17110

North American Arctic-Subarctic Tidal Salt and Brackish Marsh

BpS Model/Description Version: Nov. 2024

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| --- | --- | --- | --- |
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| None | None | None | None |

Vegetation Type

Herbaceous Wetland

Map Zones

67, 68, 72

Geographic Range

This Biophysical Setting (BpS) is found along the coastline of arctic and subarctic AK including along the Beaufort Sea, Chukchi Sea, and the Bearing Sea.

Biophysical Site Description

Tidal marshes are primarily associated with estuaries, coastal lagoons, or other locations protected from wave action. Lagoons with outer spits and beaches are well developed and common in the Aleutians. Tidal marshes, however, are not extensive within these lagoons because of constant winds and waves, plus winter sea ice may be extensive and blown to shore, scouring the vegetation. It appears that tectonic/isostatic uplift is common, lifting the marshes above the tide.

These marshes are typically salt or brackish. Some, however, are primarily freshwater that are infrequently flooded by storm surges or extreme high tides. Tidal marshes often have sediment inputs from a freshwater source. The surface gradients are flat. Progradation of the tidal marsh front will occur if sedimentation exceeds erosion. Soils are silts and clays and are periodically inundated by tidal fluctuation. The frequency of flooding may vary from twice daily (lower salt marsh) to once per growing season (upper coastal marsh). Tidal marshes represent the area of transition from maritime to freshwater terrestrial systems and encompass a complex range of plant communities and ecotones including marshes, wet meadows, or barren mudflats. Tidal flats form a narrow band along oceanic inlets and are more extensive at the mouths of larger rivers. The dominant processes are tectonic uplift or subsidence, isostatic rebound, and sediment deposition.

Vegetation Description

Tidal flats have <10% vascular species cover and are dominated by bare ground. Tidal marshes have >10% vascular species. Two different zones of tidal marshes include tidal sedge marshes and tidal herbaceous (non-sedge) marshes. *Carex lyngbyei, Carex glareosa*, *Carex mackenziei*, *Carex ramenskii,* or *Carex subspathacea* dominate the tidal sedge marshes. *Carex subspathacea* is more common along the Beaufort Sea. *Carex lyngbyei* may dominate on portions of the Yukon-Kuskokwim Delta and is often found more inland or adjacent to tidal creeks. *Dupontia fisheri* and *Puccinellia* spp. dominate the tidal herbaceous zones. *Argentina egedii* may dominate on Alaska's west coast but not on the Beaufort Coastal Plain. Other species include *Hippuris tetraphylla, Hippuris vulgaris, Ruppia cirrhosa, Stellaria humifusa*, and *Zannichellia palustris*. *Puccinellia* spp. or *Plantago maritima* dominate the tidal herbaceous zone, often with <25% cover. Sites occurring immediately above tidal marshes in arctic Alaska have >25% herbaceous cover and <25% shrub cover. These sites are tidally inundated during storm tides and extreme high tides and, consequently, are brackish. The soils typically lack organic matter, and permafrost is uncommon. The main indicators on the Yukon-Kuskokwim Delta and the Kotzebue Sound lowlands ecoregions are *Carex rariflora* (>10%), *Calamagrostis deschampsioides*, and *Chrysanthemum arcticum*. Other common species include *Eriophorum russeolum, Carex ramenskii* (usually present but not dominant), and *Salix ovalifolia*. Additional dominants on the Beaufort Coastal Plain are *Eriophorum angustifolium, Carex aquatilis*, and *Dupontia fisheri.*

Tidal marshes often include an ecotone with freshwater non-tidal wetlands, especially on the Yukon-Kuskokwim Delta. On this delta, the first system moving inland is dominated by *Puccinellia* spp., then *Carex ramenskii* or *Carex subspathacea*, then brackish meadow which can include *Carex rariflora, Calamagrostis deschampsioides*, and *Chrysanthemum arcticum*. Adjacent coastal sedge-dwarf shrubland is dominated by *Empetrum nigrum, Salix fuscescens, Salix ovalifolia, Carex rariflora, Calamagrostis deschampsioides,* and *Deschampsia cespitosa*.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| CARA4 | *Carex ramenskii* | Ramensk's sedge |
| CASU8 | *Carex subspathacea* | Hoppner's sedge |
| CALY3 | *Carex lyngbyei* | Lyngbye's sedge |
| DUFI | *Dupontia fisheri* | Fisher's tundragrass |
| PUCCI | *Puccinellia spp.* | Alkaligrass |
| AREG | *Argentina egedii* | Pacific silverweed |

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

Disturbance Description

Common disturbances in the marsh system can include freshwater and tidal flooding, sediment deposition, storm surge, and ice scour.

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 patch, Large patch

Adjacency or Identification Concerns

Issues or Problems

Native Uncharacteristic Conditions

Comments

In 2021 NatureServe merged Alaska Arctic Tidal Marsh (BpS 1711), Alaska Arctic Coastal Brackish Meadow (BpS 1712), and Aleutian Tidal Marsh (BpS 1726) into one Ecological System: North American Arctic-Subarctic Tidal Salt and Brackish Marsh. Pat Comer and Kori Blankenship merged the BpS descriptions to reflect the new Ecological System concept. All BpS were represented by models with one seral state.

During LANDFIRE National Kori Blankenship and Keith Boggs drafted BpS 1711, 1712, and 1726 based on the draft Arctic Ecological Systems description. Janet Jorgenson reviewed 1711 and 1712. Jeff Williams reviewed 1726.

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 | A | A | A | UN | UN | UN | UN | UN | UN | UN |
| Shrub | 0.5-1.0 | A | A | A | UN | UN | UN | UN | UN | UN | UN |
| Shrub | 1.0-3.0 | A | A | A | UN | UN | UN | UN | UN | UN | UN |
| Shrub | >3.0 | A | A | A | UN | UN | UN | UN | UN | UN | UN |
| Tree | 0-5 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | 5-10 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| 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 100 Mid Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| CARA4 | *Carex ramenskii* | Ramensk's sedge | Upper |
| CASU8 | *Carex subspathacea* | Hoppner's sedge | Upper |
| CALY3 | *Carex lyngbyei* | Lyngbye's sedge | Upper |
| DUFI | *Dupontia fisheri* | Fisher's tundragrass | Upper |

Description

This class represents the Tidal Salt and Brackish Marsh system.

*Maximum Tree Size Class*  
None

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Mid1:ALL | 0 | Mid1: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** |

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