Guide to

ECOLOGICAL SITES OF THE KAZAN UPLANDS SUBREGION

Alberta Government

ECOLOGICAL SITES OF THE KAZAN UPLANDS SUBREGION

Second approximation

2020

Prepared by:

Michael G. Willoughby, Margaret Meijer and Dave J. Downing

Please note: This is the second approximation of the Kazan Uplands subregion.

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Mar 2017		1.0	All
Oct 2020	**1**. Addition of crosswalk table to Alberta Wetland Classification System **2**. Added Forest Management Interpretations for harvesting **3.** Added soil type information to specifically reflect only soils described in the subregion	2.0	**1.** General Ecological Descriptions: Wetlands **2.** Appendix 1 **3.** Appendix 2

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For information on this report contact:
Michael G. Willoughby
Edmonton, AB
(780) 422-4598
E-mail: mike.willoughby@gov.ab.ca

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Executive Summary

The Kazan Uplands Natural Subregion occurs in the far northeastern corner of Alberta and occupies 1.5% of the province (Natural Regions Committee 2006). The main area lies north of Lake Athabasca. It is bordered on the east and north by the Alberta–Saskatchewan and Alberta–Northwest Territories boundaries, respectively, on the west by the Slave River, and on the south by Lake Athabasca. There is a small outlier east of the Athabasca River between Fort McMurray and Fort Chipewyan embedded within the Athabasca Plain Natural Subregion. Elevations range from about 150 m to over 400 m. Approximately 60% of the landscape of the Kazan Upland subregion is exposed precambrian bedrock (Natural Regions Committee 2006).

This guide represents the preliminary analysis of 73 plots described in the Kazan Uplands subregion. The 73 plots represent 34 community types. These types are split into: A. Native grasslands 8 community types B. Native shrublands 4 community types C. Deciduous types 8 community types D. Mixedwood types 4 community types E. Conifer types 10 community types. The dominant plant species, canopy cover, soil and environmental conditions are outlined for each type.

Acknowledgements

Landscape classification is the process of breaking the landscape into definable and manageable pieces through a hierarchical classification.

In the early 1990's the forested landscape of Alberta was classified using a well organized hierarchical system (Archibald/ Beckingham / Klappstein). Unfortunately this left about 50% of the remaining natural landscapes of the province unclassified. Starting in the late 1990's rangelands undertook efforts to classify the rangelands of Alberta. A need for consistency across the province was recognized. Therefore a hierarchical classification that built on the forested classification was used for all forest dominated subregions in the province.

These classifications involve taking large amounts of vegetation, soils and landscape inventory data taken from the ECOSYS database and compiling the data into succinct descriptive summaries for each ecological site, ecological site phase and plant community within a subregion.

In 2010 funding was provided by Policy and Planning Division, Alberta Environment and Parks in order to produce hard copy pdf documents from the ECOSYS website.

Introduction and Background

The province of Alberta is covered by a broad spectrum of vegetation regions from prairie in the South, to alpine vegetation in the mountains and dense forests and extensive wetlands in the Central and Northern parts of the province. These broad vegetation regions have been classified into 6 natural regions and 21 subregions for the province (Natural Regions and Subregions of Alberta 2006). Each of the regions consists of groups of plant communities which are influenced by environmental conditions and human impacts. Intensive management of these regions requires the ability to recognize the vegetative communities that have similar productivities and respond to disturbance in the same way. These ecological classification guides are highly regarded by most resource managers as a tool which may assist in decision making processes related to livestock grazing, prime habitat for wildlife, productive watersheds and recreational areas, addressing biodiversity and conservation matters and numerous other potential related topics.

The purpose of this guide was to develop a framework that would easily group the ecological sites and vegetative community types in the Kazan Uplands Natural Subregion of the province. Ecological site classification helps to organize our current understanding about ecosystem function. This organization is achieved by grouping research plots into similar and functional units that respond to disturbance in a similar and predictable manner.

The ecological site classification system outlined in this document organizes ecological information into a format that facilitates understanding and provides a structure for ecologically based management. The system has been developed primarily as a field tool to complement the user's knowledge about ecological site classification, soil description, and plant identification. The objectives of the ecological site classification are to provide a consistent overview of the common vegetation communities and site characteristics in order to:

1. to facilitate the application of ecological information to decisions on a wide variety of activities within the realm of land resource management
2. to facilitate the collection and organization of information to expedite the development of resource management applications and decision support systems
3. to promote communication among resource managers and between managers and the public
4. to provide a common basis for integrated planning, and
5. to reduce resource management costs by integrating ecological information into the decision-making process.

This guide builds on the work outlined in the Field guide to Ecosites of Northern Alberta (Beckingham and Archibald 1996) for the Canadian Shield Natural Region. In 2006 (Natural Regions and Subregions of Alberta 2006) the original Canadian shield region was split into the Athabasca Plain and Kazan Uplands subregions. This guide outlines the analysis of 73 plots described in the Kazan Uplands subregion.

Physiography, Climate and Soils

Please note this summary of Natural Subregion characteristics is extracted directly from the Natural Subregions guide (Natural Regions Committee 2006) and is presented here for the reader's convenience.

The Kazan Uplands Natural Subregion is 9719 km^2, covering only 1.5% of the province. It features short, warm summers where July is the warmest month, but possesses the coldest winters of any Natural Subregion in Alberta due to continental polar and continental arctic weather systems. July is also the month of maximum precipitation. Winter snowfall accounts for 40% of the annual total (Natural Regions Committee 2006). The Alberta Climate Model indicates the Kazan Upland Natural Subregion receives about the same annual precipitation as the Dry Mixedgrass Natural Subregion, and has a potential summer moisture deficit (summer moisture index) comparable to that of the Northern Fescue Natural Subregion. Figure 4-6.1 and Table 3-2 in Natural Regions and Subregions guide of Alberta provides monthly and annual climate data summaries. The prevalence of rock barrens and well to rapidly drained glacial deposits, together with low rainfalls, produce conditions that are favorable for non-vascular and vascular plants that are adapted to dry conditions.

Extensive outcrops of Precambrian bedrock, composed of Aphebian and Archaen granitoids define the Kazan Upland subregion. The westernmost edge of the Canadian Shield, defines the limits of the Kazan Uplands; approximately, 60 percent of the landscape is exposed bedrock. The surficial landscape is comprised of about 45 percent glacially scoured rock, about 40 percent sandy and gravelly ice-contact glacial drift, and about 15 percent organic accumulations in low-lying areas. Parent materials are ice-scoured bedrock and coarse textured glacial.

The terrain is hummocky to rolling with relief up to 50 m. Nonsoils occur across about half the area. Surficial deposits between bedrock outcrops are mainly coarse and acidic. Soils on these materials are predominantly eluviated Dystric Brunisols with associated Orthic, Gleyed and Lithic Subgroups, the latter on very thin deposits over bedrock. Wetlands are a complex of Typic and Fibric Mesisols, many with Terric Subgroups, Peaty Gleysols also occur (Natural Regions Committee 2006).

Approach and Methods of Classification

Approach:

Ecological classification hierarchy and terminology

It was determined that the ecosystem classification system developed by Corns and Annas (1986) and Beckingham et al. (1996) was the best approach for summarizing the data in this subregion. Consequently, this guide adopts a similar ecological unit classification hierarchy (ecodistrict, ecosection, ecological site, ecological site phase, plant community). The ecological classification system is nested within Alberta's geographically based natural region and subregion classification system (Natural Regions and Subregions of Alberta 2006).

Ecodistrict

The ecodistrict level is a unique pattern of slope, landform, soils and vegetation. Mapping of this unit is usually done at a scale of 1:1,000,000 to 1: 250,000 within the whole province (Strong and Anderson 1980). This level of the classification hierarchy is spatially defined and may or may not be unique to a subregion.

Ecosection

The natural subregion used by the Alberta Government is equivalent to the ecoregion defined by the Canada Committee on Ecological Land Classification (CCELC) as part of a multi-level national mapping system for Canada and that was used for integrated resource planning in Alberta (Marshall et al. 1996). Similarly, the ecodistrict as presently used and its associated scale of mapping is equivalent to the ecodistrict defined by the CCELC. However, the ecosection has a somewhat different meaning in the current context than it did in the national system or than it did when it was applied to integrated planning maps in Alberta in the 1980's and 1990's. For those mapping projects, the ecosection was a subdivision of the ecodistrict and was mapped at 1:20 000 to 1:50 000 as a more specific delineation of recurring landform and vegetation patterns, usually with reference to major community type groups or soil subgroups. In the current scheme, the ecosection is a term used to define one ecodistrict or an aggregation of ecodistricts that represent one or more climatic variants within a natural subregion; therefore, its mapping scale is flexible. This level of the classification system is not spatially defined. The ecosection is a unique pattern of slope, landform, soils and vegetation and may also represent a slight change in the climate of a subregion. Mapping of this unit is usually done at a scale of 1:1,000,000 to 1:100,000 and can be a grouping of ecodistricts or at smaller scales outliers in a subregion. For example the Lower Boreal Highlands subregion is split into the foothills and boreal ecosections which are influenced by their proximity and location within the Boreal and Foothills Natural Regions. Spatially these two ecosections are split by grouping ecodistricts. In contrast an example of a smaller scale ecosection (1:100,000) is the Cypress Hills outlier of the Montane subregion. Subregion ecosections have a characteristic sequence of ecological sites according to soil moisture regime (SMR) and, to a lesser degree, soil nutrient regime (SNR). Currently there is no ecosection described for this subregion.

Ecological Site

Ecological sites are ecological units that develop under similar environmental influences (climate, moisture, nutrient regime). They are groups of one or more ecological site phases that occur within the same portion of the edatope (moisture/nutrient grid). Each ecological site is designated with a small letter. These letters range from "a" the driest ecological site and the last letter being the wettest. Each ecological site has been given a name that conveys some information about the ecology of the unit. Ecological sites are typically named after plant species that are common or typical of the site (eg. e low-bush cranberry). The plant that the ecological site is named after, however, may not be present in every plot or stand belonging to the site. Ecological site in this classification system, is a functional unit defined by moisture and nutrients. It is based on the combined interaction of biophysical factors which together dictate the availability of moisture and nutrients for plant growth. Thus, different ecological sites vary in their moisture and nutrient regime and have similar characteristic plants and soils.

Ecological site phase

An ecological site phase is a subdivision of the ecological site based on the dominant species in the canopy. On lowland, meadow or grassland sites where tree canopy is not present the tallest structural vegetation layer with greater than 5% cover determines the ecological site phase. Generally, ecological site phases are mappable units and spatial ecological site phase land cover datasets have been developed from AVI (Alberta Vegetation Inventory) (Derived Ecosite Phase (DEP)) and PLVI (Primary Land Vegetation Inventory). Ecological site phases are identified by the ecological site letter "a" along with a number "a1" representing the phase within the ecological site. Ecological site phases have a distinct range in canopy composition, lower strata plant species and pedogenic processes. The ecological site phase has a strong ecological basis and correlates well with forest cover on forest inventory maps.

Plant community type

Ecological site phases may be subdivided into plant community types, which are the lowest taxonomic unit in the classification system. While plant community types of the same ecological site phase share vegetational similarities they differ in their understory species composition and abundance. Generally the plant community types are named by combining the name of the dominant plant species in each structural layer (eg. White spruce/Horsetail/Moss)

Methods:

Plant community classification

Data used to create this guide were collected from field plots within the Kazan Upland subregion. Seventy three plots were used to create the classification for this subregion. Field inventory for these plots generally followed the Ecological Land Survey Site Description Manual (2003) and uses various site, vegetation and soils forms. Plot data was analyzed using the multivariate analysis techniques of classification and ordination. Classification is the assignment of plots to classes or groups based on the similarity of species within each plot. A polythetic agglomerative approach was used to group the samples. This technique assigns each plot to a cluster which has a single measure. It then agglomerates these clusters into a hierarchy of larger and larger clusters until finally a single cluster contains all the plots (Gauch 1982). The cluster analysis was performed in SAS with Euclidean distance used as the Cluster Distance Measure and Ward's method was used in the Group Linkage Method. The groupings generated in cluster analysis were overlain on the site ordination to determine final groupings.

Ordination was used to find relationships among species, communities and environmental variables. Ordination reduces the dimensionality of the data to 1-3 most important axes to which environmental gradients can be assigned. The ordination technique used in the analysis of the data was DECORANA (Detrended Correspondence Analysis). Once final groupings were determined on the ordination specific environmental variables can be assigned to the variation outlined on the ordination axes.

Plant community summaries were generated by averaging plant species composition, range in composition, and percent constancy of occurrence, among vegetation inventory plots which were part of a community type. Environmental data was sorted into the same plant community groupings to create the plant community descriptions outlined in this guide. The number of sample plots on which the description was based is also provided (e.g. n=16).

Ecological Health and Ecological Status Score

Ecological health is determined by comparing the functioning of ecological processes on an area (e.g. plant community polygon) of to a standard (i.e. Reference Plant Community) described within an ecological site description. An ecological site is defined by the Task Group on Unity and Concepts (1995) as, “a distinctive kind of land with specific physical characteristics that differs from other kinds of land in its in its ability to produce a distinctive kind and amount of vegetation”. This guide can be used to determine the appropriate

reference plant community, within an ecological site, for a health assessment. We use health terminology (healthy, healthy with problems, or unhealthy), to rank the ability of the land to perform certain ecological functions. These functions include: net primary production, maintenance of soil/site stability, capture and beneficial release of water, nutrient and energy cycling and plant species functional diversity. For a detailed description on how to assess health for various plant communities please refer to “Rangeland Health Assessment for Grassland, Forest and Tame Pasture” (Adams et al. 2016).

An ecological status score (i.e. the integrity of the plant community composition compared to the reference plant community) has been added to each community type description. These values are based on what is currently known about how a reference plant community (RPC) responds to various kinds and levels of disturbance or successional processes. The values indicate how a particular plant community fits in the state and transition model relative to the RPC. If an experienced observer wishes to estimate the health of a plant community without completing a health form, (e.g. a small riparian area), these values can be used as a guide. Occasionally there are 2 options provided for the ecological status score. This was done for two reasons: 1) to express the range of divergence from the RPC possible for a particular plant community; or 2) to allow for different health forms to be used in communities with variable shrub or tree cover (e.g. on sites with high woody cover and/or an obvious LFH layer use the forest rangeland health form and the corresponding ecological status score; on sites dominated by herbaceous cover and/or an obvious herbaceous litter layer use the native grassland form). Late seral plant communities tend to be superior in the efficient capture of solar energy, in cycling of organic matter and nutrients, in retaining moisture, in supporting wildlife habitat values and in providing the highest potential productivity for the site (Adams et al. 2016). In contrast, early seral disturbed stages ability to produce a distinctive kind and amount of vegetation”represent plant communities with diminished ecological processes, which are less stable and more vulnerable to erosion and invasion by weeds and non-native species. In most cases these late seral plant communities are used as the RPC, but sometimes management goals influence the choice of RPC (e.g. a cut block to be maintained as untimbered rangeland).

Correlation of Soils and Ecological Sites

Please note this summary of Natural Subregion characteristics is extracted directly from the Natural Subregions guide (Natural Regions Committee 2006) and is presented here for the reader's convenience.

The acidic characteristics of granitic bedrock exposures, the well to rapidly drained glacial drift, and frequent fires significantly impact the vegetation in this subregion. Communities are associated with dry rock barrens are widespread, and although species diversity is low in any given locale, the variety of habitat results in high species variety across the barrens. Various lichen communities occupy south-facing and steep rock faces and slopes--many found only in the Kazan Uplands (Natural Regions Committee 2006). "Pocket" communities grow in rock crevices and sheltered locations where mineral soil has accumulated and moisture conditions are right. The species associated with these types of areas are stunted jack pine and Alaska birch forming open stands, with a sparse understory of bearberry, ground juniper, bog cranberry, and a variety of drought-tolerant ferns and other herbs, mosses, and lichens (Natural Regions Committee 2006).

Places with course textured, rapidly drained and dry sandy or gravelly soils support more vigorous pine growth. The driest sites are vegetated by open jack pine stands with a patchy carpet of lichens below. Moister sites support more diverse understories of green alder, common blueberry, bearberry, common Labrador tea, Canada buffaloberry, bunchberry, and other herbs and feathermosses. Aspen, Alaska birch, and black spruce are locally common in places.

Small lakes occupy about 10% of the Kazan Uplands Natural Subregion, and wetlands are common in the lower relief western half, covering approximately 20%. Adjacent to these areas, communities of moister adapted species can develop. These include aspen, balsam poplar, Alaska birch, white spruce, and a diverse shrub and forb understory. Bog communites are the domiannt wetland type. Black spruce forms open-to-dense stands with an understory of common Labrador tea, leatherleaf, bog cranberry, cloudberry, and peat moss on Organic soils. Permafrost is discontinuous but widespread. Nutrient rich wetlands typically have open forests of tamarack, willow, dwarf birch, sedges, and rich-site mosses.

Nonsoils (e.g., bedrock outcrops) occur across about half the area. Surficial deposits between bedrock outcrops are mainly coarse and acidic. Soils on these materials are predominantly eluviated Dystric Brunisols with associated Orthic, Gleyed and Lithic Subgroups, the latter on very thin deposits over bedrock. Wetlands are a complex of Typic and Fibric Mesisols, many with Terric Subgroups. Peaty Gleysols also occur. Appendix 7 summarizes the proportional occurrence of soil types in the Kazan Uplands Natural Subregion (Natural Regions Committee 2006).

Guidelines for Determining Ecological Sites

Alberta currently uses two ecological classification methods to determine ecological sites. In the agricultural settlement area of the Province, resource managers can determine site soil conditions using AGRASID (Agricultural Region of Alberta Soil Inventory Database). In the Rocky Mountain, Foothills and Boreal Natural Regions, the Ecological Landscape Classification approach incorporates both vegetation and site conditions (climate, soils and geology) into a hierarchical ecological unit classification (e.g. subregion, ecodistrict, ecosection, ecological site, ecological site phase, plant community) (Strong and Thompson 1995). Ecological sites are areas of similar climate, moisture and nutrient regimes. The combination of moisture and nutrient regimes can be represented on a two-dimensional grid called the edatope grid. The edatope grid is a two-dimensional table with soil moisture regime increasing from bottom to top along the vertical axis and soil nutrient regime increasing from left to right on the horizontal axis. Soil moisture regime (SMR) is defined as the average amount of soil water available annually for evapotranspiration by vascular plants (Meidinger and Pojar 1991). The SMR uses nine classes to define the available soil moisture, which range from the driest (very xeric) to the wettest (hydric). Soil nutrient regime (SNR) is defined as the amount of essential soil nutrients that are available to vascular plants over a period of several years (Meidinger and Pojar 1991). SNR is broken down into five classes that range from A (very poor) to E (very rich). Generally ecological sites are named from low moisture/low nutrient to high moisture/high nutrient. Ecological sites within a Natural subregion are defined unique combinations of soil moisture and nutrients. These conditions, in addition to climate, terrain, and elevations create conditions favourable to specific suite of plants referred to as Indicator species. For example a site with a subxeric moisture regime and poor nutrient regime site is characterized by the "a" [bearberry (subxeric/poor)] ecological site. A resource manager can review the indicator plant species of the ecological site, plant community types, soils and site conditions to see if the plant community in question fits the general descriptions. The following steps provide a framework for determining ecological sites.

Step 1 Review background information and pre-stratify the area to be classified

Review information about the area of interest to learn what you can about the landscape and ecology. Consult the natural subregions and Derived Ecosite Phase (DEP) or Primary Land Vegetation Inventory (PLVI) maps to ensure you are using the correct subregion guide. DEP and PLVI classification will also give you the common ecological site phase for a particular forest polygon.

Step 2 Carry out a quick reconnaissance of the site to be classified

Take note of the variability and relationship between topography and position on the landscape and the general plant species distribution including trees and understory. Check the DEP and PLVI ecological site phase maps.

Step 3 Choose a location that appears to be representative of the area to be classified

Locate an area for your assessment that appears to be representative of the site to be classified, and is homogeneous in slope, plant cover, and overstory canopy conditions as possible. Avoid locating the sample in areas that have received significant natural or artificial disturbance. Also avoid ecotone areas or relatively small areas that are transitional between homogenous ecological units such as slope breaks.

Step 4 Determine the plant species composition and abundance

Determine the plant species composition and abundance within a 10x10 m plot. Also record any species that appear to be representative of the ecological unit but occur outside the plot within the same slope position and on the same parent materials. Abundance is estimated by determining the amount of ground area that is covered by the plant species when its canopy is projected onto the ground surface (Ecological Land Survey Site Description Manual 2003).

Step 5 Determine the important soil properties

To collect soils data, a soil pit must be dug or augered. In most cases a soil pit 60 cm deep will be adequate. A deeper pit is required when the soil has a coarse to moderately coarse texture. In these cases the pit is dug deeper to see if there are finer-textured layers that are influencing ecological function below the 60 cm of coarse material. A deeper pit is also required when the plant community on the site cannot be explained by the site conditions and soil conditions above 60 cm. The minimum soils data that should be collected within a plot to classify it correctly are organic matter thickness, humus form, Ah horizon thickness, surface texture, effective texture, presence of seepage, depth to mottles, depth to gley, coarse fragment content, parent material/landform and drainage.

Step 6 Determine important site properties

Important site variables that should be collected include topographic position, slope, aspect, moisture regime, and nutrient regime.

Step 7 Determine the natural subregion, ecological site, ecological site phase and plant community type.

There are several ways to determine the ecological site, ecological site phase and plant community type. The first way is to assign an ecological classification to a site is to use the field data collected and go through the various subregion guides to identify the ecological site. You can also use the dichotomous keys to ecological site and ecological site phase. Once you find a potentially correct plant community type, check the soil, site and vegetational characteristics of your site to make sure it matches the ecological site, ecological site phase and plant community type on the various fact sheets. To consider all ecological site choices, you must compare the characteristics of your site, with the descriptions on the fact sheets for all ellipses that overlap the moisture and nutrient classes of your site on the edatope grid for the subregion and adjacent subregions within the area (Ecological Land Survey Site Description Manual 2003).

How to use the Guide

Organization of the guide

This guide is an expansion of the Ecosites of Northern Alberta guide (Beckingham and Archibald 1996). It contains new information and it is recommended that the reader has access to relevant information from both guides. The community types in this guide are closely related to the ecosites and ecosite phases outlined in Ecosites of Northern Alberta (Beckingham and Archibald 1996), and are similarly arranged (e.g. Table 1). Table 1 is a reproduction of Figure 20 in Ecosites of Northern Alberta with community types in this guide further separated into reference range plant communities, successional communities and harvesting and fire communities. The "Successional community types" or "Harvesting and Fire succession" categories outline the successional sequence the community types undergo with heavy grazing pressure, harvesting or fire disturbance.

The bulk of this guide consists of ecological sites, ecological site phase and vegetation community descriptions which include information on the dominant plant species, canopy cover and environmental conditions. Where available, plant community successional information (ie response to grazing) has been included to help you determine rangeland health and the successional relationships of an ecological site.

Ecological units within a subregion are classified by their position on the edatopic grid.

The information in this guide is presented and named by:
1. Subregion/Ecological area
a. Kazan Uplands (KU)
2. Dominant cover type
a. A-grassland
b. B-shrubland
c. C-deciduous
d. D-mixedwood
e. E-conifer
3. A number- Generally, communities are named/numbered from low moisture /nutrient status to high moisture/nutrient status. For example, KUE1 Pj/Lichen community on the"b" subxeric/poor ecological site, while KUE10 Lt/Alder/Sedge community type on the "j" subhydric/rich ecological site.

Eg. KUE1 Pj/Lichen

NOTE: As additional information is collected and new ecological units are identified and described, an attempt is made to fit them into the pre-existing ones.

How to read the fact sheets

The field guide contains 4 types of fact sheets: One for ecosection, one for ecological site, one for ecological site phase and one for plant community type.

Ecosection

There is an identification code at the top of the ecosection fact sheet and a name followed by the number of sample sites (pg 21). Each ecosection has been given a name that conveys information about the location of the unit and are frequently named after a general location within the subregion (Ecosection: Cypress Hills (Mc) of the Montane subregion). A short text description of the site is given under the General Description (pg 21), this is followed by a picture or a cross section diagram and map of the ecosection(pg 21). The section on successional relationships gives a brief note about the spatial locations and differences in ecosections (pg

21). This is followed by a list of envrionmental variables (elevation), ecodistricts and ecological sites associated with the ecosection (pg 21).

Ecological site

There is an identification letter at the top of the ecological site fact sheet and a name, moisture and nutrients followed by the number of sample sites (pg 22). Each ecological site has been given a name that conveys information about the ecology of the unit and are frequently named after a common plant species. A short text description of the site is given under the General Description (pg 22), this is followed by a picture or a cross section diagram of the ecological site (pg 22). The section on successional relationships gives a brief note about the temporal development of the ecological site (pg 22). It generally describes the successional relationships among the ecological site phases and plant community types. Plant species that are indicators of the ecological conditions on the site are listed (pg 22). Site index at 50 years of age at breast height (1.3 m) is presented next. The mean site index is presented in meters followed by the standard error and the number of trees used to calculate the mean (pg 22). Environment and soil variables are then listed and represent a roll-up from the plant community and ecological site phase descriptions (pg 22). Variables that represent environment and soils have a number (1) that indicates the number of the samples in which each variable class occurred. Data has been collected and analyzed from many sources over 40 years and data gaps may exist for many variables. The frequency of occurrence value indicates the number of sampled plots for which data was collected for that variable at the Ecological site, Ecological site phase and plant community fact sheets. Optional variables such as soil exposure, LFH thickness, forage production and stocking rate for livestock may also be listed and represent a roll-up for the plant community and ecological site phase.

Ecological site phase

There is an identification code at the top of the ecological site phase fact sheet and a name followed by the number of sample sites (pg 23). Each ecological site phase has been given a name that conveys information about the dominant tree species or lifeform (shrubland, grassland, tame/disturbance) of the unit and are frequently named after a common plant species. A short text description of the site and successional information maybe given under the General Description or Successional relationships (pg 23) if it is provides more detail than is available on the ecological site fact sheet. Plant species that are indicators of the ecological conditions on the site are listed with the average cover summarized from the various plant communities (pg 23). Indicator species for the ecological site phase are identified with an asterix "*" and are rolled-up to develop the indicator species list for the ecological site fact sheet. Environment and soil variables are then listed and represent a roll-up from the plant community (pg 23). Optional variables such as soil exposure, LFH thickness, forage production and stocking rate for livestock may also be listed and represent a roll-up for the plant communities.

Plant community

There is an identification code at the top of the plant community fact sheet and a name followed by the number of sample sites (pg 24). The name of the plant community is generally the common name of the indicator plant species within the various lifeform layers (tree, shrub, forb, grass, lichen, moss). This is followed by the latin name of each indicator species and a general description of the community type describing its unique ecology. Plant species that are indicators of the ecological conditions on the site are listed with the mean cover summarized, range in cover and overall constancy (frequency of plots that the species was described (pg 24)). Environment and soil variables are then listed and represent a roll-up from the various plots and assessements (pg 24). Optional variables such as soil exposure, LFH thickness, forage production and stocking rate for livestock may also be listed and represent a roll-up for various plots.

Results

This guide represents the analysis of 73 grassland/lichen, shrubland, conifer and deciduous field plots described from the Kazan Uplands subregion. These plots are distributed between 34 community types:

A. Native grasslands 8 types
B. Shrubland 4 types
C. Deciduous 8 types
D. Mixedwood 4 types
E. Conifer 10 types

The dominant plant species, canopy cover and environmental conditions are outlined for each community type.

General Ecological Descriptions

Please note this summary of Natural Subregion characteristics is largely extracted directly from the Natural Subregions guide (Natural Regions Committee 2006) and is presented here for the reader's convenience.

Forest Communities

Vegetation in the Kazan Uplands Natural Subregion is strongly influenced by the distribution and acidic characteristics of granitic bedrock exposures and well to rapidly drained glacial drift, and by frequent fires. Beckingham and Archibald (1996) produced a general description of vegetation communities based on limited plot data. Coarse textured, rapidly drained and dry sandy or gravelly soils support vigorous jack pine growth. The driest sites are vegetated by open jack pine stands with a patchy carpet of lichens on the forest floor. Moister sites with submesic-mesic moisture regimes support more diverse understories of green alder, common blueberry, bearberry, common Labrador tea, Canada buffaloberry, bunchberry, other herbs and feathermosses with an overstory of jack pine, white spruce or aspen. Aspen, Alaska birch and black spruce are locally common in places. Brunisols are common soils on these upland forested community types. On moister sites with subhygric to hygric moisture regimes communities of aspen, balsam poplar, Alaska birch, white spruce and a diverse and lush shrub (red osier dogwood and willow on rich sites and Labrador tea on poorer sites) and forb (horsetail) understories develop in bands adjacent to wetlands and along lakes.

Wetlands

The Alberta Wetland Classification System (2015) recognizes the hydrological, biogeochemical and biotic processes that affect differing characteristics that can be used to define a wetland. The AWCS recognizes five classes of wetlands in Alberta: bogs, fens, marshes, shallow open water and swamps. Wetlands can be divided into two broad groups: **peatlands** and **mineral wetlands**. In general the AWCS considers bogs and fens to be peatlands and all other wetland classes (i.e. swamps, marshes and shallow open waters) are considered to be mineral wetlands. For the most part the ecological sites align with AWCS five classes of wetlands (Table A), however some willow, bog birch, sedge and marsh reedgrass ecological sites because of their moisture regime and species composition are classified as fens and have mineral soils but in the AWCS classification these sites are mineral wetlands which are considered marshes or swamps. Consequently, many fluvial dominated grassland and shrublands with subhygric to hygric moisture regimes are classified as marshes in AWCS, but in the Ecological Site Classification System in the Kazan Uplands these sites are fens and the marshes are very wet aquatic systems with subhydric and hydric moisture regimes.

Swamps in AWCS are mineral wetlands where the water table is near or above the ground surface for variable periods during the year and must have at least 25% cover of trees or shrubs. In the AWCS classification swamps are further split into conifer, mixedwood, deciduous or shrub dominated types, with the shrubby dominated swamps further being split by hydroperiod and salinity (AWCS 2015). In the Ecological Site classification system many swamp types are further split into types with differing nutrient regimes poor, medium and rich. These swamp types are often distinguished based on leading tree and shrub species with black spruce and Labrador tea growing on poorer sites and larch, white spruce, willow and bog birch growing on richer sites.

Table A. Cross walk of broad AWCS classes to general Ecological site and Ecological site phase for the Kazan Uplands subregion.

AWCS Class	AWCS Form	AWCS Code for DEP	Subregion and Ecological Site Phase Code
Bog (B)	Coniferous (W)	BW	***Kazan Upland***-KUh1
	Shrubby (S)	BS	***Kazan Upland***-Kuh2
	Graminoid (G)	FG	***Kazan Upland***-KUh3
Fen (F)	Wooded Poor (Wp)	FWp	***Kazan Upland***-KUi1
	Wooded Rich (Wr)	FWr	***Kazan Upland***-KUj1
	Shrubby (S)	FS	***Kazan Upland***-KUi2,j2
	Graminoid (G)	FG	***Kazan Upland***-KUi3,j3
Marsh (M)	Graminoid (G)	MG	***Kazan Upland-***KUk1
Open water (W)	Aquatic Veg (A)	WA	
	Bare (B)	WB	
Swamp (S)	Wooded Conifer (Wc)	SWc	***Kazan Upland***-KUf1,g1
	Wooded Mixedwood (Wm)	SWm	***Kazan Upland***-KUf2
	Wooded Deciduous (Wd)	SWd	***Kazan Upland***-KUf3
	Shrubby (S)	SS	***Kazan Upland***-KUf4

Dozens of small lakes occupy about 10 percent of the Kazan Uplands Natural Subregion, the largest being Cornwall, Colin, Charles, Wylie and Andrew Lakes. A few small streams drain into the Slave River. Wetlands are most common in the lower relief western half of the Natural Subregion, and cover about 20 percent of the total area. Timoney (2004, 2013) provides a good description of these wetland community types that transition to the Peace Athabasca Delta subregion on the western edge of the Kazan Uplands. Treed poor fens and bogs on Organic soils are the most common wetland type in the central and eastern part of the subregion. Shrubby fens and marshes on Organic and wet mineral soils mostly occur on the western portion of the subregion in transition to the Peace Athabasca Delta subregion.

