BOREAL LOW ZONE OF YUKON

Southern Lakes boreal low subzone (BOLsl)

A field guide to ecosite identification

Yukon

Southern Lakes Boreal Low Subzone (BOLsl): A Field Guide to Ecosite Identification

Part 1: Introduction

Chapter 1.0: Introduction
by Nadele Flynn

Chapter 2.0: Yukon Bioclimate Ecosystem Classification (YBEC) System
by Nadele Flynn, Catherine Kennedy and Del Meidinger

Chapter 3.0: How to Identify Ecosystems
by Del Meidinger, Nadele Flynn, Karen McKenna and Catherine Kennedy

Chapter 4.0: Bioclimate Zones of Yukon
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Chapter 5.0: The Boreal Low Zone of Yukon
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Chapter 6.0: Subzones of the Boreal Low Zone
by Nadele Flynn and Karen McKenna

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Vegetation and ecological classification and mapping have a long history of practice in Yukon. The Canadian Forest Service was the first to complete mapping work in the territory and published the formative *Ecoregions of the Yukon* (Oswald and Senyk 1977). The federal government (Department of Indian Affairs and Northern Development) conducted expansive forest inventory, measurement and mapping programs throughout the southern half of Yukon between 1975 and 1982. Key contributors to this early work on ecological classification in Southern Lakes were Ed Oswald, John Senyk and Barry Brown, based out of the Pacific Forestry Research Centre, Canadian Forest Service, in Victoria, B.C. Wiken et al. (1981) conducted ecological land surveys in northern Yukon. In the 1980s the Yukon Department of Renewable Resources initiated a resource inventory of the Southern Lakes (Davies et al. 1983) and Macmillan Pass (Davies et al. 1983) areas. In 1996, through the Canada/Yukon Economic Development Agreement, the first field guide to forest classification in Yukon (Zoladeski et al. 1996) was published for southeast Yukon. This was a joint effort between the Government of Canada (Canadian Forest Service) and the Government of Yukon (Department of Renewable Resources).

In 1979 the Government of Canada (DIAND and the Department of Regional Economic Expansion) and the Government of Yukon signed a major joint federal/territorial renewable resource development agreement. A significant outcome of this agreement was a comprehensive resource inventory of the Southern Lakes region suitable for regional planning, including standardized baseline maps. Inventories of surficial geology, soils, vegetation, aquatics and archaeological values were conducted between 1980 and 1983. Field investigators included Steve Morison, Christine Boyd, Catherine Kennedy, Karen McKenna, Virgil Woo, Joe Kuhn and George Nassiopoulos. Manfred Janssen, Thom Rodger, Pat Lortie and Sue Davies assisted with mapping and data collation.

During the period 1984–2014, field data were collected under the auspices of various inventory programs of the territorial government, municipal governments and two First Nations governments in the region. Biophysical inventory surveys were conducted, including at Kusawa Lake and Carcross Dunes, by Government of Yukon; the City of Whitehorse conducted an inventory of wetlands within the city boundaries in 1997. Ecological data collected by Kwanlin Dün First Nation and Tr'ondëk Hwëch'in in their traditional territories was also incorporated into this guide. In addition to the authors, the following individuals also collected data in the region: Jane Bachman, Jamie Bastedo, Greg Brunner, Jesse Chambers, John Grods, Anne Hargrave, Mitch Heynen, Michael King, Jennifer Line, Val Loewen, Will MacKenzie, John Meikle,

Lee Mennell, Charlotte Mougeot, David Murray, Rhonda Rosie, Raphael Roy-Jauvin, Lori Schroeder, Pippa Seccombe-Hett, Scott Smith, Jennifer Staniforth, Nancy Steffen, Wayne Strong and Les Wilson.

The classification published in this guide is based on analyses of data collected at more than 900 sites in the Southern Lakes region by a variety of sources. Plot data used in this guidebook constitute a subset of a larger classification database developed with International Polar Year funding from the federal government during the period 2007–11, in a partnership between Government of Yukon and Natural Resources Canada (NRCan).

This classification database was harmonized from Yukon Biophysical Inventory System (YBIS) data, as well as data from numerous other sources; Russell Klassen, Adrian de Groot and Will Mackenzie contributed to its development. NRCan colleagues Ken Baldwin and Kim Chapman helped develop Yukon vegetation associations compatible with the Canadian National Vegetation Classification that are incorporated into this guide.

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Maps presented in this field guide were created by Hannah Gray and finalized by Gerry Perrier. Text editing was completed by Patricia Halladay of Whitehorse. Initial layout and design of the document was completed by Michelle Zieske of Outcrop Ltd. The text and illustrations from DeLong et al. (2011) that appear in Chapters 1 to 3 were used with permission from the Government of British Columbia. Thanks also to Cory Chouinard, Panya Lipovsky and Lisa Knight for their review of and constructive feedback on earlier drafts of this guide.

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1.0 Introduction

Nadele Flynn

1.1 Objectives/scope

This guide has two parts. Part 1 presents classification and identification information for ecosystems of the Boreal Low Zone of Yukon (Figure 1-1). The guide organizes current understanding of the ecological relationships among vegetation communities, landscape position, soil, climate, and vegetation succession in this bioclimatic region. Part 2 contains descriptions of the Southern Lakes Boreal Low Subzone of the Boreal Low Zone.

Part 1 has five main goals:

- to describe Yukon's Boreal Low Zone — the bioclimate zone and subzones, ecosites, and vegetation associations;
- to assist the user in classifying subzones, ecosites and vegetation associations in the field;
- to provide a common language to discuss ecosystems;
- to provide insight into the ecological conditions of the ecosystem units to support ecosystem-based management; and
- to provide a framework for incorporation of ecological knowledge.

The system used in this guide is the Yukon Bioclimate Ecosystem Classification (YBEC). It is the foundation of the Yukon Ecological and Landscape Classification (ELC) program. Information relating to this program, including bioclimatic zone mapping, links to reports, and background information on the ELC program, is on the ELC website: www.env.gov.yk.ca/elc.

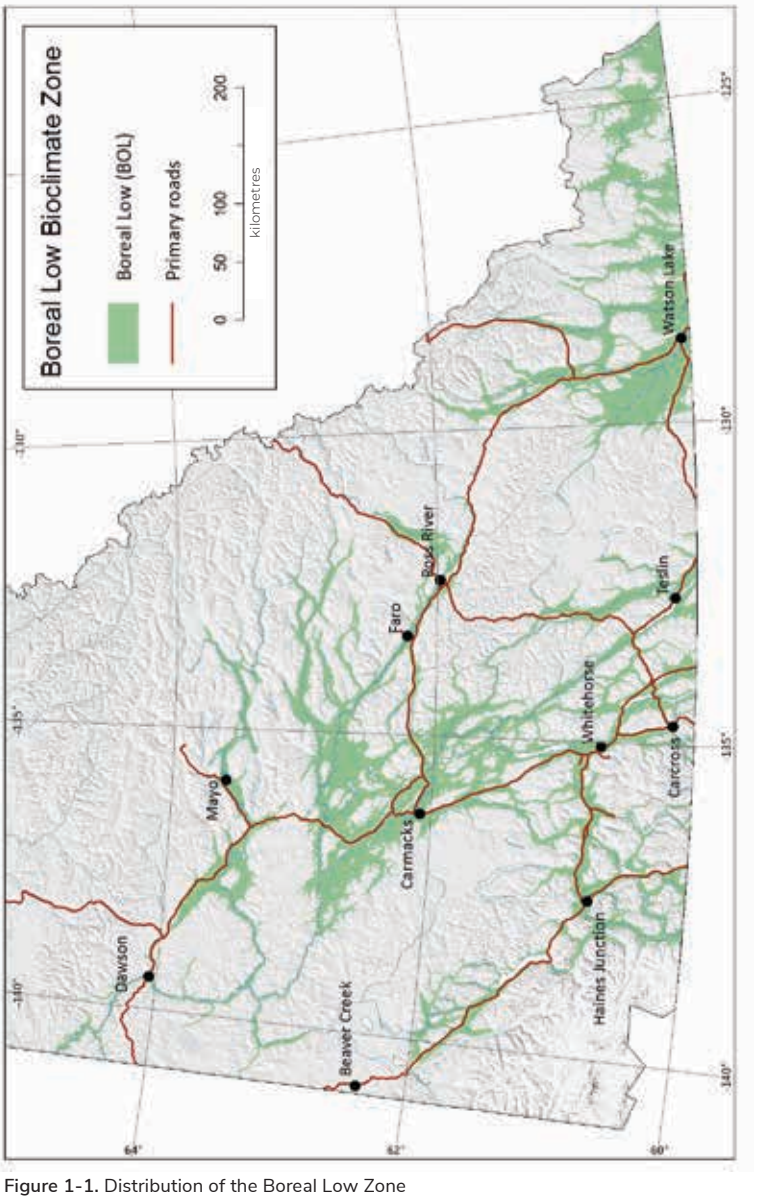


Figure 1-1. Distribution of the Boreal Low Zone

1.2 Regulatory and standards context

Ecosystem classification plays an important role in developing regulations and best practices in management and policy as well as in inventory and environmental assessment projects in Yukon. However, management interpretations are not included in this guide.

Yukon Bioclimatic Ecosystem Classification (YBEC) is a classification standard used in ecological mapping. For guidelines on ecological mapping, contact the ELC program coordinator.

1.3 Other sources of information

In order to use this guide to identify ecosystem units, some field data is generally required, including data on site, soil and vegetation features. To assist with the collection of this data, the *Field Manual for Describing Terrestrial Ecosystems* (B.C. Ministry of Environment and B.C. Ministry of Forests and Range 2010) is recommended until the Government of Yukon releases a Yukon-specific field manual.

Cody's *Flora of the Yukon Territory* (1996) is a comprehensive reference for vascular plant identification, although it is not up-to-date with current taxonomy and nomenclature. Other useful guides include *Plants of Northern British Columbia* (MacKinnon et al. 1992), *Mosses, Lichens and Ferns of Northwest North America* (Vitt et al. 2007) and *Plants of the Western Boreal Forest and Aspen Parkland* (Johnson et al. 1995).

For those interested in soils and terrain classification, refer to *The Canadian System of Soil Classification* (SCWG 1998) and *Terrain Classification System for British Columbia* (Howes and Kenk 1997). The *Canadian Wetland Classification System* (NWWG 1997) is also a useful reference.

The scientific names of plant species follow those used by the Yukon Conservation Data Centre (CDC). For vascular plants, these are generally consistent with the Flora of North America Association (http://floranorthamerica.org).

1.4 Guide content

The guide is organized into two parts.

Part 1

Part 1 contains six chapters:

- **Introduction**
- **Yukon Bioclimate Ecosystem Classification (YBEC) System:** an overview of the YBEC system.
- **How to Identify an Ecosystem:** presents the steps required to identify the bioclimate, ecosite, and vegetation units.
- **Bioclimate Zones of Yukon:** an overview of the zones.
- **The Boreal Low Zone in Yukon:** general description of the climate, physiography, geology, soils, vegetation, and disturbance history of the Boreal Low Zone.
- **Subzones of the Boreal Low Zone:** a description of proposed subzones of the Boreal Low Zone.

Part 2

Part 2 of this field guide contains ecosite descriptions for the Southern Lakes Boreal Low Subzone (BOLsl). Readers should refer to Part 1 and Appendix 2 to help identify BOLsl ecosites described in Part 2.

Part 2 also contains three appendices:

- **Appendix 1:** Aids for ecosite identification, Boreal Low Zone;
- **Appendix 2:** Aids for ecosite identification, Southern Lakes Boreal Low Subzone; and
- **Appendix 3:** Supplementary information, including a list of species combined in vegetation tables; and a list of soils and soil horizons of the Boreal Low Zone and climate tables.

1.5 Limitations of the guide

All available data was used to develop the classification and present the descriptions. Most ecosite descriptions are based on a fairly large set of plot data, but some are based on relatively little. In some ecosites, soils data are very limited and certain plant groups (e.g., bryophytes and willows) are often not identified to species. This limits the information available for these vegetation associations. Over time and where necessary, identified gaps will
be filled in.

In some cases, the characterization of the vegetation conditions within ecosites is also based on limited data, and some vegetation conditions may not have not been sampled at all (e.g., vegetation after disturbances on some ecosites). It is possible that users will encounter vegetation conditions that do not match the vegetation characterized for an ecosite in this guide. In such situations, the site and soils factors should receive stronger weighting in the identification of the ecosite.

1.6 Training courses

Training will help with the use of this guide. Contact the ELC coordinator at Yukon Environment to enquire about training opportunities.

2.0 Yukon Bioclimate Ecosystem Classification (YBEC) System

Nadele Flynn, Catherine Kennedy and Del Meidinger

2.1 An overview

An ecosystem results from a complex interaction of plants, animals and micro-organisms with the physical environment. Ecosystems can be described at various scales, from local to regional. The Yukon Bioclimate Ecosystem Classification (YBEC) system groups similar segments of the landscape — i.e., ecosystems — to form ecosites. Ecosite units are classified by combining components of the classification system at a local scale. A black spruce – peat moss bog is an example of a local-scale ecosystem. A regional ecosystem is broader, encompassing many local-scale ecosystems.

For practical purposes in YBEC, an ecosystem is generally characterized as a particular plant community and its associated topography, soil, and climate. Although animals, fungi and microorganisms are not specifically used during classification, they are recognized as important components associated with the defined ecosystems. Transitions from one ecosystem to another can be abrupt or gradual, depending on the environmental factors that influence the ecosystem.

Climate is the most important factor that influences the development of terrestrial ecosystems. Within areas of similar climate, ecosystems vary because of differences in topography and soil. For example, grasslands occur on steep, warm aspects; bogs and fens occur in sites with impeded drainage. The vegetation developing on these local-scale sites reflects the differences in topography and soil.

Vegetation is important when developing an ecological classification because it is readily visible and it reflects the environment, biology and history of a site. However, vegetation changes over time — in a process called succession — and it is the sum total of the vegetation at various stages of development on a site (i.e., uniform topography/soil) that characterizes an ecosite.

YBEC organizes regional- and local-scale ecosystems, as well as vegetation communities, in three heirarchical classifications, each with different primary contributing factors (Figure 2-1). This guide presents a classification of bioclimate subzones (subdivisions of Bioclimate Zones), vegetation associations, and ecosites (shown with thick grey rectangular borders in Figure 2-1). The YBEC system also includes the concept of Bioclimate Zones and, for some ecosites, ecosite phases.

2.2 Bioclimate classification

Bioclimate classification categorizes broad areas influenced by similar **regional climates** into a hierarchy of bioclimate units. The broadest of these is the Bioclimate Region, and the finest (at this time), is the Bioclimate Subzone. In YBEC, regional climate can be expressed elevationally as well as geographically. For example, in the Boreal Region of southwest Yukon, the Boreal Low Zone occurs at the lowest elevations; the Boreal High, Subalpine and Alpine zones occur at higher elevations, in that sequence.

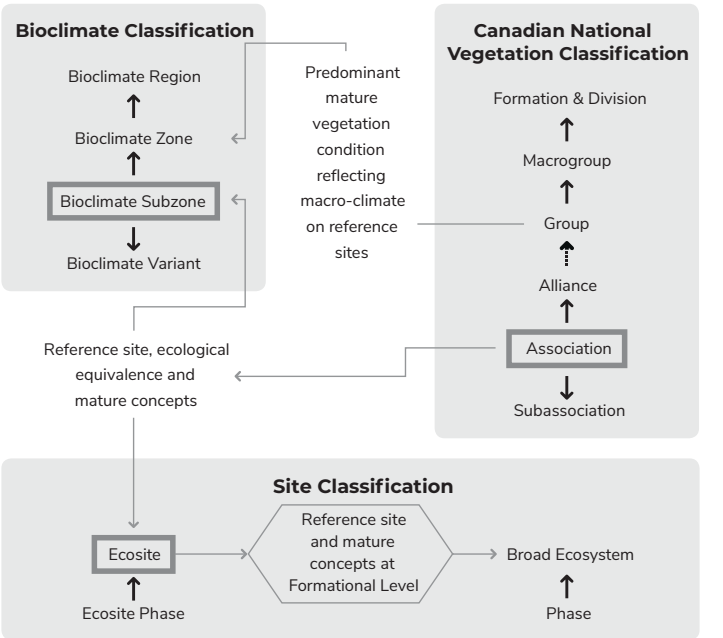


Figure 2-1. Structure of the YBEC system of ecological classification
Primary units (subzone, association and ecosite) for each level are shown with thick grey rectangular borders

The **bioclimate subzone** is the level of classification that is used to group local-level ecosystems (ecosites) for both characterization and prediction. Subzones are defined by their climate and their ecosystems. The vegetation communities are used on circum-mesic, nutrient-medium sites, i.e., **reference sites**, and the kind and pattern of ecosystems on drier, wetter, poorer and richer sites to differentiate subzones.

Bioclimate zones are groups of subzones with a uniform physiognomy and broadly similar vegetation on reference sites, and with similar overall floristic composition.

The Bioclimate Classification is under development in Yukon and both the mapping and characterization of the units will evolve.

2.2.1 Bioclimate unit names and codes

Zone names combine bioclimate regions (Boreal, Subarctic, Arctic) with elevational position (low, high, subalpine, alpine) and/or physiognomy (woodland, low shrub, dwarf shrub). The codes for these zones comprise three capital letters that use components of the descriptive terms. For example, the Boreal Low is coded BOL; the Boreal High is coded BOH; and the Subalpine is coded SUB.

A subzone is named using an ecoregion that most overlaps its range. The code for a subzone comprises two lower-case letters that are at least somewhat connotative. For example, the subzone within the Boreal Low Zone that encompasses much of the Southern Lakes ecoregion is named “Southern Lakes” and the code is “sl” (see Figure 2-2).

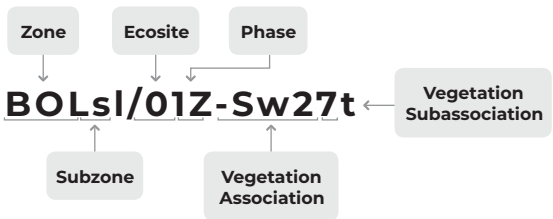


Figure 2-2. Example of coding format

2.3 Site classification

The site classification in YBEC characterizes landscape components (i.e., sites) with similar topography and soil conditions. The smallest unit is the ecosite. **Ecosites** are ecological units with uniformity in site conditions, as expressed by soil moisture and soil nutrients and other site-level environmental drivers. These drivers, which include flooding regime, presence of permafrost, duration of snow, and avalanches, have a strong influence on ecosites. After climate, soil moisture and nutrients are generally the factors that have the greatest influence on the development of ecosystems. However, other significant ecological drivers can influence or override soil moisture and nutrient conditions.

Ecosites are sometimes divided into phases. **Ecosite phases** are based on soil properties within an ecosite. The various soil properties do not alter the primary ecological conditions of the ecosite; i.e., the soil moisture or nutrient conditions or other ecological drivers. They do, however, represent subsets of environmental conditions where compensating factors result in specific overall vegetation and ecological conditions. For example, a coarse-textured soil on a lower slope position can have the same moisture conditions as a medium-textured soil on a mid-slope position. When phases are designated, the selected soil conditions are deemed to be important to the classification.

2.3.1 Site unit names and codes

Ecosites are coded in one of two ways:

1. A two-digit number indicates a certain range of soil moisture and soil nutrient conditions:

- 01 is used for the reference ecosite
- the 10s and 20s are used for ecosites drier or the same moisture regime as the 01
  - 10s are nutrient poor to medium
  - 20s are nutrient rich to very rich
- the 30s and 40s are used for ecosites moister than the 01
  - 30s are nutrient poor to medium
  - 40s are nutrient rich to very rich
- the 50s are used for saline sites.

2. Wetlands are designated with a two-character alpha-numeric code:

- per NWWG (1997) the first character is a letter that refers to the wetland class : B = bog; F = fen; S = swamp; M = marsh; and W = shallow open water
- the second character is a number to designate the unit

Ecosite names use plant species that are important indicators of the vegetation found there. For example, the driest ecosite in the Southern Lakes area is named Pine – White spruce – Kinnikinnick – Lichen. The name does not mean that these four species will always be present. It simply uses species that are often found on the ecosite and that indicate the environmental conditions in it.

Ecosite phases are designated with a single, upper-case letter that is connotative. For example, if an ecosite can occur on mineral or organic soils, the mineral phase is coded "M" and the organic phase is coded "O." This letter is appended to the ecosite code; see the example in Figure 2-2. Soil phase codes used to describe soil variation within an ecosite are listed in the ecosite description section for each subzone of the Boreal Low Zone.

2.4 Vegetation classification

YBEC classifies plant communities into vegetation associations (also called plant associations). The association is the basic unit of a hierarchy of vegetation units (Figure 2-1). It is used in YBEC to characterize the vegetation of an ecosite, or the variation within an ecosite which has more than one type of vegetation. An **association** is a vegetation classification unit that is "defined on the basis of a characteristic range of species composition, diagnostic species occurrence, habitat conditions, and physiognomy" (Faber-Langendoen et al. 2014).

A **subassociation** is a division of the association. It is generally used for characterizing variation in species composition that is not considered significant enough to be an association.

2.4.1 Vegetation unit names and codes

Every vegetation association has its own name and code.

Vegetation associations are named by one or more dominant and/or indicator species. Species of different physiognomic strata or layers (i.e., tree, shrub, herb or moss/lichen) are separated by a slash (/). Species within the same layer are separated by an en dash (–). Sometimes, species are combined into a generic term or genus group (e.g., lichen or feathermoss or *Carex* spp.). This is done when numerous species add to the characteristic value or there was not enough detail in the plot data to determine the species to use. Subassociations are named using a single species that indicates the sub-unit; the terms "typic" or "sparse" are used.

Each vegetation association is an assigned a code that is comprised of letters and numerals. The letter portion of the code describes the dominant species of the treed or non-treed overstorey (Table 2-1).

The numeric portion of the code describes the relative soil moisture condition and landscape context (Table 2-2).

Codes for treed association begin with one or two tree species codes, each comprised of one or two letters (Table 2-1). These represent the dominant or diagnostic tree species in the canopy; the letters are consistent with the tree codes of the Yukon Forest Management Branch. Subassociations are coded with a single, lower-case letter added to the association code.

Non-treed association codes begin with four letters. These are the first two letters of the genus (with the first letter upper case) and the species of the dominant species in the overstorey canopy, as determined by per cent cover. Sometimes, the letter code reflects a diagnostic species in the canopy.

Table 2-1. Letter characters used in vegetation association codes

Letter	Treed vegetation association
A	Aspen
B	Balsam poplar
W	White birch (paper, Alaska paper)
F	Subalpine fir
L	Tamarack, Larch
P	Lodgepole pine
Sw	White spruce
Sb	Black spruce
	Non-treed vegetation association
Begl	*Betula glandulosa*
Hoju	*Hordeum jubatum*
Caaq	*Carex aquatilis*
Aruv	*Arctostaphylos uva-ursi*

The numeric portion of the vegetation association code is a two-digit number that represents the relative soil moisture condition of the association. It also provides a sense of the landscape context of the vegetation association, as occurring on an upland or wetland site (Table 2-2).

Table 2-2. Numeric characters used in vegetation association codes

Number	Landscape context	Soil moisture condition
	Upland sites	
01–14		very dry to slightly dry
15–39		slightly dry to very moist
	Wetland sites	
40–49	bogs	moist to wet
50–69	fens, swamps, marshes	wet
70–79	shallow open water	wet

Here are some examples of treed and non-treed vegetation association codes:

Sw01	White spruce/Kinnikinnick/Lichen association on a dry upland site
PSw23	Pine – White spruce/Lowbush cranberry – Twinflower on a mesic upland site
Begl30	Shrub birch – Willow/Altai fescue association on a moist upland site
Arfr02	Pasture sage – Purple reedgrass association on a dry upland site
Alin55	River alder – Willow association on a swamp wetland site

2.5 YBEC and climate change

How will a changing climate affect the classification presented in this guide? The relationships between climate and vegetation have shaped the vegetation associations that are characterized in this guide. Changes in climate could affect zone and subzone boundaries, or even change the character of the bioclimate units, resulting in bioclimates new to Yukon.

Vegetation associations are assemblages of species, and climate change is likely to affect these assemblages: some more than others; some sooner than others.

However, ecosites reflect topographic/site conditions that are significant in this climate and that will be important in future climatic conditions. The vegetation on the ecosites may change, but the relative soil moisture and nutrient regime relationships between ecosites will remain consistent. The relative abiotic properties of the ecosites will endure. For these reasons, ecosites are important units to define in a time of changing climate. They are units of biological potential, and although this potential may change in a new climate or with new species assemblages, their relationship to climate and topography/site makes them useful in landscape management.

Even though the effects of climate change are starting to be seen in ecosystems, the classification presented here can be used for at least several decades. And as noted, the environmental and biological productivity relationships represented by the ecosites will remain. The species indicators may change, but these can be updated if and when changes become evident.

3.0 HOW TO IDENTIFY ECOSYSTEMS

Del Meidinger, Nadele Flynn, Karen McKenna and Catherine Kennedy

Ecosystem identification involves three major steps (Figure 3-1): identify the bioclimatic subzone; determine the ecosite; and characterize the vegetation association. These steps are accomplished through field assessment of site and vegetation characteristics, and by comparing these characteristics with information presented in this field guide. To make the identification process easier, the guide includes several aids, such as generalized maps, descriptions of vegetation and site characteristics, ecosite identification tables, edatopic grids, ecosite descriptions, vegetation tables and some keys.

Site description data should be collected carefully and accurately in order to ensure that sites and vegetation units are identified correctly.

3.1 Identifying bioclimate units

Chapters 3–6 characterize the Bioclimate zones and the Boreal Low subzones of Yukon. They include information for confirming a subzone, as compared to adjacent BOL subzones or the Boreal High Zone (BOH). The guide also includes small-scale maps that show the distribution of the subzones.

Decisions should not be made solely on the bioclimatic map, especially if the area is near bioclimatic unit boundaries, in complex mountainous terrain, or in areas only recently accessible by ground.

After noting the bioclimate subzone of interest, the identification needs to be confirmed through field observations, since subzone mapping has been conducted at a fairly small scale and has not been confirmed in every location. The observer should check the elevation and general floristic features (e.g., canopy trees and cover, major understorey plant species, locations of communities on the landscape) for the area of interest. Subzone confirmation should be based, as much as possible, on the examination of circum-mesic "reference" sites that represent average soil moisture and nutrient conditions for the subzone. However, the pattern of vegetation communities on other topographic sites will also help confirm the subzone.

Information noted in the field should be compared to the information in Chapter 6, which summarizes the key environmental and floristic features of the subzones. The observer should review the bullet points for each subzone, which describe the location, distribution, climate, soils and other differentiating features. It is important to use all available tools to verify the bioclimatic unit.

If users find discrepancies between bioclimatic mapping and field information they should be sure to document these and rationalize the bioclimatic unit chosen. If the area of interest appears to be located in the transition between two subzones, or if doubt remains after the verification step using the available information, then both possible subzones should be considered for identification of ecosites.

1. Identify bioclimate subzone

↓

Refer to map of bioclimate zones and subzones → Identify potential unit

↓

EN ROUTE TO SITE

Observe ecosystems, especially circum-mesic or reference sites, in area.
Refer to descriptions for bioclimate units.
Confirm unit

2. Identify ecosite

↓

AT SITE

Describe site, soil and vegetation conditions:
- Select sample area
- List plant species and estimate cover
- Collect site information
- Collect soil information from soil pit
- Determine soil moisture and soil nutrient regime

↓

Identify ecosite:
- Refer to edatopic grid, vegetation tables and other ecosite identification aids
- Examine ecosite descriptions
- Integrate site, soil and vegetation information

↓

Identify ecosite phase
Some ecosites have phases, based on soil features

3. Identify vegetation association

↓

If further information on vegetation is desired
- Use vegetation summary table(s) within ecosite to determine association
- Supplementary vegetation association guides may be available

Figure 3-1. Flow chart outlining the procedure for identifying ecosites

3.2 Describing and identifying ecosites

Site units are comprised of ecosites, and sometimes, ecosite phases.

Ecosite identification requires two tasks:

- accurate description (determination and recording) of site, soil, and vegetation characteristics; and
- use of the various aids and descriptive materials in this guide to determine the ecosite unit that best matches these characteristics.

It should not be expected that a field site will perfectly match all details in the description of an ecosite unit in this guide. Sites that are classified within an ecosite comprise a set of floristic and site conditions that describe a conceptual unit of classification. The site should reasonably match the concept and principal features of an ecosite, but may not perfectly match all the details of the ecosite description.

Although the ecosite classification represents most of the variability expected to be encountered in a subzone, there are still likely to be some ecosystems that do not appear to fit any of the described ecosites. This may be because the ecosystem is located in a geographically transitional area between two or more bioclimatic subzones and so reflects the transitional climate. Alternatively, an ecosite with a "poor fit" may be located on a transitional site; that is, it has features of two different ecosites. In the latter case, the assessment plot might be relocated to represent more accurately one ecosite or the other. If this is not possible, then the characteristics of the site as compared to both site units should be considered. A "poor fit" could be due to site disturbance (see Section 5.5) or to encountering a new ecosystem that has not yet been described. If this is thought to be the case, it should be brought to the attention of the ELC program coordinator, Environment Yukon.

3.2.1 Describing sites

In most cases, a field visit is necessary to confirm an ecosite. Both a site assessment, which involves collecting site and soils information (Table 3-1), and a vegetation assessment are required. Data should be collected using forms and field methods following the *Field Manual for Describing Yukon Ecosystems* (Environment Yukon 2016), or the *Field Manual for Describing Terrestrial Ecosystems* (B.C. Ministry of Environment and B.C. Ministry of Forests and Range 2010). Appendix 1 contains several keys to assist in the process.

Table 3-1. Site and soil features that are important in site identification

Site features	Soil features	
Elevation	Texture	Humus thickness
Slope position	Per cent coarse fragments	Humus form
Slope gradient	Soil depth	Type of A horizon
Aspect	Rooting depth	Presence of gleying
Floodplain	Depth to root-restricting layer	Bedrock geology
Exposure	Depth to water table	Soil drainage
Disturbance	pH	Patterned ground

In most situations, the following steps would be carried out by the observer.

Step 1 **Select sample area.** Locate an area for assessment that appears to be representative of the site being sampled, and is as homogeneous in plant cover and overstorey canopy condition as possible. The area should not include pronounced differences in site, soil or vegetation that may indicate another ecosite, and it should exclude edge effects and disturbances such as roads or paths. The assessment area should be approximately 0.04 ha (20 X 20 m).

Step 2 **Describe vegetation.** Record as many of the plant species (including tree species) in the plot as possible. Estimate the per cent cover of each species. See Appendix 1 for comparison charts for visual estimation of foliage cover.

Step 3 **Describe site and soil characteristics.** Determine and record site and soil information important for site identification. The keys and codes in Appendix 1 outline some of the more important site and soil features to be collected. More detailed site and soil information may be required for certain purposes.

Step 4 **Determine soil moisture and nutrient regime.** Using the site and soil factors recorded, determine the relative soil moisture regime and relative soil nutrient regime using the keys provided in Appendix 1.

3.2.2 Identifying site units

Once information about site, soil, and vegetation has been recorded for a given area, the ecosite unit can be identified and named. Several aids are presented in Part 2 of this field guide to assist in the identification of ecosites and ecosite phases. Initially, there is a set of aids that includes all ecosites in the subzone:

- an **Edatopic grid** shows the characteristic range of soil nutrient and moisture regimes for all ecosites;
- **Vegetation tables** displaying the vegetation that characterizes each ecosite, as compared to others;
- **Ecosite identification tables** list key features for identifying ecosites; and
- **Landscape profiles** show the distribution of ecosites on the landscape.

Edatopic grid

The edatopic grid is a two-dimensional representation of soil moisture and soil nutrient regimes (Figure 3-2), with an addition for wetlands of pH and hydrodynamic index. For each subzone, the ecosites are displayed on one or more edatopic grids. The overall grid shows the relative position of all ecosites. To simplify presentation, ecosites are displayed with no overlap of the units on the grid. Where two or more units can be found on the same soil and nutrient conditions in the field, their distribution on the grid is shown by the sharing of grid cells. Ecosite units that share a cell occupy the range of SMR/SNR conditions represented by the cell on the edatopic grid; i.e., there is no gradient of values within a cell.

These grids are qualitative representations of the moisture and nutrient status of sites within a subzone, inferred from site, soil, and vegetation characteristics. Limited data are available on nutrient or moisture conditions, acidity/alkalinity or water-level fluctuations to quantify these relationships.

Relative soil moisture regime refers to the relative amount of soil moisture available for plant growth in a subzone. It is located on the left vertical axis of Figure 3-2, ranging from driest (very xeric, or 0) to wettest (aquatic, or 9). The soil moisture regime represents the soil's ability to receive and store moisture. It can be determined from slope position and gradient, soil depth and texture, coarse fragment content, aspect, and sources of seepage.

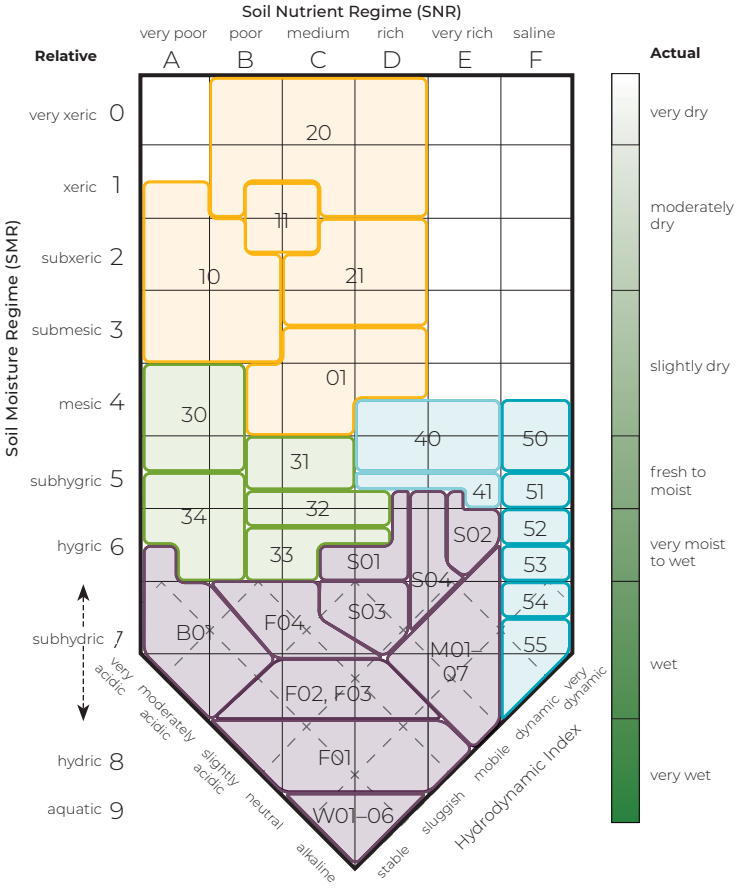


Figure 3-2. A hypothetical edatopic grid

This shows the characteristic range of soil nutrient and moisture regimes for a set of ecosites in a bioclimate subzone.

For example, on xeric sites, precipitation may be the only source of moisture. This moisture may be lost rapidly due to any combination of factors: shallow soils, steep slopes, or coarse-textured soils. Appendix 1 provides definitions of and two "keys" to the identification of relative soil moisture regime, and defines the terms used in the soil moisture regime keys.

The edatopic grid includes the **wetland edatopic grid** introduced by MacKenzie and Moran (2004). For wetland ecosystems, the acidity/alkalinity and the magnitude of lateral water flow or vertical fluctuation of the water table (i.e., hydrodynamics) are additional factors added as tangential axes at the wettest end of the grid. The pH (acidity/alkalinity) and hydrodynamic index classes are defined as follows:

The **pH (acidity/alkalinity)** is an indication of base cation availability. This factor is primarily of importance for peatlands. Generally, as acidity increases, available base cations decrease; this results in reduced site productivity. Five categories of acidity are recognized:

- **Very Acid** (VA): (<4.5 pH) sites are true bogs, with high cover of acidic peat mosses and few minerotrophic indicators.
- **Moderately Acid** (MA): (4.5–5.5 pH) sites have high peat moss cover but minerotrophic indicators also occur. Mostly poor fens.
- **Slightly Acid** (SA): (5.5–6.5 pH) sites are fens or swamps. *Tomenthypnum*, *Warnstorfia* and *Drepanocladus* brown mosses are typical for sites with a stagnant or sluggish hydrodynamic index.
- **Neutral** (N): (6.5–7.4 pH) sites are fens, swamps or marshes. Species are often a combination of species found on slightly acid and alkali sites.
- **Alkaline** (Ak): (>7.4 pH) sites are dominated by minerophilic bryophytes such as *Scorpidium* or *Campylium* mosses on peatland sites. Alkali-tolerant species occur in marshes.

The **Hydrodynamic Index** has five categories that describe the magnitude of vertical and lateral water movements in the soil on wetter sites:

- **Stagnant** (St): Stagnant to very gradually moving soil water. Vertical fluctuations minimal. Permanent surface saturation but minimal or no surface flooding. Basins or hollows with stable water regimes. Abundant organic matter accumulation and high bryophyte cover.
- **Sluggish** (Sl): Gradual groundwater movement through peat or fine-textured mineral soils along a hydrological gradient. Minor vertical watertable fluctuations. Semi-permanent soil saturation with some elevated microsites or brief periods of surface aeration. Hollows, slopes and water tracks in basins or lake flats not directly influenced by the waterbody. Abundant peat accumulation and bryophyte cover.
- **Mobile** (Mo): Distinct flooding and drawdown or pronounced lateral water movements. Peripheral areas of peatlands, sites adjacent to open water tracks, small rivulets or ponds, small potholes with relatively stable water regimes, protected lake embayments, or back-marshes in estuaries. Can have deep but well-decomposed accumulations of peat. Patchy bryophyte cover.
- **Dynamic** (Dy): Significant lateral flow and/or strong vertical water table fluctuations through mineral soils. Potholes in arid climates that experience significant drawdown, wave-exposed shores, floodplain back channels, and protected estuary sites. Little organic accumulation, few bryophytes.
- **Very Dynamic** (VD): Highly dynamic surface water regime. Exposed tidal sites, shallow potholes in arid climates that experience significant drawdown, wave-exposed shores, and sites directly adjacent to and influenced by river flow. No organic accumulation or bryophytes.

Actual soil moisture regime, shown in a bar on the right-hand side of Figure 3-2, refers to the average amount of soil water available for evapotranspiration by vascular plants over several years. It is a measure of the moisture regime of a site using a more quantitative, water-balance approach (Klinka et al. 1989). Table 3-2 presents a key to the ten ASMR classes.

Table 3-2. Classification of actual soil moisture regimes

Feature	Class
Water deficit occurs. Rooting-zone groundwater absent during the growing season. (Soil-stored reserve water is used up and drought begins if current precipitation is insufficient for plant needs).	
Deficit >5 months (AET/PET 1 ≤55%)	excessively dry
Deficit >3 months but ≤5 months (AET/PET ≤75 but >55%)	very dry
Deficit >1.5 months but ≤3 months (AET/PET ≤90 but >75%)	moderately dry
Deficit >0 but ≤1.5 months (AET/PET >90%)	slightly dry
No water deficit occurs. Rooting-zone groundwater usually absent during growing season.	
Utilization (and recharge) occurs (current need for water exceeds supply and soil-stored water is used)	fresh
No utilization (current need for water does not exceed supply; temporary groundwater table (>60 cm) may be present)	moist
No water deficit occurs. Rooting-zone groundwater present during the growing season.	
Groundwater table >30 – 60 cm deep	very moist
Groundwater table >0 but <30 cm deep	wet
Groundwater table at or above the ground surface	very wet
Permanent water table approximately >50 cm	aquatic

Source: Modified from Klinka et al. (1989) and Banner et al. (2014)

1. AET = Actual evapotranspiration; PET = Potential evapotranspiration

Soil nutrient regime indicates, in a relative way, the soil's ability to supply the major nutrients required for plant growth. It is displayed along the horizontal axis of the edatopic grid (Figure 3-2) and generally ranges from very poor (A) to very rich (E); it can also include saline (F) in subzones where such sites occur. Many factors influence the ability of the soil to store nutrients, including soil depth, texture, coarse fragment content, seepage water, humus form, and geological source of the parent material. Appendix 1 provides several keys to SNR and Figure A1-7 illustrates the relative roles of factors influencing SNR.

