Ecological Site Description ID:	F236XY116AK—Boreal Forest Loamy Slopes, Wet

Ecological Dynamics of the Site:

This boreal ecological site is in linear to convex areas of upland plains. The site is typically 3 to 961 feet above sea level with slopes of 4 to 16 percent. Slope aspect does not appear to influence the plant community dynamics of this site because it is on all aspects.

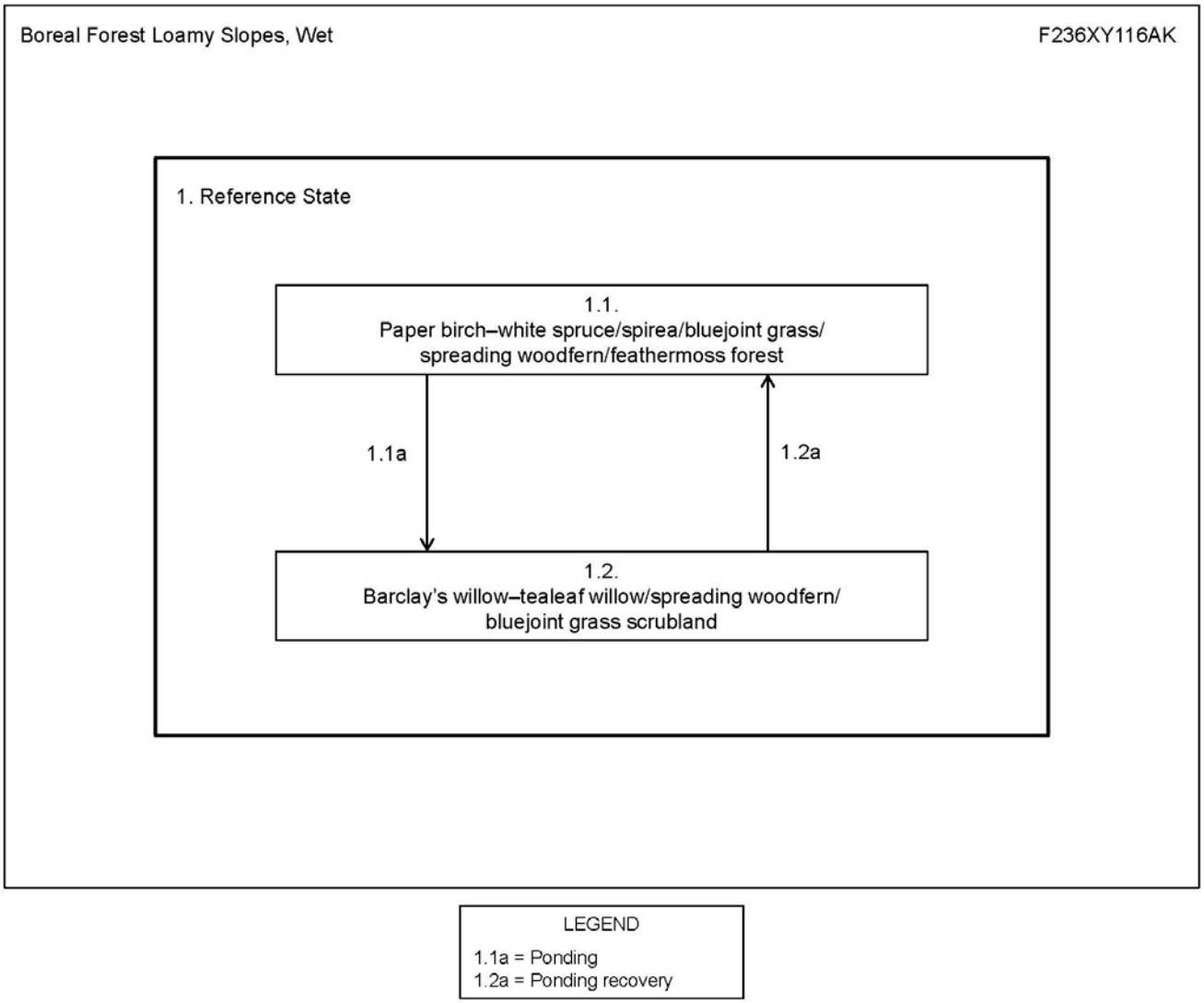
This ecological site is correlated to D-36 Boreal woodland loamy eolian slopes, wet, and Muklung soils. Soil characteristics that are likely to influence plant community dynamics include the cryic soil temperature regime, udic moisture regime with slow or very slow soil permeability to a depth of 40 inches, and strongly acidic to extremely acidic (pH 5.2 to 4.2) first mineral horizon. The organic material content is commonly 15 to 25 percent in the surface layer. The annual precipitation is 24 to 55 inches, and the annual frost-free period is 85 to 140 days. The parent material is usually organic material over coarse-silty volcanic ash over coarse-silty loess.