Bog communities with black spruce forms open-to-dense stands with an understory of common Labrador tea, leatherleaf, bog cranberry, cloudberry and peat moss on Organic soils. Permafrost is discontinuous but widespread. Nutrient-rich wetlands typically have open forests of tamarack, willow, dwarf birch, sedges and rich-site mosses. Marshes can be locally extensive in sheltered lake bays or along creek channels, and are dominated by water and small bottle sedge, bulrushes, and in deeper water, pondweeds.

Grasslands

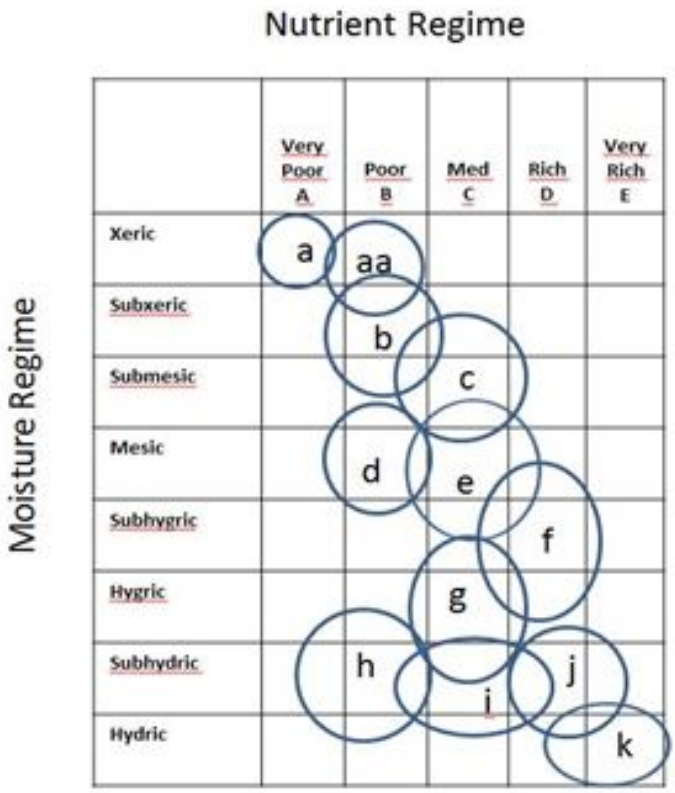
Upland dry grasslands are not common in the Kazan Uplands subregion. Allen et al. (2004) did observe a hay sedge dominated community on upper to mid slope positions on steep south and west facing slopes with sandy or gravelly glacial deposits in the Colin-Cornwall Lakes Wildland Provincial Park. Saline meadow complexes were described within the La Butte Creek Wildland Provincial Park (Allen et al. 2002) at two sites. Site 1 which is described was slightly drier than site 2 and was dominated by mat muhly, shooting star and

seaside arrow grass. The other site which was slightly wetter was dominated by brown moss, awned sedge and seaside arrowgrass on the drier margins. It was felt that the mat muhly dominated community was subjected to higher levels of salt through evaporation. Raup (1935) described similar saline complexes in Wood Buffalo National Park and Bailey et al. (1992) described saline complexes in the Yukon Territory and Miller et al (2017) described saline complexes in the Northern Mixedwood subregion. The wettest edges were dominated by samphire sea blight, the Nuttall's saltgrass, foxtail barley and reedgrass and willow communities on the drier edges.

Lowland sites dominated by water sedge and marsh reedgrass were also observed in the Colin-Cornwall Lakes Wildland Park (Allen et al. 2004). The marsh reedgrass community was observed in patches or in narrow bands besides lakes, rivers and streams. They also observed fairly extensive meadows of marsh reedgrass (bluejoint) near ponds and lakes. Water sedge and small bottle sedge communities were observed along the edges of small ponds or a linear community along drainages where moisture was sufficient. Marshes dominated by cattails tend to occur in small patches along creeks (Allen et al. 2004).

Shrublands

Upland shrub types develop when soil conditions are too poor for tree growth or tree canopy has been removed mechanically or by fire. On eroded glaciofluvial kames a Bearberry/Northern ricegrass community was described (Allen et al. 2002). Allen et al. (2004) found this community type graded into open jack pine stands in La Butte Creek Wildland Provincial Park. Upland forest sites disturbed by fire will often have a early successional shrub phase. Labrador tea, lichen and feather moss tend to dominate the poorer sites and rose, Saskatoon, green alder and Beaked willow the more mesic sites. Shrub communities dominated by willow, water birch and bog birch dominate the moister and richer sites. Sedges and reed grasses (Calamagrostis spp) dominate the drier edges of marshes or areas that have standing water only during spring runoff (i.e. fens). Willow will invade into these fens to form the Willow/Sedge and Willow/Reed grass plant communities and bog birch and Labrador tea tend to dominate the poorer nutrient sites.



Ecological sites

a=**lichen stone fields**
xeric/very poor
aa=**Sand heather/moss**
xeric/poor
b=**bearberry/lichen**
subxeric/poor
c=**blueberry**
submesic/medium
d=**Labrador tea-mesic**
mesic/poor
e= **buffaloberry/alder**
mesic/medium

g=**red osier dogwood/horsetail**
subhygric/rich
g=**Labrador tea - hygric**
hygric/medium
h=**bog**
subhydric/very poor
i=**poor fen**
subhydric/medium
j=**rich fen**
subhydric/rich
k=**marsh**
hydric/rich

Figure 1. Edatope grid and ecological sites for the Kazan Upland subregion.

Plant Community Keys

Plant Community Tables

Table 1. Kazan Uplands Communities

Ecological Site / Range Site	Ecosite Phase / Ecological Range Site	Reference Plant Community	Grazing Succession	Modified Plant Community	Harvesting Succession
a lichen stone fields	a1 lichen stonefields	KUA1 Lichen stonefield			
aa sand heather/moss (xeric/poor)	aa1 grass/sand heather				
b bearberry/lichen(subxeric/poor)	b1 bearberry/lichen - Pj	KUE1 Pj/Lichen			
		KUE2 Pj/Bearberry			
	b2 bearberry/lichen - shrub	KUA2 Bearberry/Northern ricegrass			
		KUB1 Juniper/Lichen(Pj)			
c blueberry(submesic/medium)	c1 blueberry - Pj-Aw(Bw)	KUD3 Pj-Aw(Bw)/Bearberry-Bog cranberry			
		KUE3 Pj/Blueberry			
	c2 blueberry - Aw(Bw)	KUC1 Aw/Rose/Spreading dogbane			
	c6 blueberry grassland	KUA3 Hay sedge-Slender wheatgrass			
	c7 tame/disturbed				
d Labrador tea-mesic(mesic/poor)	d1 Labrador tea-mesic Pj-Sb	KUC4 Aw-Pj-Sb/Labrador tea			
		KUD1 Sb-Aw/Moss			
		KUE11 Pj/Bog cranberry/lichen			
		KUE4 Pj- Sb/Bog cranberry/lichen			
e buffaloberry/alder(mesic/medium)	e1 buffaloberry-alder/ Aw	KUC2 Aw(Bw)/Alder			
		KUC3 Aw/Buffaloberry			
		KUC7 Aw-Pb/Saskatoon-Red Osier Dogwood/Spreading dogbane			
	e2 buffaloberry-alder/ Pj-Sw-Sb-Aw-	KUD2 Aw-Sw/Buffaloberry			

Ecological Site / Range Site	Ecosite Phase / Ecological Range Site	Reference Plant Community	Grazing Succession	Modified Plant Community	Harvesting Succession
	Bw	KUD4 Aw- Pj/Alder			
	e3 buffaloberry-alder shrubland				
	e4 buffaloberry-alder/ Pj-Sw-Sb	KUE5 Pj/Alder			
		KUE6 Sb-Sw/Moss			
f red osier dogwood/horsetail (subhygric/rich)	f1 red osier dogwood/horsetail Sw				
	f2 red osier dogwood/horsetail Pb-Sw				
	f3 red osier dogwood/horsetail - Pb-Aw(Ba)	KUC5 Pb/Alder-Red osier dogwood/Horsetail			
		KUC6 Bw-Aw-Pb/Willow			
	f4 shrub				
	f5 tame/disturbed				
g Labrador tea-hygric(hygric/medium)	g1 Labrador tea-hygric Sb-Pj	KUE10 Lt-Sb/River alder/Sedge			
		KUE7 Sb/Alder/Tufted moss			
h bog (subhydric/very poor)	h1 bog - treed	KUE8 Sb/Labrador tea/peat moss			
	h2 bog - shrubby	KUB2 Labrador tea/Peat moss (Sb)			
	h3 bog -graminoid				
i poor fen (subhydric/medium)	i1 poor fen - treed	KUE9 Sb-Lt/Labrador tea/Golden moss			
	i2 poor fen - shrubby				
	i3 poor fen - graminoid	KUA4 Shooting star/Mat muhly (saline)			
		KUA5 Sedge/Brown moss (saline)			
j rich fen (subhydric/rich)	j1 rich fen - treed				
	j2 rich fen - shrubby	KUB3 Willow/Marsh reed grass			

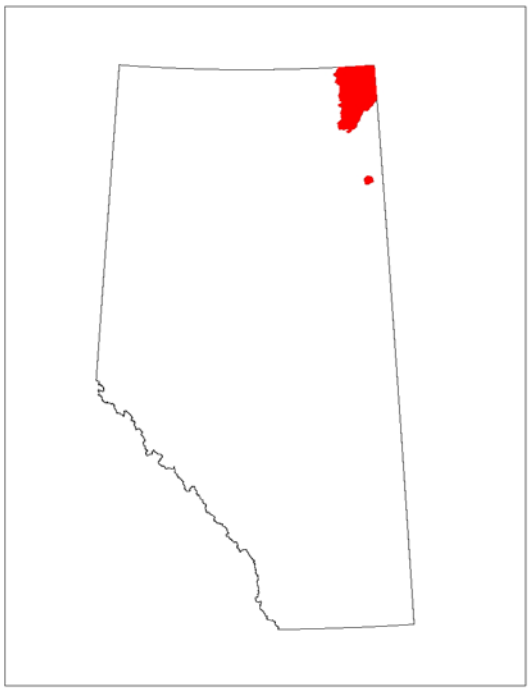
Ecological Site / Range Site	Ecosite Phase / Ecological Range Site	Reference Plant Community	Grazing Succession	Modified Plant Community	Harvesting Succession
		KUB4 Willow/Sedge			
		KUC8 Willow/Brown moss/ Aw(Bw)			
	j3 rich fen - graminoid				
k marsh (hydric/rich)	k1 marsh	KUA6 Water parsnip/Northern manna grass			
		KUA7 Northern quillwort			
		KUA8 Water arum/Sedge			

KU Kazan Uplands (n=73)

Natural Subregion: Kazan Uplands

General Description

This subregion has not been split into ecosections. It includes the Uranium City and Hart Lake Plain ecodistricts. The subregion is located north of Lake Athabasca in the Northeastern part of the province with a small outlier at the headwaters of the Marguerite River. It is bordered by Athabasca Plain in the south and Northern Mixedwood and Peace Athabasca Delta subregions on its western boundary.



Environmental Variables

Elevation (range): 248 (180-330) M

Ecological Sites		Site Count
a	lichen stone fields	1
b	bearberry/lichen(subxeric/poor)	18
c	blueberry(submesic/medium)	12
d	Labrador tea-mesic(mesic/poor)	10
e	buffaloberry/alder(mesic/medium)	16
f	red osier dogwood/horsetail (subhygric/rich)	2
g	Labrador tea-hygric(hygric/medium)	2
h	bog (subhydric/very poor)	3
i	poor fen (subhydric/medium)	3
j	rich fen (subhydric/rich)	3
k	marsh (hydric/rich)	3

a lichen stone fields (n=1)

Natural Subregion: Kazan Uplands

Ecosection: KU Kazan Uplands

General Description

This ecosite occurs on xeric rocky outcrops throughout the Kazan Uplands subregion. Moisture and nutrients are virtually nonexistent on these rock outcrops, where nearly 60% of the landscape in the subregion is exposed bedrock. Where there is some moisture accumulation in the rock crevices Cladina species and some grasses, sedges and xeric forb species are found growing. These sites also have high potential for extreme exposure to wind and insolation. There is very little soil or organic material present; therefore, the lichens have to rely on the rock substrate and the air for their moisture and nutrient requirements. Only lichen appears to tolerate the existent conditions on these rocky outcrops.

Environmental Variables

Moisture Regime: Very Xeric (very dry) (0)

Nutrient Regime: Oligotrophic (very poor) (0)

Elevation (range): 295 (295-295) M

Slope (%): very gentle slope (1)

Aspect: Southerly (1)

Topographic Position:Crest (1)

Soil Variables

Soil Drainage: Rapidly drained (1)

Soil Subgroup:

Surface Texture:

Effective Texture:

Depth to Mottles/Gley: Not Applicable (0)

Organic Thickness: 0 - 5 cm (1)

Parent Material: Rock (1)

Soil Type: SS-Shallow

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	0.00	0.00	0.00	0

Successional Relationships

This ecosite is characteristic of weakly or noncalcareous sites and is successionally mature.

Indicator Species

Lichen

N/A
Umbilicaria muehlenbergii

N/A
Arctoparmelia centrifuga

REINDEER LICHEN
Cladina mitis

a1 lichen stonefields (n=1)

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: a lichen stone fields

Characteristic Species

Shrub

[2.0]COMMON BEARBERRY
Arctostaphylos uva-ursi

[1.0]GROUND JUNIPER
Juniperus communis

Lichen

[15.0]REINDEER LICHEN*
Cladina mitis

[8.0]N/A*
Umbilicaria muehlenbergii

[5.0]N/A*
Arctoparmelia centrifuga

Moss and Liverwort

[1.0]AWNED HAIR-CAP
Polytrichum piliferum

Environmental Variables

Moisture Regime: Very Xeric (very dry) (0)

Nutrient Regime: Oligotrophic (very poor) (0)

Elevation (range): 295 (295-295) M

Slope (%): very gentle slope (1)

Aspect: Southerly (1)

Topographic Position:Crest (1)

Soil Variables

Soil Drainage: Rapidly drained (1)

Soil Subgroup:

Surface Texture:

Effective Texture:

Depth to Mottles/Gley: Not Applicable (0)

Organic Thickness: 0 - 5 cm (1)

Parent Material: Rock (1)

Soil Type:

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	0.00	0.00	0.00	0

KUA1 Lichen stonefield (n=1)

(Umblicaria spp.)

This community type represents the lichen cover on rock outcrops throughout the subregion. These Precambrian rock outcrops represent 60% of the landscape in the subregion (Natural Regions Committee 2006)). There are no soil or organic material associated with the exposed bedrock which favours the growth of crustose lichens. In the rock crevices where some organic matter and moisture accumulates reindeer lichen is common.

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: a lichen stone fields
Ecosite Phase: a1 lichen stonefields

Plant Composition	Canopy Cover (%)		
	Mean	**Range**	**Const.**
Medium Shrub (0.5 to 2 m)			
COMMON BEARBERRY *(Arctostaphylos uva-ursi)*	2.0	2.0-2.0	100
GROUND JUNIPER *(Juniperus communis)*	1.0	1.0-1.0	100
Low Forb (< 30 cm)			
HAREBELL *(Campanula rotundifolia)*	1.0	1.0-1.0	100
THREE-TOOTHED CINQUEFOIL *(Potentilla tridentata)*	1.0	1.0-1.0	100
THREE-TOOTHED SAXIFRAGE *(Saxifraga tricuspidata)*	1.0	1.0-1.0	100
RUSTY WOODSIA *(Woodsia ilvensis)*	1.0	1.0-1.0	100
Graminoid			
SILVERY-FLOWERED SEDGE *(Carex aenea)*	1.0	1.0-1.0	100
UMBELLATE SEDGE *(Carex umbellata)*	1.0	1.0-1.0	100
SMALL BOTTLE SEDGE *(Carex utriculata)*	1.0	1.0-1.0	100
ROCKY MOUNTAIN FESCUE *(Festuca saximontana)*	1.0	1.0-1.0	100
NORTHERN RICE GRASS *(Oryzopsis pungens)*	1.0	1.0-1.0	100
GLAUCOUS BLUEGRASS *(Poa glauca)*	1.0	1.0-1.0	100
Moss			
AWNED HAIR-CAP *(Polytrichum piliferum)*	1.0	1.0-1.0	100
Lichen			
REINDEER LICHEN *(Cladina mitis)*	15.0	15.0-15.0	100
N/A *(Umbilicaria muehlenbergii)*	8.0	8.0-8.0	100
N/A *(Arctoparmelia centrifuga)*	5.0	5.0-5.0	100

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Very Xeric (very dry) (0)

Nutrient Regime: Oligotrophic (very poor) (0)

Elevation (range): 295 (295-295) M

Slope (%): 2.5 - 5.99 (1)

Aspect: Southerly (1)

Topographic Position: Crest (1)

Soil Variables

Soil Drainage: Rapidly drained (1)

Soil Subgroup:

Surface Texture:

Effective Texture:

Depth to Mottles/Gley: Not Applicable (0)

Organic Thickness: 0 - 5 cm (1)

Parent Material: Rock (1)

Soil Type:

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	0.00	0.00	0.00	0

aa sand heather/moss (xeric/poor) (n=0)

Natural Subregion: Kazan Uplands

Ecosection: KU Kazan Uplands

General Description

This ecological site represents the sand of paleodunes of various types, including parabolic and longitudinal dunes and is more common in the southern outlier of the Kazan Uplands and Athabasca Plain subregions. This ecological site is primarily made up of large, distinctive dune ridges that rise well above the surrounding wetlands or sand plains. The dunes characteristically have steep slopes, dune crests and often include areas of active sand(blowouts).Tops of stabilized dune ridges have mature jack pine / lichen communities. Blowouts are generally unvegetated, with areas of sand heather / lichen crust beginning the stabilization process. Jack pine / green alder communities can be found in moister locations (e.g. bases of sand ridges). This ecological site is not common in the Kazan Upland subregion and currently no data has been collected.

Environmental Variables

Moisture Regime:

Nutrient Regime:

Elevation (range):

Slope (%):

Aspect:

Topographic Position:

Soil Variables

Soil Drainage:

Soil Subgroup:

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness:

Parent Material:

Soil Type: SV1-Very dry/Sandy

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	0.00	0.00	0.00	0

Successional Relationships

Due to the dry nature of the site often only sand heather and lichen will dominate the site. Jack pine and alder will invade in the moister areas or on northerly aspects where the dunes have stablized. See the Athabasca Plain subregion guide for a complete description of this ecological site.

Indicator Species

aa1 grass/sand heather (n=0)

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: aa sand heather/moss (xeric/poor)

General Description

A number of ecological site phases currently have no data. These ecological site phases have been created as place holders because they were described in adjacent subregions (Athabasca Plain). This ecosite phase is more common in the southern outlier of the Kazan Upland subregion. See the Athabasca Plain subregion guide for a description of the plant communities.

Characteristic Species

Environmental Variables

Moisture Regime:

Nutrient Regime:

Elevation (range):

Slope (%):

Aspect:

Topographic Position:

Soil Variables

Soil Drainage:

Soil Subgroup:

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness:

Parent Material:

Soil Type:

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	0.00	0.00	0.00	0

b bearberry/lichen(subxeric/poor) (n=18)

Natural Subregion: Kazan Uplands

Ecosection: KU Kazan Uplands

General Description

This ecosite has dry conditions with rapidly drained acidic soils and poor nutrient status due to the coarse-textured glacial parent materials. These sites commonly have bedrock within 1m of the surface. Plants that are indicative of the nutrient-poor substrate include bearberry, lichen, bog cranberry, and blueberry. Open-canopied jack pine stands dominate this ecosite that commonly has a carpet of lichens covering the forest floor. The picture of this ecosite is for the bearberry/lichen shrub phase (b2) of this ecological site.

Successional Relationships

Due to the dry nature of this ecosite, succession to a black spruce canopy is slower than the fire return interval. Pine is maintained for relatively long periods from colonization of the site after fire to the climax stages. The pine phase of this ecosite can be considered a fire edaphic climax.

Indicator Species

Tree

JACK PINE
Pinus banksiana

Shrub

COMMON BEARBERRY
Arctostaphylos uva-ursi

GROUND JUNIPER
Juniperus communis

Lichen

REINDEER LICHEN
Cladina mitis

Moss and Liverwort

AWNED HAIR-CAP
Polytrichum piliferum

Graminoid

NORTHERN RICE GRASS
Oryzopsis pungens

Environmental Variables

Moisture Regime: Subxeric (moderately dry) (9), Submesic (moderately fresh) (7), Xeric (dry) (1)

Nutrient Regime: Submesotrophic (poor) (16), Mesotrophic (medium) (1)

Elevation (range): 248 (200-330) M

Slope (%): gentle slope (6), very gentle slope (4), moderate slope (3), nearly level (2), strong slope (1)

Aspect: Southerly (5), Easterly (4), Level (4), Westerly (3)

Topographic Position:Upper Slope (5), Crest (4), Lower Slope (3), Midslope (3), Level (2)

Soil Variables

Soil Drainage: Rapidly drained (10), Well drained (7), Very poorly drained (1)

Soil Subgroup: ELUVIATED EUTRIC BRUNISOL (11), ELUVIATED DYSTRIC BRUNISOL (2), GLEYED ELUVIATED EUTRIC BRUNISOL (1), ORTHIC REGOSOL (1)

Surface Texture: Sand (9), Loamy sand (3), Loamy fine sand (1), Sandy clay (1), Silt (1), Sandy loam (0)

Effective Texture: Sand (14), Loamy fine sand (1), Sandy loam (0)

Depth to Mottles/Gley: 51 - 100 (1), Not Applicable (0)

Organic Thickness: 0 - 5 cm (16)

Parent Material: Glaciofluvial (8), Rock (7), Glaciolacustrine (2), Morainal (2), Residual (2)

Soil Type: SV4-Very dry/Fine Loamy-Clayey (8), SD1- Dry/Sandy (7)

Humus Form FIBRIMOR (1)

LFH Thickness	Mean	Min	Max	Count
cm:	3.00	2.00	5.00	15

b1 bearberry/lichen - Pj (n=15)

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: b bearberry/lichen(subxeric/poor)

Characteristic Species

Tree

[30.0]JACK PINE*
Pinus banksiana

Shrub

[2.0]COMMON BEARBERRY
Arctostaphylos uva-ursi

[2.0]SAND HEATHER
Hudsonia tomentosa

[1.0]COMMON BLUEBERRY
Vaccinium myrtilloides

[1.0]BOG CRANBERRY
Vaccinium vitis-idaea

Forb

[1.0]WILD LILY-OF-THE-VALLEY
Maianthemum canadense

Lichen

[20.0]REINDEER LICHEN*
Cladina mitis

[1.0]N/A
Peltigera malacea

Moss and Liverwort

[3.0]AWNED HAIR-CAP*
Polytrichum piliferum

Environmental Variables

Moisture Regime: Subxeric (moderately dry) (8), Submesic (moderately fresh) (7)

Nutrient Regime: Submesotrophic (poor) (14), Mesotrophic (medium) (1)

Elevation (range): 254 (200-330) M

Slope (%): gentle slope (6), very gentle slope (3), moderate slope (2), nearly level (1), strong slope (1)

Aspect: Easterly (4), Level (4), Southerly (3), Westerly (2)

Topographic Position:Upper Slope (4), Lower Slope (3), Midslope (3), Crest (2), Level (2)

Soil Variables

Soil Drainage: Well drained (7), Rapidly drained (7), Very poorly drained (1)

Soil Subgroup: ELUVIATED EUTRIC BRUNISOL (11), ELUVIATED DYSTRIC BRUNISOL (2), GLEYED ELUVIATED EUTRIC BRUNISOL (1), ORTHIC REGOSOL (1)

Surface Texture: Sand (9), Loamy sand (3), Loamy fine sand (1), Sandy clay (1), Silt (1)

Effective Texture: Sand (14), Loamy fine sand (1)

Depth to Mottles/Gley: 51 - 100 (1)

Organic Thickness: 0 - 5 cm (15)

Parent Material: Glaciofluvial (8), Rock (6), Morainal (2), Residual (2), Glaciolacustrine (2)

Soil Type: SV4-Very dry//Fine Loamy-Clayey (8), SD1-Dry/Sandy (7)

Humus Form FIBRIMOR (1)

LFH Thickness	Mean	Min	Max	Count
cm:	3.00	2.00	5.00	15

KUE1 Pj/Lichen (n=9)

(Pinus banksiana/Cladonia spp.)

This community type is found on very dry sandy or gravelly sites that are rapidly drained. Stunted jack pine and Alaska birch form open pocket communities with a sparse understory of bearberry, juniper and lichen in rock crevices or sheltered locations where mineral soil has accumulated (Natural Regions Committee 2006). Where the soil is better developed vigourous jack pine growth is evident. As the moisture increases the understory often becomes dominated by blueberry.

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: b bearberry/lichen(subxeric/poor)
Ecosite Phase: b1 bearberry/lichen - Pj

Plant Composition	Canopy Cover (%)		
	Mean	**Range**	**Const.**
Overstory Tree			
JACK PINE *(Pinus banksiana)*	12.8	0.0-42.0	78
Understory Tree			
JACK PINE *(Pinus banksiana)*	8.8	0.0-30.0	67
Tall Shrub (2 to 5m)			
JACK PINE *(Pinus banksiana)*	8.8	0.0-30.0	78
Medium Shrub (0.5 to 2 m)			
COMMON BEARBERRY *(Arctostaphylos uva-ursi)*	9.5	0.0-30.0	89
COMMON BLUEBERRY *(Vaccinium myrtilloides)*	5.5	0.0-12.0	89
BOG CRANBERRY *(Vaccinium vitis-idaea)*	4.0	0.0-18.0	56
JACK PINE *(Pinus banksiana)*	3.3	0.0-20.0	56
GREEN ALDER *(Alnus crispa)*	2.7	0.0-5.0	67
Moss			
AWNED HAIR-CAP *(Polytrichum piliferum)*	2.2	0.0-10.0	22
Lichen			
REINDEER LICHEN *(Cladina mitis)*	51.8	30.0-90.0	100
REINDEER LICHEN *(Cladina rangiferina)*	2.0	0.0-18.0	11
N/A *(Stereocaulon tomentosum)*	1.6	0.0-10.0	22

Environmental Variables

Ecological Status Score: 25

Moisture Regime: Subxeric (moderately dry) (6), Submesic (moderately fresh) (3)

Nutrient Regime: Submesotrophic (poor) (8), Mesotrophic (medium) (1)

Elevation (range): 268 (235-330) M

Slope (%): 6 - 9.99 (4), 10 - 15.99 (1), 16 - 30.99 (1), 0.5 - 2.49 (1), 2.5 - 5.99 (1)

Aspect: Easterly (3), Westerly (2), Level (2), Southerly (1)

Topographic Position: Lower Slope (3), Level (2), Midslope (2), Crest (1)

Soil Variables

Soil Drainage: Rapidly drained (4), Well drained (4), Very poorly drained (1)

Soil Subgroup: ELUVIATED EUTRIC BRUNISOL (7), ORTHIC REGOSOL (1), ELUVIATED DYSTRIC BRUNISOL (1)

Surface Texture: Sand (4), Loamy sand (3), Loamy fine sand (1), Sandy clay (1)

Effective Texture: Sand (8), Loamy fine sand (1)

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (9)

Parent Material: Glaciofluvial (5), Rock (5), Residual (1), Glaciolacustrine (1), Morainal (1)

Soil Type: SV4-Very dry/Fine Loamy-Clayey (6), SD1-Dry/Sandy (3)

Humus Form FIBRIMOR (1)

LFH Thickness	Mean	Min	Max	Count
cm:	3.00	2.00	4.00	9

KUE2 Pj/Bearberry (n=6)

(Pinus banksiana/Arctostaphylos uva-ursi)

This community type is very similar to the jack pine/lichen community type that was previously described but appears to be slightly moister and more diverse. The understory of this community type is dominated by bearberry and there is an increase in cover of more mesic plant species like alder, rose, bedstraw and wild lily of the valley. However despite the increase in moisture this community type still occupies very coarse textured sites that are well to rapidly drained.

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: b bearberry/lichen(subxeric/poor)
Ecosite Phase: b1 bearberry/lichen - Pj

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Overstory Tree			
JACK PINE *(Pinus banksiana)*	29.8	15.0-50.0	100
Understory Tree			
JACK PINE *(Pinus banksiana)*	5.8	0.0-20.0	50
Tall Shrub (2 to 5m)			
GREEN ALDER *(Alnus crispa)*	3.3	0.0-8.0	50
JACK PINE *(Pinus banksiana)*	1.3	0.0-4.0	33
Medium Shrub (0.5 to 2 m)			
COMMON BEARBERRY *(Arctostaphylos uva-ursi)*	31.5	15.0-60.0	100
BOG CRANBERRY *(Vaccinium vitis-idaea)*	10.6	0.0-20.0	83
TWINFLOWER *(Linnaea borealis)*	6.0	0.0-20.0	83
COMMON BLUEBERRY *(Vaccinium myrtilloides)*	3.6	2.0-8.0	100
PRICKLY ROSE *(Rosa acicularis)*	1.0	0.0-3.0	50
Graminoid			
NORTHERN RICE GRASS *(Oryzopsis pungens)*	1.3	0.0-2.0	83
Lichen			
REINDEER LICHEN *(Cladina mitis)*	22.5	3.0-42.0	100

Environmental Variables

Ecological Status Score: 25

Moisture Regime: Submesic (moderately fresh) (4), Subxeric (moderately dry) (2)

Nutrient Regime: Submesotrophic (poor) (6)

Elevation (range): 240 (200-300) M

Slope (%): 2.5 - 5.99 (2), 6 - 9.99 (2), 10 - 15.99 (1)

Aspect: Level (2), Southerly (2), Easterly (1)

Topographic Position: Upper Slope (4), Crest (1), Midslope (1)

Soil Variables

Soil Drainage: Rapidly drained (3), Well drained (3)

Soil Subgroup: ELUVIATED EUTRIC BRUNISOL (4), GLEYED ELUVIATED EUTRIC BRUNISOL (1), ELUVIATED DYSTRIC BRUNISOL (1)

Surface Texture: Sand (5), Silt (1)

Effective Texture: Sand (6)

Depth to Mottles/Gley: 51 - 100 (1)

Organic Thickness: 0 - 5 cm (6)

Parent Material: Glaciofluvial (3), Glaciolacustrine (1), Morainal (1), Rock (1), Residual (1)

Soil Type: SV4-Very dry/Fine Loamy-Clayey (2), SD1-Dry/Sandy (4)

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	3.00	2.00	5.00	6

b2 bearberry/lichen - shrub (n=3)

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: b bearberry/lichen(subxeric/poor)

Characteristic Species

Tree

[6.0]JACK PINE
Pinus banksiana

Shrub

[32.5]COMMON BEARBERRY*
Arctostaphylos uva-ursi

[4.0]GROUND JUNIPER*
Juniperus communis

[1.0]COMMON BLUEBERRY
Vaccinium myrtilloides

Forb

[1.5]HAREBELL
Campanula rotundifolia

[1.2]WILD STRAWBERRY
Fragaria virginiana

[1.0]THREE-TOOTHED SAXIFRAGE
Saxifraga tricuspidata

[1.0]THREE-TOOTHED CINQUEFOIL
Potentilla tridentata

Lichen

[20.0]REINDEER LICHEN*
Cladina mitis

[2.5]N/A
Stereocaulon tomentosum

Graminoid

[5.2]NORTHERN RICE GRASS*
Oryzopsis pungens

[1.7]SLENDER WHEAT GRASS
Agropyron trachycaulum

[1.5]ROUGH HAIR GRASS
Agrostis scabra

Environmental Variables

Moisture Regime: Xeric (dry) (1), Subxeric (moderately dry) (1)

Nutrient Regime: Submesotrophic (poor) (2)

Elevation (range): 242.5 (240-250) M

Slope (%): very gentle slope (1), moderate slope (1), nearly level (1)

Aspect: Southerly (2), Westerly (1)

Topographic Position:Crest (2), Upper Slope (1)

Soil Variables

Soil Drainage: Rapidly drained (3)

Soil Subgroup:

Surface Texture: Sandy loam (0)

Effective Texture: Sand (0), Sandy loam (0)

Depth to Mottles/Gley: Not Applicable (0)

Organic Thickness: 0 - 5 cm (1)

Parent Material: Rock (1), Glaciofluvial (0)

Soil Type:

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	0.00	0.00	0.00	0

KUA2 Bearberry/Northern ricegrass (n=2)

(Arctostaphylos uva-ursi/Oryzopsis pungens)

This community type represents open areas on steep south and west facing slopes with coarse textured soils. One site was described on the top of an eroded glaciofluvial kame and graded into an open jack pine/buffaloberry community type. The other site was described in an opening amongst jack pine and bog cranberry and was relatively flat with bedrock at or near the surface. The first site had better developed soils and a higher cover of slender wheatgrass. In contrast the second site had a predominance of lichen and northern ricegrass (Allen et al. 2002).

