

Appendix H

Vegetation and Wetlands

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1.0 ECOLOGICAL LAND CLASSES

Vegetation communities in the terrestrial local study area (TLSA) are classified into ecological land classes (ELC). ELC include ecosite phases (Beckingham and Archibald 1996) for the Boreal Mixedwood Ecological Area (applicable to the Central Mixedwood Natural Subregion of Alberta; Natural Regions Committee 2006) and other mapped ecological, open water and disturbance units (Volume 2, Table 11.4-2).

Ecosite phases are spatially mapped ecological units that are relatively uniform in terms of biophysical characteristics. They are developed by identifying ecosites and dominant vegetation for each mapped unit. Ecosites are functional units that develop under specific environmental conditions reflecting the local climate, moisture and nutrient regime of each mapped site. Upland ecosite phases (typically aspen, pine and spruce forests) are characterized by xeric to subhygric moisture regimes with well drained to imperfectly drained soils and poor to rich nutrient levels. Wetland ecosite phases (typically treed, shrubby or graminoid fens, marshes and bogs) are characterized by subhydric to hydric (saturated) soils and very poor to rich nutrient levels.

The non-ecosite phase units include anthropogenic classes (forestry harvesting areas, industrial sites, development), natural disturbance/sparsely vegetated classes (regenerating burns, flooded lands), swamps, riparian habitat and open water classes (rivers, lakes).

ELC are described below including site, terrain, soil, and vegetation characteristics. Characteristic vegetation species were defined as species in detailed plots with a frequency of occurrence greater than 25% (i.e., occurring in more than 1/4 of sampled plots) and a mean cover of 1% or greater. The data are presented in tables following ELC descriptions. These species are the typical vegetation species in each ELC and may be used to help determine the species that should be present following successful reclamation.

A total of 90 detailed plots were sampled in the TLSA. Additional data were obtained from baseline surveys on the Pike and Jackfish leases:

- 2002 surveys (166 detailed plots);
- 2005 surveys (38 detailed plots);
- 2010 surveys (123 detailed plots);
- 2011 surveys (34 detailed plots);
- 2012 surveys (92 detailed plots);
- 2014 surveys (9 detailed plots);
- 2015 surveys (17 detailed plots); and
- 2016 surveys (14 detailed plots).

1.1 a1: Lichen Jack Pine

This ELC occurs on sand hills (stabilized dunes), ridge tops and terrain with coarse rocky substrates. Soil parent material is predominantly aeolian, glaciofluvial, or fluvial in origin. Rapidly drained, coarse-textured soils are common and are typically classed as Brunisols. The moisture regime is xeric to submesic with a very poor to medium nutrient regime. Jack pine (*Pinus banksiana*) and small amounts of white spruce (*Picea glauca*) are the characteristic tree species (Table H-1). Shrub species include common blueberry (*Vaccinium myrtilloides*), common bearberry (*Arctostaphylos uva-ursi*), and bog cranberry (*Vaccinium vitis-idaea*). Bunchberry (*Cornus canadensis*) is a typical forb, while Schreber's moss (*Pleurozium schreberi*) and reindeer lichens (*Cladonia* spp.) cover much of the forest floor.

Table H-1: Characteristic Species in Ecological Land Class a1 (n=27)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Picea glauca</i>	White spruce	44	2
	<i>Pinus banksiana</i>	Jack pine	100	30
Shrub	<i>Arctostaphylos uva-ursi</i>	Common bearberry	93	4
	<i>Rhododendron groenlandicum</i>	Common Labrador tea	48	4
	<i>Rosa acicularis</i>	Prickly rose	74	3
	<i>Vaccinium myrtilloides</i>	Common blueberry	100	12
	<i>Vaccinium vitis-idaea</i>	Bog cranberry	96	7
Forb	<i>Cornus canadensis</i>	Bunchberry	70	3
Moss	<i>Pleurozium schreberi</i>	Schreber's moss	78	14
Lichen	<i>Cladonia mitis</i>	Reindeer lichen	89	25
	<i>Cladonia rangiferina</i>	Reindeer lichen	41	14
	<i>Cladonia stellaris</i>	Star-tipped reindeer lichen	63	2

1.2 b1: Blueberry – Jack Pine/Aspen

This ELC occurs in subxeric to mesic areas with poor to medium nutrient regimes. Soil drainage is rapid to moderate due to coarse-textured soils. This ELC is found in upper slope, crest, level and mid slope topographic positions at all aspects. Soil types are predominantly Brunisols with some Gray Luvisols, and are formed from glaciofluvial, aeolian, morainal, or fluvial parent material. This ELC is composed of an equal mixture of Jack pine and aspen (*Populus tremuloides*) in the canopy with minor components of white birch (*Betula papyrifera*) and white spruce (Table H-2). Green alder (*Alnus viridis* ssp. *crispa*) forms the tall shrub layer while the diverse low shrub layer can include common blueberry and common Labrador tea (*Rhododendron groenlandicum*). Schreber's moss dominates the ground layer with bunchberry.

Table H-2: Characteristic Species in Ecological Land Class b1 (n=24)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Betula papyrifera</i>	White birch	46	2
	<i>Picea glauca</i>	White spruce	46	7
	<i>Picea mariana</i>	Black spruce	25	3
	<i>Pinus banksiana</i>	Jack pine	100	38
	<i>Populus tremuloides</i>	Aspen	96	25
Shrub	<i>Alnus viridis ssp. crispa</i>	American green alder	33	6
	<i>Arctostaphylos uva-ursi</i>	Common bearberry	38	1
	<i>Linnaea borealis</i>	Twinflower	96	3
	<i>Rhododendron groenlandicum</i>	Common Labrador tea	83	11
	<i>Rosa acicularis</i>	Prickly rose	67	3
	<i>Vaccinium myrtilloides</i>	Common blueberry	100	8
	<i>Vaccinium vitis-idaea</i>	Bog cranberry	100	6
	<i>Viburnum edule</i>	Low-bush cranberry	46	3
Forb	<i>Chamerion angustifolium</i>	Common fireweed	83	2
	<i>Cornus canadensis</i>	Bunchberry	92	8
	<i>Trientalis borealis</i>	Northern starflower	58	2
Moss	<i>Hylocomium splendens</i>	Stair-step moss	50	4
	<i>Pleurozium schreberi</i>	Schreber's moss	83	33
	<i>Ptilium crista-castrensis</i>	Knight's plume moss	67	5
Lichen	<i>Cladonia mitis</i>	Reindeer lichen	38	2

1.3 b2: Blueberry – Aspen/White Birch

The moisture regime for this ELC ranges from subxeric to submesic and the nutrient regime ranges from poor to rich. Soil drainage varies from well to rapid. This ELC is found on terrain ranging from level to upper slope and crest positions. Soils consist mostly of Brunisols and some Gray Luvisols. Soil parent material underlying this ELC is predominantly glaciofluvial and occasionally aeolian. The tree canopy of this ELC is typically dominated by aspen with scattered white birch and white spruce (Table H-3). Low shrubs include common Labrador tea, prickly rose (*Rosa acicularis*) and common blueberry. The sparse ground cover is dominated by bunchberry, common fireweed (*Chamerion angustifolium*) and wild sarsaparilla (*Aralia nudicaulis*).

Table H-3: Characteristic Species in Ecological Land Class b2 (n=8)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Betula papyrifera</i>	White birch	75	14
	<i>Picea glauca</i>	White spruce	50	3
	<i>Pinus banksiana</i>	Jack pine	25	1
	<i>Populus tremuloides</i>	Aspen	100	58
Shrub	<i>Alnus viridis ssp. crispa</i>	American green alder	25	3
	<i>Linnaea borealis</i>	Twinflower	100	3
	<i>Rhododendron groenlandicum</i>	Common Labrador tea	63	15
	<i>Rosa acicularis</i>	Prickly rose	88	6
	<i>Salix scouleriana</i>	Scouler's willow	25	3
	<i>Salix spp.</i>	Willows	38	2
	<i>Vaccinium myrtilloides</i>	Common blueberry	100	13
	<i>Vaccinium vitis-idaea</i>	Bog cranberry	100	4
	<i>Viburnum edule</i>	Low-bush cranberry	75	2
Forb	<i>Aralia nudicaulis</i>	Wild sarsaparilla	38	4
	<i>Chamerion angustifolium</i>	Common fireweed	88	5
	<i>Cornus canadensis</i>	Bunchberry	100	23
	<i>Lathyrus ochroleucus</i>	Cream-colored vetchling	75	2
	<i>Maianthemum canadense</i>	Wild lily-of-the-valley	88	3
	<i>Orthilia secunda</i>	One-sided wintergreen	88	1
	<i>Petasites frigidus var. palmatus</i>	Palmate-leaved coltsfoot	50	2
	<i>Pyrola asarifolia</i>	Common pink wintergreen	38	1
	<i>Trientalis borealis</i>	Northern starflower	88	2
Ferns & Fern Allies	<i>Diphasiastrum complanatum</i>	Ground-cedar	25	1
	<i>Lycopodium annotinum</i>	Stiff club-moss	63	2
Graminoid	<i>Leymus innovatus</i>	Hairy wild rye	50	1
Moss	<i>Hylocomium splendens</i>	Stair-step moss	75	1
	<i>Pleurozium schreberi</i>	Schreber's moss	50	1

1.4 b3: Blueberry – Aspen/White Spruce

The blueberry aspen/white spruce ELC occurs on slightly wetter sites with moisture regimes ranging from subxeric to mesic. The nutrient regime varies from poor to medium. Topographic position typically ranges from mid-slope to crest; however, this ELC can also be found on level topography. Soils are typically classed as Brunisols and Gray Luvisols. Aspen with white spruce dominates the tree canopy of this ELC. The shrub layer is composed of common Labrador tea, common blueberry and low-bush cranberry (*Viburnum edule*). Schreber's moss, knight's-plume (*Ptilium crista-castrensis*) and bunchberry dominate the ground layer (Table H-4).

