubbard, C.J., Boggs, K. et al. 1999. Plant community types of the Chugach National Forest. Tech. Publ. R10-TP-76. Juneau, AK: USDA Forest Service, Alaska Region. 375 p.

Innes, Robin J. 2013. Fire regimes of Alaskan coastal herbaceous communities and active inland dunes. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/fire\_regimes/AK\_coastal/all.html [2016, June 28].

NatureServe. 2008. International Ecological Classification Standard: Terrestrial Ecological Classifications. Draft Ecological Systems Description for Alaska Boreal and Sub-boreal Regions.

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

Ritter, D. F. 1986. Process geomorphology. Wm. C. Brown Publishers, Dubuque, Iowa. 579 p.

Streveler, G.P., Worley, I.A., Terry, C.J. and R.J. Gordon. 1973. Dixon Harbor biological survey: final report on the summer phase of 1973 research. U.S. Dept. Interior, National Park Service, Glacier Bay National Monument. 241 p.

Talbot, S. S. and S.L. Talbot. 1994. Numerical classification of the coastal vegetation of Attu Island, Aleutian Islands, Alaska. Journal of Vegetation Science 5:867-876.

Viereck et al. 1992. The Alaska vegetation classification. Pacific Northwest Research Station, USDA Forest Service, Portland, OR. Gen. Tech. Rep. PNW-GTR286. 278 p.