16061

Western North American Boreal Dry Aspen-Steppe Bluff - Lower Elevations

BpS Model/Description Version: Nov. 2024

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

Forest and Woodland

Map Zones

70, 71, 73, 74, 75, 76, 77, 78

Model Splits or Lumps

This Biophysical Setting (BpS) is split into multiple models:

Western North American Boreal Dry Aspen-Steppe Bluff was split into a lower elevation and a higher elevation model. The lower elevation model occurs below treeline and trees are present. The higher elevation model generally occurs above treeline although sparse aspen (<10% cover) may be present.

Geographic Range

This BpS is found in AK from the southern slopes of the Brooks Range to southcentral AK and west to the limit of tree growth.

Biophysical Site Description

This BpS occurs commonly on moderately steep to very steep, dry, south-facing slopes and on wind-swept bluffs above major rivers. Soils are typically well-drained to excessively well-drained and develop on glacial, loess, or fluvial deposits or residual material. Soils are often unstable and rocky outcrops are common.

Vegetation Description

This BpS supports a diverse assemblage of species. *Populus tremuloides* is the dominant tree species. *Picea glauca* may be present, especially as time since fire increases. Understory species may include *Rosa acicularis, Juniperus communis, Artemisia alaskana, Artemisia frigida, Shepherdia canadensis, Calamagrostis purpurascens, Pulsatilla patens* ssp. *multifida (P. nuttalliana), Pseudoroegneria spicata, Elymus trachycaulus, Galium boreale*, and many different kinds of mustards such as *Boechera* spp. Some species such as *Rosa acicularis* and *Juniperus communis* are uncommon in the western reaches of the forest land where it abuts the maritime climate around Norton Sound.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| POTR5 | *Populus tremuloides* | Quaking aspen |
| PIGL | *Picea glauca* | White spruce |
| ROAC | *Rosa acicularis* | Prickly rose |
| JUCO6 | *Juniperus communis* | Common juniper |
| ARAL5 | *Artemisia alaskana* | Alaska wormwood |
| CAPU | *Calamagrostis purpurascens* | Purple reedgrass |
| PSSP6 | *Pseudoroegneria spicata* | Bluebunch wheatgrass |
| ARFR4 | *Artemisia frigida* | Prairie sagewort |
| PUPAM | *Pulsatilla patens ssp. multifida* | cutleaf anemone |

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

Disturbance Description

Fire and insects are the dominant disturbance factors influencing this vegetation type.

This BpS is located on dry sites that can easily burn given an ignition source, but fire spread is limited by fuel availability. Because this BpS often occurs on steep slopes, fire can remove vegetation and lead to post-fire erosion. White Spruce (*Picea glauca*), which can be present in later seral stages, tends to take longer to regenerate after fire than aspen which quickly resprouts. As a result, fire tends to favor aspen, but spruce will eventually come back in (Viereck et al. 1992).

Large aspen tortrix (*Choristoneura conflictana*) is an aspen defoliator which can have a severe effect on mature and overmature aspen stands. Although aspen tortrix would have been present under the reference condition, its presence and affect have increased in fire suppressed areas today. Other disturbance agents include aspen leaf miners (*Phyllocinistis populiella*) and ground rot.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 301 | 66 |  |  |
| Moderate (Mixed) | 576 | 34 |  |  |
| Low (Surface) |  |  |  |  |
| All Fires | 198 | 100 |  |  |

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

Large patch

Adjacency or Identification Concerns

Issues or Problems

Need more information on the fire return intervals for this type.

Native Uncharacteristic Conditions

Comments

4/2022 – The fire frequency of this system was adjusted based on feedback from experts who attended the Boreal Forest BpS Review Work Session in February 2022. At that session, participants ranked the boreal forest BpS by relative fire frequency. Based on that ranking it was estimated that this BpS would have a mean fire return interval of approximately 200 years, but some participants thought that fire could be more frequent than this.

