

Appendix F

Vegetation

Appendix F1
Baseline Methods

APPENDIX F1 – BASELINE METHODS

1.0 BASELINE METHODS

Appendix F1 describes the methods and information used to characterize the baseline conditions for vegetation resources in the TLSA and TRSA for the BlackGold Expansion Project.

1.1 Resource Mapping

Land units spatially describe the natural vegetation and disturbance features of the study area. These land units include natural disturbance features such as burns and clearings, and natural vegetation habitat types (forests, shrublands, meadows, barren lands, wetlands and open water). Land units were mapped for the TLSA and TRSA.

1.1.1 TLSA

Local ELC (Ecosite Phase) Mapping

Ecological Land Class (ELC) mapping was derived from Alberta Vegetation Inventory (AVI) mapping for the Project TLSA. AVI mapping that conforms to *Alberta Vegetation Inventory Standards Version 2.1.1* (AENV 2005) was used for Township 76 Range 8. AVI mapping that conforms to *Alberta Vegetation Inventory Standards Version 2.1* (AEP 1991) was used for Townships 76 and 75, Ranges 6 and 7. This baseline ELC mapping was updated to include recent surface disturbances. Baseline disturbance information was obtained from various sources including recent aerial photographs, KNOC exploration program maps, and Alberta Base Features (Alta LIS).

Based on the AVI, each natural vegetated polygon was assigned an ELC (*i.e.*, ecosite phase) according to Beckingham and Archibald (1996), with additional codes for shrublands, open water classes and disturbed sites not represented in the ecosite phase classification. Ecosite phases were interpreted based on stand characteristics (tree species, height, density, etc.) for each AVI polygon. This preliminary ELC map was used as the basis for designing field sampling programs.

The baseline area of each ELC (ecosite phase) and percent distribution was determined for the TLSA. ELC that covered $\leq 1\%$ of the TLSA at baseline were considered to be uncommon. ELC were also classified into sensitivity classes based on their susceptibilities to effects from changes in air quality, water quality, water quantity and their relative potential for reclamation success. Sensitive ecosites include bogs (i1 and i2), fens (j1, j2, k1, k2, and k3) as well as ecosite phases that occur on sandy substrates (a1, b1, b2, b3, b4). The area and percent distribution of uncommon and sensitive ELC were assessed in the TLSA.

Local Wetland Mapping

Wetland types in the TLSA were interpreted to *Alberta Wetland Inventory (AWI) Standards Version 1.0* (Halsey and Vitt, 1997) based on the AVI data. The AWI classification was completed by certified interpreters. The baseline area and percent distribution of each wetland type was calculated for the TLSA. Uncommon wetland types were defined as those with a total area $\leq 1\%$ of the TLSA.

Certain wetland types may be more sensitive to disturbance and direct or indirect impacts such as water quantity and quality changes and air emissions. Peatlands (bogs and fens) may be considered to be sensitive because of long post disturbance recovery time and specific water flow and quality requirements. Marshes, swamps and shallow open water areas have high water requirements but are adapted to frequent fluctuations in water levels, and are considered to be less sensitive. The area and percent distribution of uncommon and sensitive wetland classes were assessed in the TLSA.

1.1.2 TRSA

Baseline vegetation in the TRSA was mapped using Alberta Ground Cover Classification (AGCC version 3.0) provided by AENV Resource Data Division (2003) updated with recent surface disturbances and approved projects. The AGCC was developed from LandSat™ Imagery covering the entire NE boreal region of Alberta. The AGCC is broken down into major vegetation groups, including linear and industrial disturbances, agriculture, clearcuts, burns, coniferous forest, deciduous forest, mixedwood forest, shrublands, grasslands, wetlands (bogs, shrubby and graminoid classes), open water, barren lands, and unclassified lands. These classes were used to develop Landscape Cover Classes (LCC), by combining similar AGCC classes.

The AGCC was provided in a raster format (25 m pixel resolution). Because of the resolution of the classification, many smaller disturbance features such as trails, cutlines and many wellsites were not identified. These features were added to the classification in the development of a regional baseline landscape cover classification. Additional disturbance data was obtained from a variety of sources including Alberta Base Features (Alta LIS), Project exploratory program maps, AIPac (cutblocks and trails), approved EIAs (e.g., Devon Jackfish) and other disclosed sources for seismic lines, wellsites, cutlines and other disturbances. The baseline area of each landscape cover class was determined within the TRSA.

1.2 Field Programs

Two vegetation programs, rare plant surveys and detailed vegetation surveys, were conducted in the TLSA.

1.2.1 Rare Plant Surveys

A rare plant is defined as any native vascular or non-vascular plant that exists in low numbers or in very restricted areas in Alberta (Lancaster 2000, Kershaw *et. al.* 2001). The Alberta Natural Heritage Information Centre (ANHIC) is the conservation data centre for Alberta that ranks, maps, tracks and maintains a database of rare plant species and rare ecological communities and their locations in the province. ANHIC maintains two lists for plant species, a 'watch list' and a 'tracking list'. ANHIC defines rare ecological communities as recurring assemblages of plant species that are unusual, uncommon, of limited extent, encountered infrequently, in decline, or threatened (Allen 2008).

A search of the ANHIC database was conducted to locate records of previously located rare plants or rare ecological communities in the region. Current provincial rare or endangered plant species and communities and their ranked status was obtained from *ANHIC Tracking and Watch Lists - Vascular Plants, Mosses, Liverworts and Hornworts* (Gould 2006) and *Preliminary Ecological Community Tracking List* (Allen 2008). The *Species At Risk Act* (SARA) listing (Government of Canada 2008) was also reviewed to determine any nationally rare plant species that may occur in the area.

Field surveys were conducted in the spring and summer of 2008 in accordance with Alberta Native Plant Council (Lancaster 2000) protocols for conducting rare plant surveys. Common vascular and non-vascular plant species were recorded at each sample location. A total of 86 sample sites were visited within the TLSA focusing on natural vegetation habitats. The presence of rare ecological communities was also investigated during the rare plant surveys and also by examining recorded species distributions in detailed surveys.

Where a rare species was found, a GPS reading was taken, and the phenology, habitat and number of individuals was recorded. Whenever possible, voucher specimens were collected and/or photographs taken. All rare plant species identified are being independently confirmed by qualified taxonomic experts. Following confirmation, all collected specimens will be donated to the University of Calgary herbarium (vascular plants) or to the National Museum of Nature in Ottawa (non-vascular plants), and rare native plant report forms will be completed and provided to ANHIC.

1.2.2 Detailed Vegetation Surveys

In 2008, 87 detailed survey sites were sampled in the TLSA. Detailed survey plots were sampled to collect information to confirm the ELC mapping and to characterize the vegetation composition of the TLSA, including species composition, presence of rare plant species, and non-native invasive or weed species.

Detailed survey plots were established in representative vegetation types to characterize site and terrain conditions (moisture and nutrient conditions, slope, aspect, and location) describe the overstory species and characteristics (composition, cover, height, density), obtain information on forest serial stage, and to identify and assign cover values to all vascular plant

species. Common non-vascular plants were also recorded at the species or genus taxonomic level. Detailed plots were placed a minimum of 50 m from the stand edge to minimize edge effects. Overstory data was collected in a 400 m² quadrat, shrubs within a 100 m² quadrat, and vascular/nonvascular ground cover within five 1 m² quadrats, which were averaged for the site. In addition, all species that occurred within the 400 m² plot that did not fall within one of the 1m² quadrats were recorded for presence. Each vegetation plot was assigned an ecosite phase based on these characteristics. The presence of rare plants and non-native/weed species was also documented at each plot.

2.0 LITERATURE CITED

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Appendix F2

Baseline Data

APPENDIX F2: BASELINE DATA

1.0 ELC DESCRIPTION (ECOSITE PHASES)

Vegetation in the TLSA was classified to the ecosite phase level according to the *Field Guide to Ecosites of Northern Alberta* (Beckingham and Archibald 1996). This field guide was used to identify mappable ecological units that are relatively uniform in terms of biophysical characteristics. Ecosites are functional units that develop under specific environmental conditions reflecting the local climate, moisture regime and nutrient regime. Upland ecosite phases (typically aspen, pine and white spruce forests) are characterized by xeric to hygric moisture regimes with well drained soils and poor to rich nutrient levels. Wetland ecosite phases (typically treed, shrubby or graminoid fens, marshes and bogs) are characterized by hydric (saturated) soils and poor to rich nutrient levels. Other land cover types include anthropogenic classes (clearcuts, agricultural, industrial), natural disturbance/sparsely vegetated classes (burns, cutbanks, flooded lands) and open water classes (rivers, lakes).

The following descriptions of Ecological Land Classes (ELC) outline the main characteristics of each ecosite phase and other land cover types identified within the TLSA. Detailed plot data from the TLSA were combined with detailed plot data collected in adjacent projects to describe the characteristic species of each ELC. Characteristic species were defined as all species from the Regional Vegetation Dataset with a frequency of occurrence of >1/3 of plots in each ELC and a mean cover of 1% or greater. 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 87 detailed plots were sampled in the TLSA. Regional data was obtained from other baseline studies, and were made available to KNOC for use in the Project based on data sharing agreements. Data were obtained from the following baseline surveys:

- Newmont (53 detailed plots); and
- Devon (196 detailed plots).

a1 Lichen Jack Pine

This ecosite phase 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. The characteristic tree species is Jack pine. Characteristic shrub species include common blueberry, bearberry, and bog cranberry. Wild lily-of-the-valley is a typical herb, while Schreber's moss and reindeer lichen cover much of the forest floor.

Table F2-1: Characteristic Species in Ecosite Phase a1 (n=12)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Pinus banksiana</i>	jack pine	100.00	41.67
Shrub	<i>Vaccinium myrtilloides</i>	common blueberry	100.00	10.73
Shrub	<i>Vaccinium vitis-idaea</i>	bog cranberry	100.00	4.84
Shrub	<i>Ledum groenlandicum</i>	common Labrador tea	83.33	9.05
Shrub	<i>Rosa acicularis</i>	prickly rose	75.00	4.01
Shrub	<i>Arctostaphylos uva-ursi</i>	common bearberry	58.33	1.95
Forb	<i>Cornus canadensis</i>	bunchberry	75.00	1.86
Forb	<i>Maianthemum canadense</i>	wild lily-of-the-valley	50.00	1.05
Moss	<i>Pleurozium schreberi</i>	Schreber's moss	100.00	38.68
Lichen	<i>Cladina stellaris</i>	reindeer lichen	75.00	2.11
Lichen	<i>Cladina mitis</i>	reindeer lichen	66.67	11.65
Lichen	<i>Cladina rangiferina</i>	reindeer lichen	41.67	29.58

b1 Blueberry - Jack Pine/Aspen

This ecosite phase occurs in subxeric to mesic areas with poor to medium nutrient regimes. Soil drainage is rapid to moderate due to coarse textured soils. This ecosite phase 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 ecosite is composed of an equal mixture of Jack pine and aspen in the canopy with minor components of white birch, black spruce and white spruce. Green alder forms a sparse tall shrub layer while the diverse low shrub layer can include common blueberry and Labrador tea. Schreber's moss dominates the ground layer with bunchberry.

Table F2-2: Characteristic Species in Ecosite Phase b1 (n=27)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Populus tremuloides</i>	aspen	100.00	44.59
Tree	<i>Pinus banksiana</i>	jack pine	92.59	31.24
Tree	<i>Betula papyrifera</i>	white birch	51.85	11.07
Tree	<i>Picea glauca</i>	white spruce	40.74	7.76
Tree	<i>Picea mariana</i>	black spruce	37.04	9.43
Shrub	<i>Ledum groenlandicum</i>	common Labrador tea	96.30	11.35
Shrub	<i>Vaccinium vitis-idaea</i>	bog cranberry	96.30	4.00
Shrub	<i>Linnaea borealis</i>	twinline	96.30	3.52
Shrub	<i>Vaccinium myrtilloides</i>	common blueberry	92.59	6.22
Shrub	<i>Rosa acicularis</i>	prickly rose	62.96	5.58
Shrub	<i>Alnus viridis ssp crista</i>	green alder	55.56	7.96
Shrub	<i>Viburnum edule</i>	low-bush cranberry	40.74	2.55
Graminoid	<i>Leymus innovatus</i>	hairy wild rye	48.15	1.20
Forb	<i>Cornus canadensis</i>	bunchberry	100.00	12.15
Forb	<i>Epilobium angustifolium</i>	common fireweed	77.78	1.59
Forb	<i>Trientalis borealis</i>	northern starflower	70.37	1.83
Forb	<i>Lathyrus ochroleucus</i>	cream-colored vetchling	55.56	1.07
Fern/Allies	<i>Lycopodium annotinum</i>	stiff club-moss	51.85	1.27
Moss	<i>Pleurozium schreberi</i>	Schreber's moss	92.59	39.10
Moss	<i>Hylocomium splendens</i>	stair-step moss	59.26	4.81
Moss	<i>Ptilium crista-castrensis</i>	knight's plume moss	59.26	4.66

b2 Blueberry - Aspen/White Birch

The moisture regime for this ecosite phase ranges from subxeric to submesic and the nutrient regime ranges from poor to rich. Soil drainage varies from well to rapid. This ecosite phase is found on terrains ranging from level to upper slope and crest positions. Soils consist mostly of Brunisols and some Gray Luvisols. Soil parent material underlying this ecosite is predominantly glaciofluvial and occasionally aeolian. The tree canopy of this ecosite is dominated by aspen with scattered white birch and white spruce. Green alder forms a discontinuous tall shrub layer. Low shrubs include Labrador tea, prickly rose and common blueberry. The sparse ground cover is dominated by bunchberry and wild sarsaparilla.

Table F2-3: Characteristic Species in Ecosite Phase b2 (n=5)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Populus tremuloides</i>	aspen	100.00	61.08
Tree	<i>Picea glauca</i>	white spruce	100.00	2.90
Tree	<i>Betula papyrifera</i>	white birch	60.00	5.00
Tree	<i>Picea mariana</i>	black spruce	40.00	3.20
Shrub	<i>Alnus viridis ssp crispa</i>	green alder	100.00	15.22
Shrub	<i>Linnaea borealis</i>	twinlineflower	100.00	6.00
Shrub	<i>Vaccinium vitis-idaea</i>	bog cranberry	100.00	5.12
Shrub	<i>Ledum groenlandicum</i>	common Labrador tea	80.00	15.22
Shrub	<i>Rosa acicularis</i>	prickly rose	80.00	3.72
Shrub	<i>Vaccinium myrtilloides</i>	common blueberry	80.00	3.30
Shrub	<i>Viburnum edule</i>	low-bush cranberry	60.00	3.50
Shrub	<i>Lonicera involucrata</i>	bracted honeysuckle	40.00	3.00
Forb	<i>Cornus canadensis</i>	bunchberry	100.00	7.40
Forb	<i>Trientalis borealis</i>	northern starflower	100.00	4.80
Forb	<i>Mitella nuda</i>	bishop's-cap	60.00	2.52
Forb	<i>Aralia nudicaulis</i>	wild sarsaparilla	40.00	5.22
Forb	<i>Maianthemum canadense</i>	wild lily-of-the-valley	40.00	1.56
Forb	<i>Lathyrus ochroleucus</i>	cream-colored vetchling	40.00	1.08
Fern/Allies	<i>Lycopodium annotinum</i>	stiff club-moss	80.00	4.62

b3 Blueberry - Aspen/White Spruce

The blueberry aspen/white spruce ecosite phase 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 ecosite phase 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 ecosite phase. The shrub layer is composed of Labrador tea, common blueberry and prickly rose. Schreber's moss and scattered bunchberry dominate the ground layer.

