16370

Western North American Boreal Wet Meadow

BpS Model/Description Version: Nov. 2024

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

Reviewer: Lindsey Flagstad, Robin Innes

Vegetation Type

Herbaceous

Map Zones

68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 80

Geographic Range

The Biophysical Setting (BpS) is found in alpine and subalpine areas in the boreal and boreal transition regions of AK.

Biophysical Site Description

This BpS includes seasonally flooded habitats in the alpine and subalpine zones. Sites are often associated with pond and lake margins or streams and may include floodplains; standing water is usually present. Wet meadows may develop in alpine basins and floodplains where surface water pools, especially after snow melt, along lake and pond margins where fluctuating water levels cause inundation, and along headwater and upper perennial streams where spring flows and precipitation events cause exceedances of bankfull width. Soils develop on alluvium and are typically shallow and well-drained (NatureServe 2008).

Vegetation Description

Wet meadows support a mix of forbs and graminoids with species composition dependent on the frequency of flooding and the ability of the site to retain surface water. The wettest sites with organic soils and slow moving to standing water support aquatic vegetation such as *Hippuris vulgaris, Ranunculus gmelini, R. hyperboreus,* and *R. trichophyllus*. Aquatic vegetation generally succeeds to marsh and fen communities with species such as *Menyanthes trifoliata, Comarum palustre, Caltha palustris, Carex aquatilis,* and *Equisetum fluviatile*. Areas of late-lying snow in the alpine may include *Tricophorum caespitosum, Oxyria digina, Koenigia islandica, Saxifraga rivularis, Cardamine bellidifolia, Poa arctica, Carex lachenalia,* and *Claytonia sarmentosa*. Subalpine wet meadows typically support a rich assemblage of forbs including *Caltha leptosepala*, *Viola epipsila*, *Saxifraga nelsoniana,* *Chamerion latifolium, Mertensia paniculata*, *Valeriana sitchensis, Veratrum viride,* *Prenanthes frigida,* and *Carex macrochaeta.* With increasing successional stage, riparian willows such as *Salix alaxensis* and *S. pulchra* may establish. As these meadows become more mesic,the contributions of *Lupinus nootkatensis or L. arcticus, Erigereron peregrinus, Sangusorbia canadensis, Heracleum maximum* and the fern *Athyrium filix-femina* may increase, with *Chamerion latifolium* replaced by *C. angustifolium*.

Regardless of successional stage, woody species contribute less than 25% cover, mosses may be present but are not dominant and lichens are typically absent.

Later seral stages of wet meadow development may include Sedge-Dwarf-Shrub Bogs and Low Shrub Peatland. Common species may include *Sphagnum* spp*., Eriophorum angustifolium, Oxycoccus microcarpus, Andromeda polifolia, Myrica gale* and *Betula nana*.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| SAAL | *Salix alaxensis* | Feltleaf willow |
| SALIX | *Salix pulchra* | Willow |
| CHLA13 | *Chamerion latifolium* | Dwarf fireweed |
| METR3 | *Menyanthes trifoliata* | Buckbean |

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

Disturbance Description

Frequent stream channel migration and associated flooding and fluvial processes constitute the major disturbances in this type (NatureServe 2008). The probability of flooding is assumed to be higher in alpine floodplains compared with lower elevation floodplains because the alpine floodplains tend to have higher gradients and the landscape absorbs less runoff due to steep slopes and typically coarse substrates. The overall return interval for flooding in the alpine floodplain is estimated at about 20yrs, compared with 70-75yrs in the floodplain forest and shrub systems.

In 2015, an extensive search was done by Fire Effects Information System staff to locate information for a synthesis on fire regimes of Alaskan alder and willow shrublands (Innes 2015). At that time, the scientific literature about fire regimes in Alaskan alder and willow shrublands was scarce. Note: this BpS is willow dominated with very little alder.

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

Linear

Adjacency or Identification Concerns

Floodplain systems may occur in the active and inactive part of the riparian zone, but abandoned floodplains are considered part of the adjacent upland. Adjacent systems may include, dwarf shrub/sedge meadows (in the alpine), mesic shrublands, and meadows (in the subalpine).

Issues or Problems

The probability of flooding in the model is a best guess, not based on literature.

