

**13010**

## **Boreal Aspen-Birch Forest**

BpS Model/Description Version: Aug. 2020

Update: 3/18

| <b>Modelers</b> |                 | <b>Reviewers</b> |  |
|-----------------|-----------------|------------------|--|
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|                 |                 |                  |  |
|                 |                 |                  |  |

### **Vegetation Type**

Forest and Woodland

### **Map Zones**

40

### **Geographic Range**

The sub-boreal aspen birch forest described here is documented throughout northern and northeastern Minnesota. It is found in ECOMAP sections (Cleland et al. 2007) 212M and 212L and subsection 212Nd (Aaseng et al. 2003).

In map zones (MZs) 50 and 51, the aspen and birch component of this system is considered seral to other upland Biophysical Setting (BpS) units, including 1302, 1362, 1366, and 1407. The conifer component of this system is also indicative of lowland systems such as 1481.

### **Biophysical Site Description**

This type occurs on a variety of soil types within its range. It is common on scoured bedrock terrain, stagnation moraines and till plains, and outwash plains (Aaseng et al. 2003). Within bedrock terrain it occurs on deeper soils 36-40in (Ohmann and Ream 1971).

### **Vegetation Description**

Major deciduous species are trembling and bigtooth aspen, paper birch and red maple. Trembling aspen is often the most abundant species in early successional stages while bigtooth aspen, paper birch and red maple are common minor associates. Species considered late successional such as balsam fir, northern white-cedar, and black and white spruce are usually present though not abundant during the early successional stages. By the later successional stage stands consist mainly of balsam fir with lesser components of aspen, birch, spruce and sometimes cedar. Historically, white and red pine were more common on the landscape prior to significant logging events in the late 1800's and early 1900's, and substantial areas were converted to this vegetation type. Isolated red and jack pine are likely remnants of previously logged sites and may indicate a pine BpS (1362-1 or 1362-2) rather than this type.

Shrub cover is often dense especially on rich sites, with beaked hazel being the most abundant tall shrub followed by mountain maple, round-leaf dogwood (*Cornus rugosa*) and green alder. Low shrubs are not always abundant and consist of bush honeysuckle, blueberry and dewberry. Depending on shading and site physiography the ground layer varies in abundance and diversity. Moist and more-open sites are more abundant, containing numerous herbs. Large-leafed aster is

normally most abundant with wild sarsaparilla, bluebead-lily, star flower (*Trientalis borealis*), twisted stalk, lily-of-the-valley, ground pine (*Lycopodium dendroideum*) and club moss (*Lycopodium* spp.). As conditions become drier and more nutrient-poor, blueberry, bracken fern, veiny pea (*Latyrus venous*) and bunchberry become common. In later successional stands the herb layer becomes sparse, though still having many of the same species, and coverage of Dicranium and Schreber's mosses increases (Heinselman 1996, Ohmann and Ream 1971).

### BpS Dominant and Indicator Species

| Symbol | Scientific Name            | Common Name               |
|--------|----------------------------|---------------------------|
| POTR5  | <i>Populus tremuloides</i> | Quaking aspen             |
| BEPA   | <i>Betula papyrifera</i>   | Paper birch               |
| ABBA   | <i>Abies balsamea</i>      | Balsam fir                |
| ACRU   | <i>Acer rubrum</i>         | Red maple                 |
| DILO   | <i>Diervilla lonicera</i>  | Northern bush honeysuckle |

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

### Disturbance Description

The natural fire regime is one of stand replacement fires every 70-110yrs (Frelich 2002). Beginning with an aspen-birch early successional stage, spruce and fir present in the stand will increase in abundance over time. After 70-80yrs, the overstory aspen and birch trees begin to break apart due to insects, disease and windthrow. The conifers are usually well established in the understory at this point and will soon assume dominance in the overstory. The stand becomes more susceptible to fire and spruce budworm attacks as conifers increase in abundance. Periodic outbreaks of spruce budworm will kill much of the conifer overstory increasing the susceptibility to fire even more. It is only a matter of time before the stand burns. The post fire stand composition typically retains the composition of the former parent stand however with a greatly shifted dominance. Assume birch, aspen and maple are still relatively abundant in the pre-fire stand, the post-fire stand will consist of a dense thicket of birch, aspen and maple sprouts with scattered spruce, fir and pine. The abundance of the latter species depends greatly on the availability of nearby seed sources typically in unburned patches.

### Fire Frequency

| Severity         | Avg FI | Percent of All Fires | Min FI | Max FI |
|------------------|--------|----------------------|--------|--------|
| Replacement      | 82     | 100                  |        |        |
| Moderate (Mixed) |        |                      |        |        |
| Low (Surface)    |        |                      |        |        |
| All Fires        | 82     | 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

Historical fire size ranged from small acreages (<1,000ac) to extremely large events (>100,000ac or 40,000ha) (Heinselman 1978).