Vegetation tables

Vegetation tables are used in this guide to compare floristic features among ecosites or among vegetation associations within ecosites. The tables display a symbol for classes that combine frequency and mean cover for characteristic plant species (or groups of species), displayed by strata: trees, shrubs, ground shrubs, etc. (Table 3-3 and 3-4). Scientific names are displayed in the second column of the table (except in the case of groupings of species, which may only have a common name), and common names, where available, in the last column.

The vegetation tables are general guides to the dominant and indicator species that best characterize each unit. The actual abundance of plant species on any given site will depend on several factors, including the successional status of the site, the type and degree of disturbance that initiated succession, and chance events. The vegetation tables are derived from data collected in the sample plots used to classify and describe the ecosites. Some plants may be unique to a particular unit; this usually occurs at the extremes of the environmental gradient (e.g., in the driest or wettest units). Most sites do not have exclusive plants, and usually the relative abundance, as well as the presence or absence of a group of plants, distinguishes one ecosite or vegetation unit from another.

Scientific and English common names of plants mentioned in this guide are based on Yukon lists.

Table 3-3. An example of a vegetation table

Stratum	**Vegetation Association**	**Alin55**	
	No. of plots	5	
Shrub layer	*Alnus incana*	■■■■■	river alder
	Salix arbusculoides	■■■	little tree willow
	Salix spp.	▪▪▪▪	willows
Graminoid layer	*Calamagrostis canadensis*	■■■	bluejoint reedgrass
	Carex aquatilis	▪▪▪	water sedge
Forb layer	*Equisetum arvense*	▪▪▪▪	common horsetail
	Rubus arcticus	■■	arctic raspberry
Moss layer	*Calliergon spp.*	□□	water mosses
	Drepanocladus spp.	□□□□	hook-mosses
	Mnium spp.	■■■	leafy mosses

The symbol (see Alin55 column in Table 3-3) indicates a combination of frequency (the percentage of sampled plots in which the species occurred) and abundance (using mean per cent cover; see Table 3-4).

Table 3-4 indicates mean cover values by the number of small squares: <1% is a single square; 1–3% mean cover is two squares; etc. The open, grey or black squares indicate the frequency of occurrence: open is 25–49.9%; grey is 50–69.9%; and black is 70–100%. In order to reduce the size of tables, infrequent species are not always shown.

Table 3-4. Abundance symbols used in vegetation tables

Frequency	Mean Cover				
	<1%	1–3%	3–10%	10–25%	>25%
70–100%	■	■■	■■■	■■■■	■■■■■
50–70%	■	■■	■■■	■■■■	■■■■■
25–50%	□	□□	□□□	□□□□	□□□□□

Ecosite identification tables

Tables comparing key features of the ecosites in select groupings have been constructed to help users identify ecosites within a subzone (see Table 3-5 for an example). The tables contain a series of comparison statements about site and vegetation characteristics (site moisture, site/soils, overstorey/shrub cover, ground cover) associated with one or a group of units. The user can compare these statements to find the ecosite that best fits the field observations. The tables generally contain abbreviated information extracted from the vegetation tables and ecosite descriptions, and emphasize features that can be identified quickly and easily.

Landscape profiles

Landscape profile diagrams depict the typical location of ecosites (Figure 3-3). The profile shows the most common occurrence of parent materials (colluvial, morainal, fluvial, organic, and bedrock), and the dominant plant species are illustrated with schematic figures. Because one site factor can compensate for another (e.g., soil texture for slope position), a given ecosite can potentially occupy a range of landscape positions.

Table 3-5. Example of ecosite identification table

Dry to Mesic Ecosites		Moisture	Site/Soils	Overstorey/Shrubs	Ground Cover
20	**Pasture sage – Purple reedgrass**	SMR=0–1 drainage= R-VR	warm, steep, southerly aspect; humus form usually mull	vegetation is non-forested: <10% tree cover; <10% shrub cover	"grassland" dominated by grasses, sedges, forbs, kinnikinnick
21	**Aspen – Purple reedgrass – Kinnikinnick**	SMR=2 drainage=W	site is usually warm, often moder or mull humus form	aspen or mixed aspen-white spruce overstorey	grassy or kinnikinnick understorey; forbs common
11	**Balsam poplar – Aspen – Baikal sedge**	SMR=2 drainage= R-W	active erosion and deposition; sandy eolian material	often dominated by deciduous overstorey of balsam poplar-aspen but tree cover may be absent	sparse ground cover including Rocky Mountain fescue, Field wormwood, Baikal sedge, Yukon lupine
10	**Pine – White spruce – Kinnikinnick – Lichen**	SMR=2-3 drainage= R-W	soil is coarse textured, skeletal; often glaciofluvial, eolian or till	pine or spruce overstorey; if mixed aspen-coniferous canopy it has lichen ground cover	lichen or lichen ground shrub ground cover
01	**White spruce – Aspen – Pine – Twinflower**	SMR=3-4 drainage= W-M	site is level, may be slightly south facing for fine-textured soils; may be north facing for coarse textured soil	vegetation may be coniferous, mixed or deciduous; soapberry common	ground cover may be feathermoss dominated, mixed ground shrubs or grassy

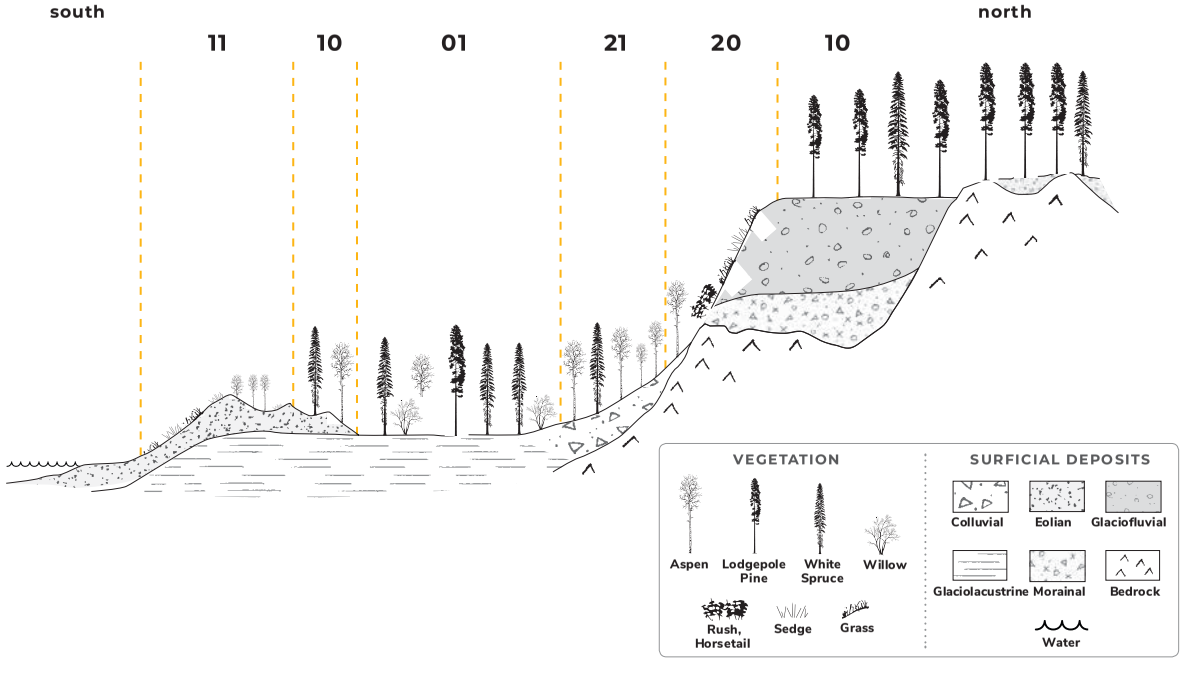


Figure 3-3. An example of a landscape profile diagram

3.2.3 Ecosite description

Following the set of general ecosite identification tools described in Section 3.2.2, each ecosite is characterized and described with the following information:

- general description;
- small edatopic grid;
- comments (which include important distinguishing features);
- table of environmental conditions;
- soil profile;
- vegetation table(s) displaying the vegetation of the ecosite, separated
  into associations; and
- one or more photos.

These are provided to help users confirm the ecosite and to identify the vegetation association, where vegetation variation is shown and is of interest to the user. Components of these sections are described further here.

General description

This section outlines the main site and vegetation features of the ecosite. It is provided to help users understand the conceptual basis of the ecosite.

Edatopic grid

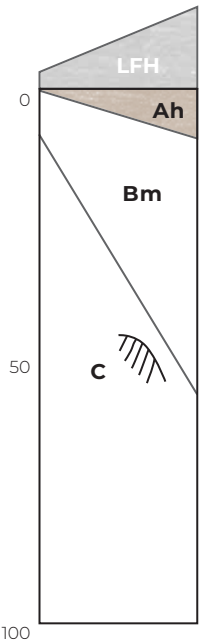
A small edatopic grid is provided as a quick visual reminder of where the ecosite fits on the edatopic grid.

Comments

This section is mostly used to outline features that best differentiate the ecosite from others with comparable vegetation or site conditions. If ecosite phases are recognized, they are outlined here.

Soil profile

A soil profile for a typical site is provided in Figure 3-4 to help users understand some key features. Soils are classified according to the Soil Classification Working Group (SCWG 1998). A summary of the soil classification and soil horizon codes shown in these diagrams is found in Appendix 3.



Note: See Appendix 1 for codes used for soil horizons (LFH, Ah, Bm, C)

line represents range of soil horizon depths

represents range of active layer depth when permafrost is present (i.e., top of permafrost)

This figure would be interpreted as:
-LFH is 3–15 cm thick;
-Ah is 0–10 cm;
-Bm ranges from 7–55 cm;
-active layer depth ranges from 40 to 55 cm; and
-C ranges from 7 to >100 cm

Figure 3-4. An example of a soil profile diagram

Common environmental conditions

The following environmental conditions are summarized in a table for each ecosite.

Table 3-6. Definition of environmental condition fields

Term	Definition
Moisture Regime	Range of soil moisture regime
Nutrient Regime	Range of soil nutrient regime
Meso Slope Position	Range of meso slope positions; see Appendix 1
Aspect	Description of range of aspects; may be “variable”
Slope Gradient	Description of range of slope conditions
Surficial Material	Listing of surficial materials; may be “variable”; see Appendix 1
Soil Texture	Generalized soil texture; may be “variable”
Soil Classification	Code for Soil Classification Order and sometimes also Great Group (SCWG 1998)
Humus Form	Humus classification at broad level: mor, moder, or mull
Humus Depth	Range of depth in cm
Soil Drainage	Range of soil drainage using terms defined in Appendix 1
Seepage/ Water Table	Presence or evidence of seepage (gleying, mottling), or depth of water table; may be “none”
Permafrost	Presence
Site Disturbance	Significant site disturbance factors, e.g., flooding and wind, are noted where significant
Exposure	Significant exposure to wind, insolation, cold air or frost is noted, where applicable

Vegetation summary

Th vegetation section includes a listing of the vegetation associations that characterize the ecosite, along with one or more vegetation tables that list the plant species and their relative abundance/frequency.

The vegetation associations presented in this guide are most applicable to vegetation that has not been disturbed too recently; perhaps, vegetation greater than 40 years of age. Generally, data is not available to characterize the younger seral plant communities, and not all the vegetation conditions encountered in the field are characterized.

3.2.4 Integrating the site and vegetation information

The aids described above provide a preliminary identification of the ecosite from the perspective of both environment (site) and vegetation. The user should look for the unit that fits best with the plant indicator species and the site and soil features.

In many situations, ecosite identification derived from both environmental and vegetation analysis will coincide. However, this is not always the case. If vegetation analysis gives a wide-ranging or unreliable result because of unsuitable floristic conditions (e.g., after a fire), place greater emphasis on environmental analysis. If vegetation analysis gives a strong and distinct result that differs significantly from environmental analysis, look more closely at the environmental analysis to try and explain the discrepancy.

For example, a flat, coarse-textured site that initially appears relatively dry based on environmental properties may have plants that indicate a moist soil moisture regime. A closer examination of the soil (i.e., digging a deeper soil pit) may reveal a fine-textured layer that creates a temporary perched water table. If neither vegetation nor environmental analysis provide a definitive classification result, check if the area is in a climatic transition area. If it is, check ecosites on the grid for the adjacent bioclimatic subzone. Try to identify the ecosite that has the closest fit; describe and, if possible, explain anomalies if they occur.

3.3 Identifying vegetation units

One or more vegetation associations are presented for each ecosite. This provides additional information for the observer who wants to better characterize and understand the vegetation communities that occur within an ecosite. Vegetation associations may occur in multiple subzones, and the association code and name are the identifiers that are used across the Yukon.

For each subzone, the associations are listed by ecosite, and vegetation tables are provided that show the relative abundance of frequent species occurring in the communities. The vegetation of a particular site can be compared to that shown in these tables. Again, it is possible that the observer will come across vegetation that is intermediate or doesn't match any of the vegetation communities presented within an ecosite. Site history, available seed sources, and time influence the development of vegetation on an ecosite. Vegetation is characterized based on the plots and it is unlikely that there are samples of all possible vegetation variation. For example, there is relatively little sampling of early seral stages and what is available can be challenging to associate with an ecosite for various reasons, including limited soil data or poor species identification (e.g., willows, mosses, and grasses not always identified).

To assist with vegetation community identification, vegetation association fact sheets are being developed for Yukon. These fact sheets will also include vegetation characteristics described at the subassociation level. These will have vegetation tables similar to those in this guide, but will also have descriptions, differentiating characters including range of the vegetation association throughout Yukon. These guidebooks will supplement what is presented here.

4.0 BIOCLIMATE ZONES OF YUKON

Nadele Flynn

The Yukon Ecological and Landscape Classification program currently recognizes eight bioclimatic zones in the territory (Figure 4-1; Table 4-1). This section provides a brief overview of the zones. Climatic characteristics for the bioclimatic zones are summarized in Table 4-2 as a mean and a range of values (maximum and minimum) for climate normals for the period 1971–2000.

Figure 4-1. Bioclimate Zones of Yukon

Table 4-1. Overview of Yukon Bioclimatic Zones
Vegetation, topography and climatic features

Bioclimate	Code	Description
Boreal Bioclimate Region (Southern Yukon)		
Boreal Low	**BOL**	Continuously forested areas at low to middle elevations (i.e., below the BOH) of all mountain valley and plateau regions of southern and central Yukon. Winters are long and cold, with short, cool and dry summers. Forests are generally mixed wood (lodgepole pine, white spruce and aspen) with moderately developed understories. Wetlands are common.
Boreal High	**BOH**	Middle to upper elevations of forested areas in all mountain valley and plateau regions of southern and central Yukon. This zone is found above the BOL in large valleys. It is characterized by steep slopes in the southern mountainous regions and gentle rolling plateaus in the central regions. Summers are brief, cool and moist, with long cold winters. Forests are dominated by white spruce, lodgepole pine and subalpine fir. Forests tend to be more open than those of the BOL.
Subalpine	**BOS**	Shrub communities with sparse tree cover (<10%) at moderate to higher elevations on steep slopes above the BOH and BOL. This forms a transitional zone between forested BOL and BOH and the higher elevation, non-treed alpine bioclimate zone. Sparse canopy conifer forests (tree cover <10%) and tall to medium shrub communities are characteristic vegetation. Depending on the geographic area, either subalpine fir or white spruce tree species may occur. Winters are long and cold, while summers are short, cool and moist.
Subarctic Bioclimate Region (Northern Yukon)		
Subarctic Woodland	**SUW**	Coniferous or mixed wood forested areas with an open canopy in northern Yukon. Generally occur in valley bottoms and lower slopes of mountain valleys, or on plateaus and plains. Slope position, aspect and the distribution and depth of permafrost are major influences on vegetation distribution and dynamics. In steep terrain, active slope processes (rock slides, slumps, talus cones) make a major contribution to the distribution of forests.
Subarctic Subalpine	**SUS**	This zone is dominated by tall or low shrubs, with sparse or sporadic tree cover. It generally occurs at high elevations in northern mountain systems. However, its distribution in some areas of northern Yukon appears to be influenced by arctic weather systems; this situation may require a different bioclimate zone designation.

Bioclimate	Code	Description
Arctic Bioclimate Region (Northern Yukon)		
Arctic Low Shrub Tundra Zone	**ARLS**	The Arctic Low Shrub Tundra zone occurs between sea level and 350–500 m elevation in the foothills of the British and Richardson mountains. The ARLS occurs below the Arctic Dwarf Shrub Tundra montane subzone in the mountains and is bounded to the south and east by the Subarctic Woodland zone in the Old Crow basin and the Mackenzie delta. Along the coast in the west, the ARLS gives way to the Arctic Dwarf Shrub Tundra lowland subzone, where shrub cover is greatly reduced and colder oceanic influences predominate. Zonal vegetation has low shrubs, often >40 cm tall. Tussock tundra with low shrubs, tall shrub riparian ecosystems and peat development are common features. Relative to other Yukon arctic zones, ecosystem diversity is high. The ARLS bioclimate zone is equivalent to the "E" bioclimate subzone in the Circumpolar Arctic Vegetation Map (CAVM Team 2003).
Arctic Dwarf Shrub Tundra Zone	**ARDS**	The Arctic Dwarf Shrub Tundra zone occurs above the Arctic Low Shrub Tundra zone in the British and Richardson mountains between approximately 500 and 1,500 m. This zone also occurs at low elevations on Herschel Island and along the coast west of the Firth River, extending into Alaska's Arctic National Wildlife Refuge. Zonal vegetation is dominated by Dryas species. Taller shrubs (>40 cm) are restricted to lower elevation riparian and snow-protected sites. This bioclimate zone is equivalent to the "D" and "C" bioclimate subzones in the Circumpolar Arctic Vegetation Map (CAVM Team 2003). Three bioclimate subzones occur in the ARDS zone.
Pacific Maritime Bioclimate Region		
Pacific Maritime Glacierized	**PMG**	This zone has high elevations associated with the Saint Elias Mountains and Pacific Ocean influences. In the Yukon it is also known as the Saint Elias Icefields. Rock, ice and snow comprise the dominant ground cover. Nunataks occasionally rise above the icefields and host a sparse vegetation of herbs, cryptograms and dwarf shrubs.
Alpine Tundra Bioclimate Region (Boreal, Subarctic)		
Alpine Tundra	**AT**	In the Boreal region, the alpine tundra zone occurs above the Boreal Subalpine (BOS) zone at high elevations (above altitudinal treeline). Moving northwards into the subarctic, the alpine tundra zone occurs at mid to high elevations, above the Subarctic Subalpine (SUS) zone.

Table 4-2. Selected annual and derived climate variables, Canadian Climate Normals (1971–2000) by Bioclimate Zone
Source: Environment Canada (2008); stations located by Yukon Bioclimate Zone

Bioclimate Zone	Boreal Low													Boreal High	Boreal Subalpine	Subarctic Woodland	Subarctic Subalpine	Arctic Tundra Dwarf Shrub		Arctic Tundra Low Shrub	Alpine	Pacific Maritime Alpine
Climate Station	Braeburn	Burwash	Dawson	Faro	Johnsons Crossing	Mayo	Mayo Road	Otter Falls	Pelly Ranch	Teslin	Watson Lake	Whitehorse	Whitehorse-Riverdale	Beaver Creek	n/a	Old Crow	n/a	Single Point	Komakuk Beach	n/a	n/a	n/a
Elevation (m)	716	806	370	716	690	504	655	830	445	705	687	706	640	649		250		49	7			
Annual precipitation (mm)	279.8	279.7	324.3	316.0	376.2	313.0	322.0	297.0	310.0	343.0	404.4	267.0	283.0	416.0	—	266.0	—	254.0	161.0	—	—	—
Mean growing-season (May–Sept.) precipitation (mm)	162.8	208.6	194.7	206.1	206.0	196.8	206.4	189.3	187.7	183.5	238.2	160.4	162.8	307.6	—	165.5	—	165.6	107.9	—	—	—
Annual snow (cm)	94.3	106.4	160.0	111.6	145.1	147.0	106.0	107.0	112.8	148.2	196.5	145.0	—	123.1	—	129.0	—	122.4	77.7	—	—	—
Annual temperature (°C)	–3.1	–3.8	–4.4	–2.2	–1.5	–3.1	–0.7	–1.0	–3.9	–1.2	–2.9	–0.7	–0.2	–5.5	—	–9.0	—	–9.9	–11.0	—	—	—
Degree-days below 0°C	2733	2825	3395	2540	2130	2967	—	—	3210	2085	2861	1998	1976	3534	—	—	—	—	—	—	—	—
Degree-days above 5°C	803	696	1007	951	769	1068	—	—	1011	845	984	895	1006	785	—	—	—	—	—	—	—	—
No. of frost-free days	109	107	120	132	117	135	119	—	119	127	136	140	139	105	—	104	—	90	76	—	—	—

5.0 THE BOREAL LOW ZONE OF YUKON

Karen McKenna and Nadele Flynn

5.1 Location and distribution

The Boreal Low (BOL) bioclimate zone, characterized by continuous, closed to open coniferous and mixed forest, covers approximately 2 million ha of southern and central Yukon (Figure 1-1). It includes the low-elevation valleys and plains from the B.C. border north to the Mackenzie Mountains just north of 64º N latitude.

Yukon occurs in the Canadian Cordillera, the system of mountain ranges that run generally in a north–south direction from the U.S. border to the Beaufort Sea. The complex topography of rugged mountains, plateaus, lowlands and valleys is a result of deposition, volcanic activity, deformation and plate movement along the western margins of the North American craton, which has been extensively modified by glaciation, erosion and weathering (McKenna and Smith 2004).

This mountainous physiography largely controls the distribution of the BOL. The BOL occupies broad to narrow valley bottoms along the Yukon River and its tributaries, which lie between mountains and mountain ranges. The BOL occurs in the southeast Yukon in the Liard River drainage, including the lower-elevation valleys and the broader Liard Plain. The BOL also exists in the lower valleys of the Alsek and Tatshenshini rivers, which drain south to the Gulf of Alaska.

The BOL occurs at lower elevations than the Boreal High (BOH) zone (Figure 3-4; Table 4-1); in other words, below about 900–950 metres in most of the south Yukon, ranging to below 650 to 500 metres in the northern part of its range. The lowest elevations of these valleys range from about 670 m in the south-central Yukon to less than 400 m on the Alsek River, 274 metres along the Yukon River northwest of Dawson City, and 228 m in the far southeast along the Liard River.

5.2 Climate

The BOL is the warmest bioclimate zone in Yukon (Table 4-2). It is also the driest of the bioclimate zones in the boreal region of south and central Yukon. The BOL climate is relatively dry compared to the boreal forest in much of Canada, as it is located in the “rain shadow” of the St. Elias Mountains. Precipitation is lowest directly in the rain shadow of the St. Elias Mountains and generally increases to the north and west.

Most of the BOL has a continental climate characterized by cold winters and warm summers, with major daily and seasonal temperature variability. Summers are moderately warm to warm and winters cold to very cold. Both the coldest temperatures recorded in Yukon (–62.8 ºC) at Snag and the warmest (36 ºC) at Mayo are in the BOL. The climate becomes somewhat subcontinental in the southwest, where incursions of coastal air cross the mountains and result in warmer mean winter temperatures and cooler summer temperatures.

Throughout the Western Cordillera the landscape is characterized by strong gradients of temperature and precipitation due to dramatic differences in elevation over short distances. The BOL is therefore restricted to low elevation portions of the landscape following major lakes and river valleys of Yukon. There is generally less precipitation at lower elevations, increasing at higher elevations in the Boreal High, Subalpine and Alpine bioclimate zones. As mountains predominate the BOL region of Yukon, the climate is subject to various features of mountainous regions, including temperature inversions, chinook winds, local rainshadow, and pronounced aspect differences.

5.3 Permafrost

Permafrost is ground that remains below 0º C for two or more years. Permafrost may have low or a high ice content depending on the amount of water available to form ice in the soil. The presence and distribution of permafrost is related to site position, slope, aspect, vegetation cover, snow cover, soil moisture and soil texture as well as site history (Yukon Permafrost Knowledge Network 2015). Permafrost in the BOL may be associated with cool sites that have peaty surface layers or in cold fine-textured soils. The distribution of permafrost generally increases with latitude. In the south, around Whitehorse, permafrost is very sporadic and discontinuous. The mean annual air temperature is very close to 0ºC, and the permafrost temperature is also often very close to 0°C. Thaw depth (active layer) may be greater than 1 m thick and therefore may not be reflected in the overlying vegetation. This area is also very dry, which limits peat accumulation so that soils tend to warm up more in the summer. In fine-textured sediments of the Takhini valley, an area that burned in a forest fire in 1958, the permafrost table is at 3 to 4 metres, which is below the depth penetrated by seasonal frost and is not in equilibrium with the current climate. In an adjacent unburned area the active layer is at 1.4 m and extends to about 18 m (Burn 1998).

Watson Lake and the Liard Basin in eastern Yukon have colder mean annual temperatures, higher rainfall, and also higher snowfalls than the Whitehorse area. These conditions favour peat development in more poorly drained areas and wetlands; when water flow is restricted,

these often contain permafrost. Most dry to mesic upland areas are not underlain by significant permafrost (Lipovsky and McKenna 2005).

Farther north and west, colder winters and lower mean annual temperatures lead to more extensive but still discontinuous permafrost. In central Yukon, winter snow cover is fairly thin and summer precipitation relatively high. The cold winter temperatures and low snow accumulation allow the ground to cool during the winter; the higher summer precipitation encourages the accumulation of surface peat, which insulates the ground and limits summer thawing. Moist and cool sites are generally underlain by permafrost, while warm aspects and drier areas are usually free of permafrost. Around Dawson, permafrost is common in many parts of the landscape; however, steeper south-facing slopes are usually free of permafrost (Laxton and Coates 2011; Lipovsky and McKenna 2005). In western Yukon, which is colder because it is shaded by the St. Elias Mountains, permafrost is also more widespread.

5.4 Vegetation and Soils

The Yukon BOL is part of the boreal forest that extends across Canada. Closed to open white and black spruce forests characterize the late seral forest vegetation of the Yukon BOL except where edaphic (soil) conditions restrict the growth of trees. White spruce usually dominates mature, dry upland and fluvial sites; black spruce dominates more poorly drained sites. In moister portions of the BOL, black spruce becomes more widespread on well-drained sites. Early seral tree species include lodgepole pine, trembling aspen, Alaska birch and balsam poplar in addition to spruce. Larch in the BOL is limited to some moister sites and wetlands in the southeastern part of Yukon. Subalpine fir is occasionally found in the Boreal Low, particularly in the south in the Boundary Ranges of the Coast Mountains, although it is more characteristic of higher elevations.

Brunisols are the most common soils found on upland sites throughout the BOL. Eutric Brunisols are most common in the dry climate and alkaline soils of south-central Yukon. Eluviated Dystric and Eutric Brunisols and Dystric Brunisols are more common in the southeast. In areas of very high rainfall, such as the Selwyn Mountains or the Yukon Stikine area, strong leaching can result in Dystric Brunisols and occasionally (on very coarse parent materials), Humo-Ferric Podzols. Fine-textured soils in the southeast may also develop Luvisols where clay particles have moved down in the profile to a zone of clay accumulation. Grassland soils with greater than 10 cm of dark-coloured Ah horizon may be classified as Melanic Brunisols or even Chernozems (on warm sites, due to aspect). On sites with active fluvial, wind and colluvial processes, Regosols are more common. Cryosols occur on soils with permafrost within 1–2 m of the surface. Organic soils (greater than 40 cm of peat) are most common

in bog and fen wetlands. Gleysols are most common in swamps and marshes. White spruce dominates the late seral forests on mesic and dry sites, with open or closed canopies, and is associated with Brunisolic soils. Sparse to moderate shrub cover under the white spruce includes willows (*Salix glauca*, *S. scouleriana*, *S. bebbiana* and others), soapberry, Labrador tea and shrub birch. Ground cover is commonly feathermosses (mostly *Hylocomium splendens* and/or *Pleurozium schreberi*), although *Cladina*, *Cladonia* and *Cetraria* lichens and ground shrubs such as kinnikinnick, lowbush cranberry and twinflower are extensive on drier sites and in seral communities. White spruce dominates the tree cover of mature sites in the drier part of the zone in the southwest and south-central BOL. Black spruce is more common in the Liard Plain, where precipitation is higher, and farther north, where permafrost is more extensive.

Grasslands occur on the warmest and driest sites, i.e., steep, south-facing slopes, except in the wettest portions of the BOL such as along the Alsek and Tatshenshini Rivers. In the drier central part of the BOL, grasslands occupy steep slopes, including those of silty and clayey parent materials, from southwest to southeast aspects. Farther north, where rainfall is slightly higher, only extremely steep, bedrock-controlled slopes with a direct south aspect are dominated by grasslands. Soils are classified as Brunisols, Regosols and Chernozems.

Pine is most common on dry, nutrient poor sites in the southern central part of the BOL and in the southeast, where it occurs with black spruce on dry to mesic glacial deposits.

Aspen is a common seral component throughout the BOL. It establishes following fire on dry to mesic sites that with medium to rich nutrient availability. On the driest sites it may persist. Alaska birch is a common seral species on moister sites. In the dry climate of south-central Yukon it is limited to a few cool north aspects; however, where the precipitation is higher, as in southeast and central Yukon, it is common on mesic sites. It is even found on southerly aspects in the Klondike Plateau.

Fluvial sites along rivers and creeks of the BOL are typically colonized by alder and willow shrub swamps on the lowest benches, followed by balsam poplar on mid benches, and white spruce on higher benches with a shorter period of flooding and less frequent flooding. These sites generally have Regosol soils.

Black spruce is more common on cool moist and wet sites with poor nutrient availability. It is found in only a few locations in south-central Yukon, but is a common component of the canopy in southeast Yukon. Sparsely treed black spruce bogs are common throughout the BOL.

Tree cover is often limited on moist and wet sites. Sparsely treed, shrub and graminoid fens are associated with Organic, Cryosol or Gleysol soils. Treed or shrub swamps are usually Regosols or Gleysols but may also be Cryosols. Graminoid-dominated marshes have Gleysol or Gleyed Regosol soils. Bogs, characterized by peat-moss cover, may be sparsely treed, shrubby or sometimes just moss covered. They are usually Cryosols due to the thick, poorly-decomposed acid peat surface and lack of water movement.

Depressions and low-lying valleys may be maintained as shrublands due to cold air draining and sinking into cold, moist pockets. This results in frequent summer frosts, late-persisting frozen soils or permafrost, which limits the establishment and growth of trees.

5.5 Disturbance

Natural disturbance is a characteristic feature of the boreal forest, including Yukon's BOL. Fire, pests, fluvial processes, thermokarst (melting of permafrost), wind, avalanches and slope failures are all common disturbances. They result in distinctive landscape and vegetation patterns.

Fire is the predominant disturbance regime in the BOL and has a major influence on the vegetation community on a site. Dry upland sites can burn frequently. Due to slow rates of regeneration and growth, these sites can remain dominated by lodgepole pine (the most common tree species on coarse-textured soils), or by aspen and mixed forests (on warm or finer textured soils) for a long time. Moister sites, or other sites that have burned less frequently, usually remain dominated by white or black spruce. These areas often have thicker surface organic layers.

Pests can also influence the health of Yukon forests. The recent infestation of spruce bark beetle (*Dendroctonus rufipennis*), initiated around 1990, was caused by dry warm summers and warmer winters. This outbreak killed vast tracts of spruce trees within and near Kluane National Park & Reserve. Aspen serpentine leaf miner (*Phyllocnistis populiella*) and large aspen tortrix (*Choristoneura conflictana*) have also extensively affected aspen stands of throughout aspen's range in Yukon. Over the last ten to twenty years, unprecedented and severe leaf miner defoliation has occurred in stands of aspen between Mayo and Stewart Crossing. Severe defoliation due to large aspen tortrix infestations of trembling aspen was recorded near Teslin Lake in the early 1980s, Braeburn in 1998, and Haines Junction and north in 2000. A large outbreak occurred in the Haines Junction-Champagne area in 2012. For more information about major forest health agents that pose a risk of extensive mortality or defoliation please refer to Forest Management Branch's *Forest Health Report 2013* (Forest Management Branch 2013).

Fluvial floodplains experience periodic erosion and flood deposition. Classic long-term succession includes gravel bars and sandbars exposed at low water; horsetail or sedge marshes or frequently flooded willow and alder shrub river margins; balsam poplar middle benches; and spruce-dominated higher benches with a longer period of stability and less subject to frequent flooding. Steeper fluvial fans are a common feature of mountain valleys.

Frequent avalanche activity in steep alpine and subalpine gullies, on slopes and in runout zones can result in unvegetated surface cover, grasslands, or coniferous or deciduous shrublands. Landslides are also common in steep mountainous terrain and in thick, fine-textured glaciolacustrine deposits along some major rivers. Even when initiated at higher elevations, long runout landslides may have an impact on lowland sites in the BOL.

Wind can affect an ecosite by maintaining active dune erosion and deposition downwind of long fetches found at the northerly ends of the large lakes in south-central Yukon. Wind is also a factor on braided rivers, such as the Slims River, and above exposed cuts or sections of surficial material. Aspen and balsam poplar often colonize steep slopes of active dunes, forming stunted dense stands. In addition, wind can break off treetops, cause tree canopies to curve away from the prevailing wind, and create openings in forests when trees get uprooted, especially after a forest fire. The strongest winds blow out of the St. Elias Mountains.

5.6 Rare ecosystems

Rare ecosystems of the Boreal Low Zone in Yukon include groundwater springs, some wetlands, grasslands, sand dunes, and saline areas as well as ecosystems associated with unglaciated regions. These rare ecosystems usually support some rare plants and/or plant communities that are specially adapted to the specific soil conditions or disturbance regime.

These ecosystems often support rare species of insects, birds, amphibians or other wildlife due to the unique conditions present. There are numerous species associated with these rare ecosystems with disjunct distributions hundreds of kilometres from their nearest relatives. As many parts of Yukon have only been rarely visited and even more rarely studied in detail, new rare ecosystems may still be encountered.

Springs in the Boreal Low Zone include the Takhini Hot Springs, Coal River Springs, and others along the Beaver and Labiche Rivers. These springs often support rare plant species and communities that are adapted to the specific temperature and mineral conditions.

Sand dunes in Carcross host the rare Yukon lupine and Baikal sedge; these are endemic to southern Yukon and well adapted to reproducing in active-moving sand. Yukon grasslands can be considered small isolated analogues to the dry steppe environments that existed in unglaciated areas of Beringia during the Pleistocene.

6.0 SUBZONES OF THE BOREAL LOW ZONE

Nadele Flynn and Karen McKenna

Eight subzones are proposed for the Boreal Low (BOL) Zone (Figure 6-1). These subzones are demarcated based on differences in vegetation associations on reference sites and regional climatic factors that drive ecosite vegetation community development. The proposed BOL subzones roughly correspond to ecoregion distribution (Smith et al. 2004):

- **BOLal** Alsek
- **BOLkp** Klondike Plateau
- **BOLlh** Liard-Hyland
- **BOLlr** La Biche River
- **BOLrr** Ruby Ranges
- **BOLsl** Southern Lakes (see Part 2)
- **BOLyc** Yukon Plateau Central
- **BOLyn** Yukon Plateau North

A summary of some climate data for selected stations in the BOL (Table 6-1) shows the trends in climatic attributes that influence the vegetation patterns within and between subzones.