The reference community phase is typified by mixed paper birch (*Betula papyrifera*) and white spruce (*Picea glauca*) forest with an understory of spreading woodfern (*Dryopteris expansa*), bluejoint grass (*Calamagrostis canadensis*), and diverse shrubs. Ecological site F236XY117AK (Boreal Forest Loamy Slopes, Very Wet) is in linear to concave areas of drainageways on boreal upland plains, whereas this site (F236XY116AK) is in non-concave positions. These sites differ in soil permeability, soil moisture subclass, surface layer pH, drainage class, and runoff potential. These differences and the resulting dissimilarities in disturbance regimes, reference states, and community phases, make use of separate ecological sites necessary.

Ponding is the major documented disturbance regime for this ecological site, and it is considered a natural event that is typically unmanaged. This disturbance regime results in two distinct community phases. The soils are moderately well drained and have a low to medium runoff potential, They are susceptible to brief, occasional periods of ponding in April through October. A water table is at a depth of 20 to 37 inches year round, and it may be at a depth of 17 inches for two weeks in June. The available background information suggests that ponding commonly inhibits access of oxygen by susceptible plants (Hook and Crawford, 1978; Jackson and others, 1991). The hypoxic or anoxic condition that may result is a major abiotic stress that helps to determine the presence or absence of vascular plants (Vartapetian and Jackson, 1996). The period of ponding that affects plants varies, as temporal tolerance of plants to oxygen deprivation differs among species and may range from many hours to several weeks (Vartapetian and Jackson, 1996). Flooding does not occur on this ecological site. Ponding is dependent on precipitation, runoff, seepage, and snowmelt; therefore, its effects depend on yearly and monthly variations in rainfall, snowmelt, and seepage.

Slight to moderate browsing by moose on willow is possible on this site, but it does not appear to affect the ecological processes significantly enough to alter the communities.

State and Transition Diagram:



State ID Number:	1	State Name:	Reference State
State Narrative:	The reference state supports two community phases, grouped by structure and dominance of the vegetation (e.g., trees and shrubs) and their ecological function and stability. The reference community phase is represented by mixed forest with a commonly dense understory of shrubs, graminoids, and forbs. The presence of the communities is temporally dictated by the ponding regime associated with the site. No alternative states have been observed. This report provides baseline vegetation inventory data for this site. Future data collection is needed to provide further information about existing plant communities and the disturbance regimes that would result in transitions from one community to another.		

Phase 1.1			
Community Phase Number:	1.1	Community Phase Name:	Paper birch-white spruce/spirea/bluejoint grass/spreading woodfern/feathermoss forest
Community Phase Narrative:			
The reference community phase for this ecological site is characterized by mixed forest with a commonly open understory of shrubs, graminoids, and forbs. Annual plant production is visually estimated to be higher among trees than in any of the other groups. Typically, the overstory consists of paper birch (*Betula papyrifera*) and white spruce (*Picea glauca*) and the understory consists of one or more of the following species—willow (*Salix spp.*), strawberryleaf raspberry (*Rubus pedatus*), spirea (*Spiraea stevenii*), bluejoint grass (*Calamagrostis canadensis*), spreading woodfern (*Dryopteris expansa*), and woodland horsetail (*Equisetum sylvaticum*). Other plants may include Lapland cornel (*Cornus suecica*), twinflower (*Linnaea borealis*), variegated sedge (*Carex stylosa*), sidebells wintergreen (*Orthilia secunda*), stiff clubmoss (*Lycopodium annotinum*), and others. Mosses, including feathermosses (*Ptilium crista-castrensis, Hylocomium splendens,* and *Pleurozium schreberi*), sphagnum mosses (*Sphagnum spp.*), and polytrichum mosses (*Polytrichum spp.*), generally make up a large percentage of the ground cover (total mean cover ~61 percent). Lichens (~1 percent) are a minor vegetative component. Other ground cover commonly includes herbaceous litter (~46 percent) and woody litter (~8 percent).			

Community Phase Canopy Cover

(Vegetation data in the table are provided as constancy (percent) and average canopy cover (percent) of the most dominant and ecologically relevant species for this community phase.)

