16050

Western North American Boreal Mesic Birch-Aspen Forest

BpS Model/Description Version: Nov. 2024

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

Forest and Woodland

Map Zones

67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 80

Geographic Range

Found throughout boreal AK. In MZ76 this type is found in Nowacki ecoregions 8, 9 and 10.

Biophysical Site Description

This Biophysical Setting (BpS) occurs on rolling hills, mountain sideslopes, and escarpments on west, east, and south aspects up to 750 m. Soils are well-drained and develop on residual material or re-transported deposits including glacial till, loess, and colluvium. Hardwood-dominated sites often persist on slopes that are warmer and drier than white spruce or mixed white spruce hardwood sites, with aspen dominating the driest, warmest sites (Viereck et al. 1992, Chapin et al. 2006).

Vegetation Description

Canopy cover is dominated by *Betula neoalaskana* or *Populus tremuloides* and typically ranges from 25-90%. *Populus balsamifera* may be a common associate. *Picea glauca* can also be present and is more likely in the western reaches of the Alaska forest. Stands are often closed-canopied with an open shrub or herbaceous understory. Common understory species include *Alnus* spp., *Ledum* spp., *Vaccinium vitis-idaea, Betula nana, Rosa acicularis, Viburnum edule*, and *Equisetum* spp.. *Spiraea stevenii* and *Cornus suecica* become more common near the maritime climatic zone. *Shepherdia canadensis* is common on drier sites, especially well-drained riparian gravel bars. Feathermosses such as *Hylocomium splendens* and *Pleurozium schreberi* are common in the ground layer (Jorgenson et al. 1999; Boggs and Sturdy, 2005).

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| BENE4 | *Betula neoalaskana* | Alaska paper birch |
| POTR5 | *Populus tremuloides* | Quaking aspen |
| POBA2 | *Populus balsamifera* | Balsam poplar |
| ROAC | *Rosa acicularis* | Prickly rose |
| VIED | *Viburnum edule* | Squashberry |
| SHCA | *Shepherdia canadensis* | Russet buffaloberry |
| ALNUS | *Alnus spp.* | Alder |
| LEDUM | *Ledum spp.* | Labrador tea |

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

Disturbance Description

As of 2014 there were no fire history studies specifically on this BpS type and information on proportions of low-, moderate-, and high-severity fire was lacking in the literature (Fryer 2014). The literature reports fire return intervals (FRI) ranging from 40 (Mann & Plug 1999) to 200+ (Fastie et al. 2010) years in upland mixed birch-aspen-spruce stands.

This BpS often acts as a firebreak. It is estimated that the mean fire return interval (MFRI) is longer than that of white and black spruce sites and maybe comparable to Boreal White Spruce-Hardwood Forest system.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 249 | 64 |  |  |
| Moderate (Mixed) | 444 | 36 |  |  |
| Low (Surface) |  |  |  |  |
| All Fires | 160 | 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

This system can be easily confused with seral stages of two other ecological systems in boreal AK: Western North American Boreal White Spruce-Hardwood Forest and Western North American Boreal White Spruce Forest. Adjacent systems include Boreal White Spruce-Hardwood, Boreal White Spruce Forest or Boreal Mesic Black Spruce Forest.

Issues or Problems

There is uncertainty about whether Boreal Mesic Birch-Aspen Forest is a separate BpS from Boreal White Spruce-Hardwood Forest and Boreal White Spruce Forest. This system may occur only where spruce seed sources are lacking.

Native Uncharacteristic Conditions

Recent ongoing leaf miner activity has been observed in birch and aspen, but no long-term information on its impact is available.

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 150 years.

More information on this and similar vegetation types can be found in the Fire Effects Information System Synthesis: [Fire regimes of Alaskan quaking aspen and balsam poplar communities](https://www.fs.fed.us/database/feis/fire_regimes/AK_aspen_balsam_poplar/all.html) (Fryer 2014). The synthesis notes that “LANDFIRE's placement of boreal mesic paper birch-quaking aspen forest in Fire Regime Group IV (35-200 year frequency, stand-replacement) is based on expert opinion. This placement may need to be reconsidered if studies show low-severity fire is important in paper birch-quaking aspen stands.”

This system was created for the AK Boreal region and did not receive review for other regions in the state during LANDFIRE National. This model was based on input from the experts who attended the LANDFIRE Fairbanks modeling meeting (Nov. 07) and refined by Michelle Schuman, Mitch Michaud and Kori Blankenship with input from Tina Boucher. Boreal Mesic Birch-Aspen Forest is treated as a separate BpS within the Boreal region because experts felt it could be distinguished as occupying different biophysical settings from the Boreal White Spruce Forest and Boreal White Spruce - Hardwood Forest systems. In contrast, the Boreal Mesic Birch-Aspen Forest system was lumped with the Sub-boreal White Spruce-Hardwood Forest system within the Sub-boreal region because experts there felt that they could not distinguish the biophysical settings that these types occur on.