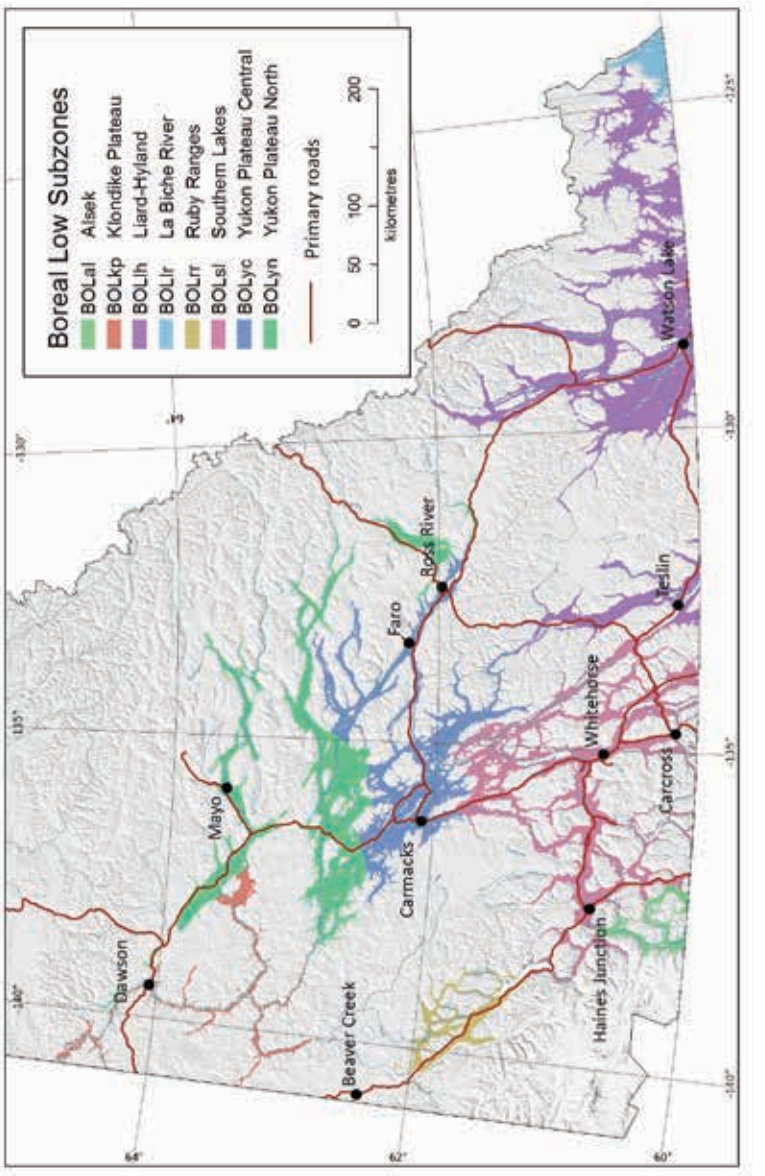


Figure 6-1. Map of preliminary subzones of the Boreal Low Zone

Table 6-1. Selected annual and derived climate variables, Canadian Climate Normals (1971–2000) by Boreal Low Subzone
Source: Environment Canada (2008); stations located by Yukon Boreal Low subzones

CLIMATE STATION (BOREAL LOW SUBZONES)	not available (**BOLal**)	Dawson (**BOLkp**)	Watson Lake (**BOLlh**)	not available (**BOLmp**)	Burwash (**BOLrr**)	Braeburn (**BOLsl**)	Johnson's Crossing (**BOLsl**)	Mayo Road (**BOLsl**)	Otter Falls (**BOLsl**)	Whitehorse (**BOLsl**)	Whitehorse - Riverdale (**BOLsl**)	Faro (**BOLyc**)	Teslin (**BOLlh**)	Mayo (**BOLyn**)	Pelly Ranch (**BOLyn**)
Elevation (m)	—	370	687	—	806	716	690	655	830	706	640	716	705	504	445
Annual precipitation (mm)	—	324.3	404.4	—	279.7	279.8	376.2	322.0	297.0	267.0	283.0	316.0	343.0	313.0	310.0
Mean growing-season (May–Sept.) precipitation (mm)	—	194.7	238.2	—	208.6	181.8	206.0	206.4	189.3	160.4	162.8	206.1	183.5	196.8	187.7
Annual snow (cm)	—	160.0	196.5	—	106.4	94.3	145.1	106.0	107.0	145.0	—	111.6	148.2	147.0	112.8
Annual temperature (°C)	—	–4.4	–2.9	—	–3.8	–3.1	–1.5	–0.7	–1.0	–0.7	–0.2	–2.2	–1.2	–3.1	–3.9
Degree-days below 0°C	—	3395	2861	—	2825	2733	2130	—	—	1998	1976	2540	2085	2967	3210
Degree-days above 5°C	—	1007	984	—	696	803	769	—	—	895	1006	951	845	1068	1011
Number of frost-free days	—	120	136	—	107	109	117	119	—	140	139	132	127	135	119

6.1 BOLal Alsek Boreal Low Subzone

Location and distribution

- 1,247 km^2 in southwest Yukon
- Ecoregions (Smith et al. 2004)
  - Yukon Stikine Highlands (western portion)
  - St. Elias Mountains (south corner)
- Restricted to the bottom of deeply incised valleys
  - below about 900–950 m
  - Alsek and Tatshenshini rivers

Climate

- Moist, influenced by periodic incursions of coastal air
- Less continental than other parts of Yukon
- Warmer winters with higher snowfall

Vegetation

- White spruce forests
- No lodgepole pine
- Lusher vegetation, reflecting greater precipitation
- South-facing slopes are aspen forest, not grasslands as in adjacent BOLsl

Soils

- Less permafrost because of greater snow depths

6.2 BOLkp Klondike Plateau Boreal Low Subzone

Location and distribution

- 2,527 km^2 in west-central Yukon
- Klondike Plateau Ecoregion (Smith et al. 2004)
- Klondike Plateau Physiographic Region (Mathews 1986)
- Limited to the narrow valleys along the major rivers that have cut deeply into the plateau surface
  - Below about 430–460 m
  - Major rivers: Nisling River, the lower reaches of the White, Sixty Mile, Klondike, Stewart, Chandindu and Fortymile, and the Yukon River to the Alaska border

Climate

- Cold; dry to moist

Vegetation

- Vegetation on reference site is Black and white spruce/Labrador tea – willow/Feathermoss
- No lodgepole pine, no subalpine fir
- Common vegetation on the floodplains of the major rivers is white spruce – balsam poplar forests
- Black and white spruce with sedge tussock ground cover and permafrost near the surface is typical of older fluvial and glaciofluvial terraces
- Aspen on steep south slopes, mixed with birch and white spruce on less steep or southeast or southwest aspects
- North-facing slopes are Black spruce/Labrador tea/Feathermoss – Peat moss – Lichen
- Mixed black and white spruce on lower slope positions
- Grasslands restricted to very steep south-facing bedrock slopes

Soils

- Extensive discontinuous permafrost
  - Permafrost on level mesic sites, only steeper south-facing slopes are free of permafrost

6.3 BOLlh Liard – Hyland Boreal Low Subzone

Location and distribution

- 18,206 km^2 in southeast Yukon
- Ecoregions (Smith et al. 2004)
  - Liard Basin
  - Yukon Plateau – North (southern portion)
  - Selwyn Mountains (southern low elevation portion)
  - Hyland Highland
  - Pelly Mountains (lowest elevations in south portion)
- Physiographic Regions (Mathews 1986)
  - Liard Lowland
  - Hyland Highland
  - Nisutlin Plateau (Yukon Plateau)
- Low elevations along Liard River and its tributairies and Nisutlin plateau
  - Below about 950 m
  - Major rivers: Liard, Hyland, Coal, Rock, Smith, Beaver, Nisutlin and Wolf

Climate

- High continentality: cold winters and hot warm summers
- Moist climate with high rainfall and deeper snow than other parts of BOL
- The Nisutlin plateau area is moister than the BOLsl to the west and has a climate transitional to the more continental climate to the east. It appears to fit best with the BOLlb

Vegetation

- Mesic upland sites are dominated by mixed white spruce – black spruce – birch – aspen
- Alder is common on mesic sites
- Similar to B.C.'s Moist Cool Boreal White and Black Spruce subzone Black spruce relatively frequent
- Black spruce-pine common on drier upland sites
- Larch occurs in some wet areas

Soils

- Greater accumulation of peat in organic soils than in BOL subzones to the west
- Permafrost is limited to cold, moist and wet sites
- Eluviated soils, Luvisols and Podzols more common than in most of BOL

6.4 BOLlr La Biche River Boreal Low Subzone

Location and distribution

- 1,049 km^2 in southeast Yukon
- Ecoregions (Smith et al. 2004)
  - Muskwa Plateau
  - Hyland Highland (southeast corner)
- Physiographic Regions (Mathews 1986)
  - Great Slave Plain
  - Hyland Highland (southeast corner)
- Lowland plain and river valleys below about 900 m
  - Major rivers: La Biche and lower Beaver

Climate

- Wet and warm, relative to the rest of Yukon

Vegetation

- Mixed forests with abundant tall shrubs dominate upland sites
- Low fire frequency
- Plants include southern species such as common miterwort, trailing raspberry, oak fern and devil's club

Soils

- Extensive till, glaciolacustrine and fluvial deposits
- Eluviated Brunisols, Luvisols and Podzols more common than in other parts of BOL

6.5 BOLrr Ruby Ranges Boreal Low Subzone

Location and distribution

- 2,238 km^2 in southwest Yukon
- Ecoregions (Smith et al. 2004)
  - Ruby Ranges
  - St. Elias Mountains (very minor portion)
- Physiographic Regions (Mathews 1986)
  - Kluane Plateau
  - Kluane Ranges
  - Shakwak Trench
- Occurs along the Shakwak Trench and along the narrow valleys of the major rivers up to about 850 m
  - Major rivers: White, Donjek, Nisling

Climate

- Dry, cold

Vegetation

- Dominated by white spruce (no pine, no fir and no black spruce)
- Reference site vegetation is White spruce/Feathermoss
- Some grasslands on steep south-facing aspects

Soils

- Soils are usually Brunisols, Cryosols, or Regosols

6.6 BOLsl Southern Lakes Boreal Low Subzone

Location and distribution

- 13,812 km^2 in southwest Yukon
- Ecoregion (Smith et al. 2004)
  - Yukon Southern Lakes
  - Yukon Stikine Highlands (eastern portion)
  - Ruby Ranges (southern portion)
  - St. Elias Mountains (southeastern corner)
  - Yukon Plateau – Central (southern portion)
- Physiographic Regions (Mathews 1986)
  - Lewes Plateau
  - Teslin Plateau
  - Shakwak Trench (southern portion)
- Occupies broad glaciated valleys below about 900 m
  - Rivers: Yukon, Teslin, Takhini, M'Clintock, Nisutlin, Wolf and Morley
  - Lakes: Kusawa, Teslin, Marsh, Laberge, Little Atlin, Bennett, Tagish

Climate

- Dry and cool
- Less continental climate than other parts of Yukon, with slightly warmer winters and cooler summers
- Occasional winter incursions of warm coastal air
- Lowest amount of summer precipitation in Yukon

Vegetation

- Open to closed coniferous forests
- Vegetation on mature reference sites is White Spruce/Soapberry/Feathermoss

Soils

- Calcareous parent materials, alkaline soils
- Saline conditions encountered in glaciolacustrine deposits of Glacial Lake Champagne north and Takhini valley
- Marl formation is common in wetlands
- Very little permafrost and what is present is very close to 0º C

6.7 BOLyn Yukon Plateau North Boreal Low Subzone

Location and distribution

- 11,770 km^2 in central Yukon
- Ecoregions (Smith et al. 2004)
  - Yukon Plateau – North
  - Klondike Plateau (small portion in east)
  - Yukon Plateau – Central (northern portion)
  - McQuesten Highlands (small southern portion)
- Physiographic Regions (Mathews 1986)
  - Stewart Plateau
  - Ross Lowland
  - Tintina Trench
- Occupies the broad valleys of the Stewart, Macmillan, Ross and Pelly rivers and Big Kalzas and Frances lakes
  - Below about 900 m in the south portion to below 490 m in the north
  - The lowest elevation is reached in the north along the Stewart River

Climate

- Continental climate: very cold winters, warm summers
- Moist (though Ross River, in the lee of the Pelly Mountains, is quite dry)
- Northern extent of the Boreal Low Zone

Vegetation

- Mature stands are often dominated by white spruce, although mixed forests are common due to frequent forest fires
- Reference site vegetation is White spruce – Black spruce/ Feathermoss; aspen or aspen-white spruce usually regenerates after fire
- Subalpine fir can be found in mixed stands
- Black spruce is common on cooler and wetter permafrost sites with Cryosolic soils

Soils

- Permafrost is present in many parts of the landscape: on the majority of cooler sites and lower slope positions

6.8 BOLyc Yukon Plateau Central Boreal Low Subzone

Location and distribution

- 9,276 km^2 in central Yukon
- Ecoregions (Smith et al. 2004)
  - Yukon Plateau – Central
  - Klondike Plateau (very small portion in southeast)
  - Yukon Plateau – North (central portion)
  - Pelly Mountains
- Physiographic Regions (Mathews 1986)
  - Lewes Plateau
  - Pelly Mountains (lowest elevations)
- Occupies broad lowlands from less than 900 m in the south to under 500 m in the north
  - Major rivers: Yukon, Pelly, Nordenskiold, Big Salmon, Little Salmon-Magundy

Climate

- Continental climate, dry and cold

Vegetation

- Mesic sites likely have mixed white spruce and aspen
- Pine present in southern parts
- Grasslands occur on warm slopes
- Black spruce on nutrient-poor, moist and wet sites

Soils

- Increasing permafrost, relative to farther south

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BOREAL LOW ZONE OF YUKON

Southern Lakes Boreal Low Subzone (BOLsl): A Field Guide to Ecosite Identification

Part 2: Southern Lakes Boreal Low Subzone (BOLsl)

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1.0 SOUTHERN LAKES BOREAL LOW SUBZONE (BOLsl)

1.1 Description

The Southern Lakes Boreal Low Subzone (BOLsl; see Figure 1-1) of the Boreal Low Zone occupies broad glaciated valleys with numerous large lakes, which give the ecoregion and subzone their name. This is the driest part of the Yukon, with low overall rainfall due to its location in the lee of the Coast Mountains. The subzone also experiences greater moisture deficits during the growing season than other regions due to warm summer temperatures and summer rainfall that is often not dependable. Open to closed white spruce, pine and aspen forests characterize the forests of this bioclimate subzone. Black spruce is limited to a few moist and cool locations and areas transitional to other subzones in the east and north; these locations are often associated with near-surface permafrost. Mature, medium to rich mesic sites are usually dominated by white spruce, with understorey shrubs such as soapberry and feathermosses. Younger forests on these mesic sites are often aspen or mixed spruce and aspen and sometimes lodgepole pine.

Grasslands occupy the driest sites (xeric and very xeric). These occur on steep southerly aspects that are much warmer and drier than other parts of the landscape. Moderate to nutrient-rich subxeric sites, which commonly occur on warm aspects, are typically occupied by aspen or mixed aspen and spruce forests. Open lodgepole pine and white spruce forest with a lichen, kinnikinnick and litter ground cover dominate nutrient-poor, subxeric-submesic sites that are usually associated with shallow or coarse-textured soils.

Moist to wet forests are usually dominated by white spruce, with a Labrador tea understorey on cold, nutrient-poor sites, and red bearberry and willows on medium and richer sites. Wetlands include bogs, fens, swamps, marshes and shallow water. Few bogs develop due to low rainfall, calcareous parent materials and slow peat development; bogs that do occur usually have fairly shallow peat and permafrost. The permafrost is likely very close to 0°C and therefore sensitive to disturbance. Fens dominated by shrubs and sedges with shallow peat are common in old meltwater channels. Shrub and treed swamps are common along creeks and rivers and surrounding ponds. Marshes are also common along larger rivers and ponds.

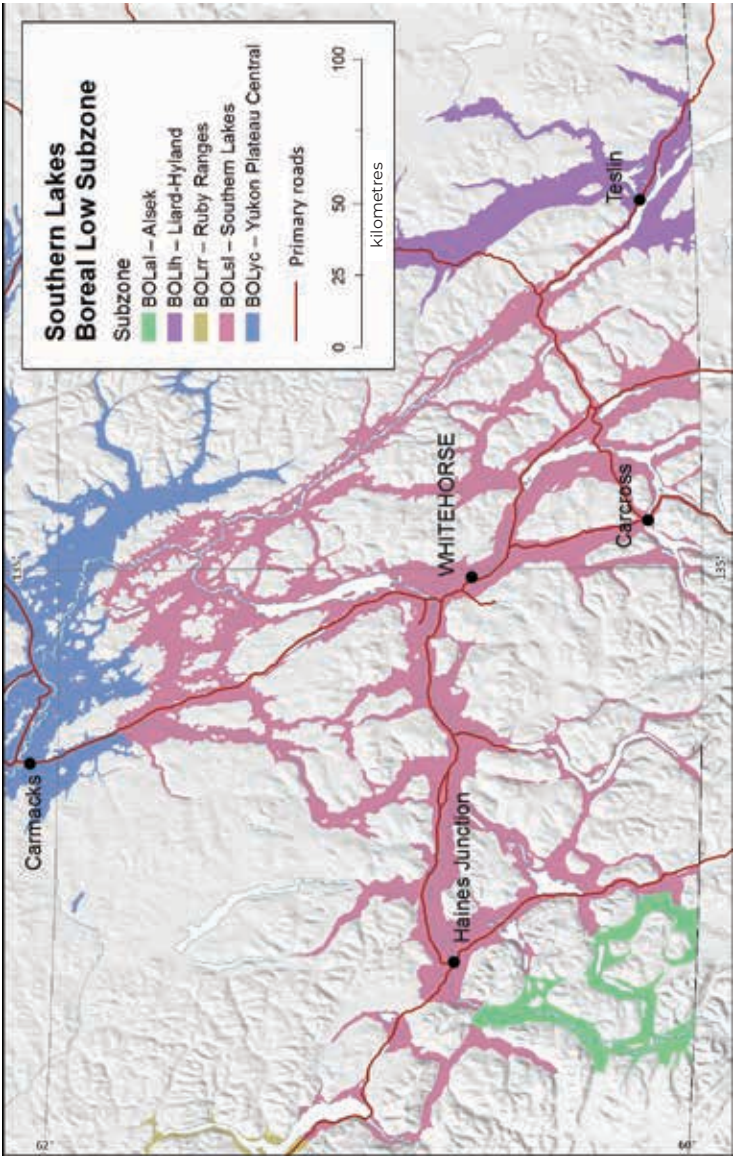


Figure 1-1. Distribution of the Southern Lakes Boreal Low Subzone (BOLsl)

The low rainfall in this subzone and the distribution of limestone bedrock results in mostly calcareous soil parent materials. Soils are usually classified as Eutric Brunisols. Regosols are common on active fluvial and eolian deposits. Gleysols are common on lower slope, toe and depressional sites. Cryosols are found on some cool moist and wet sites. Organic soils are found in incised meltwater channels and in a few other depressions. However, they are not extensive, since organic material decomposes fairly well in this low-precipitation, high-pH environment.

Interaction between groundwater, calcareous bedrock, calcareous glacio-lacustrine sediments, and permafrost in this dry region has resulted in some saline sites in large glaciolacustrine silt-filled valleys near Whitehorse. Groundwater flow brings dissolved minerals to the surface, where the water evaporates; this deposits salts (mostly sodium sulphate) at the surface. These salt flat ecosites host a series of ground vegetation communities that are specially adapted to saline conditions.

1.2 Distinguishing BOLsl from adjacent zones/subzones

BOLyc – Yukon Plateau Central

- North of BOLsl
- Mesic sites usually of mixed white spruce and aspen
- More black spruce on nutrient poor, moist and wet sites than BOLsl
- Grasslands of similar type and abundance as BOLsl
- Very dry; low annual rainfall, but more precipitation during summer growing season than BOLsl, resulting in deeper surface organic accumulation
- Colder winters and more permafrost than BOLsl

BOLlh – Liard-Hyland

- East of BOLsl
- Moister than BOLsl
- Uplands are often mixed white spruce, black spruce and pine
- Warm aspect slopes are dominated by aspen, not grasslands
- Vegetation on mesic sites includes more alder
- Soils are often eluviated subgroups of Brunisols, and Dystric Brunisols are more common

BOLrr – Ruby Ranges

- Northwest of BOLsl
- Lack of pine, subalpine fir, and black spruce; white spruce dominates tree cover

- Grasslands similar to BOLsl
- Very dry; very cold (colder than BOLsl)

BOLal – Alsek

- Southwest of BOLsl
- Forest mostly white spruce; subalpine fir is found at lower elevations in eastern part of subzone
- Lusher vegetation; more shrub cover
- South-facing slopes are aspen forest, not grasslands as in BOLsl
- Higher snowfall and rainfall, less permafrost, some coastal species present

BOH

- Higher elevations, generally above 900 m
- More open white spruce – subalpine fir forests with shrub birch and willow understorey
- Higher precipitation; colder

BWBSdk (British Columbia)

- Dry Cool Boreal Black and White Spruce biogeoclimatic subzone, to the south of BOLsl
- Moister and warmer than BOLsl
  - mean annual precipitation ranging between 347 and 539 mm
  - slightly warmer mean annual temperature
  - comparable growing season, with number of degree days above 5°C ranging from 774 to 968
- Generally, similar mature vegetation communities growing on reference (mesic) sites, but BOLsl/01 sites tend to have higher kinnikinnick (*Arctostaphylos uva-ursi*) cover and less highbush cranberry (*Viburnum edule*)
- Grasslands occur on warm aspects only in drier parts of subzone
- Permafrost occurs in similar conditions as BOlsl; more prevalent in the northern part of BWBSdk

1.3 Ecological Classification in the Southern Lakes Area

Ecosites in the BOLsl were identified through analysis of ecological plot data collected throughout the subzone between 1978 and 2014. More than 900 plots were included in the analysis. The first major ecological forest inventory was conducted across southern Yukon between 1977 and 1988 by Oswald and Senyk of the Pacific Forest Research Centre (Oswald and King 1980; Oswald 1979; Oswald and Brown 1986; Senyk et al. 1982). A comprehensive ecological land survey was conducted

throughout the Southern Lakes in 1980 (Davies et al. 1983). Other ecological studies included ecological inventories of the wetlands of Whitehorse (Mougeot Geoanalysis and Agriculture and Agri-Food Canada 1997), Kusawa proposed park (Kennedy 1986), Carcross Dunes (Kennedy and Murray 1997), and Yukon ELC surveys in 2012, 2013 and 2014.

2.0 ECOSITES OF THE BOLsl

The ecosites of the BOLsl are listed in Table 1-1, along with their codes and names. Chapter 3.0 in Part 1 of this guide describes the process of how to identify ecosites.

The ecosites are shown on an **edatopic grid** (Figure 1-2), which shows their relationship to each other based on relative soil moisture and nutrients. They are organized into seven major ecological groups to assist with their identification:

1. Dry to mesic ecosites;
2. Mesic to moist ecosites;
3. Floodplain and swamp ecosites;
4. Saline ecosites;
5. Bog and fen ecosites;
6. Marsh ecosites; and
7. Shallow water ecosites.

Three identification tools are generally provided for each ecosite grouping:

- a **Landscape profile** shows a typical distribution of ecosites on the landscape;
- an **Ecosite identification table** lists key features for identifying the ecosites; and
- a **Vegetation table** lists the species for each ecosite, including their relative frequency and abundance.

Following the edatopic grid and identification tools for each grouping, each ecosite is described and futher characterized. This may include a list of ecosite phases or tables of vegetation associations. The user can choose to identify an ecosite or ecosite phase, based on their needs, and may further describe the vegetation community by identifying the vegetation association and/or subassociation.

Note that not all marshes and shallow water ecosites are included on the landscape profiles.

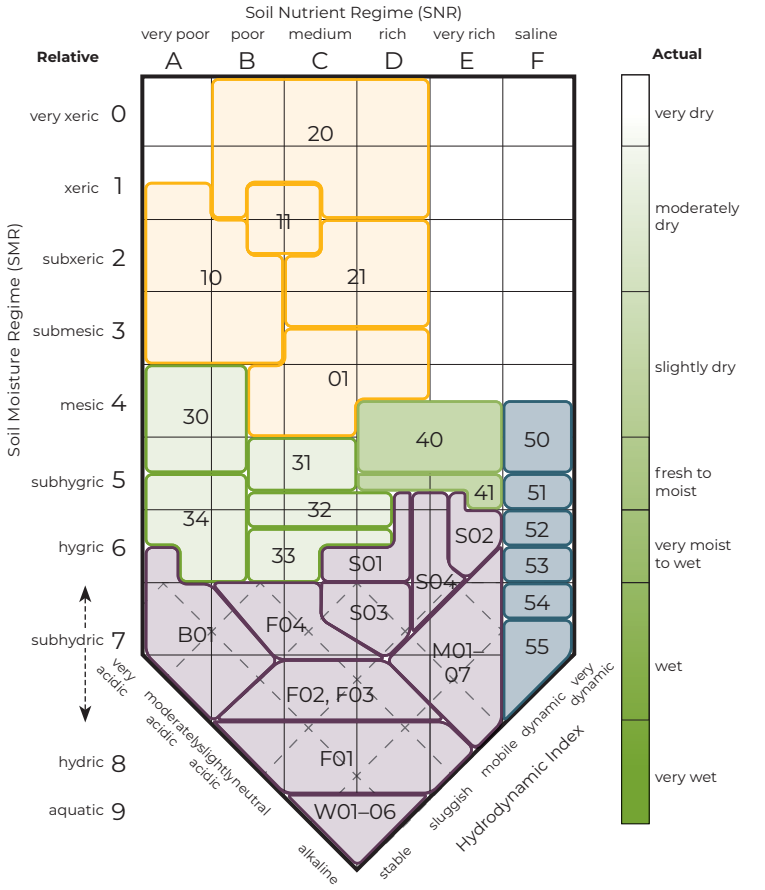


Figure 1-2. Edatopic grid for BOLsl ecosites

Table 1-1. Names and codes of ecosites

Ecosite	Ecosite grouping and name
	DRY TO MESIC ECOSITES
10	PSw – Lichen Woodland
11	B – Baikal Sedge Dunes
20	Pasture Sage Grassland
21	A – Purple Reedgrass Woodland
01	SwAP – Twinflower Forest
	MESIC TO MOIST ECOSITES
30	Sw – Labrador Tea Forest
31	Sw – Red Bearberry Forest
32	Sw – Shrub Birch Woodland
33	Sw – Willow Forest
34	SbSw – Labrador Tea Forest
	FLOODPLAIN ECOSITES
40	Sw – Riparian Forest
41	B – Riparian Forest
	SALINE ECOSITES
50	Sw – Baltic Rush Saline Forest
51	Foxtail Barley Saline Meadow
52	Sea Milkwort Saline Meadow
53	Nuttall's Alkaligrass Saline Meadow
54	Horned Sea-blite Saline Meadow
55	Red Glasswort Saline Meadow
	WETLAND ECOSITES
	BOG
B01	SbSw – Labrador Tea Bog
	FEN
F01	Water Sedge Fen
F02	Shrub Birch Fen
F03	Willow – Water Sedge Fen
F04	Sw – Water Sedge Fen
	SWAMP
S01	Willow – Bluejoint Swamp
S02	River Alder Swamp
S03	Tea-leaved Willow – Water Sedge Swamp
S04	Willow – Horsetail Swamp
	MARSH
M01	Beaked – Water Sedge Marsh
M02	Water Horsetail Marsh
M03	Seaside Arrow-grass Marsh
M04	Short-awn Foxtail Marsh
M05	Creeping Spike-rush Marsh
M06	Mannagrass Marsh
M07	Least Spike-rush Marsh
	SHALLOW WATER
W01	Thread-leaf Pondweed Shallow Water
W02	Sago Pondweed – Muskgrass Shallow Water
W03	Muskgrass Shallow Water
W04	Mare's-tail Shallow Water
W05	Northern Arrowhead Shallow Water
W06	Pondweed Shallow Water

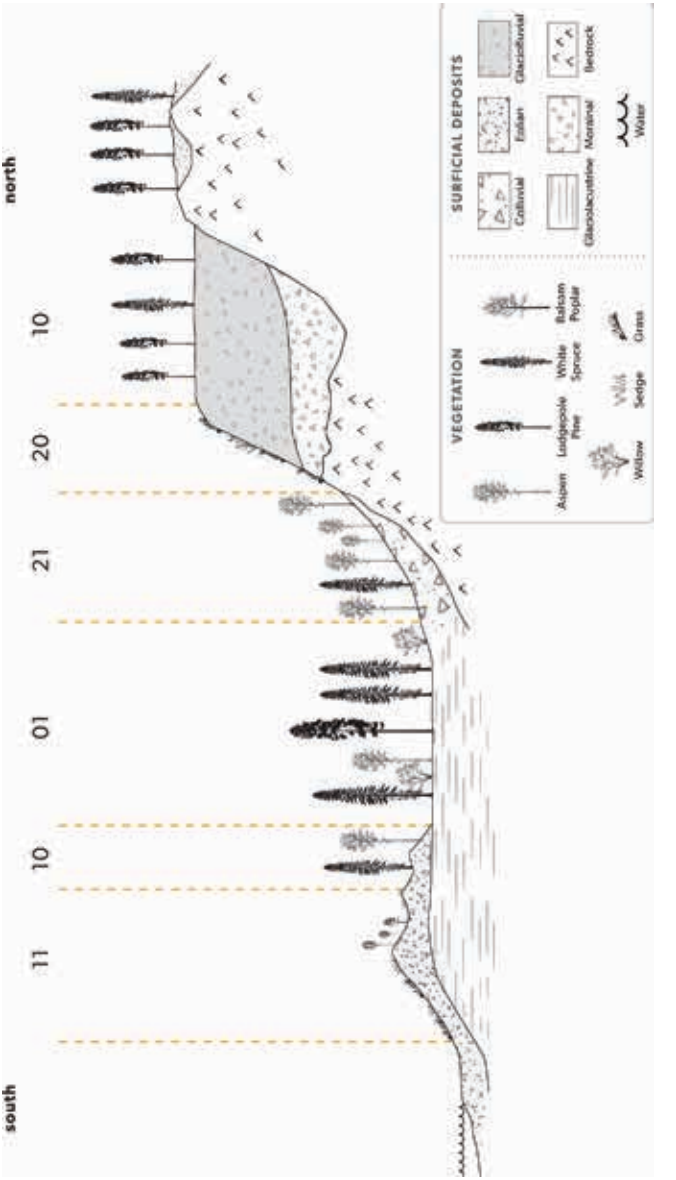


Figure 1-3. Dry to mesic ecosites: landscape profile

Dry to mesic ecosites Ecosite Identification Table

Dry to Mesic Ecosites		Moisture	Site/Soils	Overstorey/Shrubs	Ground Cover
20	Pasture Sage Grassland	SMR=0–1 drainage= R-VR	warm, steep, southerly aspect; humus form usually mull	vegetation is non-forested: <10% tree cover; <10% shrub cover	"grassland" dominated by grasses, sedges, forbs, kinnikinnick
21	A – Purple Reedgrass Woodland	SMR=2–3 drainage=W	site is usually warm, often moder or mull humus form	aspen or mixed aspen-white spruce overstorey	grassy or kinnikinnick understorey; forbs common
11	B – Baikal Sedge Dunes	SMR=1–2 drainage= R-W	active erosion and deposition; sandy eolian material	often dominated by deciduous overstorey of balsam poplar-aspen but tree cover may be absent	sparse ground cover including Rocky Mountain fescue, field wormwood, Baikal sedge, Yukon lupine
10	PSw – Lichen Woodland	SMR=2–3 drainage= R-W	soil is coarse textured, skeletal; often glaciofluvial, eolian or till	pine or spruce overstorey; if mixed aspen-coniferous canopy it has lichen ground cover	lichen or lichen ground shrub ground cover
01	SwAP – Twinflower Forest	SMR=3–4 drainage= W-M	site is level, may be slightly south facing for fine-textured soils; may be north facing for coarse textured soil	vegetation may be coniferous, mixed or deciduous; soapberry common	ground cover may be feathermoss dominated, mixed ground shrubs or grassy

Dry to mesic ecosites Vegetation Table

Stratum	Ecosite / No. of plots	10 88	11 7	20 59	21 31	01 360	
Tree layer	*Picea glauca*	■■■■	□□		■■■	■■■■	white spruce
	Pinus contorta	■■■■				□□□	lodgepole pine
	Populus tremuloides		□□□		■■■■■	■■■■	trembling aspen
Shrub layer	*Populus tremuloides*	□	□□□		■■■	□□	trembling aspen
	Populus balsamifera		■■■				balsam poplar
	Picea glauca	■■			□	□□	white spruce
	Rosa acicularis	■■			■■■	■■	prickly rose
	Salix spp.	■■			□□	■■■	willows
	Shepherdia canadensis	■■			■■■■	■■■	soapberry
Ground shrub layer	*Arctostaphylos uva-ursi*	■■■■	□□□□		■■■■	■■■■	kinnikinnick
	Linnaea borealis	■■■			□□□	■■■	twinflower
	Vaccinium vitis-idaea	■■■				□□	lowbush cranberry
Graminoid layer	*Carex sabulosa*		■■				Baikal sedge
	Poaceae	■■	■■■	■■■■	■■■■	■■■	grasses
Forb layer	*Artemisia campestris*		■■				field wormwood
	Lupinus kuschei		■■				Yukon lupine
	Polemonium pulcherrimum		■■				showy Jacob's-ladder
	Androsace septentrionalis			■			fairy candelabra
	Artemisia frigida			■■■■			pasture sage
	Penstemon gormanii			■■			Gorman's penstemon
	Achillea millefolium				■	□	yarrow
	Chamerion angustifolium	■			■■	■■	fireweed
Lichen layer	*Cetraria* spp.	■■■	■■■			□	cetraria lichens
	Cladina spp.	■■■■				□□	reindeer lichens
	Cladonia spp.	■■■	□□		□	■■	cladonia lichens
	Peltigera spp.	■■■			□□	■■■	pelt lichens
		□□□	□□	■■■■	□		lichen crust
Moss layer	*Hylocomium/Pleurozium*	■■■	■■■		□□	■■■■	feathermosses

Frequency of occurrence: ■ = 70–100% ■ = 50–70% □ = 25–50% | Abundance (average per cent cover): ■■■■■ = >25% ■■■■ = 10–25% ■■■ = 3–10% ■■ = 1–3% ■ = <1%

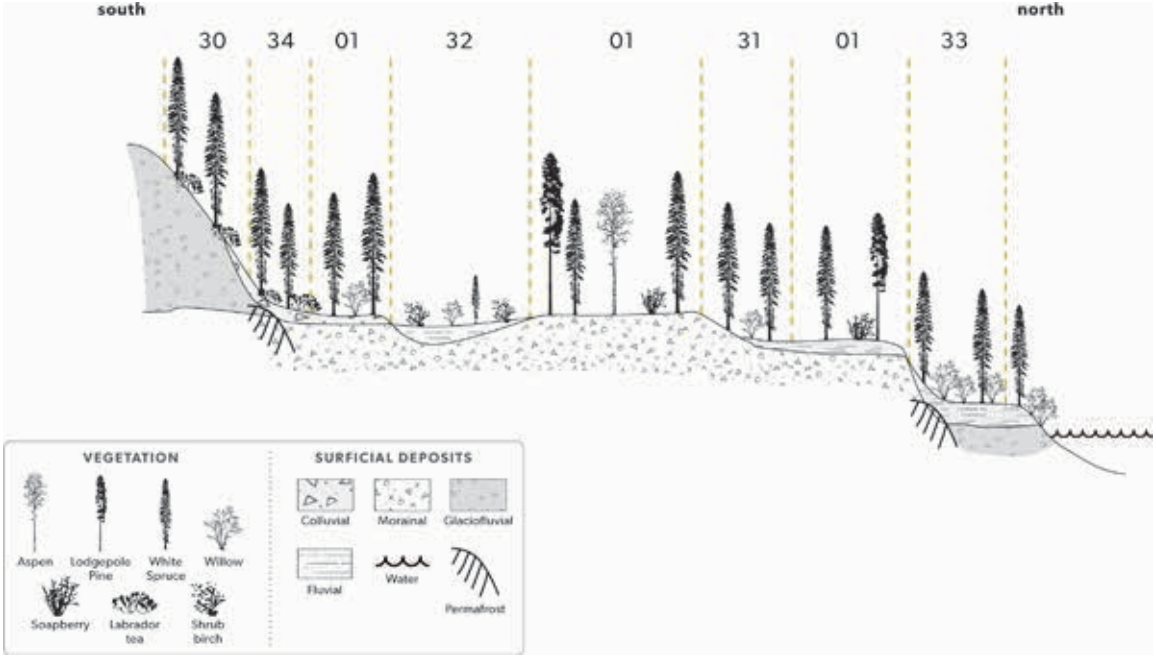


Figure 1-4. Mesic to moist ecosites: landcape profile

Mesic to moist ecosites Ecosite identification table

Mesic to Moist Ecosites		Moisture	Site/Soils	Overstorey/Shrubs	Ground Cover
01	SwAP – Twinflower Forest	SMR=(3)-4 drainage= W-M	site is level; may be slightly south facing for fine-textured soils; north facing for coarse-textured soil	tree cover may be coniferous mixed or deciduous; soapberry common	ground cover may be feathermoss, mixed ground shrubs, or grassy
30	Sw – Labrador Tea Forest	SMR=4-5 drainage= M-I	site is cool, usually north facing; thick mor humus layer is typical	moderate to high cover of Labrador tea; usually spruce dominated, sometimes other	feathermosses dominate ground cover
31	Sw – Red Bearberry Forest	SMR=5 drainage= I-M	lower slope or level position	coniferous, usually white spruce	bearberry, blueberry willow are key indicators
32	Sw – Shrub Birch Woodland	SMR=5-6 drainage= I-P	depressional site; cold air sink	moderate to high cover of shrub birch; low to sparse tree cover; tree cover may be <10%; trees may be shrub height	mixed: grass, moss, ground shrubs, forbs, lichen, sedges
33	Sw – Willow Forest	SMR=6 drainage= I-P	lower or toe slope position; permafrost may be present in soils	coniferous; usually white spruce; moderate to high willow cover	common horsetail is key indicator; bearberry, blueberry willow may also be present; feathermosses and , brown mosses usually present
34	SbSw – Labrador Tea Forest	SMR=5-6 drainage= I-P	lower or toe slope position; permafrost may be present in soils	moderate to high cover of Labrador tea under white and/or black spruce	crowberry, lowbush cranberry, bearberry, feathermoss and brown mosses low to high cover

Mesic to moist ecosites Vegetation Table

Stratum		Ecosite	01	30	34	31	33	32	
		No. of plots	360	22	14	18	22	17	
Tree layer	*Picea glauca*		■■■■	■■■■	■■■■	■■■■■	■■■■	■■■	white spruce
	Picea mariana				■■■■				black spruce
	Pinus contorta		□□□	■■■■					lodgepole pine
	Populus tremuloides		■■■■						trembling aspen
Shrub layer	*Betula glandulosa*				□		□□□	■■■■■	shrub birch
	Dasiphora fruticosa				■■		□	□	shrubby cinquefoil
	Picea glauca		□□	□	□□	□□	■■■	■■■	white spruce
	Rhododendron groenlandicum			■■■■	■■■■■	□□□	□		Labrador tea
	Rosa acicularis		■■	■■	□	□	□		prickly rose
	Salix myrtillifolia				■■■	□□	■■■	■■■	blueberry willow
	Salix spp.		■■■	■■■	■■■■	■■■■	■■■■	■■■■	willows
	Shepherdia canadensis		■■■	□□		□□	□□		soapberry
	Vaccinium uliginosum			□	■■■				blueberry
Ground shrub layer	*Arctostaphylos uva-ursi*		■■■■	□□			□	■■■	kinnikinnick
	Empetrum nigrum			■■■■	■■■■	□□	□□		crowberry
	Linnaea borealis		■■■	■■■		■■■	□		twinflower
	Vaccinium vitis-idaea		□□	■■■■	■■■■	■■■	□□		lowbush cranberry
Graminoid layer	*Poaceae*		■■■	■■	■■■	□	■■	■■■■	grasses
Forb layer	*Achillea millefolium*		□				□	■	yarrow
	Arctous rubra			□	■■■	■■■	■■■	□□	red bearberry
	Chamerion angustifolium		■■	□		□	■	■	fireweed
	Equisetum scirpoides				□□	□□	■■		dwarf scouring-rush
	Equisetum spp.				■■	□	■■■		horsetails
	Geocaulon lividum		□□	■■	■■	■■■	□□		bastard toadflax
	Hedysarum alpinum						■■	□□	alpine sweet-vetch
Lichen layer	*Cladina spp.*		□□	■■■	■■■	□	■■		reindeer lichens
	Cladonia spp.		■■	■■	■■	□□	■■	□□	cladonia lichens
	Peltigera spp.		■■■	■■■	■■	■■	■■■	■■	pelt lichens
Moss layer	*Aulacomium/Tomentypnum*				■■■		■■■■	■■■	brown mosses
	Dicranum sp.			□	■■	□□	□□	■■■	heron's-bill moss
	Hylocomium/Pleurozium		■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■	feathermosses

Frequency of occurrence: ■ = 70–100% ■ = 50–70% □ = 25–50% | Abundance (average per cent cover): ■■■■■ = >25% ■■■■ = 10–25% ■■■ = 3–10% ■■ = 1–3% ■ = <1%

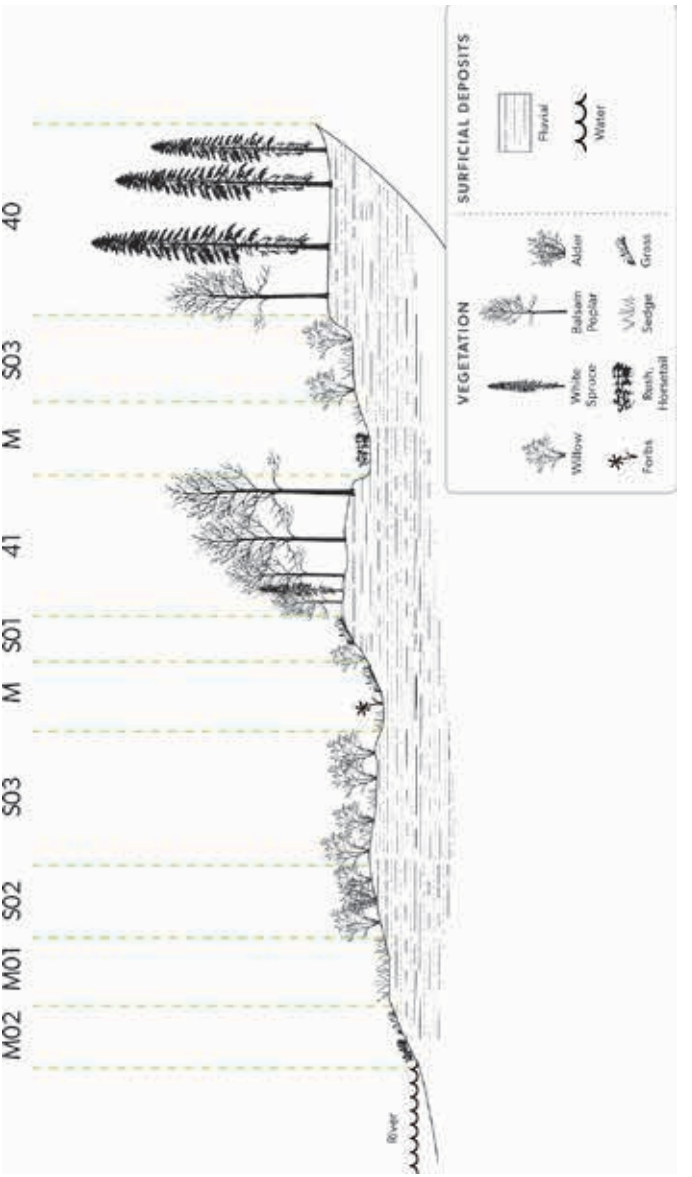


Figure 1-5. Floodplain and swamp ecosites: landcape profile

Floodplain and swamp ecosites

Ecosite Identification Table

Floodplain and Swamp Ecosites		Moisture	Site/Soils	Overstorey/Shrubs	Ground Cover
40	Sw – Riparian Forest	SMR=4-5; drainage= M-I-P	fluvial parent material; subject to periodic flooding; soils are Regosols, occasionally Brunisols, Gleysols	overstorey is white spruce dominated	feathermoss and horsetails are characteristic
41	B – Riparian Forest	SMR=5-6; drainage= M-I-P	fluvial parent material; subject to periodic flooding; Regosols	overstorey is balsam poplar dominated; willows include Bebb's or Scouler's	horsetails and forbs are common
S01	Willow – Bluejoint Swamp	SMR=5-6, drainage= I	fluvial, lacustrine parent materials; subject to periodic flooding; Regosols	<10% tree cover; willow dominated	grass and forb
S02	River Alder Swamp	SMR=5-6, drainage= I-P	fluvial parent material; subject to periodic flooding; Gleyed Regosols, Gleysols	<10% tree cover; alder or alder-willow dominated	variable, often sparse; may have common horsetail
S03	Tea-leaved Willow – Water Sedge Swamp	SMR=5,6,7 drainage= I-P-V	fluvial or lacustrine parent material; subject to periodic flooding; Regosols, Gleysols	<10% tree cover; willow dominated	water sedge; marsh cinquefoil common; hook-mosses
S04	Willow – Horsetail Swamp	SMR=5-6, drainage= I-P	fluvial parent material; shallow water table or frequent flooding or both	<10% tree cover; willow dominated	common horsetail diagnostic