Plant group	Common name	Scientific name	USDA plant code	Constancy (percent)	Average canopy cover (percent)
T	White spruce	*Picea glauca*	PIGL	200.0*	16.9^
T	Paper birch	*Betula papyrifera*	BEPA	175.0*	22.1^
S	Spirea	*Spiraea stevenii*	SPST3	96.4	9.1
S	Lingonberry	*Vaccinium vitis-idaea*	VAVI	89.3	4.2
S	Lapland cornel	*Cornus suecica*	COSU4	89.3	4.0
G	Bluejoint grass	*Calamagrostis canadensis*	CACA4	89.3	15.5
F	Spreading woodfern	*Dryopteris expansa*	DREX2	92.9	21.6
F	Woodland horsetail	*Equisetum sylvaticum*	EQSY	82.1	3.1
M	Feathermosses	Includes 3 genera		76.0, 76.0, 80.0#	16.0, 19.1, 9.3

* Trees may be present in multiple strata within one plot; therefore, it is possible for species of this plant group to have a constancy value of more than 100 percent.

^ Tall, medium, and stunted individuals are counted as canopy trees. Regenerative individuals are not included.

Feathermosses are represented by three species—*Hylocomium splendens, Pleurozium schreberi,* and *Ptilium crista-castrensis*, respectively.

Community Pathways	
Pathway Number	Pathway Name & Description
1.1a	Ponding. It is likely that ponding of the reference community phase will drown many of the species. Many plants in the reference community phase are not typically hydrophilic varieties, suggesting that the hypoxic or anoxic condition can drown these species. Affected areas will likely remain wet due to ponding, allowing for colonization by water-tolerant shrub, forb, and graminoid pioneer species. Resilient specimens extant in the reference community phase may persist during periods of ponding and then reproduce. Ponding events *in situ* occur occasionally for brief periods in April through October. The frequency and duration of ponding appears to be the disturbance regime necessary to cause a community transition from the reference community phase to the early ponding phase (1.2), though the transitional timeframe has not been confirmed in the field.

Phase 1.2			
Community Phase Number:	1.2	Community Phase Name:	Barclay's willow-tealeaf willow/spreading woodfern/ bluejoint grass scrubland
Community Phase Narrative:			
This early ponding community phase is characterized by dense scrubland with shade-tolerant species in the understory. Annual plant production is visually estimated to be highest among shrubs, though areas of dense graminoids or forbs are highly productive. Total plant production is hypothesized to be less than that of the reference community phase due to a lack of trees, but in areas of very dense shrubs the opposite might be true. Typically, this community supports dense thickets of shrubs, including Barclay's willow (*Salix barclayi*) and tealeaf willow (*S. pulchra*). Commonly, beneath these shrubs are bluegrass grass (*Calamagrostis canadensis*), spreading woodfern (*Dryopteris expansa*), and horsetails (*Equisetum spp.*). Other species include Sitka alder (*Alnus viridis ssp. sinuata*), spirea (*Spiraea stevenii*), dwarf birch (*Betula nana*), claspleaf twistedstalk (*Streptopus amplexifolius*), and others. Resilient individual white spruce (*Picea glauca*) and paper birch (*Betula papyrifera*) trees may be in this post-ponding community. Mosses (total mean cover ~36 percent) and lichens (~6 percent) are typically present. Other ground cover commonly includes herbaceous litter (~63 percent) and woody litter (~2 percent).			

Community Phase Canopy Cover

(Vegetation data in the table are provided as constancy (percent) and average canopy cover (percent) of the most dominant and ecologically relevant species for this community phase.

Plant group	Common name	Scientific name	USDA plant code	Constancy (percent)	Average canopy cover (percent)
S	Barclay's willow	*Salix barclayi*	SABA3	83.3	29.0
S	Tealeaf willow	*Salix pulchra*	SAPU15	83.3	20.8
G	Bluejoint grass	*Calamagrostis canadensis*	CACA4	83.3	16.6
F	Spreading woodfern	*Dryopteris expansa*	DREX2	66.7	23.5
F	Field horsetail	*Equisetum arvense*	EQAR	50.0	4.3

Community Pathways

Pathway Number	Pathway Name & Description
1.2a	Natural succession: Normal time and growth without disruptive ponding. It is probable that as time passes, tree species can colonize, eventually creating a shaded understory. This, combined with drier soils, can cause hydrophilic shrub populations to decrease and allow shade-tolerant forbs, graminoids, and smaller shrubs to increase in abundance and richness. The time needed for this to occur is unknown, but it is likely to depend on several factors, including reproduction and growth rate of trees and soil moisture levels.

Bibliography

Hook, D., and R.M.M. Crawford. 1978. Plant life in anaerobic environments. Ann Arbor Science Publishers, Inc.

Jackson M.B., D.D. Davies, and H. Lambers, editors. 1991**.** Plant life under oxygen deprivation: Ecology, physiology, and biochemistry. The Hague: SPB Academic.

Vartapetian, Boris B., and Michael B. Jackson. 1996. Plant adaptations to anaerobic stress. Annals of Botany. Volume 79 (Supplement A): 3-20.

This report is interim and subject to change.