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

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** |
| CHAN9 | *Chamerion angustifolium* | Fireweed | Upper |
| CACA4 | *Calamagrostis canadensis* | Bluejoint | None |
| EQUIS | *Equisetum* spp. | Horsetail | None |
| MEPA | *Mertensia paniculata* | Tall bluebells | None |

Description

Herbaceous species dominate, including *Chamerion angustifolium* ssp*. angustifolium, Calamagrostis canadensis, Equisetum sylvaticum, E. arvense, Mertensia paniculata* and *Geocaulon lividum*. Shrubs are present but not dominant. Following fire, aspen resprouts and birch appears to invade by seed (Viereck and Schandelmeier 1980)

*Maximum Tree Size Class*  
None

Class B 4 Early Development 2 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ROAC | *Rosa acicularis* | Prickly rose | Upper |
| VIED | *Viburnum edule* | Squashberry | Upper |
| LEDUM | *Ledum* spp. | Labrador tea | Upper |
| ALNUS | *Alnus* spp. | Alder | Upper |

Description

Shrubs gain dominance over the herbs. Hardwood seedlings are present. Common shrubs include *Alnus spp., Ledum* spp.*, Vaccinium vitis-idaea, Betula nana, Rosa acicularis, Shepherdia canadensis* and *Viburnum edule*.

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

Class C 12 Mid Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| BENE4 | *Betula neoalaskana* | Alaska paper birch | Upper |
| POTR5 | *Populus tremuloides* | Quaking aspen | Upper |
| ROAC | *Rosa acicularis* | Prickly rose | Lower |
| VIED | *Viburnum edule* | Squashberry | Lower |

Description

Hardwoods gain dominance over shrubs. This class is characterized by dense stands of sapling and pole sized trees. *Betula neoalaskana* or *Populus tremuloides* typically dominate but *P. balsamifera* may be a common associate. Common understory species include *Alnus* spp., *Ledum* spp., *Vaccinium vitis-idaea, Betula nana, Rosa acicularis, Shepherdia canadensis*, and *Viburnum edule*. This stage tends to be more flammable than the others (personal communication, Joan Foote).

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

Class D 15 Mid Development 2 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| BENE4 | *Betula neoalaskana* | Alaska paper birch | Upper |
| POTR5 | *Populus tremuloides* | Quaking aspen | Upper |
| ROAC | *Rosa acicularis* | Prickly rose | Lower |
| VIED | *Viburnum edule* | Squashberry | Lower |

Description

This stand is characterized by mature hardwood trees with more dead and downed fuels. *Betula neoalaskana* or *Populus tremuloides* typically dominate but *P. balsamifera* may be a common associate. Common understory species include *Ledum* spp., *Vaccinium vitis-idaea, Betula nana, Rosa acicularis, Shepherdia canadensis*, and *Viburnum edule*. Feathermosses such as *Hylocomium splendens* and *Pleurozium schreberi* are common in the ground layer (Boggs and Sturdy, 2005).

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

Class E 67 Late Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| BENE4 | *Betula neoalaskana* | Alaska paper birch | Upper |
| POTR5 | *Populus tremuloides* | Quaking aspen | Upper |
| ALNUS | *Alnus* spp. | Alder | Lower |
| LEDUM | *Ledum* spp. | Labrador tea | Lower |

Description

Late seral stands are characterized by large hardwood trees. This class captures the old, open birch-calamagrostis stands. A mixed-age stand can develop as aspen clones resprout when individual trees die. *Betula neoalaskana* or *Populus tremuloides* typically dominate but *P. balsamifera* may be a common associate. Spruce may be present in the canopy, and in the absence of fire, could potentially occupy the site. Common understory species include *Alnus* spp*., Ledum* spp*., Vaccinium vitis-idaea, Betula nana, Rosa acicularis, Shepherdia canadensis*, and *Viburnum edule*. Feathermosses such as *Hylocomium splendens* and *Pleurozium schreberi* are common in the ground layer (Boggs and Sturdy 2005).

*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 | Early2:ALL | 4 |
| Early2:ALL | 5 | Mid1:CLS | 14 |
| Mid1:CLS | 15 | Mid2:CLS | 49 |
| Mid2:CLS | 50 | Late1:OPN | 99 |
| Late1:OPN | 100 | Late1:OPN | 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 | 0.004 | 250 | Yes | 0 |
| Replacement Fire | Early2:ALL | Early1:ALL | 0.004 | 250 | Yes | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.004 | 250 | Yes | 0 |
| Replacement Fire | Mid2:CLS | Early1:ALL | 0.004 | 250 | Yes | 0 |
| Mixed Fire | Late1:OPN | Late1:OPN | 0.0033 | 303 | No | 0 |
| Replacement Fire | Late1:OPN | Early1:ALL | 0.004 | 250 | Yes | 0 |

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