Floodplain and swamp ecosites

Vegetation Table

Stratum	Ecosite / No. of plots	40 12	41 6	S01 12	S02 5	S03 37	S04 2	
Tree layer	*Picea glauca*	■■■■■	■■■	□			■	white spruce
	Populus balsamifera	□□	■■■■■					balsam poplar
Shrub layer	*Alnus incana*				■■■■■			river alder
	Picea glauca	■■			□□		■	white spruce
	Rosa acicularis	■■■■	■■	□			■	prickly rose
	Salix spp.	■■■	■■■	■■■■■	■■■■■	■■■■■	■■■■■	willows
	Shepherdia canadensis	□□□	■■■■					soapberry
	Viburnum edule	■■■	■■■■					highbush cranberry
Graminoid layer	*Calamagrostis canadensis*			■■■■	■■■	□□	■■	bluejoint reedgrass
	Carex aquatilis			■■■	■■■	■■■■	■■■	water sedge
Forb layer	*Chamerion angustifolium*	■■■	■■■	□			■	fireweed
	Equisetum arvense	■■■■	■■■■	□□	■■■■		■■■■■	common horsetail
	Equisetum palustre						■	marsh horsetail
	Fragaria virginiana			□□			■	wild strawberry
	Geocaulon lividum	■■■	□□					bastard toadflax
	Geum macrophyllum						■	large-leaved avens
	Lupinus arcticus	□□	■■					arctic lupine
	Mertensia paniculata	■	■					tall bluebells
	Orthilia secunda	□	■					one-sided wintergreen
	Petasites frigidus						■	sweet coltsfoot
	Rubus arcticus				■■		■	arctic raspberry
Ground shrub layer	*Linnaea borealis*	■■■	□					twinflower
	Vaccinium vitis-idaea	■■■						lowbush cranberry
Moss layer	*Brachythecium* sp.		■					ragged moss
	Climacium dendroides			□□			■■■■■	tree moss
	Drepanocladus spp.	□		□□□	■■■	□□□□	■	hook-mosses
	Hylocomium splendens	■■■■■						step moss
	Mnium sp.				■■■			leafy moss

Frequency of occurrence: ■ = 70–100% ■ = 50–70% □ = 25–50% | Abundance (average per cent cover): ■■■■■ = >25% ■■■■ = 10–25% ■■■ = 3–10% ■■ = 1–3% ■ = <1%

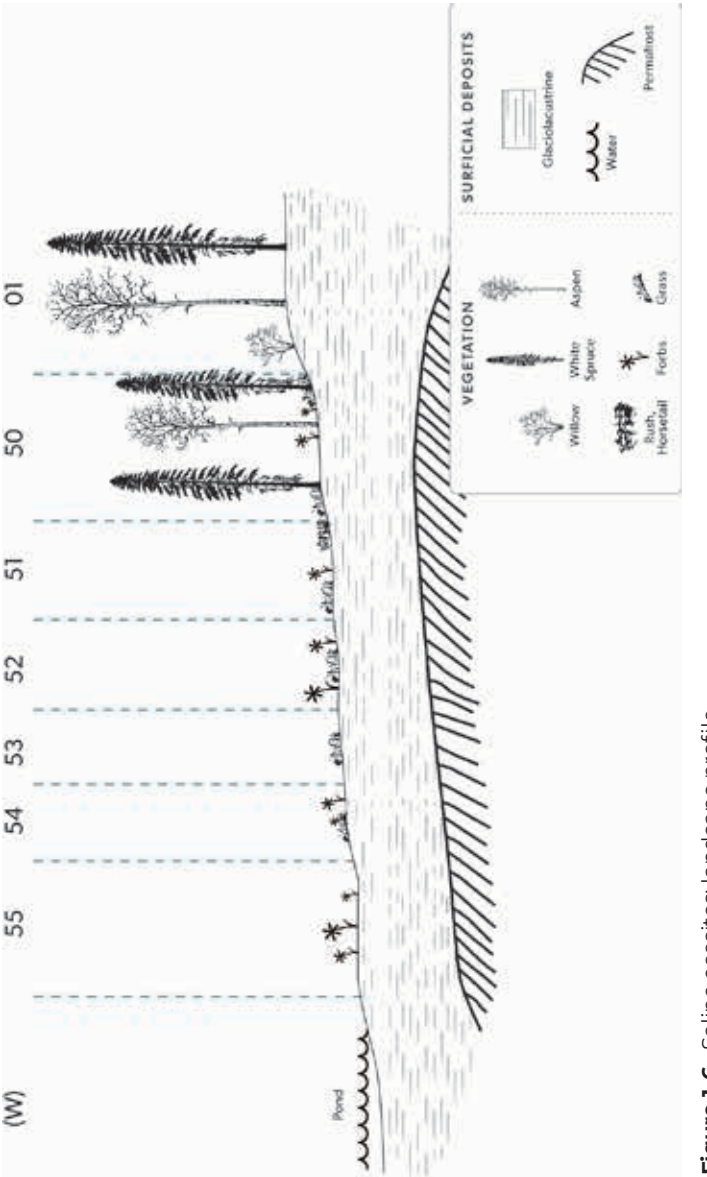


Figure 1-6. Saline ecosites: landcape profile

Saline ecosites Ecosite Identification Table

Saline ecosites		Moisture	Site/soils	Overstorey/shrubs	Ground cover
50	Sw – Baltic Rush Saline Forest	SMR=4-5; drainage= I-M	salt accumulation in rooting zone	open white spruce, aspen; shrubs low to moderate cover	kinnikinnick, glaucous bluegrass and Baltic rush
51	Foxtail Barley Saline Meadow	SMR=5; drainage= I	occasional salt crust on raised exposed soil	tree cover <10%, shrub cover <10%	dominated by foxtail barley with common associates slender wheatgrass, Baltic rush, silverweed and glaucous bluegrass
52	Sea Milkwort Saline Meadow	SMR=6; drainage= I, P	thin intermittent salt crust	trees and shrubs absent	dominated by sea milkwort
53	Nuttall's Alkaligrass Saline Meadow	SMR=6; drainage= P	thin white salt crust on surface	trees and shrubs absent	dominated by Nuttall's alkaligrass with seaside arrowgrass
54	Horned Sea-blite Saline Meadow	SMR=7,6; drainage= P, V	thin white salt crust on surface	trees and shrubs absent	dominated by horned sea-blite
55	Red Glasswort Saline Meadow	SMR=7; drainage= P, V	high moisture; thick salt crust	trees and shrubs absent	dominated by red glasswort

Saline ecosites Vegetation Table

Stratum	Ecosite / No. of plots	50 1	51 5	52 18	53 24	54 8	55 25	
Tree layer	*Picea glauca*	■■■■						white spruce
	Populus tremuloides	■■■■						trembling aspen
Shrub layer	*Juniperus horizontalis*	■■						creeping juniper
	Picea glauca	■■■						white spruce
	Pinus contorta	■						lodgepole pine
	Populus tremuloides	■■■						trembling aspen
	Salix sp.	■■■						willow
	Shepherdia canadensis	■■■■						soapberry
Ground shrub layer	*Arctostaphylos uva-ursi*	■■■■■						kinnikinnick
	Solidago simplex	■						sticky goldenrod
Graminoid layer	*Bromus pumpellianus*	■■						Pumpelly brome
	Calamagrostis purpurascens	■■						purple reedgrass
	Deschampsia cespitosa		▪▪▪					tufted hairgrass
	Elymus trachycaulus		■■■	▪▪▪				slender wheatgrass
	Juncus arcticus var. balticus	■■	▪▪▪					Baltic rush
	Hordeum jubatum		■■■■			□		foxtail barley
	Poa glauca	■■■		▪▪▪				glaucous bluegrass
	Puccinellia nutkaensis			□□□	■■■■■	■■■	▪▪	Nuttall's alkaligrass
Forb layer	*Achillea millefolium*	■	■■■					yarrow
	Anemone multifida	■■						cut-leaved anemone
	Chamerion angustifolium	■■						fireweed
	Glaux maritima			■■■■				sea-milkwort
	Salicornia rubra				▪▪	□	■■■■■	red glasswort
	Suaeda calceoliformis					■■■■■		horned sea-blite
	Symphyotrichum falcatum			▪▪▪				little gray aster
Lichen layer	*Cetraria nivalis*	■						ragged paperdoll
		■■						lichen crust
		■						lichens
	Peltigera sp.	■						pelt lichens
Moss layer	*Bryophyta*	■	□□					mosses

Frequency of occurrence: ■ = 70–100% ▪ = 50–70% □ = 25–50%

Abundance (average per cent cover): ■■■■■ = >25% ■■■■ = 10–25% ■■■ = 3–10% ■■ = 1–3% ■ = <1%

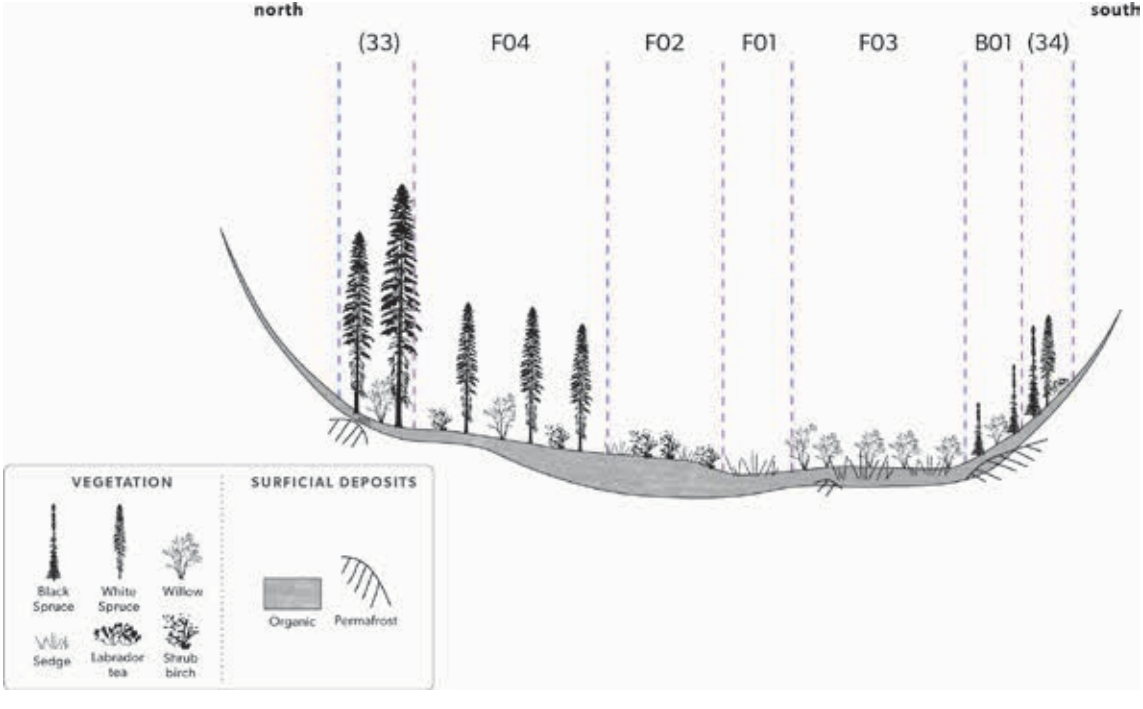


Figure 1-7. Moist to wet peat-rich ecosites: landcape profile

Bog and fen ecosites Ecosite Identification Table

Wetland Ecosites			Moisture	Site/Soils	Overstorey/Shrubs	Ground Cover
BOGS	B01	SbSw – Labrador Tea Bog	SMR=6-7; stable water table	thick mor acidic peat 30–50 cm; permafrost usually within about 60 cm; (surface may appear fairly dry)	open to sparse black or white spruce; labrador tea dominant in shrub layer	moderate to high cover of peat-moss is diagnostic, cloudberry often present
FENS	F01	Water Sedge Fen	SMR=7-8; stable water table	water table close to suface; peat 10–45 cm or more, may have limnic, cumulic, or hydric layers	tree cover <10%; shrub cover <10%	water sedge and/or beaked sedge dominate
	F02	Shrub Birch Fen	SMR=7-8; stable water table	water table close to surface; peat 10–45 cm or more, may have limnic, cumulic, or hydric layers	tree cover <10%; dominated by shrub birch and willow	water sedge
	F03	Willow – Water sedge Fen	SMR=7-8; stable water table	water table close to surface; peat 10–45 cm or more, may have limnic, cumulic, or hydric layers	tree cover <10%; dominated by willows	sedges and brown mosses (fuzzy fen, glow, star and hook-mosses)
	F04	Sw – Water Sedge Fen	SMR=7; stable water table	water table close to surface; peat phase (F04P) peat >40 cm, may have limnic, cumulic, or hydric layers; mineral phase (F04M) peat <40 cm, may have limnic, cumulic, or hydric layers	white spruce and willow	water sedges and brown mosses

Bog and fen ecosites Vegetation Table

Stratum	Ecosite / No. of plots	B01 3	F04 20	F01 19	F02 12	F03 11	
Tree layer	*Picea glauca*	□□□	■■■■		□		white spruce
	Picea mariana	■■■■					black spruce
Shrub layer	*Betula glandulosa*		■■■		■■■■■	□□	shrub birch
	Dasiphora fruticosa	□□□	■■		■	□	shrubby cinquefoil
	Picea glauca		■■■		□□	□	white spruce
	Rhododendron groenlandicum	■■■■■	■■■				Labrador tea
	Salix spp.	■■■■■	■■■		■■■■	■■■■	willows
	Salix myrtillifolia		■■■■		□□□		blueberry willow
Graminoid layer	*Carex aquatilis*	■■■■	■■■■	■■■■■	■■■■	■■■■■	water sedge
Ground shrub layer	*Arctous rubra*	■■■■■	■■■				red bearberry
	Empetrum nigrum	■■■■■	□□				crowberry
	Vaccinium vitis-idaea	■■■	■■				lowbush cranberry
Forb layer	*Rubus chamaemorus*	■■■					cloudberry
	Equisetum scirpoides		■■				dwarf scouring-rush
	Equisetum arvense		□□				common horsetail
Moss layer	*Sphagnum* sp.	■■■■					peat moss
	Bryophyta	■■■■■	■■■■■	■■■	■■■■■	■■■■■	other mosses
	Aulacomnium/Tomentypnum/Drepanocladus		■■■■■		□□□□		brown mosses
Lichen layer	*Cladina mitis*	■■■					green reindeer lichen

Frequency of occurrence: ■ = 70–100% ■ = 50–70% □ = 25–50% | Abundance (average per cent cover): ■■■■■ = >25% ■■■■ = 10–25% ■■■ = 3–10% ■■ = 1–3% ■ = <1%

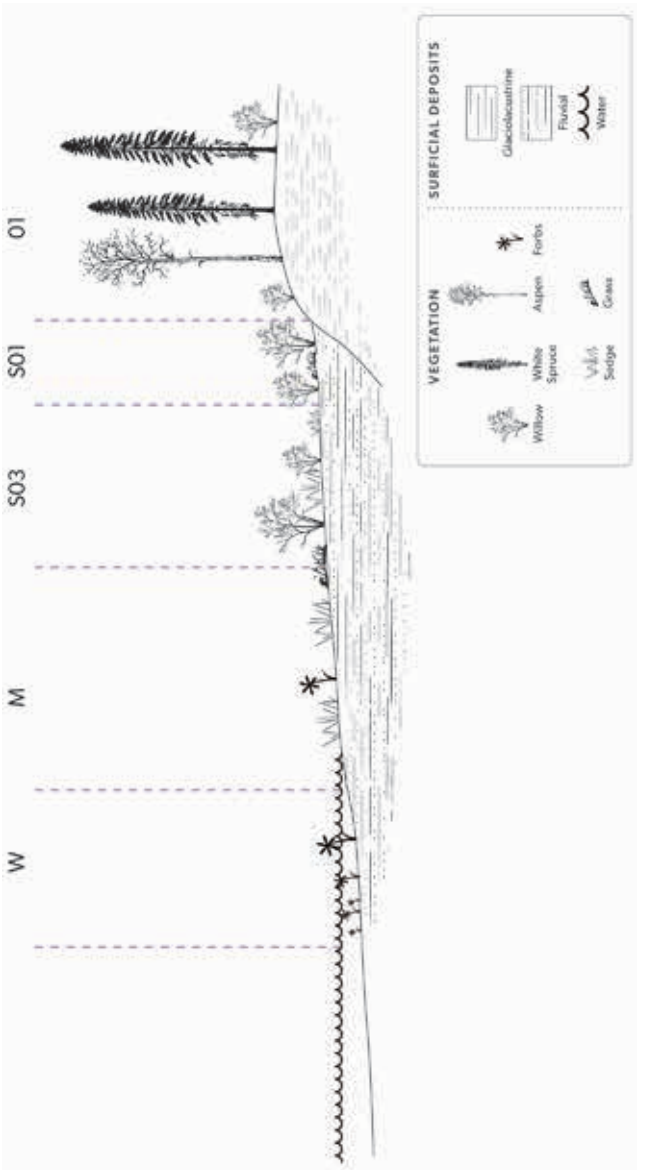


Figure 1-8. Shallow water to upland transition: landcape profile

Marsh ecosites Ecosite Identification Table

Wetland Ecosites			Moisture	Site/Soils	Overstorey/Shrubs	Ground Cover
MARSHES	M		SMR=6-7-8; drainage= P-V	fluctuating water table, frequent flooding, little to no peat	trees and shrubs absent	graminoid dominated
	M01	Beaked – Water Sedge Marsh	SMR=6-7-8; drainage= P-V	fluctuating water table, frequent flooding, little to no peat	trees and shrubs absent	water sedge and/or beaked sedge dominated
	M02	Water Horsetail Marsh	SMR=6-7-8; drainage= P-V	fluctuating water table, frequent flooding, little to no peat	trees and shrubs absent	horsetail and sedge dominated
	M03	Seaside Arrow-grass Marsh	SMR=6-7-8; drainage= P-V	fluctuating water table, frequent flooding, little to no peat	trees and shrubs absent	dominated by seaside arrow-grass, often with rushes
	M04	Short-awn Foxtail Marsh	SMR=6-7-8; drainage= P-V	fluctuating water table, frequent flooding, little to no peat	trees and shrubs absent	characterized by short-awned foxtail with kentucky bluegrass or tufted hairgrass
	M05	Creeping Spike-rush Marsh	SMR=6-7-8; drainage= P-V	fluctuating water table, frequent flooding, little to no peat	trees and shrubs absent	sparse cover of creeping spike-rush and slimstem reedgrass
	M06	Mannagrass Marsh	SMR=6-7-8; drainage= P-V	fluctuating water table, frequent flooding, little to no peat	trees and shrubs absent	characterized by tall or boreal mannagrass; sometimes with least spike-rush or marsh cinquefoil
	M07	Least Spike-rush Marsh	SMR=6-7-8; drainage= P-V	fluctuating water table, frequent flooding, little to no peat	trees and shrubs absent	dominated by least spike-rush with water sedge

Marsh ecosites Vegetation Table

	Ecosite	M01	M02	M03	M04	M05	M06	M07	
Stratum	No. of plots	15	7	1	2	2	2	3	
Shrub layer	*Salix* spp.		■			■			willows
Graminoid layer	*Alopecurus aequalis*				■■■				short-awned foxtail
	Calamagrostis stricta					■■■			slimstem reedgrass
	Carex aquatilis	■■■■■	■■■■■			■	■■	■■■■■	water sedge
	Carex utriculata	■■■■■				■■■	■■■		beaked sedge
	Deschampsia cespitosa		□		■	■			tufted hairgrass
	Eleocharis acicularis						■■■■■	■■■■■	least spike-rush
	Eleocharis palustris					■■			creeping spike-rush
	Glyceria borealis						■■■■■		boreal mannagrass
	Glyceria grandis						■■■■		tall mannagrass
	Hordeum jubatum					■			foxtail barley
	Juncus sp.			■■■■■					rush
	Poa pratensis				■■				Kentucky bluegrass
Forb layer	*Callitriche palustris*						■■■	□□	vernal water-starwort
	Comarum palustre	□□□					■■■■	■■■	marsh cinquefoil
	Equisetum arvense		□□□			■■			common horsetail
	Equisetum fluviatile		■■■■						water horsetail
	Equisetum variegatum		■■■						variegated scouring-rush
	Hippuris vulgaris	□				■	■■	■■	common mare's-tail
	Lemna minor						■		common duckweed
	Myriophyllum sibiricum						■■		Siberian water-milfoil
	Potentilla anserina					■■			common silverweed
	Ranunculus aquatilis						■■■■		white water crowfoot
	Rumex maritimus					■■			golden dock
	Sparganium spp.					■			burreeds
	Triglochin maritima		□	■■■■■					seaside arrow-grass
	Utricularia intermedia						■		flat-leaved bladderwort
	Utricularia minor						■		lesser bladderwort
Aquatic	*Chara* sp.					■■			muskgrass
Moss layer	Bryophyta				■■■■	■■■■			mosses
	Calliergon giganteum						■■■	□□□	giant water moss
	Drepanocladus spp.						■■■■	□□□□□	hook-mosses

Frequency of occurrence: ■ = 70–100% ■ = 50–70% □ = 25–50% | Abundance (average per cent cover): ■■■■■ = >25% ■■■■ = 10–25% ■■■ = 3–10% ■■ = 1–3% ■ = <1%

Shallow water ecosites Ecosite Identification Table

Wetland Ecosites			Moisture	Site/Soils	Overstorey/Shrubs	Ground Cover
SHALLOW WATER	W		SMR=9; aquatic system	permanent ponds, lakes, rivers less than about 2 m deep	trees and shrubs absent	aquatic or emergent vegetation
	W01	Thread-leaf Pondweed Shallow Water	SMR=9; aquatic system	water is saline or alkaline	trees and shrubs absent	dominated by thread-leaf pondweed
	W02	Sago Pondweed – Muskgrass Shallow Water	SMR=9; aquatic system	water is saline or alkaline	trees and shrubs absent	dominated by sago pondweed with muskgrass
	W03	Muskgrass Shallow Water	SMR=9; aquatic system	water is saline or alkaline	trees and shrubs absent	dominated just by muskgrass
	W04	Mare's-tail Shallow Water	SMR=9; aquatic system	shallow water	trees and shrubs absent	brown mosses with other species such as common mare's-tail and water starwort
	W05	Northern Arrow-head Shallow Water	SMR=9; aquatic system	shallow water of ponds and margins of slow-moving creeks	trees and shrubs absent	dominated by northern arrowhead
	W06	Pondweed Shallow Water	SMR=9; aquatic system	shallow water of ponds and margins of slow-moving creeks	trees and shrubs absent	dominated by northern pondweed; other pondweeds may dominate

Shallow water ecosites Vegetation Table

Stratum	Ecosite / No. of plots	W01 4	W02 3	W03 5	W04 2	W05 1	W06 1	
Graminoid layer	*Carex aquatilis*				■■■			water sedge
	Stuckenia filiformis	■■■■■		□□				thread-leaf pondweed
	Stuckenia pectinata		■■■■■					sago pondweed
Aquatic layer	*Callitriche palustris*				■			vernal water-starwort
	Chara spp.	□□□□	■■■■■	■■■■■				muskgrass
	Equisetum fluviatile					■		water horsetail
	Hippuris vulgaris				■■			common mare's-tail
	Potamogeton alpinus						■■■■■	northern pondweed
	Potamogeton richardsonii				■			Richardson's pondweed
	Ranunculus aquatilis				■■■			white water crowfoot
	Ruppia cirrhosa	■■■						spiral ditchgrass
	Sagittaria cuneata					■■■■■		northern arrowhead
	Sparganium angustifolium						■	narrow-leaved bur-reed
Forb layer	*Comarum palustre*				■■■■			marsh cinquefoil
Moss layer	*Calliergon giganteum*				■■■■			giant water moss
	Drepanocladus spp.				■■■■■			hook-mosses

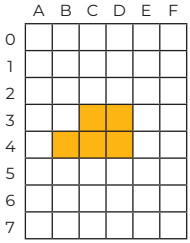
Frequency of occurrence: ■ = 70–100% ■ = 50–70% □ = 25–50% | Abundance (average per cent cover): ■■■■■ = >25% ■■■■ = 10–25% ■■■ = 3–10% ■■ = 1–3% ■ = <1%

3.0 GUIDES TO BOLsl ECOSITES

BOLsl/01 SwAP – Twinflower Forest

General Description

Edatopic Grid



The SwAP – Twinflower Forest ecosite occurs primarily on level to gently sloping, well and moderately well-drained, submesic and mesic sites. This is the reference ecosite for the BOL Southern Lakes subzone. It is found most commonly on lacustrine parent materials, often on fluvial or morainal materials, and sometimes on glaciofluvial, colluvial or eolian deposits.

Sw27 (White spruce / Feathermoss)

Stands have a well-developed canopy that consists of aspen, lodgepole pine or white spruce, or a mix of any of these. Black spruce is occasionally present near the boundaries of the subzone. The understorey is characterized by soapberry (*Shepherdia canadensis*) and twinflower (*Linnaea borealis*). Other understorey species are less consistent, but include prickly rose (*Rosa acicularis*), kinnikinnick (*Arctostaphylos uva-ursi*), fireweed (*Chamerion angustifolium*), Altai fescue (*Festuca altaica*) and lowbush cranberry (*Vaccinium vitis-idaea*). Any of these understorey species can be of moderate to high cover; however, when white spruce dominates the canopy, the shrub understorey is often light and underlain by feathermosses (mostly *Hylocomium splendens*, *Pleurozium schreberi*, or in the western part of the subzone, *Abietinella abietina*). Occasionally, medium to dense conifer stands develop a continuous ground cover of needle leaf litter, with scattered lichens and ground shrubs; these communities may be recognized as a "sparse" vegetation subassociation. Aspen and aspen-conifer stands, usually successional to conifer-dominated stands, typically have a higher cover of understorey grasses and forbs than mature conifer stands do.

Comments

Although Altai fescue is the most common grass on this ecosite, purple reedgrass (*Calamagrostis purpurescens*) or Pumpelly brome (*Bromus pumpellianus*) often occur.

Ecosite 01 is very diverse in terms of soils and vegetation cover. The soil variation is recognized in four **ecosite phases**:

- **01S** comprises sandy and gravelly soils, mostly of glaciofluvial and other coarse-textured fluvial deposits;
- **01L** includes sandy loam soils typical of morainal deposits;
- **01Z** is silty and loamy soils typical of glaciolacustrine and some fluvial deposits; and
- **01C** represents clayey soils found in some glacialacustrine deposits.

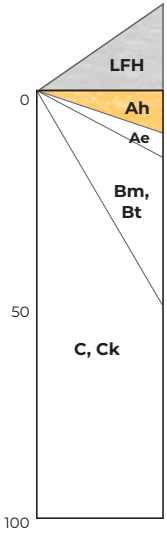
This ecosite can be differentiated from some other ecosites, as follows:

- 10 sites have lichen cover higher than 01. Some 01 sites have low moss cover and ground lichens, but the lichen cover is much lower than 10, and 10 occurs on drier sites (these may be only slightly elevated from 01 on lacustrine materials). If kinnikinnick cover is high on 01, the stands have either high cover of soapberry or other circum-mesic species;
- 21 occurs only on warm slopes and stands are aspen-dominated;
- 30 has moderate to high cover of Labrador tea and occurs on poorer sites (cool aspects with a deep organic surface mat). Small patches of Labrador tea may occur within 01 sites;
- 31 is found on slightly moister sites, usually on level, lower-slope or toe-slope positions; stands are conifer-dominated and are characterized by red bearberry, and blueberry willow and dwarf scouring rush are common associates;
- 40 is found on floodplains with subsurface irrigation; stands are predominantly conifer and usually have a mossy understorey, with some horsetail and highbush cranberry; balsam poplar may be present; and
- 41 sites are found on floodplains and are dominated by balsam poplar.

Site and soils

Site and soil characteristics

Plots in unit	360
Moisture Regime	mesic to submesic (3–4)
Nutrient Regime	medium to rich, some poor (C-D, B)
Meso Slope Position	mostly level and midslope
Aspect	variable
Slope Gradient	level to steep
Surficial Material	all
Soil Texture	variable
Soil Classification	usually Eutric and Dystric Brunisols, some Grey Luvisols, Regosols
Humus Form	mostly mor, moder
Humus Depth	0–20 cm
Soil Drainage	well to moderately well
Seepage/Water Table	none
Permafrost	occasional, may be present at depth in some fine-textured sediments



Vegetation Summary

Tables showing the relative abundance of species for each vegetation association are presented by **overstorey dominance**.

Aspen-dominated stands

These vegetation associations characterize the variation in species composition for aspen-dominated stands on this ecosite.

A03 Aspen / Kinnikinnick
A20 Aspen / Grass – Kinnikinnick
A21 Aspen / Soapberry / Kinnikinnick
A25 Aspen / Willow / Purple reedgrass / Thread-moss
A29 Aspen / Prickly rose / Fireweed

The relative abundance of species of these associations is shown in the vegetation table on page 2-38.

Mixed Aspen with Pine or Spruce stands

The following vegetation associations characterize the variation in species composition for stands dominated by aspen – pine or aspen – white spruce on this ecosite.

APSw03	Aspen – Pine – White spruce / Kinnikinnick
AP27	Aspen – Pine / Lowbush cranberry / Feathermoss
APSw25	Aspen – Pine – White spruce / Soapberry
APSw06	Aspen – Pine – White spruce / Purple reedgrass / Kinnikinnick
ASw05	Aspen – White spruce / Kinnikinnick
ASw07	Aspen – White spruce / Purple reedgrass – Kinnikinnick
ASw06	Aspen – White spruce / Soapberry / Fireweed
ASw26	Aspen – White spruce / Fireweed – Kinnikinnick

The relative abundance of species of these associations is shown in the vegetation table on page 2-39.

Pine-dominated stands

The following vegetation associations characterize the variation in species composition for pine-dominated stands on this ecosite.

P21	Pine / Lowbush cranberry / Twinflower
P22	Pine / Soapberry
P25	Pine / Purple reedgrass
P26	Pine / Grass – Kinnikinnick – Lowbush cranberry
P28	Pine / Lowbush cranberry / Step moss

The relative abundance of species of these associations is shown in the vegetation table on page 2-40.

Pine and Spruce co-dominated stands

The following vegetation associations and subassociations characterize the variation in species composition for pine – spruce co-dominated stands on this ecosite.

PSbSw22	Pine – Black spruce – White spruce / Lowbush cranberry
PSb23	Pine – Black spruce / Green alder
PSw23	Pine – White spruce / Lowbush cranberry – Twinflower
PSw24	Pine – White spruce / Lowbush cranberry – Twinflower / Feathermoss
PSw25	Pine – White spruce / Altai fescue
PSw26	Pine – White spruce / Soapberry / Feathermoss

The relative abundance of species of these associations is shown in the vegetation table on page 2-41.

Spruce- and Fir-dominated stands

The following vegetation associations and subassociations characterize the variation in species composition for spruce- and fir-dominated stands on this ecosite.

Sw20	White spruce / Grass – Kinnikinnick
Sw24	White spruce / Feathermoss – Wiry fern moss
Sw26	White spruce / Soapberry / Step moss
Sw27	White spruce / Feathermoss
FSw22	Fir – White spruce / Crowberry / Feathermoss

The relative abundance of species of these associations is shown in the vegetation table on page 2-42.

BOLsl/01 **Aspen-dominated stands:** Vegetation Table

	Vegetation association	A03	A20	A21	A25	A29	
Stratum	No. of plots	8	20	7	15	14	
Tree layer	*Picea glauca*	■■	■■	□□		■	white spruce
	Populus tremuloides	■■■■■	■■■■■	■■■■■	■■■■	■■■■■	trembling aspen
Shrub layer	*Picea glauca*	□		□□	■		white spruce
	Populus tremuloides	□□□	□□	□	■■■■		trembling aspen
	Rosa acicularis	■■	■■	■■■		■■■	prickly rose
	Salix spp.	■■■	□□	■■	■■■■	□	willows
	Shepherdia canadensis	■	■■■	■■■■	□□	■■■	soapberry
Ground shrub layer	*Arctostaphylos uva-ursi*	■■■■■	■■■■■	■■■■■	□	■■	kinnikinnick
	Linnaea borealis	□□	□□	■■■	□	□□	twinflower
Graminoid layer	*Poaceae*	■■■	■■■■■	■■■	■■■	■■	grasses
Forb layer	*Achillea millefolium*	□	□	■	□	■	yarrow
	Anemone multifida		□	□		■■	cut-leaved anemone
	Chamerion angustifolium	■■■	■■■	■■■	■■■	■■	fireweed
	Fragaria virginiana			□□		■■	wild strawberry
	Lupinus arcticus	■■	□□	□			arctic lupine
Lichen layer	*Peltlgera* spp.				■■■	■■	pelt lichens
Moss layer	*Bryum caespiticium*				■■■■■		tufted thread moss
	Ceratodon purpureus				■■■		fire moss

Frequency of occurrence: ■ = 70–100% ■ = 50–70% □ = 25–50% | Abundance (average per cent cover): ■■■■■ = >25% ■■■■ = 10–25% ■■■ = 3–10% ■■ = 1–3% ■ = <1%

BOLsl/01 Aspen mixed-wood stands: Vegetation Table

	Vegetation association	APSw03	AP27	APSw25	APSw06	ASw05	ASw07	ASw06	ASw26	
Stratum	No. of Plots	4	6	6	12	9	32	18	29	
Tree layer	*Picea glauca*	■■■	■■	■■■	■■■	■■■■	■■■■	■■■■	■■■■	white spruce
	Pinus contorta	■■■■	■■■■■	■■■■	■■■■					lodgepole pine
	Populus tremuloides	■■■■	■■■■	■■■■	■■■■	■■■■■	■■■■■	■■■■	■■■■	trembling aspen
Shrub layer	*Picea glauca*	■	■■■	■■	□	□	□	■■■	■■■■	white spruce
	Pinus contorta	■■■	■	■	□□					lodgepole pine
	Populus tremuloides	□□□	■■■	■	□□	□□	■	■■	□□	trembling aspen
	Rosa acicularis	□	■■	■■■	■	■	■■	■■■	■■	prickly rose
	Salix spp.	□	■■■	□	■■■	■■	■■	■■■	■■■	willows
	Shepherdia canadensis	■	■	■■■■	□□	□	■■	■■■■	■■	soapberry
Ground shrub layer	*Arctostaphylos uva-ursi*	■■■■■	■■■	■■■■	■■■■■	■■■■■	■■■■	■■■■	■■■	kinnikinnick
	Empetrum nigrum		■		□					crowberry
	Linnaea borealis	■	■■	■■■■	■■■		□□	■■■	■■■	twinflower
	Vaccinium vitis-idaea	□	■■■	■■■	□□				□□	lowbush cranberry
Graminoid layer	*Poaceae*	■■■	■■■	■■■	■■■■■	■■■	■■■■■	■■■	■■■	grasses
Forb layer	*Chamerion angustifolium*	■■	■■■	■	■■■	■■	■■■	■■■	■■	fireweed
	Geocaulon lividum		■■■	■■■					□	bastard toadflax
	Lupinus arcticus	■■	■■	■■■	■■	□	□□			arctic lupine
Lichen layer	*Cetraria* spp.	■	■■	□	■	□□			□□□	cetraria lichens
	Cladina spp.	■■	■■■	■■■	□□□					reindeer lichens
	Cladonia spp.	■■	■■	■■■	□□□		□	■■■	■	cladonia lichens
	Peltigera spp.	■	■■■	■■■	□□	□	□	■■	■■	pelt lichens
Moss layer	*Hylocomium/Pleurozium*	■■	■■■■	■■■■	■■■		□□	■■■	■■■■	feathermosses
	Polytrichum juniperinum		■	■	■					juniper haircap moss

Frequency of occurrence: ■ = 70–100% ■ = 50–70% □ = 25–50% | Abundance (average per cent cover): ■■■■■ = >25% ■■■■ = 10–25% ■■■ = 3–10% ■■ = 1–3% ■ = <1%

BOLsl/01 Pine-dominated stands: Vegetation Table

Stratum	Vegetation association / No. of plots	P21	P22	P25	P26	P28	
	No. of plots	4	9	3	9	5	
Tree layer	*Picea glauca*	■	□□	□□	■■	■	white spruce
	Pinus contorta	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	lodgepole pine
	Populus tremuloides			□	□□		trembling aspen
Shrub layer	*Picea glauca*	■	□□	■		■■	white spruce
	Pinus contorta	□	□	■■■			lodgepole pine
	Rhododendron groenlandicum	■■				■■	Labrador tea
	Rosa acicularis	■	■■	□	■	■■	prickly rose
	Salix spp.	■■	■■		■■■	■■	willow
	Shepherdia canadensis	■■	■■■■	□□□	□	■■	soapberry
Ground shrub layer	*Arctostaphylos uva-ursi*	■■	■■■	□	■■■■	■■	kinnikinnick
	Empetrum nigrum	■■■				■■■■	crowberry
	Linnaea borealis	■■■■	■■■				twinflower
	Vaccinium vitis-idaea	■■■■	□□				lowbush cranberry
Graminoid layer	*Poaceae*	■■	■■	■■■■■	■■■■■	■■	grasses
Forb layer	*Chamerion angustifolium*	■	■■	■	■■	■■	fireweed
	Geocaulon lividum	■				■■	bastard toadflax
	Lupinus arcticus	■■			■	■■	arctic lupine
	Orthilia secunda	■				□	one-sided wintergreen
	Anticlea elegans	■	□	□	□	■	death-camas
Lichen layer	*Cetraria* spp.	■	■	■	□□	□	cetraria lichens
	Cladina spp.	■■■	■■	□	■■	■■■	reindeer lichens
	Cladonia spp.	■■■	■■■	■■	□□	■■	cladonia lichens
	Peltigera spp.	■■■	■■■	■■	■■■	■■■	pelt lichens
Moss layer	*Hylocomium/Pleurozium*	■■■	■■■	■■	□	■■■■■	feathermoss
	Polytrichum spp.	■	■■	□	■■	■	haircap mosses

Frequency of occurrence: ■ = 70–100% ■ = 50–70% □ = 25–50% | Abundance (average per cent cover): ■■■■■ = >25% ■■■■ = 10–25% ■■■ = 3–10% ■■ = 1–3% ■ = <1%