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: b bearberry/lichen(subxeric/poor)
Ecosite Phase: b2 bearberry/lichen - shrub

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Medium Shrub (0.5 to 2 m)			
GROUND JUNIPER *(Juniperus communis)*	1.0	0.0-2.0	50
Low Shrub (< 0.5m)			
COMMON BEARBERRY *(Arctostaphylos uva-ursi)*	65.0	50.0-80.0	100
Tall Forb (>= 30 cm)			
LONG-LEAVED ARNICA *(Arnica longifolia)*	1.0	1.0-1.0	100
Low Forb (< 30 cm)			
WILD STRAWBERRY *(Fragaria virginiana)*	2.5	2.0-3.0	100
NORTHERN BEDSTRAW *(Galium boreale)*	2.0	1.0-3.0	100
PRAIRIE CROCUS *(Anemone patens)*	1.0	1.0-1.0	100
HAREBELL *(Campanula rotundifolia)*	1.0	1.0-1.0	100
WILD LILY-OF-THE-VALLEY *(Maianthemum canadense)*	1.0	0.0-2.0	50
MOUNTAIN GOLDENROD *(Solidago spathulata)*	1.0	1.0-1.0	100
Graminoid			
NORTHERN RICE GRASS *(Oryzopsis pungens)*	10.5	1.0-20.0	100
SLENDER WHEAT GRASS *(Agropyron trachycaulum)*	3.5	0.0-7.0	50
PURPLE REED GRASS *(Calamagrostis purpurascens)*	1.0	1.0-1.0	100
Lichen			
REINDEER LICHEN *(Cladina mitis)*	10.0	0.0-20.0	50

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Xeric (dry) (1)

Nutrient Regime: Submesotrophic (poor) (1)

Elevation (range): 245 (240-250) M

Slope (%): 0.5 - 2.49 (1), 2.5 - 5.99 (1)

Aspect: Southerly (1), Westerly (1)

Topographic Position: Crest (1), Upper Slope (1)

Soil Variables

Soil Drainage: Rapidly drained (2)

Soil Subgroup:

Surface Texture: Sandy loam (0)

Effective Texture: Sandy loam (0)

Depth to Mottles/Gley: Not Applicable (0)

Organic Thickness:

Parent Material: Glaciofluvial (0)

Soil Type:

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	0.00	0.00	0.00	0

KUB1 Juniper/Lichen(Pj) (n=1)

(Juniperus communis/Cladonia spp.(Pinus banksiana))

This community type is very similar to the jack pine/lichen community types that were previously described but appears to be early seral. Fire is extensive throughout the Kazan Uplands and jack pine dominated stands will burn frequently. In the absence of disturbance these sites will slowly regrow jack pine.

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: b bearberry/lichen(subxeric/poor)
Ecosite Phase: b2 bearberry/lichen - shrub

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Overstory Tree			
JACK PINE *(Pinus banksiana)*	2.0	2.0-2.0	100
Tall Shrub (2 to 5m)			
JACK PINE *(Pinus banksiana)*	10.0	10.0-10.0	100
Medium Shrub (0.5 to 2 m)			
GROUND JUNIPER *(Juniperus communis)*	7.0	7.0-7.0	100
COMMON BLUEBERRY *(Vaccinium myrtilloides)*	2.0	2.0-2.0	100
PIN CHERRY *(Prunus pensylvanica)*	1.0	1.0-1.0	100
WILD RED RASPBERRY *(Rubus idaeus)*	1.0	1.0-1.0	100
Tall Forb (>= 30 cm)			
SHOWY GOLDENROD *(Solidago nemoralis)*	1.0	1.0-1.0	100
Low Forb (< 30 cm)			
HAREBELL *(Campanula rotundifolia)*	2.0	2.0-2.0	100
PARSLEY FERN *(Cryptogramma acrostichoides)*	2.0	2.0-2.0	100
THREE-TOOTHED CINQUEFOIL *(Potentilla tridentata)*	2.0	2.0-2.0	100
THREE-TOOTHED SAXIFRAGE *(Saxifraga tricuspidata)*	2.0	2.0-2.0	100
RUSTY WOODSIA *(Woodsia ilvensis)*	1.0	1.0-1.0	100
Graminoid			
ROUGH HAIR GRASS *(Agrostis scabra)*	3.0	3.0-3.0	100
ROCKY MOUNTAIN FESCUE *(Festuca saximontana)*	1.0	1.0-1.0	100
Lichen			
REINDEER LICHEN *(Cladina mitis)*	30.0	30.0-30.0	100
N/A *(Stereocaulon tomentosum)*	5.0	5.0-5.0	100

Environmental Variables

Ecological Status Score: 25

Moisture Regime: Subxeric (moderately dry) (1)

Nutrient Regime: Submesotrophic (poor) (1)

Elevation (range): 240 (240-240) M

Slope (%): 10 - 15.99 (1)

Aspect: Southerly (1)

Topographic Position: Crest (1)

Soil Variables

Soil Drainage: Rapidly drained (1)

Soil Subgroup:

Surface Texture:

Effective Texture: Sand (0)

Depth to Mottles/Gley: Not Applicable (0)

Organic Thickness: 0 - 5 cm (1)

Parent Material: Rock (1)

Soil Type:

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	0.00	0.00	0.00	0

c blueberry(submesic/medium) (n=12)

Natural Subregion: Kazan Uplands

Ecosection: KU Kazan Uplands

General Description

This ecosite tends to be subxeric to submesic partly due to coarse-textured parent materials. It is intermediate in both moisture and nutrient regime between the bearberry ecosite (b) and the buffaloberry/alder ecosite (e) as there is some moisture at depth. As such it has species characteristic of the bearberry ecosite such as jack pine, blueberry, bearberry, bog cranberry, Labrador tea, and reindeer lichen and also species characteristic of the buffaloberry ecosite such as aspen, buffaloberry, bunchberry, alder, and fireweed.

Successional Relationships

The pine, aspen, and white birch-dominated phases of this ecosite may, in some cases, succeed to white spruce, however the process is expected to be relatively slow due to the dry nature of these sites.

Indicator Species

Tree

ASPEN
Populus tremuloides

JACK PINE
Pinus banksiana

Shrub

PRICKLY ROSE
Rosa acicularis

GREEN ALDER
Alnus crispa

COMMON BEARBERRY
Arctostaphylos uva-ursi

COMMON BLUEBERRY
Vaccinium myrtilloides

BOG CRANBERRY
Vaccinium vitis-idaea

Forb

PLAINS WORMWOOD
Artemisia campestris

SPREADING DOGBANE
Apocynum androsaemifolium

Lichen

REINDEER LICHEN
Cladina mitis

Graminoid

HAY SEDGE
Carex siccata

SLENDER WHEAT GRASS
Agropyron trachycaulum

Site Index at 50 Years	Height (m)	Variation (m)	Count
ASPEN *(Populus tremuloides)*	17.20	0.40	0

Environmental Variables

Moisture Regime: Submesic (moderately fresh) (4), Xeric (dry) (4), Mesic (fresh) (3), Subxeric (moderately dry) (1)

Nutrient Regime: Submesotrophic (poor) (9), Mesotrophic (medium) (3)

Elevation (range): 277 (240-330) M

Slope (%): very gentle slope (3), very strong slope (2), gentle slope (2), strong slope (2), moderate slope (1), nearly level (1)

Aspect: Southerly (6), Easterly (2), Level (2), Northerly (1)

Topographic Position:Upper Slope (8), Midslope (3), Level (1)

Soil Variables

Soil Drainage: Well drained (6), Rapidly drained (6)

Soil Subgroup: ELUVIATED EUTRIC BRUNISOL (5), ELUVIATED DYSTRIC BRUNISOL (2)

Surface Texture: Sand (7), Sandy loam (0)

Effective Texture: Sand (6), Sandy clay (1)

Depth to Mottles/Gley: Not Applicable (0)

Organic Thickness: 0 - 5 cm (7)

Parent Material: Glaciofluvial (4), Morainal (2), Rock (1), Glaciolacustrine (1), Lacustrine (1), Fluvial (0)

Soil Type: SV4-Very Dry/Fine Loamy-Clayey (1), SD1-Dry/Sandy (1), SD4-Dry/Fine Loamy-Clayey (1), SM1-Moist/Sandy (1)

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	3.50	2.00	6.00	7

c1 blueberry - Pj-Aw(Bw) (n=7)

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: c blueberry(submesic/medium)

Characteristic Species

Tree

[31.5]JACK PINE*
Pinus banksiana

[7.5]WHITE BIRCH
Betula papyrifera

[3.1]ASPEN*
Populus tremuloides

Shrub

[14.8]GREEN ALDER*
Alnus crispa

[12.2]BOG CRANBERRY*
Vaccinium vitis-idaea

[11.2]COMMON BEARBERRY*
Arctostaphylos uva-ursi

[10.5]COMMON BLUEBERRY*
Vaccinium myrtilloides

[4.0]COMMON BEARBERRY
Arctostaphylos uva-ursi

[3.5]BOG CRANBERRY
Vaccinium vitis-idaea

[3.0]TWINFLOWER
Linnaea borealis

[2.0]PRICKLY ROSE
Rosa acicularis

[1.2]LOW-BUSH CRANBERRY
Viburnum edule

Forb

[1.6]WILD SARSAPARILLA
Aralia nudicaulis

[1.1]NORTHERN BASTARD TOADFLAX
Geocaulon lividum

[1.0]WILD LILY-OF-THE-VALLEY
Maianthemum canadense

Lichen

[8.5]REINDEER LICHEN*
Cladina mitis

Moss and Liverwort

[8.5]SCHREBER'S MOSS
Pleurozium schreberi

[2.7]WAVY DICRANUM
Dicranum polysetum

Environmental Variables

Moisture Regime: Submesic (moderately fresh) (4), Mesic (fresh) (2), Subxeric (moderately dry) (1)

Nutrient Regime: Submesotrophic (poor) (5), Mesotrophic (medium) (2)

Elevation (range): 287.5 (240-330) M

Slope (%): gentle slope (2), very gentle slope (2), moderate slope (1), nearly level (1)

Aspect: Level (2), Easterly (2), Southerly (1), Northerly (1)

Topographic Position:Upper Slope (4), Midslope (2), Level (1)

Soil Variables

Soil Drainage: Well drained (5), Rapidly drained (2)

Soil Subgroup: ELUVIATED EUTRIC BRUNISOL (5), ELUVIATED DYSTRIC BRUNISOL (2)

Surface Texture: Sand (7)

Effective Texture: Sand (6), Sandy clay (1)

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (7)

Parent Material: Glaciofluvial (4), Morainal (2), Glaciolacustrine (1), Lacustrine (1), Rock (1)

Soil Type: SV4-Very Dry/Fine Loamy-Clayey (1), SD1-Dry/Sandy (1), SD4-Dry/Fine Loamy-Clayey (1), SM1-Moist/Sandy (1)

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	3.50	2.00	6.00	7

KUD3 Pj-Aw(Bw)/Bearberry-Bog cranberry (n=4)

(Pinus banksiana-Populus tremuloides(Betula papyrifera)/Arctostaphylos uva-ursi-Vaccinium vitis-idaea)

Community types KUE3 and KUD3 are variants occurring on modal conditions for this ecological site, but differ mainly in their initial secondary successional pathways. This community is very similar to the jack pine/blueberry community type but appears to be slightly moister. The understory of this community type is dominated by blueberry and bearberry and there is an increase in cover of more mesic plant species like alder, rose, bedstraw and wild sarsaparilla. However despite the increase in moisture this community type still occupies very dry coarse textured sites that are rapidly drained at the soil surface.

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: c blueberry(submesic/medium)
Ecosite Phase: c1 blueberry - Pj-Aw(Bw)

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Overstory Tree			
JACK PINE *(Pinus banksiana)*	32.0	20.0-50.0	100
WHITE BIRCH *(Betula papyrifera)*	15.0	0.0-42.0	50
ASPEN *(Populus tremuloides)*	6.2	0.0-20.0	50
Tall Shrub (2 to 5m)			
GREEN ALDER *(Alnus crispa)*	27.7	0.0-63.0	75
Medium Shrub (0.5 to 2 m)			
BOG CRANBERRY *(Vaccinium vitis-idaea)*	24.5	0.0-40.0	75
COMMON BEARBERRY *(Arctostaphylos uva-ursi)*	22.5	0.0-42.0	75
TWINFLOWER *(Linnaea borealis)*	6.0	2.0-10.0	100
PRICKLY ROSE *(Rosa acicularis)*	4.0	0.0-15.0	50
LOW-BUSH CRANBERRY *(Viburnum edule)*	2.5	0.0-8.0	75
Tall Forb (>= 30 cm)			
WILD SARSAPARILLA *(Aralia nudicaulis)*	3.2	1.0-10.0	100
Low Forb (< 30 cm)			
NORTHERN BASTARD TOADFLAX *(Geocaulon lividum)*	2.2	0.0-8.0	50
Graminoid			
NORTHERN RICE GRASS *(Oryzopsis pungens)*	1.0	0.0-2.0	75
Moss			
SCHREBER'S MOSS *(Pleurozium schreberi)*	10.0	0.0-18.0	75
WAVY DICRANUM *(Dicranum polysetum)*	5.5	0.0-18.0	50

Environmental Variables

Ecological Status Score: 25

Moisture Regime: Submesic (moderately fresh) (2), Mesic (fresh) (2)

Nutrient Regime: Submesotrophic (poor) (2), Mesotrophic (medium) (2)

Elevation (range): 290 (240-330) M

Slope (%): 6 - 9.99 (2), 10 - 15.99 (1)

Aspect: Easterly (2), Level (1)

Topographic Position: Upper Slope (3), Level (1)

Soil Variables

Soil Drainage: Rapidly drained (2), Well drained (2)

Soil Subgroup: ELUVIATED DYSTRIC BRUNISOL (2), ELUVIATED EUTRIC BRUNISOL (2)

Surface Texture: Sand (4)

Effective Texture: Sand (4)

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (4)

Parent Material: Glaciofluvial (2), Glaciolacustrine (1), Lacustrine (1), Morainal (1), Rock (1)

Soil Type: SD1-Dry/Sandy (1), SM1-Moist/Sandy(1)

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	4.00	3.00	6.00	4

KUE3 Pj/Blueberry (n=3)

(Pinus banksiana/Vaccinium myrtilloides)

Community types KUE3 and KUD3 are variants occurring on modal conditions for this ecological site, but differ mainly in their initial secondary successional pathways. This community is very similar to the jack pine/bearberry community type but appears to be slightly moister. The understory of this community type is dominated by blueberry and there is an increase in cover of more mesic plant species like alder, rose, bedstraw and wild lily of the valley. However despite the increase in moisture this community type still occupies very dry coarse textured sites that are rapidly drained at the soil surface.

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: c blueberry(submesic/medium)
Ecosite Phase: c1 blueberry - Pj-Aw(Bw)

Plant Composition	Canopy Cover (%)		
	Mean	**Range**	**Const.**
Overstory Tree			
JACK PINE *(Pinus banksiana)*	33.3	25.0-45.0	100
Understory Tree			
JACK PINE *(Pinus banksiana)*	6.6	0.0-10.0	67
WHITE BIRCH *(Betula papyrifera)*	3.3	0.0-10.0	33
Tall Shrub (2 to 5m)			
GREEN ALDER *(Alnus crispa)*	4.3	3.0-7.0	100
JACK PINE *(Pinus banksiana)*	3.3	0.0-6.0	67
Medium Shrub (0.5 to 2 m)			
COMMON BLUEBERRY *(Vaccinium myrtilloides)*	15.6	10.0-25.0	100
COMMON BEARBERRY *(Arctostaphylos uva-ursi)*	11.6	5.0-15.0	100
BOG CRANBERRY *(Vaccinium vitis-idaea)*	9.6	7.0-12.0	100
GREEN ALDER *(Alnus crispa)*	2.3	0.0-4.0	67
TWINFLOWER *(Linnaea borealis)*	2.0	0.0-5.0	67
COMMON LABRADOR TEA *(Ledum groenlandicum)*	1.3	0.0-4.0	33
JACK PINE *(Pinus banksiana)*	1.0	0.0-2.0	67
Low Forb (< 30 cm)			
GREENISH-FLOWERED WINTERGREEN *(Pyrola chlorantha)*	1.0	1.0-1.0	100
Lichen			
REINDEER LICHEN *(Cladina mitis)*	21.6	0.0-35.0	67

Environmental Variables

Ecological Status Score: 25

Moisture Regime: Submesic (moderately fresh) (2), Subxeric (moderately dry) (1)

Nutrient Regime: Submesotrophic (poor) (3)

Elevation (range): 285 (260-330) M

Slope (%): 2.5 - 5.99 (2), 0.5 - 2.49 (1)

Aspect: Level (1), Northerly (1), Southerly (1)

Topographic Position: Midslope (2), Upper Slope (1)

Soil Variables

Soil Drainage: Well drained (3)

Soil Subgroup: ELUVIATED EUTRIC BRUNISOL (3)

Surface Texture: Sand (3)

Effective Texture: Sand (2), Sandy clay (1)

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (3)

Parent Material: Glaciofluvial (2), Morainal (1)

Soil Type: SV4-Very Dry/Fine Loamy-Clayey (1), SD1-Dry/Sandy (1), SD4-Dry/Fine Loamy-Clayey (1)

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	3.00	2.00	5.00	3

c2 blueberry - Aw(Bw) (n=1)

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: c blueberry(submesic/medium)

Characteristic Species

Tree

[70.0]ASPEN
Populus tremuloides

Shrub

[15.0]PRICKLY ROSE*
Rosa acicularis

[5.0]COMMON BEARBERRY
Arctostaphylos uva-ursi

[2.0]BOG CRANBERRY
Vaccinium vitis-idaea

[1.0]TWINFLOWER
Linnaea borealis

Forb

[20.0]SPREADING DOGBANE*
Apocynum androsaemifolium

[5.0]BUNCHBERRY
Cornus canadensis

[1.0]WILD LILY-OF-THE-VALLEY
Maianthemum canadense

Graminoid

[5.0]HAIRY WILD RYE
Elymus innovatus

Environmental Variables

Moisture Regime: Mesic (fresh) (1)

Nutrient Regime: Mesotrophic (medium) (1)

Elevation (range): 245 (245-245) M

Slope (%): very gentle slope (1)

Aspect: Southerly (1)

Topographic Position:Midslope (1)

Soil Variables

Soil Drainage: Well drained (1)

Soil Subgroup:

Surface Texture: Sand (0)

Effective Texture: Sand (0)

Depth to Mottles/Gley:

Organic Thickness:

Parent Material: Fluvial (0)

Soil Type:

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	0.00	0.00	0.00	0

KUC1 Aw/Rose/Spreading dogbane (n=1)

(Populus tremuloides/Rosa acicularis/Androsace androsaefolium)

In La Butte Creek Wildland Provincial Park, Allen et al. (2002) described this community type on gently sloping fluvial, sandy terraces. This community type also appears to be transitional to the Peace-Athabasca Delta subregion and is associated with the large river systems described in these two subregions. This community type has species characteristic of mesic sites rose, bunchberry and peavine, but it also has species characteristic of drier sites bearberry, spreading dogbane and hairy wildrye. It is intermediate in moisture and nutrients between the blueberry and the buffaloberry dominated ecological sites.

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: c blueberry(submesic/medium)
Ecosite Phase: c2 blueberry - Aw(Bw)

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Overstory Tree			
ASPEN *(Populus tremuloides)*	70.0	70.0-70.0	100
Understory Tree			
ASPEN *(Populus tremuloides)*	1.0	1.0-1.0	100
Tall Shrub (2 to 5m)			
BEAKED WILLOW *(Salix bebbiana)*	1.0	1.0-1.0	100
Medium Shrub (0.5 to 2 m)			
PRICKLY ROSE *(Rosa acicularis)*	15.0	15.0-15.0	100
COMMON BEARBERRY *(Arctostaphylos uva-ursi)*	5.0	5.0-5.0	100
BOG CRANBERRY *(Vaccinium vitis-idaea)*	2.0	2.0-2.0	100
TWINFLOWER *(Linnaea borealis)*	1.0	1.0-1.0	100
SNOWBERRY *(Symphoricarpos albus)*	1.0	1.0-1.0	100
LOW-BUSH CRANBERRY *(Viburnum edule)*	1.0	1.0-1.0	100
Tall Forb (>= 30 cm)			
SPREADING DOGBANE *(Apocynum androsaemifolium)*	20.0	20.0-20.0	100
CREAM-COLORED VETCHLING *(Lathyrus ochroleucus)*	3.0	3.0-3.0	100
Low Forb (< 30 cm)			
BUNCHBERRY *(Cornus canadensis)*	5.0	5.0-5.0	100
NORTHERN BEDSTRAW *(Galium boreale)*	1.0	1.0-1.0	100
WILD LILY-OF-THE-VALLEY *(Maianthemum canadense)*	1.0	1.0-1.0	100
ONE-SIDED WINTERGREEN *(Orthilia secunda)*	1.0	1.0-1.0	100
Graminoid			
HAIRY WILD RYE *(Elymus innovatus)*	5.0	5.0-5.0	100

Environmental Variables

Ecological Status Score: 25

Moisture Regime: Mesic (fresh) (1)

Nutrient Regime: Mesotrophic (medium) (1)

Elevation (range): 245 (245-245) M

Slope (%): 2.5 - 5.99 (1)

Aspect: Southerly (1)

Topographic Position: Midslope (1)

Soil Variables

Soil Drainage: Well drained (1)

Soil Subgroup:

Surface Texture: Sand (0)

Effective Texture: Sand (0)

Depth to Mottles/Gley:

Organic Thickness:

Parent Material: Fluvial (0)

Soil Type:

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	0.00	0.00	0.00	0

c6 blueberry grassland (n=4)

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: c blueberry(submesic/medium)

Characteristic Species

Shrub

[1.0]GROUND JUNIPER
Juniperus communis

[1.0]SASKATOON
Amelanchier alnifolia

Forb

[1.0]PLAINS WORMWOOD*
Artemisia campestris

Lichen

[15.0]REINDEER LICHEN
Cladina mitis

Graminoid

[15.0]HAY SEDGE*
Carex siccata

[2.0]SLENDER WHEAT GRASS*
Agropyron trachycaulum

[2.0]ROCKY MOUNTAIN FESCUE
Festuca saximontana

Environmental Variables

Moisture Regime: Xeric (dry) (4)

Nutrient Regime: Submesotrophic (poor) (4)

Elevation (range): 291 (290-292) M

Slope (%): very strong slope (2), strong slope (2)

Aspect: Southerly (4)

Topographic Position:Upper Slope (4)

Soil Variables

Soil Drainage: Rapidly drained (4)

Soil Subgroup:

Surface Texture: Sandy loam (0)

Effective Texture: Sand (0)

Depth to Mottles/Gley: Not Applicable (0)

Organic Thickness: 0 - 5 cm (0)

Parent Material: Glaciolacustrine (0)

Soil Type:

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	0.00	0.00	0.00	0

KUA3 Hay sedge-Slender wheatgrass (n=4)

(Carex siccata-Agropyron trachycaulum)

This community type is found on coarse textured, sandy soils. with southerly facing slopes. It is generally found on hilltops and steep (>20%) south-facing slopes throughout the Colin Cornwall Lakes Wildland Provincial Park (Allen et al. 2004). This community type generally has better soil conditions than bearberry dominated communities previously described in the bearberry ecological site. This community type was also described on benches and south facing slopes in the Athabasca Plain subregion.

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: c blueberry(submesic/medium)
Ecosite Phase: c6 blueberry grassland

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Medium Shrub (0.5 to 2 m)			
GROUND JUNIPER *(Juniperus communis)*	1.3	0.0-5.0	50
Tall Forb (>= 30 cm)			
PLAINS WORMWOOD *(Artemisia campestris)*	1.2	0.0-3.0	75
COMMON BLUE-EYED GRASS *(Sisyrinchium montanum)*	0.1	0.0-0.5	25
Low Forb (< 30 cm)			
THREE-TOOTHED SAXIFRAGE *(Saxifraga tricuspidata)*	0.2	0.0-0.5	50
ROCK LITTLE CLUB-MOSS *(Selaginella rupestris)*	0.1	0.0-0.5	25
RUSTY WOODSIA *(Woodsia ilvensis)*	0.1	0.0-0.5	25
Graminoid			
HAY SEDGE *(Carex siccata)*	14.5	10.0-25.0	100
ROCKY MOUNTAIN FESCUE *(Festuca saximontana)*	2.3	0.0-6.0	75
SLENDER WHEAT GRASS *(Agropyron trachycaulum)*	1.8	0.5-3.0	100
Moss			
HAIRY SCREW MOSS *(Tortula ruralis)*	0.2	0.0-1.0	25
Lichen			
REINDEER LICHEN *(Cladina mitis)*	15.2	1.0-50.0	100

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Xeric (dry) (4)

Nutrient Regime: Submesotrophic (poor) (4)

Elevation (range): 291 (290-292) M

Slope (%): 16 - 30.99 (2), 31 - 45.99 (2)

Aspect: Southerly (4)

Topographic Position: Upper Slope (4)

Soil Variables

Soil Drainage: Rapidly drained (4)

Soil Subgroup:

Surface Texture: Sandy loam (0)

Effective Texture: Sand (0)

Depth to Mottles/Gley: Not Applicable (0)

Organic Thickness: 0 - 5 cm (0)

Parent Material: Glaciolacustrine (0)

Soil Type:

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	0.00	0.00	0.00	0

c7 tame/disturbed (n=0)

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: c blueberry(submesic/medium)

General Description

A number of ecological site phases currently have no data. These ecological site phases have been created as place holders because they were described in adjacent subregions (Central Mixedwood).

Characteristic Species

Environmental Variables

Moisture Regime:

Nutrient Regime:

Elevation (range):

Slope (%):

Aspect:

Topographic Position:

Soil Variables

Soil Drainage:

Soil Subgroup:

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness:

Parent Material:

Soil Type:

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	0.00	0.00	0.00	0

d Labrador tea-mesic(mesic/poor) (n=10)

Natural Subregion: Kazan Uplands

Ecosection: KU Kazan Uplands

General Description

This ecosite generally occurs in submesic to subhygric nutrient-poor substrates. Labrador tea and bog cranberry are indicative of the relatively acidic surface soil conditions. It occurs in upland (midslope, upper slope, and crest) or level topographic positions dominantly on till or fluvial over till parent materials. There is commonly a two-tiered even-aged canopy with faster growing jack pine in the higher layer and slower growing black spruce as a secondary canopy. While the Labrador tea-mesic ecosite has plant community types similar to the Labrador tea-hygric ecosite (g), the mesic ecosite tends to occur in upper topographic positions and the presence of mottles in the upper 50 cm. is less common (Beckingham and Archibald 1996).

Successional Relationships

Successionally mature stands that develop on these ecosites may be dominated by black spruce. Residual pine occuring in the climax community are generally very old. The successionally mature stage is rare due to high fire frequency.

Indicator Species

Tree

ASPEN
Populus tremuloides

BLACK SPRUCE
Picea mariana

JACK PINE
Pinus banksiana

Shrub

COMMON LABRADOR TEA
Ledum groenlandicum

BOG CRANBERRY
Vaccinium vitis-idaea

Lichen

REINDEER LICHEN
Cladina mitis

Moss and Liverwort

STAIR-STEP MOSS
Hylocomium splendens

Environmental Variables

Moisture Regime: Mesic (fresh) (5), Subhygric (moderately moist) (5)

Nutrient Regime: Mesotrophic (medium) (4), Submesotrophic (poor) (4), Permesotrophic (rich) (2)

Elevation (range): 246 (180-300) M

Slope (%): very gentle slope (5), nearly level (3), gentle slope (2)

Aspect: Easterly (3), Southerly (3), Westerly (2), Level (1), Northerly (1)

Topographic Position:Lower Slope (4), Upper Slope (3), Midslope (2), Level (1)

Soil Variables

Soil Drainage: Imperfectly drained (4), Moderately well drained (3), Well drained (2), Rapidly drained (1)

Soil Subgroup: GLEYED GRAY LUVISOL (2), ORTHIC GRAY LUVISOL (2), ORTHIC LUVIC GLEYSOL (1), ELUVIATED DYSTRIC BRUNISOL (1), ELUVIATED EUTRIC BRUNISOL (1), GLEYED ELUVIATED DYSTRIC BRUNISOL (1), GLEYED ELUVIATED EUTRIC BRUNISOL (1), ORTHIC GLEYSOL (1)

Surface Texture: Sand (3), Silt (3), Clay loam (2), Silty clay loam (1), Sandy loam (1)

Effective Texture: Sand (6), Silt (1), Silt loam (1), Heavy clay (1), Loam (1)

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (10)

Parent Material: Glaciolacustrine (3), Morainal (3), Glaciofluvial (2), Lacustrine (2)

Soil Type: SM1-Moist/Sandy (4), SM2-Moist/Coarse Loamy (1), SM3-Moist/Silty Loamy (1), SM4-Moist/Fine Loamy-Clayey (4)

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	4.75	2.00	11.00	10

d1 Labrador tea-mesic Pj-Sb (n=10)

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: d Labrador tea-mesic(mesic/poor)

Characteristic Species

Tree

[20.6]JACK PINE*
Pinus banksiana

[18.9]BLACK SPRUCE*
Picea mariana

[12.4]ASPEN*
Populus tremuloides

[3.3]WHITE BIRCH
Betula papyrifera

Shrub

[6.0]BOG CRANBERRY*
Vaccinium vitis-idaea

[5.0]COMMON LABRADOR TEA*
Ledum groenlandicum

[2.5]LOW-BUSH CRANBERRY
Viburnum edule

[1.7]TWINFLOWER
Linnaea borealis

[1.2]CANADA BUFFALOBERRY
Shepherdia canadensis

Forb

[4.3]BUNCHBERRY
Cornus canadensis

Lichen

[7.9]REINDEER LICHEN*
Cladina mitis

Moss and Liverwort

[13.7]STAIR-STEP MOSS*
Hylocomium splendens

[13.4]SCHREBER'S MOSS
Pleurozium schreberi

Environmental Variables

Moisture Regime: Mesic (fresh) (5), Subhygric (moderately moist) (5)

Nutrient Regime: Mesotrophic (medium) (4), Submesotrophic (poor) (4), Permesotrophic (rich) (2)

Elevation (range): 246.5 (180-300) M

Slope (%): very gentle slope (5), nearly level (3), gentle slope (2)

Aspect: Southerly (3), Easterly (3), Westerly (2), Northerly (1), Level (1)

Topographic Position:Lower Slope (4), Upper Slope (3), Midslope (2), Level (1)

Soil Variables

Soil Drainage: Imperfectly drained (4), Moderately well drained (3), Well drained (2), Rapidly drained (1)

Soil Subgroup: GLEYED GRAY LUVISOL (2), ORTHIC GRAY LUVISOL (2), ORTHIC LUVIC GLEYSOL (1), ELUVIATED DYSTRIC BRUNISOL (1), GLEYED ELUVIATED DYSTRIC BRUNISOL (1), ELUVIATED EUTRIC BRUNISOL (1), GLEYED ELUVIATED EUTRIC BRUNISOL (1), ORTHIC GLEYSOL (1)

Surface Texture: Sand (3), Silt (3), Clay loam (2), Sandy loam (1), Silty clay loam (1)

Effective Texture: Sand (6), Silt (1), Silt loam (1), Heavy clay (1), Loam (1)

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (10)

Parent Material: Glaciolacustrine (3), Morainal (3), Lacustrine (2), Glaciofluvial (2)

Soil Type: SM1-Moist/Sandy (4), SM2-Moist/Coarse Loamy (1), SM3-Moist/Silty Loamy (1), SM4-Moist/Fine Loamy-Clayey (4)

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	4.75	2.00	11.00	10

KUC4 Aw-Pj-Sb/Labrador tea (n=1)

(Populus tremuloides-Picea mariana-Pinus banksiana/Ledum groenlandicum)

This community type is a moister variant of the ecological site with a slightly richer nutrient regime which favours the growth of aspen and more medium nutrient species like wild sarsaparilla. Successionally mature sites are often dominated by black spruce within this ecological site. The presence of a high cover of aspen and alder indicate the slightly better nutrients. This community type is rapidly drained and has a sandy soil texture at the surface. In the absence of disturbance this community type will likely succeed to a black spruce dominated community.