Table H-4: Characteristic Species in Ecological Land Class b3 (n=14)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Betula papyrifera</i>	White birch	36	2
	<i>Picea glauca</i>	White spruce	71	21
	<i>Picea mariana</i>	Black spruce	43	10
	<i>Pinus banksiana</i>	Jack pine	57	3
	<i>Populus tremuloides</i>	Aspen	100	44
Shrub	<i>Alnus viridis ssp. crispa</i>	American green alder	29	4
	<i>Linnaea borealis</i>	Twinflower	86	2
	<i>Lonicera involucrata</i>	Bracted honeysuckle	29	2
	<i>Rhododendron groenlandicum</i>	Common Labrador tea	71	11
	<i>Rosa acicularis</i>	Prickly rose	64	3
	<i>Salix bebbiana</i>	Beaked willow	29	2
	<i>Vaccinium myrtilloides</i>	Common blueberry	100	11
	<i>Vaccinium vitis-idaea</i>	Bog cranberry	93	4
Forb	<i>Viburnum edule</i>	Low-bush cranberry	64	4
	<i>Aralia nudicaulis</i>	Wild sarsaparilla	57	3
	<i>Chamerion angustifolium</i>	Common fireweed	79	1
Ferns & Fern Allies	<i>Cornus canadensis</i>	Bunchberry	100	10
	<i>Lycopodium annotinum</i>	Stiff club-moss	79	4
Moss	<i>Hylocomium splendens</i>	Stair-step moss	50	2
	<i>Pleurozium schreberi</i>	Schreber's moss	79	27
	<i>Ptilium crista-castrensis</i>	Knight's plume moss	57	6

1.5 b4: Blueberry – White Spruce/Jack Pine

This ELC occurs on sites with moisture regimes ranging from xeric to mesic and nutrient regimes varying from poor to medium. Topographic positions are the same as b3 (typically mid-slope to crest and sometimes level topography). Soil is well to very rapidly drained. Soils are classed typically as Brunisols with some Gray Luvisols. White spruce and jack pine dominate the tree canopy of this ELC with associated aspen and white birch (Table H-5). The tall shrub layer is composed of scattered green alder and the diverse low shrub layer is composed of common Labrador tea and common blueberry. Schreber's moss dominates the ground cover.

Table H-5: Characteristic Species in Ecological Land Class b4 (n=9)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Betula papyrifera</i>	White birch	44	4
	<i>Picea glauca</i>	White spruce	78	34
	<i>Picea mariana</i>	Black spruce	33	6
	<i>Pinus banksiana</i>	Jack pine	89	23
	<i>Populus tremuloides</i>	Aspen	78	10
Shrub	<i>Alnus viridis ssp. crispa</i>	American green alder	44	5
	<i>Arctostaphylos uva-ursi</i>	Common bearberry	56	1
	<i>Rhododendron groenlandicum</i>	Common Labrador tea	100	30
	<i>Rosa acicularis</i>	Prickly rose	67	5
	<i>Vaccinium myrtilloides</i>	Common blueberry	100	9
	<i>Vaccinium vitis-idaea</i>	Bog cranberry	100	2
	<i>Viburnum edule</i>	Low-bush cranberry	33	3
Forb	<i>Chamerion angustifolium</i>	Common fireweed	44	1
	<i>Cornus canadensis</i>	Bunchberry	100	3
	<i>Trientalis borealis</i>	Northern starflower	67	1
Moss	<i>Hylocomium splendens</i>	Stair-step moss	67	3
	<i>Pleurozium schreberi</i>	Schreber's moss	100	49
	<i>Ptilium crista-castrensis</i>	Knight's plume moss	78	4
Lichen	<i>Cladonia mitis</i>	Reindeer lichen	56	3
	<i>Cladonia rangiferina</i>	Reindeer lichen	56	7
	<i>Usnea</i> spp.	Old man's beard lichens	33	15

1.6 c1: Labrador Tea – Mesic Jack Pine/Black Spruce

This ELC ranges from subxeric to subhygric with mostly nutrient poor soil conditions. Topographic positions include level, midslope, upper slope and crest facing all aspects. Soils are predominantly Brunisols and Gray Luvisols. Soil parent material is morainal and glaciofluvial. The tree canopy of this ELC is composed of jack pine and black spruce (*Picea mariana*) (Table H-6). Low shrubs include common Labrador tea and common blueberry. Schreber's moss with knight's plume moss, stair-step moss (*Hylocomium splendens*) and reindeer lichens dominate the ground cover.

Table H-6: Characteristic Species in Ecological Land Class c1 (n=50)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Picea mariana</i>	Black spruce	92	23
	<i>Pinus banksiana</i>	Jack pine	100	34
	<i>Populus tremuloides</i>	Aspen	40	1
Shrub	<i>Linnaea borealis</i>	Twinflower	68	1
	<i>Rhododendron groenlandicum</i>	Common Labrador tea	92	15
	<i>Rosa acicularis</i>	Prickly rose	76	3
	<i>Vaccinium myrtilloides</i>	Common blueberry	94	12
	<i>Vaccinium vitis-idaea</i>	Bog cranberry	92	4
Forb	<i>Cornus canadensis</i>	Bunchberry	88	3
Moss	<i>Hylocomium splendens</i>	Stair-step moss	60	5
	<i>Pleurozium schreberi</i>	Schreber's moss	94	48
	<i>Ptilium crista-castrensis</i>	Knight's plume moss	62	4
Lichen	<i>Cladonia mitis</i>	Reindeer lichen	54	8
	<i>Cladonia rangiferina</i>	Reindeer lichen	46	7
	<i>Cladonia stellaris</i>	Star-tipped reindeer lichen	60	1

1.7 d1: Low-bush Cranberry – Aspen

The moisture regime of this ELC ranges from submesic to subhygric and the nutrient regime ranges from medium to rich. Topography includes level, midslope, upper slope, and crest with all aspects except westerly. Soils are mainly Gray Luvisols that develop on morainal, glaciolacustrine or glaciofluvial parent materials. This ELC has a canopy dominated by aspen with a minor component of white spruce and white birch (Table H-7). Green alder forms an open tall shrub layer with prickly rose, dewberry (*Rubus pubescens*) and low-bush cranberry in the low shrub layer. The diverse ground layer is characterized by wild sarsaparilla, bunchberry, common fireweed and tall lungwort (*Mertensia paniculata*). Schreber's moss and stiff club-moss are also common.

Table H-7: Characteristic Species in Ecological Land Class d1 (n=31)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Betula papyrifera</i>	White birch	29	5
	<i>Picea glauca</i>	White spruce	65	7
	<i>Populus tremuloides</i>	Aspen	94	58
Shrub	<i>Alnus viridis ssp. crispa</i>	American green alder	52	11
	<i>Linnaea borealis</i>	Twinflower	94	4
	<i>Rhododendron groenlandicum</i>	Common Labrador tea	52	2
	<i>Rosa acicularis</i>	Prickly rose	100	16
	<i>Rubus idaeus</i>	Wild red raspberry	39	5
	<i>Rubus pubescens</i>	Dewberry	87	5
	<i>Salix spp.</i>	Willows	29	1
	<i>Vaccinium myrtilloides</i>	Common blueberry	65	2
	<i>Vaccinium vitis-idaea</i>	Bog cranberry	42	1
	<i>Viburnum edule</i>	Low-bush cranberry	94	22
Forb	<i>Aralia nudicaulis</i>	Wild sarsaparilla	94	15
	<i>Chamerion angustifolium</i>	Common fireweed	94	5
	<i>Cornus canadensis</i>	Bunchberry	100	9
	<i>Lathyrus ochroleucus</i>	Cream-colored vetchling	77	1
	<i>Maianthemum canadense</i>	Wild lily-of-the-valley	81	1
	<i>Mertensia paniculata</i>	Tall lungwort	77	2
	<i>Pyrola asarifolia</i>	Common pink wintergreen	87	2
	<i>Trientalis borealis</i>	Northern starflower	81	1
Ferns and Fern Allies	<i>Lycopodium annotinum</i>	Stiff club-moss	71	4
Graminoid	<i>Calamagrostis canadensis</i>	Bluejoint	74	4
Moss	<i>Hylocomium splendens</i>	Stair-step moss	45	2
	<i>Pleurozium schreberi</i>	Schreber's moss	65	2

1.8 d2: Low-bush Cranberry – Aspen/White Spruce

This ELC ranges from submesic to subhygric moisture regimes and poor to rich (typically medium) nutrient regimes. Soils are typically Gray Luvisols and Eluviated Eutric Brunisols. Topography includes level, sloped, and crest positions at all aspects. Parent materials are morainal, glaciofluvial, glaciolacustrine, glaciofluvial/morainal or lacustrine. Aspen and white spruce dominate the tree canopy of this ELC with associated white birch (Table H-8). The tall shrub layer is composed of green alder, with prickly rose and low-bush cranberry characterizing the low shrub layer. The ground layer is dominated by Schreber's moss, knight's-plume moss with wild sarsaparilla and bunchberry.