BOLsl/01 Pine and spruce co-dominated stands: Vegetation Table

	Vegetation association	PSbSw22	PSb23	PSw23	PSw24	PSw25	PSw26	
Stratum	No. of plots	2	1	13	11	9	6	
Tree layer	*Picea glauca*	■■■		■■■	■■■■	■■■■	■■■■	white spruce
	Picea mariana	■■■	■■■■■					black spruce
	Pinus contorta	■■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	lodgepole pine
Shrub layer	*Alnus viridis*		■■■■■					green alder
	Picea glauca			■■	■■	□	■■	white spruce
	Pinus contorta			■■	□	□□□	□	lodgepole pine
	Rhododendron groenlandicum	■■		□	□□		■	Labrador tea
	Rosa acicularis	■■		■	□	□	■	prickly rose
	Salix spp.	■	■■■	■■■	■■■	■■■	■■■■	willow
	Shepherdia canadensis	■■■		■■■	■■	□	■■■	soapberry
Ground shrub layer	*Arctostaphylos uva-ursi*	■		■■■■	■■■	■■■	■■■	kinnikinnick
	Empetrum nigrum			■■■	■■■	□	■■	crowberry
	Linnaea borealis	■		■■■■	■■	■■■	■■■	twinflower
	Vaccinium vitis-idaea	■■■■■	■■	■■■■	■■■	■■■	■■■	lowbush cranberry
Graminoid layer	*Poaceae*	■■■		■■	■	■■■■■	■	grasses
Forb layer	*Chamerion angustifolium*	■		■	■■	■■	■■	fireweed
	Geocaulon lividum		■■	■■	■■	□	■■	bastard toadflax
	Lupinus arcticus			■■■	■■	□	■■	arctic lupine
	Mertensia paniculata			■	□	□	□	tall bluebells
	Orthilia secunda			□	■		■■	one-sided wintergreen
	Pyrola asarifolia				■			pink wintergreen
	Anticlea elegans			■	■	□	□	mountain death-camas
Lichen layer	*Cetraria* spp.			■■	□	■	■	cetraria lichens
	Cladina spp.	■	■■	■■■	■■■	■■■	■■	reindeer lichens
	Cladonia spp.	■	■	■■■	■■	■■■	■■■	cladonia lichens
	Peltigera spp.	■■	■■■	■■■	■■■	■■	■■■	pelt lichens
	Stereocaulon spp.	■		■		■	■	foam lichens
				■■	□	□□		lichen crust
Moss layer	*Dicranum* spp.				□			heron's-bill mosses
	Hylocomium/Pleurozium	■	■■■■■	■■■	■■■■■	■■■	■■■■■	feathermosses
	Polytrichum spp.	■■		■■	□	■■	■	haircap mosses

Frequency of occurrence: ■ = 70–100% ■ = 50–70% □ = 25–50% | Abundance (average per cent cover): ■■■■■ = >25% ■■■■ = 10–25% ■■■ = 3–10% ■■ = 1–3% ■ = <1%

BOLsl/01 Spruce- and fir-dominated stands: Vegetation Table

	Vegetation association	Sw20	Sw24	Sw26	Sw27	FSw22	
Stratum	No. of plots	7	5	24	60	1	
Tree layer	*Abies lasiocarpa*					■■■■■	subalpine fir
	Picea glauca	■■■■■	■■■■■	■■■■■	■■■■■	■■■	white spruce
	Populus tremuloides	■■					trembling aspen
Shrub layer	*Abies lasiocarpa*					■■■■■	subalpine fir
	Rhododendron groenlandicum					■■	Labrador tea
	Rosa acicularis	□□		■■	■		prickly rose
	Salix spp.	■■	□□	■■■	□□		willow
	Shepherdia canadensis	□□	■	■■■■	□		soapberry
Ground shrub layer	*Arctostaphylos uva-ursi*	■■■■	□	□	□		kinnikinnick
	Arctous rubra		□□	□	□		red bearberry
	Linnaea borealis	□	□□□	■■■	■■■	■■■■	twinflower
Graminoid layer	*Poaceae*	■■■■■		□□	■■		grasses
Forb layer	*Chamerion angustifolium*	■■		■	□		fireweed
	Cornus canadensis					■■	bunchberry
	Geocaulon lividum		■■	□□	□□	■■■■	bastard toadflax
	Lupinus arcticus	■	■■■	□	□		arctic lupine
	Orthilia secunda	□	■	□	□	■■■■	one-sided wintergreen
Lichen layer	*Cetraria* spp.	□□		■	■■		cetraria lichens
	Cladina mitis			□	□□		green reindeer lichen
	Cladonia spp.	□□		■■	■■		cladonia lichens
	Peltigera spp.	□□	■■■	■■■	■■■	■■	pelt lichens
Moss layer	*Abietinella abietina*		■■■■■				wiry fern moss
	Dicranum spp.		□	□	■■	■■■	heron's-bill mosses
	Hylocomium/Pleurozium	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	feathermosses

Frequency of occurrence: ■ = 70–100% ■ = 50–70% □ = 25–50% | Abundance (average per cent cover): ■■■■■ = >25% ■■■■ = 10–25% ■■■ = 3–10% ■■ = 1–3% ■ = <1%

BOLsl/01 ASPEN-DOMINATED STANDS

BOLsl /01-A20 (Aspen / Grass – Kinnikinnick)

BOLsl /01-A25 (Aspen / Willow / Purple reedgrass / Thread-moss)

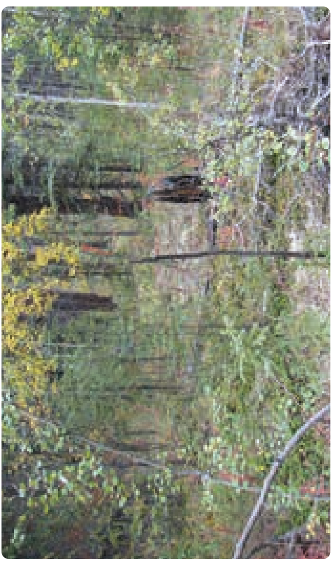
BOLsl /01-A03 (Aspen / Kinnikinnick)

BOLsl /01-A21 (Aspen / Soapberry / Kinnikinnick)

BOLsl/01 MIXED ASPEN WITH PINE OR SPRUCE STANDS

BOLsl /01-APSw03 (Aspen – Pine – White Spruce /Kinnikinnick)

BOLsl /01-APSw25 (Aspen – Pine – White spruce /Soapberry)



BOLsl /01-AP27 (Aspen – Pine /Lowbush cranberry /Feathermoss)

BOLsl /01-APSw06 (Aspen – Pine – White spruce /Purple reedgrass /Kinnikinnick)

BOLsl/01 MIXED ASPEN WITH PINE OR SPRUCE STANDS

BOLsl /01-ASw06 (Aspen – White spruce /Soapberry /Fireweed)

BOLsl /01-ASw26 (Aspen – White spruce /Fireweed – Kinnikinnick)

BOLsl /01-ASw05 (Aspen – White spruce /Kinnikinnick) foreground

BOLsl /01-ASw07 (Aspen – White spruce / Purple reedgrass – Kinnikinnick)

BOLsl/01 PINE-DOMINATED STANDS

BOLsl / 01-P25 (Pine / Purple reedgrass)

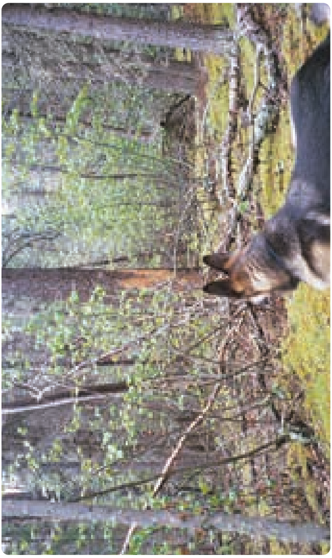
BOLsl / 01-P22 (Pine / Soapberry)

BOLsl / 01-P21 (Pine / Lowbush cranberry – Twinflower)

BOLsl / 01-P28 (Pine / Lowbush cranberry / Step moss)

BOLsl / 01-P26 (Pine / Grass – Kinnikinnick – Lowbush cranberry)

BOLsl/01 PINE AND SPRUCE CO-DOMINATED STANDS



BOLsl /01-PSb23 (Pine – Black spruce / Green alder)

no photo available

BOLsl /01-PSbSw22 (Pine – Black spruce – White spruce / Lowbush cranberry) / Grass)

BOLsl /01-ASw07 (Aspen – White spruce / Purple reedgrass – Kinnikinnick)

BOLsl/01 PINE AND SPRUCE CO-DOMINATED STANDS

BOLsl /01-PSw25 (Pine – White spruce / Altai fescue)

BOLsl /01-PSw24 (Pine – White spruce / Lowbush cranberry – Twinflower / Feathermoss)

BOLsl /01-PSw26 (Pine – White spruce / Soapberry / Feathermoss)

BOLsl/01 SPRUCE- AND FIR-DOMINATED STANDS

BOLsl /01-Sw20 (White spruce / Grass – Kinnikinnick)

no photo available

BOLsl /01-FSw22 (Fir – White spruce / Crowberry / Feathermoss)

no photo available

BOLsl /01-Sw24 (White spruce / Feathermoss - Wiry fern moss)

BOLsl/01 SPRUCE- AND FIR-DOMINATED STANDS

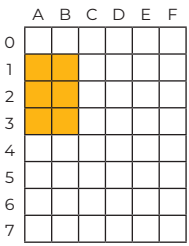
BOLsl /01-Sw27 (White spruce / Feathermoss)

BOLsl /01-Sw26 (White spruce / Soapberry / Step moss)

BOLsl/10 PSw – Lichen Woodland

General Description

Edatopic Grid



The PSw – Lichen Woodland ecosite occurs on the driest and most nutrient poor of the treed sites on the landscape. These sites are typically situated on fairly level ground with coarse to very coarse textured soils, but may also occur on crest or upper to mid-slope positions with moderate to coarse soil textures. The soils are well to rapidly drained, occurring mostly on coarse-textured glaciofluvial, eolian and morainal surficial materials. This ecosite also occurs on coarse-textured fluvial or colluvial deposits or on shallow soil over bedrock.

P01 (Pine / Kinnikinnick / Lichen)

Stands are characterized by an open canopy and poor to low productivity due to droughtiness. Conifer stands predominate, either lodgepole pine, white spruce or a mix of the two; aspen may be present with low cover.

Although the lichen ground cover is key in characterizing this ecosite, it may be absent or of low cover on some sites, where it is replaced by kinnikinnick (*Arctostaphylos uva-ursi*) or sparse ground cover with high per cent litter. Moss cover is low, typically comprised of dry-site mosses such as haircap moss (*Polytrichum*). Lichen cover is usually dominated by reindeer lichens (*Cladina* spp.); a significant cover of Cetraria and Cladonia lichens or a lichen crust on the soil surface may be present. Shrubs and herbs tend to be sparse, except for kinnikinnick; common juniper (*Juniperus communis*) can be present. Grasses, if present, are generally less than 5% cover, but may be as high as 10%. Altai fescue (*Festuca altaica*) is the most common grass; purple reedgrass (*Calamagrostis purpurescens*) or Pumpelly brome (*Bromus pumpellianus*) can also occur.

Lichen dominance increases with length of time since disturbance. Cover of ground shrubs is higher in younger stands, particularly kinnikinnick, as ground shrubs regenerate quickly after fire.

Soils have a thin surface organic mat that is often removed by fire. Soils are most commonly classified as Orthic Eutric Brunisols.

Comments

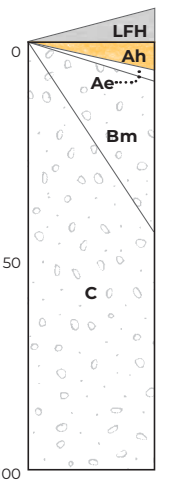
Ecosite 10 is differentiated from other treed, dry-site ecosites, as follows:

- 11 occurs on moderately active dunes and often has balsam poplar, Baikal sedge, Yukon lupine and Rocky Mountain fescue;
- 21 generally has an aspen or mixed aspen – white spruce canopy and occurs on warm aspects; 10 rarely has a mixed aspen – conifer canopy, but when it does it has high lichen cover; and
- 01 occurs on moister or richer sites and generally has better tree growth and a higher moss cover; where reindeer, cladonia or cetraria lichens do dominate the ground cover, the sites are not as dry as 10 and have higher cover of grasses, or presence of "moister" species such as soapberry (*Shepherdia canadensis*), Arctic lupine (*Lupinus arcticus*), fireweed (*Chamerion angustifolium*), willows (*Salix* spp.).

Site and soils

Site and soil characteristics

Plots in unit	88
Moisture Regime	xeric to submesic (1–3)
Nutrient Regime	very poor to poor (A-B)
Meso Slope Position	usually level, mid slope, crest or upper slope
Aspect	variable
Slope Gradient	level to steep
Surficial Material	glaciofluvial, eolian, gravelly fluvial terraces and fans
Soil Texture	sandy, gravelly
Soil Classification	usually Eutric and Dystric Brunisols, sometimes Regosols
Humus Form	mor, moder
Humus Depth	0–7 cm
Soil Drainage	well to very rapid
Seepage/Water Table	none
Permafrost	none



Vegetation Summary

The following vegetation associations characterize the variation in species composition on this ecosite.

AP04	Aspen – Pine / Kinnikinnick / Lichen
P01	Pine / Kinnikinnick / Lichen
P02	Pine / Kinnikinnick
PSw01	Pine – White spruce / Kinnikinnick / Lichen
PSw02	Pine – White spruce / Kinnikinnick
Sw01	White spruce / Kinnikinnick / Lichen
Sw02	White spruce / Kinnikinnick

The relative abundance of species of these associations is shown in the vegetation table on page 2-54.

BOLsl/10 Vegetation Table

Stratum	Vegetation association / No. of plots	AP04 6	P01 23	P02 14	PSw01 14	PSw02 10	Sw01 19	Sw02 3	
Tree layer	*Picea glauca*	□□	□	■■	■■■■	■■■■	■■■■■	■■■■	white spruce
	Pinus contorta	■■■	■■■■■	■■■■■	■■■■	■■■■		■■■	lodgepole pine
	Populus tremuloides							■■	trembling aspen
Shrub layer	*Picea glauca*	■	■	□	■■	■■	■■■		white spruce
	Pinus contorta	■■■	■■						lodgepole pine
	Populus tremuloides	■■■		□	□				trembling aspen
	Rosa acicularis	□□	□	■	■■	■■	□□	■■	prickly rose
	Salix sp.	■■	■■	□	■■	■■■	■■	■■■	willow
	Shepherdia canadensis	□	□□	■■	■■	■■	■■	■■	soapberry
Ground shrub layer	*Arctostaphylos uva-ursi*	■■■■	■■■	■■■	■■■	■■■■■	■■■	■■■■■	kinnikinnick
	Empetrum nigrum		□□		■■■	■■			crowberry
	Linnaea borealis	■■■	■■	■■■	■■■	■■■	□□	■	twinflower
	Vaccinium vitis-idaea		■■	■■■	■■■	■■■	□□	□□□□	lowbush cranberry
Graminoid layer	*Poaceae*	■■■	■■	■■	■■■	■■	■■	□□	grasses
Forb layer	*Anticlea elegans*		□	■	□	■	□		death-camas
	Chamerion angustifolium	■	■	■■	■	■■	■	□	fireweed
	Geocaulon lividum			□	■■	■■	■■■	■	bastard toadflax
	Lupinus arcticus	■	□□	■■	■■	■■			arctic lupine
	Pedicularis labradorica	■			□	□			Labrador lousewort
	Saxifraga tricuspidata	□□						■	prickly saxifrage
	Solidago simplex	■			■		□		sticky goldenrod
Lichen layer	*Cetraria* spp.	■■■	■■	■	■■	■	■■■■	■	cetraria lichens
	Cladina spp.	■■■■	■■■■	■■	■■■■	■■■	■■■		reindeer lichens
	Cladonia spp.	■■■■	■■■■	■■■	■■■■	■■	■■■	□□	cladonia lichens
	Peltigera spp.	■■■	■■■	■■	■■■	■■■	■■■	□□	pelt lichens
	Stereocaulon spp.	□	■	□	■	□	□		foam lichens
		■■■■			■■■	■■	□□□		lichen crust
Moss layer	*Hylocomium/Pleurozium*	■■■	□□□	□□	■■■	■■■	■■■		feathermosses
	Polytrichum spp.	■	■■	■■	■■	□	□	□	haircap mosses

Frequency of occurrence: ■ = 70–100% ■ = 50–70% □ = 25–50% | Abundance (average per cent cover): ■■■■■ = >25% ■■■■ = 10–25% ■■■ = 3–10% ■■ = 1–3% ■ = <1%

BOLsl/10 PSw – Lichen Woodland

BOLsl /10-P01 (Pine / Kinnikinnick / Lichen)

BOLsl /10-PSw01 (Pine – White spruce / Kinnikinnick / Lichen)

BOLsl /10-AP04 (Aspen – Pine / Kinnikinnick / Lichen)

BOLsl /10-P02 (Pine / Kinnikinnick)

BOLsl/10 PSw – Lichen Woodland

BOLsl /10-Sw01 (White spruce / Kinnikinnick / Lichen)

BOLsl /10-PSw02 (Pine – white spruce / Kinnikinnick)

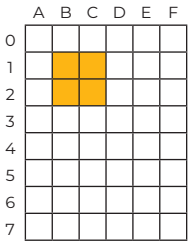
no photo available

BOLsl /10-Sw02 (White spruce / Kinnikinnick)

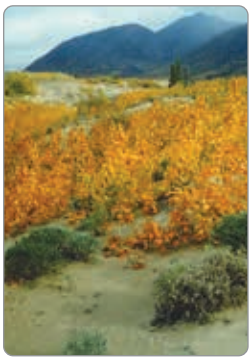
BOLsl/11 B – Baikal Sedge Dunes

General Description

Edatopic Grid



The B – Baikal Sedge Dunes ecosite occurs on recently active, dry, sandy dune sites. Shrubby balsam poplar or trembling aspen characterize the sparse overstorey, but white spruce may be present on somewhat more stable dunes. Two endemic plant species characterize this ecosite: Yukon lupine (*Lupinus kuschei*) and Baikal sedge (*Carex sabulosa*); Yukon lupine is consistently present. Rocky Mountain fescue (*Festuca saximontana*) is fairly abundant on the younger sites, usually comprising less than 10 per cent cover. Kinnikinnick (*Arctostaphylos uva-ursi*) can be abundant on older sites. Field wormwood (*Artemisia campestris*) and showy Jacob's-ladder (*Polemonium pulcherrimum*) are often present, but not abundant. Soils are poorly developed on younger sites and classed as Regosols; some brunisolic development is evident on more stable sites.



AB03 (Aspen – Balsam poplar / Rocky Mountain fescue – Yukon lupine)

Comments

Ecosite 11 is differentiated from other dry-site, treed ecosites, as follows:

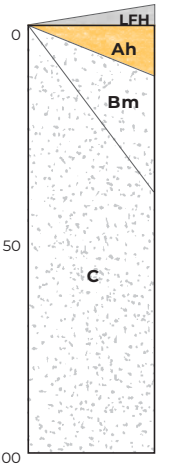
- 10 generally has a coniferous overstorey with lichen or kinnikinnick understorey; balsam poplar is not present
- 21 does not occur on dunes

Later seral communities of stable dunes are included in Ecosite 10.

Site and soils

Site and soil characteristics

Plots in unit	7
Moisture Regime	subxeric to xeric (2–1)
Nutrient Regime	poor to medium (B–C)
Meso Slope Position	variable
Aspect	variable
Slope Gradient	level to moderate
Surficial Material	eolian
Soil Texture	sand
Soil Classification	Regosols, minor Brunisols
Humus Form	mor, (mull)
Humus Depth	0–5 cm
Soil Drainage	rapid to very rapid
Seepage/Water Table	none
Permafrost	none
Site disturbance	active eolian deflation and deposition
Exposure	wind



Vegetation Summary

The following vegetation associations characterize the variation in species composition on this ecosite.

Casa01 Baikal sedge – Rocky Mountain fescue

AB03 Aspen – Balsam poplar / Rocky Mountain fescue – Yukon lupine

SwB04 White spruce – Balsam poplar / Yukon lupine

The relative abundance of species of these associations is shown in the vegetation table on page 2-59.

BOLsl/11 Vegetation Table

	Vegetation association	Casa01	AB03	SwB04	
Stratum	No. of plots	2	4	1	
Tree layer	*Picea glauca*		□	■■■	white spruce
	Populus tremuloides		■■■		trembling aspen
Shrub layer	*Juniperus communis*	■	□□		common juniper
	Picea glauca			■■	white spruce
	Pinus contorta	■			lodgepole pine
	Populus balsamifera	■■■	■■■	■■■■	balsam poplar
	Populus tremuloides		■■■■		trembling aspen
Ground shrub layer	*Arctostaphylos uva-ursi*		■■■■	■■■■■	kinnikinnick
Graminoid layer	*Bromus pumpellianus*		■■		Pumpelly brome
	Calamagrostis purpurascens	■	■	■■■	purple reedgrass
	Carex sabulosa	■	■■		Baikal sedge
	Carex filifolia	■		■	thread-leaved sedge
	Festuca saximontana	■■	■■■	■■	Rocky Mountain fescue
Forb layer	*Artemisia campestris*	■	■■	■■	field wormwood
	Eurybia sibirica		■■		Siberian aster
	Lupinus kuschei	■	■■■	■■	Yukon lupine
	Minuartia obtusiloba	■	■	■■	alpine sandwort
	Penstemon gormanii			■	Gorman's penstemon
	Polemonium pulcherrimum	■	■■	■■	showy Jacob's-ladder
	Saxifraga tricuspidata		□□□	■■	prickly saxifrage
	Solidago multiradiata			■	northern goldenrod
	Solidago simplex		■■	■	sticky goldenrod
Lichen layer	*Cetraria* spp.			■■■■	cetraria lichens
	Cladonia spp.		■■		cladonia lichens
			□	■■■	lichen crust
	Stereocaulon spp.	■	□	■■■	foam lichens
Moss layer	*Polytrichum juniperinum*		□	■■	juniper haircap moss
	Bryophyta		■■■		mosses

Frequency of occurrence: ■ = 70–100% ■ = 50–70% □ = 25–50% | Abundance (average per cent cover): ■■■■■ = >25% ■■■■ = 10–25% ■■■ = 3–10% ■■ = 1–3% ■ = <1%

BOLsl/11 B – Baikal Sedge Dunes

BOLsl /11-AB03 (Aspen – Balsam poplar / Rocky Mountain fescue – Yukon lupine)

BOLsl /11-Casa01 (Baikal sedge – Rocky Mountain fescue)

BOLsl /11-SwB04 (White spruce – Balsam poplar /Yukon lupine)

BOLsl/20 Pasture Sage Grassland

General Description

Edatopic Grid

	A	B	C	D	E	F
0		■	■	■		
1		■	■	■		
2						
3						
4						
5						
6						
7						

The Pasture Sage Grassland ecosite is associated with moderate to steep southerly facing slopes (southeast to southwest) on a range of surficial materials: morainal, glaciolacustrine, colluvial, eolian and glaciofluvial. These sites are the warmest and driest in the subzone and have a growing season microclimate comparable to regions many degrees of latitude farther south.

The vegetation is characterized by a high cover of grasses, sedges and forbs. Trees and most shrubs are absent or scant; prickly rose (*Rosa acicularis*) or juniper (*Juniperus communis* or *J. horizontalis*) can sometimes be present with moderate cover (e.g., on bedrock-controlled slopes). Pasture sage (*Artemisia frigida*) and purple reedgrass (*Calamagrostis purpurescens*) are generally present, and the dominance of these two with or without small, dry-site sedges or kinnikinnick (*Arctostaphylous uva-ursi*) suggests some site variation as noted in the associations comprising this ecosite. Other fairly consistent herbs are Gorman's beardtongue (*Penstemon gormanii*) and fairy candelabra (*Androsace septentrionalis*).

Arfr02 (Pasture sage – Purple reedgrass)

Soil textures are variable, reflecting the different parent materials. Soils have traditionally been classified as Melanic or Eutric Brunisols, or Humic Regosols, although many soils could be classified as Chernozems (Sanborn 2010) because of the warm temperate microclimate that exists on these sites.

Fire is important to maintain these sites as grasslands. If there are long periods between fires, aspen begins to invade the open slopes.

Comments

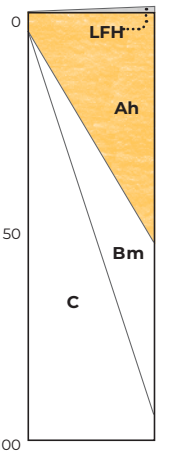
Ecosite 20 is differentiated from other dry-site, non-treed ecosites, as follows:

- 51 is a dry saline meadow found on fairly level sites at the edges of saline depressions and is characterized by foxtail barley (*Hordeum jubatum*), slender wheatgrass (*Elymus trachycaulus*), and Baltic rush (*Juncus arcticus* var. *balticus*).

Site and soils

Site and soil characteristics

Plots in unit	59
Moisture Regime	very xeric to xeric (0–1)
Nutrient Regime	poor, medium, rich (B, C, D)
Meso Slope Position	mid, upper slope and crest
Aspect	southerly
Slope Gradient	usually steep to very steep
Surficial Material	variable
Soil Texture	variable
Soil Classification	Melanic and Eutric Brunisols, minor Humic Regosols and Regosols
Humus Form	mull
Humus Depth	0–2 cm
Soil Drainage	very rapid, rapid, well
Seepage/Water Table	none
Permafrost	none
Site Disturbance	slope colluviation
Exposure	insolation, wind



Vegetation Summary

The following vegetation associations, adapted from the work of Schroeder (2011), characterize the variation in species composition on this ecosite.

Arfr01 Pasture sage – Small sedge

This association tends to occur more often on high on slopes and windswept areas that are free of snow during winter months than it does on sites of the other associations. Small dryland sedges (*Carex duriuscula*, *C. filifolia*, *C. obtusata* and *C. supina*) characterize this association; they have greater cover than grasses here.

Arfr02 Pasture sage – Purple reedgrass

This occurs lower on the slope than Arfr01, or on sites that have more snow protection. The most abundant grasses are purple reedgrass (*Calamagrostis purpurascens*), sand-dune wildrye (*Elymus lanceolatus* spp. *psammophilus*), and/or glaucous bluegrass (*Poa glauca*).

Aruv02 Kinnikinnick

This association may be found on slightly cooler aspects or on sites better protected from winter snow cover than the other grassland associations. Kinnikinnick is the most abundant species, often accompanied by grasses.

The relative abundance of species of these associations is shown in the vegetation table on page 2-64.

BOLsl/20 Vegetation Table

	Vegetation association	Arfr01	Arfr02	Aruv02	
Stratum	No. of plots	26	27	6	
Shrub layer	*Rosa acicularis*		□	□	prickly rose
Gound shrub layer	*Arctostaphylos uva-ursi*			■■■■	kinnikinnick
Graminoid layer	*Calamagrostis purpurascens*	■■	■■■■	■■■	purple reedgrass
	Carex duriuscula	■■■	□□		needle-leaved sedge
	Carex filifolia	■■■			thread-leaved sedge
	Carex obtusata	□□□		■■	blunt sedge
	Elymus lanceolatus		■■■		Sand-dune wild rye
	Festuca saximontana		□□	■■	Rocky Mountain fescue
	Poa glauca	■	□□	□	glaucous bluegrass
Forb layer	*Achillea millefolium*			■■	yarrow
	Androsace septentrionalis	■	□	■	fairy candelabra
	Anemone spp.	■	□	■■■	anemones
	Artemisia frigida	■■■■	■■■■		pasture sage
	Chamaerhodos erecta	■■			chamaerhodos
	Penstemon gormanii	■■■	■■	□	Gorman's penstemon
	Potentilla pensylvanica	■■	□		Pennsylvanian cinquefoil
	Solidago simplex			■■■	sticky goldenrod
Lichen layer		■■■	■■■■	■■■■	lichen crust

Frequency of occurrence: ■ = 70–100% ■ = 50–70% □ = 25–50% | Abundance (average per cent cover): ■■■■■ = >25% ■■■■ = 10–25% ■■■ = 3–10% ■■ = 1–3% ■ = <1%

BOLsl/20 Pasture Sage Grassland

BOLsl /20-Arfr02 (Pasture sage / Purple reedgrass)

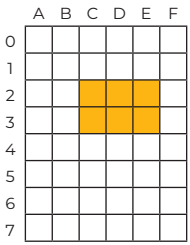
BOLsl /20-Arfr01 (Pasture sage / Small sedge)

BOLsl /20-Aruv02 (Kinnikinnick)

BOLsl/21 A – Purple Reedgrass Woodland

General Description

Edatopic Grid



The A – Purple Reedgrass Woodland ecosite is mostly associated with warm, south-facing slopes, and steep east- and west-facing slopes. Surficial materials are varied and include morainal, glaciolacustrine, colluvial, eolian and glaciofluvial deposits.

Aspen dominates the canopy, although white spruce can be present. A moderate to high cover of common juniper (*Juniperus communis*), purple reedgrass (*Calamagrostis purpurescens*) and/or kinnikinnick (*Arctostaphylos uva-ursi*) characterizes the understorey. Prickly rose (*Rosa acicularis*) and/or soapberry (*Shepherdia canadensis*) are usually present and may be of moderate cover. Highbush cranberry (*Viburnum edule*) may be present. Moss strata and lichens are of low cover.

Soils are variable in texture due to the range of parent materials and are typically classified as Eutric Brunisols, but may also be Melanic Brunisols. Most soils are well to rapidly drained.

A21 (Aspen / Soapberry / Kinnikinnick)

Comments

Ecosite 21 is differentiated from other dry-site, treed ecosites as follows:

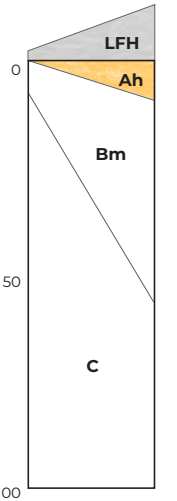
- 10 has either higher lichen cover or lower grass cover than 21. In addition, 10 is predominantly in conifer forests; where 10 is comprised of mixed stands, they are not found on warm aspects.
- 11 only occurs on dunes in the vicinity of Carcross and Takhini River and does not have high grass cover.
- 01 aspen and mixed aspen-conifer stands do not occur on warm slopes or steep neutral aspects. Although the understorey vegetation of aspen and mixed aspen – spruce stands may not differentiate between 01 and 21 sites, the successional development of 21 stands is restricted to aspen dominance due to location on warm slopes, association with grasslands of ecosite 20, and fire.

Grass cover on Ecosite 21 is dominated by purple reedgrass, but can include Altai fescue (*Festuca altaica*), Rocky Mountain fescue (*F. saximontana*), and/or Pumpelly brome (*Bromus pumpellianus*).

Site and soils

Site and soil characteristics

Plots in unit	31
Moisture Regime	subxeric (2)
Nutrient Regime	medium to rich (C-D)
Meso Slope Position	mid to lower slope
Aspect	south, east and west
Slope Gradient	moderate to steep
Surficial Material	variable
Soil Texture	silt loam to loamy sand
Soil Classification	usually Eutric Brunisols
Humus Form	mor, moder, mull
Humus Depth	3-14 cm
Soil Drainage	well
Seepage/Water Table	none
Permafrost	none
Exposure	Insolation
Site Disturbance	n/a



Vegetation Summary

The following vegetation associations characterize the variation in species composition on this ecosite.

A02	Aspen / Juniper
A03	Aspen / Kinnikinnick
A04	Aspen / Prickly rose / Grass – Kinnikinnick
A21	Aspen / Soapberry / Kinnikinnick
ASw05	Aspen – White spruce / Kinnikinnick
ASw07	Aspen – White spruce / Purple reedgrass – Kinnikinnick
ASw06	Aspen – White spruce / Soapberry / Fireweed

The relative abundance of species of these associations is shown in the vegetation table on page 2-69.

BOLsl/21 Vegetation Table

Stratum	Vegetation association / No. of plots	A02 3	A03 3	A04 6	A21 11	ASw05 4	ASw07 1	ASw06 3	
Tree layer	*Picea glauca*	□	■■		■■	■■■	■■■	■■■■	white spruce
	Populus tremuloides	■■■■■	■■■■	■■■■■	■■■■■	■■■■	■■■■	■■■■	trembling aspen
Shrub layer	*Juniperus communis*	■■■■■				□□		□□□	common juniper
	Picea glauca	□□	■		□	■■	■■	■■	white spruce
	Populus tremuloides	■■■■	■■■■	■■■	■■■■	■■■	■■	□□	trembling aspen
	Rosa acicularis	□□	■	■■■■	■■■	■■■	■■	□□	prickly rose
	Salix spp.		■■■				■■	■■	willow
	Shepherdia canadensis	■■■■	□	■■■	■■■■	■■■	■	■■■■	soapberry
	Viburnum edule	□□□			■■■	□		□□	highbush cranberry
Ground shrub layer	*Arctostaphylos uva-ursi*	□□□□	■■■■	■■■	■■■■	■■■■	■	□□□	kinnikinnick
	Linnaea borealis	□□□			■■■	■■■	■	■■■	twinflower
Graminoid layer	*Poaceae*	■■■	■■■	■■■■	■■■	■■■■	■■■■	■■	grasses
Forb layer	*Achillea millefolium*	■■	□	■■	□	■■		■	yarrow
	Artemisia spp.	■		■		■		■	wormwoods
	Chamerion angustifolium	■■	■■		■■■		■■■	■■	fireweed
	Galium boreale	□□		■■	□	■■		□	northern bedstraw
	Geocaulon lividum		□□			■■		□□□	bastard toadflax
	Lupinus arcticus				□□	□□□	■		arctic lupine
Lichen layer	*Cladina mitis*						■■		green reindeer lichen
	Cladonia spp.			□□		■■■		■■	cladonia lichens
	Peltigera spp			□□		■■	■	■■■	pelt lichens
	Stereocaulon spp.							■	foam lichens
Moss layer	*Hylocomium/Pleurozium*				□□	■■■		■■■	feathermosses

Frequency of occurrence: ■ = 70–100% ■ = 50–70% □ = 25–50% | Abundance (average per cent cover): ■■■■■ = >25% ■■■■ = 10–25% ■■■ = 3–10% ■■ = 1–3% ■ = <1%

BOLsl/21 A – Purple Reedgrass Woodland

BOLsl /21-A03 (Aspen / Kinnikinnick)

BOLsl /21-A21 (Aspen / Soapberry / Kinnikinnick)

BOLsl /21-A02 (Aspen / Juniper)

BOLsl /21-A04 (Aspen / Prickly rose / Grass – Kinnikinnick)

BOLsl/21 A – Purple Reedgrass Woodland

BOLsl /21-ASw06 (Aspen – White spruce /Soapberry / Fireweed)

BOLsl /21-ASw05 (Aspen – White spruce /Kinnikinnick)

BOLsl /21-ASw07 (Aspen – White spruce / Purple reedgrass – Kinnikinnick)

BOLsl/30 Sw – Labrador Tea Forest

General Description

Edatopic Grid

	A	B	C	D	E	F
0						
1						
2						
3						
4	■	■				
5	■	■				
6						
7						

The Sw – Labrador Tea Forest ecosite occurs on cold, nutrient poor, mesic to moist sites. Sites are often gently to steeply sloped, on cool to neutral aspects. The ecosite can occur on a variety of parent materials, which are mostly well to moderately well drained, but sometimes imperfectly drained.

White spruce is present on all sites but is not always dominant. Aspen, paper birch or lodgepole pine may dominate or co-dominate with white spruce where sites have been subject to disturbance including fire and wood harvesting. Black spruce may be present, occurring most frequently closer to boundaries with adjacent subzones, but also on cool aspects.

SbSw30 (Black spruce – White spruce / Labrador tea / Feathermoss)

Labrador tea *(Rhododendron groenlandicum)* of moderate to high cover is the key indicator in the understorey. Other ericaceous shrubs include crowberry (*Empetrum nigrum*) and lowbush cranberry *(Vaccinium vitis-idaea)*. Bunchberry *(Cornus canadensis)* is often present. Willows *(Salix* spp.) can be of high cover and on some sites green alder *(Alnus viridis)* is abundant. Feathermosses usually comprise a continuous ground cover.

A peaty surface horizon (4–30 cm) is typical, with a variable underlying soil texture. Soils will have late persisting frost and are usually classified as Eutric or Dystric Brunisols. Soils are cold, leading to slow rates of decomposition and reducing the availability of nutrients. These sites often burn less frequently than drier sites.

Comments

The thick humus layer results in colder soils that favour Labrador tea.

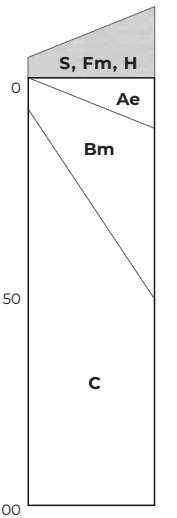
Ecosite 30 is differentiated from some ecosites, as follows:

- 10 can have Labrador tea but of low cover.
- 01 can have small patches of Labrador tea, whereas on 30 sites the patches are larger; 30 is on cooler sites with a deeper organic layer.
- 31 often has Labrador tea but it is of low cover; the indicators of 31 are characteristic, e.g., red bearberry, blueberry willow.
- 33 often has Labrador tea but it is of low cover; 33 sites also have high willow cover and brown mosses.
- 34 also has moderate to high cover of Labrador tea but occurs on moister sites with imperfectly to poorly drained soils; brown mosses commonly occur; black spruce is frequent.

Site and soils

Site and soil characteristics

Plots in unit	22
Moisture Regime	mesic to subhygric (4-5)
Nutrient Regime	poor to very poor (B-A)
Meso Slope Position	mid slopes
Aspect	northerly
Slope Gradient	gentle to steep
Surficial Material	variable
Soil Texture	variable
Soil Classification	Eutric and Dystric Brunisols
Humus Form	mor
Humus Depth	5–18 cm
Soil Drainage	well to imperfect
Seepage/Water Table	none
Permafrost	may be present



Vegetation Summary

The following vegetation associations characterize the variation in species composition on Ecosite 30:

ASw27	Aspen – White spruce (Black spruce) / Labrador tea
SwW29	White spruce – Alaska birch / Alder – Labrador tea
P29	Pine / Labrador tea / Feathermoss
P27	Pine / Labrador tea / Lowbush cranberry
SbSw30	Black spruce – White spruce / Labrador tea / Feathermoss
Sw29	White spruce / Labrador tea / Crowberry / Feathermoss

The relative abundance of species of these associations is shown in the vegetation table on page 2-76.

BOLsl/30 Vegetation Table

Stratum	Vegetation association / No. of plots	ASw27 4	SwW29 2	P29 3	P27 3	SbSw30 1	Sw29 9	
Tree layer	*Betula neoalaskana*		■■■■■					Alaska paper birch
	Picea glauca	■■■■	■■■	■■■■	■■	■■■	■■■■■	white spruce
	Picea mariana	□□□				■■■■		black spruce
	Pinus contorta	□	■■■	■■■■	■■■■■	■■		lodgepole pine
	Populus tremuloides	■■■■			□			trembling aspen
Shrub layer	*Alnus viridis*		■■■■■					green alder
	Betula neoalaskana	□	■■■					Alaska paper birch
	Picea glauca	□	■■	■■		■	□	white spruce
	Picea mariana					■■■		black spruce
	Pinus contorta	□		■				lodgepole pine
	Rhododendron groenlandicum	■■■■■	■■■■	■■■■■	■■■■	■■■■■	■■■■	Labrador tea
	Rosa acicularis	■	■■■	□	■	■	□□	prickly rose
	Salix myrtillifolia					■		blueberry willow
	Salix spp.	■■■■	■■■	■■	■■	■■■	■■■■	willows
	Shepherdia canadensis	■■		■■	■■■			soapberry
	Vaccinium uliginosum	□			□	■■■	□	blueberry
	Viburnum edule	■						highbush cranberry
Ground shrub layer	*Arctostaphylos uva-ursi*			■■	■■■		□	kinnikinnick
	Arctous rubra	■■		□	□		■	red bearberry
	Empetrum nigrum	■■■■	■■■■	■■■■■	■■■	■■■■	■■■■	crowberry
	Linnaea borealis	■■■	■■■■	■	■■■		■■	twinflower
	Vaccinium vitis-idaea	■■■■	■■■■	■■■■	■■■■■	■■■■	■■■	lowbush cranberry
Graminoid layer	*Poaceae*	■	■■	□	■	■■	■■	grasses
Forb layer	*Cornus canadensis*	■■■		■■■	□	■■■		bunchberry
	Chamerion angustifolium	□		■■	■		□	fireweed
	Geocaulon lividum	■	■	□		■■■	■■	bastard toadflax
	Lupinus arcticus	■■■		■	□		□	arctic lupine
	Lycopodium annotinum	□	■■					bristly clubmoss
	Mertensia paniculata	■■	■	■			□	tall bluebells
	Orthilia secunda	□	■■■	■				one-sided wintergreen
Lichen layer	*Cladina* spp.	■■■	■■■	■■■	■■■	■■■	■■■	reindeer lichens
	Cladonia spp.	■	■	■■	■■	■■	■■	cladonia lichens
	Peltigera spp.	□□□□	■	■■■	■■■	■■	■■	pelt lichens
Moss layer	*Hylocomium/Pleurozium*	■■■■■	■■■■■	■■■■■	■	■■■■■	■■■■■	feathermosses

Frequency of occurrence: ■ = 70–100% ■ = 50–70% □ = 25–50% | Abundance (average per cent cover): ■■■■■ = >25% ■■■■ = 10–25% ■■■ = 3–10% ■■ = 1–3% ■ = <1%

BOLsl/30 Sw – Labrador Tea Forest

BOLsl /30-SwW29 (White spruce – Alaska birch / Alder – Labrador tea)

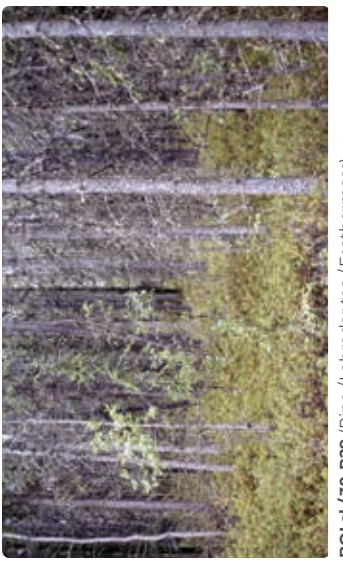
BOLsl /30-ASw27 (Aspen – White spruce (Black spruce) / Labrador tea)

no photo available

BOLsl /30-P27 (Pine / Labrador tea / Lowbush cranberry)

BOLsl/30 Sw – Labrador Tea Forest

BOLsl / 30-SbSw30 (Black spruce – White spruce / Labrador tea / Feathermoss)



BOLsl / 30-P29 (Pine / Labrador tea / Feathermoss)

BOLsl / 30-Sw29 (White spruce / Labrador tea / Crowberry / Feathermoss)

BOLsl/31 Sw – Red Bearberry Forest

General Description

Edatopic Grid

	A	B	C	D	E	F
0						
1						
2						
3						
4						
5		■	■			
6						
7						

The Sw – Red Bearberry Forest ecosite occurs on subhygric sites with poor to medium nutrient regime. The sites are very gently to moderately sloping lower or toe slopes or level sites on various parent materials. Soils are usually moderately well to imperfectly drained.