Natural Subregion: **Kazan Uplands**
Ecosection: **KU Kazan Uplands**

Ecosite: **d Labrador tea-mesic(mesic/poor)**
Ecosite Phase: **d1 Labrador tea-mesic Pj-Sb**

Plant Composition	Canopy Cover (%)		
	Mean	**Range**	**Const.**
Overstory Tree			
ASPEN *(Populus tremuloides)*	35.0	35.0-35.0	100
JACK PINE *(Pinus banksiana)*	10.0	10.0-10.0	100
Understory Tree			
BLACK SPRUCE *(Picea mariana)*	8.0	8.0-8.0	100
ASPEN *(Populus tremuloides)*	8.0	8.0-8.0	100
Tall Shrub (2 to 5m)			
GREEN ALDER *(Alnus crispa)*	4.0	4.0-4.0	100
Medium Shrub (0.5 to 2 m)			
COMMON LABRADOR TEA *(Ledum groenlandicum)*	15.0	15.0-15.0	100
BLACK SPRUCE *(Picea mariana)*	4.0	4.0-4.0	100
TWINFLOWER *(Linnaea borealis)*	2.0	2.0-2.0	100
PRICKLY ROSE *(Rosa acicularis)*	2.0	2.0-2.0	100
LOW-BUSH CRANBERRY *(Viburnum edule)*	2.0	2.0-2.0	100
Tall Forb (>= 30 cm)			
WILD SARSAPARILLA *(Aralia nudicaulis)*	2.0	2.0-2.0	100
COMMON FIREWEED *(Epilobium angustifolium)*	1.0	1.0-1.0	100
WOODLAND HORSETAIL *(Equisetum sylvaticum)*	1.0	1.0-1.0	100
Low Forb (< 30 cm)			
BUNCHBERRY *(Cornus canadensis)*	8.0	8.0-8.0	100
WILD LILY-OF-THE-VALLEY *(Maianthemum canadense)*	1.0	1.0-1.0	100
ONE-SIDED WINTERGREEN *(Orthilia secunda)*	1.0	1.0-1.0	100
Moss			
STAIR-STEP MOSS *(Hylocomium splendens)*	2.0	2.0-2.0	100
SCHREBER'S MOSS *(Pleurozium schreberi)*	2.0	2.0-2.0	100

Environmental Variables

Ecological Status Score: 25

Moisture Regime: Subhygric (moderately moist) (1)

Nutrient Regime: Permesotrophic (rich) (1)

Elevation (range): 230 (230-230) M

Slope (%): 6 - 9.99 (1)

Aspect: Southerly (1)

Topographic Position: Lower Slope (1)

Soil Variables

Soil Drainage: Imperfectly drained (1)

Soil Subgroup: GLEYED GRAY LUVISOL (1)

Surface Texture: Sandy loam (1)

Effective Texture: Sand (1)

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (1)

Parent Material: Morainal (1)

Soil Type: SM2-Moist/Coarse Loamy (1)

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm**:**	6.00	6.00	6.00	1

KUD1 Sb-Aw/Moss (n=3)

(Picea mariana-Populus tremuloides/Stair step moss)

This community type is a moist variant with a slightly richer nutrient regime of the Labrador tea-mesic ecological site. Successionally mature sites are often dominated by black spruce within this ecological site. The presence of a high cover of aspen and stair step moss indicate the slightly better nutrients. This community type is well drained and has a Loamy-Clayey soil texture. In the absence of disturbance this community type will likely succeed to a black spruce dominated community.

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: d Labrador tea-mesic(mesic/poor)
Ecosite Phase: d1 Labrador tea-mesic Pj-Sb

Plant Composition	Canopy Cover (%)		
	Mean	**Range**	**Const.**
Overstory Tree			
BLACK SPRUCE *(Picea mariana)*	23.3	20.0-30.0	100
WHITE BIRCH *(Betula papyrifera)*	13.3	0.0-35.0	67
ASPEN *(Populus tremuloides)*	5.0	0.0-10.0	67
Understory Tree			
BLACK SPRUCE *(Picea mariana)*	6.6	0.0-20.0	33
ASPEN *(Populus tremuloides)*	1.6	0.0-5.0	33
Tall Shrub (2 to 5m)			
BEAKED WILLOW *(Salix bebbiana)*	2.3	0.0-4.0	67
Medium Shrub (0.5 to 2 m)			
CANADA BUFFALOBERRY *(Shepherdia canadensis)*	5.0	0.0-15.0	33
BOG CRANBERRY *(Vaccinium vitis-idaea)*	0.6	0.0-2.0	33
Low Forb (< 30 cm)			
NORTHERN BASTARD TOADFLAX *(Geocaulon lividum)*	3.3	0.0-10.0	33
Graminoid			
BLUEJOINT *(Calamagrostis canadensis)*	5.0	0.0-15.0	33
Moss			
STAIR-STEP MOSS *(Hylocomium splendens)*	35.0	15.0-50.0	100
SCHREBER'S MOSS *(Pleurozium schreberi)*	13.3	5.0-30.0	100
Lichen			
REINDEER LICHEN *(Cladina mitis)*	2.6	2.0-3.0	100

Environmental Variables

Ecological Status Score: 25

Moisture Regime: Subhygric (moderately moist) (2), Mesic (fresh) (1)

Nutrient Regime: Submesotrophic (poor) (1), Mesotrophic (medium) (1), Permesotrophic (rich) (1)

Elevation (range): 222 (180-255) M

Slope (%): 2.5 - 5.99 (2), 0.5 - 2.49 (1)

Aspect: Southerly (2), Westerly (1)

Topographic Position: Lower Slope (1), Midslope (1), Upper Slope (1)

Soil Variables

Soil Drainage: Moderately well drained (2), Imperfectly drained (1)

Soil Subgroup: GLEYED GRAY LUVISOL (1), ORTHIC GRAY LUVISOL (1), ORTHIC LUVIC GLEYSOL (1)

Surface Texture: Clay loam (2), Silt (1)

Effective Texture: Heavy clay (1), Silt (1), Silt loam (1)

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (3)

Parent Material: Lacustrine (2), Glaciolacustrine (1)

Soil Type: SM4-Moist/Fine Loamy Clayey (3)

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	7.00	5.00	11.00	3

KUE11 Pj/Bog cranberry/lichen (n=1)

(Pinus banksiana/Vaccinium vitis idea/Cladina spp.)

This community type is a drier variant of the Labrador tea-mesic ecological site. Successionally mature sites are often dominated by black spruce within this ecological site. This community type is rapidly drained and has a coarse texture.

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: d Labrador tea-mesic(mesic/poor)
Ecosite Phase: d1 Labrador tea-mesic Pj-Sb

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Overstory Tree			
JACK PINE *(Pinus banksiana)*	42.0	42.0-42.0	100
Understory Tree			
JACK PINE *(Pinus banksiana)*	1.0	1.0-1.0	100
Medium Shrub (0.5 to 2 m)			
BOG CRANBERRY *(Vaccinium vitis-idaea)*	18.0	18.0-18.0	100
LOW-BUSH CRANBERRY *(Viburnum edule)*	8.0	8.0-8.0	100
TWINFLOWER *(Linnaea borealis)*	2.0	2.0-2.0	100
COMMON BEARBERRY *(Arctostaphylos uva-ursi)*	1.0	1.0-1.0	100
Low Forb (< 30 cm)			
BUNCHBERRY *(Cornus canadensis)*	8.0	8.0-8.0	100
NORTHERN BASTARD TOADFLAX *(Geocaulon lividum)*	2.0	2.0-2.0	100
ONE-SIDED WINTERGREEN *(Orthilia secunda)*	1.0	1.0-1.0	100
Moss			
SCHREBER'S MOSS *(Pleurozium schreberi)*	29.0	29.0-29.0	100
STAIR-STEP MOSS *(Hylocomium splendens)*	18.0	18.0-18.0	100
Lichen			
REINDEER LICHEN *(Cladina mitis)*	18.0	18.0-18.0	100
N/A *(Cladonia multiformis)*	1.0	1.0-1.0	100
N/A *(Cladonia uncialis)*	1.0	1.0-1.0	100

Environmental Variables

Ecological Status Score: 25

Moisture Regime: Mesic (fresh) (1)

Nutrient Regime: Submesotrophic (poor) (1)

Elevation (range): 300 (300-300) M

Slope (%): 2.5 - 5.99 (1)

Aspect: Easterly (1)

Topographic Position: Upper Slope (1)

Soil Variables

Soil Drainage: Well drained (1)

Soil Subgroup: ELUVIATED DYSTRIC BRUNISOL (1)

Surface Texture: Silt (1)

Effective Texture: Sand (1)

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (1)

Parent Material: Glaciolacustrine (1)

Soil Type: SM1-Moist/Sandy (1)

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	3.00	3.00	3.00	1

KUE4 Pj- Sb/Bog cranberry/lichen (n=5)

(Pinus banksiana-Picea mariana/Vaccinium vitis idea/Cladina spp.)

This community type represents a successionally immature stand of this ecological site. Successionally mature sites are often dominated by black spruce within this ecological site. This community type is rapidly drained and has a coarse texture.

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: d Labrador tea-mesic(mesic/poor)
Ecosite Phase: d1 Labrador tea-mesic Pj-Sb

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Overstory Tree			
JACK PINE *(Pinus banksiana)*	20.2	15.0-25.0	100
Understory Tree			
JACK PINE *(Pinus banksiana)*	9.6	5.0-15.0	100
BLACK SPRUCE *(Picea mariana)*	6.4	0.0-15.0	80
Tall Shrub (2 to 5m)			
BLACK SPRUCE *(Picea mariana)*	15.4	5.0-40.0	100
JACK PINE *(Pinus banksiana)*	2.4	0.0-4.0	80
Medium Shrub (0.5 to 2 m)			
BLACK SPRUCE *(Picea mariana)*	12.6	2.0-40.0	100
BOG CRANBERRY *(Vaccinium vitis-idaea)*	5.6	0.0-10.0	80
COMMON LABRADOR TEA *(Ledum groenlandicum)*	5.0	0.0-10.0	80
COMMON BLUEBERRY *(Vaccinium myrtilloides)*	3.8	0.0-12.0	60
TWINFLOWER *(Linnaea borealis)*	2.8	1.0-5.0	100
Low Forb (< 30 cm)			
BUNCHBERRY *(Cornus canadensis)*	1.2	0.0-3.0	60
Moss			
SCHREBER'S MOSS *(Pleurozium schreberi)*	9.4	0.0-45.0	40
JUNIPER HAIR-CAP *(Polytrichum juniperinum)*	2.0	0.0-10.0	20
Lichen			
REINDEER LICHEN *(Cladina mitis)*	11.2	0.0-16.0	80

Environmental Variables

Ecological Status Score: 25

Moisture Regime: Mesic (fresh) (3), Subhygric (moderately moist) (2)

Nutrient Regime: Mesotrophic (medium) (3), Submesotrophic (poor) (2)

Elevation (range): 234 (230-239) M

Slope (%): 0.5 - 2.49 (2), 2.5 - 5.99 (2), 6 - 9.99 (1)

Aspect: Easterly (2), Westerly (1), Level (1), Northerly (1)

Topographic Position: Lower Slope (2), Level (1), Upper Slope (1), Midslope (1)

Soil Variables

Soil Drainage: Imperfectly drained (2), Rapidly drained (1), Well drained (1), Moderately well drained (1)

Soil Subgroup: GLEYED ELUVIATED DYSTRIC BRUNISOL (1), ELUVIATED EUTRIC BRUNISOL (1), GLEYED ELUVIATED EUTRIC BRUNISOL (1), ORTHIC GLEYSOL (1), ORTHIC GRAY LUVISOL (1)

Surface Texture: Sand (3), Silt (1), Silty clay loam (1)

Effective Texture: Sand (4), Loam (1)

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (5)

Parent Material: Morainal (2), Glaciofluvial (2), Glaciolacustrine (1)

Soil Type: SM1-Moist/Sandy (3), SM3-Moist/Silty Loamy (1), SM4-Moist/Fine Loamy-Clayey (1)

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	3.00	2.00	5.00	5

e buffaloberry/alder(mesic/medium) (n=16)

Natural Subregion: Kazan Uplands

Ecosection: KU Kazan Uplands

General Description

This is the reference ecosite for the Kazan Uplands subregion because it has a mesic moisture regime and a medium nutrient regime. However, the conventional reference site concept of deep, medium textured, well drained and associated vegetation does not generally fit for most of this subregion. The majority of the characteristic sites in this subregion are rocky exposures or dry, rapidly drained coarse glacial deposits. Generally, this ecosite has fine to medium textured glaciolacustrine and glaciofluvial parent materials. This ecological site is located at a mid to lower slope positions where some moisture accumulates. These sites are often dominated by aspen, green alder and buffaloberry and have a high diversity of shrubs and forbs in the understory.

Successional Relationships

Pioneer jack pine and deciduous tree species such as aspen, balsam poplar, and white birch are replaced by white spruce, black spruce and balsam fir as the sites develop successionally. Along with a change in canopy composition is a change in understory structure and understory species composition and abundance. Generally, as a stand successionally matures, the coniferous canopy cover increases, and understory species structure and diversity declines. This results in stands with low cover of shrub, forb, and grass species and high moss cover.

Indicator Species

Tree

ASPEN
Populus tremuloides

WHITE SPRUCE
Picea glauca

JACK PINE
Pinus banksiana

Shrub

CANADA BUFFALOBERRY
Shepherdia canadensis

GREEN ALDER
Alnus crispa

Moss and Liverwort

STAIR-STEP MOSS
Hylocomium splendens

SCHREBER'S MOSS
Pleurozium schreberi

Graminoid

HAIRY WILD RYE
Elymus innovatus

Site Index at 50 Years	Height (m)	Variation (m)	Count
WHITE SPRUCE *(Picea glauca)*	12.00	0.00	0
WHITE BIRCH *(Betula papyrifera)*	10.40	0.60	0

Environmental Variables

Moisture Regime: Mesic (fresh) (10), Submesic (moderately fresh) (3), Subhygric (moderately moist) (2)

Nutrient Regime: Mesotrophic (medium) (7), Submesotrophic (poor) (6), Permesotrophic (rich) (2)

Elevation (range): 243.86 (180-330) M

Slope (%): very gentle slope (7), gentle slope (3), level (2), nearly level (1), strong slope (1), extreme slope (1)

Aspect: Northerly (4), Easterly (3), Westerly (3), Level (2), Southerly (2)

Topographic Position:Midslope (7), Level (3), Lower Slope (3), Upper Slope (2), Depression (1)

Soil Variables

Soil Drainage: Well drained (9), Moderately well drained (6), Rapidly drained (1)

Soil Subgroup: ELUVIATED EUTRIC BRUNISOL (5), ORTHIC GRAY LUVISOL (5), ELUVIATED DYSTRIC BRUNISOL (3), BRUNISOLIC GRAY LUVISOL (2)

Surface Texture: Sand (6), Silt loam (2), Silty clay (1), Silty clay loam (1), Loam (1), Sandy clay loam (1), Sandy loam (1), Silt (1)

Effective Texture: Sand (6), Silty clay (3), Sandy clay loam (2), Silt loam (1), Silty clay loam (1), Clay (1)

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (15)

Parent Material: Glaciofluvial (7), Glaciolacustrine (5), Lacustrine (3), Fluvial (2), Rock (2), Colluvial (1), Morainal (1)

Soil Type: SD1-Dry/Sandy (2), SD2-Dry/Coarse Loamy (1), SM1-Moist/Sandy (4), SM3-Moist/Silty-Loamy (1), SM4-Moist/Fine Loamy-Clayey (7)

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	5.50	3.00	11.00	14

e1 buffaloberry-alder/ Aw (n=8)

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: e buffaloberry/alder(mesic/medium)

Characteristic Species

Tree

[67.4]ASPEN*
Populus tremuloides

Shrub

[16.4]BOG CRANBERRY
Vaccinium vitis-idaea

[11.6]CANADA BUFFALOBERRY*
Shepherdia canadensis

[7.1]PRICKLY ROSE
Rosa acicularis

[5.5]GREEN ALDER*
Alnus crispa

[5.0]SASKATOON
Amelanchier alnifolia

[3.7]LOW-BUSH CRANBERRY
Viburnum edule

[3.3]RED-OSIER DOGWOOD
Cornus stolonifera

[3.0]TWINFLOWER
Linnaea borealis

[2.3]BEAKED WILLOW
Salix bebbiana

[2.0]DEWBERRY
Rubus pubescens

Forb

[5.0]SPREADING DOGBANE
Apocynum androsaemifolium

[3.8]COMMON FIREWEED
Epilobium angustifolium

[3.4]BUNCHBERRY
Cornus canadensis

[3.3]CREAM-COLORED VETCHLING
Lathyrus ochroleucus

[2.1]WILD SARSAPARILLA
Aralia nudicaulis

Graminoid

[6.8]HAIRY WILD RYE*
Elymus innovatus

Environmental Variables

Moisture Regime: Mesic (fresh) (6), Submesic (moderately fresh) (1)

Nutrient Regime: Mesotrophic (medium) (5), Submesotrophic (poor) (2)

Elevation (range): 231.33 (200-260) M

Slope (%): very gentle slope (3), strong slope (1), extreme slope (1), gentle slope (1), level (1), nearly level (1)

Aspect: Northerly (2), Westerly (2), Southerly (1), Level (1), Easterly (1)

Topographic Position:Midslope (3), Level (2), Upper Slope (2), Lower Slope (1)

Soil Variables

Soil Drainage: Well drained (5), Moderately well drained (3)

Soil Subgroup: ORTHIC GRAY LUVISOL (3), ELUVIATED EUTRIC BRUNISOL (2), BRUNISOLIC GRAY LUVISOL (1), ELUVIATED DYSTRIC BRUNISOL (1)

Surface Texture: Silt loam (2), Sand (2), Silty clay loam (1), Sandy loam (1), Silt (1)

Effective Texture: Sand (2), Silty clay (2), Silty clay loam (1), Silt loam (1), Sandy clay loam (1)

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (7)

Parent Material: Glaciolacustrine (3), Lacustrine (2), Rock (2), Glaciofluvial (1), Morainal (1), Fluvial (0)

Soil Type: SD2-Dry/Coarse Loamy (1), SM1-Moist/Sandy (1), SM3-Moist/Silty-Loqmy (1), SM4-Moist/Fine Loamy-Clayey (4)

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	6.50	4.00	9.00	7

KUC2 Aw(Bw)/Alder (n=3)

(Populus tremuloides (Betula papyrifera))/Alnus crispa)

This reference plant community represents the deciduous phase of the buffaloberry-alder ecological site in the Kazan Uplands subregion. Moisture and nutrients are intermediate between the drier blueberry ecosite and the moister fern/horsetail ecological site. Succession in the absence of disturbance is to a white spruce climax community.

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: e buffaloberry/alder(mesic/medium)
Ecosite Phase: e1 buffaloberry-alder/ Aw

Plant Composition	Canopy Cover (%)		
	Mean	**Range**	**Const.**
Overstory Tree			
ASPEN *(Populus tremuloides)*	45.0	35.0-60.0	100
JACK PINE *(Pinus banksiana)*	2.0	1.0-3.0	100
Understory Tree			
ASPEN *(Populus tremuloides)*	15.0	10.0-20.0	100
Tall Shrub (2 to 5m)			
GREEN ALDER *(Alnus crispa)*	16.6	15.0-20.0	100
Medium Shrub (0.5 to 2 m)			
BOG CRANBERRY *(Vaccinium vitis-idaea)*	13.0	2.0-30.0	100
GREEN ALDER *(Alnus crispa)*	5.0	0.0-15.0	33
PRICKLY ROSE *(Rosa acicularis)*	2.0	1.0-4.0	100
TWINFLOWER *(Linnaea borealis)*	1.6	0.0-3.0	67
LOW-BUSH CRANBERRY *(Viburnum edule)*	1.6	1.0-2.0	100
Low Shrub (< 0.5m)			
DEWBERRY *(Rubus pubescens)*	3.3	0.0-10.0	33
Tall Forb (>= 30 cm)			
WILD SARSAPARILLA *(Aralia nudicaulis)*	6.3	0.0-15.0	67
COMMON FIREWEED *(Epilobium angustifolium)*	3.0	0.0-8.0	67
Low Forb (< 30 cm)			
BUNCHBERRY *(Cornus canadensis)*	8.3	6.0-12.0	100
NORTHERN BASTARD TOADFLAX *(Geocaulon lividum)*	5.6	0.0-15.0	67
PALMATE-LEAVED COLTSFOOT *(Petasites palmatus)*	1.0	0.0-3.0	33
Moss			
SCHREBER'S MOSS *(Pleurozium schreberi)*	1.6	0.0-4.0	67
Lichen			
STUDDED LEATHER LICHEN *(Peltigera aphthosa)*	1.6	0.0-5.0	33

Environmental Variables

Ecological Status Score: 25

Moisture Regime: Mesic (fresh) (2), Submesic (moderately fresh) (1)

Nutrient Regime: Submesotrophic (poor) (2), Mesotrophic (medium) (1)

Elevation (range): 237 (200-260) M

Slope (%): 2.5 - 5.99 (2), 16 - 30.99 (1)

Aspect: Northerly (1), Southerly (1), Westerly (1)

Topographic Position: Upper Slope (2), Lower Slope (1)

Soil Variables

Soil Drainage: Well drained (2), Moderately well drained (1)

Soil Subgroup: ELUVIATED DYSTRIC BRUNISOL (1), ELUVIATED EUTRIC BRUNISOL (1), ORTHIC GRAY LUVISOL (1)

Surface Texture: Sand (1), Silt loam (1), Sandy loam (1)

Effective Texture: Sand (2), Sandy clay loam (1)

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (3)

Parent Material: Rock (2), Glaciofluvial (1), Lacustrine (1), Morainal (1)

Soil Type: SD2-Dry/Coarse Loamy (1), SM1-Moist/Sandy (1), SM4-Moist/Fine Loamy-Clayey (1)

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	6.00	4.00	8.00	3

KUC3 Aw/Buffaloberry (n=4)

(Populus tremuloides/ Shepherdia canadensis)

This community type was found on mesic sites, with shallow slopes and had medium nutrient regimes. Beckingham (1993) felt the Aw/Buffaloberry type was slightly drier and had a slightly poorer nutrient regime than the more modal Aw/Alder or Aw/Low bush cranberry dominated community types. A similar buffaloberry dominated community was described at upper elevations in the Birch and Saddle Hills of the Boreal Mixedwood Natural Region (Moisey et al. 2012).

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: e buffaloberry/alder(mesic/medium)
Ecosite Phase: e1 buffaloberry-alder/ Aw

Plant Composition	Canopy Cover (%)		
	Mean	**Range**	**Const.**
Overstory Tree			
ASPEN *(Populus tremuloides)*	46.2	40.0-55.0	100
JACK PINE *(Pinus banksiana)*	1.7	0.0-5.0	50
Understory Tree			
ASPEN *(Populus tremuloides)*	15.0	0.0-30.0	75
Tall Shrub (2 to 5m)			
BEAKED WILLOW *(Salix bebbiana)*	2.0	1.0-3.0	100
ASPEN *(Populus tremuloides)*	1.2	0.0-4.0	50
Medium Shrub (0.5 to 2 m)			
CANADA BUFFALOBERRY *(Shepherdia canadensis)*	35.0	10.0-60.0	100
PRICKLY ROSE *(Rosa acicularis)*	9.5	3.0-20.0	100
BOG CRANBERRY *(Vaccinium vitis-idaea)*	6.2	0.0-15.0	50
LOW-BUSH CRANBERRY *(Viburnum edule)*	4.5	0.0-15.0	50
COMMON BEARBERRY *(Arctostaphylos uva-ursi)*	2.7	0.0-5.0	75
TWINFLOWER *(Linnaea borealis)*	2.5	1.0-5.0	100
ASPEN *(Populus tremuloides)*	1.2	0.0-2.0	75
Low Shrub (< 0.5m)			
DEWBERRY *(Rubus pubescens)*	2.7	0.0-6.0	50
Tall Forb (>= 30 cm)			
COMMON FIREWEED *(Epilobium angustifolium)*	3.5	0.0-6.0	75
Low Forb (< 30 cm)			
BUNCHBERRY *(Cornus canadensis)*	2.0	2.0-2.0	100
NORTHERN BEDSTRAW *(Galium boreale)*	1.0	0.0-2.0	75
PALMATE-LEAVED COLTSFOOT *(Petasites palmatus)*	1.0	0.0-3.0	50
Graminoid			
HAIRY WILD RYE *(Elymus innovatus)*	10.5	1.0-20.0	100
BLUEJOINT *(Calamagrostis canadensis)*	4.0	0.0-10.0	75

Environmental Variables

Ecological Status Score: 25

Moisture Regime: Mesic (fresh) (4)

Nutrient Regime: Mesotrophic (medium) (4)

Elevation (range): 212 (205-225) M

Slope (%): 0 - 0.49 (1), 0.5 - 2.49 (1), 2.5 - 5.99 (1), 6 - 9.99 (1)

Aspect: Level (1), Easterly (1), Westerly (1)

Topographic Position: Level (2), Midslope (2)

Soil Variables

Soil Drainage: Well drained (2), Moderately well drained (2)

Soil Subgroup: ORTHIC GRAY LUVISOL (2), ELUVIATED EUTRIC BRUNISOL (1), BRUNISOLIC GRAY LUVISOL (1)

Surface Texture: Sand (1), Silt (1), Silty clay loam (1), Silt loam (1)

Effective Texture: Silty clay (2), Silty clay loam (1), Silt loam (1)

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (4)

Parent Material: Glaciolacustrine (3), Lacustrine (1)

Soil Type: SM3-Moist/Silty-Loamy (1), SM4 –Moist/Fine Loamy-Clayey (3)

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	7.00	4.00	9.00	4

KUC7 Aw-Pb/Saskatoon-Red Osier Dogwood/Spreading dogbane (n=1)

(Populus tremuloides-Populus balsamifera/ Amelanchier alnifolia-Cornus stolonifera/Apocynum androsaefolium)

This community type was found on mesic to subhygric sites, with shallow slopes and had medium nutrient regimes. The presence of Balsam poplar and red osier dogwood indicate the transition to the moisture and richer ecological site. A similar spreading dogbane community was described in the La Butte Creek Wildland Park but the other site was described on slightly drier sites. Spreading dogbane dominated community types appears to be a provincially rare plant community type and should be recoqnized as a special feature of provincial significance (Allen et al. 2002).

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: e buffaloberry/alder(mesic/medium)
Ecosite Phase: e1 buffaloberry-alder/ Aw

Plant Composition	Canopy Cover (%)		
	Mean	**Range**	**Const.**
Overstory Tree			
ASPEN *(Populus tremuloides)*	75.0	75.0-75.0	100
BALSAM POPLAR *(Populus balsamifera)*	5.0	5.0-5.0	100
Tall Shrub (2 to 5m)			
ASPEN *(Populus tremuloides)*	5.0	5.0-5.0	100
BEAKED WILLOW *(Salix bebbiana)*	5.0	5.0-5.0	100
Medium Shrub (0.5 to 2 m)			
BOG CRANBERRY *(Vaccinium vitis-idaea)*	30.0	30.0-30.0	100
SASKATOON *(Amelanchier alnifolia)*	15.0	15.0-15.0	100
RED-OSIER DOGWOOD *(Cornus stolonifera)*	10.0	10.0-10.0	100
PRICKLY ROSE *(Rosa acicularis)*	10.0	10.0-10.0	100
TWINFLOWER *(Linnaea borealis)*	5.0	5.0-5.0	100
LOW-BUSH CRANBERRY *(Viburnum edule)*	5.0	5.0-5.0	100
TWINING HONEYSUCKLE *(Lonicera dioica)*	2.0	2.0-2.0	100
Tall Forb (>= 30 cm)			
SPREADING DOGBANE *(Apocynum androsaemifolium)*	15.0	15.0-15.0	100
CREAM-COLORED VETCHLING *(Lathyrus ochroleucus)*	10.0	10.0-10.0	100
COMMON FIREWEED *(Epilobium angustifolium)*	5.0	5.0-5.0	100
Low Forb (< 30 cm)			
NORTHERN BEDSTRAW *(Galium boreale)*	5.0	5.0-5.0	100
WILD LILY-OF-THE-VALLEY *(Maianthemum canadense)*	5.0	5.0-5.0	100
Graminoid			
HAIRY WILD RYE *(Elymus innovatus)*	10.0	10.0-10.0	100

Environmental Variables

Ecological Status Score: 25

Moisture Regime:

Nutrient Regime:

Elevation (range): 245 (245-245) M

Slope (%): > 100.99 (1)

Aspect: Northerly (1)

Topographic Position: Midslope (1)

Soil Variables

Soil Drainage: Well drained (1)

Soil Subgroup:

Surface Texture: Sand (0)

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness:

Parent Material: Fluvial (0)

Soil Type:

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	0.00	0.00	0.00	0

e2 buffaloberry-alder/ Pj-Sw-Sb-Aw-Bw (n=5)

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: e buffaloberry/alder(mesic/medium)

Characteristic Species

Tree

[28.2]ASPEN
Populus tremuloides

[20.0]JACK PINE*
Pinus banksiana

[6.3]WHITE SPRUCE*
Picea glauca

[1.3]BLACK SPRUCE
Picea mariana

Shrub

[15.0]CANADA BUFFALOBERRY
Shepherdia canadensis

[13.2]BOG CRANBERRY
Vaccinium vitis-idaea

[8.7]GREEN ALDER
Alnus crispa

[5.5]COMMON BEARBERRY
Arctostaphylos uva-ursi

[4.9]TWINFLOWER
Linnaea borealis

[2.0]DEWBERRY
Rubus pubescens

[1.6]PRICKLY ROSE
Rosa acicularis

Forb

[6.6]BUNCHBERRY
Cornus canadensis

Lichen

[6.2]REINDEER LICHEN
Cladina mitis

Moss and Liverwort

[8.3]STAIR-STEP MOSS*
Hylocomium splendens

Environmental Variables

Moisture Regime: Mesic (fresh) (4), Submesic (moderately fresh) (1)

Nutrient Regime: Submesotrophic (poor) (2), Permesotrophic (rich) (2), Mesotrophic (medium) (1)

Elevation (range): 216 (180-240) M

Slope (%): very gentle slope (2), gentle slope (2), level (1)

Aspect: Northerly (2), Southerly (1), Level (1), Easterly (1)

Topographic Position:Midslope (4), Lower Slope (1)

Soil Variables

Soil Drainage: Moderately well drained (2), Well drained (2), Rapidly drained (1)

Soil Subgroup: ELUVIATED EUTRIC BRUNISOL (2), ORTHIC GRAY LUVISOL (2), BRUNISOLIC GRAY LUVISOL (1)

Surface Texture: Loam (1), Sandy clay loam (1), Sand (1), Silty clay (1)

Effective Texture: Silty clay (1), Sand (1), Sandy clay loam (1), Clay (1)

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (5)

Parent Material: Glaciofluvial (5), Fluvial (2), Colluvial (1), Lacustrine (1)

Soil Type: SD1-Dry/Sandy (1), SM1-Moist/Sandy (1), SM4-Moist/Fine Loamy-Clayey (3)

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	4.50	4.00	6.00	4

KUD2 Aw-Sw/Buffaloberry (n=3)

(Populus tremuloides-Picea glauca/ Shepherdia canadensis)

This community type was found on mesic sites, with shallow slopes and had medium nutrient regimes. Beckingham (1993) felt the Aw/Buffaloberry type was slightly drier and had a slightly poorer nutrient regime than the more modal Aw/Alder or Aw/Low bush cranberry dominated community types. In the absence of disturbance spruce will dominate this plant community type.