Table H-8: Characteristic Species in Ecological Land Class d2 (n=25)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Betula papyrifera</i>	White birch	64	8
	<i>Picea glauca</i>	White spruce	100	41
	<i>Populus balsamifera</i>	Balsam poplar	28	4
	<i>Populus tremuloides</i>	Aspen	100	48
Shrub	<i>Alnus viridis ssp. crispa</i>	American green alder	60	11
	<i>Linnaea borealis</i>	Twinflower	96	3
	<i>Lonicera dioica</i>	Twining honeysuckle	28	1
	<i>Lonicera involucrata</i>	Bracted honeysuckle	40	2
	<i>Rhododendron groenlandicum</i>	Common Labrador tea	44	5
	<i>Ribes triste</i>	Wild red currant	32	1
	<i>Rosa acicularis</i>	Prickly rose	96	11
	<i>Rubus idaeus</i>	Wild red raspberry	36	3
	<i>Rubus pubescens</i>	Dewberry	92	5
	<i>Vaccinium myrtilloides</i>	Common blueberry	44	3
	<i>Vaccinium vitis-idaea</i>	Bog cranberry	64	1
	<i>Viburnum edule</i>	Low-bush cranberry	84	19
Forb	<i>Aralia nudicaulis</i>	Wild sarsaparilla	88	11
	<i>Chamerion angustifolium</i>	Common fireweed	68	2
	<i>Cornus canadensis</i>	Bunchberry	96	8
	<i>Maianthemum canadense</i>	Wild lily-of-the-valley	76	2
	<i>Mertensia paniculata</i>	Tall lungwort	92	3
	<i>Mitella nuda</i>	Bishop's-cap	84	2
	<i>Pyrola asarifolia</i>	Common pink wintergreen	68	1
	<i>Trientalis borealis</i>	Northern starflower	80	2
Fern and Fern Allies	<i>Lycopodium annotinum</i>	Stiff club-moss	72	4
Graminoid	<i>Calamagrostis canadensis</i>	Bluejoint	52	2
Moss	<i>Hylocomium splendens</i>	Stair-step moss	72	5
	<i>Pleurozium schreberi</i>	Schreber's moss	88	13
	<i>Ptilium crista-castrensis</i>	Knight's plume moss	68	5

1.9 d3: Low-bush Cranberry – White Spruce

This ELC is characterized by mesic to subhygric moisture regimes with medium nutrient levels. Topographic positions in this phase include level to middle and upper slopes primarily at cooler (northern to eastern) aspects. Soil types are predominantly classed as Gray Luvisols. White spruce typically dominates this ELC and balsam fir (*Abies balsamea*) is sometimes present with a minor component of aspen and white birch (Table H-9). The tall shrub layer is composed of green alder, with the low shrub layer characterized by prickly rose and low-bush cranberry. Bunchberry and wild sarsaparilla dominate the ground layer with Schreber's moss, knight's plume moss and stair-step moss.

Table H-9: Characteristic Species in Ecological Land Class d3 (n=9)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Abies balsamea</i>	Balsam fir	33	27
	<i>Betula papyrifera</i>	White birch	44	5
	<i>Picea glauca</i>	White spruce	100	49
	<i>Populus tremuloides</i>	Aspen	78	9
Shrub	<i>Alnus viridis ssp. crispa</i>	American green alder	44	5
	<i>Linnaea borealis</i>	Twinflower	100	4
	<i>Rosa acicularis</i>	Prickly rose	89	5
	<i>Rubus pubescens</i>	Dewberry	78	3
	<i>Vaccinium vitis-idaea</i>	Bog cranberry	78	3
	<i>Viburnum edule</i>	Low-bush cranberry	56	3
Forb	<i>Aralia nudicaulis</i>	Wild sarsaparilla	56	5
	<i>Cornus canadensis</i>	Bunchberry	100	7
	<i>Mertensia paniculata</i>	Tall lungwort	56	1
	<i>Mitella nuda</i>	Bishop's-cap	67	2
	<i>Petasites frigidus var. palmatus</i>	Palmate-leaved coltsfoot	78	2
	<i>Trientalis borealis</i>	Northern starflower	100	1
Ferns and Fern Allies	<i>Lycopodium annotinum</i>	Stiff club-moss	78	4
Moss	<i>Hylocomium splendens</i>	Stair-step moss	78	22
	<i>Pleurozium schreberi</i>	Schreber's moss	100	27
	<i>Ptilium crista-castrensis</i>	Knight's plume moss	67	10

1.10 e1: Dogwood – Balsam Poplar/Aspen

This ELC has mesic to subhygric moisture regimes and medium to rich nutrient regimes. Topography is sloped to level, and it occurs at all aspects except southerly. Soil types are typically Gleysols and Gleyed Gray Luvisols derived from glaciolacustrine, morainal and fluvial parent materials. Balsam poplar (*Populus balsamifera*) and aspen dominate this ELC. The tall shrub layer is composed of willow and river alder (*Alnus incana ssp. tenuifolia*). The low shrub layer is dominated by low-bush cranberry, willows, prickly rose, dewberry and bracted honeysuckle (*Lonicera involucrata*). The ground layer is dominated by horsetails (*Equisetum* spp.) and forb species including wild sarsaparilla, bunchberry, tall lungwort and red and white baneberry (*Actaea rubra*) (Table H-10). Knight's plume moss is present within the ground layer.

Table H-10: Characteristic Species in Ecological Land Class e1 (n=5)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Betula papyrifera</i>	White birch	60	6
	<i>Picea glauca</i>	White spruce	80	19
	<i>Populus balsamifera</i>	Balsam poplar	80	27
	<i>Populus tremuloides</i>	Aspen	100	38
Shrub	<i>Alnus incana ssp. tenuifolia</i>	River alder	40	10
	<i>Lonicera involucrata</i>	Bracted honeysuckle	100	6
	<i>Rhamnus alnifolia</i>	Alder-leaved buckthorn	40	4
	<i>Rhododendron groenlandicum</i>	Common Labrador tea	60	2
	<i>Rosa acicularis</i>	Prickly rose	100	14
	<i>Rubus pubescens</i>	Dewberry	100	8
	<i>Salix bebbiana</i>	Beaked willow	40	1
	<i>Salix spp.</i>	Willows	60	19
	<i>Vaccinium myrtilloides</i>	Common blueberry	40	1
	<i>Viburnum edule</i>	Low-bush cranberry	100	25
Forb	<i>Actaea rubra</i>	Red and white baneberry	100	3
	<i>Aralia nudicaulis</i>	Wild sarsaparilla	80	9
	<i>Chamerion angustifolium</i>	Common fireweed	100	1
	<i>Cornus canadensis</i>	Bunchberry	80	9
	<i>Lathyrus ochroleucus</i>	Cream-colored vetchling	60	1
	<i>Maianthemum canadense</i>	Wild lily-of-the-valley	100	2
	<i>Mertensia paniculata</i>	Tall lungwort	100	4
	<i>Mitella nuda</i>	Bishop's-cap	100	2
	<i>Petasites frigidus var. palmatus</i>	Palmate-leaved coltsfoot	60	2
	<i>Pyrola asarifolia</i>	Common pink wintergreen	80	2
Ferns and Fern Allies	<i>Equisetum pratense</i>	Meadow horsetail	60	5
	<i>Equisetum sylvaticum</i>	Woodland horsetail	40	2
	<i>Lycopodium annotinum</i>	Stiff club-moss	40	1
Moss	<i>Ptilium crista-castrensis</i>	Knight's plume moss	40	4

1.11 e3: Dogwood White Spruce

This ELC has a mesic to subhygric moisture regime with medium to rich nutrient levels. Topography is usually gently sloped or level. Soil types are typically Gleysols and Gleyed Gray Luvisols derived from glaciolacustrine, morainal and fluvial parent material. Characteristic trees include white spruce with occasional balsam fir, white birch or balsam poplar trees (Table H-11). Shrubs include low-bush cranberry, prickly rose, river alder, bracted honeysuckle, twining honeysuckle (*Lonicera dioica*), currant species (*Ribes* spp.), red-osier dogwood (*Cornus stolonifera*), dewberry, and wild red raspberry (*Rubus idaeus*). Forbs, such as: bunchberry, three-leaved Solomon's-seal (*Maianthemum trifolium*), marsh-marigold (*Caltha*

palustris), sweet scented bedstraw (*Galium triflorum*) dominate the dense ground layer with bluejoint (*Calamagrostis canadensis*). Tufted moss (*Aulacomnium palustre*) and arboreal lichens (old man’s beard) (*Usnea* spp.) are also present.

