16050

Western North American Boreal Mesic Birch-Aspen Forest

Model Date: 04/16/08 Report Date: 9/11/15

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

Forest and Woodland

Map Zones

68, 69, 70, 71, 72, 73, 74, 76

Geographic Range

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

Biophysical Site Description

This system occurs on rolling hills and mountain sideslopes on west, east, and south aspects up to 750 m (NatureServe 2008). Soils are well-drained and develop on residual material or retransported deposits including glacial till, loess, and colluvium (NatureServe 2008). 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 papyrifera or Populus tremuloides and typically ranges from 25-90%. P. balsamifera may be a common associate. 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. (NatureServe 2008). 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** |
| BEPA | Betula papyrifera | 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 | Alder |
| LEDUM | Ledum | Labrador tea |

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 FRI ranging from 40 (Mann & Plug 1999) to 200+ (Fastie et al. 2010) years in upland mixed birch-aspen-spruce stands.

The system often acts as a firebreak. It is estimated that the 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** | **Min FI** | **Max FI** | **Percent of All Fires** |
| Replacement | 190 |  |  | 73 |
| Moderate (Mixed) | 503 |  |  | 27 |
| Low (Surface) |  |  |  |  |
| **All Fires** | **138** |  |  | **100** |

Scale Description

Large patch

Non-Fire Disturbances

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

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.

**Model Parameters**

*Using Track Changes in Word you may suggest changes to any of the parameters indicated in the following tables. If you wish to see how those changes impact model results, go to the “Simulation Model Review Instructions” section on* <http://www.landfirereview.org/models.html>*. If you do not wish to edit and run the actual model, the TNC LANDFIRE will do so and if requested provide the reviewer with the results.*

**Deterministic Transitions**

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Early2:ALL | 4 |
| Early2:ALL | 5 | Mid1:CLS | 14 |
| Late1:OPN | 100 | Late1:OPN | 999 |
| Mid1:CLS | 15 | Mid2:CLS | 49 |
| Mid2:CLS | 50 | Late1:OPN | 99 |

**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** |
| ReplacementFire | Early1:ALL | Early1:ALL | 0.0050 | 200 | No | 0 |
| ReplacementFire | Early2:ALL | Early1:ALL | 0.0050 | 200 | Yes | 0 |
| ReplacementFire | Late1:OPN | Early1:ALL | 0.0050 | 200 | Yes | 0 |
| MixedFire | Late1:OPN | Late1:OPN | 0.0033 | 303 | No | 0 |
| ReplacementFire | Mid1:CLS | Early1:ALL | 0.0067 | 149 | Yes | 0 |
| ReplacementFire | Mid2:CLS | Early1:ALL | 0.0050 | 200 | Yes | 0 |

Succession Classes

Class A 5 Early Development 1 - All Structures

Structural Information

Tree Size Class: None

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| CHAN9 | Chamerion angustifolium | Fireweed | Upper |
| CACA4 | Calamagrostis canadensis | Bluejoint | None |
| EQUIS | Equisetum | 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)

Class B 5 Early Development 2 - All Structures

Structural Information

Tree Size Class: Seedling/Sapling <5"

Indicator Species

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

Class C 15 Mid Development 1 - Closed

Structural Information

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

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| BEPA | Betula papyrifera | 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 papyrifera 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).

Class D 15 Mid Development 2 - Closed

Structural Information

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

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| BEPA | Betula papyrifera | 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 papyrifera 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).

Class E 60 Late Development 1 - Open

Structural Information

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

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| BEPA | Betula papyrifera | Paper birch | Upper |
| POTR5 | Populus tremuloides | Quaking aspen | Upper |
| ALNUS | Alnus | Alder | Lower |
| LEDUM | Ledum | 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 papyrifera 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).

References

Boggs, K. and Sturdy, M. 2005. Plant associations and post-fire vegetation succession in Yukon-Charley Rivers National Preserve. Alaska Natural Heritage Program, Environment and Natural Resources Institute, University of Alaska Anchorage. Prepared For: National Park Service, Landcover Mapping Program, National Park Service-Alaska Support Office, Anchorage, Alaska 99501.

Chapin, F. S., Oswood, M. W., Van Cleve, K., Viereck, L. A., Verblya, D. L. (eds.) 2006. Alaska’s Changing Boreal Forest. Oxford University Press, NY. 354 p.

Fastie, Christopher L.; Lloyd, Andrea H.; Doak, Patricia. 2002. Fire history and postfire forest development in an upland watershed of interior Alaska. Journal of Geophysical Research. 107 (D1): 8150.DOI:10.1029/2001JD000570.

Fryer, Janet L. 2014. Fire regimes of Alaskan quaking aspen and balsam poplar 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_aspen_balsam_poplar/all.html>

Jorgenson, M. T., J. E. Roth, M. Raynolds, M. D. Smith, W. Lentz, A. Zusi-Cobb, and C. H. Racine. 1999. An ecological land survey for Fort Wainwright, Alaska. U.S. Army Cold Regions Research and Engineering Laboratory, Hanover, NH. U.S. Army Cold Regions Research Engineering Laboratory, Hanover, NH CRREL Report 99-9. 83 pp.

Mann, Daniel H.; Plug, Lawrence J. 1999. Vegetation and soil development at an upland taiga site, Alaska. Ecoscience. 6(2): 272-285.

NatureServe. 2008. International Ecological Classification Standard: Terrestrial Ecological Classifications. Draft Ecological Systems Description for Alaska Boreal and Sub-boreal Regions.

Viereck, L.A. and L.A. Schandelmeier. 1980. Effects of fire in Alaska and adjacent Canada: a literature review. USDI BLM. GLM-Alaska Technical Report 6. Alaska State Office. Anchorage, AK.

Viereck, L.A., Dyrness, C.T., Batten, A.R., Wenzlick, K.J. 1992. The Alaska vegetation classification. Pacific Northwest Research Station, USDA Forest Service, Portland, OR. Gen. Tech. Rep. PNW-GTR286. 278 p.