Table F2-4: Characteristic Species in Ecosite Phase b3 (n=7)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Populus tremuloides</i>	aspen	85.71	33.86
Tree	<i>Pinus banksiana</i>	jack pine	85.71	4.36
Tree	<i>Picea glauca</i>	white spruce	71.43	36.50
Tree	<i>Picea mariana</i>	black spruce	42.86	25.50
Tree	<i>Betula papyrifera</i>	white birch	42.86	3.07
Shrub	<i>Vaccinium myrtilloides</i>	common blueberry	100.00	10.64
Shrub	<i>Linnaea borealis</i>	twinlineer	85.71	1.67
Shrub	<i>Ledum groenlandicum</i>	common Labrador tea	71.43	19.61
Shrub	<i>Vaccinium vitis-idaea</i>	bog cranberry	71.43	1.73
Shrub	<i>Rosa acicularis</i>	prickly rose	57.14	2.07
Shrub	<i>Viburnum edule</i>	low-bush cranberry	42.86	3.07
Forb	<i>Cornus canadensis</i>	bunchberry	100.00	6.66
Forb	<i>Epilobium angustifolium</i>	common fireweed	71.43	1.49
Forb	<i>Maianthemum canadense</i>	wild lily-of-the-valley	71.43	1.21
Forb	<i>Aralia nudicaulis</i>	wild sarsaparilla	57.14	2.14
Forb	<i>Trientalis borealis</i>	northern starflower	57.14	1.00
Fern/Allyes	<i>Lycopodium annotinum</i>	stiff club-moss	57.14	1.43
Moss	<i>Pleurozium schreberi</i>	Schreber's moss	85.71	46.24
Moss	<i>Ptilium crista-castrensis</i>	knight's plume moss	57.14	8.14

b4 Blueberry - White Spruce/Jack Pine

This phase occurs on slightly moister sites than the b1 ecosite phase. Moisture conditions range from xeric to mesic and nutrient regime varies from poor to medium. Topographic positions are the same as b3, typically midslope to crest, but also on level topography. Soil drainage is well to very rapid. Soils are classed typically as Brunisols with some Gray Luvisols. White spruce and Jack pine in equal amounts dominate the tree canopy of this ecosite with associated aspen. The tall shrub layer is composed of scattered green alder and the diverse low shrub layer is composed of Labrador tea, bog cranberry and common blueberry. Schreber's moss dominates the ground cover in association with bunchberry.

Table F2-5: Characteristic Species in Ecosite Phase b4 (n=10)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Pinus banksiana</i>	jack pine	90.00	21.05
Tree	<i>Picea glauca</i>	white spruce	80.00	37.25
Tree	<i>Populus tremuloides</i>	aspen	70.00	8.65
Tree	<i>Betula papyrifera</i>	white birch	40.00	3.85
Shrub	<i>Ledum groenlandicum</i>	common Labrador tea	90.00	27.25
Shrub	<i>Vaccinium myrtilloides</i>	common blueberry	90.00	7.95
Shrub	<i>Vaccinium vitis-idaea</i>	bog cranberry	90.00	1.75
Shrub	<i>Rosa acicularis</i>	prickly rose	70.00	5.05
Shrub	<i>Alnus viridis ssp crispa</i>	green alder	40.00	4.15
Shrub	<i>Viburnum edule</i>	low-bush cranberry	40.00	2.90
Forb	<i>Cornus canadensis</i>	bunchberry	100.00	3.10
Forb	<i>Trientalis borealis</i>	northern starflower	60.00	1.10
Forb	<i>Epilobium angustifolium</i>	common fireweed	50.00	1.15
Moss	<i>Pleurozium schreberi</i>	Schreber's moss	100.00	47.40
Moss	<i>Ptilium crista-castrensis</i>	knight's plume moss	80.00	7.40
Moss	<i>Hylocomium splendens</i>	stair-step moss	60.00	2.40
Lichen	<i>Cladina rangiferina</i>	reindeer lichen	50.00	6.65
Lichen	<i>Cladina mitis</i>	reindeer lichen	50.00	2.95

c1 Labrador Tea - Mesic Jack Pine/Black Spruce

The moisture regime for this ecosite phase is 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 ecosite is composed of Jack pine and black spruce. Low shrubs are common, including Labrador tea, common blueberry and bog cranberry. Schreber's moss, Knight's plume moss, stair-step moss and reindeer lichen form a dense ground cover with scattered bunchberry.

Table F2-6: Characteristic Species in Ecosite Phase c1 (n=28)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Pinus banksiana</i>	jack pine	100.00	46.43
Tree	<i>Picea mariana</i>	black spruce	92.86	32.28
Tree	<i>Populus tremuloides</i>	aspen	42.86	2.59
Shrub	<i>Vaccinium myrtilloides</i>	common blueberry	96.43	8.53
Shrub	<i>Vaccinium vitis-idaea</i>	bog cranberry	96.43	2.11
Shrub	<i>Ledum groenlandicum</i>	common Labrador tea	92.86	19.93
Shrub	<i>Rosa acicularis</i>	prickly rose	82.14	2.33
Shrub	<i>Linnaea borealis</i>	twinline	71.43	1.23
Forb	<i>Cornus canadensis</i>	bunchberry	96.43	3.09
Moss	<i>Pleurozium schreberi</i>	Schreber's moss	92.86	55.89
Moss	<i>Ptilium crista-castrensis</i>	knight's plume moss	75.00	5.74
Moss	<i>Hylocomium splendens</i>	stair-step moss	50.00	3.00
Lichen	<i>Cladina rangiferina</i>	reindeer lichen	53.57	11.91
Lichen	<i>Cladina stellaris</i>	reindeer lichen	46.43	1.59

d1 Low-bush Cranberry - Aspen

Submesic to subhygric moisture regimes characterize this ecosite phase with medium to rich nutrient regimes. Topography includes level, midslope, upper slope, and crest with all aspects except westerly. Soils consist predominantly of Gray Luvisols. Parent material is morainal, glaciolacustrine and glaciofluvial. This ecosite has a canopy dominated by aspen with a minor component of white spruce. Green alder form an open tall shrub layer with prickly rose and low-bush cranberry in the low shrub layer. The diverse ground layer is characterized by twinflower, wild sarsaparilla, bunchberry, common fireweed and northern starflower.

Table F2-7: Characteristic Species in Ecosite Phase d1 (n=22)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Populus tremuloides</i>	aspen	100.00	64.93
Tree	<i>Picea glauca</i>	white spruce	63.64	9.14
Tree	<i>Betula papyrifera</i>	white birch	36.36	6.43
Shrub	<i>Rosa acicularis</i>	prickly rose	95.45	13.84
Shrub	<i>Linnaea borealis</i>	twinflower	95.45	5.19
Shrub	<i>Viburnum edule</i>	low-bush cranberry	77.27	22.97
Shrub	<i>Rubus pubescens</i>	dewberry	72.73	6.03
Shrub	<i>Vaccinium myrtilloides</i>	common blueberry	68.18	2.73
Shrub	<i>Alnus viridis ssp crispera</i>	green alder	59.09	13.35
Shrub	<i>Vaccinium vitis-idaea</i>	bog cranberry	45.45	1.43
Shrub	<i>Lonicera involucrata</i>	bracted honeysuckle	45.45	1.24
Shrub	<i>Ledum groenlandicum</i>	common Labrador tea	40.91	2.74
Graminoid	<i>Calamagrostis canadensis</i>	bluejoint	59.09	2.57
Forb	<i>Epilobium angustifolium</i>	common fireweed	100.00	4.36
Forb	<i>Cornus canadensis</i>	bunchberry	95.45	11.90
Forb	<i>Aralia nudicaulis</i>	wild sarsaparilla	81.82	15.27
Forb	<i>Lathyrus ochroleucus</i>	cream-colored vetchling	72.73	1.36
Forb	<i>Maianthemum canadense</i>	wild lily-of-the-valley	72.73	1.00
Forb	<i>Mertensia paniculata</i>	tall lungwort	68.18	2.03
Forb	<i>Trientalis borealis</i>	northern starflower	68.18	1.20
Forb	<i>Pyrola asarifolia</i>	common pink wintergreen	68.18	1.17
Forb	<i>Petasites frigidus var palmatus</i>	palmate-leaved coltsfoot	40.91	1.21
Fern/Allies	<i>Lycopodium annotinum</i>	stiff club-moss	59.09	2.78
Moss	<i>Pleurozium schreberi</i>	Schreber's moss	63.64	4.42
Moss	<i>Hylocomium splendens</i>	stair-step moss	40.91	3.25
Moss	<i>Ptilium crista-castrensis</i>	knight's plume moss	36.36	1.96

d2 Low-bush Cranberry - Aspen/White Spruce

The moisture regime for this ecosite phase is submesic to subhygric. The nutrient regime is commonly medium, however it can occasionally have poor or rich nutrient regimes. Soils are typically Gray Luvisols and Eluviated Eutric Brunisols. Topography includes level, sloped, and crest positions at all aspects. Parent material is morainal, glaciofluvial, glaciolacustrine, glaciofluvial/morainal or lacustrine. Aspen and white spruce dominate the tree canopy of this ecosite with associated white birch. Prickly rose and low-bush cranberry characterize the low shrub layer. The ground layer is dominated by Schreber's moss and stair-step moss with bunchberry and wild sarsaparilla.

Table F2-8: Characteristic Species in Ecosite Phase d2 (n=22)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Populus tremuloides</i>	aspen	100.00	50.31
Tree	<i>Picea glauca</i>	white spruce	100.00	36.55
Tree	<i>Betula papyrifera</i>	white birch	59.09	7.81
Shrub	<i>Rosa acicularis</i>	prickly rose	95.45	8.54
Shrub	<i>Linnaea borealis</i>	twinflower	95.45	4.49
Shrub	<i>Viburnum edule</i>	low-bush cranberry	81.82	18.69
Shrub	<i>Rubus pubescens</i>	dewberry	72.73	2.78
Shrub	<i>Vaccinium vitis-idaea</i>	bog cranberry	68.18	1.06
Shrub	<i>Ledum groenlandicum</i>	common Labrador tea	59.09	4.30
Shrub	<i>Vaccinium myrtilloides</i>	common blueberry	54.55	2.73
Graminoid	<i>Calamagrostis canadensis</i>	bluejoint	50.00	2.39
Forb	<i>Cornus canadensis</i>	bunchberry	95.45	7.53
Forb	<i>Maianthemum canadense</i>	wild lily-of-the-valley	90.91	2.38
Forb	<i>Mertensia paniculata</i>	tall lungwort	86.36	3.12
Forb	<i>Trientalis borealis</i>	northern starflower	86.36	2.09
Forb	<i>Aralia nudicaulis</i>	wild sarsaparilla	77.27	12.75
Forb	<i>Epilobium angustifolium</i>	common fireweed	72.73	1.87
Fern/Allies	<i>Lycopodium annotinum</i>	stiff club-moss	81.82	5.35
Moss	<i>Pleurozium schreberi</i>	Schreber's moss	77.27	16.58
Moss	<i>Hylocomium splendens</i>	stair-step moss	72.73	11.09
Moss	<i>Ptilium crista-castrensis</i>	knight's plume moss	59.09	5.88

d3 Low-bush Cranberry - White Spruce

This ecosite phase is characterized by mesic to subhygric moisture regimes with medium nutrient levels. Topography in this phase is level to mid and upper sloped with all aspects except westerly. Soil types are predominantly classed as Gray Luvisols. White spruce dominates this ecosite with a minor component of aspen. There is typically no tall shrub layer. The low shrub layer is characterized by prickly rose and low-bush cranberry. Schreber's moss, Knight's plume moss and stair-step moss dominate the ground layer with bunchberry, bishop's-cap. Scattered wild sarsaparilla and lungwort are also typically present.

Table F2-9: Characteristic Species in Ecosite Phase d3 (n=7)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Picea glauca</i>	white spruce	100.00	49.64
Tree	<i>Populus tremuloides</i>	aspen	57.14	9.93
Tree	<i>Picea mariana</i>	black spruce	42.86	23.86
Tree	<i>Populus balsamifera</i>	balsam poplar	42.86	5.00
Shrub	<i>Rosa acicularis</i>	prickly rose	100.00	9.67
Shrub	<i>Viburnum edule</i>	low-bush cranberry	71.43	10.83
Shrub	<i>Ledum groenlandicum</i>	common Labrador tea	71.43	4.51
Shrub	<i>Rubus pubescens</i>	dewberry	42.86	6.30
Shrub	<i>Ribes oxycanthoides</i>	northern gooseberry	42.86	2.14
Forb	<i>Mitella nuda</i>	bishop's-cap	85.71	5.84
Forb	<i>Cornus canadensis</i>	bunchberry	85.71	5.83
Forb	<i>Petasites frigidus var palmatus</i>	palmate-leaved coltsfoot	71.43	3.01
Forb	<i>Mertensia paniculata</i>	tall lungwort	57.14	8.34
Forb	<i>Aralia nudicaulis</i>	wild sarsaparilla	42.86	6.07
Forb	<i>Actaea rubra</i>	red and white baneberry	42.86	2.37
Fern/Allies	<i>Equisetum pratense</i>	meadow horsetail	42.86	6.07
Fern/Allies	<i>Lycopodium annotinum</i>	stiff club-moss	42.86	1.40
Moss	<i>Hylocomium splendens</i>	stair-step moss	71.43	24.73
Moss	<i>Ptilium crista-castrensis</i>	knight's plume moss	42.86	16.36
Moss	<i>Pleurozium schreberi</i>	Schreber's moss	42.86	8.11

e1 Dogwood - Balsam Poplar/Aspen

This ecosite phase has a subhygric to mesic moisture regime with rich to medium nutrient levels. Topography is sloped to level facing all aspects except southerly. Soil types are typically Gleysols and Gleyed Gray Luvisols derived from glaciolacustrine, morainal and fluvial parent material. Balsam poplar, white birch and aspen typically dominate this ecosite. The shrub layer is composed of red-osier dogwood, bracted honeysuckle, low-bush cranberry and prickly rose. The ground layer is dominated by herbaceous species including wild sarsaparilla, common horsetail and bluejoint.