Table H-11: Characteristic Species in Ecological Land Class e3 (n=5)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Abies balsamea</i>	Balsam fir	40	7
	<i>Betula papyrifera</i>	White birch	60	7
	<i>Picea glauca</i>	White spruce	100	49
	<i>Populus balsamifera</i>	Balsam poplar	40	2
Shrub	<i>Alnus incana</i> ssp. <i>tenuifolia</i>	River alder	80	27
	<i>Cornus stolonifera</i>	Red-osier dogwood	60	9
	<i>Lonicera dioica</i>	Twining honeysuckle	60	2
	<i>Lonicera involucrata</i>	Bracted honeysuckle	80	3
	<i>Rhamnus alnifolia</i>	Alder-leaved buckthorn	60	2
	<i>Ribes lacustre</i>	Bristly black currant	40	1
	<i>Ribes oxycanthoides</i>	Northern gooseberry	100	2
	<i>Ribes triste</i>	Wild red currant	60	2
	<i>Rosa acicularis</i>	Prickly rose	80	3
	<i>Rubus idaeus</i>	Wild red raspberry	80	2
	<i>Rubus pubescens</i>	Dewberry	100	3
	<i>Salix</i> spp.	Willows	60	3
	<i>Viburnum edule</i>	Low-bush cranberry	80	9
Forb	<i>Actaea rubra</i>	Red and white baneberry	40	1
	<i>Aralia nudicaulis</i>	Wild sarsaparilla	40	1
	<i>Caltha palustris</i>	Marsh-marigold	80	3
	<i>Chamerion angustifolium</i>	Common fireweed	60	1
	<i>Cornus canadensis</i>	Bunchberry	80	4
	<i>Galium triflorum</i>	Sweet-scented bedstraw	60	1
	<i>Maianthemum trifolium</i>	Three-leaved Solomon's-seal	60	4
	<i>Mertensia paniculata</i>	Tall lungwort	80	1
	<i>Petasites frigidus</i> var. <i>frigidus</i>	Sweet coltsfoot	60	1
Graminoid	<i>Calamagrostis canadensis</i>	Bluejoint	80	8
	<i>Carex disperma</i>	Two-seeded sedge	60	2
Moss	<i>Aulacomnium palustre</i>	Tufted moss	40	1
Lichen	<i>Usnea</i> spp.	Old man’s beard lichens	40	8

1.12 f3: Horsetail White Spruce

This ELC has a mesic to subhygric moisture regime with moderately well to imperfect soil drainage. Nutrient levels are mostly rich on level areas or on gently sloped areas near the base of hills. Parent materials are lacustrine, glaciolacustrine, fluvial, or glaciofluvial in origin and soils are mostly Gleysols. The only typical tree species is white spruce. Occasionally aspen, balsam fir, white birch or balsam poplar trees are present. Typical shrubs include prickly rose, dewberry, low-bush cranberry, twinflower (*Linnaea borealis*), bracted honeysuckle and common Labrador tea. Horsetails dominate the ground layer. Typical forbs include bishop’s cap (*Mitella nuda*), tall lungwort, sweet coltsfoot (*Petasites frigidus* var. *frigidus*), wild sarsaparilla, and bunchberry. Bluejoint and feathermosses, including knight’s plume, Schreber’s moss and stair-step moss are also typical (Table H-12).

Table H-12: Characteristic Species in Ecological Land Class f3 (n=9)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Abies balsamea</i>	Balsam fir	67	17
	<i>Betula papyrifera</i>	White birch	78	4
	<i>Picea glauca</i>	White spruce	100	38
	<i>Populus balsamifera</i>	Balsam poplar	89	14
	<i>Populus tremuloides</i>	Aspen	67	7
Shrub	<i>Alnus incana</i> ssp. <i>tenuifolia</i>	River alder	89	17
	<i>Cornus stolonifera</i>	Red-osier dogwood	67	5
	<i>Linnaea borealis</i>	Twinflower	100	1
	<i>Lonicera dioica</i>	Twining honeysuckle	33	3
	<i>Lonicera involucrata</i>	Bracted honeysuckle	78	7
	<i>Rhododendron groenlandicum</i>	Common Labrador tea	78	7
	<i>Ribes lacustre</i>	Bristly black currant	67	2
	<i>Ribes oxycanthoides</i>	Northern gooseberry	67	1
	<i>Rosa acicularis</i>	Prickly rose	100	7
	<i>Rubus idaeus</i>	Wild red raspberry	44	2
	<i>Rubus pubescens</i>	Dewberry	100	5
	<i>Salix</i> spp.	Willows	78	5
	<i>Symphoricarpos albus</i>	Snowberry	33	1
	<i>Viburnum edule</i>	Low-bush cranberry	100	9
Forb	<i>Actaea rubra</i>	Red and white baneberry	56	3
	<i>Aralia nudicaulis</i>	Wild sarsaparilla	78	10
	<i>Caltha palustris</i>	Marsh-marigold	33	1
	<i>Chamerion angustifolium</i>	Common fireweed	56	1
	<i>Cornus canadensis</i>	Bunchberry	89	5
	<i>Mertensia paniculata</i>	Tall lungwort	89	5
	<i>Mitella nuda</i>	Bishop's-cap	100	2
	<i>Petasites frigidus</i> var. <i>frigidus</i>	Sweet coltsfoot	89	2

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Ferns & Fern Allies	<i>Equisetum arvense</i>	Common horsetail	56	16
	<i>Equisetum pratense</i>	Meadow horsetail	67	18
	<i>Equisetum sylvaticum</i>	Woodland horsetail	44	7
Graminoid	<i>Calamagrostis canadensis</i>	Bluejoint	67	10
	<i>Carex disperma</i>	Two-seeded sedge	56	2
Moss	<i>Hylocomium splendens</i>	Stair-step moss	56	6
	<i>Mnium</i> spp.	Mnium	33	2
	<i>Pleurozium schreberi</i>	Schreber's moss	100	18
	<i>Ptilium crista-castrensis</i>	Knight's plume moss	100	26

1.13 g1: Labrador Tea – Subhygric Black Spruce/Jack Pine

This ELC ranges from subhygric to subhydric moisture regime and from poor to medium nutrient regime. Soil types are Gleysols and Gleyed Gray Luvisols with imperfect to poor drainage. Most g1 sites occur in level topography, lower slopes, or at the base of slopes, often in association with peatland areas. Soil parent materials may be morainal, glaciofluvial and glaciolacustrine, and may have a thin to moderate (<40 cm) organic layer present. Black spruce and jack pine dominate this ELC (Table H-13). The shrub layer is characterized by common Labrador tea with bog cranberry and common blueberry. The ground layer is dominated by Schreber's moss, knight's plume moss, stair-step moss, peat moss (*Sphagnum* spp.) and reindeer lichens.

Table H-13: Characteristic Species in Ecological Land Class g1 (n=27)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Betula papyrifera</i>	White birch	33	2
	<i>Picea mariana</i>	Black spruce	93	58
	<i>Pinus banksiana</i>	Jack pine	82	12
	<i>Populus tremuloides</i>	Aspen	26	5
Shrub	<i>Rhododendron groenlandicum</i>	Common Labrador tea	96	26
	<i>Rosa acicularis</i>	Prickly rose	48	2
	<i>Salix</i> spp.	Willows	100	2
	<i>Vaccinium myrtilloides</i>	Common blueberry	82	5
	<i>Vaccinium vitis-idaea</i>	Bog cranberry	93	2
Forb	<i>Cornus canadensis</i>	Bunchberry	78	1
Ferns and Fern Allies	<i>Equisetum arvense</i>	Common horsetail	26	3

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Moss	<i>Hylocomium splendens</i>	Stair-step moss	52	13
	<i>Pleurozium schreberi</i>	Schreber's moss	96	44
	<i>Polytrichum commune</i>	Common hair-cap moss	30	1
	<i>Ptilium crista-castrensis</i>	Knight's plume moss	63	7
	<i>Sphagnum</i> spp.	Peat moss	56	8
Lichen	<i>Cladonia mitis</i>	Reindeer lichen	41	6
	<i>Cladonia rangiferina</i>	Reindeer lichen	48	4

1.14 h1: Labrador Tea – White Spruce/Black Spruce

This ELC occurs in level or lower slope areas with poor soil drainage, and many sites are considered to be transitional uplands or swamps. The moisture regime typically ranges from subhygric to subhydric, while the nutrient regime ranges from poor to rich. Soils are varied and can include Gleysols, Terric Humisols and Regosols derived from glaciolacustrine, morainal, lacustrine, fluvial or glaciofluvial parent materials. Black spruce and white spruce dominate the tree canopy of this ELC (Table H-14). Common Labrador tea dominates the shrub layer. The ground layer is dominated by horsetails, Schreber's moss and stair-step moss.