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: e buffaloberry/alder(mesic/medium)
Ecosite Phase: e2 buffaloberry-alder/ Pj-Sw-Sb-Aw-Bw

Plant Composition	Canopy Cover (%)		
	Mean	**Range**	**Const.**
Overstory Tree			
ASPEN *(Populus tremuloides)*	18.3	5.0-35.0	100
WHITE SPRUCE *(Picea glauca)*	6.6	0.0-15.0	67
BLACK SPRUCE *(Picea mariana)*	6.0	5.0-8.0	100
Understory Tree			
ASPEN *(Populus tremuloides)*	18.3	5.0-40.0	100
BLACK SPRUCE *(Picea mariana)*	6.6	2.0-10.0	100
WHITE SPRUCE *(Picea glauca)*	6.0	2.0-10.0	100
Tall Shrub (2 to 5m)			
WHITE SPRUCE *(Picea glauca)*	3.3	2.0-5.0	100
BLACK SPRUCE *(Picea mariana)*	2.6	0.0-6.0	67
Medium Shrub (0.5 to 2 m)			
CANADA BUFFALOBERRY *(Shepherdia canadensis)*	30.0	20.0-50.0	100
GREEN ALDER *(Alnus crispa)*	9.0	5.0-12.0	100
WHITE SPRUCE *(Picea glauca)*	5.0	2.0-10.0	100
TWINFLOWER *(Linnaea borealis)*	3.3	0.0-5.0	67
BLACK SPRUCE *(Picea mariana)*	3.0	1.0-5.0	100
PRICKLY ROSE *(Rosa acicularis)*	2.3	0.0-4.0	67
LOW-BUSH CRANBERRY *(Viburnum edule)*	2.0	2.0-2.0	100
Low Shrub (< 0.5m)			
DEWBERRY *(Rubus pubescens)*	4.0	2.0-8.0	100
Tall Forb (>= 30 cm)			
COMMON FIREWEED *(Epilobium angustifolium)*	1.6	1.0-3.0	100
Low Forb (< 30 cm)			
BUNCHBERRY *(Cornus canadensis)*	12.3	7.0-20.0	100
Moss			
STAIR-STEP MOSS *(Hylocomium splendens)*	16.6	15.0-20.0	100

Environmental Variables

Ecological Status Score: 25

Moisture Regime: Mesic (fresh) (3)

Nutrient Regime: Permesotrophic (rich) (2), Mesotrophic (medium) (1)

Elevation (range): 193 (180-210) M

Slope (%): 0 - 0.49 (1), 2.5 - 5.99 (1), 6 - 9.99 (1)

Aspect: Northerly (2), Level (1)

Topographic Position: Midslope (2), Lower Slope (1)

Soil Variables

Soil Drainage: Moderately well drained (2), Well drained (1)

Soil Subgroup: ORTHIC GRAY LUVISOL (2), BRUNISOLIC GRAY LUVISOL (1)

Surface Texture: Loam (1), Sandy clay loam (1), Silty clay (1)

Effective Texture: Clay (1), Sandy clay loam (1), Silty clay (1)

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (3)

Parent Material: Fluvial (2), Lacustrine (1), Colluvial (1)

Soil Type: SM4-Moist/Fine Loamy-Clayey (3)

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	5.00	5.00	6.00	3

KUD4 Aw- Pj/Alder (n=2)

(Populus tremuloides-Pinus banksiana/Alnus crispa)

A better water supply in the rooting zone due to aspect, finer soil textures at depth or local groundwater flow contributes to better understory growth of alder and feather mosses. Typically these sites are often dominated by a mixture of aspen and jackpine.

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: e buffaloberry/alder(mesic/medium)
Ecosite Phase: e2 buffaloberry-alder/ Pj-Sw-Sb-Aw-Bw

Plant Composition	Canopy Cover (%)		
	Mean	**Range**	**Const.**
Overstory Tree			
JACK PINE *(Pinus banksiana)*	25.0	20.0-30.0	100
ASPEN *(Populus tremuloides)*	15.0	0.0-30.0	50
Understory Tree			
JACK PINE *(Pinus banksiana)*	15.0	10.0-20.0	100
ASPEN *(Populus tremuloides)*	5.0	0.0-10.0	50
Tall Shrub (2 to 5m)			
GREEN ALDER *(Alnus crispa)*	17.5	5.0-30.0	100
Medium Shrub (0.5 to 2 m)			
BOG CRANBERRY *(Vaccinium vitis-idaea)*	26.5	3.0-50.0	100
COMMON BEARBERRY *(Arctostaphylos uva-ursi)*	11.0	2.0-20.0	100
TWINFLOWER *(Linnaea borealis)*	6.5	3.0-10.0	100
COMMON BLUEBERRY *(Vaccinium myrtilloides)*	2.5	2.0-3.0	100
PRICKLY ROSE *(Rosa acicularis)*	1.0	0.0-2.0	50
Low Forb (< 30 cm)			
BUNCHBERRY *(Cornus canadensis)*	1.0	0.0-2.0	50
WILD LILY-OF-THE-VALLEY *(Maianthemum canadense)*	1.0	1.0-1.0	100
ONE-SIDED WINTERGREEN *(Orthilia secunda)*	1.0	1.0-1.0	100
Moss			
JUNIPER HAIR-CAP *(Polytrichum juniperinum)*	2.5	0.0-5.0	50
Lichen			
REINDEER LICHEN *(Cladina mitis)*	12.5	0.0-25.0	50

Environmental Variables

Ecological Status Score: 25

Moisture Regime: Submesic (moderately fresh) (1), Mesic (fresh) (1)

Nutrient Regime: Submesotrophic (poor) (2)

Elevation (range): 240 (240-240) M

Slope (%): 2.5 - 5.99 (1), 6 - 9.99 (1)

Aspect: Easterly (1), Southerly (1)

Topographic Position: Midslope (2)

Soil Variables

Soil Drainage: Rapidly drained (1), Well drained (1)

Soil Subgroup: ELUVIATED EUTRIC BRUNISOL (2)

Surface Texture: Sand (1)

Effective Texture: Sand (1)

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (2)

Parent Material: Glaciofluvial (5)

Soil Type: SD1-Dry/Sandy (1), SM1-Moist/Sandy (2)

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	4.00	4.00	4.00	1

e3 buffaloberry-alder shrubland (n=0)

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: e buffaloberry/alder(mesic/medium)

General Description

A number of ecological site phases currently have no data. These ecological site phases have been created as place holders because they were described in adjacent subregions (Athabasca Plain and Northern mixedwood).

Characteristic Species

Environmental Variables

Moisture Regime:

Nutrient Regime:

Elevation (range):

Slope (%):

Aspect:

Topographic Position:

Soil Variables

Soil Drainage:

Soil Subgroup:

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness:

Parent Material:

Soil Type:

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	0.00	0.00	0.00	0

e4 buffaloberry-alder/ Pj-Sw-Sb (n=3)

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: e buffaloberry/alder(mesic/medium)

Characteristic Species

Tree

[30.0]JACK PINE
Pinus banksiana

[22.8]BLACK SPRUCE
Picea mariana

[10.5]WHITE SPRUCE
Picea glauca

[7.5]ASPEN
Populus tremuloides

Shrub

[20.0]GREEN ALDER
Alnus crispa

[1.5]TWINFLOWER
Linnaea borealis

[1.0]BEAKED WILLOW
Salix bebbiana

Forb

[3.5]NORTHERN BASTARD TOADFLAX
Geocaulon lividum

Moss and Liverwort

[38.2]SCHREBER'S MOSS*
Pleurozium schreberi

[7.0]STAIR-STEP MOSS
Hylocomium splendens

[5.0]WAVY DICRANUM
Dicranum polysetum

Environmental Variables

Moisture Regime: Subhygric (moderately moist) (2), Submesic (moderately fresh) (1)

Nutrient Regime: Submesotrophic (poor) (2), Mesotrophic (medium) (1)

Elevation (range): 290 (250-330) M

Slope (%): very gentle slope (2)

Aspect: Westerly (1), Easterly (1)

Topographic Position:Lower Slope (1), Level (1), Depression (1)

Soil Variables

Soil Drainage: Well drained (2), Moderately well drained (1)

Soil Subgroup: ELUVIATED DYSTRIC BRUNISOL (2), ELUVIATED EUTRIC BRUNISOL (1)

Surface Texture: Sand (3)

Effective Texture: Sand (3)

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (3)

Parent Material: Glaciolacustrine (2), Glaciofluvial (1)

Soil Type: SD1-Dry/Sandy (1), SM1-Moist/Sandy (2)

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	5.50	3.00	11.00	3

KUE5 Pj/Alder (n=1)

(Pinus banksiana/Alnus crispa)

The increase in moisture favours the growth of alder, aspen and feather moss in the understory of this community type. This community type occupies lower slope positions that accumulate some moisture. Typically these sites are often dominated by a mixture of aspen and jackpine.

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: e buffaloberry/alder(mesic/medium)
Ecosite Phase: e4 buffaloberry-alder/ Pj-Sw-Sb

Plant Composition	Canopy Cover (%)		
	Mean	**Range**	**Const.**
Overstory Tree			
JACK PINE *(Pinus banksiana)*	50.0	50.0-50.0	100
Understory Tree			
JACK PINE *(Pinus banksiana)*	10.0	10.0-10.0	100
ASPEN *(Populus tremuloides)*	5.0	5.0-5.0	100
Tall Shrub (2 to 5m)			
GREEN ALDER *(Alnus crispa)*	40.0	40.0-40.0	100
ASPEN *(Populus tremuloides)*	10.0	10.0-10.0	100
BEAKED WILLOW *(Salix bebbiana)*	2.0	2.0-2.0	100
BLACK SPRUCE *(Picea mariana)*	1.0	1.0-1.0	100
Medium Shrub (0.5 to 2 m)			
TWINFLOWER *(Linnaea borealis)*	3.0	3.0-3.0	100
BLACK SPRUCE *(Picea mariana)*	2.0	2.0-2.0	100
Low Forb (< 30 cm)			
NORTHERN BASTARD TOADFLAX *(Geocaulon lividum)*	1.0	1.0-1.0	100
GROUND-PINE *(Lycopodium obscurum)*	1.0	1.0-1.0	100
ONE-SIDED WINTERGREEN *(Orthilia secunda)*	1.0	1.0-1.0	100
Moss			
STAIR-STEP MOSS *(Hylocomium splendens)*	1.0	1.0-1.0	100
SCHREBER'S MOSS *(Pleurozium schreberi)*	1.0	1.0-1.0	100
Lichen			
REINDEER LICHEN *(Cladina arbuscula)*	2.0	2.0-2.0	100

Environmental Variables

Ecological Status Score: 25

Moisture Regime: Submesic (moderately fresh) (1)

Nutrient Regime: Mesotrophic (medium) (1)

Elevation (range): 250 (250-250) M

Slope (%): 2.5 - 5.99 (1)

Aspect: Westerly (1)

Topographic Position: Lower Slope (1)

Soil Variables

Soil Drainage: Moderately well drained (1)

Soil Subgroup: ELUVIATED EUTRIC BRUNISOL (1)

Surface Texture: Sand (1)

Effective Texture: Sand (1)

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (1)

Parent Material: Glaciofluvial (1)

Soil Type: SD1-Dry/Sandy (1)

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	3.00	3.00	3.00	1

KUE6 Sb-Sw/Moss (n=2)

(Picea mariana-Picea glauca/Moss)

This community type represents the climax community type for the buffaloberry-alder ecological site in the Kazan Uplands subregion. Pine, aspen and white birch dominated phases of this ecological site are seral to the white spruce dominated climax community. Black spruce once established may occupy a significant portion of the canopy in the climax community (Beckingham and Archibald 1996). On wetter sites in the absence of disturbance white and black spruce dominated communities are also found, but the understory species usually are dominated by a presence of horsetail species.

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: e buffaloberry/alder(mesic/medium)
Ecosite Phase: e4 buffaloberry-alder/ Pj-Sw-Sb

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Overstory Tree			
BLACK SPRUCE *(Picea mariana)*	31.5	0.0-63.0	50
WHITE SPRUCE *(Picea glauca)*	21.0	0.0-42.0	50
Understory Tree			
BLACK SPRUCE *(Picea mariana)*	13.0	8.0-18.0	100
WHITE SPRUCE *(Picea glauca)*	0.5	0.0-1.0	50
Tall Shrub (2 to 5m)			
BLACK SPRUCE *(Picea mariana)*	18.0	18.0-18.0	100
Medium Shrub (0.5 to 2 m)			
BOG CRANBERRY *(Vaccinium vitis-idaea)*	1.5	1.0-2.0	100
PRICKLY ROSE *(Rosa acicularis)*	1.0	1.0-1.0	100
Low Forb (< 30 cm)			
NORTHERN BASTARD TOADFLAX *(Geocaulon lividum)*	6.0	4.0-8.0	100
Epiphyte			
OLD MAN'S BEARD *(Usnea hirta)*	1.0	1.0-1.0	100
Moss			
SCHREBER'S MOSS *(Pleurozium schreberi)*	75.5	63.0-88.0	100
STAIR-STEP MOSS *(Hylocomium splendens)*	13.0	8.0-18.0	100
WAVY DICRANUM *(Dicranum polysetum)*	10.0	2.0-18.0	100
PIPECLEANER MOSS *(Rhytidium rugosum)*	4.0	0.0-8.0	50

Environmental Variables

Ecological Status Score: 25

Moisture Regime: Subhygric (moderately moist) (2)

Nutrient Regime: Submesotrophic (poor) (2)

Elevation (range): 330 (330-330) M

Slope (%): 2.5 - 5.99 (1)

Aspect: Easterly (1)

Topographic Position: Level (1), Depression (1)

Soil Variables

Soil Drainage: Well drained (2)

Soil Subgroup: ELUVIATED DYSTRIC BRUNISOL (2)

Surface Texture: Sand (2)

Effective Texture: Sand (2)

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (2)

Parent Material: Glaciolacustrine (2)

Soil Type: SM1-Moist/Sandy (2)

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	8.00	6.00	11.00	2

f red osier dogwood/horsetail (subhygric/rich) (n=2)

Natural Subregion: Kazan Uplands

Ecosection: KU Kazan Uplands

General Description

The red osier dogwood/horsetail ecosite is subhygric and nutrient rich. These sites are commonly found on level or depressional areas near the base of slopes or near watercourses where they receive nutrient-rich seepage or flood waters for a portion of the growing season. Upland tree dominated ecological sites in the Peace-Athabasca Delta subregion are often this ecological site. Fine-textured till and lacustrine parent materials are common. Horsetails commonly form a blanket over the forest floor.

Environmental Variables

Moisture Regime: Subhygric (moderately moist) (2)

Nutrient Regime: Permesotrophic (rich) (2)

Elevation (range): 217 (200-235) M

Slope (%): level (1), nearly level (1)

Aspect: Level (1), Westerly (1)

Topographic Position:Level (1), Upper Slope (1)

Soil Variables

Soil Drainage: Imperfectly drained (1), Moderately well drained (1)

Soil Subgroup: ORTHIC LUVIC GLEYSOL (1)

Surface Texture: Silty clay (1)

Effective Texture: Silt loam (1)

Depth to Mottles/Gley: 26 - 50 (1)

Organic Thickness: 0 - 5 cm (1)

Parent Material: Lacustrine (1)

Soil Type: SM4-Moist/Fine Loamy-Clayey(1)

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	5.00	5.00	5.00	1

Successional Relationships

Succession on these rich sites proceeds slowly after disturbance due to the proliferation of grass, forb and shrub cover. This explosion of vegetational cover can make tree establishment (especially coniferous) difficult and can reduce early growth rates. Once white spruce becomes established, high growth rates can be expected.

Indicator Species

Tree

BALSAM POPLAR
Populus balsamifera

ASPEN
Populus tremuloides

Shrub

BEAKED WILLOW
Salix bebbiana

RIVER ALDER
Alnus tenuifolia

RED-OSIER DOGWOOD
Cornus stolonifera

Forb

MEADOW HORSETAIL
Equisetum pratense

f1 red osier dogwood/horsetail Sw (n=0)

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: f red osier dogwood/horsetail (subhygric/rich)

General Description

A number of ecological site phases currently have no data. These ecological site phases have been created as place holders because they were described in adjacent subregions (Athabasca Plain and Northern Mixedwood).

Characteristic Species

Environmental Variables

Moisture Regime:

Nutrient Regime:

Elevation (range):

Slope (%):

Aspect:

Topographic Position:

Soil Variables

Soil Drainage:

Soil Subgroup:

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness:

Parent Material:

Soil Type:

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	0.00	0.00	0.00	0

f2 red osier dogwood/horsetail Pb-Sw (n=0)

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: f red osier dogwood/horsetail (subhygric/rich)

General Description

A number of ecological site phases currently have no data. These ecological site phases have been created as place holders because they were described in adjacent subregions (Northern Mixedwood and Athabasca Plain).

Characteristic Species

Environmental Variables

Moisture Regime:

Nutrient Regime:

Elevation (range):

Slope (%):

Aspect:

Topographic Position:

Soil Variables

Soil Drainage:

Soil Subgroup:

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness:

Parent Material:

Soil Type:

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	0.00	0.00	0.00	0

f3 red osier dogwood/horsetail - Pb-Aw(Ba) (n=2)

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: f red osier dogwood/horsetail (subhygric/rich)

Characteristic Species

Tree

[32.0]BALSAM POPLAR*
Populus balsamifera

[20.0]WHITE BIRCH
Betula papyrifera

[7.5]ASPEN*
Populus tremuloides

Shrub

[11.0]RIVER ALDER*
Alnus tenuifolia

[10.5]RED-OSIER DOGWOOD*
Cornus stolonifera

[7.5]BEAKED WILLOW*
Salix bebbiana

[5.0]TWINFLOWER
Linnaea borealis

[5.0]DEWBERRY
Rubus pubescens

[4.0]BEAKED WILLOW
Salix bebbiana

[3.5]PRICKLY ROSE
Rosa acicularis

[2.0]LOW-BUSH CRANBERRY
Viburnum edule

Forb

[5.0]COMMON PINK WINTERGREEN
Pyrola asarifolia

[2.5]MEADOW HORSETAIL*
Equisetum pratense

[1.5]COMMON FIREWEED
Epilobium angustifolium

Environmental Variables

Moisture Regime: Subhygric (moderately moist) (2)

Nutrient Regime: Permesotrophic (rich) (2)

Elevation (range): 217.5 (200-235) M

Slope (%): level (1), nearly level (1)

Aspect: Westerly (1), Level (1)

Topographic Position:Upper Slope (1), Level (1)

Soil Variables

Soil Drainage: Imperfectly drained (1), Moderately well drained (1)

Soil Subgroup: ORTHIC LUVIC GLEYSOL (1)

Surface Texture: Silty clay (1)

Effective Texture: Silt loam (1)

Depth to Mottles/Gley: 26 - 50 (1)

Organic Thickness: 0 - 5 cm (1)

Parent Material: Lacustrine (1)

Soil Type: SM4-Moist/Fine Loamy-Clayey (1)

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	5.00	5.00	5.00	1

KUC5 Pb/Alder-Red osier dogwood/Horsetail (n=1)

(Populus balsamifera/Alnus tenuifolia-Cornus stolonifera/Equisetum pratense)

This plant community is transitional to the Peace-Athabasca subregion and is found in lower slope topographic positions near water courses where it receives nutrient-rich seepage or flood waters for a portion of the growing season. Undisturbed, this plant community tends to have dense shrub cover. Light is limited for lower herbaceous layers and succession in the absence of disturbance will be to white spruce.

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: f red osier dogwood/horsetail (subhygric/rich)
Ecosite Phase: f3 red osier dogwood/horsetail - Pb-Aw(Ba)

Plant Composition	Canopy Cover (%)		
	Mean	**Range**	**Const.**
Overstory Tree			
BALSAM POPLAR *(Populus balsamifera)*	50.0	50.0-50.0	100
Understory Tree			
BALSAM POPLAR *(Populus balsamifera)*	1.0	1.0-1.0	100
Tall Shrub (2 to 5m)			
RIVER ALDER *(Alnus tenuifolia)*	20.0	20.0-20.0	100
Medium Shrub (0.5 to 2 m)			
RED-OSIER DOGWOOD *(Cornus stolonifera)*	20.0	20.0-20.0	100
PRICKLY ROSE *(Rosa acicularis)*	5.0	5.0-5.0	100
LOW-BUSH CRANBERRY *(Viburnum edule)*	2.0	2.0-2.0	100
WILD RED RASPBERRY *(Rubus idaeus)*	1.0	1.0-1.0	100
Low Shrub (< 0.5m)			
DEWBERRY *(Rubus pubescens)*	10.0	10.0-10.0	100
Tall Forb (>= 30 cm)			
MEADOW HORSETAIL *(Equisetum pratense)*	5.0	5.0-5.0	100
COMMON FIREWEED *(Epilobium angustifolium)*	1.0	1.0-1.0	100
Low Forb (< 30 cm)			
COMMON PINK WINTERGREEN *(Pyrola asarifolia)*	10.0	10.0-10.0	100
Lichen			
N/A *(Melanelia albertana)*	1.0	1.0-1.0	100

Environmental Variables

Ecological Status Score: 25

Moisture Regime: Subhygric (moderately moist) (1)

Nutrient Regime: Permesotrophic (rich) (1)

Elevation (range): 200 (200-200) M

Slope (%): 0 - 0.49 (1)

Aspect: Level (1)

Topographic Position: Level (1)

Soil Variables

Soil Drainage: Moderately well drained (1)

Soil Subgroup:

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness:

Parent Material:

Soil Type:

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	0.00	0.00	0.00	0

KUC6 Bw-Aw-Pb/Willow (n=1)

(Betula papyrifera-Populus tremuloides-Populus balsamifera/Salix spp.)

This community type occupies moist rich seepage areas in lower slope positions. Succession in the absence of disturbance will likely be to white spruce.

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: f red osier dogwood/horsetail (subhygric/rich)
Ecosite Phase: f3 red osier dogwood/horsetail - Pb-Aw(Ba)

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Overstory Tree			
WHITE BIRCH *(Betula papyrifera)*	40.0	40.0-40.0	100
ASPEN *(Populus tremuloides)*	10.0	10.0-10.0	100
BALSAM POPLAR *(Populus balsamifera)*	8.0	8.0-8.0	100
Understory Tree			
WHITE BIRCH *(Betula papyrifera)*	20.0	20.0-20.0	100
BALSAM POPLAR *(Populus balsamifera)*	5.0	5.0-5.0	100
ASPEN *(Populus tremuloides)*	5.0	5.0-5.0	100
Tall Shrub (2 to 5m)			
BEAKED WILLOW *(Salix bebbiana)*	15.0	15.0-15.0	100
RIVER ALDER *(Alnus tenuifolia)*	2.0	2.0-2.0	100
Medium Shrub (0.5 to 2 m)			
TWINFLOWER *(Linnaea borealis)*	10.0	10.0-10.0	100
BEAKED WILLOW *(Salix bebbiana)*	8.0	8.0-8.0	100
PRICKLY ROSE *(Rosa acicularis)*	2.0	2.0-2.0	100
LOW-BUSH CRANBERRY *(Viburnum edule)*	2.0	2.0-2.0	100
RED-OSIER DOGWOOD *(Cornus stolonifera)*	1.0	1.0-1.0	100
TWINING HONEYSUCKLE *(Lonicera dioica)*	1.0	1.0-1.0	100
Tall Forb (>= 30 cm)			
COMMON FIREWEED *(Epilobium angustifolium)*	2.0	2.0-2.0	100
LINDLEY'S ASTER *(Aster ciliolatus)*	1.0	1.0-1.0	100
Low Forb (< 30 cm)			
BUNCHBERRY *(Cornus canadensis)*	2.0	2.0-2.0	100

Environmental Variables

Ecological Status Score: 25

Moisture Regime: Subhygric (moderately moist) (1)

Nutrient Regime: Permesotrophic (rich) (1)

Elevation (range): 235 (235-235) M

Slope (%): 0.5 - 2.49 (1)

Aspect: Westerly (1)

Topographic Position: Upper Slope (1)

Soil Variables

Soil Drainage: Imperfectly drained (1)

Soil Subgroup: ORTHIC LUVIC GLEYSOL (1)

Surface Texture: Silty clay (1)

Effective Texture: Silt loam (1)

Depth to Mottles/Gley: 26 - 50 (1)

Organic Thickness: 0 - 5 cm (1)

Parent Material: Lacustrine (1)

Soil Type: SM4-Moist/Fine Loamy-Clayey (1)

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	5.00	5.00	5.00	1

f4 shrub (n=0)

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: f red osier dogwood/horsetail (subhygric/rich)

General Description

A number of ecological site phases currently have no data. These ecological site phases have been created as place holders because they were described in adjacent subregions (Northern Mixedwood and Athabasca Plain).

Characteristic Species

Environmental Variables

Moisture Regime:

Nutrient Regime:

Elevation (range):

Slope (%):

Aspect:

Topographic Position:

Soil Variables

Soil Drainage:

Soil Subgroup:

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness:

Parent Material:

Soil Type:

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	0.00	0.00	0.00	0

f5 tame/disturbed (n=0)

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: f red osier dogwood/horsetail (subhygric/rich)

General Description

A number of ecological site phases currently have no data. These ecological site phases have been created as place holders because they were described in adjacent subregions (Central Mixedwood).

Characteristic Species

Environmental Variables

Moisture Regime:

Nutrient Regime:

Elevation (range):

Slope (%):

Aspect:

Topographic Position:

Soil Variables

Soil Drainage:

Soil Subgroup:

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness:

Parent Material:

Soil Type:

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	0.00	0.00	0.00	0

g Labrador tea-hygric(hygric/medium) (n=2)

Natural Subregion: Kazan Uplands

Ecosection: KU Kazan Uplands

General Description

The Labrador tea-hygric ecosite has a nutrient poor substrate with imperfectly to very poorly drained soils. Labrador tea and bog cranberry are indicative of the relatively acidic surface soil conditions. The Labrador tea - hygric ecosite has plant community types similar to the Labrador tea - mesic ecosite the hygric ecosite tends to be in mid to lower slope positions, has distinct mottling within the top 50cm of soil and tends to be dominated by black spruce rather than pine.

Successional Relationships

Young and mature stands developing in this ecosite often have a component of black spruce. The black spruce is often the same age as the pine but forms a secondary canopy due to slower growth rates. Successionally mature stands are dominated by black spruce with a small component of old residual pine.

Indicator Species

Tree

BLACK SPRUCE
Picea mariana

TAMARACK
Larix laricina

Shrub

SMALL BOG CRANBERRY
Oxycoccus microcarpus

GREEN ALDER
Alnus crispa

RIVER ALDER
Alnus tenuifolia

Moss and Liverwort

TUFTED MOSS
Aulacomnium palustre

PEAT MOSS
Sphagnum warnstorfii

GOLDEN MOSS
Tomenthypnum nitens

Graminoid

WATER SEDGE
Carex aquatilis

Environmental Variables

Moisture Regime: Hygric (moist) (1), Subhydric (moderately wet) (1)

Nutrient Regime: Mesotrophic (medium) (1), Permesotrophic (rich) (1)

Elevation (range): 245 (240-250) M

Slope (%): level (1), nearly level (1)

Aspect: Level (2)

Topographic Position:Depression (1), Midslope (1)

Soil Variables

Soil Drainage: Imperfectly drained (1), Very poorly drained (1)

Soil Subgroup: GLEYED MELANIC BRUNISOL (1), REGO GLEYSOL (1)

Surface Texture: Sand (2)

Effective Texture: Sand (2)

Depth to Mottles/Gley: 26 - 50 (1)

Organic Thickness: 0 - 5 cm (2)

Parent Material: Glaciofluvial (1), Lacustrine (1)

Soil Type: SWm-Wet/Mineral (2)

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	6.50	3.00	10.00	2

g1 Labrador tea-hygric Sb-Pj (n=2)

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: g Labrador tea-hygric(hygric/medium)

Characteristic Species

Tree

[32.5]BLACK SPRUCE*
Picea mariana

[3.5]TAMARACK*
Larix laricina

Shrub

[17.5]RIVER ALDER*
Alnus tenuifolia

[10.0]GREEN ALDER*
Alnus crispa

[5.0]LEATHERLEAF
Chamaedaphne calyculata

[2.5]BEAKED WILLOW
Salix bebbiana

[2.5]MYRTLE-LEAVED WILLOW
Salix myrtillifolia

[2.5]DWARF BIRCH
Betula pumila

[2.5]BOG ROSEMARY
Andromeda polifolia

[1.0]SMALL BOG CRANBERRY*
Oxycoccus microcarpus

Moss and Liverwort

[25.0]PEAT MOSS*
Sphagnum warnstorfii

[17.5]TUFTED MOSS*
Aulacomnium palustre

[10.0]GOLDEN MOSS*
Tomenthypnum nitens

[10.0]STAIR-STEP MOSS
Hylocomium splendens

[2.5]JUNIPER HAIR-CAP
Polytrichum juniperinum

Graminoid

[7.5]WATER SEDGE*
Carex aquatilis

Environmental Variables

Moisture Regime: Hygric (moist) (1), Subhydric (moderately wet) (1)

Nutrient Regime: Permesotrophic (rich) (1), Mesotrophic (medium) (1)

Elevation (range): 245 (240-250) M

Slope (%): level (1), nearly level (1)

Aspect: Level (2)

Topographic Position:Midslope (1), Depression (1)

Soil Variables

Soil Drainage: Very poorly drained (1), Imperfectly drained (1)

Soil Subgroup: REGO GLEYSOL (1), GLEYED MELANIC BRUNISOL (1)

Surface Texture: Sand (2)

Effective Texture: Sand (2)

Depth to Mottles/Gley: 26 - 50 (1)

Organic Thickness: 0 - 5 cm (2)

Parent Material: Glaciofluvial (1), Lacustrine (1)

Soil Type: SWm-Wet/Mineral (2)

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	6.50	3.00	10.00	2

KUE10 Lt-Sb/River alder/Sedge (n=1)

(Larix laricina-Picea mariana/Alnus tenuifolia/Carex spp)

Fen ecosites are not common in the Canadian Shield natural region. Most wetlands are situated in the bog or poor fen ecosites because of the acidic nature of the soils in the region. Micro-topography allows trees to grow on slightly higher ground and contributes to species richness. Increased flooding and prolonged water-logging may result in the disappearance of trees and a transition to a willow/sedge fen.

