16550

Alaskan Pacific Maritime Floodplain Forest and Shrubland

BpS Model/Description Version: Nov. 2024

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

Forest and Woodland

Map Zones

75, 76, 77, 78, 80

Geographic Range

This Biophysical Setting (BpS) is found from Prince William Sound through southeast AK.

Biophysical Site Description

This BpS includes the active and inactive portions of the floodplain of glacially and non-glacially-fed rivers and streams. This system includes large and small channels as well as proximal outwash, but not abandoned floodplains. Glacially-fed rivers occur primarily on the mainland, while non-glacially fed rivers occur on both the mainland and large islands in the Gulf of Alaska.

Glacial outwash occurs near the terminus of the glacier. This is active proximal outwash with high flood frequency and high sediment input. Channels are scoured and braided, and the substrate is well-drained to excessively well-drained gravel or cobble.

Vegetation Description

Vegetation dominance on the floodplain depends on seral stage and frequency of flooding. Low benches are dominated by shrub, seedling, and herbaceous species such as *Alnus viridis* ssp*. sinuata, Salix alaxensis,* other *Salix* spp*., Ribes bracteosum* and *Sambucus racemosa*. Mid bench vegetation features shrub types and early seral forests (*Picea sitchensis, Alnus rubra, Populus balsamifera* ssp*. trichocarpa*). High bench types include mature forests with a more diverse shrub understory (*Picea sitchensis, Tsuga heterophylla, Oplopanax horridus, Rubus spectabilis, Vaccinium ovalifolium, Menziesia ferruginea,* and *Lysichiton americanus* in poorly drained inclusions). Herbaceous species may include *Tiarella trifoliata, Viola glabrescens, Prenanthes alata, Osmorhiza purpurea, Circaea alpina* and *Heracleum lanatum* (Schoen and Dovichin 2007). Extensive wetlands (modeled separately) may develop on the low angle glacially-fed floodplains.

On non-glacially fed streams *Populus balsamifera* ssp*. trichocarpa* is not common as it is on the glacially fed systems. *Alnus rubra* or *Alnus viridis* ssp*. sinuata* may be common in early seral stands of non-glacially fed streams. Salmonberry (*Rubus spectabilis*) is characteristic, and often forms a mosaic with *Vaccinium* spp., with the latter on older, inactive alluvial deposits. *Oplopanax horridus* is also common. Floodplain wetlands (modeled separately) on non-glacially fed streams are common, but small patch compared to those on large, distal outwash plains.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| PISI | *Picea sitchensis* | Sitka spruce |
| TSHE | *Tsuga heterophylla* | Western hemlock |
| POBA2 | *Populus balsamifera ssp. trichocarpa* | Black cottonwood |
| ALRU2 | *Alnus rubra* | Red alder |
| ALVIS | *Alnus viridis ssp. sinuata* | Sitka alder |
| SALIX | *Salix spp.* | Willow |
| OPHO | *Oplopanax horridus* | Devilsclub |
| RUSP | *Rubus spectabilis* | Salmonberry |

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

Disturbance Description

Frequent flooding, shifting channels, and sediment deposition characterize the system. Flooding can be caused by snowmelt, precipitation, ice jams and glacial runoff. Different rivers or portions of rivers may be more prone to certain types of flooding. Frequent flooding and channel migration create a pattern of gravel bars and early successional stages across the valley bottom. Sediment deposition raises the surface of the floodplain over time. As the terrace becomes farther removed from the channel, flooding becomes less frequent and spruce forest can establish. Water availability on terraces plays a major role in community structure and composition. On very active floodplains (e.g. Taku River), conifers have difficult establishing and the hardwood community tends to dominate (Schoen and Dovichin 2007). Water inputs are from overbank flow (flooding), ground water, and precipitation. Deposits with high permeability become progressively drier as they are vertically and horizontally removed from the active channels.

Windthrow can affect the conifer and hardwood/conifer stages of this BpS.

In 2014, an extensive literature search was done by Fire Effects Information System staff to locate information on this and other BpS with black cottonwood for a synthesis on fire regimes of Alaskan black cottonwood communities, with few results (Innes 2014). The literature suggests that fire was likely very rare in this BpS (Innes 2014; Zouhar 2017) and that this BpS can act as a fire break (Innes 2014). Fire frequency in this BpS is likely related to the fire frequency of adjacent BpS (Innes 2014).

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 wetlands are modeled separately from the floodplains.