Table H-14: Characteristic Species in Ecological Land Class h1 (n=17)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Picea glauca</i>	White spruce	82	34
	<i>Picea mariana</i>	Black spruce	88	31
	<i>Populus balsamifera</i>	Balsam poplar	47	2
Shrub	<i>Linnaea borealis</i>	Twinflower	65	2
	<i>Rhododendron groenlandicum</i>	Common Labrador tea	88	22
	<i>Ribes triste</i>	Wild red currant	29	1
	<i>Rosa acicularis</i>	Prickly rose	82	3
	<i>Rubus pubescens</i>	Dewberry	59	2
	<i>Salix maccalliana</i>	Velvet-fruited willow	29	2
	<i>Salix</i> spp.	Willows	100	5
	<i>Vaccinium vitis-idaea</i>	Bog cranberry	77	1
	<i>Viburnum edule</i>	Low-bush cranberry	41	2
Forb	<i>Cornus canadensis</i>	Bunchberry	65	2
	<i>Galium boreale</i>	Northern bedstraw	29	2
	<i>Mertensia paniculata</i>	Tall lungwort	47	1
	<i>Mitella nuda</i>	Bishop's-cap	77	2
Ferns and Fern Allies	<i>Equisetum arvense</i>	Common horsetail	77	10
	<i>Equisetum pratense</i>	Meadow horsetail	41	2

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Moss	<i>Hylocomium splendens</i>	Stair-step moss	77	15
	<i>Pleurozium schreberi</i>	Schreber's moss	94	35
	<i>Ptilium crista-castrensis</i>	Knight's plume moss	47	4
	<i>Sphagnum</i> spp.	Peat mosses	53	4
Lichen	<i>Cladonia</i> spp.	Reindeer lichens	71	2
	<i>Usnea</i> spp.	Old man's beard lichens	53	9

1.15 i1: Treed Bog

Treed bogs occur only in level and depressional areas. Stagnant water and impeded drainage enhance the accumulation of organic matter in this ELC. Very poor to poor nutrient regimes and hygric to hydric moisture levels characterize this ELC. Soils are generally Fibrisols with some Mesisols originating from organic parent material. This ELC occurs in depressional to level areas across the landscape. A canopy of black spruce is typical in this ELC with a dense shrub layer of common Labrador tea (Table H-15). Cloudberry (*Rubus chamaemorus*) and bog cranberry are common low shrub species. Peat moss and Schreber's moss dominate the ground layer and reindeer lichen species are common.

Table H-15: Characteristic Species in Ecological Land Class i1 (n=7)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Picea mariana</i>	Black spruce	100	54
Shrub	<i>Chamaedaphne calyculata</i>	Leatherleaf	43	1
	<i>Rhododendron groenlandicum</i>	Common Labrador tea	100	44
	<i>Rubus chamaemorus</i>	Cloudberry	86	6
	<i>Vaccinium vitis-idaea</i>	Bog cranberry	100	3
Forb	<i>Maianthemum trifolium</i>	Three-leaved Solomon's-seal	57	1
Moss	<i>Pleurozium schreberi</i>	Schreber's moss	100	17
	<i>Ptilium crista-castrensis</i>	Knight's plume moss	29	1
	<i>Sphagnum capillifolium</i>	Acute-leaved peat moss	29	3
	<i>Sphagnum fuscum</i>	Rusty peat moss	29	14
	<i>Sphagnum</i> spp.	Peat mosses	100	36
Lichen	<i>Cladonia mitis</i>	Reindeer lichen	57	4
	<i>Cladonia rangiferina</i>	Reindeer lichen	43	4

1.16 i2: Shrubby Bog

This ELC is characterized by a subhydric to hydric moisture regime and a very poor to poor nutrient regime. This ELC occurs in level areas and depressions. Soils are formed from organic or organic/glaciolacustrine parent materials and include Fibrisols, Organic Cryosols and Mesisols. Soil water in these sites is very acidic and low in minerals. As this ELC has no tree canopy, shrub species are the dominant

vegetative cover. Black spruce less than 2 m tall and common Labrador tea dominate the shrub layer in this ELC (Table H-16). The ground layer is composed of bog cranberry, cloudberry, leather leaf (*Chamaedaphne calyculata*), Schreber’s moss, peat moss and reindeer lichens.

Table H-16: Characteristic Species in Ecological Land Class i2 (n=11)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Picea mariana</i>	Black spruce	100	58
Shrub	<i>Chamaedaphne calyculata</i>	Leatherleaf	64	2
	<i>Rhododendron groenlandicum</i>	Common Labrador tea	100	46
	<i>Rubus chamaemorus</i>	Cloudberry	100	6
	<i>Salix myrtillofolia</i>	Myrtle-leaved willow	27	1
	<i>Vaccinium vitis-idaea</i>	Bog cranberry	100	4
Forb	<i>Maianthemum trifolium</i>	Three-leaved Solomon’s-seal	64	1
Graminoid	<i>Carex aquatilis</i>	Water sedge	27	1
Moss	<i>Pleurozium schreberi</i>	Schreber’s moss	55	17
	<i>Sphagnum</i> spp.	Peat mosses	100	62
Lichen	<i>Cladonia mitis</i>	Reindeer lichen	73	4
	<i>Cladonia rangiferina</i>	Reindeer lichen	27	7

1.17 j1: Treed Poor Fen

This ELC is found in both level and depressional areas with high water tables. These sites are intermediate in soil water acidity and mineralogy between bog and rich fen ELC. The moisture regime ranges from hygric to hydric while the nutrient regime ranges from very poor to rich. Soils originate from organic parent materials or in sites with organic material above glaciolacustrine, morainal or glaciofluvial materials. Soil types include Mesisols and Fibrisols. The open tree canopy in this ELC is composed of black spruce and tamarack (*Larix laricina*) (Table H-17). Common Labrador tea, dwarf birch (*Betula pumila*), willows, bog cranberry and cloudberry dominate the shrub layer. The ground layer is typically composed of peat moss, Schreber’s moss, stair-step moss and golden moss (*Tomentypnum nitens*) with scattered three-leaved Solomon’s-seal, water sedge (*Carex aquatilis*) and lichens.

Table H-17: Characteristic Species in Ecological Land Class j1 (n=47)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Larix laricina</i>	Tamarack	62	8
	<i>Picea mariana</i>	Black spruce	96	39
Shrub	<i>Betula pumila</i>	Dwarf birch	36	2
	<i>Rhododendron groenlandicum</i>	Common Labrador tea	98	37
	<i>Rubus chamaemorus</i>	Cloudberry	64	2
	<i>Salix myrtillofolia</i>	Myrtle-leaved willow	30	1
	<i>Salix</i> spp.	Willows	100	6
	<i>Vaccinium vitis-idaea</i>	Bog cranberry	96	3

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Forb	<i>Maianthemum trifolium</i>	Three-leaved Solomon's-seal	79	2
Ferns and Fern Allies	<i>Equisetum sylvaticum</i>	Woodland horsetail	34	2
Graminoid	<i>Carex aquatilis</i>	Water sedge	47	1
Moss	<i>Hylocomium splendens</i>	Stair-step moss	43	3
	<i>Pleurozium schreberi</i>	Schreber's moss	85	22
	<i>Sphagnum</i> spp.	Peat mosses	100	44
	<i>Tomentypnum nitens</i>	Golden moss	45	3
Lichen	<i>Cladonia mitis</i>	Reindeer lichen	40	2
	<i>Cladonia rangiferina</i>	Reindeer lichen	34	1

1.18 j2: Shrubby Poor Fen

This ELC has very wet fibric soils with a hygric to hydric moisture regime and very poor to medium nutrient regime. Soil water is medium in acidity and in minerals. This ELC occurs in depressions and level areas. Soil types include mostly Mesisols and Rego-Gleysols, with small amounts of Fibrisols, Mesisols, Gleysols and Cryosols. Soils have very poor drainage and are derived from organic or organic over mineral parent materials. Black spruce and tamarack less than 2 m in height along with other shrub species including common Labrador tea, dwarf birch, bog birch (*Betula glandulosa*) and willows dominate this ELC (Table H-18). The ground layer typically includes peat moss, golden moss, Schreber's moss, water sedge, horsetails and three-leaved Solomon's-seal.