### Adjacency or Identification Concerns

This type encompasses a variety of communities described by other authors (Frelich 2002, Hop et al. 2001, Heinselman 1996, Ohmann and Ream 1971), namely, aspen-birch, aspen-birch-boreal conifer, birch-fir, maple-aspen-birch, spruce-fir-aspen and spruce-fir-birch-cedar. Each of these can be considered a different successional stage of the same community with some

variation. This type is commonly referred to as mixedwood in Canada and refers to all successional stages.

## Issues or Problems

## Native Uncharacteristic Conditions

## 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      | 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        | A                | A          | A          | A          | A          | A          | A          | A          | A          | A          |
| Tree                 | 5-10       | A                | A          | A          | A          | A          | A          | A          | A          | A          | A          |
| Tree                 | 10-25      | B<br>brdlf       | B<br>brdlf | B<br>brdlf | B<br>brdlf | B<br>brdlf | B<br>brdlf | B<br>brdlf | B<br>brdlf | B<br>brdlf | B<br>brdlf |
| Tree                 | 10-25      | C mix            | C mix      | C mix      | C mix      | C mix      | C mix      | C mix      | C mix      | C mix      | C mix      |
| 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      | B<br>brdlf       | B<br>brdlf | B<br>brdlf | B<br>brdlf | B<br>brdlf | B<br>brdlf | B<br>brdlf | B<br>brdlf | B<br>brdlf | B<br>brdlf |
| Tree                 | 25-50      | C mix            | C mix      | C mix      | C mix      | C mix      | C mix      | C mix      | C mix      | C mix      | C mix      |
| 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        | C mix            | C mix      | C mix      | C mix      | C mix      | C mix      | C mix      | C mix      | C mix      | C mix      |
| Tree                 | >50        | D con            | D con      | D con      | D con      | D con      | D con      | D con      | D con      | D con      | D con      |
| Tree                 | >50        | B<br>brdlf       | B<br>brdlf | B<br>brdlf | B<br>brdlf | B<br>brdlf | B<br>brdlf | B<br>brdlf | B<br>brdlf | B<br>brdlf | B<br>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

|                |           |                                             |
|----------------|-----------|---------------------------------------------|
| <b>Class A</b> | <b>33</b> | <b>Early Development 1 - All Structures</b> |
|----------------|-----------|---------------------------------------------|

### Indicator Species



replacement fire is possible. These species begin to fill gaps in the canopy. Upper and middle canopies are apparent. Spruce budworm outbreaks are possible.

Maximum Tree Size Class

Medium 9-21"DBH

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**Class D                      21                                              Late Development 2 - Closed**

Indicator Species

| Symbol | Scientific Name | Common Name        | Canopy Position |
|--------|-----------------|--------------------|-----------------|
| ABBA   | Abies balsamea  | Balsam fir         | Upper           |
| PIGL   | Picea glauca    | White spruce       | Upper           |
| PIMA   | Picea mariana   | Black spruce       | Middle          |
| PIST   | Pinus strobus   | Eastern white pine | Upper           |

Description

The overstory of aspen and birch breaks up due to windthrow and disease. The gaps are quickly filled with spruce, fir, cedar and birch, which dominate the canopy. Cedar and black spruce are common in the mid to upper canopy. Occasional red and white pine are present as super canopy trees. Other indicators: white cedar and *Betula papyrifera* could still be present at the beginning of the class, but by the end, the original cohort of aspen and birch are all but gone. This class should be distinguished from C by species/Existing Vegetation Type.

Maximum Tree Size Class

Medium 9-21"DBH

**Model Parameters**

**Deterministic Transitions**

| From Class | Begins at (yr) | Succeeds to | After (years) |
|------------|----------------|-------------|---------------|
| Early1:ALL | 0              | Mid1:CLS    | 30            |
| Mid1:CLS   | 31             | Late1:CLS   | 70            |
| Late1:CLS  | 71             | Late2:CLS   | 110           |
| Late2:CLS  | 111            | Late2: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 |
|--------------------|-----------------------|---------------------|-------------------------|-----------------------|-----------------------------------------------------|------------------------------|
| Replacement Fire   | Early1:ALL            | Early1:ALL          | 0.009                   | 111                   | Yes                                                 | 0                            |
| Replacement Fire   | Mid1:CLS              | Early1:ALL          | 0.013                   | 77                    | Yes                                                 | 0                            |
| Replacement Fire   | Late1:CLS             | Early1:ALL          | 0.013                   | 77                    | Yes                                                 | 0                            |
| Insects or Disease | Late1:CLS             | Late1:CLS           | 0.03                    | 33                    | No                                                  | 0                            |

|                       |           |            |       |    |     |   |
|-----------------------|-----------|------------|-------|----|-----|---|
| Replacement<br>Fire   | Late2:CLS | Early1:ALL | 0.015 | 67 | Yes | 0 |
| Insects or<br>Disease | Late2:CLS | Late2:CLS  | 0.03  | 33 | No  | 0 |

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