This model was based on input from the experts who attended the LANDFIRE Fairbanks (Nov. 07) and Anchorage modeling meetings (Dec. 08) and refined by Mitch Michaud and Michelle Schuman.

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 | A | A | A | A | A | A | A |
| Shrub | 0.5-1.0 | A | A | A | A | A | A | A | A | A | A |
| Shrub | 1.0-3.0 | A | A | A | A | A | A | A | A | A | A |
| Shrub | >3.0 | A | A | A | A | A | A | A | A | A | A |
| Tree | 0-5 | B | B | B | B | B | B | B | B | B | B |
| Tree | 5-10 | C brdlf | C brdlf | C brdlf | C brdlf | C brdlf | C brdlf | C brdlf | C brdlf | C brdlf | C brdlf |
| Tree | 10-25 | C brdlf | C brdlf | C brdlf | C brdlf | C brdlf | C brdlf | C brdlf | C brdlf | C brdlf | C brdlf |
| Tree | 25-50 | C brdlf | C brdlf | C brdlf | C brdlf | C brdlf | C brdlf | C brdlf | C brdlf | C brdlf | C brdlf |
| Tree | >50 | C brdlf | C brdlf | C brdlf | C brdlf | C brdlf | C brdlf | C brdlf | C brdlf | C brdlf | C brdlf |
| Tree | 5-10 | D mix | D mix | D mix | D mix | D mix | D mix | D mix | D mix | D mix | D mix |
| Tree | 10-25 | D mix | D mix | D mix | D mix | D mix | D mix | D mix | D mix | D mix | D mix |
| Tree | 25-50 | D mix | D mix | D mix | D mix | D mix | D mix | D mix | D mix | D mix | D mix |
| Tree | >50 | D mix | D mix | D mix | D mix | D mix | D mix | D mix | D mix | D mix | D mix |
| Tree | 5-10 | D con | D con | D con | D con | D con | D con | D con | D con | D con | D con |
| Tree | 10-25 | D con | D con | D con | D con | D con | D con | D con | D con | D con | D con |
| Tree | 25-50 | D con | D con | D con | D con | D con | D con | D con | D con | D con | D con |
| Tree | >50 | D con | D con | D con | D con | D con | D con | D con | D con | D con | D con |

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 2 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| CAPU | *Calamagrostis purpurascens* | Purple reedgrass | Upper |
| PSSP6 | *Pseudoroegneria spicata* | Bluebunch wheatgrass | Upper |
| ARFR4 | *Artemisia frigida* | Prairie sagewort | Upper |
| JUCO6 | *Juniperus communis* | Common juniper | Upper |

Description

This stage is characterized by dry herbaceous and low shrub vegetation coming in after a major disturbance. Common shrub species include *Vaccinium vitis-idaea, Rosa acicularis, Shepherdia canadensis* and *Chamerion angustifolium* (Boggs and Sturdy, 2005). Very dry sites on bluffs typically have steppe vegetation including *Juniperus communis, Arctostaphylos uva-ursi, Artemisia frigida, A. alaskana, Calamagrostis purpurascens, Pseudoroegneria spicata* (= *Agropyron spicatum*), *Festuca altaica* and *Poa* spp. (Viereck et al. 1992, Chapin et al. 2006 p.89). In the Nulato Hills area common species include rusty woodsia (*Woodsia ilvensis*) fireweed (*Chamerion angustifolium*), dwarf fireweed (*Epilobium latifolia*), and various *Poa* and *Festuca* spp. Bare ground due to post fire erosion is possible.

This stage was modeled with a duration of two years. This represents a typical post-fire scenario where aspen quickly resprout and overtop the shrubs in 1-2yrs. It is possible that this stage may last much longer. For example, some sites severely affected by the tortrix moth (*Choristoneura conflictana*) can become heavily dominated by *Calamagrostis canadensis* which can impede aspen regeneration, possibly for up to 10yrs, and increase the ability of the site to carry fire.