Table H-18: Characteristic Species in Ecological Land Class j2 (n=35)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Larix laricina</i>	Tamarack	54	6
	<i>Picea mariana</i>	Black spruce	97	44
Shrub	<i>Betula glandulosa</i>	Bog birch	49	6
	<i>Betula pumila</i>	Dwarf birch	37	7
	<i>Rhododendron groenlandicum</i>	Common Labrador tea	97	34
	<i>Rubus chamaemorus</i>	Cloudberry	60	2
	<i>Salix</i> spp.	Willows	100	9
	<i>Vaccinium oxycoccos</i>	Small bog cranberry	91	1
	<i>Vaccinium vitis-idaea</i>	Bog cranberry	86	3
Forb	<i>Maianthemum trifolium</i>	Three-leaved Solomon's-seal	86	4
Ferns and Fern Allies	<i>Equisetum</i> spp.	Horsetails	100	2
Graminoid	<i>Carex aquatilis</i>	Water sedge	69	5

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Moss	<i>Pleurozium schreberi</i>	Schreber's moss	71	6
	<i>Sphagnum</i> spp.	Peat mosses	100	55
	<i>Tomentypnum nitens</i>	Golden moss	51	4
Lichen	<i>Cladonia rangiferina</i>	Reindeer lichen	46	2

1.19 k1: Treed Rich Fen

This ELC is associated with subsurface water seepage, with alkaline (low acidity) mineral rich soil water. These fens occur in level areas, old channels or in depressions. The moisture regime ranges from hygric to hydric and the nutrient regime ranges from medium to very rich; however, this richness refers mostly to soil minerals and nitrogen is often limited in these sites. Soil parent material is organic with Mesisols being the dominant soil type. The tree canopy of this ELC is composed of tamarack and black spruce (Table H-19). Bog birch, dwarf birch, willows and common Labrador tea dominate the shrub layer. The diverse ground layer includes peat moss, golden moss, Schreber's moss, stair-step moss, three-leaved Solomon's-seal, buck-bean (*Menyanthes trifoliata*) and sedges (*Carex* spp.).

Table H-19: Characteristic Species in Ecological Land Class k1 (n=35)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Larix laricina</i>	Tamarack	97	37
	<i>Picea mariana</i>	Black spruce	91	27
Shrub	<i>Andromeda polifolia</i>	Bog rosemary	66	3
	<i>Betula glandulosa</i>	Bog birch	37	10
	<i>Betula pumila</i>	Dwarf birch	63	24
	<i>Rhododendron groenlandicum</i>	Common Labrador tea	80	17
	<i>Salix pedicellaris</i>	Bog willow	37	2
	<i>Salix</i> spp.	Willows	100	4
	<i>Vaccinium oxycoccos</i>	Small bog cranberry	89	2
	<i>Vaccinium vitis-idaea</i>	Bog cranberry	51	1
Forb	<i>Caltha palustris</i>	Marsh-marigold	77	1
	<i>Comarum palustris</i>	Marsh cinquefoil	77	1
	<i>Maianthemum trifolium</i>	Three-leaved Solomon's-seal	94	7
	<i>Menyanthes trifoliata</i>	Buck-bean	43	6
Ferns and Fern Allies	<i>Equisetum fluviatile</i>	Swamp horsetail	60	2
Graminoid	<i>Calamagrostis canadensis</i>	Bluejoint	29	3
	<i>Carex aquatilis</i>	Water sedge	46	2
	<i>Carex chordorrhiza</i>	Prostrate sedge	43	2

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Moss	<i>Aulacomnium palustre</i>	Tufted moss	29	2
	<i>Hylocomium splendens</i>	Stair-step moss	34	3
	<i>Pleurozium schreberi</i>	Schreber's moss	69	6
	<i>Tomentypnum nitens</i>	Golden moss	63	8
	<i>Sphagnum</i> spp.	Peat mosses	100	51

1.20 k2: Shrubby Rich Fen

Like k1, this ELC is associated with subsurface water seepage, with alkaline (low acidity) mineral rich soil water. These fens occur in level areas, old channels or in depressions. The moisture regime ranges from hygric to hydric and the nutrient regime ranges from medium to very rich. The water table tends to be near the surface in these sites. Soil types include Gleysols and Fibrisols derived from organic, glaciolacustrine and lacustrine parent material. Shrub species dominate the vegetative cover and include tamarack and black spruce less than 2 m in height as well as willows, dwarf birch and bog birch. The ground layer includes peat moss, golden moss, tufted moss, buck-bean, three-leaved Solomon's-seal and sedges (Table H-20).

Table H-20: Characteristic Species in Ecological Land Class k2 (n=31)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Larix laricina</i>	Tamarack	81	20
	<i>Picea mariana</i>	Black spruce	45	4
Shrub	<i>Andromeda polifolia</i>	Bog rosemary	58	3
	<i>Betula glandulosa</i>	Bog birch	42	11
	<i>Betula pumila</i>	Dwarf birch	65	22
	<i>Rhododendron groenlandicum</i>	Common Labrador tea	45	5
	<i>Salix pedicellaris</i>	Bog willow	39	1
	<i>Salix</i> spp.	Willows	100	11
	<i>Vaccinium oxycoccos</i>	Small bog cranberry	61	2
Forb	<i>Caltha palustris</i>	Marsh-marigold	68	3
	<i>Comarum palustris</i>	Marsh cinquefoil	74	1
	<i>Maianthemum trifolium</i>	Three-leaved Solomon's-seal	61	5
	<i>Menyanthes trifoliata</i>	Buck-bean	42	8
Ferns and Fern Allies	<i>Equisetum fluviatile</i>	Swamp horsetail	36	1
Graminoid	<i>Carex aquatilis</i>	Water sedge	58	6
	<i>Carex diandra</i>	Two-stamened sedge	36	3
	<i>Carex magellanica</i>	Bog sedge	29	2
Moss	<i>Aulacomnium palustre</i>	Tufted moss	39	2
	<i>Sphagnum</i> spp.	Peat mosses	97	22
	<i>Tomentypnum nitens</i>	Golden moss	42	11

1.21 k3: Graminoid Rich Fen

This ELC is found in areas with hygric to hydric moisture regimes and medium to very rich nutrient regimes. It occurs in depressional to level topographic areas, often in old channels or associated with riparian areas. Soil types are predominantly Gleysols, Mesisols and Fibrisols. Soil parent material is organic, lacustrine or organic/glaciolacustrine. This ELC is dominated by sedges (Table H-21). Buck-bean, flat-leaved bladderwort (*Utricularia intermedia*) and marsh cinquefoil (*Comarum palustris*) are also common.

Table H-21: Characteristic Species in Ecological Land Class k3 (n=20)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Shrub	<i>Salix pedicellaris</i>	Bog willow	50	1
	<i>Salix</i> spp.	Willows	45	1
Forb	<i>Comarum palustris</i>	Marsh cinquefoil	65	3
	<i>Menyanthes trifoliata</i>	Buck-bean	55	10
	<i>Utricularia intermedia</i>	Flat-leaved bladderwort	40	5
Ferns and Fern Allies	<i>Equisetum fluviatile</i>	Swamp horsetail	50	1
Graminoid	<i>Carex aquatilis</i>	Water sedge	80	15
	<i>Carex chordorrhiza</i>	Prostrate sedge	25	2
	<i>Carex diandra</i>	Two-stamened sedge	65	5
	<i>Carex limosa</i>	Mud sedge	30	2
	<i>Carex magellanica</i>	Bog sedge	25	3
	<i>Carex utriculata</i>	Small bottle sedge	35	6
	<i>Eriophorum angustifolium</i>	Narrowleaf cotton-grass	25	3
Moss	<i>Sphagnum</i> spp.	Peat mosses	75	4

1.22 I1: Graminoid Marsh

Marshes are found in level and depressional areas, as well as surrounding shorelines of waterbodies and riparian zones. The water level is above the rooting zone for some portion of the growing season. This ELC is found in sites with hydric to subhydric moisture regimes and rich to very rich (occasionally medium) nutrient regimes. Soil drainage is poor to very poor. Soil types include Gleysols and Fibrisols. Soils are derived from lacustrine, fluvial, organic, and organic/lacustrine parent materials. Graminoid species dominate the plant community in this ELC and consist of sedges (e.g., water sedge, small bottle sedge (*Carex utriculata*)) and grasses (e.g., narrow reed grass (*Calamagrostis stricta*)) (Table H-22). The ground layer includes golden moss and tufted moss.

Table H-22: Characteristic Species in Ecological Land Class I1 (n=3)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Shrub	<i>Betula glandulosa</i>	Bog birch	33	1
	<i>Salix</i> spp.	Willows	100	7
Forb	<i>Caltha palustris</i>	Marsh-marigold	33	1
	<i>Comarum palustris</i>	Marsh cinquefoil	100	2
	<i>Menyanthes trifoliata</i>	Buck-bean	67	4
	<i>Nuphar variegata</i>	Yellow pond-lily	33	1
Graminoid	<i>Calamagrostis stricta</i>	Narrow reed grass	100	8
	<i>Carex aquatilis</i>	Water sedge	100	39
	<i>Carex chordorrhiza</i>	Prostrate sedge	33	1
	<i>Carex crawfordii</i>	Crawford's sedge	33	3
	<i>Carex disperma</i>	Two-seeded sedge	33	6
	<i>Carex lasiocarpa</i>	Hairy-fruited sedge	33	1
	<i>Carex magellanica</i>	Bog sedge	67	12
	<i>Carex utriculata</i>	Small bottle sedge	33	13
Moss	<i>Eriophorum angustifolium</i>	Narrowleaf cotton-grass	100	2
	<i>Aulacomnium palustre</i>	Tufted moss	33	13
	<i>Calliergon giganteum</i>	Giant calliergon moss	33	3
	<i>Calliergon richardsonii</i>	Calliergon moss	33	1
	<i>Drepanocladus aduncus</i>	Brown moss	67	1
	<i>Tomentypnum nitens</i>	Golden moss	33	13

1.23 Shrubland/Regeneration

This ELC includes grass dominated clearings (NOM and CLG), shrublands (NSH and SH) as well as regenerating forests (RFD, RFM, RFP, and RFS).