Issues or Problems

Since glacial and non-glacial floodplain types cannot be mapped confidently as separate systems, they are considered one ecological system. However, vegetation composition and disturbance cycle vary depending on type of input (glacial vs. non-glacial) and proximity to the glacier. Close to the glacier terminus, glacially fed streams likely have a higher frequency of flooding and therefore a greater percentage of the landscape in early seral stages than distal locations or non-glacially fed streams.

Native Uncharacteristic Conditions

Riparian spruce forests have been heavily logged and human-caused fire ignitions may be increasing in parts of south-central and southeastern Alaska, where this BpS occurs (Innes 2014).

Comments

This model was based on input from the experts who attended the LANDFIRE Juneau modeling meeting (Feb. 08), input from Tom DeMeo, and the hypothesized outwash plain and flood plain successional sequences from Boggs 2000, p. 51. Review resulted in minor changes to the model description and the addition of an alternate succession pathway in Class D in the VDDT model. The quantitative change to the model did not change the model results.

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 | C con | C con | C con | C con | C con | C con | E con | E con | E con | E con |
| Tree | 5-10 | C con | C con | C con | C con | C con | C con | E con | E con | E con | E con |
| Tree | 10-25 | C con | C con | C con | C con | C con | C con | E con | E con | E con | E con |
| Tree | 25-50 | C con | C con | C con | C con | C con | C con | E con | E con | E con | E con |
| Tree | >50 | C con | C con | C con | C con | C con | C con | E con | E con | E con | E con |
| Tree | 0-5 | D mix | D mix | D mix | D mix | D mix | D mix | E mix | E mix | E mix | E mix |
| Tree | 5-10 | D mix | D mix | D mix | D mix | D mix | D mix | E mix | E mix | E mix | E mix |
| Tree | 10-25 | D mix | D mix | D mix | D mix | D mix | D mix | E mix | E mix | E mix | E mix |
| Tree | 25-50 | D mix | D mix | D mix | D mix | D mix | D mix | E mix | E mix | E mix | E mix |
| Tree | >50 | D mix | D mix | D mix | D mix | D mix | D mix | E mix | E mix | E mix | E mix |
| Tree | 0-5 | D brdlf | D brdlf | D brdlf | D brdlf | D brdlf | D brdlf | E brdlf | E brdlf | E brdlf | E brdlf |
| Tree | 5-10 | D brdlf | D brdlf | D brdlf | D brdlf | D brdlf | D brdlf | E brdlf | E brdlf | E brdlf | E brdlf |
| Tree | 10-25 | D brdlf | D brdlf | D brdlf | D brdlf | D brdlf | D brdlf | E brdlf | E brdlf | E brdlf | E brdlf |
| Tree | 25-50 | D brdlf | D brdlf | D brdlf | D brdlf | D brdlf | D brdlf | E brdlf | E brdlf | E brdlf | E brdlf |
| Tree | >50 | D brdlf | D brdlf | D brdlf | D brdlf | D brdlf | D brdlf | E brdlf | E brdlf | E brdlf | E brdlf |

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 6 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| TITR | *Tiarella trifoliata* | Threeleaf foamflower | Upper |
| PRAL | *Prenanthes alata* | Western rattlesnakeroot | Upper |
| OSPU | *Osmorhiza purpurea* | Purple sweetroot | Upper |
| CIAL | *Circaea alpina* | Small enchanter's nightshade | Upper |

Description

Floodplain, herbaceous wetlands. These early seral communities colonize new alluvial deposits following flood events. Herbaceous species may include *Tiarella trifoliata, Viola glabrescens, Prenanthes alata, Osmorhiza purpurea, Circaea alpina* and *Heracleum lanatum* (Schoen and Dovichin 2007). Flooding could be more frequent than modeled, especially on glacial streams.

*Maximum Tree Size Class*  
Seedling/Sapling <5"

Class B 17 Early Development 2 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ALVIS | *Alnus viridis* ssp*. sinuata* | Sitka alder | Upper |
| SAAL | *Salix alaxensis* | Feltleaf willow | Upper |
| RIBR | *Ribes bracteosum* | Stink currant | Upper |
| SARA2 | *Sambucus racemosa* | Red elderberry | Upper |

Description

Floodplain, early-seral shrub/sapling. Red alder or cottonwood typically dominate and can sometimes persist for 75-110yrs. Life expectancy of alder depends on if it gets overtopped by spruce because spruce shades out the alder. Other common species may include *Ribes bracteosum* and *Sambucus racemosa*.

The alternate succession pathway represents lack of a hardwood seed source or the possibility that spruce will germinate in large numbers on mineral soil after flooding, resulting in a dense, even-aged stand. Flooding could be more frequent than modeled, especially on glacial streams.