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

Class B 10 Mid Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| POTR5 | *Populus tremuloides* | Quaking aspen | Upper |
| ROAC | *Rosa acicularis* | Prickly rose | Mid-Upper |
| JUCO6 | *Juniperus communis* | Common juniper | Mid-Upper |
| ARAL5 | *Artemisia alaskana* | Alaska wormwood | Mid-Upper |

Description

This stage is characterized by suckering *Populus tremuloides* and low shrubs. *Populus tremuloides* tends to overtop the shrub and herbaceous vegetation. The shrubs and herbaceous species listed in Class A are still present.

For mapping purposes this class was defined as a state where trees are less than three meters tall. The age range at which *Populus tremuloids* exceeds three meters in height varies based on site conditions and can often happen in less than 10yrs. Heavy ungulate browsing will delay growth.

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

Class C 70 Late Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| POTR5 | *Populus tremuloides* | Quaking aspen | Upper |
| ROAC | *Rosa acicularis* | Prickly rose | Lower |
| JUCO6 | *Juniperus communis* | Common juniper | Lower |
| ARAL5 | *Artemisia alaskana* | Alaska wormwood | Lower |

Description

This stage is characterized by mature and eventually over-mature *Populus tremuloides. Populus tremuloides* dominates the site but *Picea glauca* may be present in the mid or understory. The shrubs and herbaceous species listed in Class A may still be present.

Experts who provided input at the LANDFIRE Fairbanks (Nov. 07) and Anchorage modeling meetings (Dec. 08) described a mature and an over-mature aspen sere. Both concepts are incorporated into this stage because it was felt that LANDFIRE mapping teams would not be able to distinguish them as separate units.

This class can persist in the absence of disturbance or follow an alternate succession pathway which represents sites where *Picea glauca* is present in the overstory.

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

Class D 18 Late Development 2 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| POTR5 | *Populus tremuloides* | Quaking aspen | Upper |
| PIGL | *Picea glauca* | White spruce | Upper |
| ROAC | *Rosa acicularis* | Prickly rose | Lower |
| JUCO6 | *Juniperus communis* | Common juniper | Lower |

Description

This stage is characterized by mature *Populus tremuloides* mixed with *Picea glauca*. *Populus tremuloides* typically decline between 60 and 100yrs of age allowing spruce to become more dominant on some sites (Viereck et al. 1992). Aspen are generally even aged initiating from a disturbance event while spruce tend to be uneven aged and come into the stand gradually over time (Viereck et al.1992). Canopy cover can range from woodland to closed but stands tend to open up overtime. The shrubs and herbaceous species listed in Class A may still be present.

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

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Mid1:ALL | 2 |
| Mid1:ALL | 3 | Late1:OPN | 9 |
| Late1:OPN | 10 | Late1:OPN | 999 |
| Late2:ALL | 60 | 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** |
| Replacement Fire | Early1:ALL | Early1:ALL | 0.0033 | 303 | Yes | 0 |
| Replacement Fire | Mid1:ALL | Early1:ALL | 0.0033 | 303 | Yes | 0 |
| Alternative Succession | Late1:OPN | Late2:ALL | 0.004 | 250 | Yes | 0 |
| Mixed Fire | Late1:OPN | Late1:OPN | 0.002 | 500 | No | 0 |
| Replacement Fire | Late1:OPN | Early1:ALL | 0.0033 | 303 | Yes | 0 |
| Insects or Disease | Late1:OPN | Early1:ALL | 0.0125 | 80 | Yes | 0 |
| Mixed Fire | Late2:ALL | Late2:ALL | 0.002 | 500 | No | 0 |
| Replacement Fire | Late2:ALL | Early1:ALL | 0.0033 | 303 | Yes | 0 |
| Insects or Disease | Late2:ALL | Early1:ALL | 0.0125 | 80 | Yes | 0 |

References

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