Clearings include all regenerating areas dominated by graminoid vegetation. These can be any moisture or nutrient regime, and occur anywhere in the landscape, but are typically level or gradually sloped. Older well pads and linear disturbances which are no longer in use may fall into this classification. Typical species can include: wild red raspberry, fireweed, red fescue (*Festuca rubra*), smooth brome (*Bromus inermis*), Canadian milk vetch (*Astragalus canadensis*), wild strawberry (*Fragaria virginiana*) and northern manna grass (*Glyceria borealis*).

Shrublands are typically old clearings or burns that are regenerating into forests, and include young deciduous trees, seedling conifers, willows, alders, and other species typical of adjacent forest areas. Aspen and white birch are typically scattered throughout these areas as is common fireweed.

Regenerating forests show evidence of past disturbance (e.g., forestry activity, fire, old wood piles, etc.). Trees are 1 to 5 m in height and comprise greater than 25% cover. Aspen, jack pine, white and black spruce as well as common Labrador tea less than 5 m in height dominate the shrub layer. Common

blueberry and bog cranberry are also common. The dominant forbs are common fireweed and bunchberry. Sedges and grasses are common. Peat mosses, hair-cap mosses (*Polytrichum* spp.) and reindeer lichens are scattered throughout (Table H-23).

**Table H-23: Characteristic Species in Ecological Land Class
Shrubland/Regeneration (n=26)**

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Picea glauca</i>	White spruce	31	1
	<i>Picea mariana</i>	Black spruce	31	4
	<i>Pinus banksiana</i>	Jack pine	89	17
	<i>Populus tremuloides</i>	Aspen	62	18
Shrub	<i>Arctostaphylos uva-ursi</i>	Common bearberry	35	3
	<i>Linnaea borealis</i>	Twinflower	46	2
	<i>Rhododendron groenlandicum</i>	Common Labrador tea	73	14
	<i>Rosa acicularis</i>	Prickly rose	58	3
	<i>Salix bebbiana</i>	Beaked willow	50	2
	<i>Salix</i> spp.	Willows	54	2
	<i>Vaccinium myrtilloides</i>	Common blueberry	73	11
	<i>Vaccinium vitis-idaea</i>	Bog cranberry	77	7
Forb	<i>Chamerion angustifolium</i>	Common fireweed	85	2
	<i>Cornus canadensis</i>	Bunchberry	58	7
Ferns and Fern Allies	<i>Equisetum</i> spp.	Horsetails	69	1
Graminoid	<i>Carex</i> spp.	Sedges	89	4
	Various species	Grasses	85	5
Moss	<i>Polytrichum</i> spp.	Hair-cap mosses	46	3
	<i>Sphagnum</i> spp.	Peat mosses	54	15
Lichen	<i>Cladonia</i> spp.	Reindeer lichens	100	3

1.24 Shrubby Swamp

Shrubby swamps (SS) are characterized by hygric to hydric moisture regimes, rich nutrient regimes, and a dominant tall shrub layer. The shrubby swamp is non-peat forming. The tall shrub layer is characterized by river alder and willow and there may be white birch scattered throughout in the tree layer. The ground layer is comprised of graminoids such as sedges, rushes and bluejoint as well as forbs such as marsh cinquefoil, water arum (*Calla palustris*), and three-leaved Solomon’s seal. Dominant mosses include peat moss.

1.25 Coniferous Swamp

Coniferous swamps (SC) are characterized by subhygric to subhydric moisture regimes, while the nutrient regime ranges from poor to rich. Tamarack is dominant in the tree canopy with black spruce and lesser amounts of white spruce. Scattered river alder forms a sparse tall shrub layer. The low shrub layer can include common Labrador tea and bog cranberry. Schreber's moss and stair-step moss dominate the ground layer with scattered common horsetail and bluejoint.

1.26 Flooded Lands/Shallow Open Water

This ELC includes wet meadows (WM) and shallow open water (OW). Flooded lands are typically associated with ephemeral wetlands and beaver ponds that may dry up in mid-summer, and recharge in spring; typically, these are shallow open water wetlands with shrubs and graminoids typical of marshes and fens occurring on the edges. Shallow open water habitats occur in permanent, shallow (less than 2 m deep) open water areas that are less than 2 ha in size; with greater than 25% cover of submerged (pondweeds [*Polygonum* spp.] and water-milfoil [*Myriophyllum* spp.]) and floating-leaved macrophytes (arrowhead [*Sagittaria* spp.], water arum and buck-bean) in a distinct basin.

1.27 Open Water

This classification refers to permanent, open water areas (greater than 2 m deep) including lakes (NWL and LA) and ponds (PD), with low to no cover of emergent vegetation or floating-leaved macrophytes.

1.28 Riparian Habitat

Riparian meadows (MR) occur adjacent to creeks and rivers, and on alluvial deposits. These sites often flood during the spring freshet, which removes trees, shrubs and organic materials in the soil layer. The moisture regime ranges from mesic to hygric and can be quite dry by mid-summer. The nutrient regime is typically medium to rich, especially in areas that are periodically flooded. Typical species include bluejoint, small bottle sedge, water arum, small bedstraw (*Galium trifidum*), water smartweed (*Persicaria amphibia*) and marsh skullcap (*Scutellaria galericulata*).

Riparian shrublands (RS) are generally raised slightly higher above the flowing creek level or occur on more stable sand and gravel deposits or at the forest edge. The moisture regime ranges from mesic to hygric and the nutrient regime is typically medium to rich. Some riparian shrublands are regenerating phases of the low-bush cranberry (d1, d2, d3) or dogwood (e1, e2, e3) ELC that never fully succeed to mature forests due to recurrent flooding disturbance. The following species are most common: white birch, river alder, dwarf birch, willow, bluejoint, small bottle sedge, water sedge, marsh marigold, bedstraw (*Galium* spp.), slender wheat grass (*Elymus trachycaulus*) and bluegrass (*Poa* spp.) (Table H-24).

**Table H-24: Characteristic Species in Ecological Land Class
Riparian Habitat (n=12)**

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Betula papyrifera</i>	White birch	100	3
Shrub	<i>Alnus incana</i> ssp. <i>tenuifolia</i>	River alder	100	12
	<i>Alnus viridis</i> ssp. <i>crispa</i>	American green alder	100	2
	<i>Betula glandulosa</i>	Bog birch	100	3
	<i>Betula pumila</i>	Dwarf birch	100	5
	<i>Ribes</i> spp.	Currant	100	3
	<i>Rubus</i> spp.	Raspberry	100	3
	<i>Salix bebbiana</i>	Beaked willow	100	4
	<i>Salix maccalliana</i>	Velvet-fruited willow	100	8
	<i>Salix planifolia</i>	Flat-leaved willow	100	4
	<i>Salix</i> spp.	Willow	100	16
Forb	<i>Caltha palustris</i>	Marsh-marigold	100	7
	<i>Galium</i> spp.	Bedstraw	100	2
	<i>Thalictrum sparsiflorum</i>	Flat-fruited meadow rue	100	1
Ferns and Fern Allies	<i>Equisetum</i> spp.	Horsetails	100	1
Graminoid	<i>Bromus inermis</i>	Smooth brome	100	5
	<i>Calamagrostis canadensis</i>	Bluejoint	100	27
	<i>Carex aquatilis</i>	Water sedge	100	7
	<i>Carex diandra</i>	Two-stamened sedge	100	4
	<i>Carex utriculata</i>	Small bottle sedge	100	5
	<i>Cinna latifolia</i>	Drooping wood-reed	100	1
	<i>Elymus trachycaulus</i>	Slender wheat grass	100	5
	<i>Poa</i> sp.	Bluegrass	100	13
Moss	<i>Aulacomnium palustre</i>	Tufted moss	100	2
	<i>Calliergon giganteum</i>	Giant calliergon moss	100	8
	<i>Drepanocladus</i> sp.	Brown moss	100	1

1.29 Disturbance

Disturbance refers to anthropogenic disturbances; including non-vegetated surfaces such as roads, reservoirs, buildings or other facilities; and vegetated disturbances such as 3D seismic lines, trails, road rights-of-way, or well sites.