Table F2-10: Characteristic Species in Ecosite Phase e1 (n=3)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Populus balsamifera</i>	balsam poplar	100.00	87.50
Tree	<i>Betula papyrifera</i>	white birch	100.00	17.00
Tree	<i>Populus tremuloides</i>	aspen	66.67	13.67
Tree	<i>Picea glauca</i>	white spruce	66.67	2.33
Shrub	<i>Viburnum edule</i>	low-bush cranberry	100.00	8.83
Shrub	<i>Rosa acicularis</i>	prickly rose	100.00	6.17
Shrub	<i>Rubus pubescens</i>	dewberry	100.00	5.50
Shrub	<i>Lonicera involucrata</i>	bracted honeysuckle	66.67	22.00
Shrub	<i>Rubus idaeus</i>	wild red raspberry	66.67	6.33
Shrub	<i>Ledum groenlandicum</i>	common Labrador tea	66.67	1.67
Shrub	<i>Ribes oxycanthoides</i>	northern gooseberry	66.67	1.67
Shrub	<i>Cornus stolonifera</i>	red-osier dogwood	33.33	12.50
Shrub	<i>Rhamnus alnifolia</i>	alder-leaved buckthorn	33.33	5.83
Shrub	<i>Ribes triste</i>	wild red currant	33.33	1.17
Graminoid	<i>Calamagrostis canadensis</i>	bluejoint	100.00	8.17
Forb	<i>Actaea rubra</i>	red and white baneberry	100.00	8.83
Forb	<i>Epilobium angustifolium</i>	common fireweed	100.00	4.83
Forb	<i>Mertensia paniculata</i>	tall lungwort	100.00	3.50
Forb	<i>Mitella nuda</i>	bishop's-cap	100.00	1.17
Forb	<i>Cornus canadensis</i>	bunchberry	66.67	2.33
Forb	<i>Petasites frigidus</i>	sweet coltsfoot	66.67	1.33
Forb	<i>Galium triflorum</i>	sweet-scented bedstraw	66.67	1.00
Forb	<i>Aralia nudicaulis</i>	wild sarsaparilla	33.33	12.50
Forb	<i>Trientalis borealis</i>	northern starflower	33.33	2.50
Forb	<i>Petasites frigidus var sagittatus</i>	arrow-leaved coltsfoot	33.33	1.17
Fern/Allies	<i>Equisetum pratense</i>	meadow horsetail	66.67	8.33
Fern/Allies	<i>Equisetum arvense</i>	common horsetail	33.33	20.83
Fern/Allies	<i>Equisetum sylvaticum</i>	woodland horsetail	33.33	5.83
Moss	<i>Hylocomium splendens</i>	stair-step moss	66.67	1.33
Moss	<i>Ptilium crista-castrensis</i>	knight's plume moss	33.33	1.17

e2 Dogwood - Balsam Poplar/White Spruce

This ecosite phase is found on mesic to hygric sites with a medium to rich nutrient regime. It is found topographically on level or lower slope to upper slope positions. Soil drainage ranges from poor to well. Soils typically include Gleysols and Gray Luvisols. White spruce, balsam poplar and white birch form the tree canopy of this ecosite. Low-bush cranberry, river alder and red-osier dogwood dominate the diverse shrub layer. Other shrub species can include prickly rose, bracted honeysuckle, and wild red currant. Knight's plume moss and Schreber's moss dominate the ground layer in association with scattered meadow horsetail and wild sarsaparilla.

Table F2-11: Characteristic Species in Ecosite Phase e2 (n=6)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Populus balsamifera</i>	balsam poplar	100.00	46.58
Tree	<i>Picea glauca</i>	white spruce	100.00	40.58
Tree	<i>Betula papyrifera</i>	white birch	66.67	7.25
Tree	<i>Abies balsamea</i>	balsam fir	33.33	16.62
Shrub	<i>Viburnum edule</i>	low-bush cranberry	100.00	18.55
Shrub	<i>Rosa acicularis</i>	prickly rose	100.00	13.13
Shrub	<i>Rubus pubescens</i>	dewberry	100.00	7.85
Shrub	<i>Ribes triste</i>	wild red currant	100.00	7.63
Shrub	<i>Alnus incana ssp tenuifolia</i>	river alder	83.33	27.33
Shrub	<i>Lonicera involucrata</i>	bracted honeysuckle	83.33	5.92
Shrub	<i>Linnaea borealis</i>	twinlineer	83.33	1.92
Shrub	<i>Ribes oxycanthoides</i>	northern gooseberry	83.33	1.92
Shrub	<i>Cornus stolonifera</i>	red-osier dogwood	66.67	8.33
Shrub	<i>Rubus idaeus</i>	wild red raspberry	66.67	7.67
Shrub	<i>Lonicera dioica</i>	twining honeysuckle	66.67	3.00
Shrub	<i>Ribes lacustre</i>	bristly black currant	66.67	2.67
Shrub	<i>Rhamnus alnifolia</i>	alder-leaved buckthorn	50.00	4.08
Shrub	<i>Ledum groenlandicum</i>	common Labrador tea	50.00	2.42
Shrub	<i>Symphoricarpos albus</i>	snowberry	50.00	1.08
Shrub	<i>Ribes hudsonianum</i>	northern black currant	33.33	1.58
Graminoid	<i>Calamagrostis canadensis</i>	bluejoint	66.67	16.33
Forb	<i>Aralia nudicaulis</i>	wild sarsaparilla	100.00	12.63
Forb	<i>Mertensia paniculata</i>	tall lungwort	100.00	6.83
Forb	<i>Mitella nuda</i>	bishop's-cap	100.00	2.00
Forb	<i>Actaea rubra</i>	red and white baneberry	83.33	6.10
Forb	<i>Cornus canadensis</i>	bunchberry	83.33	4.57
Forb	<i>Petasites frigidus</i>	sweet coltsfoot	83.33	2.42
Forb	<i>Thalictrum sparsiflorum</i>	flat-fruited meadow rue	50.00	3.42
Forb	<i>Epilobium angustifolium</i>	common fireweed	50.00	2.42
Forb	<i>Caltha palustris</i>	marsh-marigold	50.00	1.83
Fern/Allies	<i>Equisetum pratense</i>	meadow horsetail	83.33	16.25
Fern/Allies	<i>Equisetum sylvaticum</i>	woodland horsetail	50.00	7.08
Moss	<i>Ptilium crista-castrensis</i>	knight's plume moss	100.00	10.83
Moss	<i>Pleurozium schreberi</i>	Schreber's moss	100.00	9.10
Moss	<i>Hylocomium splendens</i>	stair-step moss	33.33	1.25

e3 Dogwood - White Spruce

This ecosite phase is found on mesic to hygric sites with a medium to rich nutrient regime. Topographic position ranges from lower slope to upper slope and also includes level sites. Soil drainage ranges from poor to well. Soils are typically Gray Luvisols and Gleysols. White spruce dominates this ecosite with a minor component of balsam fir and white birch in the canopy. The dense shrub layer is dominated by red-osier dogwood, river alder and low-bush cranberry. Schreber's moss and stair-step moss dominate the diverse ground layer. Other typical species in the ground layer include bluejoint, common horsetail and bunchberry.

Table F2-12: Characteristic Species in Ecosite Phase e3 (n=4)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Picea glauca</i>	white spruce	100.00	43.75
Tree	<i>Abies balsamea</i>	balsam fir	75.00	19.38
Tree	<i>Betula papyrifera</i>	white birch	75.00	8.88
Tree	<i>Populus balsamifera</i>	balsam poplar	75.00	5.38
Shrub	<i>Viburnum edule</i>	low-bush cranberry	100.00	9.75
Shrub	<i>Rosa acicularis</i>	prickly rose	100.00	4.00
Shrub	<i>Rubus pubescens</i>	dewberry	100.00	3.25
Shrub	<i>Cornus stolonifera</i>	red-osier dogwood	75.00	11.13
Shrub	<i>Alnus incana ssp tenuifolia</i>	river alder	75.00	8.88
Shrub	<i>Lonicera involucrata</i>	bracted honeysuckle	75.00	2.63
Shrub	<i>Rubus idaeus</i>	wild red raspberry	75.00	2.13
Shrub	<i>Ribes triste</i>	wild red currant	75.00	1.88
Shrub	<i>Lonicera dioica</i>	twining honeysuckle	75.00	1.88
Shrub	<i>Ribes lacustre</i>	bristly black currant	75.00	1.63
Shrub	<i>Ribes oxycanthoides</i>	northern gooseberry	75.00	1.38
Graminoid	<i>Calamagrostis canadensis</i>	bluejoint	100.00	5.75
Graminoid	<i>Carex disperma</i>	two-seeded sedge	50.00	4.50
Forb	<i>Petasites frigidus</i>	sweet coltsfoot	100.00	2.00
Forb	<i>Cornus canadensis</i>	bunchberry	75.00	2.88
Forb	<i>Mertensia paniculata</i>	tall lungwort	75.00	2.13
Forb	<i>Mitella nuda</i>	bishop's-cap	75.00	2.13
Forb	<i>Epilobium angustifolium</i>	common fireweed	75.00	1.38
Forb	<i>Aralia nudicaulis</i>	wild sarsaparilla	50.00	1.75
Forb	<i>Actaea rubra</i>	red and white baneberry	50.00	1.25
Forb	<i>Pyrola asarifolia</i>	common pink wintergreen	50.00	1.00
Fern/Allies	<i>Equisetum arvense</i>	common horsetail	100.00	2.75
Fern/Allies	<i>Gymnocarpium dryopteris</i>	oak fern	50.00	1.00
Moss	<i>Hylocomium splendens</i>	stair-step moss	50.00	9.50
Moss	<i>Pleurozium schreberi</i>	Schreber's moss	50.00	4.75

f1 Horsetail - Balsam Poplar/Aspen

This ecosite phase has a mesic to hygric moisture regime with imperfect soil drainage. Nutrient levels are mostly rich with level topography and some lower to mid slopes. Aspects are level, northerly and easterly. Soil parent material consists of fluvial, glaciofluvial, and colluvium with mostly Regosol soils. Gleysols are also found throughout this ecosite phase. Balsam poplar and white birch with scattered white spruce form the tree canopy in this ecosite phase. The open shrub layer is dominated by bracted honeysuckle, prickly rose and red-osier dogwood. The ground layer is almost entirely composed of horsetails (meadow horsetail, common horsetail and woodland horsetail).

Table F2-13: Characteristic Species in Ecosite Phase f1 (n=2)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Populus balsamifera</i>	balsam poplar	100.00	67.50
Tree	<i>Picea glauca</i>	white spruce	50.00	7.50
Tree	<i>Betula papyrifera</i>	white birch	50.00	1.75
Shrub	<i>Lonicera involucrata</i>	bracted honeysuckle	100.00	21.25
Shrub	<i>Rosa acicularis</i>	prickly rose	100.00	5.45
Shrub	<i>Cornus stolonifera</i>	red-osier dogwood	100.00	4.25
Shrub	<i>Ribes triste</i>	wild red currant	100.00	3.95
Shrub	<i>Ribes oxycanthoides</i>	northern gooseberry	100.00	3.90
Shrub	<i>Rubus idaeus</i>	wild red raspberry	50.00	31.25
Shrub	<i>Rhamnus alnifolia</i>	alder-leaved buckthorn	50.00	31.25
Shrub	<i>Ribes hudsonianum</i>	northern black currant	50.00	18.75
Shrub	<i>Alnus viridis ssp crispa</i>	green alder	50.00	18.75
Shrub	<i>Rubus pubescens</i>	dewberry	50.00	3.75
Shrub	<i>Ledum groenlandicum</i>	common Labrador tea	50.00	3.00
Shrub	<i>Betula pumila</i>	dwarf birch	50.00	2.50
Forb	<i>Mitella nuda</i>	bishop's-cap	100.00	2.25
Forb	<i>Cornus canadensis</i>	bunchberry	50.00	1.85
Forb	<i>Urtica dioica</i>	common nettle	50.00	1.75
Forb	<i>Petasites frigidus var palmatus</i>	palmate-leaved coltsfoot	50.00	1.05
Fern/Allies	<i>Equisetum pratense</i>	meadow horsetail	50.00	8.75
Fern/Allies	<i>Equisetum sylvaticum</i>	woodland horsetail	50.00	8.75
Fern/Allies	<i>Equisetum arvense</i>	common horsetail	50.00	3.95

f3 Horsetail - White Spruce

Subhydric to mesic moisture regimes dominate this ecosite phase with medium to rich nutrient levels. Topography is mostly level with lower slope, depressions, and toe positions with level and northerly aspects. Soil types include Gleysols with imperfect drainage derived from morainal, glaciolacustrine, fluvial, and glaciofluvial parent material. White spruce dominates this ecosite with balsam fir and balsam poplar as associates. The diverse shrub layer is dominated by bracted honeysuckle and low-bush cranberry. The dense ground layer is dominated by mosses (stair-step moss, Schreber's moss and Knight's plume moss) and horsetails (common horsetail and meadow horsetail).

Table F2-14: Characteristic Species in Ecosite Phase f3 (n=4)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Picea glauca</i>	white spruce	100.00	36.88
Tree	<i>Populus balsamifera</i>	balsam poplar	75.00	11.88
Tree	<i>Abies balsamea</i>	balsam fir	75.00	8.50
Tree	<i>Populus tremuloides</i>	aspen	75.00	2.13
Tree	<i>Betula papyrifera</i>	white birch	50.00	2.00
Shrub	<i>Lonicera involucrata</i>	bracted honeysuckle	100.00	9.13
Shrub	<i>Viburnum edule</i>	low-bush cranberry	100.00	6.88
Shrub	<i>Rosa acicularis</i>	prickly rose	100.00	3.95
Shrub	<i>Linnaea borealis</i>	twinlineflower	100.00	3.40
Shrub	<i>Rubus pubescens</i>	dewberry	75.00	3.63
Shrub	<i>Ledum groenlandicum</i>	common Labrador tea	75.00	2.88
Shrub	<i>Ribes oxycanthoides</i>	northern gooseberry	75.00	1.78
Shrub	<i>Alnus viridis ssp crispa</i>	green alder	50.00	5.88
Shrub	<i>Cornus stolonifera</i>	red-osier dogwood	50.00	4.75
Graminoid	<i>Calamagrostis canadensis</i>	bluejoint	50.00	2.25
Forb	<i>Mitella nuda</i>	bishop's-cap	100.00	4.43
Forb	<i>Cornus canadensis</i>	bunchberry	75.00	8.28
Forb	<i>Aralia nudicaulis</i>	wild sarsaparilla	75.00	6.95
Forb	<i>Petasites frigidus</i>	sweet coltsfoot	75.00	2.13
Forb	<i>Mertensia paniculata</i>	tall lungwort	75.00	2.00
Forb	<i>Caltha palustris</i>	marsh-marigold	50.00	1.00
Fern/Allies	<i>Equisetum arvense</i>	common horsetail	50.00	25.00
Fern/Allies	<i>Equisetum pratense</i>	meadow horsetail	50.00	15.60
Moss	<i>Ptilium crista-castrensis</i>	knight's plume moss	100.00	41.50
Moss	<i>Hylocomium splendens</i>	stair-step moss	100.00	16.00
Moss	<i>Pleurozium schreberi</i>	Schreber's moss	75.00	15.63
Moss	<i>Climacium dendroides</i>	tree moss	50.00	1.25

g1 Labrador Tea - Subhygric Black Spruce/Jack Pine

Poor nutrient substrates dominate this ecosite phase with mostly subhygric to subhydric moisture regimes. Soil types are Gleysols and Gleyed Gray Luvisols with imperfect to poor drainage. Topography includes level to crest positions as well as depressions with predominantly level aspects. Soil parent material consists of morainal, organic, glaciofluvial and glaciolacustrine. Black spruce and Jack pine dominate this ecosite. The shrub layer is dominated by Labrador tea with bog cranberry and common blueberry. The ground layer is dominated by Schreber's moss, Knight's plume moss, stair-step moss and reindeer lichen.