Stands have a moderately well to well-developed canopy of white spruce, sometimes with lodgepole pine; black spruce may occur near the edge of the subzone. The characteristic understorey species are red bearberry (*Arctous rubra*), blueberry willow (*Salix myrtillifolia*) and grey-leaved willow (*Salix glauca*). Crowberry (*Empetrum nigrum*) and dwarf scouring-rush (*Equisetum scirpoides*) are also indicators of these cool, moist sites, but are not always present. Feathermosses can dominate the forest floor, generally step moss (*Hylocomium splendens*).

Sw31 (White spruce / Willow / Red bearberry / Feathermoss)

Soils are variable in texture and may show signs of periodic reduction and oxidation. Soils are usually classified as Gleyed Eutric Brunisols, Humic Regosols, or sometimes Cryosols.

Comments

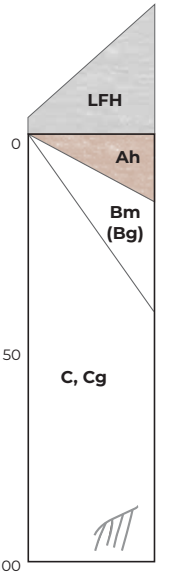
Ecosite 31 is differentiated from some other ecosites, as follows:

- 30 may also occur on moist sites and have crowberry and red bearberry, but the high cover of Labrador tea differentiates it from 31.
- 01 can occasionally have red bearberry and blueberry willow, but the sites are mesic or drier: too dry for 31.
- 32 may have blueberry willow and red bearberry but the shrub birch cover characterizes ecosite 32.
- 33 may have blueberry willow and red bearberry, but these sites have high willow cover and brown mosses.
- 34 has blueberry willow and red bearberry but is characterized by the high Labrador tea cover.

Site and soils

Site and soil characteristics

Plots in unit	22
Moisture Regime	subhygric (5)
Nutrient Regime	medium, poor (C,B)
Meso Slope Position	level, lower and toe
Aspect	variable
Slope Gradient	level to moderate slopes
Surficial Material	variable
Soil Texture	variable
Soil Classification	Gleyed Eutric Brunisols, Humic Regosols, sometimes Cryosols
Humus Form	mor, moder
Humus Depth	4–30 cm
Soil Drainage	moderately well to imperfect
Seepage/Water Table	may have mottles at depth
Permafrost	may be present



Vegetation Summary

The following vegetation associations characterize the variation in species composition on Ecosite 31.

SbSw31 Black spruce – White spruce / Blueberry willow / Feathermoss

Sw31 White spruce / Willow / Red bearberry / Feathermoss

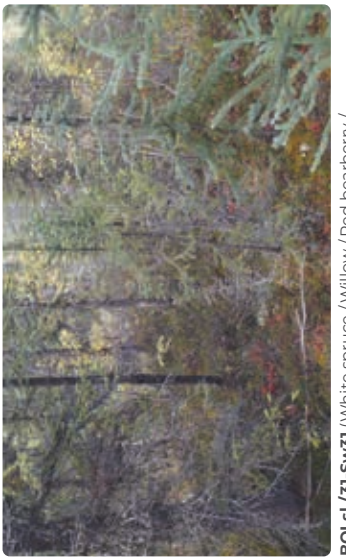
The relative abundance of species of these associations is shown in the vegetation table on page 2-81.

BOLsl/31 Vegetation Table

	Vegetation association	SbSw31	Sw31	
Stratum	No. of plots	4	13	
Tree layer	*Picea glauca*	■■■■■	■■■■■	white spruce
	Picea mariana	■■■■■		black spruce
Shrub layer	*Rhododendron groenlandicum*	■		Labrador tea
	Salix myrtillifolia	■■		blueberry willow
	Salix spp.	■■■	■■■■■	willows
Ground shrub layer	*Arctous rubra*	■■	■■■	red bearberry
	Empetrum nigrum	■	□□□	crowberry
	Linnaea borealis	■	■■■	twinflower
	Vaccinium vitis-idaea	■■■	□□□	lowbush cranberry
Forb layer	*Equisetum scirpoides*	■■	□□	dwarf scouring-rush
	Geocaulon lividum	■■	□□□	bastard toadflax
Lichen layer	*Cladina mitis*	■■		green reindeer lichen
	Cladonia spp.	■	□□	cladonia lichens
	Peltigera aphthosa	■■■	■■	freckle pelt lichen
Moss layer	*Dicranum* spp.	■■■■		heron's-bill mosses
	Hylocomium/Pleurozium	■■■■■	■■■■■	feathernosses

Frequency of occurrence: ■ = 70–100% ■ = 50–70% □ = 25–50% | Abundance (average per cent cover): ■■■■■ = >25% ■■■■ = 10–25% ■■■ = 3-10% ■■ = 1-3% ■ = <1%

BOLsl/31 SW – Red Bearberry Forest



BOLsl /31-Sw31 (White spruce / Willow / Red bearberry / Feathermoss)

BOLsl /31-SbSw31 (Black spruce – White spruce / Blueberry willow / Feathermoss)

BOLsl/32 Sw – Shrub Birch Woodland

General Description

Edatopic Grid

	A	B	C	D	E	F
0						
1						
2						
3						
4						
5		■	■	■		
6		■	■	■		
7						

The Sw – Shrub Birch Woodland ecosite occurs in depressions and valley bottoms strongly influenced by cold air. Moisture regime is mostly subhygric to hygric.

The overstorey is usually open to sparse white spruce (*Picea glauca*) which may be only shrub height. Lodgepole pine (*Pinus contorta*) is sometimes present. The vegetation is characterized by fairly high cover of shrub birch (*Betula glandulosa*) and willow, often grey-leaved willow (*Salix glauca*) or blueberry willow (*S. myrtillifolia*). The low shrub understorey can be diverse depending on the hydrological conditions with a high cover of various ground shrubs (*Arctous rubra*, *Arctostaphylos uva-ursi*, or *Vaccinium vitis-idaea*). Altai fescue (*Festuca altaica*) is usually present and can be of high cover. Lichens are often present and occasionally of high cover (*Cladina* spp. or *Cetraria* spp.); feathermosses are present, but of low cover.

Sw28 (White spruce / Shrub birch / Crowberry / Reindeer lichen)

Soils are often sandy or loamy. Sites are characterised by late persisting frost; soils often show cryoturbation, evidence of the presence of permafrost or former permafrost. Soils are usually classified as Turbic Cryosols, Gleysols or Regosols.

Comments

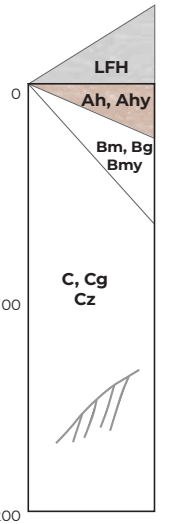
Ecosite 32 is differentiated from some other ecosites, as follows:

- 30 or 34 may have low cover of shrub birch, but are characterized by the high cover of Labrador tea.
- 31 may have minor cover of shrub birch, but the willow cover is greater than 32.
- 33 may have shrub birch, but it is of low cover and the willow cover is greater than 32.

Site and soils

Site and soil characteristics

Plots in unit	17
Moisture Regime	subhygric to hygric (5-6)
Nutrient Regime	medium to rich (C-D)
Meso Slope Position	level, depressional, lower slope
Aspect	variable
Slope Gradient	level to gently sloping
Surficial Material	variable
Soil Texture	clay, silt loam, sandy loam, loamy sand
Soil Classification	Regosols, Gleysols, Humic Gleysols, Turbic Cryosols are common
Humus Form	moder, mor
Humus Depth	3–18 cm
Soil Drainage	imperfect to poor
Seepage/Water Table	mottles at depth
Permafrost	common, soils are often cryoturbated
Exposure	cold air drainage, frost



Vegetation Summary

The following vegetation associations characterize the variation in species composition on this ecosite.

Begl30	Shrub birch – Willow / Altai fescue
P30	Pine / Shrub birch / Altai fescue
Sw25	White spruce / Shrub birch – Willow / Altai fescue – Kinnikinnick
Sw28	White spruce / Shrub birch / Crowberry / Reindeer lichen
Sw30	White spruce / Shrub birch / Crowberry / Feathermoss

The relative abundance of species of these associations is shown in the vegetation table on page 2-85.

BOLsl/32 Vegetation Table

	Vegetation association	Begl30	P30	Sw28	Sw30	Sw25	
Stratum	No. of plots	9	1	1	3	3	
Tree layer	*Picea glauca*	□	■■■	■■■■	■■■■	■■■■	white spruce
	Pinus contorta		■■■■■			□	lodgepole pine
Shrub layer	*Betula glandulosa*	■■■■■	■■■■■	■■■■	■■■■■	■■■■	shrub birch
	Dasiphora fruticosa	■			□	□	shrubby cinquefoil
	Picea glauca	■■■		■	■■■	□□	white spruce
	Salix myrtillifolia	■■■			■■■	■■■	blueberry willow
	Salix spp.	■■■■	■■	■■■■	■■■	■■■■	willow
	Shepherdia canadensis			■		□	soapberry
	Vaccinium uliginosum		■		□□□		blueberry
Ground shrub layer	*Arctostaphylos uva-ursi*	■■■	■■■	■■■■		■■	kinnikinnick
	Arctous rubra	□				■■■	red bearberry
	Vaccinium vitis-idaea		■■				lowbush cranberry
Graminoid layer	*Festuca altaica*	■■■	■■■■		□	■■■■■	Altai fescue
Forb layer	*Achillea millefolium*	■■		■	□	■	yarrow
	Chamerion angustifolium	■■	■	■■		■	fireweed
	Hedysarum alpinum	■		■		■■■	alpine sweet-vetch
	Rubus arcticus	■■			□		arctic raspberry
	Senecio lugens	□□			□	■	black-tipped groundsel
	Solidago multiradiata/simplex	■■		■		□	goldenrods
Lichen layer	*Cetraria* spp.		■■■■			□	cetraria lichens
	Cladina spp.		■■■■	■■■■			reindeer lichens
	Cladonia spp.	□□	■■	■■■■	■■■		cladonia lichens
	Peltigera spp.	■■	■	■■■	■■■		pelt lichens
	Stereocaulon tomentosum		■■■■				woolly foam lichen
Moss layer	*Aulacomium/Tomentypnum*		■■■■	■■	□□□	□	brown mosses
	Dicranum spp.	□□□		■■	■■■■	■	heron's-bill mosses
	Hylocomium/Pleurozium	■■■	■■		■■■■	■■■	feathermosses
	Polytrichum spp.		■■		■■	□	haircap mosses

Frequency of occurrence: ■ = 70–100% ■ = 50–70% □ = 25–50% | Abundance (average per cent cover): ■■■■■ = >25% ■■■■ = 10–25% ■■■ = 3–10% ■■ = 1–3% ■ = <1%

BOLsl/32 MESIC TO MOIST ECOSITES

BOLsl/32 Sw – Shrub Birch Woodland

no photo available

BOLsl /32-P30 (Pine / Shrub birch / Altai fescue)

BOLsl /32-Begl30 (Shrub birch – Willow / Altai fescue)

BOLsl /32-Sw25 (White spruce / Shrub birch – Willow / Altai fescue – Kinnikinnick)

BOLsl/32 Sw – Shrub Birch Woodland

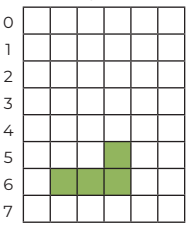
BOLsl/32-Sw30 (White spruce /Shrub birch /Crowberry / Feathermoss)

BOLsl/32-Sw28 (White spruce /Shrub birch /Crowberry / Reindeer lichen)

BOLsl/33 Sw – Willow Forest

General Description

Edatopic Grid



The Sw – Willow Forest ecosite occurs on medium nutrient, subhygric to hygric sites. These are toe slope, level or depressional sites that are imperfectly to poorly drained (usually cool sites). Parent materials are generally lacustrine, morainal and fluvial.

Stands have an open to well-developed canopy of white spruce (*Picea glauca*); sometimes lodgepole pine (*Pinus contorta*) will occur. The characteristic understorey species are willows (*Salix glauca*, *myrtillifolia*, and others) and brown mosses (*Aulacomnium palustre*, *Tomentypnum nitens*). Other consistent species, generally of low cover, include crowberry (*Empetrum nigrum*) and red bearberry (*Arctous rubra*). Common horsetail (*Equisetum arvense*) often occurs, sometimes with moderately high cover. Step moss (*Hylocomium splendens*) dominates the forest floor, along with the brown mosses.

Soils are variable in texture — surface is often loamy — and are usually classified as Gleysols, Gleyed Brunisols or Regosols, or Turbic Cryosols.

Sw32 (White spruce / Willow / Red bearberry / Brown moss)

Comments

The soils of ecosite 33 vary in that some have permafrost. As the presence of permafrost can be important for applications of the classification, two **ecosite phases** have been identified:

- **33P** is for soils that are permanently frozen.
- **33N** is for soils that are not frozen.

Ecosite 33 can be differentiated from some other ecosites, as follows:

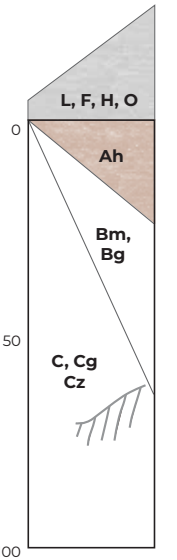
- 30 may have moderate to high cover of willow and horsetail and moderate to high cover of Labrador tea, but lacks brown mosses.
- 31 may have minor common horsetail and/or moderate to high cover of willow, as well as red bearberry and blueberry willow, but lacks brown mosses.

- 32 is characterized by high cover of shrub birch; when it occurs in 33, it is of lower cover than the willow.
- 40 is often characterized by horsetail, but 40 occurs on richer floodplain sites and lacks species indicative of 33 such as red bearberry and brown mosses.
- F04 has willow and brown mosses, but is characterized by moderate to high cover of water sedge.
- 34 may have moderate to high cover of willow, brown mosses, and/or some common horsetail, but is differentiated by moderate to high cover of Labrador tea.

Site and soils

Site and soil characteristics

Plots in unit	22
Moisture Regime	subhygric to hygric (5–6)
Nutrient Regime	medium to rich (C-D)
Meso Slope Position	level, lower, toe, depression
Aspect	variable
Slope Gradient	level to moderate
Surficial Material	variable
Soil Texture	clay loam, silt loam, loam, loamy sand
Soil Classification	Gleysols, Regosols, Brunisols, Turbic Cryosols
Humus Form	mor, moder
Humus Depth	5–40 cm
Soil Drainage	imperfect, poor, very poor
Seepage/Water Table	mottles or seepage within 50 cm
Permafrost	common
Exposure	frost, cold air drainage



Vegetation Summary

The following vegetation associations characterize the variation in species composition on Ecosite 33.

Sw32 White spruce / Willow / Red bearberry / Brown moss

Sw39 White spruce / Willow / Horsetail / Brown moss

The relative abundance of species of these associations is shown in the vegetation table on page 2-92.

BOLsl/33 Vegetation Table

	Vegetation association	Sw32	Sw39	
Stratum	No. of plots	13	9	
Tree layer	*Picea glauca*	■■■■■	■■■■	white spruce
Shrub layer	*Picea glauca*	■■	■■■	white spruce
	Salix spp.	■■■■	■■■■	willows
	Salix myrtillifolia	■■■	□□□	blueberry willow
	Shepherdia canadensis		■■■	soapberry
Ground shrub layer	*Arctous rubra*	■■■	■■■	red bearberry
	Empetrum nigrum	□□	■■■	crowberry
	Linnaea borealis		■■	twinflower
	Vaccinium vitis-idaea	□□□	■■	lowbush cranberry
Graminoid layer	*Poaceae*	■■■	■■	grasses
Forb layer	*Chamerion angustifolium*	□	■	fireweed
	Equisetum arvense		■■■■	common horsetail
	Equisetum scirpoides	■	□□	dwarf scouring-rush
	Geocaulon lividum		■■■	bastard toadflax
	Hedysarum alpinum	□□	■■■	alpine sweet-vetch
Lichen layer	*Cladonia* spp.	■■	■	cladonia lichens
	Peltigera spp.	■■■	■■■	pelt lichens
Moss layer	*Aulacomium/Tomenthypnum*	■■■	■■■■	brown mosses
	Dicranum spp.	■■■	□□	heron's-bill mosses
	Hylocomium/Pleurozium	■■■■■	■■■■■	feathermosses

Frequency of occurrence: ■ = 70–100% ■ = 50–70% □ = 25–50% | Abundance (average per cent cover): ■■■■■ = >25% ■■■■ = 10–25% ■■■ = 3–10% ■■ = 1–3% ■ = <1%

BOLsl/33 Sw – Willow Forest

BOLsl /33-Sw39 (White spruce / Willow / Horsetail / Brown moss)

BOLsl /33-Sw32 (White spruce / Willow / Red bearberry / Brown moss)

BOLsl/34 SbSw – Labrador Tea Forest

General Description

Edatopic Grid

	A	B	C	D	E	F
0						
1						
2						
3						
4						
5	■	■				
6	■	■				
7						

The SbSw – Labrador Tea Forest ecosite occurs on cold, nutrient poor, moist sites, usually on lower or toe slope positions. Sites are often gently to moderately sloped, on cool to neutral aspects, but may occur on steep, cool aspects. The ecosite can occur on a variety of parent materials that are imperfectly to poorly drained.

The canopy is comprised of black spruce, white spruce or both. The key indicators are Labrador tea (*Rhododendron groenlandicum*) of moderate to high cover and brown mosses (*Aulacomnium palustre*, *Tomentypnum nitens*). Willows (including *Salix glauca*, *myrtillifolia*) and ericaceous ground shrubs such as crowberry (*Empetrum nigrum*), red bearberry (*Arctous rubra*) and lowbush cranberry (*Vaccinium vitis-idaea*) are generally present, with low to moderate cover. Step moss (*Hylocomium splendens*) dominates the forest floor, along with the brown mosses.

SbSw32 (Black spruce (White spruce) / Labrador tea / Feathermoss – Brown moss)

A peaty surface horizon (6–40 cm) is typical, with a variable underlying soil texture. Soils exhibit late persisting frost, may have seepage and are usually classified as Gleysols, Humic Gleysols or Cryosols. Cold soil temperatures contribute to slow rates of decomposition, reducing the availability of nutrients.

Comments

The thick humus layer results in colder soils which favour Labrador tea. The soils of ecosite 34 vary in that some have permafrost. As the presence of permafrost can be important for applications of the classification, two **ecosite phases** have been identified:

- **34P** is for soils that are permanently frozen.
- **34N** is for soils that are not frozen.

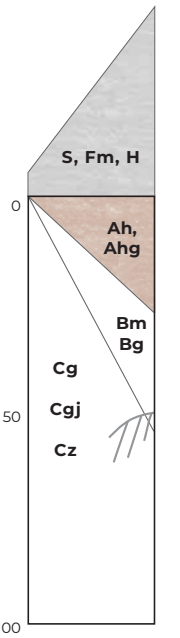
Ecosite 34 is differentiated from other moist to wet ecosites, as follows:

- 30 also has moderate to high cover of Labrador tea but occurs on drier sites that are mostly well to moderately well drained; if brown mosses occur, they are of very low cover; black spruce may occur;
- 31 often has Labrador tea but it is of low cover; the indicators of 31 are characteristic, e.g., red bearberry, blueberry willow;
- 32 is characterized by high cover of shrub birch; Labrador tea is rarely present, but if so, is of less cover than shrub birch;
- 33 often has Labrador tea but it is of low cover; 33 sites also have high willow cover and brown mosses;
- B01 generally has black spruce, peat moss and sedges and occurs on wetter soils with a deeper organic layer; stands are of lower productivity than 34; and
- F04 has higher sedge and brown moss cover, and lower cover of Labrador tea; stands are of lower productivity than 34.

Site and soils

Site and soil characteristics

Plots in unit	14
Moisture Regime	hygric to subhygric (6–5)
Nutrient Regime	poor (B) to very poor (A)
Meso Slope Position	toe slopes and level sites
Aspect	variable
Slope Gradient	level to moderate
Surficial Material	variable
Soil Texture	variable
Soil Classification	Gleysols, Humic Gleysols, Cryosols
Humus Form	moder, mor
Humus Depth	6–40 cm
Soil Drainage	poor to imperfect
Seepage/Water Table	mottles or seepage within 50 cm
Permafrost	common
Exposure	frost, cold air drainage



Vegetation Summary

The following vegetation associations characterizes the variation in species composition on Ecosite 34.

SbSw32	Black spruce (White spruce) / Labrador tea / Feathermoss – Brown moss
Sw38	White spruce / Labrador tea / Red bearberry / Brown moss

The relative abundance of species of these associations is shown in the vegetation table on page 2-98.

BOLsl/34 Vegetation Table

	Vegetation association	SbSw32	Sw38	
Stratum	No. of plots	8	6	
Tree layer	*Picea glauca*	■■■■	■■■■	white spruce
	Picea mariana	■■■■■		black spruce
Shrub layer	*Dasiphora fruticosa*	□□	■■	shrubby cinquefoil
	Picea glauca		■■■	white spruce
	Rhododendron groenlandicum	■■■■■	■■■■■	Labrador tea
	Rosa acicularis	□	■	prickly rose
	Salix myrtillifolia	■■■	□	blueberry willow
	Salix spp.	■■■	■■■■	willows
	Vaccinium uliginosum	■■	■■■	blueberry
Ground shrub layer	*Arctous rubra*	■■■	■■■■	red bearberry
	Empetrum nigrum	■■■	■■■■	crowberry
	Linnaea borealis		■■	twinflower
	Vaccinium vitis-idaea	■■■■	■■■	lowbush cranberry
Forb layer	*Equisetum scirpoides*		■■	dwarf scouring-rush
	Geocaulon lividum	□	■■	bastard toadflax
	Equisetum spp.	□	■■■	horsetails
Lichen layer	*Cladina* spp.	■■■	■■■	reindeer lichens
	Cladonia spp.	■	■■■	cladonia lichens
	Peltigera spp.	■■	■■	pelt lichens
Moss layer	*Aulacomium/Tomentypnum*	■■■	■■■■	brown mosses
	Dicranum spp.	■■	□	heron's-bill mosses
	Hylocomium splendens	■■■■■	■■■■■	step moss

Frequency of occurrence: ■ = 70–100% ■ = 50–70% □ = 25–50% | Abundance (average per cent cover): ■■■■■ = >25% ■■■■ = 10–25% ■■■ = 3–10% ■■ = 1–3% ■ = <1%

BOLsl/34 SbSw – Labrador Tea Forest

BOLsl /34-Sw38 (White spruce / Labrador tea / Red bearberry / Brown moss)

BOLsl /34-SbSw32 (Black spruce (White Spruce) / Labrador tea / Feathermoss – Brown moss)

BOLsl/40 Sw – Riparian Forest

General Description

Edatopic Grid

	A	B	C	D	E	F
0						
1						
2						
3						
4			■	■	■	
5			■	■	■	
6						
7						

The Sw – Riparian Forest ecosite is found on moderately well to imperfectly drained, fluvial parent materials. White spruce (*Picea glauca*) dominates, sometimes with a component of balsam poplar (*Populus balsamifera*). These sites flood occasionally, and are influenced by subsurface water.

A variety of shrubs are found on these sites; willows (*Salix* spp.), prickly rose (*Rosa acicularis*), and/or highbush cranberry (*Viburnum edule*) may be abundant. Horsetails (*Equisetum arvense, pratense*) are characteristic of these floodplain sites, but may be sparse or even absent. Common herbs are tall bluebells (*Mertensia paniculata*), twinflower (*Linnaea borealis*) and one-sided wintergreen (*Orthilia secunda*). Step moss usually dominates the forest floor.

Sw36 (White spruce / Highbush cranberry / Horsetail)

These sites are susceptible to flooding that may be caused by ice jams in the river. Subsurface seepage and occasional flooding result in an influx of nutrients giving these sites a medium, rich to very rich nutrient regime. Soils are typically fine sandy to loamy in texture and are classified as Regosols or Eutric Brunisols. These sites may be subject to river erosion.

Comments

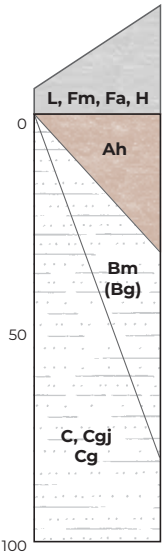
Ecosite 40 can be differentiated from some other ecosites, as follows:

- 01 can also have common horsetail but it is of a minor amount and the sites are not on floodplains;
- 31 can also have common horsetail but it is of a minor amount and the sites are characterized by red bearberry, often accompanied by blueberry willow, crowberry, or dwarf scouring rush;
- 33 has varying amounts of common horsetail and it can be abundant, but occurs on moister sites with red bearberry and brown mosses; and
- 41 also occurs along river floodplains, but stands are dominated by balsam poplar, not white spruce.

Site and soils

Site and soil characteristics

Plots in unit: 12	
Moisture Regime	subhygric, mesic (5, 4)
Nutrient Regime	rich, medium, very rich (D, C, E)
Meso Slope Position	level, depressional and fluvial fans on slopes
Aspect	variable
Slope Gradient	level to moderate
Surficial Material	fluvial, lacustrine
Soil Texture	clay loam, silt loam, sandy loam, sand, loamy sand
Soil Classification	Eutric Brunisols, usually gleyed
Humus Form	moder, mor
Humus Depth	6–25 cm
Soil Drainage	moderately well, imperfect, well
Seepage/Water Table	usually mottles at depth
Permafrost	rare
Site Disturbance	occasional flooding



Vegetation Summary

The following vegetation associations characterize the variation in species composition on Ecosite 40.

SwB28 White spruce – Balsam poplar / Step moss

Sw36 White spruce / Highbush cranberry / Horsetail

The relative abundance of species of these associations is shown in the vegetation table on page 2-102.

BOLsl/40 Vegetation Table

	Vegetation association	SwB28	Sw36	
Stratum	No. of plots	4	8	
Tree layer	*Picea glauca*	■■■■■	■■■■■	white spruce
	Populus balsamifera	■■■		balsam poplar
	Populus tremuloides	■■		trembling aspen
Shrub layer	*Picea glauca*	■	■■	white spruce
	Populus balsamifera	■		balsam poplar
	Rosa acicularis	■■■	■■■■	prickly rose
	Salix spp.	■■■	■■■	willows
	Shepherdia canadensis	■■■	□□□	soapberry
	Viburnum edule	■■■	■■■	highbush cranberry
Ground shrub layer	*Linnaea borealis*	■■	■■■	twinflower
	Vaccinium vitis-idaea	■■■	■■■	lowbush cranberry
Graminoid layer	*Poaceae*	■	■■	grasses
Forb layer	*Chamerion angustifolium*	■	■■■	fireweed
	Cornus canadensis	■■■	□□□	bunchberry
	Equisetum arvense	■■	■■■■	common horsetail
	Geocaulon lividum	■■■	■■■	bastard toadflax
	Mertensia paniculata	■	■	tall bluebells
	Moneses uniflora	□	■	single delight
	Orthilia secunda	■■	□	one-sided wintergreen
	Pyrola chlorantha	□	■	green wintergreen
Lichen layer	*Peltigera* spp.	■	■■■	pelt lichens
Moss layer	*Dicranum* sp.	■	□	heron's-bill moss
	Hylocomium splendens	■■■■■	■■■■■	step moss
	Pleurozium schreberi	□	■■■	red-stemmed feathermoss

Frequency of occurrence: ■ = 70–100% ■ = 50–70% □ = 25–50% | Abundance (average per cent cover): ■■■■■ = >25% ■■■■ = 10–25% ■■■ = 3–10% ■■ = 1–3% ■ = <1%

BOLsl/40 Sw – Riparian Forest

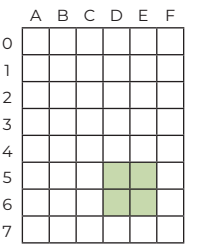
BOLsl /40-Sw36 (White spruce / Highbush cranberry / Horsetail)

BOLsl /40-SwB28 (White spruce – Balsam poplar / Step moss)

BOLsl/41 B – Riparian Forest

General Description

Edatopic Grid



The B – Riparian Forest ecosite is found on moderately well to imperfectly drained fluvial parent materials. These sites vary in the frequency of surface flooding and depth of subsurface water. They occur commonly along the banks of larger rivers, but occasionally may be found on smaller drainages. These sites are generally moister than Sw – Riparian Forest (Ecosite 40), with more frequent flooding. However, some of the stands in this ecosite may be on slightly drier fluvial sites that flood due to ice jamming and may lack horsetails.

Stands have a well-developed canopy dominated by young to maturing balsam poplar. Young white spruce may also be present.

A variety of shrubs are found on these sites: highbush cranberry (*Viburnum edule*), willows (*Salix* spp.), river alder (*Alnus incana*), prickly rose (*Rosa acicularis*), or soapberry (*Shepherdia canadensis*). Tree size willows are generally Scouler's (*Salix scouleriana*) or Bebb's (*S. bebbiana*). Horsetails (*Equisetum arvense, pratense*) are not always present for the reasons noted. Frequent herbs are fireweed (*Chamerion angustifolium*), tall bluebells (*Mertensia paniculata*), one-sided wintergreen (*Orthilia secunda*) and arctic lupine (*Lupinus arcticus*). Moss cover is sparse or absent due to extensive leaf litter and/or frequent flooding.

Soils are usually sandy to loamy in texture and usually classified as Gleyed or Cumulic Regosols and sometimes Eutric Brunisols. Because of flood deposition, decomposition of leaf litter and or subsurface seepage, these sites usually have a rich to very rich nutrient regime.

Comments

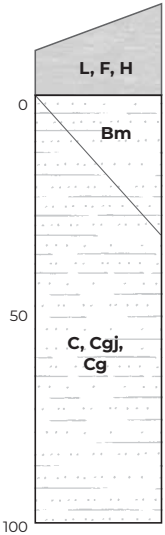
Ecosite 41 can be differentiated from some other ecosites, as follows:

- 40 also occurs along river floodplains and can have balsam poplar, but stands are dominated by white spruce;
- 31 and 33 can have common horsetail, but stands are conifer dominated; and
- S02 and S04 may be found on river floodplains, but are dominated by river alder or willow and have wetter soils.

Site and soils

Site and soil characteristics

Plots in unit	12
Moisture Regime	subhygric to hygric (5–6)
Nutrient Regime	rich, very rich (D,E)
Meso Slope Position	level and lower slope
Aspect	variable
Slope Gradient	level to moderate
Surficial Material	fluvial
Soil Texture	loam to loamy sand
Soil Classification	Regosols, Eutric Brunisols
Humus Form	mor, moder
Humus Depth	10–22 cm
Soil Drainage	moderate to imperfect
Seepage/Water Table	mottles at depth
Permafrost	none
Site Disturbance	flooding



Vegetation Summary

The following vegetation associations characterize the variation in species composition on Ecosite 41:

B23 Balsam poplar / Highbush cranberry / Horsetail
B31 Balsam poplar / Willow / Fireweed
SwB27 Balsam poplar – White spruce / Soapberry

The relative abundance of species of these associations is shown on page 2-106.

BOLsl/41 Vegetation Table

Stratum	Vegetation association / No. of plots	B23 2	B31 2	SwB27 2	
Tree layer	*Picea glauca*	■■■		■■■■	white spruce
	Populus balsamifera	■■■■■	■■■■■	■■■■■	balsam poplar
	Salix spp.	■■■■			willows
Shrub layer	*Alnus incana*	■■		■■■■	river alder
	Picea glauca	■			white spruce
	Populus balsamifera	■■	■■		balsam poplar
	Ribes lacustre	■	■		black gooseberry
	Ribes triste	■			wild red currant
	Rosa acicularis	■■■	■	■	prickly rose
	Salix spp.	■■■■	■■■■■	■	willows
	Shepherdia canadensis		■	■■■■■	soapberry
	Viburnum edule	■■■■■	■■	■■■■	highbush cranberry
Ground shrub layer	*Linnaea borealis*		■■	■	twinflower
Graminoid layer	*Calamagrostis canadensis*	■			bluejoint reedgrass
Forb layer	*Achillea millefolium*		■■		yarrow
	Arnica cordifolia		■■		heart-leaved arnica
	Astragalus americanus		■■		American milk-vetch
	Chamerion angustifolium	■■	■■■■	■	fireweed
	Cornus canadensis		■■■■		bunchberry
	Equisetum arvense	■■■■■	■		common horsetail
	Galium labradoricum		■■		northern bog bedstraw
	Geocaulon lividum	■■■	■		bastard toadflax
	Heracleum maximum	■	■		cow parsnip
	Lupinus arcticus		■■■	■	arctic lupine
	Mertensia paniculata	■	■	■	tall bluebells
	Orthilia secunda	■	■■	■	one-sided wintergreen
	Pyrola asarifolia		■	■	pink wintergreen
Moss layer	*Brachythecium* spp.	■	■		ragged mosses
	Hylocomium splendens	■	■		step moss

Frequency of occurrence: ■ = 70–100% ■ = 50–70% □ = 25–50% | Abundance (average per cent cover): ■■■■■ = >25% ■■■■ = 10–25% ■■■ = 3–10% ■■ = 1–3% ■ = <1%

BOLsl/41 B – Riparian Forest

no photo available

BOLsl / 41-B31 (Balsam poplar / Willow / Fireweed)

BOLsl / 41-B23 (Balsam poplar / Highbush cranberry / Horsetail)

no photo available

BOLsl / 41-SwB27 (Balsam poplar – White spruce / Soapberry)

BOLsl/50–55

General Description

There are several ecosites occurring as concentric rings around saline ponds. These sites contain excess salts in the rooting zone and are typically found at a few localities in the fine-textured glaciolacustrine deposits north and east of Whitehorse. Soils in glaciolacustrine sediments surrounding other lakes and ponds in the BOLsl also exhibit highly alkaline soils and may be slightly saline. Changes in water table from year to year and over decades, due to differences in rainfall and climate, can result in strong variations in water table, salinity and vegetation cover at a particular location (Harris 1990; Veres et al. 1995; Line 2005, Secombe-Hett and Line 2005).

Shallow water and marsh ecosites of alkaline waters have been described (W01, W02, W03). Most of the ecosites presented here are slightly drier than marshes, and are often called “saline meadows.”

BOLsl/50 Sw – Baltic Rush Saline Forest

Characterized by one plot. The plot has a white spruce – aspen overstorey and an understorey dominated by kinnikinnick (*Arctostaphylos uva-ursi*). Glaucous bluegrass (*Poa glauca*) and Baltic rush (*Juncus arcticus* var. *balticus*) may characterize these highly saline, treed stands.

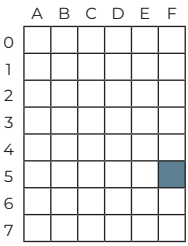
Edatopic Grid

	A	B	C	D	E	F
0						
1						
2						
3						
4						■
5						■
6						■
7						

These sites lie slightly higher than other saline sites. They are imperfectly drained subhygric sites with Gleyed Eutric Brunisol soils. They are characterized by some salt accumulation within the rooting zone, which limits the growth of some species.

BOLsl/51 Foxtail Barley Saline Meadow

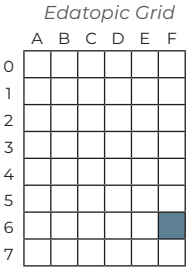
Edatopic Grid



Saline meadows characterized by foxtail barley (*Hordeum jubatum*) occur between the saline depression and the forest edge. Common associates include slender wheatgrass (*Elymus trachycaulus*), Baltic rush (*Juncus arcticus* var. *balticus*), tufted hairgrass (*Deschampsia caepitosa*), seaside buttercup (*Ranunculus cymballaria*), silverweed (*Potentilla anserina*) and glaucous bluegrass (*Poa glauca*).
Though tolerant of some salinity, these species are not limited to saline conditions.

BOLsl/52 Sea Milkwort Saline Meadow

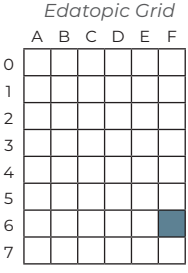
Edatopic Grid



Sea milkwort (*Glaux maritima*) is characterized by an intermittent and thin salt crust, drier soils and a diversity of forest edge species. The edge of the milkwort zone seems to delineate the edge of the saline influence, hence the highest number and most diverse number of species associated with milkwort. Sea milkwort is often found growing in association with saline plantain (*Plantago eriopoda*) and western heath aster (*Symphyotrichum falcatum*).

BOLsl/53 Nuttall's Alkaligrass Saline Meadow

Edatopic Grid

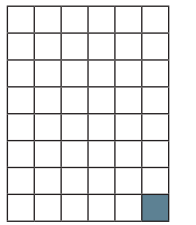


This area typically has a distinct yet thin salt crust upon the soil surface. Nuttall's alkaligrass (*Puccinellia nuttalliana*) is occasionally intermixed with seaside arrow-grass (*Triglochin maritima*) and an unidentified species of alkaligrass (*Puccinellia*).

BOLsl/54 Horned Sea-blite Saline Meadow

Horned sea-blite (*Suaeda calceoliformis*) occurs in a zone above red glasswort (Ecosite 55) and has been observed in dense and extensive patches at two of the salt flat sites (Cracker Creek-Big and Takhini).

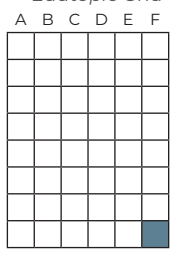
Edatopic Grid



BOLsl/55 Red Glasswort Saline Meadow

This glasswort-dominated area is characterized by high moisture levels, a thick salt crust between 3 and 5 mm thick and varying densities of red glasswort (*Salicornia rubra*).