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: g Labrador tea-hygric(hygric/medium)
Ecosite Phase: g1 Labrador tea-hygric Sb-Pj

Plant Composition

	Canopy Cover (%)		
	Mean	**Range**	**Const.**
Overstory Tree			
TAMARACK *(Larix laricina)*	2.0	2.0-2.0	100
Tall Shrub (2 to 5m)			
RIVER ALDER *(Alnus tenuifolia)*	10.0	10.0-10.0	100
TAMARACK *(Larix laricina)*	5.0	5.0-5.0	100
BLACK SPRUCE *(Picea mariana)*	5.0	5.0-5.0	100
Medium Shrub (0.5 to 2 m)			
RIVER ALDER *(Alnus tenuifolia)*	15.0	15.0-15.0	100
LEATHERLEAF *(Chamaedaphne calyculata)*	10.0	10.0-10.0	100
BOG ROSEMARY *(Andromeda polifolia)*	5.0	5.0-5.0	100
DWARF BIRCH *(Betula pumila)*	5.0	5.0-5.0	100
MYRTLE-LEAVED WILLOW *(Salix myrtillifolia)*	5.0	5.0-5.0	100
TAMARACK *(Larix laricina)*	2.0	2.0-2.0	100
SMALL BOG CRANBERRY *(Oxycoccus microcarpus)*	2.0	2.0-2.0	100
Tall Forb (>= 30 cm)			
MARSH CINQUEFOIL *(Potentilla palustris)*	2.0	2.0-2.0	100
Graminoid			
WATER SEDGE *(Carex aquatilis)*	15.0	15.0-15.0	100
Moss			
PEAT MOSS *(Sphagnum warnstorfii)*	50.0	50.0-50.0	100
GOLDEN MOSS *(Tomenthypnum nitens)*	20.0	20.0-20.0	100
TUFTED MOSS *(Aulacomnium palustre)*	5.0	5.0-5.0	100

Environmental Variables

Ecological Status Score: 25

Moisture Regime: Subhydric (moderately wet) (1)

Nutrient Regime: Mesotrophic (medium) (1)

Elevation (range): 240 (240-240) M

Slope (%): 0 - 0.49 (1)

Aspect: Level (1)

Topographic Position: Depression (1)

Soil Variables

Soil Drainage: Very poorly drained (1)

Soil Subgroup: REGO GLEYSOL (1)

Surface Texture: Sand (1)

Effective Texture: Sand (1)

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (1)

Parent Material: Lacustrine (1)

Soil Type: SWm-Wet/Mineral (1)

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	3.00	3.00	3.00	1

KUE7 Sb/Alder/Tufted moss (n=1)

(Picea mariana/Alnus crispa/Aulacomnium palustre)

This community type represents the transition between a treed bog and the upland jack pine/black spruce dominated community types. Alder and stair step-moss indicate the medium nutrient status of this community type.

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: g Labrador tea-hygric(hygric/medium)
Ecosite Phase: g1 Labrador tea-hygric Sb-Pj

Plant Composition	Canopy Cover (%)		
	Mean	**Range**	**Const.**
Overstory Tree			
BLACK SPRUCE *(Picea mariana)*	2.0	2.0-2.0	100
JACK PINE *(Pinus banksiana)*	2.0	2.0-2.0	100
WHITE SPRUCE *(Picea glauca)*	1.0	1.0-1.0	100
Tall Shrub (2 to 5m)			
BLACK SPRUCE *(Picea mariana)*	40.0	40.0-40.0	100
GREEN ALDER *(Alnus crispa)*	20.0	20.0-20.0	100
RIVER ALDER *(Alnus tenuifolia)*	10.0	10.0-10.0	100
BEAKED WILLOW *(Salix bebbiana)*	5.0	5.0-5.0	100
Medium Shrub (0.5 to 2 m)			
BLACK SPRUCE *(Picea mariana)*	20.0	20.0-20.0	100
BEAKED WILLOW *(Salix bebbiana)*	2.0	2.0-2.0	100
Low Forb (< 30 cm)			
THREE-LEAVED SOLOMON'S-SEAL *(Smilacina trifolia)*	2.0	2.0-2.0	100
BUNCHBERRY *(Cornus canadensis)*	1.0	1.0-1.0	100
VINE-LEAVED COLTSFOOT *(Petasites vitifolius)*	1.0	1.0-1.0	100
Graminoid			
NORTHERN REED GRASS *(Calamagrostis inexpansa)*	1.0	1.0-1.0	100
Moss			
TUFTED MOSS *(Aulacomnium palustre)*	30.0	30.0-30.0	100
STAIR-STEP MOSS *(Hylocomium splendens)*	20.0	20.0-20.0	100
JUNIPER HAIR-CAP *(Polytrichum juniperinum)*	5.0	5.0-5.0	100
Lichen			
N/A *(Cladonia gracilis)*	3.0	3.0-3.0	100

Environmental Variables

Ecological Status Score: 25

Moisture Regime: Hygric (moist) (1)

Nutrient Regime: Permesotrophic (rich) (1)

Elevation (range): 250 (250-250) M

Slope (%): 0.5 - 2.49 (1)

Aspect: Level (1)

Topographic Position: Midslope (1)

Soil Variables

Soil Drainage: Imperfectly drained (1)

Soil Subgroup: GLEYED MELANIC BRUNISOL (1)

Surface Texture: Sand (1)

Effective Texture: Sand (1)

Depth to Mottles/Gley: 26 - 50 (1)

Organic Thickness: 0 - 5 cm (1)

Parent Material: Glaciofluvial (1)

Soil Type: SWm-Wet/Mineral (1)

Humus Form

LFH Thickness	Mean	Min	Max	Count
cm:	10.00	10.00	10.00	1

h bog (subhydric/very poor) (n=3)

Natural Subregion: Kazan Uplands

Ecosection: KU Kazan Uplands

General Description

Bog communities are the dominant wetland type in the Kazan Uplands subregion. The bog ecosite has a very poor to poor nutrient regime and is poor to very poorly drained. Organic soils consisting of slowly decomposing peat moss are common. This ecosite occupies level and depressional areas where water tends to be stagnant and impeded drainage or high water tables enhance the accumulation of organic matter. Stunted black spruce forms a sparse canopy on the treed phase (h1) of the bog ecosite. Leatherleaf (Chamaedaphne calyculata) is very common in the bog ecosite.

Environmental Variables

Moisture Regime: Subhydric (moderately wet) (3)

Nutrient Regime: Submesotrophic (poor) (2), Oligotrophic (very poor) (1)

Elevation (range): 267.5 (230-300) M

Slope (%): level (1), very gentle slope (1)

Aspect: Level (1), Northerly (1)

Topographic Position:Depression (2), Lower Slope (1)

Soil Variables

Soil Drainage: Very poorly drained (2), Poorly drained (1)

Soil Subgroup: FIBRIC ORGANIC CRYOSOL (1), REGO GLEYSOL (1), TYPIC FIBRISOL (1)

Surface Texture: Fibric (2)

Effective Texture: Mesic (1), Sand (1)

Depth to Mottles/Gley:

Organic Thickness: 26 - 39 cm (1), 60 - 79 cm (1)

Parent Material: Undifferentiated Organic (2), Glaciofluvial (1)

Soil Type: SR-Organic (2), SWp-Wet/Peaty (1)

Humus Form

Successional Relationships

The bog ecosite is an edaphic climax that is maintained by water tables. The hydrarch succession that leads to the bog ecosite is extremely slow.

Indicator Species

Tree

BLACK SPRUCE
Picea mariana

Shrub

COMMON LABRADOR TEA
Ledum groenlandicum

SMALL BOG CRANBERRY
Oxycoccus microcarpus

LEATHERLEAF
Chamaedaphne calyculata

NORTHERN LAUREL
Kalmia polifolia

Moss and Liverwort

N/A
Sphagnum nemoreum

PEAT MOSS
Sphagnum angustifolium

h1 bog - treed (n=1)

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: h bog (subhydric/very poor)

Characteristic Species

Tree

[71.0]BLACK SPRUCE*
Picea mariana

Shrub

[42.0]COMMON LABRADOR TEA*
Ledum groenlandicum

[29.0]CLOUDBERRY
Rubus chamaemorus

[8.0]LEATHERLEAF*
Chamaedaphne calyculata

[8.0]BOG CRANBERRY
Vaccinium vitis-idaea

Moss and Liverwort

[42.0]PEAT MOSS*
Sphagnum angustifolium

[42.0]N/A*
Sphagnum nemoreum

[18.0]SCHREBER'S MOSS
Pleurozium schreberi

Environmental Variables

Moisture Regime: Subhydric (moderately wet) (1)

Nutrient Regime: Oligotrophic (very poor) (1)

Elevation (range): 300 (300-300) M

Slope (%):

Aspect:

Topographic Position:Depression (1)

Soil Variables

Soil Drainage: Poorly drained (1)

Soil Subgroup: FIBRIC ORGANIC CRYOSOL (1)

Surface Texture: Fibric (1)

Effective Texture: Mesic (1)

Depth to Mottles/Gley:

Organic Thickness: 60 - 79 cm (1)

Parent Material:

Soil Type: SR-Organic (1)

Humus Form

KUE8 Sb/Labrador tea/peat moss (n=1)

(Picea mariana/Ledum groenlandicum/Sphagnum spp.)

This community type is typical if a treed bog ecological site phase. Rich fens tend to be dominated by larch, willow and golden moss, whereas, bogs are dominated by black spruce, Labrador tea and peat moss.

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: h bog (subhydric/very poor)
Ecosite Phase: h1 bog - treed

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Overstory Tree			
BLACK SPRUCE *(Picea mariana)*	29.0	29.0-29.0	100
Understory Tree			
BLACK SPRUCE *(Picea mariana)*	42.0	42.0-42.0	100
Tall Shrub (2 to 5m)			
BLACK SPRUCE *(Picea mariana)*	29.0	29.0-29.0	100
Medium Shrub (0.5 to 2 m)			
COMMON LABRADOR TEA *(Ledum groenlandicum)*	42.0	42.0-42.0	100
LEATHERLEAF *(Chamaedaphne calyculata)*	8.0	8.0-8.0	100
BOG CRANBERRY *(Vaccinium vitis-idaea)*	8.0	8.0-8.0	100
Low Shrub (< 0.5m)			
CLOUDBERRY *(Rubus chamaemorus)*	29.0	29.0-29.0	100
Moss			
N/A *(Sphagnum nemoreum)*	42.0	42.0-42.0	100
PEAT MOSS *(Sphagnum angustifolium)*	42.0	42.0-42.0	100
SCHREBER'S MOSS *(Pleurozium schreberi)*	18.0	18.0-18.0	100

Environmental Variables

Ecological Status Score: 25

Moisture Regime: Subhydric (moderately wet) (1)

Nutrient Regime: Oligotrophic (very poor) (1)

Elevation (range): 300 (300-300) M

Slope (%):

Aspect:

Topographic Position: Depression (1)

Soil Variables

Soil Drainage: Poorly drained (1)

Soil Subgroup: FIBRIC ORGANIC CRYOSOL (1)

Surface Texture: Fibric (1)

Effective Texture: Mesic (1)

Depth to Mottles/Gley:

Organic Thickness: 60 - 79 cm (1)

Parent Material:

Soil Type: SR-Organic (1)

Humus Form

h2 bog - shrubby (n=2)

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: h bog (subhydric/very poor)

Characteristic Species

Tree

[15.0]BLACK SPRUCE
Picea mariana

Shrub

[40.0]LEATHERLEAF
Chamaedaphne calyculata

[35.5]COMMON LABRADOR TEA
Ledum groenlandicum

[10.0]NORTHERN LAUREL*
Kalmia polifolia

[7.5]BOG CRANBERRY
Vaccinium vitis-idaea

[5.0]SMALL BOG CRANBERRY*
Oxycoccus microcarpus

[2.0]CLOUDBERRY
Rubus chamaemorus

Forb

[4.0]THREE-LEAVED SOLOMON'S-SEAL
Smilacina trifolia

Lichen

[12.5]REINDEER LICHEN
Cladina mitis

Moss and Liverwort

[65.0]RUSTY PEAT MOSS
Sphagnum fuscum

[17.5]MIDWAY PEAT MOSS
Sphagnum magellanicum

[5.0]N/A
Sphagnum nemoreum

[2.0]TUFTED MOSS
Aulacomnium palustre

Graminoid

[4.0]SHEATHED COTTON GRASS
Eriophorum vaginatum

[3.0]WATER SEDGE
Carex aquatilis

Environmental Variables

Moisture Regime: Subhydric (moderately wet) (2)

Nutrient Regime: Submesotrophic (poor) (2)

Elevation (range): 235 (230-240) M

Slope (%): very gentle slope (1), level (1)

Aspect: Northerly (1), Level (1)

Topographic Position:Lower Slope (1), Depression (1)

Soil Variables

Soil Drainage: Very poorly drained (2)

Soil Subgroup: TYPIC FIBRISOL (1), REGO GLEYSOL (1)

Surface Texture: Fibric (1)

Effective Texture: Sand (1)

Depth to Mottles/Gley:

Organic Thickness: 26 - 39 cm (1)

Parent Material: Undifferentiated Organic (2), Glaciofluvial (1)

Soil Type: SWp-Wet/Peaty (1), SR-Organic (1)

Humus Form

KUB2 Labrador tea/Peat moss (Sb) (n=2)

(Ledum groelandicum/Sphagnum spp (Picea mariana))

This plant community represents an early seral community of the treed bog ecosite phase. The bog ecosite commonly has organic soils consisting of slowly decomposing peat moss. In the absence of disturbance this community type will become dominated by black spruce. The soils for one plot in this community type was described as peaty phase of a Rego Gleysol as the soil was described at the outer edge of the bog.

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: h bog (subhydric/very poor)
Ecosite Phase: h2 bog - shrubby

Plant Composition	Canopy Cover (%)		
	Mean	**Range**	**Const.**
Understory Tree			
BLACK SPRUCE *(Picea mariana)*	1.0	0.0-2.0	50
Tall Shrub (2 to 5m)			
BLACK SPRUCE *(Picea mariana)*	5.0	5.0-5.0	100
Medium Shrub (0.5 to 2 m)			
LEATHERLEAF *(Chamaedaphne calyculata)*	40.0	10.0-70.0	100
COMMON LABRADOR TEA *(Ledum groenlandicum)*	35.5	1.0-70.0	100
BLACK SPRUCE *(Picea mariana)*	15.0	10.0-20.0	100
NORTHERN LAUREL *(Kalmia polifolia)*	10.0	0.0-20.0	50
BOG CRANBERRY *(Vaccinium vitis-idaea)*	7.5	0.0-15.0	50
SMALL BOG CRANBERRY *(Oxycoccus microcarpus)*	5.0	5.0-5.0	100
WHITE BIRCH *(Betula papyrifera)*	1.5	0.0-3.0	50
Low Shrub (< 0.5m)			
CLOUDBERRY *(Rubus chamaemorus)*	2.0	2.0-2.0	100
Low Forb (< 30 cm)			
THREE-LEAVED SOLOMON'S-SEAL *(Smilacina trifolia)*	4.0	3.0-5.0	100
Graminoid			
SHEATHED COTTON GRASS *(Eriophorum vaginatum)*	4.0	0.0-8.0	50
WATER SEDGE *(Carex aquatilis)*	3.0	3.0-3.0	100
Moss			
RUSTY PEAT MOSS *(Sphagnum fuscum)*	65.0	60.0-70.0	100
MIDWAY PEAT MOSS *(Sphagnum magellanicum)*	17.5	0.0-35.0	50
N/A *(Sphagnum nemoreum)*	5.0	0.0-10.0	50
TUFTED MOSS *(Aulacomnium palustre)*	2.0	1.0-3.0	100
JUNIPER HAIR-CAP *(Polytrichum juniperinum)*	1.0	0.0-2.0	50
Lichen			
REINDEER LICHEN *(Cladina mitis)*	12.5	0.0-25.0	50

Environmental Variables

Ecological Status Score: 25

Moisture Regime: Subhydric (moderately wet) (2)

Nutrient Regime: Submesotrophic (poor) (2)

Elevation (range): 235 (230-240) M

Slope (%): 0 - 0.49 (1), 2.5 - 5.99 (1)

Aspect: Level (1), Northerly (1)

Topographic Position: Lower Slope (1), Depression (1)

Soil Variables

Soil Drainage: Very poorly drained (2)

Soil Subgroup: TYPIC FIBRISOL (1), REGO GLEYSOL (1)

Surface Texture: Fibric (1)

Effective Texture: Sand (1)

Depth to Mottles/Gley:

Organic Thickness: 26 - 39 cm (1)

Parent Material: Undifferentiated Organic (2), Glaciofluvial (1)

Soil Type: SWp-Wet/Peaty (1), SR-Organic (1)

Humus Form

h3 bog -graminoid (n=0)

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: h bog (subhydric/very poor)

General Description

This ecological site phase currently has no data and graminoid bogs have not been described in the Boreal Natural Region. This ecological site phase was created for photo interpretation of vegetation for Alberta Vegetation Inventory (AVI) and Primary Land Vegetation Inventory (PLVI) if the interpreters call for a mapcode of 9B (Hydric/very poor). If interpreted in the various vegetation land cover inventories it will provide a spatial location in which to sample.

Environmental Variables

Moisture Regime:

Nutrient Regime:

Elevation (range):

Slope (%):

Aspect:

Topographic Position:

Characteristic Species

Soil Variables

Soil Drainage:

Soil Subgroup:

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness:

Parent Material:

Soil Type:

Humus Form

i poor fen (subhydric/medium) (n=3)

Natural Subregion: Kazan Uplands

Ecosection: KU Kazan Uplands

General Description

The poor fen ecosite is intermediate in nutrient regime between the bog (h) and the rich fen (j) ecosites and as such has species characteristic of both. Drainage is poor to very poor, however, there is some movement of water through the substratum. This ecosite occupies level and depressional areas where impeded drainage or high water tables enhance the accumulation of organic matter. This organic matter consists of a combination of bog-type organic matter (peat moss) and rich fen-type organic matter (sedges, golden moss, tufted moss, and brown moss). Both the black spruce and/or tamarack that dominate a sparse canopy on the treed phase (i1) of the poor fen ecosite are stunted and generally considered unmerchantable. A number of saline influenced plant community types were described here (KUA4, KUA5). In the Northern Mixedwood subregion a saline lowland ecological site was described, but the saline ecological sites in the Kazan Uplands are presently not adequately described that warrants a new ecological site.

Successional Relationships

Succession within this ecosite occurs over periods of hundreds to thousands of years. Recovery from disturbance is extremely slow. Changing hydrologic regimes that can result from disturbance influence the direction and rate of succession. These systems depend on water flow through them, impeding this flow can result in reduction or elimination of tree cover and changes in the shrub, forb and grass layers (Beckingham and Archibald 1996).

Indicator Species

Tree

BLACK SPRUCE
Picea mariana

TAMARACK
Larix laricina

Shrub

COMMON LABRADOR TEA
Ledum groenlandicum

MYRTLE-LEAVED WILLOW
Salix myrtillifolia

RIVER ALDER
Alnus tenuifolia

Forb

SALINE SHOOTING STAR
Dodecatheon pulchellum

SEASIDE ARROW-GRASS
Triglochin maritima

Moss and Liverwort

BROWN MOSS
Drepanocladus exannulatus

GOLDEN MOSS
Tomenthypnum nitens

Environmental Variables

Moisture Regime: Hygric (moist) (1), Subhygric (moderately moist) (1)

Nutrient Regime: Mesotrophic (medium) (1), Submesotrophic (poor) (1)

Elevation (range): 230 (205-250) M

Slope (%): level (3)

Aspect: Level (2)

Topographic Position:Depression (2), Lower Slope (1)

Soil Variables

Soil Drainage: Poorly drained (2), Imperfectly drained (0)

Soil Subgroup: TERRIC FIBRISOL (1)

Surface Texture: Fibric (1)

Effective Texture: Fibric (1)

Depth to Mottles/Gley:

Organic Thickness: >= 80 cm (1)

Parent Material: Lacustrine (1), Undifferentiated Organic (1), Glaciolacustrine (0)

Soil Type: SR-Organic (1)

Humus Form

i1 poor fen - treed (n=1)

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: i poor fen (subhydric/medium)

Characteristic Species

Tree

[53.0]BLACK SPRUCE*
Picea mariana

[18.0]TAMARACK*
Larix laricina

Shrub

[30.0]COMMON LABRADOR TEA*
Ledum groenlandicum

[6.0]MYRTLE-LEAVED WILLOW*
Salix myrtillifolia

[6.0]RIVER ALDER*
Alnus tenuifolia

[3.0]BEAKED WILLOW
Salix bebbiana

[3.0]BOG CRANBERRY
Vaccinium vitis-idaea

[2.0]BEAKED WILLOW
Salix bebbiana

Forb

[2.0]SWAMP HORSETAIL
Equisetum fluviatile

[1.0]COMMON HORSETAIL
Equisetum arvense

Moss and Liverwort

[15.0]GOLDEN MOSS*
Tomenthypnum nitens

Graminoid

[2.0]BLUEJOINT
Calamagrostis canadensis

Environmental Variables

Moisture Regime: Hygric (moist) (1)

Nutrient Regime: Submesotrophic (poor) (1)

Elevation (range): 205 (205-205) M

Slope (%): level (1)

Aspect: Level (1)

Topographic Position:Lower Slope (1)

Soil Variables

Soil Drainage: Poorly drained (1)

Soil Subgroup: TERRIC FIBRISOL (1)

Surface Texture: Fibric (1)

Effective Texture: Fibric (1)

Depth to Mottles/Gley:

Organic Thickness: >= 80 cm (1)

Parent Material: Undifferentiated Organic (1), Lacustrine (1)

Soil Type: SR-Organic (1)

Humus Form

KUE9 Sb-Lt/Labrador tea/Golden moss (n=1)

(Picea mariana-Larix laricina/Ledum groenlandicum/Tomenthypnum nitens)

This community type is transitional between the rich fen and the bog ecological sites. Rich fens tend to be dominated by larch, willow and golden moss, whereas, bogs are dominated by black spruce, Labrador tea and peat moss.

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: i poor fen (subhydric/medium)
Ecosite Phase: i1 poor fen - treed

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Overstory Tree			
BLACK SPRUCE *(Picea mariana)*	30.0	30.0-30.0	100
TAMARACK *(Larix laricina)*	10.0	10.0-10.0	100
Understory Tree			
BLACK SPRUCE *(Picea mariana)*	15.0	15.0-15.0	100
TAMARACK *(Larix laricina)*	5.0	5.0-5.0	100
Tall Shrub (2 to 5m)			
RIVER ALDER *(Alnus tenuifolia)*	6.0	6.0-6.0	100
BLACK SPRUCE *(Picea mariana)*	5.0	5.0-5.0	100
BEAKED WILLOW *(Salix bebbiana)*	3.0	3.0-3.0	100
Medium Shrub (0.5 to 2 m)			
COMMON LABRADOR TEA *(Ledum groenlandicum)*	30.0	30.0-30.0	100
MYRTLE-LEAVED WILLOW *(Salix myrtillifolia)*	6.0	6.0-6.0	100
RIVER ALDER *(Alnus tenuifolia)*	5.0	5.0-5.0	100
TAMARACK *(Larix laricina)*	3.0	3.0-3.0	100
BLACK SPRUCE *(Picea mariana)*	3.0	3.0-3.0	100
BOG CRANBERRY *(Vaccinium vitis-idaea)*	3.0	3.0-3.0	100
BEAKED WILLOW *(Salix bebbiana)*	2.0	2.0-2.0	100
Tall Forb (>= 30 cm)			
SWAMP HORSETAIL *(Equisetum fluviatile)*	2.0	2.0-2.0	100
COMMON HORSETAIL *(Equisetum arvense)*	1.0	1.0-1.0	100
Graminoid			
BLUEJOINT *(Calamagrostis canadensis)*	2.0	2.0-2.0	100
Moss			
GOLDEN MOSS *(Tomenthypnum nitens)*	15.0	15.0-15.0	100

Environmental Variables

Ecological Status Score: 25

Moisture Regime: Hygric (moist) (1)

Nutrient Regime: Submesotrophic (poor) (1)

Elevation (range): 205 (205-205) M

Slope (%): 0 - 0.49 (1)

Aspect: Level (1)

Topographic Position: Lower Slope (1)

Soil Variables

Soil Drainage: Poorly drained (1)

Soil Subgroup: TERRIC FIBRISOL (1)

Surface Texture: Fibric (1)

Effective Texture: Fibric (1)

Depth to Mottles/Gley:

Organic Thickness: >= 80 cm (1)

Parent Material: Lacustrine (1), Undifferentiated Organic (1)

Soil Type: SR-Organic (1)

Humus Form

i2 poor fen - shrubby (n=0)

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: i poor fen (subhydric/medium)

General Description

This ecological site phase currently has no data, but is presented here because it has been described in adjacent subregions (Northern Mixedwood and Athabasca Plain).

Characteristic Species

Tree

[15.0]BLACK SPRUCE
Picea mariana

[1.0]TAMARACK
Larix laricina

Shrub

[45.0]COMMON LABRADOR TEA
Ledum groenlandicum

[5.0]LEATHERLEAF
Chamaedaphne calyculata

[1.0]CLOUDBERRY
Rubus chamaemorus

[1.0]SMALL BOG CRANBERRY
Oxycoccus microcarpus

Forb

[4.0]WOODLAND HORSETAIL
Equisetum sylvaticum

[2.0]THREE-LEAVED SOLOMON'S-SEAL
Smilacina trifolia

Lichen

[1.0]CLADINA
Cladina

Moss and Liverwort

[95.0]PEAT MOSS
Sphagnum

Graminoid

[3.0]SHEATHED COTTON GRASS
Eriophorum vaginatum

Environmental Variables

Moisture Regime:

Nutrient Regime:

Elevation (range):

Slope (%):

Aspect:

Topographic Position:

Soil Variables

Soil Drainage:

Soil Subgroup:

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness:

Parent Material:

Soil Type:

Humus Form

i3 poor fen - graminoid (n=2)

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: i poor fen (subhydric/medium)

Characteristic Species

Forb

[20.0]SALINE SHOOTING STAR*
Dodecatheon pulchellum

[2.5]SEASIDE ARROW-GRASS*
Triglochin maritima

[1.5]SEASIDE ARROW-GRASS
Triglochin maritima

Moss and Liverwort

[27.5]BROWN MOSS*
Drepanocladus exannulatus

Graminoid

[20.0]MAT MUHLY
Muhlenbergia richardsonis

[4.0]AWNED SEDGE
Carex atherodes

[1.0]WIRE RUSH
Juncus balticus

Environmental Variables

Moisture Regime: Subhygric (moderately moist) (1), Hygric (moist) (0)

Nutrient Regime: Mesotrophic (medium) (1)

Elevation (range): 242.5 (235-250) M

Slope (%): level (2)

Aspect: Level (1)

Topographic Position:Depression (2)

Soil Variables

Soil Drainage: Poorly drained (1), Imperfectly drained (0)

Soil Subgroup:

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness:

Parent Material: Glaciolacustrine (0)

Soil Type:

Humus Form

KUA4 Shooting star/Mat muhly (saline) (n=1)

(Dodecatheon pulchellum/Muhlenbergia richardsonis)

This community type is part of a saline meadow complex described within the La Butte Creek Wildland Provincial Park (Allen et al. 2002). Site 1 which is described was slightly drier and was dominated by mat muhly, shooting star and seaside arrow grass. The other site which was slightly wetter was dominated by brown moss, awned sedge and seaside arrowgrass on the drier margins. It was felt that the mat muhly dominated community was subjected to higher levels of salt through evaporation.

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: i poor fen (subhydric/medium)
Ecosite Phase: i3 poor fen - graminoid

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Medium Shrub (0.5 to 2 m)			
HOARY WILLOW *(Salix candida)*	1.0	1.0-1.0	100
Tall Forb (>= 30 cm)			
SALINE SHOOTING STAR *(Dodecatheon pulchellum)*	40.0	40.0-40.0	100
SEASIDE ARROW-GRASS *(Triglochin maritima)*	5.0	5.0-5.0	100
HIRSUTE FLEABANE *(Erigeron lonchophyllus)*	1.0	1.0-1.0	100
Low Forb (< 30 cm)			
SEA MILKWORT *(Glaux maritima)*	1.0	1.0-1.0	100
Graminoid			
MAT MUHLY *(Muhlenbergia richardsonis)*	40.0	40.0-40.0	100
SLENDER WHEAT GRASS *(Agropyron trachycaulum)*	1.0	1.0-1.0	100

Environmental Variables

Ecological Status Score: 0

Moisture Regime: Subhygric (moderately moist) (1)

Nutrient Regime: Mesotrophic (medium) (1)

Elevation (range): 250 (250-250) M

Slope (%): 0 - 0.49 (1)

Aspect: Level (1)

Topographic Position: Depression (1)

Soil Variables

Soil Drainage: Poorly drained (1)

Soil Subgroup:

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness:

Parent Material: Glaciolacustrine (0)

Soil Type:

Humus Form

KUA5 Sedge/Brown moss (saline) (n=1)

(Carex atherodes/Drepanocladus exannulata)

This community represents the wetter portion of a saline meadow complex within the La Butte Creek Wildland Provincial Park (Allen et al. 2002). Site 1 which is slightly drier and was dominated by mat muhly, shooting star and seaside arrow grass. The other site described here was slightly wetter and was dominated by brown moss, awned sedge and seaside arrowgrass on the drier margins. Towards the areas of open water this community type integrated into wetland communities dominated by water and awned sedge.

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: i poor fen (subhydric/medium)
Ecosite Phase: i3 poor fen - graminoid

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Low Forb (< 30 cm)			
SEASIDE ARROW-GRASS *(Triglochin maritima)*	3.0	0.0-0.0	100
Graminoid			
AWNED SEDGE *(Carex atherodes)*	8.0	0.0-0.0	100
WIRE RUSH *(Juncus balticus)*	2.0	0.0-0.0	100
Moss			
BROWN MOSS *(Drepanocladus exannulatus)*	55.0	0.0-0.0	0

Environmental Variables

Ecological Status Score: 0

Moisture Regime: Hygric (moist) (0)

Nutrient Regime: Mesotrophic (medium) (0)

Elevation (range): 235 (235-235) M

Slope (%): 0 - 0.49 (1)

Aspect: Level (0)

Topographic Position: Depression (1)

Soil Variables

Soil Drainage: Imperfectly drained (0)

Soil Subgroup:

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness:

Parent Material: Glaciolacustrine (0)

Soil Type:

Humus Form

j rich fen (subhydric/rich) (n=3)

Natural Subregion: Kazan Uplands

Ecosection: KU Kazan Uplands

General Description

The rich fen ecosite is characterized by flowing water and alkaline nutrient-rich conditions. The soil is composed of organic matter derived from decomposing sedges, as well as golden, tufted, and brown mosses. This ecosite occupies level and depressional areas where the water table is at or near the surface for a portion of the growing season. Tamarack dominates the canopy on the treed phase while dwarf birch or willow form the canopy of the shrubby phase, and sedges dominate the graminoid phase of the rich fen ecosite. A number of sites within this ecological site were described with mineral soils. According to the Alberta Wetland Classification system (2015) mineral soils can only be swamps or marshes, however because of the species composition and moisture regime these willow and sedge dominated communities within this classification were placed within the rich fen ecological site.

Environmental Variables

Moisture Regime: Hydric (wet) (1), Subhydric (moderately wet) (1), Subhygric (moderately moist) (1)

Nutrient Regime: Permesotrophic (rich) (2), Mesotrophic (medium) (1)

Elevation (range): 264.5 (229-300) M

Slope (%): level (2), nearly level (1)

Aspect: Level (2)

Topographic Position:Level (2), Depression (1)

Soil Variables

Soil Drainage: Very poorly drained (2), Poorly drained (1)

Soil Subgroup: REGO GLEYSOL (1), REGO HUMIC GLEYSOL (1), TERRIC MESISOL (1)

Surface Texture: Mesic (1), Sand (1), Silt (1)

Effective Texture: Loam (1), Sandy clay (1), Silt (1)

Depth to Mottles/Gley: 26 - 50 (1)

Organic Thickness: 0 - 5 cm (2), 26 - 39 cm (1)

Parent Material: Fluvial (2), Lacustrine (1), Rock (1), Undifferentiated Organic (1)

Soil Type: SM3-Moist/Silty-Loamy (1), SWm-Wet/Mineral (1), SWp-Wet/Peaty (1)

Humus Form

Successional Relationships

The rich fen is an early stage in hydrarch succession. Species composition, and direction and rate of succession changes with the changing hydrologic regime. As with other wetlands, rich fens have slow successional rates, so recovery from disturbance may also be slow.