Table F2-15: Characteristic Species in Ecosite Phase g1 (n=28)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Picea mariana</i>	black spruce	96.43	85.94
Tree	<i>Pinus banksiana</i>	jack pine	78.57	20.20
Shrub	<i>Ledum groenlandicum</i>	common Labrador tea	96.43	24.46
Shrub	<i>Vaccinium vitis-idaea</i>	bog cranberry	92.86	4.55
Shrub	<i>Vaccinium myrtilloides</i>	common blueberry	89.29	4.43
Shrub	<i>Rosa acicularis</i>	prickly rose	50.00	1.49
Forb	<i>Cornus canadensis</i>	bunchberry	78.57	2.30
Moss	<i>Pleurozium schreberi</i>	Schreber's moss	89.29	56.82
Moss	<i>Ptilium crista-castrensis</i>	knight's plume moss	64.29	8.03
Moss	<i>Hylocomium splendens</i>	stair-step moss	57.14	12.96
Lichen	<i>Cladina rangiferina</i>	reindeer lichen	53.57	4.10

h1 Labrador Tea - White Spruce/Black Spruce

Rich to poor nutrient levels are found throughout this ecosite phase with mesic to hydric moisture regimes. Topography is dominantly level with poor soil drainage. Soils are varied and can include Gleysols, Terric Humisols, and Regosols derived from glaciolacustrine, morainal, lacustrine, fluvial, and glaciofluvial parent materials. Black spruce and white spruce dominate the tree canopy of this ecosite. Labrador tea dominates the shrub layer. The ground layer is dominated by Schreber's moss and stair-step moss with scattered horsetail (common horsetail and meadow horsetail).

Table F2-16: Characteristic Species in Ecosite Phase h1 (n=14)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Picea mariana</i>	black spruce	100.00	47.07
Tree	<i>Picea glauca</i>	white spruce	71.43	27.86
Tree	<i>Betula papyrifera</i>	white birch	35.71	10.07
Tree	<i>Larix laricina</i>	tamarack	35.71	2.00
Shrub	<i>Ledum groenlandicum</i>	common Labrador tea	92.86	38.58
Shrub	<i>Vaccinium vitis-idaea</i>	bog cranberry	92.86	2.54
Shrub	<i>Rosa acicularis</i>	prickly rose	78.57	4.00
Shrub	<i>Salix sp.</i>	unknown willow	35.71	2.89
Forb	<i>Cornus canadensis</i>	bunchberry	71.43	1.24
Fern/Allies	<i>Equisetum arvense</i>	common horsetail	50.00	3.34
Fern/Allies	<i>Equisetum pratense</i>	meadow horsetail	42.86	1.04
Moss	<i>Pleurozium schreberi</i>	Schreber's moss	92.86	43.75
Moss	<i>Hylocomium splendens</i>	stair-step moss	78.57	26.14
Moss	<i>Ptilium crista-castrensis</i>	knight's plume moss	50.00	4.67

i2 Shrubby Bog

This ecosite phase is characterized by wet fibric soil conditions with a very poor to poor nutrient regime. This ecosite phase occurs in level and depressional areas. Soils were formed from organic or organic/glaciolacustrine parent materials and include Fibrisols, Organic Cryosols and Mesisols. As this ecosite phase has no tree canopy, shrub species are the dominant vegetative cover. Black spruce less than 2 m tall and Labrador tea dominate the shrub layer in this ecosite. The ground layer is composed of bog cranberry, small bog cranberry, cloudberry, peat moss, Schreber's moss and reindeer lichen.

Table F2-17: Characteristic Species in Ecosite Phase i2 (n=8)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Picea mariana</i>	black spruce	100.00	75.51
Shrub	<i>Ledum groenlandicum</i>	common Labrador tea	100.00	41.50
Shrub	<i>Vaccinium vitis-idaea</i>	bog cranberry	100.00	5.23
Shrub	<i>Oxycoccus microcarpus</i>	small bog cranberry	100.00	2.33
Shrub	<i>Rubus chamaemorus</i>	cloudberry	87.50	12.31
Forb	<i>Smilacina trifolia</i>	three-leaved Solomon's-seal	62.50	1.76
Moss	<i>Sphagnum spp.</i>	peat moss	100.00	55.16
Moss	<i>Pleurozium schreberi</i>	Schreber's moss	75.00	17.18
Lichen	<i>Cladina mitis</i>	reindeer lichen	62.50	7.10
Lichen	<i>Cladina rangiferina</i>	reindeer lichen	37.50	9.06

j1 Treed Poor Fen

This ecosite is found in both level and depressional areas with high water tables and is intermediate in nutrient levels between the bog and the rich fen ecosites. Subhydic to hygric moisture regimes dominate this ecosite phase with poor to very poor nutrient regimes. Similar to the Bog ecosite, topography is depressional to level with level slopes. Soils originate predominantly from organic parent materials with some smaller deposits of organic/glaciolacustrine, organic/morainal and organic/glaciofluvial materials. Soil types include Mesisols and Fibrisols. The open tree canopy in this ecosite is composed of black spruce and tamarack. Labrador tea, bog birch and willows dominate the shrub layer. The ground layer is typically composed of Schreber's moss and peat moss with scattered meadow horsetail and three-leaved Solomon's-seal.

Table F2-18: Characteristic Species in Ecosite Phase j1 (n=39)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Picea mariana</i>	black spruce	97.44	48.61
Tree	<i>Larix laricina</i>	tamarack	71.79	9.69
Shrub	<i>Ledum groenlandicum</i>	common Labrador tea	100.00	32.21
Shrub	<i>Vaccinium vitis-idaea</i>	bog cranberry	97.44	2.92
Shrub	<i>Oxycoccus microcarpus</i>	small bog cranberry	71.79	1.29
Shrub	<i>Salix spp.</i>	willow	58.97	4.67
Shrub	<i>Rubus chamaemorus</i>	cloudberry	61.54	2.29
Forb	<i>Smilacina trifolia</i>	three-leaved Solomon's-seal	71.79	2.51
Fern/Allies	<i>Equisetum pratense</i>	meadow horsetail	33.33	1.21
Moss	<i>Sphagnum spp.</i>	peat moss	84.62	32.59
Moss	<i>Pleurozium schreberi</i>	Schreber's moss	79.49	22.91
Moss	<i>Hylocomium splendens</i>	stair-step moss	53.85	3.17
Moss	<i>Tomentypnum nitens</i>	golden moss	33.33	2.50
Lichen	<i>Cladina rangiferina</i>	reindeer lichen	41.03	1.26

j2 Shrubby Poor Fen

This ecosite phase also has very wet fibric soils with a medium to poor nutrient regime and can be found 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 and morainal parent material. Black spruce and tamarack less than 2 m in height along with other shrub species including Labrador tea and bog birch dominate this ecosite. The sparse ground layer typically includes peat moss, golden moss, Schreber's moss, water sedge and three-leaved Solomon's-seal.

Table F2-19: Characteristic Species in Ecosite Phase j2 (n=25)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Picea mariana</i>	black spruce	100.00	45.99
Tree	<i>Larix laricina</i>	tamarack	64.00	6.15
Shrub	<i>Ledum groenlandicum</i>	common Labrador tea	100.00	24.48
Shrub	<i>Vaccinium vitis-idaea</i>	bog cranberry	80.00	2.17
Shrub	<i>Betula glandulosa</i>	bog birch	60.00	9.42
Shrub	<i>Salix spp.</i>	willow	60.00	4.61
Shrub	<i>Rubus chamaemorus</i>	cloudberry	48.00	2.08
Graminoid	<i>Carex aquatilis</i>	water sedge	60.00	5.94
Forb	<i>Smilacina trifolia</i>	three-leaved Solomon's-seal	68.00	2.66
Moss	<i>Sphagnum spp.</i>	peat moss	88.00	48.36
Moss	<i>Pleurozium schreberi</i>	Schreber's moss	72.00	4.84
Moss	<i>Tomentypnum nitens</i>	golden moss	48.00	4.92
Lichen	<i>Cladina rangiferina</i>	reindeer lichen	72.00	2.54

k1 Treed Rich Fen

This ecosite is associated with flowing water and alkaline nutrient-rich soil conditions in level and depressional topographic areas. The moisture regime for this ecosite phase ranges from hydric to hygric with a very rich to medium nutrient regime. This ecosite phase can be found mostly in level and depressional topographic locations with level aspects. Soil parent material is organic with Mesisols being the dominant soil type. The tree canopy of this ecosite is composed of tamarack and black spruce. Dwarf birch and bog birch dominate the shrub layer that can also include Labrador tea. The diverse ground layer includes peat moss, golden moss, Schreber's moss, buck-bean, three-leaved Solomon's-seal and sedges.

Table F2-20: Characteristic Species in Ecosite Phase k1 (n=25)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Larix laricina</i>	tamarack	96.00	44.49
Tree	<i>Picea mariana</i>	black spruce	88.00	30.04
Shrub	<i>Ledum groenlandicum</i>	common Labrador tea	84.00	24.54
Shrub	<i>Oxycoccus microcarpus</i>	small bog cranberry	84.00	1.67
Shrub	<i>Salix spp.</i>	willow	68.00	4.21
Shrub	<i>Vaccinium vitis-idaea</i>	bog cranberry	64.00	1.59
Shrub	<i>Andromeda polifolia</i>	bog rosemary	60.00	3.23
Shrub	<i>Betula glandulosa</i>	bog birch	56.00	15.60
Shrub	<i>Betula pumila</i>	dwarf birch	48.00	7.54
Graminoid	<i>Carex spp.</i>	sedge	48.00	6.56
Graminoid	<i>Carex chordorrhiza</i>	prostrate sedge	36.00	1.66
Forb	<i>Smilacina trifolia</i>	three-leaved Solomon's-seal	88.00	5.51
Forb	<i>Caltha palustris</i>	marsh-marigold	80.00	1.39
Forb	<i>Potentilla palustris</i>	marsh cinquefoil	76.00	2.28
Forb	<i>Menyanthes trifoliata</i>	buck-bean	36.00	4.76
Fern/Allies	<i>Equisetum hyemale</i>	common scouring-rush	44.00	1.28
Fern/Allies	<i>Equisetum fluviatile</i>	swamp horsetail	40.00	1.29
Moss	<i>Sphagnum spp.</i>	peat moss	76.00	28.26
Moss	<i>Pleurozium schreberi</i>	Schreber's moss	64.00	9.17
Moss	<i>Tomentypnum nitens</i>	golden moss	44.00	7.81

k2 Shrubby Rich Fen

This ecosite phase is found in hygric to hydric moisture regimes with predominantly rich nutrient regimes. Aspects are level in level to depressional topographic locations. 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 bog birch and dwarf birch. The diverse ground layer includes peat moss, golden moss, buck-bean and sedges.

Table F2-21: Characteristic Species in Ecosite Phase k2 (n=23)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Larix laricina</i>	tamarack	82.61	20.12
Tree	<i>Picea mariana</i>	black spruce	60.87	7.28
Shrub	<i>Salix spp.</i>	willow	69.57	9.64
Shrub	<i>Ledum groenlandicum</i>	common Labrador tea	60.87	3.83
Shrub	<i>Oxycoccus microcarpus</i>	small bog cranberry	60.87	1.00
Shrub	<i>Betula pumila</i>	dwarf birch	56.52	19.47
Shrub	<i>Andromeda polifolia</i>	bog rosemary	56.52	2.04
Shrub	<i>Salix pedicellaris</i>	bog willow	47.83	1.72
Shrub	<i>Betula glandulosa</i>	bog birch	43.48	14.33
Graminoid	<i>Carex spp.</i>	sedge	47.83	8.16
Forb	<i>Caltha palustris</i>	marsh-marigold	73.91	2.30
Forb	<i>Potentilla palustris</i>	marsh cinquefoil	73.91	1.18
Forb	<i>Smilacina trifolia</i>	three-leaved Solomon's-seal	69.57	3.06
Forb	<i>Menyanthes trifoliata</i>	buck-bean	47.83	7.19
Moss	<i>Tomentypnum nitens</i>	golden moss	60.87	15.53
Moss	<i>Sphagnum spp.</i>	peat moss	43.48	17.84
Moss	<i>Aulacomnium palustre</i>	tufted moss	34.78	1.83

k3 Graminoid Rich Fen

This ecosite phase is found in areas with hygric to hydric moisture regimes and rich to very rich nutrient regimes. It occurs in depressional to level topographic areas. Soil types are predominantly Gleysols, Mesisols and Fibrisols. Soil parent material is organic, lacustrine or organic/glaciolacustrine. This ecosite phase is dominated by graminoid species, such as sedges and cotton grass. Buck-bean, brown moss and marsh cinquefoil are also common.

Table F2-22: Characteristic Species in Ecosite Phase k3 (n=8)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Graminoid	<i>Eriophorum angustifolium</i>	cotton grass	75.00	8.81
Graminoid	<i>Carex aquatilis</i>	water sedge	62.50	7.81
Graminoid	<i>Carex diandra</i>	two-stamened sedge	50.00	6.75
Graminoid	<i>Poa spp.</i>	bluegrass	37.50	14.69
Graminoid	<i>Carex limosa</i>	mud sedge	37.50	4.96
Graminoid	<i>Carex paupercula</i>	poor sedge	37.50	3.56
Forb	<i>Menyanthes trifoliata</i>	buck-bean	50.00	6.75
Forb	<i>Potentilla palustris</i>	marsh cinquefoil	50.00	6.45
Fern/Allies	<i>Equisetum hyemale</i>	common scouring-rush	37.50	2.69
Fern/Allies	<i>Equisetum fluviatile</i>	swamp horsetail	37.50	1.19
Moss	<i>Drepanocladus spp.</i>	brown moss	37.50	20.63

Riparian Shrublands

Riparian shrublands are defined by association with creek and river valleys, and pertain to shrublands that occur on well drained slopes or alluvial deposits. The moisture regime ranges from xeric to hygric. Shrublands that are wetter than this are classified as ecosite phases i2, j2 or k2. The nutrient regime is typically medium to rich, especially in areas periodically flooded. Some riparian shrublands are regenerating phases of d, e or f ecosite phases, that never fully succeed into mature forests due to recurrent flooding disturbances. Other riparian shrublands occur on steep slopes that are too dry and subject to too much downslope soil movement to allow tree growth. River alder and willow typically dominates these sites with a small component of balsam poplar scattered throughout. The ground layer is sparse but can include bluejoint, sedges and marsh marigold.

Table F2-23: Characteristic Species in Riparian Shrubland (n=6)

Type	Scientific Name	Common Name	Frequency (%)	Mean Cover (%)
Tree	<i>Populus balsamifera</i>	balsam poplar	33.33	3.25
Shrub	<i>Rubus pubescens</i>	dewberry	66.67	2.00
Shrub	<i>Alnus incana ssp tenuifolia</i>	river alder	50.00	17.08
Shrub	<i>Salix bebbiana</i>	beaked willow	50.00	4.83
Shrub	<i>Salix spp.</i>	willow	33.33	20.83
Shrub	<i>Salix maccalliana</i>	velvet-fruited willow	33.33	7.08
Shrub	<i>Ribes lacustre</i>	bristly black currant	33.33	1.33
Graminoid	<i>Calamagrostis canadensis</i>	bluejoint	100.00	28.33
Graminoid	<i>Carex spp.</i>	sedge	50.00	7.25
Forb	<i>Galium trifidum</i>	small bedstraw	83.33	1.08
Forb	<i>Caltha palustris</i>	marsh-marigold	66.67	7.00
Forb	<i>Mitella nuda</i>	bishop's-cap	66.67	1.50
Forb	<i>Mertensia paniculata</i>	tall lungwort	50.00	2.58
Fern/Allies	<i>Equisetum arvense</i>	common horsetail	33.33	1.17
Moss	<i>Mnium spp.</i>	mnium	50.00	4.25
Moss	<i>Aulacomnium palustre</i>	tufted moss	50.00	4.25
Moss	<i>Climacium dendroides</i>	tree moss	50.00	1.08

Upland Shrublands

Upland 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.

Open Water

This classification refers to deep open water areas, with submergent vegetation (pondweeds and water-milfoil), emergent macrophytes (arrowhead, water arum and buck-bean), algae, and surrounding marsh or fen vegetation areas.

