17150

Alaska Arctic Floodplain

BpS Model/Description Version: Nov. 2024

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

Vegetation Type

Forest and Woodland

Map Zones

67, 68, 69, 72

Geographic Range

This Biophysical Setting (BpS) is found on floodplains throughout the Arctic region of AK. It includes all floodplains except those associated with the Yukon and Kuskokwim rivers. In MZ76 this type is found in Nowacki ecoregions 8, 9 and 10.

Biophysical Site Description

This system includes active and inactive glacially- and non-glacially fed floodplains. It is mosaiced with various wetland systems, but these are modeled separately. The rivers are typically braided, and the floodplain terraces may be short-lived (<100yrs) or last for more than a 1000yrs (Boggs et al. 2008). Soils develop on alluvium and are typically shallow and well-drained; barren alluvium is common (Boggs et al. 2008). Permafrost is usually present on the North Slope but may be absent elsewhere.

Vegetation Description

The following information was taken from the draft Arctic Ecological Systems description (Boggs et al. 2008):

Common existing vegetation types include: mesic herbaceous, low-tall willow, Dryas, dwarf shrub, and patches of *Populus balsamifera* or *Betula papyrifera*. Herbaceous species include *Chamerion latifolium* and *Lupinus* spp. Common willows include *Salix alaxensis, Salix richardsonii (= Salix lanata), Salix glauca,* and *Salix pulchra*. *Dryas integrifolia* dominates the Dryas existing vegetation type, but other species may also be common such as *Lupinus* spp., *Cassiope tetragona, Vaccinium uliginosum, Salix* spp., and *Arctostaphylos rubra*. The tall-low willow class may be absent at higher elevations.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| SAAL | *Salix alaxensis* | Feltleaf willow |
| SARI4 | *Salix richardsonii* | Richardson's willow |
| SAGL | *Salix glauca* | Grayleaf willow |
| SAPU15 | *Salix pulchra* | Tealeaf willow |
| DRIN4 | *Dryas integrifolia* | Entireleaf mountain-avens |
| CHLA13 | *Chamerion latifolium* | Dwarf fireweed |
| LUPIN | *Lupinus spp.* | Lupine |
| POBA2 | *Populus balsamifera* | Balsam poplar |

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

Disturbance Description

Floodplain succession begins with herbaceous or shrub species colonizing bare ground after a flood. Dryas or poplar and paper birch patches can eventually develop. Experts at the arctic meeting disagreed about how to treat Dryas for BpS modeling. Some felt that Dryas may take hundreds of years to develop and would therefore be treated as a separate system outside of the floodplain. Others felt that Dryas could develop more quickly and could be modeled as part of floodplain succession. This model takes the later approach.

Frequent river channel migration and associated flooding are the major disturbances affecting this type.

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

Wetlands systems are mosaiced with this system but modeled separately. Floodplains occur adjacent to most other systems that occur in the arctic.

Issues or Problems

This model should also contain a separate early seral bare ground phase, but this is not included because LANDFIRE does not map barren seral stages.

Input from experts at the Arctic Modeling Meeting (April 08) indicated that on the North Slope the low-tall willow stage can persist for 300 years and then might succeed to Dryas/dwarf shrub. A separate model would be required to capture this dynamic. This model contains two later seral endpoints: forest (*Populus balsamifera* or *Betula papyrifera*) or Dryas. In reality some areas will likely succeed to Dryas whereas other sites will succeed to the forested stage. This could be accounted for by creating separate models, but a clear geographic distinction would have to be made for where each model would apply. It is recommended that this be evaluated for future modeling efforts.

Native Uncharacteristic Conditions

Comments

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

This model was based on input from the experts who attended the LANDFIRE Fairbanks Arctic (April 08) modeling meeting and refined by Kori Blankenship and Keith Boggs. Minor edits were made to the description as a result of review comments.

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 | D | D | D | D | D | D | D | D | D | D |
| 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 | C | C | C | C | C | C | C | C | C | C |
| Tree | 5-10 | C | C | C | C | C | C | C | C | C | C |
| Tree | 10-25 | C | C | C | C | C | C | C | C | C | C |
| Tree | 25-50 | C | C | C | C | C | C | C | C | C | C |
| Tree | >50 | C | C | C | C | C | C | C | C | C | C |

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 21 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 |

Description

Herbaceous vegetation colonizes bare ground after a flood.

*Maximum Tree Size Class*  
None

Class B 70 Mid Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| SAAL | *Salix alaxensis* | Feltleaf willow | Upper |
| SARI4 | *Salix richardsonii* | Richardson's willow | Upper |
| SAGL | *Salix glauca* | Grayleaf willow | Upper |
| SAPU15 | *Salix pulchra* | Tealeaf willow | Upper |

Description

Low and tall shrubs gain dominance (succession from Class A) or colonize bare ground after a flood. This stage should start at age 0 but LANDFIRE rules only allow one seral stage to start at age 0; therefore, for modeling purposes it starts at age 1. On colder sites, this class is more likely to succeed to the Dryas stage (Class D). This class may be absent at higher elevations (Boggs et al. 2008).

*Maximum Tree Size Class*  
None

Class C 7 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| POBA2 | *Populus balsamifera* | Balsam poplar | Upper |
| BEPA | *Betula papyrifera* | Paper birch | Upper |

Description

Closed patches of *Populus balsamifera* or *Betula papyrifera* may occur in some areas as a later seral stage within the floodplain but their presence will diminish closer to the coast.

*Maximum Tree Size Class*  
Pole 5–9" (swd)/5–11" (hwd)

Class D 2 Late Development 2 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| DRIN4 | *Dryas integrifolia* | Entireleaf mountain-avens | Upper |
| SALIX | *Salix* spp. | Willow | Upper |
| CATE11 | *Cassiope tetragona* | White arctic mountain heather | Upper |
| VAUL | *Vaccinium uliginosum* | Bog blueberry | Upper |

Description

Dryas dwarf shrubs are a likely late seral stage within the floodplain, especially on sites that are too cold to support trees. Dryas will take longer to develop than the poplar or birch patches (Class C) but the age range on this class is uncertain and probably highly variable.

*Maximum Tree Size Class*  
None

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Mid1:ALL | 5 |
| Mid1:ALL | 1 | Late2:ALL | 99 |
| Late1:CLS | 20 | Late1:CLS | 999 |
| Late2:ALL | 100 | 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** |
| Optional 1 | Early1:ALL | Early1:ALL | 0.05 | 20 | Yes | 0 |
| Alternative Succession | Mid1:ALL | Late1:CLS | 0.001 | 1000 | Yes | 0 |
| Optional 1 | Mid1:ALL | Early1:ALL | 0.05 | 20 | Yes | 0 |
| Optional 1 | Late1:CLS | Early1:ALL | 0.01 | 100 | Yes | 0 |
| Optional 1 | Late2:ALL | Early1:ALL | 0.01 | 100 | Yes | 0 |

Optional Disturbances

Optional 1: Flooding

References

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