Native Uncharacteristic Conditions

Comments

In 2021, changes to the Ecological Systems classification resulted in the Boreal and Aleutian floodplain and wetland systems merging into one system called Western North American Boreal Wet Meadow and Marsh. Kori Blankenship merged the descriptions for Western North American Boreal Shrub and Herbaceous Floodplain Wetland (BpS 16170), Western North American Boreal Alpine Floodplain - Lower Elevations (BpS 16371), and Western North American Boreal Alpine Floodplain - Higher Elevations (16372) into one BpS called Western North American Boreal Wet Meadow and Marsh – Boreal. A separate description and model were developed for the Aleutians. Blankenship used the 16372 model as a starting point to represent this BpS but changed the overall modeled flooding frequency to about 50 years; a compromise between the estimates for lower and upper elevation floodplains (as described in the Disturbance Description section). Blankenship also adjusted the alternative succession probability to reduce the proportion of the dwarf shrub class because this model now represents all elevations.

During LANDFIRE National, the Ecological System Western North American Boreal Alpine Floodplain was split into a Lower Elevations and an Upper Elevations BpS model. The lower elevation model applied in the subalpine zone within the tall shrub zone, and the upper elevations model applied above the elevational limit of tall shrubs. These models were developed based on input from the experts who attended the LANDFIRE Anchorage (Dec. 07) modeling meeting and refined by Tina Boucher and Kori Blankenship for the boreal region of AK (it did not receive review for other parts of the state).

During LANDFIRE National, the model and description for the Western North American Boreal Shrub and Herbaceous Floodplain Wetland was based on input from the experts who attended the LANDFIRE Fairbanks modeling meeting (Nov. 07) and refined by Tina Boucher, Kori Blankenship, and Colleen Ryan. Michelle Schuman reviewed the BpS.

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 | C | C | C | C | C | C | C | C | C | C |
| 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 | 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 22 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| CHLA13 | *Chamerion latifolium* | Dwarf fireweed | Upper |
| LUPIN | *Lupinus* spp. | Lupine | Upper |
| MEPA | *Mertensia paniculata* | Tall bluebells | Upper |
| CREL | *Crepis elegans* | Elegant hawksbeard | Upper |

Description

Although it is not modeled, because LANDFIRE does not map sparsely vegetated areas, this class should be preceded by a sparse/gravel bar phase. This herbaceous class represents early seral vegetation that would come in on gravel bars or other sparsely vegetated areas in the floodplain. Common species include *Chamerion latifolium, Lupinus* spp. (*L. nootkatnesis* in the boreal transition and *L. arcticus* in the core boreal), *Mertensia paniculata, Crepis elegans, Erigeron acris*, and small stature wetland sedges. Vegetation cover is generally open (10-50%) with large areas of exposed alluvium.

The alternate succession pathway represents sites that would not support low or tall shrubs.

*Maximum Tree Size Class*  
None

Class B 42 Late Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| SAAL | *Salix alaxensis* | Feltleaf willow | Upper |
| SAPU15 | *Salix pulchra* | Tealeaf willow | Upper |
| ALVIS | *Alnus viridis* ssp*. sinuata* | Sitka alder | Upper |
| BENA | *Betula nana* | Dwarf birch | Upper |

Description

Willow and alder low and tall shrubs. Common shrub species may include *Salix alaxensis*, other *Salix* spp., *Alnus viridis* ssp. *sinuata,* and *Betula nana*.

This class may persist on some sites or may eventually transition to dwarf shrub.

*Maximum Tree Size Class*  
None

Class C 36 Late Development 2 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| SAPU15 | *Salix pulchra* | Tealeaf willow | Upper |
| SARE2 | *Salix reticulata* | Netleaf willow | Upper |
| DROC | *Dryas octopetala* | Eightpetal mountain-avens | Upper |
| EMNI | *Empetrum nigrum* | Black crowberry | Upper |

Description

On higher elevation alpine flood plains, dwarf shrubs may replace the early seral herbaceous stage. Dominant shrubs may include one or more of the following: *Salix glauca, Salix reticulata, Dryas octopetala.,* or *Empetrum nigrum*. Low willows can still be present, but cover is less than 25%.

*Maximum Tree Size Class*  
None

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Late1:ALL | 14 |
| Late1:ALL | 15 | Late1:ALL | 999 |
| Late2:ALL | 15 | Late2: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 | Late2:ALL | 0.0083 | 120 | Yes | 0 |
| Optional 1 | Early1:ALL | Early1:ALL | 0.05 | 20 | Yes | 0 |
| Alternative Succession | Late1:ALL | Late2:ALL | 0.0083 | 120 | Yes | 0 |
| Optional 1 | Late1:ALL | Early1:ALL | 0.0143 | 70 | Yes | 0 |
| Optional 1 | Late2:ALL | Early1:ALL | 0.0143 | 70 | Yes | 0 |

Optional Disturbances

Optional 1: Flooding

References

Innes, Robin J. 2015. Fire regimes of Alaskan alder and willow shrublands. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Missoula Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/fire\_regimes/AK\_alder\_shrub/all.html [ 2016, August 3].

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