Rivers

This classification refers to shallow open water areas with continuous water movement and emergent macrophytes. Rivers are typically bounded by riparian meadows or shrublands and sometimes by ecosite phases k1, k2 or k3.

2.0 ALBERTA WETLAND TYPES (AWI)

Wetlands are defined in Canada as “...*land that is saturated with water long enough to promote wetland or aquatic processes as indicated by poorly drained soils, hydrophytic vegetation and various kinds of biological activity which are adapted to a wet environment*” (NWWG 1988).

Wetlands within the TLSA were classified according to the Alberta Wetland Inventory Standards (version 1.0) developed by Halsey and Vitt (1997) based on aerial photography previously typed to Alberta Vegetation Inventory (AVI) standards. This system follows the wetland classes developed by the National Wetlands Working Group (1988). Five wetland classes are defined: shallow open water, marsh, swamp, fen, and bog. Three are non-peat forming (shallow open water, marsh, swamp) and two are peat forming (bog and fen). Wetland classes are modified into finer groups based on vegetation cover, developmental structure, and local landforms (Table F2-24).

Table F2-24: Wetland Classification Scheme

Classification	Symbol
<i>Wetland Class</i>	
Bog	B
Fen	F
Swamp	S
Marsh	M
Shallow Open Water	W
Non-wetland	Z
<i>Vegetation Modifier</i>	
Forested closed canopy >70% tree cover	F
Wooded open canopy >6% - 70% tree cover	T
Open: shrubs, sedges, graminoids, herbs, etc. <6% tree cover	O
<i>Wetland Complex Landform Modifier</i>	
Permafrost present	X
Patterning present	P
Permafrost or patterning is not present	N
<i>Local Landform Modifier</i>	
Collapse scar	C
Internal lawn with islands of forested peat plateau	R
Internal lawns	I
No internal lawns are present	N
Shrub cover >25% when tree cover <6%	S
Graminoid dominated with shrub cover <25% and tree cover <6%	G

BOGS

Bogs are ombrotrophic peatlands, receiving water and nutrients 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 and are dominated by oligotrophic species such as rusty peat moss, red-stem feather moss, stair-step moss, reindeer lichens and ericaceous shrubs. Bogs may be open, wooded or forested, with black spruce as the only dominant tree species (Halsey and Vitt 1997; Keys 1992).

In the TLSA, bogs are an uncommon wetland type, occupying < 1% of the TLSA and 1 % of the wetland types. One bog class has been identified: BTNN (wooded bogs with no internal lawns).

Wooded Bogs without Internal Lawns (BTNN)

This community is wooded, with total black spruce cover ranging between 6% and 70%, and with no permafrost, patterning or internal lawns present. These 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 and Vitt 1997).

This bog type is dominated by black spruce typically less than 10 m in height and typically between 5% and 30% in canopy closure. The shrub layer is dominated by low shrub species such as 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. Peat mosses and reindeer lichens dominate the ground cover. Other common mosses include wavy dicranum and red-stem feather moss.

FENS

Fens are also peatlands, but they are affected by mineral soil water (ground and/or surface water), which may be relatively rich in nutrients (minerotrophic). Unlike bogs, fens have some degree of water movement through them and more nutrients as a result. Water levels in fens are typically at or near the peat surface. Fens are classed into poor fens, moderate-rich fens and extreme-rich fens based on a vegetation (species richness) gradient that correlates strongly with a chemical gradient.

Poor fens are low in indicator species such as tamarack, willow and dwarf birch and high in oligotrophic and mesotrophic species including peat mosses, black spruce, cloudberry and Labrador tea. They are moderately acidic (pH 4.5 to 5.5), poor in base cations and have little or no alkalinity. Moderate-rich fens are intermediate between poor and extreme-rich fens with a slightly acidic to neutral pH (5.5 to 7.0). They have low to moderate alkalinity and typically support a ground layer of brown mosses (e.g., *Drepanocladus spp.*, *Brachythecium spp.*, or *Calliigon spp.*). Extreme-rich fens are high in indicator species such as: dwarf birch, sedges, swamp horsetail, marsh marigold, marsh cinquefoil, tamarack, willow, and water mosses (*Drepanocladus spp.*, *Scorpidium spp.*, and *Campylium spp.*). These sites have a high pH (above 7.0). They have high concentrations of base cations and high alkalinity (Halsey and Vitt 1997, OSWWG 2000).

In the TLSA fens occupy 48% of the wetland types. Four fen classes were observed: FONG (non-patterned, open, graminoid fens), FONS (non-patterned, open, shrubby fens), FTNN (non-patterned, wooded fens with no internal lawns) and FTPN (patterned, wooded fens with no internal lawns).

Non-patterned, Open, Graminoid-dominated Fens (FONG)

This fen type is open, dominated by graminoid species and has no patterning. There is little tree cover, comprising a few scattered tamarack and/or black spruce trees. Tall shrub cover is less than 25%, although low shrubs may be mixed in with the graminoid vegetation. 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 (SONS), inland of lacustrine marshes (MONG), or as

small isolated basins. They may also occur as wetter phases in featureless wooded fens (FTNN) in flat, featureless peatlands sloping gently in the direction of drainage (Halsey and Vitt 1997).

This community is uncommon in the TLSA. Graminoid species dominate this community in various combinations with sedges as the most prevalent species, however common tall manna grass (*Glyceria grandis*), bluejoint (*Calamagrostis canadensis*), and rough hair grass (*Agrostis scabra*) can also be present. Scattered low shrubs including dwarf birch, sweet gale (*Myrica gale*) and flat-leaved willow (*Salix planifolia*) are present throughout this fen type. Peat moss dominates the ground cover.

Non-patterned, Open, Shrub-dominated Fens (FONS)

These fens are shrub-dominated, non-patterned, non-treed fens dominated by birch and willow (typically below 1.5 m in height). They are found as small isolated basins within wooded fens (FTNN) sloping gently in the direction of drainage, and inland of riverine swamps (SONS) and lacustrine marshes (MONS). These fens can be poor or rich (Halsey and Vitt 1997).

This wetland type is scattered throughout the study area typically in association with creeks. Typical shrub species can include dwarf birch, flat-leaved willow, bog willow (*Salix pedicellaris*), bog rosemary (*Andromeda polifolia*) and leatherleaf (*Chamadaphne calyculata*). Common graminoid species include sedges, sheathed cotton grass (*Eriophorum vaginatum*) and common tall manna grass. Peat mosses are common on hummocks in association with golden moss and tufted moss. Water mosses are typically found in water filled depressions.

Non-patterned, Wooded Fens with No Internal Lawns (FTNN)

This wetland community is the second most common in the TLSA after wooded swamps. These non-patterned fens are wooded with a combination of black spruce and tamarack. These fens can be poor to rich depending on local drainage/seepage conditions (Halsey and Vitt 1997). Low shrubs dominate a large proportion of this community including myrtle-leaved willow (*Salix myrtifolia*), Labrador tea, dwarf-birch, cloudberry and bog cranberry. The ground cover is composed predominantly of sedges and sheathed cotton grass, along with a wide variety of forb species. Peat moss in association with golden moss and tufted moss form hummocks through the system. Red-stem feather moss, stair-step moss, and reindeer lichen are common on the tops of hummocks, whereas pools are dominated by water mosses.

Patterned, Wooded Fens with No Internal Lawns (FTPN)

This wetland community is characterized by open wet “flarks” and drier shrubby or wooded “strings”. Strings are oriented perpendicular to surface water flow and can be treed with black spruce, tamarack, willows and birch. While graminoid species are typically associated with the standing water found in the flarks. Moss species will be dependent on the richness of each particular fen with peat moss in poor fens to brown mosses in extremely rich fens (Halsey and Vitt 1997).

SWAMPS

Swamps are considered as non-peatlands but can have deep pockets of peat accumulation. They tend to have medium to tall overstory trees (>12 m) and/or a high cover of tall shrubs (>2 m). They have a poorly developed bryophyte (moss) layer because of a combination of strong seasonal fluctuations in the water level that results in high decomposition rates and high rates of vascular plant production. The vegetation composition varies widely and may be composed of some combination of black spruce, tamarack, birch and willow (Halsey and Vitt 1997, OSWWG 2000). Swamps are not common in the boreal forest, being generally confined to the transition zone between peatlands and upland forests.

In the TLSA swamps comprise 50% of the wetlands. This may be related to the terrain, such that water seepage rates are high and contact with the mineral soil is probable. Swamp classes that were identified in the TLSA include SONS (shrubby swamps) and STNN (wooded swamps).

Shrubby Swamps (SONS)

Shrubby swamps typically occur along floodplains, stream terraces and peatland margins. 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 basal 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 two metres. Other species may include dwarf birch, paper 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. Red-stem feather 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 and Vitt 1997).

Wooded Swamps (STNN)

Wooded swamps are characterized by low to moderate canopy covers and medium to tall (8 to 16 m) trees. They typically have a canopy of black spruce and tamarack, but a few scattered white spruce, balsam poplar, paper birch, or balsam fir may be present where mineral soil is close to the surface. Wooded swamps occur in association with floodplains, streams and along the margins of some peatland complexes. Tree height is greater in swamps than in fens probably because the organic accumulation in swamps is less than 40 cm (Halsey and Vitt 1997).

This swamp type is the dominant wetland type in the TLSA. A wide variety of shrub species including: river alder, Labrador tea, dwarf birch, willow, sweet gale, fly honeysuckle (*Lonicera villosa*), currant (*Ribes* spp.) and bog cranberry dominate the understory. The ground cover is often very diverse, with species typical of both fen and marsh habitats including: bog rosemary, alpine bearberry (*Arctostaphylos rubra*), two-seeded sedge, marsh cinquefoil, swamp horsetail,

bedstraw (*Galium* spp.) and arrow-leaved coltsfoot (*Petasites sagittatus*). Mosses are diverse and include peat mosses, golden moss, tufted moss, red-stem feather moss, stair-step moss, cushion moss (*Dicranum* spp.) and giant water moss. Peat depths tend to be slightly greater in treed swamps than shrubby swamps due to the growth of mosses at the surface.

MARSHES

Marshes are not peatlands but may have some peat accumulation. They are dominated by emergent vegetation such as sedges, reed grasses (*Phalaris arundinaceae*, *Phragmites australis*), rushes (*Juncus* spp.), cattails (*Typha latifolia*), or bulrushes (*Scirpus* spp.) (Keys 1992). Seasonal water fluctuations are characteristic of marshes. Marshes typically have relatively high amounts of water flow and nutrient levels, resulting in abundant vascular plant production. Rapid decomposition restricts the formation of peat in these communities. Plant communities of marshes are strongly influenced by the chemistry of the water. Alkaline marshes (dominated by calcium and bicarbonate) have vegetation dominated by sedges, bulrushes and cattails, whereas Saline marshes (dominated by sodium and sulfate) have vegetation dominated by samphire (*Salicornia europaea*) and bulrushes (Halsey and Vitt 1997).

Graminoid Dominated Marsh (MONG)

This graminoid-dominated wetland is differentiated from open fens because of its association with fluctuating water levels. In Alberta, marshes are typically associated with the margins of streams and lakes and with shallow open water (Halsey and Vitt 1997). Marshes are uncommon in the TLSA.

Marshes in the study area are mostly associated with shallow flooded areas, and are dominated in various areas by sedges, bluejoint, rat root (*Acorus calamus*), cattail, and spangletop grass (*Scolochloa festucacea*). Shrubs including flat-leaved willow and dwarf birch are present in dry/raised locations. Mosses are not prevalent in this community and tend towards species that can tolerate standing water for at least part of the year such as purple horn-toothed moss (*Ceratodon purpureus*), acute-leaved peat moss streamside water moss. This community grades into shallow open water (WONN) as the water depth increases and into shrubby swamp (SONS) as water depth decreases.

3.0 LITERATURE CITED

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Appendix F3

Vegetation and Wetland Assessment Methods

APPENDIX F3: VEGETATION AND WETLAND ASSESSMENT METHODS

1.0 HABITAT DISTRIBUTION

A set of vegetation and wetland indicators were selected to assess habitat distribution at baseline.

- the distribution of local vegetation cover classes (ELC);
- the distribution of local wetland types (AWI); and
- the distribution of regional landscape cover classes (LCC).

1.1 Ecological Land Classes (ELC)

ELC in the TLSA include ecosite phases (Beckingham and Archibald 1996), open water, regenerating and disturbance classes. These were identified and mapped as described in [Appendix H1](#). A detailed summary of the ELC are provided in [Appendix H2](#).

Distribution of ELC

The baseline area and percent distribution of each ELC was determined. For summary purposes, ELC were combined into uplands, lowlands, open water, and natural disturbances.

Distribution of Uncommon ELC

Uncommon ELC were defined as those types that occupied $\leq 1\%$ of the TLSA at baseline.

Distribution of Sensitive ELC

Sensitive ELC are defined as ecosite phases that are sensitive to ecological changes resulting from disturbances associated with project development. Project disturbances and associated stresses that might directly or indirectly effect on vegetation resources include air emissions and changes in surface and ground water quality and quantity. Bogs, fens and ecosites on sandy soils represent the most sensitive communities present in the TLSA.

1.2 Wetland Types

A wetland classification map was developed according to the procedures outlined in the Alberta Wetland Inventory (AWI) Standards Version 1.0 manual (Halsey and Vitt 1997). The AWI classification divides wetlands into five main classes: bog, fen, swamp, marsh, and shallow open water, and each of these is subdivided further into classes depending upon vegetative and other ecological characteristics (Halsey and Vitt 1997). A detailed summary of the wetland classes are provided in [Appendix H2](#).

Distribution of Wetland Types

The baseline area and percent distribution of each wetland class was calculated for the TLSA.

Distribution of Uncommon Wetland Types

Uncommon wetland types were defined as those classes that occupied $\leq 1\%$ of the TLSA at baseline.

1.3 Landscape Cover Classes (LCC)

LCC were determined based on mapped and classified satellite imagery (AGCC) for northern Alberta. Details of this mapping are provided in Appendix H1.

Distribution of LCC

The baseline area and percent distribution of each LCC was calculated for the TRSA.

2.0 RARE PLANT SPECIES AND PLANT COMMUNITIES

2.1 Rare Plant Species

Rare plant species include:

- those species listed by the ANHIC on the tracking list for vascular plants and mosses, liverworts and hornworts (Gould 2006) as well as lichens (Gould 2000) which are typically ranked from S1-S3;
- those species listed within Alberta as “At Risk” (ASRD 2005);
- those species listed within Alberta as “Species at Risk” by Alberta Endangered Species Conservation Committee (ESCC 2007); and
- those species listed as Special Concern, Threatened, or Endangered under the federal *Species at Risk Act* (Government of Canada 2009) and the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

Section 12.0 provides definitions for ASRD, ESCC, SARA and COSEWIC designations. ANHIC ranks plant species provincially on a scale from S1 (highest level of rarity) to S5 (lowest level of rarity) ([Table F3-1](#)).