Indicator Species

Shrub

FLAT-LEAVED WILLOW
Salix planifolia

BALSAM WILLOW
Salix pyrifolia

Moss and Liverwort

BROWN MOSS
Drepanocladus aduncus

Graminoid

BLUEJOINT
Calamagrostis canadensis

SMALL BOTTLE SEDGE
Carex utriculata

j1 rich fen - treed (n=0)

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: j rich fen (subhydric/rich)

General Description

This ecological site phase currently has no data, but is presented here because it has been described in adjacent subregions (Northern Mixedwood and Athabasca Plain).

Characteristic Species

Tree

[5.0]BLACK SPRUCE
Picea mariana

[2.0]TAMARACK
Larix laricina

Shrub

[25.0]RIVER ALDER
Alnus tenuifolia

[5.0]DWARF BIRCH
Betula pumila

[1.0]BOG WILLOW
Salix pedicellaris

Forb

[2.0]THREE-LEAVED SOLOMON'S-SEAL
Smilacina trifolia

Moss and Liverwort

[50.0]PEAT MOSS
Sphagnum

[20.0]GOLDEN MOSS
Tomenthypnum nitens

Graminoid

[15.0]WATER SEDGE
Carex aquatilis

Environmental Variables

Moisture Regime:

Nutrient Regime:

Elevation (range):

Slope (%):

Aspect:

Topographic Position:

Soil Variables

Soil Drainage:

Soil Subgroup:

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness:

Parent Material:

Soil Type:

Humus Form

j2 rich fen - shrubby (n=3)

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: j rich fen (subhydric/rich)

Characteristic Species

Tree

[5.0]WHITE BIRCH
Betula papyrifera

[3.3]ASPEN
Populus tremuloides

Shrub

[30.0]BALSAM WILLOW*
Salix pyrifolia

[21.6]FLAT-LEAVED WILLOW
Salix planifolia

[10.0]FLAT-LEAVED WILLOW*
Salix planifolia

[1.6]SMOOTH WILLOW
Salix glauca

[1.6]SMOOTH WILLOW
Salix glauca

Moss and Liverwort

[16.6]BROWN MOSS*
Drepanocladus aduncus

Graminoid

[46.6]BLUEJOINT*
Calamagrostis canadensis

[16.6]SMALL BOTTLE SEDGE*
Carex utriculata

Environmental Variables

Moisture Regime: Subhydric (moderately wet) (1), Subhygric (moderately moist) (1), Hydric (wet) (1)

Nutrient Regime: Permesotrophic (rich) (2), Mesotrophic (medium) (1)

Elevation (range): 264.5 (229-300) M

Slope (%): level (2), nearly level (1)

Aspect: Level (2)

Topographic Position:Level (2), Depression (1)

Soil Variables

Soil Drainage: Very poorly drained (2), Poorly drained (1)

Soil Subgroup: REGO GLEYSOL (1), REGO HUMIC GLEYSOL (1), TERRIC MESISOL (1)

Surface Texture: Sand (1), Mesic (1), Silt (1)

Effective Texture: Silt (1), Sandy clay (1), Loam (1)

Depth to Mottles/Gley: 26 - 50 (1)

Organic Thickness: 0 - 5 cm (2), 26 - 39 cm (1)

Parent Material: Fluvial (2), Undifferentiated Organic (1), Rock (1), Lacustrine (1)

Soil Type: SM3-Moist/Silty-Loamy (1), SWm-Wet/Mineral (1), SWp-Wet/Peaty (1)

Humus Form

KUB3 Willow/Marsh reed grass (n=1)

(Salix spp/Calamagrostis canadensis)

This plant community is found along the edges of marsh reed grass and sedge fen meadows and in moist depressions. Willow will invade onto these graminoid fens to form the Willow/Marsh reed grass community type. Increased flooding and prolonged waterlogging may result in the disappearance of willow and a transition to a graminoid fen.

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: j rich fen (subhydric/rich)
Ecosite Phase: j2 rich fen - shrubby

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Understory Tree			
SMOOTH WILLOW *(Salix glauca)*	5.0	5.0-5.0	100
Medium Shrub (0.5 to 2 m)			
SMOOTH WILLOW *(Salix glauca)*	5.0	5.0-5.0	100
Tall Forb (>= 30 cm)			
COMMON FIREWEED *(Epilobium angustifolium)*	1.0	1.0-1.0	100
Graminoid			
BLUEJOINT *(Calamagrostis canadensis)*	95.0	95.0-95.0	100

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Subhygric (moderately moist) (1)

Nutrient Regime: Permesotrophic (rich) (1)

Elevation (range): 0 (0-0) M

Slope (%): 0 - 0.49 (1)

Aspect: Level (0)

Topographic Position: Level (1)

Soil Variables

Soil Drainage: Poorly drained (1)

Soil Subgroup: REGO HUMIC GLEYSOL (1)

Surface Texture: Silt (1)

Effective Texture: Silt (1)

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (1)

Parent Material: Fluvial (1)

Soil Type: SM3-Moist/Silty-Loamy (1)

Humus Form

KUB4 Willow/Sedge (n=1)

(Salix planifolia/Carex utriculata)

This community type is found along the edges of sedge fens (meadows) and in moist depressions. Willow becomes established at the edges of the sedge fens due to the shorter duration of standing water. Increased flooding and prolonged water-logging may result in the disappearance of willow and a transition to a sedge fen.

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: j rich fen (subhydric/rich)
Ecosite Phase: j2 rich fen - shrubby

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Tall Shrub (2 to 5m)			
FLAT-LEAVED WILLOW *(Salix planifolia)*	30.0	30.0-30.0	100
Medium Shrub (0.5 to 2 m)			
FLAT-LEAVED WILLOW *(Salix planifolia)*	65.0	65.0-65.0	100
BASKET WILLOW *(Salix petiolaris)*	2.0	2.0-2.0	100
Graminoid			
SMALL BOTTLE SEDGE *(Carex utriculata)*	50.0	50.0-50.0	100
BLUEJOINT *(Calamagrostis canadensis)*	40.0	40.0-40.0	100

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Hydric (wet) (1)

Nutrient Regime: Permesotrophic (rich) (1)

Elevation (range): 229 (229-229) M

Slope (%): 0 - 0.49 (1)

Aspect: Level (1)

Topographic Position: Level (1)

Soil Variables

Soil Drainage: Very poorly drained (1)

Soil Subgroup: REGO GLEYSOL (1)

Surface Texture: Sand (1)

Effective Texture: Sandy clay (1)

Depth to Mottles/Gley: 26 - 50 (1)

Organic Thickness: 0 - 5 cm (1)

Parent Material: Fluvial (1)

Soil Type: SWm-Wet/Mineral (1)

Humus Form

KUC8 Willow/Brown moss/ Aw(Bw) (n=1)

(Salix pyrifolia/Drepananocladus aduncus)

This community type is found along the edges of sedge fens (meadows) and in moist depressions. Willow becomes established at the edges of the sedge fens due to the shorter duration of standing water. Increased flooding and prolonged water-logging may result in the disappearance of willow and a transition to a sedge fen. If the water table continues to decline the site will eventually become dominated by Aspen and birch.

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: j rich fen (subhydric/rich)
Ecosite Phase: j2 rich fen - shrubby

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Overstory Tree			
ASPEN *(Populus tremuloides)*	10.0	10.0-10.0	100
Understory Tree			
WHITE BIRCH *(Betula papyrifera)*	15.0	15.0-15.0	100
BALSAM WILLOW *(Salix pyrifolia)*	1.0	1.0-1.0	100
Tall Shrub (2 to 5m)			
BALSAM WILLOW *(Salix pyrifolia)*	90.0	90.0-90.0	100
WHITE SPRUCE *(Picea glauca)*	1.0	1.0-1.0	100
Medium Shrub (0.5 to 2 m)			
JACK PINE *(Pinus banksiana)*	1.0	1.0-1.0	100
PRICKLY ROSE *(Rosa acicularis)*	1.0	1.0-1.0	100
Low Shrub (< 0.5m)			
DEWBERRY *(Rubus pubescens)*	1.0	1.0-1.0	100
Graminoid			
BLUEJOINT *(Calamagrostis canadensis)*	5.0	5.0-5.0	100
INLAND SEDGE *(Carex interior)*	3.0	3.0-3.0	100
GRACEFUL MANNA GRASS *(Glyceria pulchella)*	2.0	2.0-2.0	100
WATER SEDGE *(Carex aquatilis)*	1.0	1.0-1.0	100
Moss			
BROWN MOSS *(Drepanocladus aduncus)*	50.0	50.0-50.0	100
TUFTED MOSS *(Aulacomnium palustre)*	2.0	2.0-2.0	100
JUNIPER HAIR-CAP *(Polytrichum juniperinum)*	2.0	2.0-2.0	100
SQUARROSE PEAT MOSS *(Sphagnum squarrosum)*	2.0	2.0-2.0	100

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Subhydric (moderately wet) (1)

Nutrient Regime: Mesotrophic (medium) (1)

Elevation (range): 300 (300-300) M

Slope (%): 0.5 - 2.49 (1)

Aspect: Level (1)

Topographic Position: Depression (1)

Soil Variables

Soil Drainage: Very poorly drained (1)

Soil Subgroup: TERRIC MESISOL (1)

Surface Texture: Mesic (1)

Effective Texture: Loam (1)

Depth to Mottles/Gley:

Organic Thickness: 26 - 39 cm (1)

Parent Material: Lacustrine (1), Undifferentiated Organic (1), Rock (1)

Soil Type: SWp-Wet/Peaty (1)

Humus Form

j3 rich fen - graminoid (n=0)

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: j rich fen (subhydric/rich)

General Description

This ecological site phase currently has no data, but is presented here because it has been described in adjacent subregions (Northern Mixedwood and Athabasca Plain).

Characteristic Species

Shrub

[4.0]BOG WILLOW
Salix pedicellaris

[1.0]DWARF BIRCH
Betula pumila

Forb

[3.0]ARROW-LEAVED COLTSFOOT
Petasites sagittatus

[1.0]SWAMP HORSETAIL
Equisetum fluviatile

[1.0]MARSH CINQUEFOIL
Potentilla palustris

Graminoid

[25.0]SMALL BOTTLE SEDGE
Carex utriculata

Environmental Variables

Moisture Regime:

Nutrient Regime:

Elevation (range):

Slope (%):

Aspect:

Topographic Position:

Soil Variables

Soil Drainage:

Soil Subgroup:

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness:

Parent Material:

Soil Type:

Humus Form

k marsh (hydric/rich) (n=3)

Natural Subregion: Kazan Uplands

Ecosection: KU Kazan Uplands

General Description

Marshes can be locally extensive in sheltered lake bays or along creek channels and are dominated by water and small bottle sedge, bulrushes and in deeper water pondweeds (Natural Regions Committee 2006). All the information for this ecological site is copied from the Central Mixedwood (marsh (l)) (Beckingham and Archibald 1996).

The marsh ecosite is found in level and depressional areas and around the shorelines of water bodies and riparian zones. The water is above the rooting zone for at least a portion of the growing season. These ecosites are dominated by a high diversity of emergent sedges and rushes.

Environmental Variables

Moisture Regime: Hydric (wet) (3)

Nutrient Regime: Eutrophic (very rich) (3)

Elevation (range): 231.33 (200-284) M

Slope (%): level (3)

Aspect: Level (2)

Topographic Position:Depression (3)

Soil Variables

Soil Drainage: Very poorly drained (3)

Soil Subgroup:

Surface Texture:

Effective Texture: Undifferentiated Organic (0)

Depth to Mottles/Gley:

Organic Thickness:

Parent Material: Water (0)

Soil Type: SWm-Wet/Mineral

Humus Form

Successional Relationships

The marsh ecosite is near the beginning stages of hydrarch succession. The marsh ecosite can be thought of as successionally stable, but overtime will evolve into bogs and fens through the processes of terrestrialization (filling of shallow lakes) and palludification (blanketing of terrestrial ecosystems by overgrowth of wetland vegetation) (http://www.aquatic.uoguelph.ca/wetlands/chapter2/bogpage2.htm) both processes caused by accumulating organic matter.

Indicator Species

Forb

NORTHERN QUILLWORT
Isoetes echinospora

WATER ARUM
Calla palustris

WATER PARSNIP
Sium suave

Graminoid

NORTHERN MANNA GRASS
Glyceria borealis

k1 marsh (n=3)

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: k marsh (hydric/rich)

Characteristic Species

Forb

[31.6]WATER ARUM*
Calla palustris

[6.6]NORTHERN QUILLWORT*
Isoetes echinospora

[3.6]WATER PARSNIP*
Sium suave

[3.3]NARROW-LEAVED BUR-REED
Sparganium angustifolium

[1.6]ARUM-LEAVED ARROWHEAD
Sagittaria cuneata

Graminoid

[30.0]NORTHERN MANNA GRASS*
Glyceria borealis

[1.6]CYPERUS-LIKE SEDGE
Carex pseudo-cyperus

Environmental Variables

Moisture Regime: Hydric (wet) (3)

Nutrient Regime: Eutrophic (very rich) (3)

Elevation (range): 231.33 (200-284) M

Slope (%): level (3)

Aspect: Level (2)

Topographic Position:Depression (3)

Soil Variables

Soil Drainage: Very poorly drained (3)

Soil Subgroup:

Surface Texture:

Effective Texture: Undifferentiated Organic (0)

Depth to Mottles/Gley:

Organic Thickness:

Parent Material: Water (0)

Soil Type:

Humus Form

KUA6 Water parsnip/Northern manna grass (n=1)

(Sium suave/Glyceria borealis)

This community was described in 2 m wide widths along stretches of the La Butte Creek in the La Butte Wildland Provincial Park (Allen et al. 2002). This community represents a floating-leaved aquatic community. The center of the creek was occupied by submerged vegetation usually dominated by clasping-leaf pondweed. Moving towards shore this community occupied the next zone of vegetation, followed by a band of emergent creeping spike-rush along the shoreline.

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: k marsh (hydric/rich)
Ecosite Phase: k1 marsh

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Tall Forb (>= 30 cm)			
WATER PARSNIP *(Sium suave)*	10.0	10.0-10.0	100
NARROW-LEAVED BUR-REED *(Sparganium angustifolium)*	10.0	10.0-10.0	100
ALPINE PONDWEED *(Potamogeton alpinus)*	1.0	1.0-1.0	100
VARIOUS-LEAVED PONDWEED *(Potamogeton gramineus)*	1.0	1.0-1.0	100
CLASPING-LEAF PONDWEED *(Potamogeton richardsonii)*	1.0	1.0-1.0	100
ARUM-LEAVED ARROWHEAD *(Sagittaria cuneata)*	1.0	1.0-1.0	100
Graminoid			
NORTHERN MANNA GRASS *(Glyceria borealis)*	90.0	90.0-90.0	100
Moss			
N/A *(Fontinalis hypnoides)*	1.0	1.0-1.0	100

Environmental Variables

Ecological Status Score: 0

Moisture Regime: Hydric (wet) (1)

Nutrient Regime: Eutrophic (very rich) (1)

Elevation (range): 210 (210-210) M

Slope (%): 0 - 0.49 (1)

Aspect: Level (1)

Topographic Position: Depression (1)

Soil Variables

Soil Drainage: Very poorly drained (1)

Soil Subgroup:

Surface Texture:

Effective Texture: Undifferentiated Organic (0)

Depth to Mottles/Gley:

Organic Thickness:

Parent Material: Water (0)

Soil Type:

Humus Form

KUA7 Northern quillwort (n=1)

(Isoetes echinospora)

This community type was described along La Butte(Allen et al. 2003). This community was found in a band close to the shoreline on a sandy substrate in water 0-30 cm deep. It was also noted that the consistency of the water depth for this community type was striking and suggests that this community type inhabits sands in shallow water around the entire lake. Other aquatic species noted in this community type include water milfoil and pondweeds.

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: k marsh (hydric/rich)
Ecosite Phase: k1 marsh

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Medium Shrub (0.5 to 2 m)			
SWEET GALE *(Myrica gale)*	1.0	1.0-1.0	100
Tall Forb (>= 30 cm)			
NORTHERN QUILLWORT *(Isoetes echinospora)*	20.0	20.0-20.0	100
ARUM-LEAVED ARROWHEAD *(Sagittaria cuneata)*	4.0	4.0-4.0	100
UNDIFFERENTIATED PONDWEED *(Potamogeton)*	1.0	1.0-1.0	100
LARGE-LEAVED WHITE WATER CROWFOOT *(Ranunculus aquatilis)*	1.0	1.0-1.0	100

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Hydric (wet) (1)

Nutrient Regime: Eutrophic (very rich) (1)

Elevation (range): 284 (284-284) M

Slope (%): 0 - 0.49 (1)

Aspect: Level (0)

Topographic Position: Depression (1)

Soil Variables

Soil Drainage: Very poorly drained (1)

Soil Subgroup:

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness:

Parent Material: Water (0)

Soil Type:

Humus Form

KUA8 Water arum/Sedge (n=1)

(Calla palustris/Carex pseudocyperus)

This community type was described around the open pools of water in an old meander channel along La Butte Creek near the Slave River in La Butte Creek Wildland Provincial Park (Allen et al. 2002). This community type was best expressed where the water table was about 1m deep. It was noted that open water covered about 50% of the plot.

Natural Subregion: Kazan Uplands
Ecosection: KU Kazan Uplands

Ecosite: k marsh (hydric/rich)
Ecosite Phase: k1 marsh

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Tall Forb (>= 30 cm)			
NARROW-LEAVED WATER-HEMLOCK *(Cicuta virosa)*	2.0	2.0-2.0	100
NODDING BEGGARTICKS *(Bidens cernua)*	1.0	1.0-1.0	100
TUFTED LOOSESTRIFE *(Lysimachia thyrsiflora)*	1.0	1.0-1.0	100
MARSH CINQUEFOIL *(Potentilla palustris)*	1.0	1.0-1.0	100
MARSH SKULLCAP *(Scutellaria galericulata)*	1.0	1.0-1.0	100
WATER PARSNIP *(Sium suave)*	1.0	1.0-1.0	100
Low Forb (< 30 cm)			
WATER ARUM *(Calla palustris)*	95.0	95.0-95.0	100
SWEET-SCENTED BEDSTRAW *(Galium triflorum)*	1.0	1.0-1.0	100
COMMON MARE'S-TAIL *(Hippuris vulgaris)*	1.0	1.0-1.0	100
COMMON DUCKWEED *(Lemna minor)*	1.0	1.0-1.0	100
Graminoid			
CYPERUS-LIKE SEDGE *(Carex pseudo-cyperus)*	5.0	5.0-5.0	100
SMALL BOTTLE SEDGE *(Carex utriculata)*	1.0	1.0-1.0	100
Moss			
BROWN MOSS *(Drepanocladus aduncus)*	2.0	2.0-2.0	100

Environmental Variables

Ecological Status Score: 0

Moisture Regime: Hydric (wet) (1)

Nutrient Regime: Eutrophic (very rich) (1)

Elevation (range): 200 (200-200) M

Slope (%): 0 - 0.49 (1)

Aspect: Level (1)

Topographic Position: Depression (1)

Soil Variables

Soil Drainage: Very poorly drained (1)

Soil Subgroup:

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness:

Parent Material: Water (0)

Soil Type:

Humus Form

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Appendix 1. Forest Management Interpretations[1]

Forest Management Interpretations are derived from the limitations of the ecological units in the classification system. These have been developed through literature review and expert opinion from public workshops. They present the user with a general outline of limitations that together with the user's knowledge and experience should be applied in a creative manner. Some management interpretations will change dramatically with time, season of year, economic conditions, existing technology, scale of application, and program objectives (Still and Utzig 1982). Under no circumstances should the information in the dataset be construed as a formal recommendation or guideline for resource management, or as a prescription for specific sites.

Six levels were used to rate the ecosites and soil types: low (L), low to medium (L-M), low to high (L-H), medium (M), medium to high (M-H) and high (H).

Table 2. Forest management interpretations for Ecological sites in the Kazan Uplands Subregion.

ECOSITE_CODE	ECOSECTION	DROUGHT	EXCESS_MOIST	RUTTING	COMPACTION	SOIL_TEMP	COMPETITION	WINDTHROW
a	KU	H	L	NA	NA	H	L	NA
aa	KU	H	L	L	L	H	L	L
b	KU	H	L	L	L	L	L	L-M
c	KU	M-H	L	L	L	L	M	L
d	KU	L-H	L	M	M	L	L	L
e	KU	L	L	M	M	L	H	L
f	KU	L	L-M	H	H	M	H	L-M
g	KU	L	M-H	H	H	H	M	M-H
h	KU	L	H	H	L	H	L	H
I	KU	L	H	H	L	H	L	H
j	KU	L	H	H	L	H	L	H
k	KU	L	H	H	L	NA	NA	NA

The relative meaning of a limitation rating and the variables that were used in the rating process are described below. All limiting factors were rated through an assessment of the variability of important site and soil characteristics associated with each ecosite and soil type.

Drought Limitations

Droughty conditions are associated with rapidly drained soils that draw water away from the rooting zone for a significant portion of the growing season. Typically, sites that are limited by drought are associated with coarse-textured soils or are situated on steep south-facing slopes where insolation and surface runoff are high. Remedial silviculture efforts such as drought-tolerant species, using stock with small tops and large root systems, and using micro-shelter planting sites can all help alleviate the effects of drought (Strong and Carnell 1995).

Ratings are based on the moisture regime of the ecosites and soil types. A high drought limitation rating indicates severe limitations while low ratings indicate little or no limitations.

[1] Beckingham, J., I.G.W. Corns and J.H. Archibald. 1996. Field guide to ecosites of West-Central Alberta. Special report 9. Canadian Forest Service. Northwest Region. Edmonton, AB

Excess Moisture

Excess soil moisture is a concern because serious site degradation can occur if sites are not properly managed. Operating heavy equipment on wet sites can cause serious rutting, compaction and puddling damage and therefore should be avoided. Winter months are suitable for operating on wet sites as the ground is frozen and snow cover acts as a disturbance buffer.

From a silvicultural perspective, excess moisture is a concern because wet soils require more heat to raise rooting zone temperatures and rooting zone aeration is reduced by saturation.

Ratings are based on the moisture regime of the ecosites and soil types. A high excess moisture rating indicates severe limitations while low ratings indicate little or no limitations.

Soil Rutting and Compaction Hazard

Machine traffic most often modifies soil quality through compaction, remoulding, puddling and/or soil displacement, which in turn affects several interrelated soil physical properties. The modification that predominates depends on soil wetness, applied stress and number of passes. Soil texture may also be important, especially when soils are at moisture levels close to field capacity.

The risk of causing soil compaction or rutting by forestry operations should be evaluated before beginning operations as both risks are greatly influenced by the amount of water in the soil at the time of disturbance. Risk assessments are based on soil water content and on estimates of the time it takes a wet soil to drain.

The rating system included in this database does not replace the operational assessment but is designed as a planning tool. It can be used as part of the decision proves when evaluating whether an area has the potential for supporting operations in the summer months.

Soil modifications affect four physical processes important to an organism's health: water supply and flux, heat flux, soil strength, and gas diffusion. Simply stated, the effects of compaction and rutting are manifested in changed in water infiltration rates, soil heat flux, root penetration, and oxygen supply in the soil. All of these conditions may influence soil quality and ultimately soil productivity.

The rating system is based primarily on moisture regime and related soil drainage with soil texture considered for coarse-textured soils (less than 20% silt and clay). High risk ratings indicate that it is unlikely that summer operations would be possible, medium ratings indicate that operations may be possible in dry periods, while those with low risk ratings are good candidates for summer operations. Current moisture conditions should always be evaluated before initiating operations.

Soil Temperature Limitations

Soil temperature is an important characteristic as it relates to seedling growth and survival. In cold soils, the rate of root development and the ability of plants to uptake water is considerably less than in warm soils. Thus seedlings planted in cold soils are disadvantaged during the critical establishment period. Areas where cold soils are prevalent include depressions, north-facing slopes (300 to 60 degree aspect) greater than 30%, sites located at the base of major slopes and in valleys. Opportunities exist to increase soil temperatures to more than favourable levels using various site preparation methods that create raised microsites and/or exposed mineral soils. Educating tree planters to plant in idealized microsite locations will also help increase the survival rates of seedlings situated in areas where cold soils exist.

Ratings were based on moisture regime, topographic position and surface texture of the ecosites and soil types and on the assumption that organic layers are disturbed during operations. Increase the rating by one level (e.g., medium to high) if organic layers are not disturbed.

Vegetation Competition

Assessing the degree of vegetation competition associated with each ecosite is important as it relates to forestry planning and operations such as choosing an appropriate planting stock, site preparation methods and projected management costs. Research and experience has shown that competition is related to the height and percent cover of shrubs, forbs and grasses and whether a seedling is overtopped by a competitor. Some of the more competitive species include shrubs such as green alder, river alder, willow and bracted

honeysuckle, tall prolific forbs such as fireweed and wild sarsaparilla and grasses such as hairy wild rye and most particularly marsh reed grass.

Ratings were based on the moisture regime, nutrient regime, and surface texture of the ecosites and on the assumption that organic layers are disturbed during operations. In general, high ratings were assigned to those ecosites that are moist and rich. Low ratings were assigned to ecosites that are very dry, rapidly drained and/or nutrient poor where dense understorey vegetation is uncommon.

Windthrow Hazard

Several environmental and man-made factors, not particular to an ecosite or soil type, influence the susceptibility of a site to windthrow hazard. These factors include exposure, cutblock layout and topography and should always be considered when assessing the windthrow hazard of a particular site. Shallow root systems evident on sites with thick organic layers or high water tables increases the chance of windthrow while coarse-textured soils can reduce the ability of a root system to anchor trees firmly.

Windthrow hazard ratings for ecosites and soil types were based on organic thickness, presence of water table, tree rooting habit and effective soil texture.

Soil Erosion Hazard (see soil type descriptions)

Soil types were rated for surface water erosion hazard. Infiltration capacity and structural stability are regarded as the most important factors in controlling water erosion; therefore, they were central to the evaluation. Numerous soil and site variable affect infiltration capacity and structural stability including the extent and type of vegetation cover, the thickness of the LFH layer, the type of humus form, texture of the surface and C horizons, degree of carbonate cementing, coarse fragment content, slope angle, and length of slope. Climatic factors such as rainfall intensity, duration and seasonal distribution and the rapidity of snow melt affect erosion, but are difficult to relate to a particular ecosite or soil type. Soil erosion hazard decreases as clay or sand content increase, and increases as percent silt increases. As organic matter depth and vegetation increase erosion hazard decreases.

Ratings were based on the moisture regime and surface texture of the soil types and on the assumption that organic layers are disturbed during operations. Reduce the soil hazard rating by one level (e.g. high to medium) if organic layers and/or vegetation are not disturbed.

Appendix 2. Soil Types

Soil types are taxonomic units used to group soils based on soil moisture regime, effective soil texture, organic matter thickness and solum depth. Soil types can be used independently, in association with the hierarchical classification system (ecosite, ecosite phase and plant community type) or to classify disturbed sites.

Along with moisture regime, organic matter thickness, and solum depth, effective texture is central to the soil type classification system. Effective texture for mineral soils is generally defined as the textural class of the finest-textured horizon that occurs 20 to 60 cm below the mineral soil surface and that is at least 10cm thick. The 10-cm minimum thickness stipulation avoids misclassifying soils as fine textured when they are predominantly coarse, but have thin, finer-textured depositional bands.

There are 5 major soil types defined by their soil moisture: very dry (SV) (very xeric-xeric-subxeric); dry (SD) (submesic); moist (SM) (mesic-subhygric); wet (SW) (hygric-subhydric-hydric); organic (SR); and shallow (SS). The soil types are further broken down by their texture class, for a total of 17 classes.

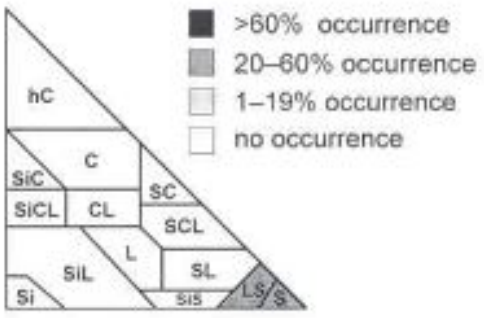
Soils are not extensively described in the Kazan Uplands subregion. Nonsoils (e.g., bedrock outcrops) occur across about half the area. Surficial deposits between bedrock outcrops are mainly coarse and acidic. Soils on these materials are predominantly eluviated Dystric Brunisols with associated Orthic, Gleyed and Lithic Subgroups, the latter on very thin deposits over bedrock. Wetlands are a complex of Typic and Fibric Mesisols, many with Terric Subgroups. Peaty Gleysols also occur.

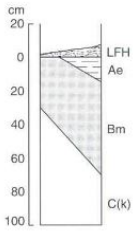
For this guide we have taken the soil type definitions from the field Ecosite guides of Northern Alberta (Beckingham and Archibald 1996) and when a soil type has not been described in the subregion we have used the soil descriptions from the adjacent Athabasca Plain and Central Mixedwood subregions. The numbers in brackets (8) indicate the number of plots representing a particular attribute.

SV1 Very Dry/Sandy (n=0)

General Description

This soil type has not been described in the Kazan Uplands subregion and this soil description is taken from 58 plots done in the Central Mixedwood (Willoughby et al. 2019). This soil type would occur on very dry coarse sandy, sandy and loamy sand soil that develop in glaciolfluvial and eolian parent materials.





Comments

This soil type is most commonly associated with ecosite a in all ecological areas of the boreal. SV1 has a poor nutrient status and a low capacity to retain water because of its coarse texture. Forest productivity on these soils tends to be low. A moderate windthrow hazard exists for shallow rooted white spruce trees.

Environmental Variables

Moisture Regime: Xeric (dry) (19), Subxeric (moderately dry) (39)

Nutrient Regime: Oligotrophic (very poor) (4), Mesotrophic (medium) (10), Submesotrophic (poor) (44)

Soil Variables

Soil Drainage: Well drained (11), Rapidly drained (45), Moderately well (2)

Soil Subgroup: ELUVIATED DYSTRIC BRUNISOL (11), ELUVIATED EUTRIC BRUNISOL (32), ORTHIC EUTRIC BRUNISOL (3), ORTHIC DYSTRIC BRUNISOL (1), ORTHIC HUMO-FERRIC PODZOL (3), ORTHIC REGOSOL (1), PODZOLIC GRAY LUVISOL (1)

Surface Texture: Loamy sand (5), Sand (51), Sandy clay loam (2)

Effective Texture: : Loamy sand (6), Sand (51), Sandy loam (1)

Depth to Mottles/Gley:None (57), 51-75 (1)

Parent Material Fluvioeolian (7), Fluvial (7), Eolian (13), Glaciofluvial (27), Colluvial (1), Lacustrine (1), Morainal (1)

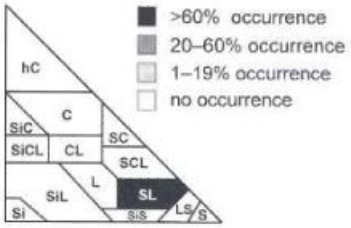
Interpretations

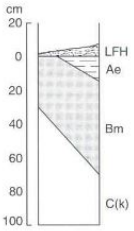
Drought Limitations	H
Excess Moisture	L
Rutting Hazard	L
Compaction Hazard	L
Puddling Hazard	L
Soil Erosion Hazard	L
Frost Heave Hazard	L
Soil Temperature Limitations	L
Windthrow Hazard	L-M

SV2 Very Dry/Coarse Loamy (n=0)

General Description

This soil type has not been described in the Kazan Uplands subregion and the soil description is taken from 2 plots done in the Athabasca Plain subregion. This soil type will occur on very dry coarse loamy materials that commonly develop in glaciofluvial parent materials.





Comments

The droughty nature of SV2 is attributed to its moderate coarse texture and rapid drainage.