*Maximum Tree Size Class*  
Seedling/Sapling <5"

Class C 9 Mid Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PISI | *Picea sitchensis* | Sitka spruce | Upper |
| ALVIS | *Alnus viridis* ssp*. sinuata* | Sitka alder | Middle |
| SAAL | *Salix alaxensis* | Feltleaf willow | Middle |
| RUSP | *Rubus spectabilis* | Salmonberry | Lower |

Description

Floodplain, mid-seral spruce. Spruce gains canopy dominance over shrubs but overstory remains open.

*Maximum Tree Size Class*  
Med. 9–20" (swd)/11–20" (hwd)

Class D 20 Late Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PISI | *Picea sitchensis* | Sitka spruce | Upper |
| POBA2 | *Populus balsamifera* ssp*. trichocarpa* | Black cottonwood | Upper |
| ALRU2 | *Alnus rubra* | Red alder | Upper |
| ALVIS | *Alnus viridis* ssp*. sinuata* | Sitka alder | Upper |

Description

Floodplain, mid-seral spruce-hardwood. Mixed spruce/cottonwood stands are common on glacial streams whereas spruce/alder tends to be more prevalent on non-glacially fed streams. A reviewer noted that in many of the floodplain spruce forests in the central and northern part of southeast AK this class may persist for well over 200yrs (see the alternate succession pathway below).

The alternate succession pathway represents frequently flooded areas where spruce have difficulty establishing.

*Maximum Tree Size Class*  
Med. 9–20" (swd)/11–20" (hwd)

Class E 48 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PISI | *Picea sitchensis* | Sitka spruce | Upper |
| TSHE | *Tsuga heterophylla* | Western hemlock | Upper |
| OPHO | *Oplopanax horridus* | Devilsclub | Lower |
| RUSP | *Rubus spectabilis* | Salmonberry | Lower |

Description

Floodplain terraces, mature spruce forest. Mature spruce forest develops. Western hemlock eventually co-dominates with spruce (Boggs 2000). These forests tend to be more open than non-riparian forests and therefore support an abundant understory community.

*Maximum Tree Size Class*  
Large 20" – 40"

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Early2:ALL | 5 |
| Early2:ALL | 6 | Late1:OPN | 30 |
| Mid1:ALL | 31 | Late1:CLS | 110 |
| Late1:OPN | 31 | Late1:CLS | 110 |
| Late1:CLS | 111 | Late1:CLS | 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 | Early2:ALL | Mid1:ALL | 0.01 | 100 | Yes | 0 |
| Optional 1 | Early2:ALL | Early1:ALL | 0.033 | 30 | Yes | 0 |
| Optional 1 | Mid1:ALL | Early1:ALL | 0.01 | 100 | Yes | 0 |
| Alternative Succession | Late1:OPN | Late1:OPN | 0.01 | 100 | No | 0 |
| Optional 1 | Late1:OPN | Early1:ALL | 0.01 | 100 | Yes | 0 |
| Optional 1 | Late1:CLS | Early1:ALL | 0.005 | 200 | Yes | 0 |

Optional Disturbances

Optional 1: Flooding

References

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

Comer, P., D. Faber-Langendoen, R. Evans, S. Gawler, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, M. Russo, K. Schulz, K. Snow, J. Teague, and R. White. 2003-present. Ecological systems of the United States: A working classification of U.S. terrestrial systems. NatureServe, Arlington, VA.

DeMeo, T., J. Martin and R.A. West. 1992. Forest plant association management guide, Ketchikan Area, Tongass National Forest. USDA Forest Service, Alaska Region. R10-MB-210. 405p.

Innes, Robin J. 2014. Fire regimes of Alaskan black cottonwood communities. 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\_black\_cottonwood/all.html [2016, August 1].

Mouw,J., J. Stanford and P. Alaback. 2008. Influences of flooding and hyporheic exchange on floodplain plant richness and productivity. River Research and Applications.

Schoen, J.W. and E. Dovichin (editors). 2007. The Coastal Forests and Mountains

Ecoregion of Southeastern Alaska and the Tongass National Forest. Published by The Nature Conservancy and the Audobon Society. Available online at http://conserveonline.org/workspaces/akcfm.

Zouhar, Kristin. 2017. Fire regimes in Alaskan Pacific maritime ecosystems. In: Fire Effects Information System, (Online) U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: https://www.fs.fed.us/database/feis/fire\_regimes/AK\_Pacific\_maritime/all.html [2021, May 20].