Table F3-1: Explanation of Element Ranking System Used by ANHIC

Global Rank	Alberta Rank	Frequency/Distribution	Concerns/Comments
G1	S1	5 or fewer occurrences or only a few remaining individuals	May be especially vulnerable to extirpation because of some factor of its biology
G2	S2	6 to 20 occurrences or with many individuals in fewer occurrences	
G3	S3	21 to 100 occurrences, may be rare and local throughout it's range, or in a restricted range (may be abundant in some locations)	
G4	S4	Typically >100 occurrences but may be fewer with many large populations, may be rare in parts of its range, especially peripherally	Apparently secure under present conditions
G5	S5	Typically >100 occurrences	Demonstrably secure
GU	SU	Status is uncertain often because of low search effort or cryptic nature of the element; possibly in peril, unrankable, more information needed	
GH	SH	Historically known, may be observed in the future	
E		Exotic species established, may be native to nearby regions	
HYB		Hybrid taxon that is recurrent in the landscape	
P		Potentially exists; may have occurred historically, but not well documented	
Q		Taxonomic questions or problems	
R		Reported but lacking sufficient documentation to accept or reject	
RD		Report dubious	
RF		Reported falsely	
T_		Rank for subspecific taxon	
X		Believed to be extirpated	
G? or S?		Not yet ranked	
_?		Rank Questionable	

Uncommon Plant Species

In addition to rare plant species, there are species that are not considered rare but for which information on their distribution in the province is lacking. These species are listed in [Table F3-3](#) and include:

- those species listed on the ANHIC “watch list” which are typically ranked from S2-S4 (Gould 2006); and
- those species listed within Alberta as “May Be At Risk”, and “Sensitive” (ASRD 2005).

Sample Sites

For this analysis, two sets of data were employed to determine the presence of rare plant species in the TLSA. First, a search of the ANHIC database was completed, providing all existing records of rare species that occurred within the vicinity of the TLSA (ANHIC 2008). In addition, reports for studys undertaken in the vicinity of the TLSA were reviewed for rare plant species (Newmont 2006, Devon 2003, Devon 2006, Devon 2008).

This literature search provided existing records for fifteen rare plant species and two species that are considered new records for the province ([Table F3-2](#)). There were no species within the vicinity of the TLSA that are designated in the province as “Species at Risk” (ESCC 2007) or federally under the *Species at Risk Act* (Government of Canada 2009).

Table F3-2: Rare Plant Species Documented in the Literature in the Vicinity of the TLSA

Scientific Name	Common Name	S Rank	ANHIC status	ASRD 2005	Source
<i>Cardamine palustris</i> ssp. <i>paludosa</i>	bitter cress	New Species in AB			Newmont 2006
<i>Carex adusta</i>	browned sedge	S1	Tracked	May Be at Risk	ANHIC, Devon 2006
<i>Carex backii</i>	Back's sedge	S2	Tracked	May Be at Risk	ANHIC, Devon 2006
<i>Carex heleonastes</i>	Hudson Bay sedge	S2	Tracked	Sensitive	Newmont 2006, ANHIC
<i>Carex houghtoniana</i>	sand sedge	S2	Tracked	May Be at Risk	Newmont 2006, ANHIC, Devon 2006
<i>Carex oligosperma</i>	few-fruited sedge	S1S2	Tracked	Sensitive	Devon 2006
<i>Chrysosplenium iowense</i>	golden saxifrage	S2	Tracked	Sensitive	ANHIC, Newmont 2006, Devon 2006, Devon 2008
<i>Chrysosplenium tetrandrum</i>	green saxifrage	S3	Tracked		ANHIC, Devon 2008
<i>Cladonia squamosa</i>	lichen	S2	Tracked		Devon 2006
<i>Euphrasia hudsoniana</i>	Hudson Bay eyebright	New Species in AB			Newmont 2006
<i>Juncus stygius</i> ssp. <i>americanus</i>	stygian rush	S2	Tracked	May Be at Risk	Newmont 2006
<i>Oryzopsis micrantha</i>	little-seed rice grass	S2	Tracked	May Be At Risk	Devon 2003
<i>Malaxis monophylla</i>	white adder's-mouth	S2	Tracked	Sensitive	Devon 2008
<i>Sarracenia purpurea</i>	pitcher-plant	S2	Tracked	Sensitive	Newmont 2006, ANHIC, Devon 2003, Devon 2006, Devon 2008
<i>Spiranthes lacera</i>	northern slender ladies'-tresses	S1	Tracked	May Be at Risk	Newmont 2006, ANHIC, Devon 2008
<i>Splachnum rubrum</i>	red collar moss	S3	Tracked		ANHIC, Devon 2008
<i>Utricularia cornuta</i>	horned bladderwort	S1	Tracked	May Be at Risk	Devon 2006

The literature search also provided existing records of uncommon plant species; three watch list species and ten species that are considered Sensitive by ASRD ([Table F3-3](#)).

**Table F3-3: Uncommon Plant Species Documented in the Literature
in the Vicinity of the TLSA**

Scientific Name	Common Name	S Rank	ANHIC status	ASRD 2005	Source
<i>Barbarea orthoceras</i>	American winter cress	S3		Sensitive	Devon 2006
<i>Carex capitata</i>	capitate sedge	S2	Watch	Sensitive	Devon 2008
<i>Carex lasiocarpa</i>	hairy-fruited sedge	S4	Watch		Devon 2006
<i>Coptis trifolia</i>	goldthread	S3	Watch		Newmont 2006, Devon 2003, Devon 2006, Devon 2008
<i>Corallorhiza striata</i>	striped coralroot	S3		Sensitive	Devon 2006, Devon 2008
<i>Cypripedium parviflorum var pubescens</i>	large yellow lady's-slipper	S3		Sensitive	Devon 2006, Devon 2008
<i>Lathyrus venosus</i>	purple peavine	S3		Sensitive	Devon 2008
<i>Monotropa uniflora</i>	Indian-pipe	S3		Sensitive	Devon 2006
<i>Platanthera dilatata</i>	tall white bog orchid	S3		Sensitive	Newmont 2006, Devon 2006, Devon 2008
<i>Pyrola elliptica</i>	white wintergreen	S3		Sensitive	Devon 2008
<i>Rhamnus alnifolia</i>	alder-leaved buckthorn	S3		Sensitive	Devon 2006, Devon 2008
<i>Thalictrum sparsiflorum</i>	flat-fruited meadow rue	S3		Sensitive	Devon 2006
<i>Vaccinium uliginosum</i>	bog bilberry	S3		Sensitive	Devon 2008

Secondly, a series of field surveys were completed throughout the TLSA in 2008. These surveys included specific rare plant surveys as well as detailed vegetation surveys that included a general search for rare species (see Appendix H1 for detailed methods). All observed rare plants were collected or photographed and taxonomic interpretation was independently confirmed. A total of 173 sites were examined in the TLSA (Table F3-4).



Table F3-4: Rare Plant Search Sites in the TLSA

ELC	Description	BlackGold Survey Sites		
		Rare Plant	Detailed Vegetation	Total
a1	Pj lichen	5	6	11
b1	Pj/Aw - blueberry	10	8	18
b2	Aw/Bw - blueberry		4	4
b3	Aw/Sw - blueberry	1	1	2
c1	Pj/Sb - Labrador tea	12	4	16
d1	Aw - lowbush cranberry	7	6	13
d2	Aw/Sw - lowbush cranberry	3	6	9
d3	Sw - lowbush cranberry		4	4
e2	Pb/Sw - dogwood		1	1
f1	Pb/Aw - horsetail	1	1	2
f3	Sw - horsetail		1	1
g1	Sb/Pj - Labrador tea	19	7	26
h1	Sw/Sb - Labrador tea	1	5	6
i2	shrubby bog		2	2
j1	treed poor fen	17	9	26
j2	shrubby poor fen	2	4	6
k1	treed rich fen	2	7	9
k2	shrubby rich fen	5	9	14
k3	graminoid fen		2	2
	TOTAL	86	87	173

Results

The following rare vascular species have been documented for the TLSA based on the literature as well as fieldwork conducted in 2008 (Table F3-5). New locations of these species have been provided to ANHIC.

Table F3-5: Observed Rare Plant Species by Survey Location in the TLSA

ELC	Scientific Name	Common Name	S Rank	ANHIC status	ASRD 2005	Easting	Northing
j2	<i>Cardamine palustris</i> ssp. <i>paludosa</i>	bitter cress	New Species in AB			500034	6161133
k2	<i>Carex heleonastes</i>	Hudson Bay sedge	S2	Tracked	Sensitive	499665	6158013
k2	<i>Carex heleonastes</i>	Hudson Bay sedge	S2	Tracked	Sensitive	499670	6158008
k2	<i>Carex heleonastes</i>	Hudson Bay sedge	S2	Tracked	Sensitive	502041	6158034
b1	<i>Carex houghtoniana</i>	sand sedge	S2	Tracked	May Be At Risk	496510	6159987
g1	<i>Carex houghtoniana</i>	sand sedge	S2	Tracked	May Be At Risk	496601	6159982
h1	<i>Carex houghtoniana</i>	sand sedge	S2	Tracked	May Be At Risk	496142	6159992
h1	<i>Carex houghtoniana</i>	sand sedge	S2	Tracked	May Be At Risk	496183	6159998
k2	<i>Chrysosplenium iowense</i>	golden saxifrage	S3	Tracked	Sensitive	499074	6157062
h1	<i>Chrysosplenium iowense</i>	golden saxifrage	S3	Tracked	Sensitive	495084	6157200
NSH	<i>Chrysosplenium iowense</i>	golden saxifrage	S3	Tracked	Sensitive	499065	6157069
i2	<i>Euphrasia hudsoniana</i>	Hudson Bay eyebright	New Species in AB			500034	6161133
k2	<i>Juncus stygius</i> var <i>americanus</i>	marsh rush	S2	Tracked	May Be At Risk	498995	6159879
e2	<i>Malaxis monophylla</i>	white adder's-mouth	S2	Tracked	Sensitive	498862	6154855
k2	<i>Sarracenia purpurea</i>	pitcher-plant	S2	Tracked	Sensitive	502690	6157693
k2	<i>Sarracenia purpurea</i>	pitcher-plant	S2	Tracked	Sensitive	498995	6159879
k2	<i>Sarracenia purpurea</i>	pitcher-plant	S2	Tracked	Sensitive	498588	6159848
k2	<i>Sarracenia purpurea</i>	pitcher-plant	S2	Tracked	Sensitive	498292	6159512
c1	<i>Spiranthes lacera</i>	northern slender ladies'-tresses	S1	Tracked	May Be At Risk	497331	6159892
j1	<i>Spiranthes lacera</i>	northern slender ladies'-tresses	S1	Tracked	May Be At Risk	500286	6154217

The following uncommon plant species have been documented for the TLSA based on the literature as well as fieldwork conducted in 2008 ([Table F3-6](#)).

Table F3-6: Observed Uncommon Plant Species by Survey Location in the TLSA

ELC	Scientific Name	Common Name	S Rank	ANHIC status	ASRD 2005	Easting	Northing
j1	<i>Carex capitata</i>	capitate sedge	S2	Watch	Sensitive	500480	6154739
j1	<i>Carex capitata</i>	capitate sedge	S2	Watch	Sensitive	500247	6154350
k3	<i>Carex lasiocarpa</i>	hairy-fruited sedge	S4	Watch	Secure	505412	6160113
d1	<i>Coptis trifolia</i>	goldthread	S3	Watch	Secure	503848	6157090
j2	<i>Coptis trifolia</i>	goldthread	S3	Watch	Secure	502766	6159864
g1	<i>Coptis trifolia</i>	goldthread	S3	Watch	Secure	500746	6159158
b1	<i>Corallorhiza maculata</i>	spotted coralroot	S3		Sensitive	503669	6157150
d1	<i>Corallorhiza maculata</i>	spotted coralroot	S3		Sensitive	503848	6157090
k2	<i>Platanthera dilatata</i>	tall white bog orchid	S3		Sensitive	n/a	n/a
g1	<i>Pyrola elliptica</i>	white wintergreen	S3		Sensitive	502411	6158397
e2	<i>Rhamnus alnifolia</i>	alder-leaved buckthorn	S3		Sensitive	498702	6155122
f3	<i>Rhamnus alnifolia</i>	alder-leaved buckthorn	S3		Sensitive	496790	6156526
j2	<i>Rhamnus alnifolia</i>	alder-leaved buckthorn	S3		Sensitive	503083	6159436
k2	<i>Rhamnus alnifolia</i>	alder-leaved buckthorn	S3		Sensitive	503000	6158086
j1	<i>Rhamnus alnifolia</i>	alder-leaved buckthorn	S3		Sensitive	503265	6159818
j2	<i>Rhamnus alnifolia</i>	alder-leaved buckthorn	S3		Sensitive	501745	6158873
f3	<i>Thalictrum sparsiflorum</i>	flat-fruited meadow rue	S3		Sensitive	497800	6156665
NSH*	<i>Thalictrum sparsiflorum</i>	flat-fruited meadow rue	S3		Sensitive	499075	6157063

* Note: NSH = shrubland/regeneration

2.2 Rare Ecological Communities

ANHIC has developed a preliminary tracking list of rare ecological communities in Alberta (Allen 2008). Natural ecological communities are defined as recurring assemblages of plant species that occur in habitats with similar attributes. This list was developed based on publications describing vegetation types in Alberta, commissioned reports and expert opinion. Rare (natural) ecological communities included those described as unusual, uncommon, or of limited extent plus those known to be in decline or threatened by human encroachments. Like the rare plant list, a watch list of ecological communities (that appear to have a restricted distribution) has also been developed. Rare ecological communities are ranked using the same nomenclature as used for rare plants, although for communities, ranks S1, S2 and S3 are considered rare.

Allen (2008) describes 42 rare ecological communities that have been documented for the Boreal Forest Region of Alberta. Fourteen of these communities are forest/woodlands, six are shrublands, three are sparsely vegetated, seventeen are herbaceous, and two are aquatic. All of the sampled plots were screened for rare communities.

One rare ecological community was identified within the TLSA (Matrix 2006). This community is *Andromeda polifolia* / *Sarracenia purpurea* / *Sphagnum angustifolium* (bog rosemary / pitcher-plant / peat moss). It is ranked as S1S2 in Alberta. Fieldwork in 2008 confirmed the presence of this community in the central portion of the TLSA (Figure 11.5, Section 11.0).

Baseline Analysis

The baseline area of the rare ecological community was calculated for the TLSA.

2.3 Rare Plant Potential Analysis

Detailed vegetation plot and rare plant survey data collected from the TLSA as well as two other adjacent projects has been combined to result in increased sample size for each ELC. A discussion of sample size and pooling of data is provided in [Appendix H1](#). [Table F3-7](#) details the vegetation and rare plant plots used in this assessment.

**Table F3-7: Vegetation and Rare Plant Survey Plots
used in Rare Plant Potential Analysis**

ELC	Description	Rare Plant	Detailed Vegetation	Total Plots
a1	Pj lichen	12	12	24
b1	Pj/Aw - blueberry	29	27	56
b2	Aw/Bw - blueberry	3	5	8
b3	Aw/Sw - blueberry	10	7	17
b4	Pj/Sw - blueberry	5	10	15
c1	Pj/Sb - Labrador tea	43	28	71
d1	Aw - lowbush cranberry	31	22	53
d2	Aw/Sw - lowbush cranberry	27	22	49
d3	Sw - lowbush cranberry	8	7	15
e1	Pb/Aw - dogwood	3	3	6
e2	Pb/Sw - dogwood	3	6	9
e3	Sw - dogwood	3	4	7
f1	Pb/Aw - horsetail	5	2	7
f3	Sw - horsetail	6	4	10
g1	Sb/Pj - Labrador tea	54	28	82
h1	Sw/Sb - Labrador tea	16	14	30
i2	shrubby bog	6	8	14
j1	treed poor fen	80	39	119
j2	shrubby poor fen	24	25	49
k1	treed rich fen	8	25	33
k2	shrubby rich fen	28	23	51
k3	graminoid fen	14	8	22
NSH	shrubland / regeneration	9	7	16
NBU	recent burn	19	0	19
	TOTAL	446	336	782

The number of sites where rare plant species were observed in the regional area was used as the basis for ranking each ELC (Table F3-8). Ranking was undertaken based on the total number of rare plant species observations (an observation was defined as any rare species at any site, where there was more than one species at a site, each was a separate observation) by ELC (Table F3-9).