2.0 ALBERTA WETLAND CLASSIFICATION SYSTEM

“Wetlands are land saturated with water for long enough to promote the formation of water altered soils, growth of water tolerant vegetation and biological activity adapted to a wet environment” (GOA 2015). Wetlands within the TLSA were classified according to the Alberta Wetland Classification System (AWCS) (GOA 2015). A description of AWCS wetland types found within the TLSA is discussed below.

Bogs

Bogs are defined as peatlands, which are isolated from surface water and groundwater influences due to either landscape position (i.e., depressions with no sources of water inflow) or by elevation (i.e., ground surface is typically >40 cm above the water table) (GOA 2015). Bogs receive water solely from precipitation, resulting in acidic conditions. Low decomposition rates relative to plant production results in peat accumulation. The water table is generally 40 to 60 cm below the peat surface. Bogs are acidic, low nutrient ecosystems dominated by oligotrophic species such as rusty peat moss (*Sphagnum fuscum*), Schreber’s moss, stair-step moss, reindeer lichens and ericaceous shrubs (e.g., common Labrador tea). Bogs may be open, wooded or forested, with black spruce as the only dominant tree species (Keys 1992; Halsey et al. 2004).

Wooded coniferous bog (BWc) and shrubby bog (BS) were identified within the TLSA.

BWc Wooded Coniferous Bog

This community is wooded, with total black spruce cover greater than 25% (GOA 2015), without permafrost, patterning, or internal lawns. These bogs correspond to the “flat bogs” of Zoltai et al. (1988), occurring in complexes with large fen systems. This community is also found in small basins (basin bogs) associated with hummocky terrain, in broad, poorly defined depressions, or along drainage divides (Halsey et al. 2004).

This bog type is dominated by black spruce, which is typically less than 10 m in height with 5 to 30% canopy closure. The shrub layer is dominated by low shrub species such as common Labrador tea, bog cranberry, cloudberry, and small bog cranberry. Graminoid species are not common in this community and are limited to species such as cotton grasses (*Eriophorum* spp.). Peat mosses, feather mosses and lichens dominate the ground cover. Other common mosses include wavy dicranum (*Dicranum polysetum*) and Schreber’s moss.

BS Shrubby Bog

Shrubby bogs (BS) are open communities with more than 25% shrub cover and tree cover of 25% or less (GOA 2015). This bog type is dominated by a high cover of shrub species such as leatherleaf, common Labrador tea and small bog cranberry, including dwarf trees such as white birch, black spruce and tamarack. *Sphagnum* spp. (peat mosses) are typically the dominant species in this wetland type.

Fens

Fens are also peatlands, influenced by mineral soil water (ground and surface), which may be relatively minerotrophic (nutrient rich). Water levels in fens are typically at or near the peat surface. Fens typically have a pH of greater than 4.5; although in specific landscapes, which include glaciofluvial deposits on northern uplands with local groundwater flow, pH can be as low as 3.5. Fens have fresh to slightly brackish water and like bogs, are low in salinity and available nutrients (GOA 2015).

Fen vegetation is typically dominated by sedges and dense mats of moss species. Many vascular plants commonly found in fens are not typically found in bogs. Some of these species include bog muhly (*Muhlenbergia glomerata*), buck-bean, hairy-fruit sedge (*Carex lasiocarpa*), mud sedge (*Carex limosa*), tall white bog orchid (*Platanthera dilatata*), tamarack, sticky false asphodel (*Tofieldia glutinosa*) and willows (GOA 2015).

Wooded coniferous fen (FWc), shrubby fen (FS) and graminoid fen (FG) were identified within the TLSA.

FWc Wooded Fen

Wooded fens have more than 25% tree cover of black spruce and tamarack (GOA 2015). Such fens can be poor to rich depending on local drainage or seepage conditions (Halsey et al. 2004). Low shrubs dominate a large proportion of this community including myrtle-leaved willow, common Labrador tea, dwarf birch, cloudberry and bog cranberry. The ground cover is composed predominantly of sedges and sheathed cotton grass (*Eriophorum vaginatum*), along with a wide variety of forb species. Peat and brown mosses (*Drepanocladus* spp.) in association with golden moss and tufted moss form hummocks through the system. Water mosses are typically found in water filled depressions.

FS Shrubby Fen

These fens are shrub-dominated (more than 25% shrub cover and 25% or less tree cover). Common species include birch and willow (typically below 2 m in height). They are found along creeks but also occur within wooded fens or interspersed with inland swamps and marshes. These fens can be poor or rich (Halsey et al. 2004).

Typical shrub species can include dwarf birch, flat-leaved willow (*Salix planifolia*), bog willow (*Salix pedicellaris*) and bog-rosemary (*Andromeda polifolia*). Common graminoid species include sedges, sheathed cotton grass and common tall manna grass (*Glyceria grandis*). Peat and brown mosses are common on hummocks in association with golden moss and tufted moss. Water mosses are typically found in water filled depressions.

FG Graminoid-dominated Fen

Graminoid fens are dominated by graminoid species with 25% or less tree and shrub cover (GOA 2015). This fen type may occur as collapse scars in association with peat plateaus, at the margins of bog islands, as deeper phases within riverine swamps, inland of lacustrine marshes, or as small isolated basins. They may also occur as wetter phases in wooded fens in flat, featureless peatlands sloping gently in the direction of drainage (Halsey et al. 2004). Graminoid species dominate this community in various combinations with sedges as the most prevalent species.

Marshes and Shallow Open Waters

Marshes and shallow open waters are mineral wetlands (which can include non-peat accumulating organic soil) with seasonally fluctuating water levels (GOA 2015). Marshes and shallow open waters typically have relatively high amounts of water flow and nutrient levels, resulting in eutrophic conditions. Rapid decomposition restricts the formation of peat in these communities.

Marshes contain less than 25% shrub cover but may have willows and other woody species scattered along the wetland margin (GOA 2015). Marshes in the TLSA are mostly associated with shallow flooded areas and are dominated in various areas by sedges and thin-leaved cotton grass. This community grades into shallow open water as the water depth increases and into shrubby swamp as water depth decreases.

Shallow open waters are also non-peat forming wetlands. They are characterized by an open water zone supporting floating and submersed aquatic plant species that cover more than 25% of the wetland area in most years (GOA 2015). These wetlands are less than 2 m in depth at mid-summer. Depth measurements may be required to differentiate them from adjacent lakes, ponds and other bodies of water. Many shallow open waters have no inlets or outlets, and thus receive water from precipitation, overland surface flow and groundwater discharge (GOA 2015). Other shallow open water systems may have a widened channel with continual inflow and outflow via surface streams.

Swamps

Swamps are not considered peatlands but can have deep pockets of peat accumulation (GOA 2015). They are defined as mineral wetlands that have at least 25% woody cover (either trees or shrubs). Wooded swamps occur in association with floodplains, streams and along the margins of some peatland complexes (Halsey et al. 2004). Many swamps along rivers flood annually with water levels typically declining through the growing season. However, groundwater is always present in the tree and shrub rooting zone (GOA 2015).

Swamp classes that were identified in the TLSA include SWc (wooded coniferous swamp) and SS (shrubby swamp).

SWc Wooded Coniferous Swamp

Wooded coniferous swamps have more than 25% tree cover, of which 75% or more is comprised of coniferous species. Coniferous swamps are typically made up of black spruce and occasionally tamarack (GOA 2015). White spruce is occasionally present. Trees often reach heights greater than 10 m in closed canopy stands.

The understory of coniferous wooded swamps supports a variety of shrubs, including alders, bog birch, common Labrador tea and dwarf birch. The ground surface is hummocky, with pools of standing water accumulating around the base of trees. Ground cover includes bunchberry, dewberry, long-leaved chickweed (*Stellaria longifolia*), northern starflower (*Trientalis borealis*) and small bedstraw. Scattered bryophytes can be found but are more common in open stands. Feathermosses may also be present.

SS Shrubby Swamp

Shrubby swamps have more than 25% shrubby cover and a canopy with 25% or less tree cover (GOA 2015). Shrubby swamps typically occur along rivers, floodplains, stream terraces and margins of marshes, peatlands and shallow open water wetlands. The chemistry of these sites is affected by over-bank flooding that refreshes nutrient and sediment supply on an annual or more frequent basis. They commonly have mineral soils with shallow organic or organic/mineral surface horizons, although they can also have deeper peats in basinal settings (e.g., in cut-off meanders). The soils in this wetland type often display 'cumulic' layering consisting of alternating layers of alluvial silt and organic material.

Shrubby swamps are dominated by willows. These species generally grow above 2 m in height. Other species may include dwarf birch, white birch and river alder. Fluctuating water tables generally prevent the establishment of mosses, except on higher hummocks. The diverse understory is dominated by a variety of sedges and bluejoint. Schreber's moss, stair-step moss, tufted moss, and golden moss are often present in drier locations. Shrubby swamps may be confused with open, shrub-dominated fens; they are differentiated by shrub height and position in the landscape (Halsey et al. 2004). Mosses may be present but typically do not develop thick mats as they do in shrubby fens.

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