Environmental Variables

Moisture Regime: Xeric (dry) (2)

Nutrient Regime: Oligotrophic (very poor) (2)

Soil Variables

Soil Drainage: Rapdily (2)

Soil Subgroup: ELUVIATED EUTRIC BRUNISOL (1), ELUVIATED DYSTRIC BRUNISOL (1)

Surface Texture: Loamy sand (2)

Effective Texture; Sandy loam (2)

Depth to Mottles/Gley:none (2)

Parent Material: Glaciofluvial (2)

Soil Type: Very Dry/Coarse (3)

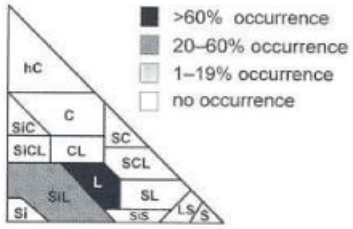
Interpretations

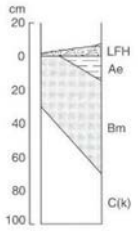
Drought Limitations	H
Excess Moisture	L
Rutting Hazard	L
Compaction Hazard	L
Puddling Hazard	L
Soil Erosion Hazard	L
Frost Heave Hazard	L
Soil Temperature Limitations	L
Windthrow Hazard	L

SV3 Very Dry/Silty Loamy (n=0)

General Description

This soil type has not been described in the Kazan Uplands subregion and this soil description is taken from 4 plots done in the Central Mixedwood subregion (Willoughby et al. 2019). This soil type would occur on very dry silty or loamy materials that develop in a variety of parent materials





Comments

SV3 soils typically occur in topographic positions that shed water such as slope crests and steep, south-facing valley slopes where solar radiation is intense. Droughty conditions exist throughout most of the growing season. Those soils that occur on steep slopes are highly susceptible to water erosion.

Environmental Variables

Moisture Regime: Subxeric (4)

Nutrient Regime:Submesotrophic (poor) (4)

Soil Variables

Soil Drainage: Rapidly drained (1), Well (3)

Soil Subgroup: ELUVIATED EUTRIC BRUNISOL (1) ORTHIC EUTRIC BRUNISOL (3)

Surface Texture: Silty Loam (2) Sand (2)

Effective Texture: Silty Loam (1), Silt (2), Sand (1)

Depth to Mottles/Gley: None (10)

Parent Material: Fluvial (2), Saprolite (1), Eolian (1)

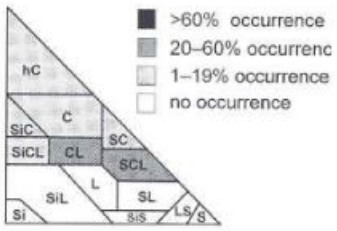
Interpretations

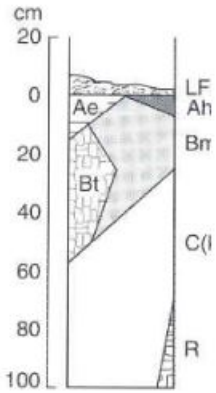
Drought Limitations	H
Excess Moisture	L
Rutting Hazard	L
Compaction Hazard	L-M
Puddling Hazard	M
Soil Erosion Hazard	H
Frost Heave Hazard	L-M
Soil Temperature Limitations	L
Windthrow Hazard	L

SV4 Very Dry/Fine Loamy-Clayey (n=9)

General Description

Very dry, fine loamy or clay soils that are found developed in all morainal and predominantly glaciofluvial parent materials in the Kazan Uplands subregion.





Comments

The SV4 soils were found on midslope, upper slope and crest positions in the landscape. If plots occur on steep south-facing slopes (>45%) solar radiation can be intense (Beckingham and Archibald 1996). On such sites, droughty conditions persist throughout the growing season and the soil erosion hazard tends to be high.

Environmental Variables

Moisture Regime: Subxeric (9)

Nutrient Regime: Submesotrophic (poor) (9)

Soil Variables

Soil Drainage: Rapidly drained (2), Well (7)

Soil Subgroup: ELUVIATED EUTRIC BRUNISOL (8), ELUVIATED DYSTRIC BRUNISOL (1)

Surface Texture: Loamy Sand (2) Sand (6), Sandy Clay (1)

Effective Texture: Sand (8), Loamy Sand (1)

Depth to Mottles/Gley: None (10)

Parent Material: Morainal (1), Glaciofluvial (6), Rock (1), Residual (1)

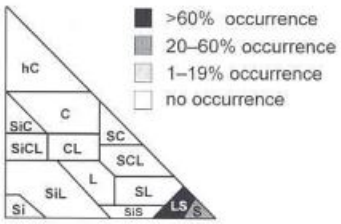
Interpretations

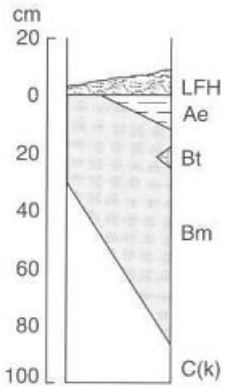
Drought Limitations	H
Excess Moisture	L
Rutting Hazard	L
Compaction Hazard	L-M
Puddling Hazard	M
Soil Erosion Hazard	H
Frost Heave Hazard	L-M
Soil Temperature Limitations	L
Windthrow Hazard	L

SD1 Dry/Sandy (n=11)

General Description

Dry, sandy soils that were found on predominantly glaciofluvial parent materials.





Comments

SD1 soils exhibit rapid to well internal soil drainage and occur on a variety of topographic positions. Mottles are typically not encountered in the soil profile. Droughty conditions may persist for part of the growing season. A moderate windthrow hazard exists for shallow rooted white spruce trees.

Environmental Variables

Moisture Regime: Submesic (11)

Nutrient Regime: Mesotrophic (medium) (3), Submesotrophic (poor) (8)

Soil Variables

Soil Drainage: Rapidly drained (6), Well (4), Moderately well (1)

Soil Subgroup: ELUVIATED EUTRIC BRUNISOL (8), GLEYED ELUVIATED EUTRIC BRUNISOL (1), ELUVIATED DYSTRIC BRUNISOL (1), ORTHIC REGOSOL (1)

Surface Texture: Loamy Sand (1), Sand (9), Silt (1)

Effective Texture: Sand (11)

Depth to Mottles/Gley: None (10), 51-75 (1)

Parent Material: Glaciofluvial (6), Glaciolacustrine (2), Residual (1), Morainal (2)

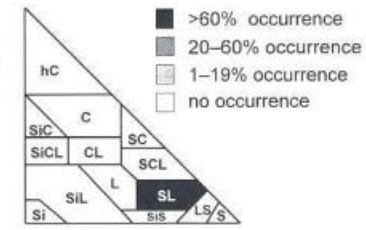
Interpretations

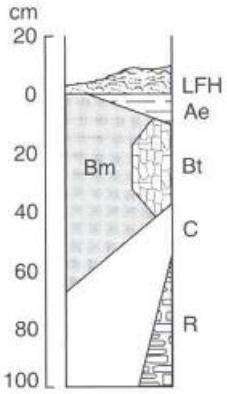
Drought Limitations	M
Excess Moisture	L
Rutting Hazard	L
Compaction Hazard	L
Puddling Hazard	L
Soil Erosion Hazard	L
Frost Heave Hazard	L
Soil Temperature Limitations	L
Windthrow Hazard	L-M

SD2 Dry/Coarse Loamy (n=1)

General Description

Dry, coarse loamy soils that most commonly develop in morainal deposits as described in the Kazan Uplands subregion.





Comments

SD2 soils occur on crest to lower slope topographic positions. Mottles are typically not encountered in the soil profile.

Environmental Variables

Moisture Regime: Submesic (11)

Nutrient Regime: Submesotrophic (poor) (1)

Soil Variables

Soil Drainage: Well (1)

Soil Subgroup: ELUVIATED DYSTRIC BRUNISOL (1)

Surface Texture: Loam (1)

Effective Texture: Sandy Loam (1)

Depth to Mottles/Gley: None (1)

Parent Material: Morainal (1)

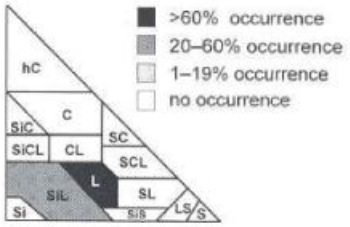
Interpretations

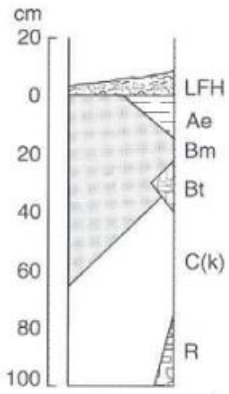
Drought Limitations	M
Excess Moisture	L
Rutting Hazard	L
Compaction Hazard	L
Puddling Hazard	L
Soil Erosion Hazard	L
Frost Heave Hazard	L
Soil Temperature Limitations	L
Windthrow Hazard	L

SD3 Dry/Silty-Loamy (n=0)

General Description

This soil type has not been described in the Kazan Uplandssubregion and this soil description is taken from 6 plots described in the Central Mixedwood subregion (Willoughby et al. 2019). This soil type would occur on dry, silty loamy soils that most commonly develop in fluviolacustrine or glaciofluvial or eolian deposits.





Comments

SD3 soils occur on upper slope to level positions in the landscape. Those sites with SD3 soils that occur on straight slopes are most susceptible to soil erosion.

Environmental Variables

Moisture Regime: Submesic (6)

Nutrient Regime: Submesotrophic (poor) (6)

Soil Variables

Soil Drainage: Well (6)

Soil Subgroup: ELUVIATED EUTRIC BRUNISOL (2), ORTHIC EUTRIC BRUNISOL (1), BRUNISOLIC GRAY LUVISOL (3)

Surface Texture: Loam (1)

Effective Texture: Sandy Loam (1)

Depth to Mottles/Gley: None (6)

Parent Material: Glaciofluvial (1), Fluvioeolian (1), Eolian(3), Glaciolacustrine (1)

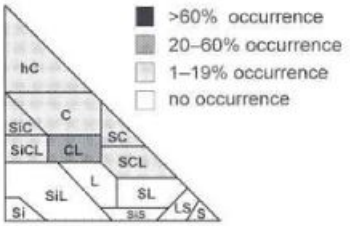
Interpretations

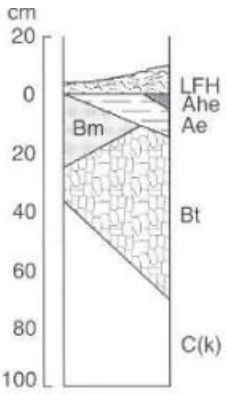
Drought Limitations	M
Excess Moisture	L
Rutting Hazard	L-M
Compaction Hazard	M
Puddling Hazard	M
Soil Erosion Hazard	M-H
Frost Heave Hazard	M
Soil Temperature Limitations	L
Windthrow Hazard	L

SD4 Dry/Fine Loamy-Clayey (n=1)

General Description

This soil type would occur on dry, fine loamy to clayey soils that were found developed in all parent materials (Beckingham and Archibald 1996).





Comments

SD4 soils occur in upland landscape positions and are generally characterized by moderately coarse to medium-textured surface layers overlying a fine-textured Bt horizon. This illuviated horizon can become restrictively hard if extended periods of warm, dry weather persist. Under these conditions, root development and plant growth are reduced (Beckingham and Archibald 1996).

Environmental Variables

Moisture Regime: Submesic (1)

Nutrient Regime: Submesotrophic (poor) (11)

Soil Variables

Soil Drainage: Well (1)

Soil Subgroup: ELUVIATED EUTRIC BRUNISOL (1)

Surface Texture: Loamy sand (1)

Effective Texture: Sandy Clay (1)

Depth to Mottles/Gley: None (1)

Parent Material: Glaciofluvial (1)

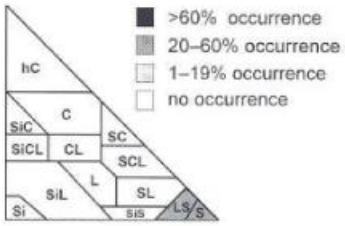
Interpretations

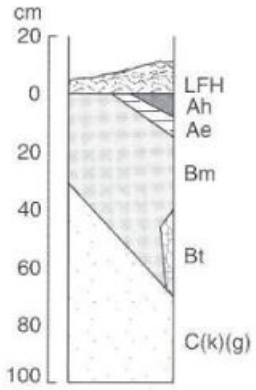
Drought Limitations	M
Excess Moisture	L
Rutting Hazard	M
Compaction Hazard	M
Puddling Hazard	H
Soil Erosion Hazard	M-H
Frost Heave Hazard	M
Soil Temperature Limitations	L
Windthrow Hazard	L

SM1 Moist/Sandy (n=10)

General Description

Moist sandy soils that develop on a variety of parent materials.





Comments

SM1 soils typically occur on level to gently sloping topography (<10%) and are predominantly well-drained. Although the upper 60 cm of SM1 soil profiles are sandy, soil water is not limited. Sites with SM1 soils tend to located in water receiving topographic positions or are underlain by fine-textured material, which inhibits rapid drainage. Mottles are occasionally encountered in the soil profile (Beckingham and Archibald 1996).

Environmental Variables

Moisture Regime: Mesic (6), Subhygric (4)

Nutrient Regime: Mesotrophic (medium) (3), Submesotrophic (poor) (7)

Soil Variables

Soil Drainage: Well (8), Rapidly (1), Imperfectly (1)

Soil Subgroup: ELUVIATED EUTRIC BRUNISOL (3), ELUVIATED DYSTRIC BRUNISOL (5), GLEYED ELUVIATED EUTRIC BRUNISOL (1), ORTHIC GLEYSOL (1)

Surface Texture: Sand (9), Silt (1)

Effective Texture: Sand (10)

Depth to Mottles/Gley: None (10)

Parent Material: Glaciofluvial (4), Glaciolacustrine(4), Lacustrine (1), Morainal (1)

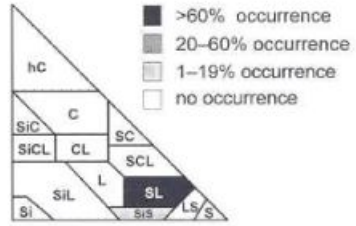
Interpretations

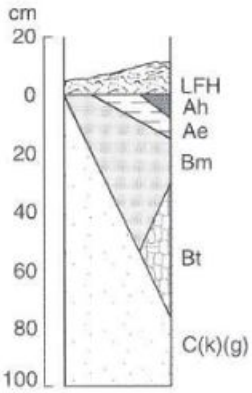
Drought Limitations	L
Excess Moisture	L-M
Rutting Hazard	L
Compaction Hazard	L
Puddling Hazard	L
Soil Erosion Hazard	L
Frost Heave Hazard	L
Soil Temperature Limitations	M
Windthrow Hazard	L-M

SM2 Moist/Coarse Loamy (n=1)

General Description

Moist coarse loamy soils that have developed on a variety of parent materials (Beckingham and Archibald 1996).





Comments

The SM2 soils typically occur on level to very gently sloping topography. The soils that occur in water-receiving topographic positions and have a subhygric moisture regime typically have higher hazard ratings than those soils in better-drained locations.

Environmental Variables

Moisture Regime: Subhygric (1)

Nutrient Regime: Permesotrohic (rich)(1)

Soil Variables

Soil Drainage: Imperfectly (1)

Soil Subgroup: GLEYED GRAY LUVISOL (1),

Surface Texture: Sand (1)

Effective Texture Sandy Loam (1)

Depth to Mottles/Gley: None (1)

Parent Material: Morainal (1)

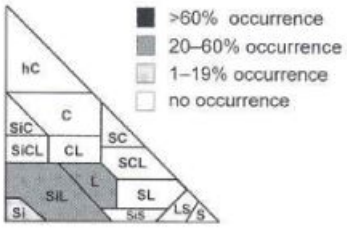
Interpretations

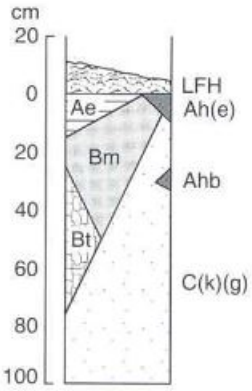
Drought Limitations	L
Excess Moisture	L-M
Rutting Hazard	L-M
Compaction Hazard	L-M
Puddling Hazard	L
Soil Erosion Hazard	L
Frost Heave Hazard	L-M
Soil Temperature Limitations	L-M
Windthrow Hazard	L

SM3 Moist/Silty Loamy (n=3)

General Description

Moist silty loamy soils that can develop on a variety of parent materials, but are most common on fluvial parent materials.





Comments

SM3 soils typically occur on level, fluvially deposited landscapes. Soils in this environment may exhibit buried, humified Ah horizons (Ahb). High hazard ratings generally apply to those SM3 soils that are associated with sites that have a subhygric moisture regime. Faint mottles may be present in any horizon.

Environmental Variables

Moisture Regime: Mesic (2), Subhygric (1)

Nutrient Regime: Mesotrophic (medium) (2) Permesotrohic (rich)(1)

Soil Variables

Soil Drainage: Poorly (1), Moderately well (1), Imperfectly (1)

Soil Subgroup: GLEYED ELUVIATED EUTRIC BRUNISOL (1), ELUVIATED EUTRIC BRUNISOL (1), REGO HUMIC GLEYSOL (1)

Surface Texture: Sand (1), Silty Loam (1), Silt (1)

Effective Texture Silt (2), Silty Loam (1)

Depth to Mottles/Gley: None (3)

Parent Material: Fluvial (1), Morainal (1), Glaciolacustrine(1)

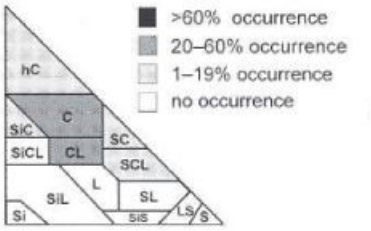
Interpretations

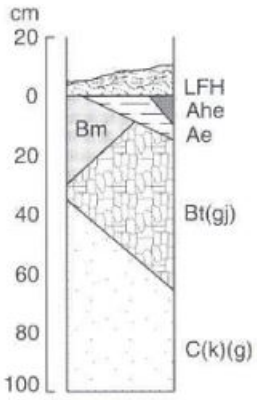
Drought Limitations	L
Excess Moisture	L-M
Rutting Hazard	M-H
Compaction Hazard	M-H
Puddling Hazard	M-H
Soil Erosion Hazard	M
Frost Heave Hazard	M-H
Soil Temperature Limitations	L-M
Windthrow Hazard	L

SM4 Moist/Fine Loamy-Clayey (n=12)

General Description

Moist silty loamy to clayey soils that can develop on a variety of parent materials, but are most common on lacustrine and glaciolacustrine parent materials as described in the Kazan Uplands subregion.





Comments

SM4 was the most extensively sampled soil type in northern Alberta and occurs on upper slope, lower slope and level positions in the landscape (Beckingham and Archibald 1996). Typically, these soils have a medium to moderately coarse-textured surface layer overlying a fine-textured Bt horizon. This illuvial horizon (Bt) may temporarily impede internal soil drainage during high rainfall and spring runoff periods causing saturated soil conditions in the upper horizons. High hazard ratings generally apply to those SM4 soils that are associated with sites that have a subhygric moisture regime.

Environmental Variables

Moisture Regime: Mesic (9), Subhygric (3)

Nutrient Regime: Mesotrophic (medium) (7), Submesotrophic (poor) (1), Permesotrohic (rich)(4)

Soil Variables

Soil Drainage: Well (3), Moderately well (7), Imperfectly (2)

Soil Subgroup: ORTHIC LUVIC GLEYSOL (2), BRUNISOLIC GRAY LUVISOL (2), ORTHIC GRAY LUVISOL (7), GLEYED GRAY LUVISOL (1)

Surface Texture: Loam (2), Silty Loam (3), Loamy Sand (2), Silt (3), Silty Clay Loam (1), Sand (1)

Effective Texture Silty Clay (5), Silty Clay Loam (2), Sandy Clay Loam (2), Clay Loam (2), Heavy Clay (1)

Depth to Mottles/Gley: None (11), (26-51)(1)

Parent Material: Glaciolacustrine (4), Lacustrine (6), Fluvial (1), Colluvial (1)

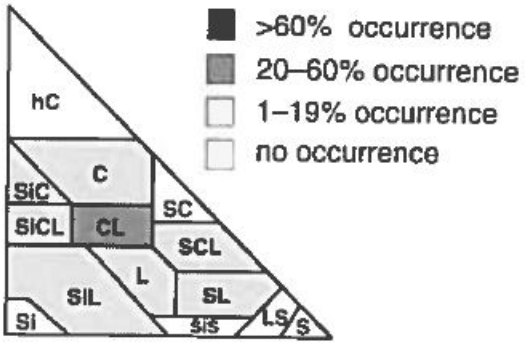
Interpretations

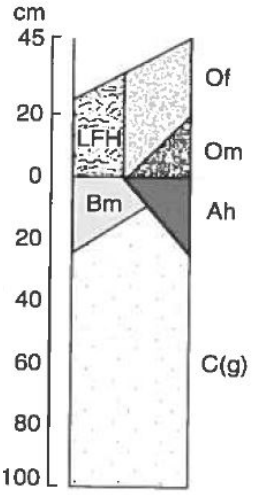
Drought Limitations	L
Excess Moisture	L-M
Rutting Hazard	M-H
Compaction Hazard	H
Puddling Hazard	M-H
Soil Erosion Hazard	M
Frost Heave Hazard	H
Soil Temperature Limitations	L-M
Windthrow Hazard	L

SMp Moist/Peaty (n=0)

General Description

This soil type has not been described in the Kazan Uplands subregion and this soil description is taken from 51 plots described in the Central Mixedwood subregion (Willoughby et al. 2019). This soil type would occur on moist soils with a duff layer thicker than 20cm. They are found on a variety of parent materials (Beckingham and Archibald 1996).





Comments

SMp soils have a higher mean moisture regime rating than other moist soil types (SM1-4), which implies that they are transitional to SWp. If the thick organic layer of SMp is not excessively disturbed, the effects of forestry operations on soil erosion, rutting, compaction and puddling can be reduced. Faint to distinct mottles are commonly encountered in the upper 25 cm of SMp soils.

Environmental Variables

Moisture Regime: Mesic (4), Subhygric (6)

Nutrient Regime: Mesotrophic (medium) (5), Submesotrophic (poor) (2), Permesotrohic (rich)(3)

Soil Variables

Soil Drainage: Well (2), Moderately well (3), Imperfectly (3), Poor (3)

Soil Subgroup: ORTHIC LUVIC GLEYSOL (1), ORTHIC GLEYSOL (1), REGO HUMIC GLEYSOL (1), GLEYED GRAY LUVISOL (1)

Surface Texture: Silty clay (1), Silty Loam (2), Silty Clay Loam (1), Sandy Loam (2), Clay Loam (1), Loamy sand (1)

Effective Texture Silty Clay (1), Silty Loam (1), Silty Clay Loam (2), Sandy Clay Loam (2), Clay (2)

Depth to Mottles/Gley: (0-25)(6), (26-50)(1), none (1)

Parent Material: Fluvial (2), Morainal (2), Glaciolacustrine (2), Lacustrine (1)

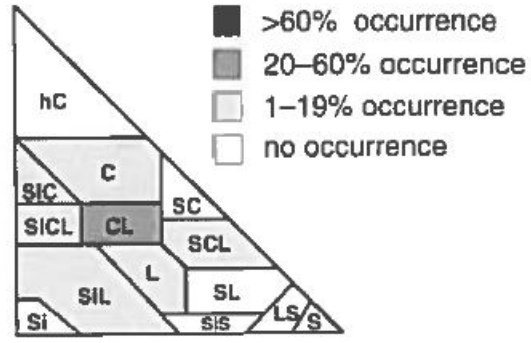
Interpretations

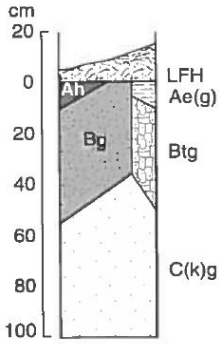
Drought Limitations	L
Excess Moisture	M
Rutting Hazard	H
Compaction Hazard	H
Puddling Hazard	H
Soil Erosion Hazard	L-M
Frost Heave Hazard	M-H
Soil Temperature Limitations	H
Windthrow Hazard	M-H

SWm Wet/Mineral (n=3)

General Description

SWm soils are wet soils with an organic layer thickness of less than 20cm. They are found in a variety of parent materials





Comments

SWm are commonly associated with forested and non-forested plant community types that occur in two different environments. The forested plant community types tend to occur in lower slope, depressional, and toe positions in the landscape where seepage waters discharge or where water table levels rise into the rooting zone. These sites commonly have hygric to subhydric moisture regimes. Non-forested plant community types with SWm soils tend to occur on level topography adjacent to lakes and streams where water table levels are often above the mineral surface for a significant portion of the growing season. Hydric to subhydric moisture regimes are most common on SWm soils associated with non-forested sites.

Environmental Variables

Moisture Regime: Hygric (1), Subhydric (1), Hydric (1)

Nutrient Regime: Mesotrophic (medium) (1), Permesotrohic (rich)2)

Soil Variables

Soil Drainage: Very poor (2), Moderately well (1)

Soil Subgroup: GLEYED MELANIC BRUNISOL (1)), REGO GLEYSOL (2)

Surface Texture: Sand (3)

Effective Texture : Sandy Clay (1), Sand (2)

Depth to Mottles/Gley: (26-50)(2), None (1)

Parent Material: Fluvial (1), Glaciofluvial(1), Lacustrine (1)

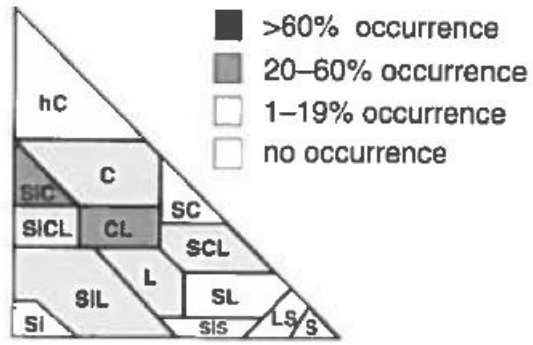
Interpretations

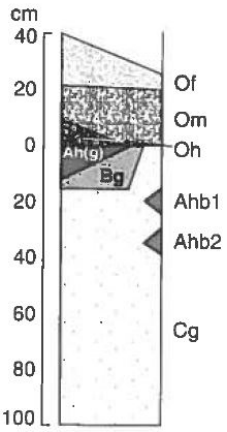
Drought Limitations	L
Excess Moisture	H
Rutting Hazard	H
Compaction Hazard	H
Puddling Hazard	H
Soil Erosion Hazard	L-M
Frost Heave Hazard	H
Soil Temperature Limitations	H
Windthrow Hazard	H

SWp Wet/Peaty (n=2)

General Description

SWp soils are wet soils with an organic layer thickness of greater than 20cm. This soil type is commonly associated with ecosites that have feather moss or sphagnum-dominated moss layers.





Comments

SWp soils most commonly occur on flat, depressional, or lower slope positions in the landscape where seepage waters discharge or where local drainage waters accumulate. SWp are transitional between SMp and SR soil types. Most of the tree roots found in this soil type occur in its thick peaty layers, increasing the risk of blowdown. Black spruce, tamarack, balsam poplar and white spruce are the most common tree species associated with SWp. Distinct to prominent mottles are commonly encountered at any depth throughout the soil profile.

Environmental Variables

Moisture Regime: Subhydric (2)

Nutrient Regime: Mesotrophic (medium) (1), Submestrophic (1)

Soil Variables

Soil Drainage: Very poor (2)

Soil Subgroup: REGO GLEYSOL (1), TERRIC MESISOL (1)

Surface Texture; Mesic (1), Sand (1)

Effective Texture : Sand (1), Loam (1),

Depth to Mottles/Gley: None (2)

Parent Material: Lacustrine (1),Glaciofluvial (1)

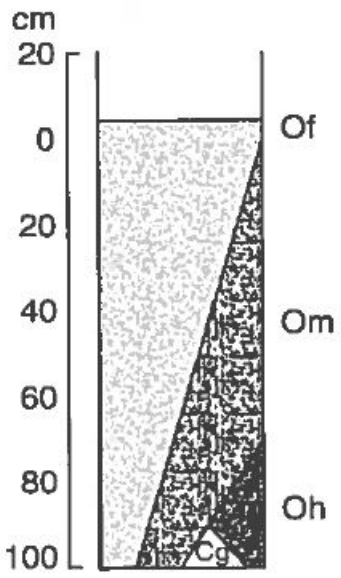
Interpretations

Drought Limitations	L
Excess Moisture	H
Rutting Hazard	H
Compaction Hazard	H
Puddling Hazard	H
Soil Erosion Hazard	H
Frost Heave Hazard	H
Soil Temperature Limitations	H
Windthrow Hazard	H

SR Organic (n=3)

General Description

Organic soils are wet with an organic thickness greater than 60cm if the material is fibric or > 40cm if the material is mesic or humic. On sites with mosses covering the surface substrate, microtopography tends to be hummocky.



Comments

SR soils are typically located on flat or depressional areas in the landscape where regional or local drainage waters accumulate. They exhibit a diverse range of profiles based on organic matter thickness and on the degree of organic matter decomposition. SR soils are strongly associated with unmerchantable lowland ecosites.

Environmental Variables

Moisture Regime: Hygric (1), Subhydric (2)

Nutrient Regime: Oligotrophic (very poor) (1), Submestrophic (poor) (2)

Soil Variables

Soil Drainage: Very poor (1), Poorly (1), Well (1)

Soil Subgroup: TERRIC FIBRISOL (1), TYPIC FIBRISOL (1), FIBRIC ORGANIC CRYOSOL (1)

Surface Texture: Fibric (2)

Effective Texture: Mesic (1), Fibric (2)

Depth to Mottles/Gley: not applicable

Parent Material: Organic (10)

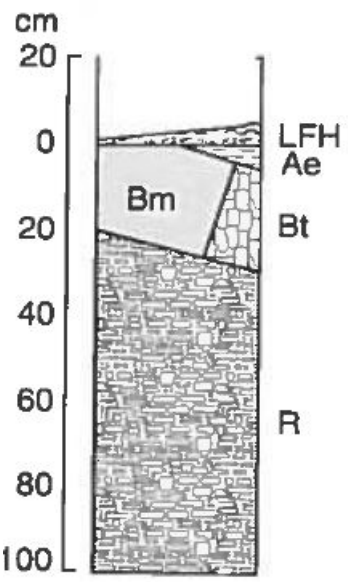
Interpretations

Drought Limitations	L
Excess Moisture	H
Rutting Hazard	H
Compaction Hazard	L
Puddling Hazard	L
Soil Erosion Hazard	L
Frost Heave Hazard	H
Soil Temperature Limitations	H
Windthrow Hazard	H

SS Shallow (n=0)

General Description

Shallow soils with less than or equal to 30 cm of mineral material overlying bedrock. This soil type includes exposed bedrock surfaces. Nearly 60% of the Kazan Uplands subregion consists of exposed bedrock (Natural Regions Committee 2006) so this soil type is likely the most common throughout the subregion. However this soil type has not been described in the Kazan Upland subregion and this description is from one plot described in the Athabasca Plain subregion.



Comments

These soils occur in areas where bedrock is encountered at or near the surface. Typically these soils are dry as their water-holding capacity is low. Windthrow hazard is one of the most limiting factors associated with shallow soils.

Environmental Variables

Moisture Regime: Submesic (1)

Nutrient Regime: Submesotrophic (poor) (1)

Soil Variables

Soil Drainage: Moderately well (1)

Soil Subgroup: ELUVIATED EUTRIC BRUNISOL (1)

Surface Texture: Silt (1)

Effective Texture: bedrock (1)

Depth to Mottles/Gley: None (10)

Parent Material: Fluvial/Rock (1), Rock (1)

Interpretations

Drought Limitations	M-H
Excess Moisture	L
Rutting Hazard	M
Compaction Hazard	M
Puddling Hazard	M
Soil Erosion Hazard	M
Frost Heave Hazard	L-M
Soil Temperature Limitations	L
Windthrow Hazard	H