Table F3-8: Rare Plant Species Observations among Sample Plots by ELC

Scientific Name	Common Name	b1	b3	b4	c1	e1	e2	f1	g1	h1	i2	j1	j2	k1	k2	k3	NSH	NBU
<i>Cardamine palustris</i> ssp. <i>paludosa</i>	bitter cress												1					
<i>Carex adusta</i>	browned sedge																	1
<i>Carex backii</i>	Back's sedge																	2
<i>Carex heleonastes</i>	Hudson Bay sedge														3			
<i>Carex houghtoniana</i>	sand sedge	1	1		1				1	2								4
<i>Carex oligosperma</i>	few-fruited sedge											1	1					
<i>Chrysosplenium iowense</i>	golden saxifrage			1				1		1		1			2	3	5	
<i>Chrysosplenium tetrandrum</i>	green saxifrage					1									1			
<i>Cladonia squamosa</i>	lichen				1													
<i>Euphrasia hudsoniana</i>	Hudson Bay eyebright										1							
<i>Juncus stygius</i> var <i>americanus</i>	marsh rush														1			
<i>Malaxis monophylla</i>	white adder's-mouth						1											
<i>Sarracenia purpurea</i>	pitcher-plant											9	16	4	17	4		2
<i>Spiranthes lacera</i>	northern slender ladies'-tresses				1							2	1					
<i>Splachnum rubrum</i>	red collar moss				2													
<i>Utricularia cornuta</i>	horned bladderwort																1	
	Count of Species	1	1	1	4	1	1	1	1	2	1	4	4	1	5	2	2	4
	Total Observations	1	1	1	5	1	1	1	1	3	1	13	19	4	24	7	6	9

Note: NSH = shrubland/regeneration and NBU = recent burn

Ranking Method

- High ratio of sample sites with rare plant observations of > 45 %
- Medium ratio of sample sites with rare plant observations of 22 to 45 %
- Low ratio of sample sites with rare plant observations of < 22 %

Table F3-9: Rare Vascular Plant Species Potential Ranking by ELC

ELC unit	Total Plots	Total Rare Species	Total Observations	Ratio	Potential
a1	24	0	0	0	Low
b1	56	1	1	1.8	Low
b2	8	0	0	0	Low
b3	17	1	1	5.9	Low
b4	15	1	1	6.7	Low
c1	71	4	5	7.0	Low
d1	53	0	0	0	Low
d2	49	0	0	0	Low
d3	15	0	0	0	Low
e1	6	1	1	16.7	Low
e2	9	1	1	11.1	Low
e3	7	0	0	0	Low
f1	7	1	1	14.3	Low
f3	10	0	0	0	Low
g1	82	1	1	1.2	Low
h1	30	2	3	10.9	Low
i2	14	1	1	7.1	Low
j1	119	4	13	10.9	Low
j2	49	4	19	38.8	Medium
k1	33	1	4	12.1	Low
k2	51	5	24	47.1	High
k3	22	2	7	31.8	Medium
NSH	16	2	6	37.5	Medium
NBU	19	4	9	47.4	High

Note: NSH = shrubland/regeneration and NBU = recent burn

The majority of ELC in the TLSA have a low to medium rare plant potential. Rich shrubby fens (k2) as well as recent burns (NBU) have a high potential for rare plants.

Baseline Analysis

The baseline area and percent distribution of the ELC by rare plant potential rank was determined for the TLSA.

3.0 NON-NATIVE AND WEED SPECIES

Weeds are introduced or native species that are designated in the *Alberta Weed Control Act* and Regulations (AAFRD 2003). The designations include restricted, noxious and nuisance weeds. These are primarily agricultural pests but also include species that may invade disturbed or natural lands. Weeds include both the live plants and their seeds. According to the act, an occupant of any lands (or the land owner if the land is unoccupied) must control weeds. Specifically, restricted weeds must be destroyed to prevent the spread, growth, ripening or scattering of the seeds, noxious weeds must be controlled to prevent the spread, growth, ripening or scattering of seeds, and nuisance weeds needs to be managed to avoid the spread or scattering of seeds.

Introduced species are those species that are not native to the Province of Alberta and that are known to have established populations or occurrences outside of farms or gardens in Alberta. The list of introduced species was obtained from the Alberta Natural Heritage Information Centre (ANHIC 2006) and was cross referenced for origin in the *Flora of Alberta* (Moss 1983). [Table F3-10](#) provides a list of non-native and weed species observed during field surveys in the TLSA and surrounding area.

A total of five non-native and weed species were observed in the TLSA. The most common non-native species in the TLSA is clover. Perennial sow-thistle is designated as a noxious weed and must be controlled.

Table F3-10: Non-native and Weed Species

Weed Species				Observed Location NAD 83 Grid Zone 12	
Scientific Name	Common Name	Provincial Weed Act Designation	Origin	Easting	Northing
<i>Plantago major</i>	common plantain	Not Listed	Non-native	502896	6161619
<i>Sonchus arvensis</i>	perennial sow-thistle	Noxious	Non-native	500368	6159354
<i>Taraxacum officinale</i>	common dandelion	Nuisance	Non-native	502055	6162036
<i>Trifolium hybridum</i>	alsike clover	Not Listed	Non-native	503882	6159762
<i>Trifolium sp.</i>	unknown clover	Not Listed	Non-native	501398	6159713
<i>Trifolium sp.</i>	unknown clover	Not Listed	Non-native	500427	6159345

Baseline Analysis

There was no analysis for this indicator.

4.0 TRADITIONAL USE PLANTS

4.1 Traditional Use Plant Potential

Introduction

The objective of this indicator was to assess and rank, on a low to high scale, the number of traditionally used (TU) plant species that occur within ELC in the TLSA. These ranks were then used to map baseline TU plant conditions and quantitatively assess potential impacts to TU plant species as a result of project development. Vegetation data collected as part of this project as well as data from other adjacent projects was used in this analysis.

First Nations people have been harvesting a variety of plant species in the boreal forest for thousands of years (Marles *et al.* 2000). Until recently, knowledge of most of the plant species harvested for medicine, spiritual/ritual use, food, or other technological uses has not been documented and has instead relied on oral transmission from generation to generation. Recent studies in the oil sands region have documented many of the species that were most important for First Nations people in this area.

Study Objectives

Our goal was to measure and rank the importance of each ELC to support an assemblage of traditionally used species. Two general methods were used to summarize the data:

- First, the data was used to show the capability of ELC to support the complete range of traditionally used species, and also to maintain unique or uncommon species;
- Second, the sites that potentially support the greatest berry production was assessed.

Plant Species Lists

Two aboriginal cultural groups live in this region, the Algonkian (*Nehinawewak*) represented by Cree, and Athapaskan, represented by Chipewyan (*Dene*) (Marles *et al.* 2000). A list was obtained from the True North Fort Hills Oil Sand Project, which was a compilation of plant species used by residents of Fort McKay (Cree), and included a description of their traditional uses [medicine, food, spiritual/ritual, tools and dyes (Table F3-11)]. A second list was obtained from the Athabasca Chipewyan First Nation (ACFN), and listed plants used as food (berries), trees, and medicines (Table F3-12).

Together, these lists contain 65 species (or taxonomic groups) of traditional importance. In this analysis, each TU species is regarded as equal in importance. That is, the analysis does not rank any TU species higher than any other species.

Table F3-11: Traditional Uses of Plants by the Fort McKay People (True North 2000)

Scientific Name	Common Name	Part of Plant Used	Traditional Uses				
			Medicinal	Dietary	Spiritual / Ritual	Utensil	Dyes
VASCULAR PLANTS							
<i>Abies balsamea</i>	Balsam fir	Bark, resin, needles	x				
<i>Achillea millefolium</i>	Common yarrow	Whole plant	x				
<i>Acorus americanus</i>	Rat root	Rhizome	x				
<i>Alnus crispa</i>	Green alder	Wood	x			x	x
<i>Alnus tenuifolia</i>	River alder	Wood	x			x	x
<i>Amelanchier alnifolia</i>	Saskatoon	Root, stem	x	x		x	
<i>Aralia nudicaulis</i>	Wild sarsaparilla	Root	x				
<i>Arctostaphylos uva-ursi</i>	Common bearberry	Leaves, fruit, stem, root	x		x		x
<i>Aster conspicuus</i>	Showy aster		x		x		
<i>Betula papyrifera</i>	Paper birch	Wood, bark, leaves, sap	x	x	x	x	x
<i>Betula pumila</i>	Bog birch	Roots	x	x			
<i>Campanula rotundifolia</i>	Harebell	Roots	x				
<i>Cornus canadensis</i>	Bunchberry	Fruit		x			
<i>Cornus stolonifera</i>	Red-osier dogwood	Bark, inner bark, leaves	x		x		x
<i>Corylus cornuta</i>	Hazelnut	Fruit		x			
<i>Equisetum</i> spp.	Horsetail	Whole plant	x			x	
<i>Fragaria virginiana</i>	Wild strawberry	Fruit, root	x	x			
<i>Galium boreale</i>	Northern bedstraw	Root					x
<i>Galium triflorum</i>	Sweet-scented bedstraw	Flower			x	x	
<i>Juniperus communis</i>	Ground juniper	Wood, flower, needles, fruit, bark	x				
<i>Larix laricina</i>	Larch	Bark, gum	x				
<i>Ledum groenlandicum</i>	Labrador tea	Leaves	x	x			
<i>Lonicera caerulea</i>	Fly honeysuckle		x				
<i>Lonicera dioica</i>	Twining honeysuckle		x				
<i>Lonicera involucrata</i>	Bracted honeysuckle		x				
<i>Lycopodium annotinum</i>	Stiff club moss	Spores			x		
<i>Matricaria matricariodes</i>	Pineappleweed		x				
<i>Mentha arvensis</i>	Wild mint	Whole plant	x	x			
<i>Picea glauca</i>	White spruce	Wood, cone	x			x	
<i>Picea mariana</i>	Black spruce	Wood, resin	x				
<i>Pinus banksiana</i>	Jack pine	Wood	x			x	
<i>Plantago major</i>	Common plantain	Leaves	x				
<i>Polygala senega</i>	Seneca-root	Root	x				
<i>Populus balsamifera</i>	Balsam poplar	Wood, bark	x			x	
<i>Populus tremuloides</i>	Trembling aspen	Wood, bark	x			x	
<i>Prunus pensylvanica</i>	Pin cherry			x			
<i>Prunus virginiana</i>	Chokecherry	Flower, bark, wood, roots	x	x			
<i>Pyrola asarifolia</i>	Common pink wintergreen		x				
<i>Ribes hudsonianum</i>	Wild black currant	Stem, bark, roots, leaves	x	x			
<i>Ribes oxycanthoides</i>	Gooseberry	Stem, bark, roots, leaves		x			
<i>Rosa acicularis</i>	Prickly rose	Stem, roots, rosehips	x				
<i>Rubus chamaemorus</i>	Cloudberry	Whole plant	x	x			
<i>Rubus idaeus</i>	Wild red raspberry	Fruit	x	x			



Scientific Name	Common Name	Part of Plant Used	Traditional Uses				
			Medicinal	Dietary	Spiritual / Ritual	Utensil	Dyes
<i>Rubus pubescens</i>	Dewberry	Fruit	x	x			
<i>Rumex occidentalis</i>	Western dock	Roots					x
<i>Sarracenia purpurea</i>	Pitcher plant	Leaf	x				
<i>Salix</i> spp.	Willow	Whole plant	x		x	x	
<i>Scirpus</i> spp.	Bulrush	Roots, shoots		x			
<i>Streptopus amplexifolius</i>	Twisted stalk	Fruit		x			
<i>Symphoricarpos albus</i>	Snowberry	Bark	x				
<i>Tanacetum vulgare</i>	Common tansy			x			
<i>Typha latifolia</i>	Common cattail	Stem, flower, roots		x			
<i>Urtica dioica</i>	Common nettle		x	x			
<i>Vaccinium</i> spp.	Huckleberry	Fruit		x			
<i>Vaccinium myrtilloides</i>	Blueberry	Fruit, roots	x	x			
<i>Vaccinium vitis-idaea</i>	Bog cranberry	Fruit		x			
<i>Viburnum edule</i>	Low-bush cranberry	Fruit	x				
<i>Viburnum opulus</i>	High-bush cranberry	Fruit	x				
FUNGI, LICHENS AND MOSSES							
<i>Fomes officinalis</i>	Bracket fungus	Fruiting body	x			x	
<i>Fomes pinicola</i>	Bracket fungus	Fruiting body	x			x	
<i>Polyporus tuberaster</i>	Tuckahoe fungus	Vegetative part	x				
<i>Lycoperdon</i> spp.	Puffball	Fruiting body	x				
<i>Echinodontium tinctorium</i>	Red touchwood fungus	Fruiting body	x				
<i>Umbilicaria</i> spp.	Rock tripe	Entire plant		x			
<i>Sphagnum</i> spp.	Sphagnum moss	Entire plant				x	

**Table F3-12: Athabasca Chipewyan First Nation
– Traditional Use Plants (ACFN 2002)**

BERRIES	
<i>Vaccinium myrtilloides</i>	Blueberry
<i>Viburnum opulus</i>	High-bush Cranberry
<i>Viburnum edule</i>	Low-bush Cranberry
<i>Rubus idaeus</i>	Raspberry
<i>Amelanchier alnifolia</i>	Saskatoon
<i>Fragaria virginiana</i>	Strawberry
<i>Prunus pensylvanica</i>	Pin Cherry
<i>Prunus virginiana</i>	Choke Cherry
TREES	
<i>Betula papyrifera</i>	Birch
<i>Pinus banksiana</i>	Jackpine
<i>Larix laricina</i>	Tamarack
<i>Populus balsamifera</i>	Poplar
<i>Picea glauca</i>	White Spruce
<i>Picea</i> spp.	Spruce Gum
MEDICINAL PLANTS	
<i>Rosa acicularis</i>	Rosehip
<i>Hierochloe odorata</i>	Sweetgrass
<i>Artemisia frigida</i>	Sage
<i>Ledum groenlandicum</i>	Labrador Tea (Muskeg Tea)
<i>Picea</i> spp.	Spruce Gum; Spruce Acorn
<i>Mentha arvensis</i>	Mint
<i>Acorus americanus</i>	Rat Root
<i>Larix laricina</i>	Tamarack Bark
<i>Populus balsamifera</i>	Poplar Bark and Buds
<i>Populus tremuloides</i>	Aspen
<i>Amelanchier alnifolia</i>	Saskatoon Berries
<i>Prunus virginiana</i>	Choke Cherries
<i>Lycoperdon</i> spp.	Dried Puffballs
<i>Sarracenia purpurea</i>	Pitcher Plant
<i>Sorbus scopulina</i>	Mountain Ash

Vegetation Data

Detailed vegetation plot data collected from the TLSA and two other adjacent projects has been combined to result in increased sample size for each ELC. A discussion of sample size and pooling of data is provided in [Appendix H1](#). [Appendix H1](#) details the vegetation plots used in this assessment.