Edatopic Grid



Comments

Saline soils contain excess soluble salts in the rooting zone. The salts occur naturally in bedrock and in the fine-textured glaciolacustrine sediments of the Takhini and Lake Laberge valleys. When groundwater discharges at the surface it evaporates, leaving the salts behind; these accumulate over time. The discontinuous permafrost may have helped to concentrate the salts in unfrozen pockets of the sediments and also to focus discharge in certain areas. The ground surface may turn white from the accumulated salts. Only salt-tolerant plants are able to grow in areas that are severely saline.

The main salts encountered in the Takhini Valley in the Southern Lakes subzone are calcium carbonate ($CaCO_3$) and sodium sulphate (Na_2S0_4). The electrical conductivity measured at different depths in the soil fluctuates throughout the season in response to changes in the depth to the water table and the equilibrium between evaporation, evapotranspiration and rainfall.

References: Davies et al. 1983; Roberts and Turney 2012; Schroeder 2011; Secombe-Hett and Line 2005.

Other communities

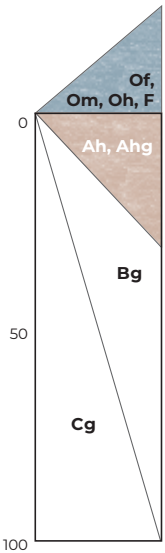
Thick-leaved orache (*Atriplex dioica*) is sometimes found forming a crescent-shaped pattern in areas slightly elevated above the edge of the red glasswort zone.

References: Davies et al. 1983; Roberts and Turney 2012.

Site and soils

Site and soil characteristics

Plots in unit	81
Moisture Regime	mesic to hydric (4 - 8)
Nutrient Regime	saline (F)
Meso Slope Position	level and depressional sites
Aspect	level
Slope Gradient	level
Surficial Material	lacustrine
Soil Texture	clay loam – clay
Soil Classification	gleyed Brunisol, Gleysol
Humus Form	not applicable
Humus Depth	not applicable
Soil Drainage	imperfect – very poor
Seepage/Water Table	mottles, or seepage/water table within 50 cm
Permafrost	none



Vegetation Summary

The following vegetation associations characterize the variation in species composition on Saline ccosites (50–55):

50	Sw19	White spruce / Kinnikinnick – Baltic rush
51	Hobr20	Foxtail barley – Baltic rush
52	Lyma20	Sea milkwort
53	Punu21	Nuttall's alkaligrass
54	Suca21	Horned sea-blight
55	Saru50	Red glasswort

The relative abundance of species of these associations is shown on page 2-112.

BOLsl/50–55 Vegetation Table

	Vegetation association	50 Sw19	51 Hobr20	52 Lyma20	53 Punu21	54 Suca21	55 Saru50	
Stratum	No. of plots	1	5	18	24	8	25	
Tree layer	*Picea glauca*	■■■■						white spruce
	Populus tremuloides	■■■■						trembling aspen
Shrub layer	*Juniperus horizontalis*	■■						creeping juniper
	Picea glauca	■■■						white spruce
	Pinus contorta	■						lodgepole pine
	Populus tremuloides	■■■						trembling aspen
	Salix sp.	■■■						willow
	Shepherdia canadensis	■■■■						soapberry
Ground shrub layer	*Arctostaphylos uva-ursi*	■■■■■						kinnikinnick
Graminoid layer	*Bromus pumpellianus*	■■						pumpelly brome
	Calamagrostis purpurascens	■■						purple reedgrass
	Deschampsia cespitosa		▪▪▪					tufted hairgrass
	Elymus trachycaulus		■■■	▪▪▪				slender wheatgrass
	Hordeum brachyantherum		■■■■			□		foxtail barley
	Juncus arcticus var. *balticus*	■■	▪▪▪					Baltic rush
	Poa glauca	■■■		▪▪▪				glaucous bluegrass
	Puccinellia nuttalliana			□□□	■■■■■	■■■	▪▪	Nuttall's alkaligrass
Forb layer	*Achillea millefolium*	■	■■■					yarrow
	Anemone multifida	■■						cut-leaved anemone
	Chamerion angustifolium	■■						fireweed
	Lysimachia maritima			■■■■				sea-milkwort
	Salicornia rubra				▪▪	□	■■■■■	red glasswort
	Solidago simplex	■						sticky goldenrod
	Suaeda calceoliformis					■■■■■		Horned sea-blite
	Symphyotrichum falcatum			▪▪▪				little gray aster
Lichen layer	*Cetraria nivalis*	■						ragged paperdoll
		■■						lichen crust
		■						lichens
	Peltigera sp.	■						pelt lichens
Moss layer	*Bryophyta*	■	□□					mosses

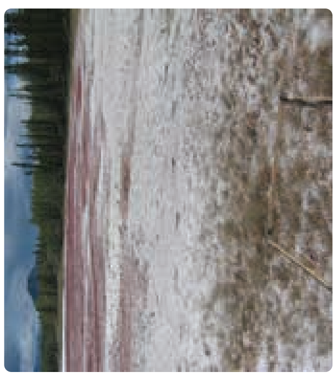
Frequency of occurrence: ■ = 70–100% ▪ = 50–70% □ = 25–50% | Abundance (average per cent cover): ■■■■■ = >25% ■■■■ = 10–25% ■■■ = 3–10% ■■ = 1–3% ■ = <1%

BOLsl/50–55 SALINE ECOSITES

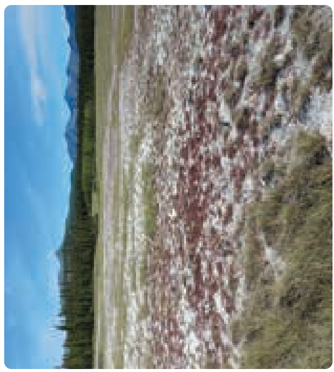
BOLsl /50-Sw19 (White spruce – Kinnikinnick – Baltic rush)

BOLsl /51-Hobr20 (Foxtail barley – Baltic rush)

BOLsl /52-Lyma20 (Sea milkwort)



BOLsl /53-Punu21 (Nuttall's alkaligrass)



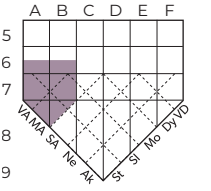
BOLsl /54- Suca21 (Horned sea-blite)

BOLsl /55-Saru50 (Red glasswort)

BOLsl/B01 SbSw – Labrador Tea Bog

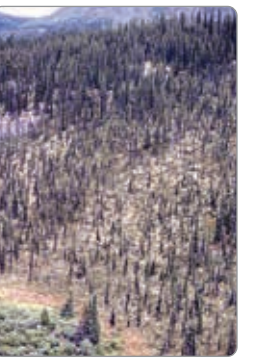
General Description

Edatopic Grid



The SbSw – Labrador Tea Bog ecosite is a treed bog, established on subhydric and sometimes, hygric sites, with a poor nutrient regime. Parent materials are organic veneer over various mineral materials, with permafrost generally within 50 cm of the surface. These are slightly richer bogs than occur elsewhere in Yukon, due to the calcareous parent materials in the area and "warm" permafrost (often very close to 0º C).

These sparsely treed stands have an open canopy that is usually comprised of black spruce (*Picea mariana*) and sometimes white (*P. glauca*). The characteristic understorey species are ericaceous shrubs, Labrador tea (*Rhododendron groenlandicum*) and crowberry (*Empetrum nigrum*); peat moss (*Sphagnum* spp.) is diagnostic. Willows (*Salix glauca* and others) may be abundant. Sedges (usually *Carex aquatilis*) occur with low to moderate abundance; brown mosses (*Aulacomnium palustre*, *Tomentypnum nitens*) are also present.



Sb41 (Black spruce / Willow – Labrador tea / Water sedge / Peat moss)

Soils are usually classified as Organic Cryosols when characterized by a peaty surface horizon greater than 40 cm or Gleysolic Turbic Cryosols when the organic mat is less than 40 cm. This ecosite is extremely sensitive to disturbance as permafrost temperatures are very close to 0º C. Even minor disturbances such as wildlife trails may cause or increase the cover of water sedge and other hydrophytes.

Comments

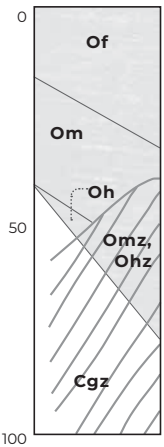
Ecosite B01 can be differentiated from some other ecosites, as follows:

- F04 has higher sedge and brown moss cover, and lower Labrador tea, crowberry and peat moss cover than B01; both can have either white or black spruce, but F04 is generally white and B01 is usually black spruce. B01 usually has near surface permafrost;
- 33 may have a minor component of peat moss and some brown mosses, but step moss dominates the forest floor; stands are more productive and comprised of white spruce; soils are better drained than B01;
- 34 is also characterized by white and black spruce and Labrador tea, and may have a minor component of peat moss and some brown mosses, but step moss dominates the forest floor; stands are more productive; soils are drier and better drained than in B01; and
- Other swamps and fens are not "treed," although they may have scattered white spruce (less than 5% cover).

Site and soils

Site and soil characteristics

Plots in unit	3
Moisture Regime	hygric to hydric (6–8)
Nutrient Regime	very poor to poor (A–B)
Meso Slope Position	level and depressional sites
Aspect	none
Slope Gradient	level
Surficial Material	organic veneer
Soil Texture	fibric organic material
Soil Classification	Organic Cryosol and Turbic Cryosol
Humus Form	fibrimor
Humus Depth	30–60 cm
Soil Drainage	poor
Seepage/Water Table	water table within 1 m and frozen
Permafrost	present



Vegetation Summary

The following vegetation association displays the species composition on this ecosite.

Sb41 Black spruce / Willow – Labrador tea / Water sedge / Peat moss

The relative abundance of species of this association is shown on page 2-116.

BOLsl/B01 Vegetation Table

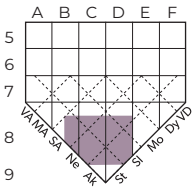
	Vegetation association	Sb41	
Stratum	No. of plots	3	
Tree layer	*Picea mariana*	■■■■	black spruce
	Picea glauca	□□□	white spruce
Shrub layer	*Rhododendron groenlandicum*	■■■■■	Labrador tea
	Salix spp.	■■■■■	willows
Ground shrub layer	*Arctous rubra*	■■■■■	red bearberry
	Empetrum nigrum	■■■■■	crowberry
	Vaccinium vitis-idaea	■■■	lowbush cranberry
Graminoid layer	*Carex* spp.	■■■■	sedges
Forb layer	*Rubus chamaemorus*	■■■	cloudberry
Lichen layer	*Cladina mitis*	■■■	green reindeer lichen
Moss layer	*Bryophyta*	■■■■■	mosses
	Sphagnum spp.	■■■■	peat mosses

Frequency of occurrence: ■ = 70–100% ■ = 50–70% □ = 25–50%
Abundance (average per cent cover): ■■■■■ = >25% ■■■■ = 10–25% ■■■ = 3–10% ■■ = 1–3% ■ = <1%

BOLsl/F01 Water Sedge Fen

General Description

Edatopic Grid



The Water Sedge Fen ecosite is the wettest of the fens in this subzone and is dominated by large water sedges, mostly water sedge (*Carex aquatilis*) but sometimes beaked sedge (*Carex utriculata*). Standing water can be near, at or above the ground surface, depending upon the time of season and run-off.

In addition to the sedge cover, brown mosses often occur, including golden fuzzy fen moss (*Tomentypnum nitens*), glow moss (*Aulacomnium palustre*), hook-mosses (*Drepanocladus* spp.) or water moss (*Calliergon* sp.).

In this dry cold climate with calcareous parent materials, peat accumulation in wetlands is slow and peat is generally thin. This ecosite, the wettest of the fens, usually has organic layers 20–40 cm and occasionally up to 100 cm thick. Limnic (marl), cumulic (fluvial) and hydric (water) layers may be present. Soils are usually classified as Terric Mesisols or Fibrisols or peaty phases of Gleysols.

Caaq55 (Water sedge – Beaked sedge)

Comments

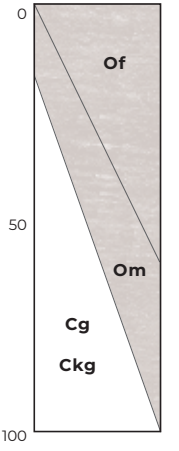
Ecosite F01 is equivalent to Wf01 in British Columbia (Mackenzie and Moran 2004). This ecosite can be differentiated from other wetlands with water sedges, as follows:

- B01 and F04 are open treed bogs and fens, respectively, with water sedges, but with a tree cover >9%;
- F02, F03 and S03 can have water sedge, but are shrub fens and swamps with high cover of shrub birch (F02) or willow (F03, S03); F01 can sometimes have willows, but less than 5% cover; and
- M01 occurs on mineral soils with a fluctuating water table; by contrast, F01 sites have a moderately decomposed peaty surface with a more stable water table.

Site and soils

Site and soil characteristics

Plots in unit	19
Moisture Regime	hydric (8)
Nutrient Regime	medium to rich (C–D)
Meso Slope Position	level, depressional
Aspect	none
Slope Gradient	level
Surficial Material	organic over fluvial, glaciofluvial
Soil Texture	fibric, mesic organic materials over loams
Soil Classification	Gleysols, Mesisols
Humus Form	fibrimor, mesimor
Humus Depth	20–100 cm
Soil Drainage	very poor, poor
Seepage/Water Table	water table within 40 cm
Permafrost	none



Vegetation Summary

The following vegetation association displays the species composition on this ecosite.

Caaq55 Water sedge – Beaked sedge

The relative abundance of species of this association is shown in the vegetation table below.

BOLsl/F01 Vegetation Table

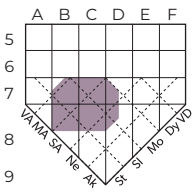
	Vegetation association	Caaq55	
Stratum	No. of plots	19	
Graminoid layer	Carex *aquatilis*	■■■■■	water sedge
Moss layer	*Bryophyta*	■■■■	mosses

Frequency of occurrence: ■ = 70–100% ■ = 50–70% □ = 25–50%
Abundance (average per cent cover): ■■■■■ = >25% ■■■■ = 10–25% ■■■ = 3–10% ■■ = 1–3% ■ = <1%

BOLsl/F02 Shrub Birch Fen

General Description

Edatopic Grid



The Shrub Birch Fen ecosite is a shrub fen that occurs on subhydric sites with a medium nutrient regime. The sites are level and poorly to very poorly drained. Parent materials are organic veneers or, occasionally, organic blankets over mineral materials.

Shrub birch (*Betula glandulosa*) dominates the shrub overstorey with numerous willow species (*Salix glauca*, *arbusculoides*, *athabascensis*, *myrtillifolia*, and others) occurring as codominants. Water sedge (*Carex aquatilis*) is the dominant and diagnostic understorey species; other sedges (*Carex lachenalii, diandra*) may be abundant. Wetland species such as Baltic rush (*Juncus arcticus* var. *balticus*), bog buckbean (*Menyanthes trifoliata*), Pacific kobresia (*Kobresia simpliciuscula*) or seaside arrow-grass (*Triglochlin maritima*) occur with significant cover on some sites, though there is currently insufficient data to distinguish different ecosites. Brown mosses dominate the moss layer, including golden fuzzy fen moss (*Tomentypnum nitens*), glow moss (*Aulacomnium palustre*), and/or hook-moss (*Drepanocladus* spp.).

Begl50 (Shrub birch – Willow / Water sedge)

Comments

Ecosite F02 is similar to Wf02 in British Columbia (MacKenzie and Moran 2004), although there is a greater willow component in F02.

As this ecosite can occur on soils with a range of organic surface horizons, two **ecosite phases** are recognized:

- **F02O** occurs on organic soils with surface peat greater than 30 cm; and
- **F02M** is found on on peaty soils of less than 30 cm overlying mineral soil.

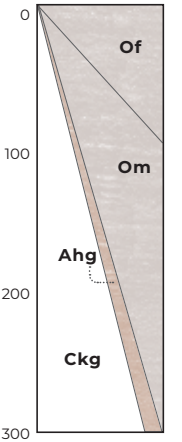
This ecosite can be differentiated from other wetlands in the following ways:

- B01 and F04 are open treed bogs and fens, so have a higher tree cover than F02; and
- Other shrubby fens or swamps do not have the high shrub birch cover of this ecosite.

Site and soils

Site and soil characteristics

Plots in unit	3
Moisture Regime	subhydric to hydric (7–8)
Nutrient Regime	medium, rich (C, D)
Meso Slope Position	depressional, level
Aspect	none
Slope Gradient	level
Surficial Material	organic over fluvial
Soil Texture	fibric, mesic over clay loam to sandy loam or loamy sand
Soil Classification	Mesisols, Gleysols, Humic Gleysols
Humus Form	mor, moder
Humus Depth	20–225 cm
Soil Drainage	poor to very poor
Seepage/Water Table	water table within 40 cm
Permafrost	none



Vegetation Summary

The following vegetation association displays the species composition on this ecosite.

Begl50 Shrub birch – Willow / Water sedge

The relative abundance of species of this association is shown in the vegetation table below.

BOLsl/F02 Vegetation Table

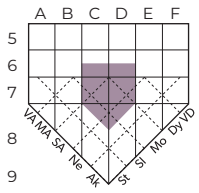
	Vegetation association	Begl50	
Stratum	No. of plots	12	
Shrub layer	*Betula glandulosa*	■■■■■	shrub birch
	Dasiphora fruticosa	■	shrubby cinquefoil
	Salix spp.	■■■■	willows
Graminoid layer	*Carex aquatilis*	■■■■	water sedge
Moss layer	*Bryophyta*	■■■■■	mosses

Frequency of occurrence: ■ = 70–100% ■ = 50–70% □ = 25–50%
Abundance (average per cent cover): ■■■■■ = >25% ■■■■ = 10–25% ■■■ = 3–10% ■■ = 1–3% ■ = <1%

BOLsl/F03 Willow – Water Sedge Fen

General Description

Edatopic Grid



The Willow – Water sedge Fen ecosite is a shrub fen that occurs on subhydric sites with a medium to rich nutrient regime. The sites are level and mostly very poorly drained. Parent materials are organic layers over mineral materials. Soils are often organic types and can occasionally have permafrost. Willows (*Salix glauca*, *arbusculoides*, *athabascensis*, *myrtillifolia*, *planifolia*, and others) dominate the shrub overstorey; water sedge (*Carex aquatilis*) dominates the herb layer. Sometimes beaked sedge (*Carex utriculata*) replaces or co-occurs with water sedge. Brown mosses dominate the moss layer, including golden fuzzy fen moss (*Tomentypnum nitens*), glow moss (*Aulacomnium palustre*), water moss (*Calliergon* spp.) or hook-moss (*Drepanocladus* spp.). Soils are characterized by a fibric or mesic peaty surface organic horizon 10–45 cm thick, overlying fluvial or lacustrine deposits. Limnic (marl), cumulic (fluvial) and hydric layers may be present. The soils are classified as Gleysols, Organic soils, Organic Cryosols or peaty phases of other Cryosols.

Sasp58 (Willow/Water sedge)

Comments

Ecosite F03 can be differentiated from other wetlands with water sedges, as follows:

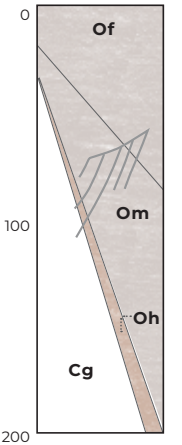
- B01 and F04 are open treed bogs and fens, respectively; these ecosites have a greater tree cover than F03;
- F02 has moderate to high cover of shrub birch;
- F01 and M01 have water sedge, and may have up to 5 per cent cover of willows;
- S02 has a high cover of river alder;
- S03: Both S03 and F03 have a high cover of willows and water sedges. They likely differ in willow species and bryophyte composition, but sufficient data is currently lacking. Fens, in general, are more nutrient poor than swamps, as the water table is more stable and water flow is much slower; as a result, the soils have less decomposed peat and greater peat depth than swamps. Differentiate

the F03 by looking at the peat depth and decomposition, and use position on the landscape to infer the degree of water flow; the F03 will occur in depressions or pond edges where water flow appears stagnant. In contrast, S03 will occur along creeks, rivers or shores where the water flows more or is more dynamic (i.e., flood waters and fluctuating water tables influence the site).

Site and soils

Site and soil characteristics

Plots in unit	11
Moisture Regime	hygric to subhydric (6–8)
Nutrient Regime	medium, rich (C, D)
Meso Slope Position	level, depressional
Aspect	none
Slope Gradient	level
Surficial Material	organic
Soil Texture	fibric, mesic
Soil Classification	Fibrisols, Mesisols, minor Gleysols
Humus Form	mor
Humus Depth	20–100 cm
Soil Drainage	poor to very poor
Seepage/Water Table	water table within 40 cm
Permafrost	occasionally
Site Disturbance	may be subject to flooding



Vegetation Summary

The following vegetation association displays the species composition on this ecosite.

Sasp58 Willow / Water sedge

The relative abundance of species of this association is shown in the vegetation table below.

BOLsl/F03 Vegetation Table

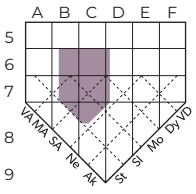
	Vegetation association	Sasp58	
Stratum	No. of plots	11	
Shrub layer	*Salix* spp.	■■■■■	willows
Graminoid layer	*Carex aquatilis*	■■■■	water sedge
Moss layer	*Bryophyta*	■■■■■	brown mosses

Frequency of occurrence: ■ = 70–100% ■ = 50–70% □ = 25–50%
Abundance (average per cent cover): ■■■■■ = >25% ■■■■ = 10–25% ■■■ = 3–10% ■■ = 1–3% ■ = <1%

BOLsl/F04 Sw – Water Sedge Fen

General Description

Edatopic Grid



The Sw – Water Sedge Fen ecosite is an open to sparsely treed wetland that occurs on hygric to subhydric sites with a medium to rich nutrient regime. The sites are level to nearly level, and poorly to very poorly drained. Parent materials usually consist of organic veneers over fluvial or lacustrine materials. Occasional deep peat deposits occur in deeply incised glacial meltwater channels. Permafrost is occasionally present. This ecosite includes fens and some treed swamps.

Sw50 (White spruce / Labrador tea / Water sedge)

Stands are very open to moderately closed white spruce (*Picea glauca*), of short stature and poor growth. Occasionally, black spruce (*Picea mariana*) may occur.

The characteristic understorey species are willows (*Salix glauca, arbusculoides, myrtillifolia*, and others), shrub birch (*Betula glandulosa*) and water sedge (*Carex aquatilis*). Labrador tea (*Rhododendron groenlandicum*) is sometimes present, and can be moderately abundant. Brown mosses are abundant, including golden fuzzy fen moss (*Tomentypnum nitens*) and glow moss (*Aulacomnium palustre*).

In this subzone, characterized by low rainfall and calcareous parent materials, peat accumulation occurs slowly and is generally thin. Soils of this ecosite have an organic surface horizon between 10 and 300 cm thick that overlies mineral soil. Soils are usually classified as Humic Gleysols, Gleysols or Mesisols. Sparse to open stunted tree cover on level sites with shallow peaty soils (15–40 cm) is typical of fen hydrology rather than the richer swamp condition that is more likely found in the toe slope position and represented by taller trees. There is currently insufficient data to distinguish these swamps.

Comments

The F04 ecosite is diverse in terms of soils and vegetation cover. For this reason two **ecosite phases** of ecosite F04 are recognized:

- **F04O** consists of treed fens on organic soils greater than 30 cm in depth; and
- **F04M** occurs on peaty soils of less than 30 cm overlying mineral soil.

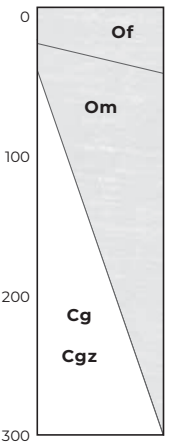
Ecosite F04 can be differentiated from some other ecosites, as follows:

- B01 has lower cover of sedge and brown moss and higher cover of Labrador tea, crowberry and peat moss than F04; both can have either white or black spruce, but F04 is generally white and B01 is black spruce;
- 33 may have some water sedge (<2% cover) and brown mosses, but step moss dominates the forest floor; stands are more productive;
- 34 may have some water sedge (<5% cover) and brown mosses, but step moss dominates the forest floor; Labrador tea is of moderate to high cover; 34 stands are more productive; and
- Other fens and swamps are not "treed," although they may have scattered white spruce (less than 5% cover).

Site and soils

Site and soil characteristics

Plots in unit	20
Moisture Regime	hydric to hygric (8–6)
Nutrient Regime	medium to rich (C-D)
Meso Slope Position	level and toe slope
Aspect	variable
Slope Gradient	level to gently sloping
Surficial Material	organic veneers and blankets over fluvial, lacustrine, glaciofluvial deposits
Soil Texture	mesic over mineral soil
Soil Classification	Gleysols, Humic Gleysols, Mesisols, Humic Follisol
Humus Form	mor or moder
Humus Depth	10–300 cm
Soil Drainage	poor to very poor
Seepage/Water Table	water table within 40 cm
Permafrost	may be present



Vegetation Summary

The following vegetation associations characterize the variation in species composition on Ecosite F04:

Sw50 White spruce / Labrador tea / Water sedge

Sw51 White spruce / Shrub birch / Water sedge

The relative abundance of species of these associations is shown in the vegetation table below.

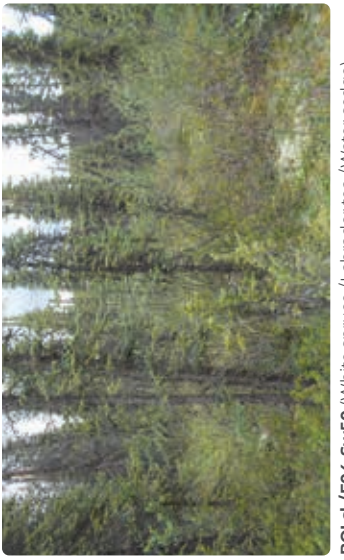
BOLsl/F04 Vegetation Table

	Vegetation association	Sw50	Sw51	
Stratum	No. of plots	9	11	
Tree layer	*Picea glauca*	■■■■	■■■	white spruce
Shrub layer	*Betula glandulosa*	▪▪	■■■■■	shrub birch
	Dasiphora fruticosa	■■	■■■■	shrubby cinquefoil
	Picea glauca	■■■	■■■	white spruce
	Rhododendron groenlandicum	■■■■	□□	Labrador tea
	Salix myrtillifolia	■■■■	▪▪▪▪	blueberry willow
	Salix spp.	■■■■	■■■	willows
Ground shrub	*Arctous rubra*	■■■■	▪▪▪	red bearberry
layer	*Empetrum nigrum*	■■■		crowberry
	Vaccinium vitis-idaea	■■	□	lowbush cranberry
Graminoid layer	*Carex aquatilis*	■■■	■■■■	water sedge
Forb layer	*Equisetum scirpoides*	▪▪	□	dwarf scouring-rush
Moss layer	*Aulacomium/Tomentypnum*		■■■■■	brown mosses

Frequency of occurrence: ■ = 70–100% ▪ = 50–70% □ = 25–50%
Abundance (average per cent cover): ■■■■■ = >25% ■■■■ = 10–25% ■■■ = 3–10% ■■ = 1–3% ■ = <1%

BOLsl/F04 Sw – Water Sedge Fen

BOLsl /F04-Sw51 (White spruce /Shrub birch /Water sedge)

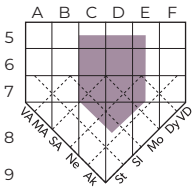


BOLsl /F04-Sw50 (White spruce /Labrador tea /Water sedge)

BOLsl/S01 Willow – Bluejoint Swamp

General Description

Edatopic Grid



Willow – Bluejoint Swamp ecosites are found along rivers, smaller creeks and ponds that flood less frequently than some other swamps.

Willows (*Salix glauca*, *planifolia*, *maccalliana*, and others) characterize these swamps, along with moderate to high cover of bluejoint reedgrass (*Calamagrostis canadensis*). Water sedges (*C. aquatilis*, *C. utriculata*) also occur as co-dominants or with lower cover. Various other grasses and forbs are often present, but usually occur with low to sparse cover. Moss cover is generally high and comprised of brown mosses; e.g., glow moss (*Aulacomnium palustre*) or hook-mosses (*Drepanocladus* spp.), as well as tree moss (*Climacium dendroides*) and/or leafy liverwort (*Brachiolejeunea* spp.).

Soils are Regosols or Gleysols. Permafrost may be present at depth.

Sasp50 (Willow / Bluejoint reedgrass)

Comments

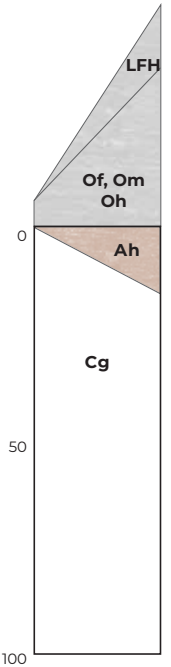
Ecosite S01 can be differentiated from other willow-dominated, shrub wetlands, as follows:

- F03 and S03 have a high cover of willows, but with abundant water sedges and little to no bluejoint reedgrass; and
- S04 also occurs along rivers and creeks, but is characterized by moderate to high cover of horsetails.

Site and soils

Site and soil characteristics

Plots in unit	12
Moisture Regime	hygric to subhydric (6–7)
Nutrient Regime	medium to very rich (C–E)
Meso Slope Position	level, depressional, toe
Aspect	variable
Slope Gradient	level to very gently sloping
Surficial Material	organic veneer over fluvial
Soil Texture	mesic over variable textures
Soil Classification	Regosols, Humic Regosols, Gleysols,
Humus Form	variable
Humus Depth	5–50 cm
Soil Drainage	poor, imperfect
Seepage/Water Table	fluctuating water table within 50 cm
Permafrost	none
Site Disturbance	flooding



Vegetation Summary

The following vegetation association displays the species composition on this ecosite.

Sasp50 Willow / Bluejoint reedgrass

The relative abundance of species of this association is shown in the vegetation table below.

BOLsl/S01 Vegetation Table

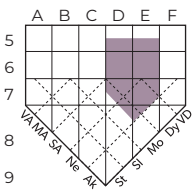
	Vegetation association	Sasp50	
Stratum	No. of plots	12	
Shrub layer	*Salix* spp.	■■■■■	willows
Graminoid layer	*Calamagrostis canadensis*	■■■■	bluejoint reedgrass
	Carex aquatilis	■■■	water sedge
Moss layer	*Bryophyta*	■■■■■	mosses and liverworts

Frequency of occurrence: ■ = 70–100% ■ = 50–70% □ = 25–50%
Abundance (average per cent cover): ■■■■■ = >25% ■■■■ = 10–25% ■■■ = 3–10% ■■ = 1–3% ■ = <1%

BOLsl/S02 River Alder Swamp

General Description

Edatopic Grid



The River Alder Swamp ecosites occur on the frequently flooded low benches and banks of larger rivers. Soils are hygric to subhydric in moisture regime and medium to rich in nutrients.

River alder (*Alnus incana*) and willows (*Salix arbusculoides, planifolia, pseudomonticola*) characterize these swamps along with key understorey species such as bluejoint reedgrass (*Calamagrostis canadensis*), water sedge (*Carex aquatilis*), common horsetail (*Equisetum arvense*) and/or cottongrasses (*Eriophorum* spp.). Mosses are mostly "richer" species such as leafy mosses (*Mnium, Rhizomnium* spp.), thread-mosses (*Bryum* spp.), or hook-mosses (*Drepanocladus* spp.), but can also include glow moss (*Aulacomium palustre*) or golden fuzzy fen moss (*Tomentypnum nitens*).

Alin55 (River alder – Willow)

These fluvial soils do not have permafrost and are classified as Regosols or sometimes Gleysols. Although both river alder and willows are adapted to the frequent flooding and are able to establish quickly on recently exposed river flats, river alder is less tolerant of long periods of inundation.

Comments

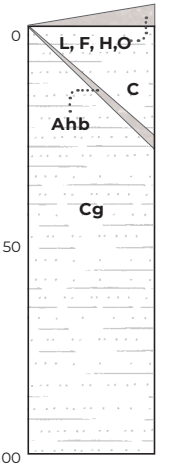
Ecosite S02 can be differentiated from other shrub swamps, as follows:

- S01, S03 and S04 lack river alder.

Site and soils

Site and soil characteristics

Plots in unit	5
Moisture Regime	hygric, subhydric (6, 7)
Nutrient Regime	rich to very rich (D–E)
Meso Slope Position	level, depressional
Aspect	none
Slope Gradient	level to very gently sloping
Surficial Material	fluvial
Soil Texture	silt loam to sandy
Soil Classification	Regosols, Gleysols
Humus Form	mor
Humus Depth	0–5 cm
Soil Drainage	poor to imperfect
Seepage/Water Table	fluctuating water table within 50 cm
Permafrost	none
Site Disturbance	frequent flooding



Vegetation Summary

The following vegetation association displays the species composition on this ecosite.

Alin55 River alder – Willow

The relative abundance of species of this association is shown in the vegetation table below.

BOLsl/S02 Vegetation Table

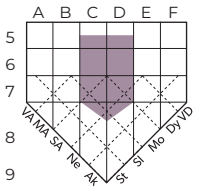
	Vegetation association	Alin55	
Stratum	No. of plots	5	
Shrub layer	*Alnus incana*	■■■■■	river alder
	Salix arbusculoides	■■■	littletree willow
	Salix spp.	■■■	willows
Graminoid layer	*Calamagrostis canadensis*	■■■	bluejoint reedgrass
	Carex aquatilis	■■■	water sedge
Forb layer	*Equisetum arvense*	■■■■	mosses and liverworts
	Rubus arcticus	■■	arctic raspberry
Moss layer	*Calliergon* spp.	■■	water mosses
	Drepanocladus spp.	■■■■	hook-mosses
	Mnium spp.	■■■	leafy mosses

Frequency of occurrence: ■ = 70–100% ■ = 50–70% □ = 25–50%
Abundance (average per cent cover): ■■■■■ = >25% ■■■■ = 10–25% ■■■ = 3–10% ■■ = 1–3% ■ = <1%

BOLsl/S03 Tea-leaved Willow – Water Sedge Swamp

General Description

Edatopic Grid



Tea-leaved Willow – Water Sedge Swamp ecosites are common along rivers and smaller creeks and ponds. These shrub swamps occur on hygric sites with a rich nutrient regime. The sites are level and imperfectly to poorly drained. Parent materials are lacustrine or fluvial, with a moderately to well-decomposed organic veneer that varies considerably in thickness.

Willows (*Salix planifolia, glauca*) and water sedges (*C. aquatilis, utriculata*) characterize these swamps. Other willows (e.g., *S. arbusculoides*, *S. barclayi*, *S. maccalliana*) may be present or even predominate on some sites. Marsh cinquefoil (*Comarum palustre*) is often present, sometimes with high cover. The moss layer is characterized by mosses and liverworts that indicate richer soil nutrient conditions, mostly hook-mosses (*Drepanocladus* spp.), but also includes various brown mosses, such as glow moss (*Aulacomium palustre*), golden fuzzy fen moss (*Tomentypnum nitens*) or water mosses (*Calliergon* spp.), and leafy mosses (*Mnium, Rhizomnium*).

Sapl57 (Tea-leaved willow / water sedge)

Soils are usually Gleysols or Cumulic Regosols. Although a surface organic mat may be present, it is usually less than 20 cm thick. Permafrost may be present on very cool sites; such soils would be classified as Cryosols if the permafrost is within 2 m of the surface.

Comments

Ecosite S03 can be differentiated from other shrub wetlands with water sedges, as follows:

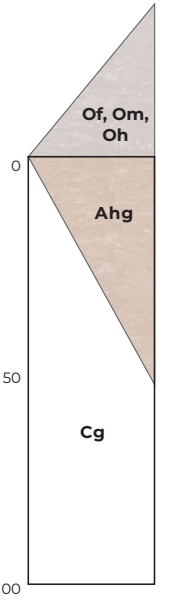
- F02 has high cover of shrub birch;
- F03 also has high cover of willows and water sedges; however, F03 sites have 40 cm or more of fibric or mesic peat. S03 has less than 40 cm of peat. F03 and S03 should also differ in willow species and bryophyte composition, but the data for these is poor. See the differentiating features in the F03 section;

- F01 has less willow cover (no more than 5 per cent); and
- S02 has high cover of river alder.

Site and soils

Site and soil characteristics

Plots in unit	37
Moisture Regime	subhydric to subhygric (7-5)
Nutrient Regime	medium to very rich (C-E)
Meso Slope Position	level, depressional
Aspect	none
Slope Gradient	level to very gently sloping
Surficial Material	organic veneer over lacustrine or fluvial
Soil Texture	mesic, fibric, humic over variable textures
Soil Classification	Gleysols, Humic Gleysols, Humisols, Cryosols
Humus Form	mor, moder or mull
Humus Depth	1–35 cm
Soil Drainage	poor, very poor, imperfect
Seepage/Water Table	fluctuating water table within 50 cm
Permafrost	may be present
Site Disturbance	may be subject to flooding



Vegetation Summary

The following vegetation association displays the species composition on this ecosite.

SapI57 Tea-leaved willow / Water sedge

The relative abundance of species of this association is shown in the vegetation table below.

BOLsl/S03 Vegetation Table

	Vegetation association	SapI57	
Stratum	No. of plots	37	
Shrub layer	*Salix* spp.	■■■■■	willows
	Salix planifolia	■■■■	tea-leaved willow
Graminoid layer	*Carex aquatilis*	■■■■■	water sedge
Moss layer	*Bryophyta*	■■■■	brown mosses

Frequency of occurrence: ■ = 70–100% ■ = 50–70% □ = 25–50%
Abundance (average per cent cover): ■■■■■ = >25% ■■■■ = 10–25% ■■■ = 3-10% ■■ = 1–3% ■ = <1%

BOLsl/S04 Willow – Horsetail Swamp

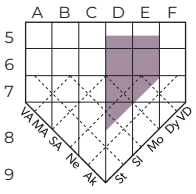
General Description

Willow – Horsetail Swamp ecosites occur along rivers, smaller creeks and ponds.

High cover of willows (*Salix* spp.) and moderate to high cover of common horsetail (*Equisetum arvense*) characterize these swamps. Tree moss (*Climacium dendroides*) is sometimes abundant. Bluejoint reedgrass (*Calamagrostis canadensis*) is usually present, with low cover.

Soils are Regosols or Gleysols.

Edatopic Grid



Sasp56 (Willow / Horsetail)

Comments

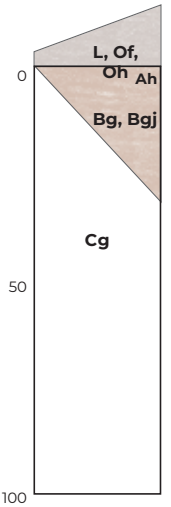
Ecosite S04 can be differentiated from other willow-dominated, shrub wetlands, as follows:

- F03 and S03 have high cover of water sedges; and
- S01 has moderate to high cover of bluejoint reedgrass, and horsetails, if present, are of low cover.

Site and soils

Site and soil characteristics

Plots in unit	2
Moisture Regime	subhydric to hydric (7–8)
Nutrient Regime	rich to very rich (D-E)
Meso Slope Position	level, depressional
Aspect	none
Slope Gradient	level
Surficial Material	fluvial
Soil Texture	loam to sand
Soil Classification	Gleysols
Humus Form	variable
Humus Depth	3–15 cm
Soil Drainage	poor to very poor
Seepage/Water Table	fluctuating water table within 50 cm
Permafrost	none
Site Disturbance	frequent flooding



Vegetation Summary

The following vegetation association displays the species composition on this ecosite.

Sasp56 Willow / Horsetail

The relative abundance of species of this association is shown in the vegetation table below.

BOLsl/S04 Vegetation Table

	Vegetation association	Sasp56	
Stratum	No. of plots	2	
Shrub layer	*Salix* spp.	■■■■■	willows
Graminoid layer	*Calamagrostis canadensis*	■■■	bluejoint reedgrass
	Carex aquatilis	■■■	water sedge
Forb layer	*Equisetum arvense*	■■■■■	common horsetail
Moss layer	*Climacium dendroides*	■■■■■	tree moss
	Sanionia uncinata	■	sickle-moss

Frequency of occurrence: ■ = 70–100% ■ = 50–70% □ = 25–50%
Abundance (average per cent cover): ■■■■■ = >25% ■■■■ = 10–25% ■■■ = 3-10% ■■ = 1–3% ■ = <1%

BOLsl/M

General Description

A variety of marshes occur in this subzone. Most are poorly sampled, but they are briefly characterized below, outlining the main species. The first two marshes show similarities to marsh ecosystems recognized in B.C. Marshes tend to be dominated by relatively few species. Often, the species in the community name are the only dominants.