ELC with less than 5 sampling sites (e1, e3, f1 and f3) will not be analyzed further for TU plant species richness. In addition, ELC that were identified as shrubland/regeneration or open water will not be used in the analyses since they were not systematically sampled.

TU Plant Species Capability

Three measurements of plant species richness were used to assess capability of each ELC to support TU plant species.

- Mean TU Plant Species Richness
- Total TU Plant Species Richness
- Unique and Uncommon TU Plant Species Richness

Mean richness is the mean number of TU plant species that occurred within sample plots. This value provides us with the expected number of TU plant species that should be found at any particular site. Total richness provides a count of all TU plant species that occurred in each ELC, among all plots sampled. Unique and uncommon richness is the count of all TU plant species that occur within only one to two ELC. Unique and uncommon TU plant species are important because they are at a greater risk of being impacted if the ELC that they are found within is disturbed by developments.

These three measurements were combined to assess the capability for each ELC to support potential TU plant species. Vegetation plot data was first reorganised to include only the TU plant species. Table F3-13 shows the number of occurrences of each TU plant species for each ELC.

Results

TU plant species that were unique or uncommon in the TLSA ([Table F3-13](#)) are:

- *Aster conspicuus* (2 ecosite phases)
- *Mentha arvensis* (1 ecosite phase)
- *Plantago major* (1 ecosite phase)
- *Prunus virginiana* (1 ecosite phase)
- *Sorbus scopulina* (1 ecosite phase)
- *Scirpus spp.* (1 ecosite phase)



Table F3-13: Potential TU Species Occurrence (Number of Observations Among Sample Plots) by ELC

Type	Scientific Name	Common Name	a1	b1	b2	b3	b4	c1	d1	d2	d3	e2	g1	h1	i2	j1	j2	k1	k2	k3
Number of Plots			12	27	5	7	10	28	22	22	7	6	28	14	8	39	25	25	23	8
Tree	<i>Abies balsamea</i>	balsam fir		2			1		4	6	2	2	1							
Tree	<i>Betula papyrifera</i>	white birch	1	11	2	3	3	4	5	10	1	4	3	4		4	1	1	1	1
Tree	<i>Larix laricina</i>	tamarack					1			1			3	4		24	13	22	17	
Tree	<i>Picea glauca</i>	white spruce	3	10	5	4	8	2	13	19	6	6	1	8		2			1	
Tree	<i>Picea mariana</i>	black spruce	1	10	2	3	3	23	1	1	3		26	12	7	29	21	22	13	1
Tree	<i>Pinus banksiana</i>	jack pine	10	12		5	7	15	2	2			15	1		1	1	1	1	
Tree	<i>Populus balsamifera</i>	balsam poplar		5		1	1	2	4	4	3	5	4	4		1			1	
Tree	<i>Populus tremuloides</i>	aspen	3	25	4	4	7	9	16	16	4	1	7	2					1	
Shrub	<i>Alnus incana ssp tenuifolia</i>	river alder					1					2		2		1				
Shrub	<i>Alnus viridis ssp crispa</i>	green alder	1	10	5	2	4	5	11	4	2	1	2			1				
Shrub	<i>Amelanchier alnifolia</i>	saskatoon					1		2	3		1								
Shrub	<i>Arctostaphylos uva-ursi</i>	common bearberry	5	3		2	3	3		1			1	1		1				
Shrub	<i>Betula pumila</i>	dwarf birch														9	7	12	12	2
Shrub	<i>Cornus stolonifera</i>	red-osier dogwood					1			1		2		1						
Shrub	<i>Ledum groenlandicum</i>	common Labrador tea	9	13	4	5	3	13	7	8	4	2	14	13	5	19	13	13	10	1
Shrub	<i>Lonicera caerulea</i>	fly honeysuckle									1		3	2	1	1	4	1	3	
Shrub	<i>Lonicera dioica</i>	twining honeysuckle		1	1		1	1	4	3	2	2	2	1						
Shrub	<i>Lonicera involucrata</i>	bracted honeysuckle		4	1			2	5	6	2	3	2	2		2			1	
Shrub	<i>Prunus virginiana</i>	choke cherry								1										
Shrub	<i>Ribes hudsonianum</i>	northern black currant		2			1	1	1	1	1	2		2				2		
Shrub	<i>Ribes oxycanthoides</i>	northern gooseberry		1			1		4	5	3	2	1	1		1			1	
Shrub	<i>Rosa acicularis</i>	prickly rose	8	11	4	3	4	8	13	14	7	3	9	9		2	3	1		
Shrub	<i>Rubus chamaemorus</i>	cloudberry						1					2	1	5	12	8	3		1
Shrub	<i>Rubus idaeus</i>	wild red raspberry		1	1	1	1	1	3	3			3	1						
Shrub	<i>Rubus pubescens</i>	dewberry		4	2	1	2		10	10	3	4	2	2		3	1	2	3	



Type	Scientific Name	Common Name	a1	b1	b2	b3	b4	c1	d1	d2	d3	e2	g1	h1	i2	j1	j2	k1	k2	k3
Number of Plots			12	27	5	7	10	28	22	22	7	6	28	14	8	39	25	25	23	8
Shrub	<i>Salix spp.</i>	willow	6	12	2	4	2	10	8	5	2	4	13	9	3	21	14	14	20	4
Shrub	<i>Sorbus scopulina</i>	western mountain-ash								1										
Shrub	<i>Symphoricarpos albus</i>	snowberry		1			1	3	2	2		2	1	2		2	2	1	1	
Shrub	<i>Vaccinium myrtilloides</i>	common blueberry	11	15	4	7	4	12	10	8	1	1	14	5	2	5	4			
Shrub	<i>Vaccinium vitis-idaea</i>	bog cranberry	10	14	4	4	4	8	7	9	3	2	12	9	7	15	8	9	7	1
Shrub	<i>Viburnum edule</i>	low-bush cranberry	1	8	2	3	4	2	11	11	5	3	3	2		1				
Moss	<i>Sphagnum spp.</i>	peat moss	2					2		1		2	7	5	9	26	15	20	13	6
Graminoid	<i>Scirpus spp.</i>	bulrush										1								
Forb	<i>Achillea millefolium</i>	common yarrow		3			1	1	2	1	1	1	2	1	1	2	2	2	2	
Forb	<i>Aralia nudicaulis</i>	wild sarsaparilla		7	2	3	1		11	13	3	5		1						
Forb	<i>Aster conspicuus</i>	showy aster								1		1								
Forb	<i>Campanula rotundifolia</i>	harebell	2	2	1	1	1	1	1	1					1					
Forb	<i>Cornus canadensis</i>	bunchberry	7	15	5	5	4	10	10	13	5	3	13	7	1	3	1	1		
Forb	<i>Fragaria sp.</i>	strawberry		5	3	1	1	1	6	3	2	3	2	1		2	1	1	2	
Forb	<i>Galium boreale</i>	northern bedstraw		2			1	1	3	3	1	2	1	3		1				
Forb	<i>Galium triflorum</i>	sweet-scented bedstraw		1	1				4	2	1	3		1	1	2	1	3	3	
Forb	<i>Mentha arvensis</i>	wild mint										1								
Forb	<i>Plantago major</i>	common plantain											1							
Forb	<i>Pyrola asarifolia</i>	common pink wintergreen		4	3	1	3	1	8	8	1	1				3	1	1	2	
Forb	<i>Rumex occidentalis</i>	western dock																1	1	1
Forb	<i>Sarracenia purpurea</i>	pitcher-plant																1	3	1
Fern/Allies	<i>Equisetum spp.</i>	horsetail	5	10	2	1	3	3	6	7	6	5	8	11	4	15	10	14	9	6
Fern/Allies	<i>Lycopodium annotinum</i>	stiff club-moss	1	8	4	3	2	4	8	11	3	1	1							

TU plant species richness ranking categories are summarised in [Table F3-14](#). Overall potential TU plant species capability ranking is shown in [Table F3-15](#).

Table F3-14: Ranges of TU Plant Species Richness Values Used to Rank TU Capability

Category (weight)*	Mean TU Plant Species Range	Total TU Plant Species Range	Uncommon TU Plant Species Range	Overall TU Plant Species Range
Low (1)	1.0 to 6.0	0 to 18	0	3 to 6
Medium (3)	6.1 to 13.0	19 to 32	1	7 to 12
High (7)	13.1 or more	33 or more	2 or more	13 to 21

* weight = value applied to each rank to determine the overall score

Table F3-15: TU Plant Species Richness Results

ELC	N	Mean Richness	Mean Ranking	Total Richness	Total Ranking	Unique Richness	Unique Ranking	Overall Score	Overall Ranking
a1	12	7.17	Medium	18	Low	0	Low	5	Low
b1	27	8.59	Medium	32	Medium	0	Low	7	Medium
b2	5	12.80	Medium	23	Medium	0	Low	7	Medium
b3	7	9.57	Medium	23	Medium	0	Low	7	Medium
b4	10	8.60	Medium	34	High	0	Low	11	Medium
c1	28	5.32	Low	29	Medium	0	Low	5	Low
d1	22	9.23	Medium	33	High	0	Low	11	Medium
d2	22	9.95	Medium	39	High	2	High	17	High
d3	7	11.14	Medium	28	Medium	0	Low	7	Medium
e2	6	14.33	High	35	High	2	High	21	High
g1	28	6.32	Medium	32	Medium	1	Medium	9	Medium
h1	14	9.21	Medium	32	Medium	0	Low	7	Medium
i2	8	5.88	Low	13	Low	0	Low	3	Low
j1	39	5.41	Low	30	Medium	0	Low	5	Low
j2	25	5.24	Low	21	Medium	0	Low	5	Low
k1	25	5.92	Low	23	Medium	0	Low	5	Low
k2	23	5.57	Low	24	Medium	0	Low	5	Low
k3	8	3.13	Low	11	Low	0	Low	3	Low

The majority of ELC have a low to medium overall potential TU plant species capability rank. Two ELC (d2 and e2) received a high overall rank.

Baseline Analysis

The baseline area and percent distribution of the ELC by overall potential TU plant species capability rank was determined.

4.2 Availability of Berry Producing Species

In this analysis the following 32 species were assessed as the potential berry harvest species (Table F3-16). Each species is regarded as equal in importance (i.e., the analysis does not rank any berry species higher than any other species).

Table F3-16: Berry Harvest Species

Common Name	Scientific Name
saskatoon	<i>Amelanchier alnifolia</i>
woodland strawberry	<i>Fragaria vesca</i>
wild strawberry	<i>Fragaria virginiana</i>
small bog cranberry	<i>Oxycoccus microcarpus</i>
large bog cranberry	<i>Oxycoccus quadripetalus</i>
pin cherry	<i>Prunus pensylvanica</i>
choke cherry	<i>Prunus virginiana</i>
wild black currant	<i>Ribes americanum</i>
golden currant	<i>Ribes aureum</i>
skunk currant	<i>Ribes glandulosum</i>
wild gooseberry	<i>Ribes hirtellum</i>
northern black currant	<i>Ribes hudsonianum</i>
mountain gooseberry	<i>Ribes inerme</i>
bristly black currant	<i>Ribes lacustre</i>
mountain currant	<i>Ribes laxiflorum</i>
northern gooseberry	<i>Ribes oxycanthoides</i>
wild red currant	<i>Ribes triste</i>
sticky currant	<i>Ribes viscosissimum</i>
dwarf raspberry	<i>Rubus arcticus</i>
cloudberry	<i>Rubus chamaemorus</i>
wild red raspberry	<i>Rubus idaeus</i>
thimbleberry	<i>Rubus parviflorus</i>
dwarf bramble	<i>Rubus pedatus</i>
dewberry	<i>Rubus pubescens</i>
dwarf bilberry	<i>Vaccinium caespitosum</i>
tall bilberry	<i>Vaccinium membranaceum</i>
common blueberry	<i>Vaccinium myrtilloides</i>
low bilberry	<i>Vaccinium myrtillus</i>
oval-leaved blueberry	<i>Vaccinium ovalifolium</i>
bog bilberry	<i>Vaccinium uliginosum</i>
bog cranberry	<i>Vaccinium vitis-idaea</i>
low-bush cranberry	<i>Viburnum edule</i>

Vegetation Data

Detailed vegetation plot data collected from the TLSA and two other adjacent projects has been combined to result in increased sample size for each ELC. A discussion of sample size and pooling of data is provided in Appendix H1. Appendix H1 details the vegetation plots used in this assessment.

ELC with less than 5 sampling sites (e1, e3, f1 and f3) will not be analyzed further for berry cover. In addition, ELC that were identified as shrubland/regeneration or open water will not be used in the analyses since they were not systematically sampled.

Potential Berry Cover

The mean percent cover of all of the berry producing species was calculated and ranked from high to low among ELC.

Berry cover was summed by ELC ranked into low to high cover classes ([Table F3-17](#)).

- Low < 10 % berry species coverage
- Medium 10 to 25 %
- High > 25 %

The majority of ELC have a low to medium overall potential berry cover rank. Two ELC (d3 and e2) received a high overall rank.

Baseline Analyses

The baseline area and percent distribution of ELC by their potential berry cover rank was determined.



Table F3-17: Berry Percent Cover by ELC

Berry Species	a1	b1	b2	b3	b4	c1	d1	d2	d3	e2	g1	h1	i2	j1	j2	k1	k2	k3
Number of Plots	12	27	5	7	10	28	22	22	7	6	28	14	8	39	25	25	23	8
saskatoon					0.4		0.2	0.3		0.3								
woodland strawberry						+	+	+		0.3					+			
wild strawberry		0.9	0.3	0.1	0.1	+	0.8	0.1	0.2	0.5	0.1	+		+	+	+	+	
small bog cranberry											+		0.5	0.8	0.3	0.8	0.5	+
choke cherry								0.8										
wild black currant							0.2					+						
skunk currant				0.5		0.1		0.3										
northern black currant		0.1			0.1	+	0.1	0.1	3.9	1.6		0.3				0.1		
bristly black currant			0.1				0.1	0.3	0.6	2.1	0.1	0.1		0.1			0.1	
northern gooseberry		+			0.2		0.4	0.3	2.1	0.8	+	+		+			+	
wild red currant			+			+	0.3	0.1	0.5	7.1	0.1			+				
dwarf raspberry								+	1.1		0.1	+		0.1	+	+	0.3	
cloudberry						+					0.1	+	7.5	1.3	1.4	0.4		3.8
wild red raspberry		0.3	0.3	5.4	0.2	1.3	3.2	1.0		7.1	0.4							
dewberry		0.5	0.5	0.5	1.1		3.5	2.1	6.3	5.4	0.1	0.1		0.1	+	0.1	0.2	
common blueberry	7.2	1.7	3.3	10.1	3.0	3.6	1.3	2.2	0.6	0.3	1.7	0.9	0.5	0.2	0.1			
bog cranberry	4.3	1.9	4.5	1.5	1.3	0.8	1.2	0.6	0.6	0.3	2.9	1.9	4.8	0.8	1.2	0.8	0.3	0.4
low-bush cranberry	0.1	1.8	3.5	3.1	2.9	0.1	8.2	6.8	10.8	9.8	1.1	0.1		+				
Total	11.6	7.1	12.4	21.2	9.1	5.9	19.3	15.0	26.8	35.4	6.7	3.6	13.3	3.4	3.0	2.3	1.4	4.2
Rank	Med	Low	Med	Med	Low	Low	Med	Med	High	High	Low	Low	Med	Low	Low	Low	Low	Low

Note: + indicates < 0.1%

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