BOLsl/M01 Beaked – Water Sedge Marsh

May be dominated by either beaked sedge (*Carex utriculata*) or water sedge (*Carex aquatilis*). Soils are mineral types, not peaty. Equivalent to Wm01 in B.C. (MacKenzie and Moran 2004).

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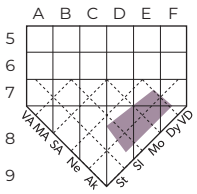
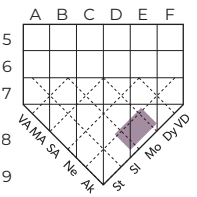


BOLsl/M02 Water Horsetail Marsh

Comprises several horsetails, such as water horsetail (*Equisetum fluviatile*), common horsetail (*E. arvense*), and/or variegated horsetail (*E. variegatum*) as well as sedges, including water sedge (*Carex aquatilis*) or beaked sedge (*Carex utriculata*). Soils are Gleyed Regosols or Gleysols, Somewhat similar to Wm02 in B.C. (MacKenzie and Moran 2004).

Edatopic Grid



BOLsl/M03 Seaside Arrow-grass Marsh

Saline marsh dominated by seaside arrow-grass (*Triglochin maritima*), often with some rush (*Juncus* spp.). Soils are Gleyed Regosols or Gleysols. May be a short-lived successional community on saline flats with improving moisture conditions.

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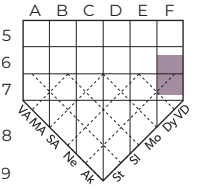
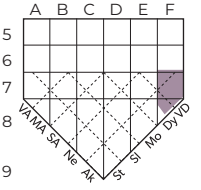


BOLsl/M04 Short-awn Foxtail Marsh

Graminoid marsh with short-awn foxtail (*Alopecurus aequalis*) and sometimes Kentucky bluegrass (*Poa pratensis*), or tufted hairgrass (*Deschampsia cespitosa*).

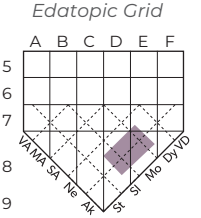
Edatopic Grid



BOLsl/M05 Creeping Spike-rush Marsh

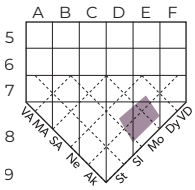
Creeping spike-rush (*Eleocharis palustris*) and slimstem reedgrass (*Calamagrostis stricta*) characterize these graminoid marshes; water sedge (*Carex aquatilis*) is present with very low cover. Soils have variable textures and are classed as Gleysols or Gleyed Regosols.

Edatopic Grid



BOLsl/M06 Mannagrass Marsh

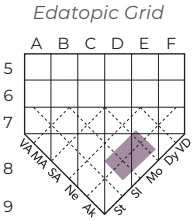
Edatopic Grid



Boreal (*Glyceria borealis*) and American (*Glyceria grandis*) mannagrasses dominate. Least spike-rush (*Eleocharis acicularis*) or marsh cinquefoil (*Comarum palustre*) may be moderately abundant. Other species with a minor presence are vernal water starwort (*Callitriche palustris*), water sedge (*Carex aquatilis*), and common mare's-tail (*Hippuris vulgaris*). Soils are Gleysols.

BOLsl/M07 Least Spike-rush Marsh

Edatopic Grid

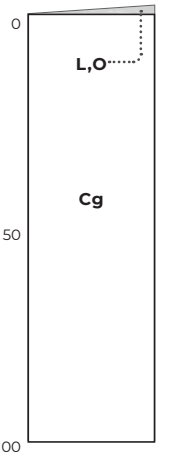


Graminoid marsh dominated by least spike-rush (*Eleocharis acicularis*) and water sedge (*Carex aquatilis*).

Site and soils

Site and soil characteristics

Plots in unit	32
Moisture Regime	hygric, subhydric, hydric (6, 7, 8)
Nutrient Regime	rich, very rich (D, E)
Meso Slope Position	level, lower slopes
Aspect	variable
Slope Gradient	level to gently sloping
Surficial Material	fluvial, lacustrine
Soil Texture	clay loam to sand
Soil Classification	Gleysols, Humic Gleysols, Regosols
Humus Form	variable
Humus Depth	0–8 cm
Soil Drainage	very poor to imperfect
Seepage/Water Table	fluctuating water table within 50 cm
Permafrost	none
Site Disturbance	frequent flooding



Vegetation Summary

The following vegetation associations characterize the variation in species composition on Marsh ecosites (M01–M07):

M01	Caut56	Beaked sedge – Water sedge
M02	Eqfl55	Water horsetail – Water sedge
M03	Trma55	Seaside arrow grass
M04	Alae55	Short-awn foxtail
M05	Elpa55	Creeping spike-rush – Slimstem reedgrass
M06	Glsp56	Mannagrass
M07	Elac56	Least spike-rush – Water sedge

The relative abundance of species of these associations is shown in the vegetation table on page 2-139.

BOLsl/M Vegetation Table

Stratum	Vegetation association	M01 Caut56	M02 Eqfl55	M03 Trma55	M04 Alae55	M05 Elpa55	M06 Glsp56	M07 Elac56	
	No. of plots	15	7	1	2	2	2	3	
Shrub layer	*Salix* spp.		■			■			willows
Graminoid layer	*Alopecurus aequalis*				■■■				short-awned foxtail
	Calamagrostis stricta					■■■			slimstem reedgrass
	Carex aquatilis	■■■■■	■■■■■			■	■■	■■■■■	water sedge
	Carex utriculata	■■■■■				■■■	■■■		beaked sedge
	Deschampsia cespitosa		□		■	■			tufted hairgrass
	Eleocharis acicularis						■■■■■	■■■■■	least spike-rush
	Eleocharis palustris					■■			creeping spike-rush
	Glyceria borealis						■■■■■		boreal mannagrass
	Glyceria grandis						■■■■		tall mannagrass
	Hordeum jubatum					■			foxtail barley
	Juncus sp.			■■■■■					rush
	Poa pratensis				■■				Kentucky bluegrass
Forb layer	*Callitriche palustris*						■■■	□□	vernal water-starwort
	Comarum palustre	□□□					■■■■	■■■	marsh cinquefoil
	Equisetum arvense		□□□			■■			common horsetail
	Equisetum fluviatile		■■■■						water horsetail
	Equisetum variegatum		■■■						variegated scouring-rush
	Hippuris vulgaris	□				■	■■	■■	common mare's-tail
	Lemna minor						■		common duckweed
	Myriophyllum sibiricum						■■		Siberian water-milfoil
	Potentilla anserina					■■			common silverweed
	Ranunculus aquatilis						■■■■		white water crowfoot
	Rumex maritimus					■■			golden dock
	Sparganium spp.					■			burreeds
	Triglochin maritima		□	■■■■■					seaside arrow-grass
	Utricularia intermedia						■		flat-leaved bladderwort
	Utricularia minor						■		lesser bladderwort
Moss layer	Bryophyta				■■■■	■■■■			mosses
	Calliergon giganteum						■■■	□□□	giant water moss
	Drepanocladus spp.						■■■■	□□□□□	hook-mosses
Aquatic layer	*Chara* sp.					■■			muskgrass

Frequency of occurrence: ■ = 70–100% ■ = 50–70% □ = 25–50% | Abundance (average per cent cover): ■■■■■ = >25% ■■■■ = 10–25% ■■■ = 3–10% ■■ = 1–3% ■ = <1%

BOLsl/M01–M06 MARSH ECOSITES

BOLsl /M02-Eqfl55 (Water horsetail / Water sedge)

BOLsl /M04-Alae55 (Short-awned foxtail)

BOLsl /M01-Caut56 (Beaked sedge – Water sedge)

no photo available

BOLsl /M03-Trpa55 (Seaside arrow – grass)

BOLsl/M01–M06 MARSH ECOSITES

BOLsl /M05-Elpa55 (Creeping spike-rush – Slim-stem reedgrass)

no photo available

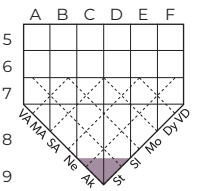
BOLsl /M06-Glsp56 (Mannagrass)

no photo available

BOLsl /M07-Elac56 (Least spike-rush - Water sedge)

BOLsl/W Shallow Water

Edatopic Grid



General Description

These aquatic ecosystems occupy shallow waters of ponds (usually less than 2 m in depth) and margins of lakes and ponds. Six ecosites are characterized in this subzone; the first three occur in alkaline and saline waters.

BOLsl/W01 Thread-leaf Pondweed Shallow Water

Stuckenia filiformis dominates, with moderate to high cover. Muskgrass (*Chara* spp.), a macroalgae, can also occur.

BOLsl/W02 Sago Pondweed – Muskgrass Shallow Water

Sago pondweed (*Stuckenia pectinata*) dominates; muskgrass (*Chara* spp.) occurs with moderate to high cover.

BOLsl/W03 Muskgrass Shallow Water

Muskgrass (*Chara* spp.) dominates, often alone, but sometimes with some other species. Muskgrass occurs mostly in stagnant, alkali waters. This macroalgae is efficient at processing bicarbonate for photosynthesis and this precipitates large amounts of calcium carbonate (marl).

BOLsl/W04 Mare's-tail Shallow Water

The dominant vegetation is generally various brown mosses (*Drepanocladus, Scorpidium, Calliergon*). Scattered vascular plants, such as common mare's-tail (*Hippuris vulgaris*), vernal water starwort (*Callitriche palustris*), marsh cinquefoil (*Comarum palustre*) or water sedge (*Carex aquatilis*) may be present. Open water appears to dominate.

BOLsl/W05 Northern Arrowhead Shallow Water

Dominated by northern arrowhead (*Sagittaria cuneata*).

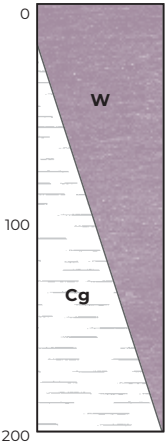
BOLsl/W06 Pondweed Shallow Water

Pondweeds (*Potamogeton* spp.) dominate. In the BOLsl, northern pondweed (*Potamogeton alpinus*) has been surveyed, but Richardson's pondweed (*P. richardsonii*) or flat-stalked pondweed (*P. friesii*) may also occur; they have been recorded in southern Yukon.

Site and soils

Site and soil characteristics

Plots in unit: 16	
Moisture Regime	aquatic, hydric (9, 8)
Nutrient Regime	medium, rich (C, D)
Meso Slope Position	level and depressional sites
Aspect	level
Slope Gradient	level
Surficial Material	lacustrine
Soil Texture	variable
Soil Classification	not applicable
Humus Form	not applicable
Humus Depth	not applicable
Soil Drainage	aquatic
Seepage/Water Table	standing water
Permafrost	none
Site Disturbance	frequent flooding



Vegetation Summary

The following vegetation associations characterize the variation in species composition on Shallow Water ecosites (W01–W06):

W01	Stfi70	Thread-leaf pondweed – Spiral ditchgrass
W02	Stpe71	Sago pondweed – Muskgrass
W03	Chsp75	Muskgrass
W04	Hivu70	Mare's tail – Brown moss
W05	Sacu70	Northern arrowhead
W06	Posp70	Pondweed

The relative abundance of species of these associations is shown in the vegetation table on page 2-144.

BOLsl/W Vegetation Table

Stratum	Vegetation association / No. of plots	W01 Stfi70 1	W02 Stpe71 3	W03 Chsp75 5	W04 Hivu70 2	W05 Sacu70 1	W06 Posp70 1	
Graminoid layer	*Carex aquatilis*				■■■			water sedge
	Stuckenia filiformis	■■■■■		□□				thread-leaf pondweed
	Stuckenia pectinata		■■■■■					sago pondweed
Aquatic layer	*Callitriche palustris*				■			vernal water-starwort
	Chara spp.	□□□□	■■■■■	■■■■■				muskgrass
	Equisetum fluviatile					■		water horsetail
	Hippuris vulgaris				■■			common mare's-tail
	Potamogeton alpinus						■■■■■	northern pondweed
	Ruppia cirrhosa	■■■						spiral ditchgrass
	Sagittaria cuneata					■■■■■		northern arrowhead
	Sparganium angustifolium						■	narrow-leaved bur-reed
Forb layer	*Comarum palustre*				■■■■			marsh cinquefoil
	Potamogeton richardsonii				■			Richardson's pondweed
	Ranunculus aquatilis				■■■			white water crowfoot
Moss layer	*Calliergon giganteum*				■■■■			giant water moss
	Drepanocladus spp.				■■■■■			hook-mosses

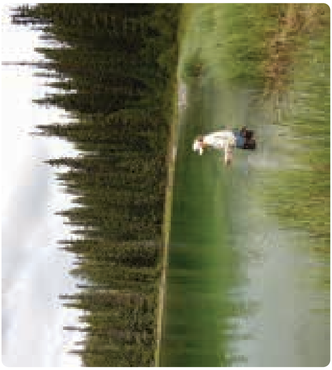
Frequency of occurrence: ■ = 70–100% ■ = 50–70% □ = 25–50% | Abundance (average per cent cover): ■■■■■ = >25% ■■■■ = 10–25% ■■■ = 3–10% ■■ = 1–3% ■ = <1%

BOLsl/W SHALLOW WATER

BOLsl /W01-Stfi70 (Thread-leaf pondweed)

no photo available

BOLsl /W02-Stpe71 (Sago pondweed – Muskgrass)



BOLsl /W03-Chsp75 (Muskgrass)

no photo available

BOLsl /W04-Hivu70 (Mare's tail – Brown moss)

no photo available

BOLsl /W05-Sacu70 (Northern arrowhead)

no photo available

BOLsl /W06-Posp70 (Pondweed)

4.0 LIST OF BOLsl ECOSITES AND VEGETATION UNITS

Ecosite	Ecosite Name	Moisture Range	Nutrient Range	Veg Assoc Code	Vegetation association Name
01	SwAP – Twinflower Forest	Submesic to mesic	medium to rich, some poor	A03	Aspen/Kinnikinnick
				A20	Aspen/Grass – Kinnikinnick
				A21	Aspen/Soapberry/Kinnikinnick
				A25	Aspen/Willow/Purple reedgrass/Thread-moss
				A29	Aspen/Prickly rose/Fireweed
				AP27	Aspen – Pine/Salix/Feathermoss
				APSw03	Aspen – Pine – White Spruce/Kinnikinnick
				APSw06	Aspen – Pine – White spruce/Purple reedgrass/Kinnikinnick
				APSw25	Aspen – Pine – White spruce/Soapberry
				ASw05	Aspen – White spruce/Kinnikinnick
				ASw06	Aspen – White spruce/Soapberry/Fireweed
				ASw07	Aspen – White spruce/Purple reedgrass – Kinnikinnick
				ASw26	Aspen – White spruce/Fireweed – Kinnikinnick
				FSw22	Fir – White spruce/Crowberry/Feathermoss
				P21	Pine/Lowbush cranberry – Twinflower
				P22	Pine/Soapberry
				P25	Pine/Purple reedgrass
				P26	Pine/Grass – Kinnikinnick – Lowbush cranberry
				P28	Pine/Lowbush cranberry/Step moss
				PSbSw22	Pine – Black spruce – White spruce/Lowbush cranberry/Grass
				PSb23	Pine – Black spruce/Green alder
				PSw23	Pine – White spruce/Lowbush cranberry – Twinflower
				PSw24	Pine – White spruce/Lowbush cranberry – Twinflower/Feathermoss
				PSw25	Pine – White spruce/Altai fescue
				PSw26	Pine – White spruce/Soapberry/Feathermoss
				Sw20	White spruce/Grass – Kinnikinnick
				Sw26	White spruce/Soapberry/Step moss
				Sw27	White spruce/Feathermoss
				Sw24	White spruce/Feathermoss - Wiry fern moss

LIST OF BOLsl ECOSITES AND VEGETATION UNITS (continued)

Ecosite	Ecosite Name	Moisture Range	Nutrient Range	Veg Assoc Code	Vegetation association Name
10	PSw – Lichen Woodland	subxeric to submesic	very poor, poor	AP04	Aspen – Pine/Kinnikinnick/Lichen
				P01	Pine/Kinnikinnick/Lichen
				P02	Pine/Kinnikinnick
				PSw01	Pine – White spruce/Kinnikinnick/Lichen
				PSw02	Pine – White spruce/Kinnikinnick
				Sw01	White spruce/Kinnikinnick/Lichen
				Sw02	White spruce/Kinnikinnick
11	B – Baikal Sedge Dunes	subxeric to xeric	poor – medium	Casa01	Baikal sedge – Rocky Mountain fescue
				AB03	Aspen – Balsam poplar/Rocky Mountain fescue/Yukon lupine
				SwB04	White spruce – Balsam poplar/Yukon lupine
20	Pasture Sage Grassland	very xeric to xeric	Poor – medium – rich	Arfr01	Pasture sage – Small sedge
				Arfr02	Pasture sage – Purple reedgrass
				Aruv02	Kinnikinnick
21	A – Purple Reedgrass Woodland	subxeric	medium to rich	A02	Aspen/Juniper
				A03	Aspen/Kinnikinnick
				A04	Aspen/Prickly rose/Grass – Kinnikinnick
				A21	Aspen/Soapberry/Kinnikinnick
				ASw05	Aspen – White spruce/Kinnikinnick
				ASw06	Aspen – White spruce/Soapberry/Fireweed
				ASw07	Aspen – White spruce/Purple reedgrass – Kinnikinnick
30	Sw – Labrador Tea Forest	mesic to subhygric	poor to very poor	ASw27	Aspen – White spruce (Black spruce)/Labrador tea
				SwW29	White spruce – Alaska birch/Labrador tea/Water sedge
				P27	Pine/Labrador tea/Lowbush cranberry
				P29	Pine/Labrador tea/Feathermoss
				SbSw30	Black spruce – White spruce/Labrador tea/Feathermoss
				Sw29	White spruce/Labrador tea/Crowberry/Feathermoss
31	Sw – Red Bearberry Forest	subhygric	medium, poor	SbSw31	Black spruce – White spruce/Blueberry willow/Feathermoss
				Sw31	White spruce/Willow/Red bearberry/Feathermoss

LIST OF BOLsl ECOSITES AND VEGETATION UNITS (continued)

Ecosite	Ecosite Name	Moisture Range	Nutrient Range	Veg Assoc Code	Vegetation association Name
32	Sw – Shrub Birch Woodland	subhygric to hygric	medium to rich	BegI30	Shrub birch – Willow/Altai fescue
				P30	Pine/Shrub birch/Altai fescue
				Sw25	White spruce/Shrub birch – Willow/Altai fescue – Kinnikinnick
				Sw28	White spruce/Shrub birch/Crowberry/Reindeer lichen
				Sw30	White spruce/Shrub birch/Crowberry/Feathermoss
33	Sw – Willow Forest	subhygric to hygric	medium to rich	Sw32	White spruce/Willow/Red bearberry/Brown moss
				Sw39	White spruce/Willow/Horsetail /Brown moss
34	SbSw – Labrador Tea Forest	hygric	poor to medium	SbSw32	Black spruce (White Spruce)/Labrador tea/Feathermoss – Brown moss
				Sw38	White spruce/Labrador tea/Red bearberry/Brown moss
40	Sw – Riparian Forest	subhygric, mesic	rich, medium, very rich	SwB28	White spruce – Balsam poplar/Step moss
				Sw36	White spruce/Highbush cranberry/Horsetail
41	B – Riparian Forest	subhygric	rich, very rich	B23	Balsam poplar/Highbush cranberry/Horsetail
				B31	Balsam poplar/Willow – Fireweed
				SwB27	Balsam poplar – White spruce/Soapberry
50	Sw – Baltic Rush Saline Forest	mesic to subhygric	saline	Sw19	White spruce – Kinnikinnick – Baltic rush
51	Foxtail Barley Saline Meadow	subhygric	saline	Hobr20	Foxtail barley/Baltic rush
52	Sea Milkwort Saline Meadow	hygric	saline	Lyma20	Sea milkwort
53	Nuttall's Alkaligrass Saline Meadow	hygric	saline	Punu21	Nuttall's alkaligrass

LIST OF BOLsl ECOSITES AND VEGETATION UNITS (continued)

Ecosite	Ecosite Name	Moisture Range	Nutrient Range	Veg Assoc Code	Vegetation association Name
54	Horned Sea-blite Saline Meadow	subhydric	saline	Suca21	Horned sea-blite
55	Red Glasswort Saline Meadow	subhydric	saline	Sabo50	Red glasswort
B01	SbSw – Labrador Tea Bog	hygric	very poor to poor	Sb41	Black spruce (White spruce)/Labrador tea/Sphagnum
F01	Water Sedge Fen	subhydric, hydric	medium to rich	Caaq55	Water sedge – Beaked sedge
F02	Shrub Birch Fen	subhydric	medium, rich	Begl50	Shrub birch – Willow/Water sedge
F03	Willow – Water Sedge Fen	hygric, subhydric	medium, rich	Sasp58	Willow/Water sedge
F04	Sw – Water Sedge Fen	subhydric to hygric	medium to very rich	Sw50	White spruce/Labrador tea/Water sedge
				Sw51	White spruce/Shrub birch/Water sedge
S01	Willow – Bluejoint Swamp	hygric to subhydric	medium to very rich	Sasp50	Grey – Leaved Willow/Bluejoint Reedgrass
S02	River Alder Swamp	hygric, subhydric, hydric	rich to very rich	Alin55	River alder – Willow
S03	Tea-leaved Willow – Water Sedge Swamp	subhydric to subhygric	medium to very rich	Sapl57	Tea – Leaved willow/Water Sedge
S04	Willow – Horsetail Swamp	subhydric to hydric	rich to very rich	Sasp56	Willow/Common horsetail
M01	Beaked – Water Sedge Marsh	subhydric to hydric	rich to very rich	Caut56	Beaked sedge – Water sedge
M02	Water Horsetail Marsh	subhydric to hydric	rich to very rich	Eqfl55	Water horsetail/Water sedge
M03	Seaside Arrow-grass Marsh	subhydric to hydric	rich to very rich	Trpa55	Seaside arrow- grass

LIST OF BOLsl ECOSITES AND VEGETATION UNITS (continued)

Ecosite	Ecosite Name	Moisture Range	Nutrient Range	Veg Assoc Code	Vegetation association Name
M04	Short-awn Foxtail Marsh	subhydric to hydric	rich to very rich	Alae55	Short-awned foxtail
M05	Creeping Spike-rush Marsh	subhydric to hydric	rich to very rich	Elpa55	Creeping spike-rush – Slim-stem reedgrass
M06	Mannagrass Marsh	subhydric to hydric	rich to very rich	Glsp56	Mannagrass
M07	Least Spike-rush Marsh	subhydric to hydric	rich to very rich	Elac56	Least spike-rush – Water sedge
W01	Thread-leaf Pondweed Shallow Water	aquatic		Stfi70	Thread-leaf pondweed
W02	Sago Pondweed – Muskgrass Shallow Water	aquatic		Stpe71	Sago pondweed – Muskgrass
W03	Muskgrass Shallow Water	aquatic		Chsp75	Muskgrass
W04	Mare's-tail Shallow Water	aquatic		Hivu70	Mare's tail – Brown moss
W05	Northen Arrowhead Shallow Water	aquatic		Sacu70	Northern arrowhead
W06	Pondweed Shallow Water	aquatic		Posp70	Pondweed

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Table A1-1. Terms used in the keys

Term	Definition
Ridge crest	Comprises the meso-scale height of land and the strongly, water-shedding convex slopes immediately adjacent.
Upper slope	The uppermost portion of a meso-scale slope; slope profile generally convex; soil water mostly shedding but some water receiving from crest.
Middle slope	The portion of a slope between the upper and lower slopes; soil water is shedding & receiving more or less equally.
Lower slope	The moisture-receiving area towards the base of a slope; the slope profile is usually somewhat concave. Sites located near the base of a slope that are not moisture-receiving are treated as middle slope positions in the keys.
Toe slope	Gently-sloped areas directly below the lower slope, transitioning to the level area or depression at the base of the slope.
Level	Any broad level area; the surface profile is generally more-or-less horizontal, with no distinct aspect and minimal slope (<5%).
Depression	Profile concave in all directions; usually in flat or subdued topography or at the base of a slope.
Alluvium/Fluvial landforms	Post-glacial, active floodplain deposits along rivers and streams in valley bottoms; usually a series of low benches and channels.
Southerly aspect	SW, S and SE aspects inclusive for slopes greater than 5%.
Average soil texture	Soil texture class occupying majority of the upper 50 cm of the mineral soil or to bedrock contact, or where contrasting textures are both present in equal amounts, a texture of the materials combined. Where rooting is restricted to the organic horizons, use the organic material codes. Use soil texture keys to determine soil texture.
Coarse fragment content	The coarse fragment content (% by volume) of the upper 50 cm of mineral soil profile, or rooting zone where it extends deeper, or to bedrock contact.
Soil coarse	Soil contains >70% coarse fragments; or soil texture is sandy (LS, S); or loamy (SL, L) with >50% volume of coarse fragments.
Soil fine	Soil is silty (SiL, Si) or clayey (SiCL, CL, SC, SiC, C) with <20% volume of coarse fragments.
Soil medium	Includes the remaining soils i.e., SL, L with ≤ 50% volume of coarse fragments; or fine-textured soils with ≥20% coarse fragments.
Gleyed, gleying	Soils that have orange-coloured mottles indicative of periodic oxidation and reduction due to a fluctuating water table (this includes faint, distinct and prominent mottles); or, soils that are dull yellowish, blue, or olive in colour indicative of permanent saturation.
Prominent mottles	Mottles that differ by 3 or more hues from the matrix, or by ≥2 units of value or chroma when hue varies by 2 pages (using Munsell Soil Color Charts), by ≥3 units of value or chroma or both chroma and value differ by 2 when hue differs by 1, or by 4 units of value or chroma if hue is the same.
Distinct mottles	Mottles that differ by 2 or more hues from the matrix or by 2 units of chroma and/or value when hue is the same or differs by one page (using Munsell Soil Color Charts).
Faint mottles	Mottles that do not meet the above criteria.

Table A1-1. (continued)

Term	Definition
Organic Soils	Soils of Organic Order, specifically those that are water saturated — have greater than 40 cm of organic material on surface if mesic or humic peat, or greater than 60 cm if fibric peat. Fibric peat consists of well-preserved fibre (40%), identified after rubbing; mesic peat is intermediate composition between fibric and humic; and humic peat consists of decomposed organic material (10%), identified after rubbing. See Canadian System of Soil Classification for details.
Mor Humus Form	Soil characterized by matted Fm horizon and abundant fungal mycelia. Insect droppings absent. For keying purposes, includes soil where no F or organic accumulation is present.
Moder Humus Form	Soil characterized by Fa or Fz horizon with loosely arranged, often granular structure reflecting insect activity; insect droppings present; fungal mycelia may also be present but not dominating; or soil characterized by having both F and Ah horizons greater than 2 cm.
Mull Humus Form	Soil characterized by well-developed Ah (dark coloured, organically enriched) mineral horizon reflecting active mixing of mineral and organic horizons.
Restricting layer	Layer that restricts the downward movement of soil water; includes bedrock, cemented or very compacted horizon, permafrost.
Soil depth	Depth from the ground (forest floor) surface to bedrock, or other impermeable layer, but not including permafrost.
Near-surface permafrost	Soil layer that is "permanently" frozen; this can be difficult to distinguish from "seasonal frost," but date of observation and features of the ecosystem can provide clues as to whether ice is permafrost or seasonal.
Calcareous	Soils that fizz/effervesce when dilute hydrochloric acid is applied. For these purposes, soils that are calcareous in the rooting zone have an impact on soil nutrition.
High salinity	Saline sites are recognizable by the white salts on the soil surface, or in the rooting zone when the soils are dry. Salinity can also be measured: saline soils have an electrical conductivity >4 dS/m.
Water table	The surface of groundwater saturated materials in a soil.
Depth to water table	Depth to water table can be determined by the depth below the soil surface to the level of standing water in a soil pit. However, the water table is dynamic and may not be present when observing the soil.
Depth to gleying	Depth from the surface to mottles or gley colours. These mottles are an indication of a fluctuating water table resulting in alternating reducing and oxidizing conditions. Gley colour, with no mottles, indicates permanent saturation.
Seepage	Seepage is subsurface flowing water, which may be observed on sloping sites receiving soil water. It may not form a stable water table, particularly in coarse-textured materials.
Soil shallow	Soils where soil depth limits available moisture; generally less than 25 cm.

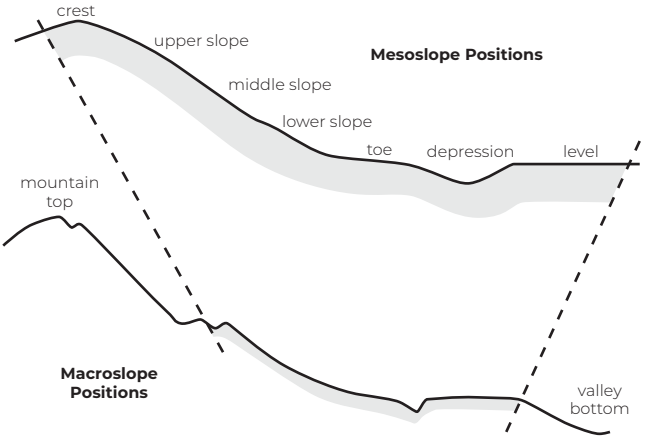


Figure A1-1. Mesoslope position

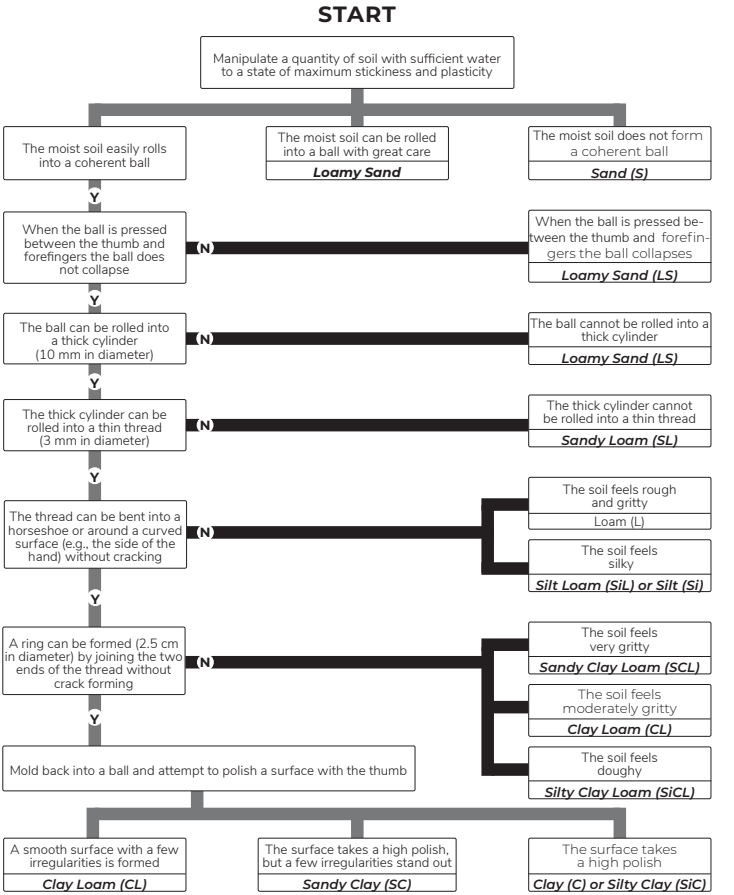


Figure A1-2. Soil texturing flow chart using the ball test

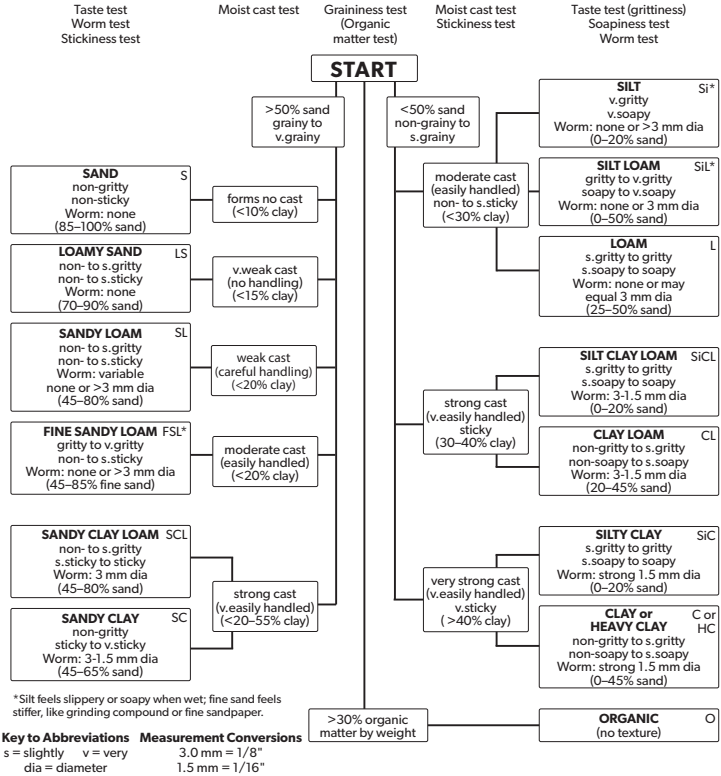
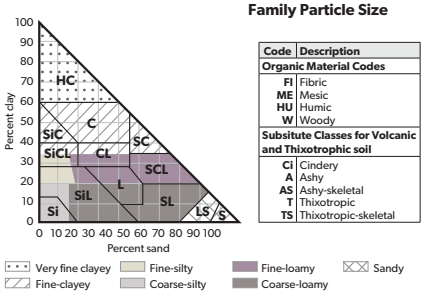


Figure A1-3. Soil texturing flow chart using the graininess test



Code	Description
Organic Material Codes	
FI	Fibric
ME	Mesic
HU	Humic
W	Woody
Subsitute Classes for Volcanic and Thixotrophic soil	
Ci	Cindery
A	Ashy
AS	Ashy-skeletal
T	Thixotropic
TS	Thixotropic-skeletal

Code	Description
Code fragments ≥70%	
F	Fragmental
Coarse fragments ≥35% and <70%	
SS	Sandy-skeletal
CLS	Coarse-loamy-skeletal
FLS	Fine-loamy-skeletal
SIS	Silty-skeletal
CS	Clayey-skeletal
Code fragments <35%	
S	Sandy
CL	Coarse-loamy
FL	Fine-loamy
CSI	Coarse-silty
FSI	Fine-silty
FC	Fine-clayey
VFC	Very-fine-clayey

Figure A1-4. Soil texture classes

Note: Triangle shows soil texture classes and rooting zone particle size when coarse fragments are <35%. Percentages of clay and sand determine the textural classes of soil; the remaining proportion of each class is silt.

Table A1-2. Key to humus form

Note: If no humus is present, treat as MOR in SNR key.

1a. Rapid to imperfectly drained sites; humus form not saturated for prolonged periods. Soil is mineral or upland Folisol.

2a. Ah horizon <2 cm and combined thickness of F and H horizons if present ≥Ah.

3a. >50% thickness of F horizon(s) is Fm ..... **MORS (R)**

4a. Decaying wood >35% of organic matter volume in humus form profile ..... **Lignomor (LR)**

4b. Decaying wood ≤ 35% of organic matter volume in humus form profile.

5a. F horizon >50% of thickness of F and H horizon ..... **Hemimor (HR)**

5b. Hh horizon >50% of thickness of F and H horizons ..... **Humimor (UR)**

5c. Hr horizon >50% of thickness of F and H horizons ..... **Resimor (RR)**

3b. F horizon(s) includes Fz and/or Fa ..... **MODERS (D)**

6a. Decaying wood >35% of organic matter volume in humus form profile. ..... **Lignomoder (LD)**

6b. Decaying wood ≤ 35% of organic matter volume in humus form profile.

7a. Fa horizon >50% of thickness of F horizons; or Fm horizon present. ..... **Mormoder (RD)**

7b. Fz (or Hz) horizon >50% of thickness of F horizons ..... **Leptomoder (TD)**

2b. Ah horizon ≥2cm and combined thickness of F and H horizons ≥2 ..... **MODERS (D)**

8a. Ah horizon formed by infiltration or accumulation of organic materials by mechanical intermixing (gravity, wind, flooding, ice churning or root churning) ..... **Paramoder (PD)**

8b. Ah formed by soil fauna activity or root decomposition; Fa and/or Fz horizons present.

9a. F and H horizons greater than or equal to thickness of Ah horizon; .. **Leptomoder (TD)**

9b. Ah >combined F and H horizons; ..... **Mullmoder (MD)**

2c. Combined thickness of F and H horizons <2cm and Ah horizon ≥2cm ..... **MULLS (L)**

10a. Rhizogenous Ah horizon formed from decomposition of dense fine roots ..... **Rhizomull (ZL)**

10b. Zoogenous Ah horizon formed through actions of abundant earthworms... **Vermimull (VL)**

10c. Ah formed by infiltration or accumulation of organic materials by mechanical intermixing (gravity, wind, flooding, ice-frost churning or root-churning)..... **Paramull (PL)**

1b. Poor to very poorly drained sites; Humus is saturated for prolonged periods. Soils are Gleysols, Fibrisols, Mesisols, Humisols, Organic Cryosols, or Gleysolic or Histic subgroups of Turbic or Static Cryosols

11a. Combined thickness of F, H, and O horizons <2 cm and Ah horizon >2cm ..... **Hydromull (YL)**

11b. Combined thickness of F, H, and O horizons ≥2 cm.

12a. Thickness of F and H horizons ≥O horizons.

13a. F horizon(s) is Fm. ..... **Hydromor (YR)**

13b. F horizon(s) includes Fz and/or Fa, F is not present or Ah ≥2 ..... **Hydromoder (YD)**

12b. Combined thickness of O horizons greater than F and H horizons.

14a. O horizons ≤ 40cm and Ah horizon >2cm ..... **Moder (D)**

14b. Of horizon >50% of thickness of O horizons ..... **Fibrimor (FR)**

14c. Om horizon >50% of thickness of O horizons ..... **Mesimor (MR)**

14d. Oh horizon >50% of thickness of O horizons ..... **Saprimoder (SD)**

Table A1-3. Relative soil moisture regime (SMR): codes and classes

Code	Class	Description	Water source
0	**Very xeric**	Water removed extremely rapidly in relation to supply; soil is moist for a negligible time after precipitation.	Precipitation
1	**Xeric**	Water removed very rapidly in relation to supply; soil is moist for brief periods following precipitation.	Precipitation
2	**Subxeric**	Water removed rapidly in relation to supply; soil is moist for short periods following precipitation.	Precipitation
3	**Submesic**	Water removed readily in relation to supply; water available for moderately short periods following precipitation.	Precipitation
4	**Mesic**	Water removed somewhat slowly in relation to supply; soil may remain moist for a significant, but sometimes short period of the year. Available soil moisture reflects climatic inputs.	Precipitation in moderate- to fine-textured soils; limited seepage in coarse-textured soils
5	**Subhygric**	Water removed slowly enough to keep soil wet for a significant part of growing season; some temporary seepage and possibly mottling below 20 cm.	Precipitation and seepage
6	**Hygric**	Water removed slowly enough to keep soil wet for most of growing season; permanent seepage and mottling; gleyed colours common.	Seepage
7	**Subhydric**	Water removed slowly enough to keep water table at or near surface for most of year; gleyed mineral or organic soils; permanent seepage <30 cm below surface.	Seepage or permanent water table
8	**Hydric**	Water removed so slowly that water table is at or above soil surface all year; gleyed mineral or organic soils.	Permanent water table
9	**Aquatic**	Water is well above the sediment bed all year.	Water body

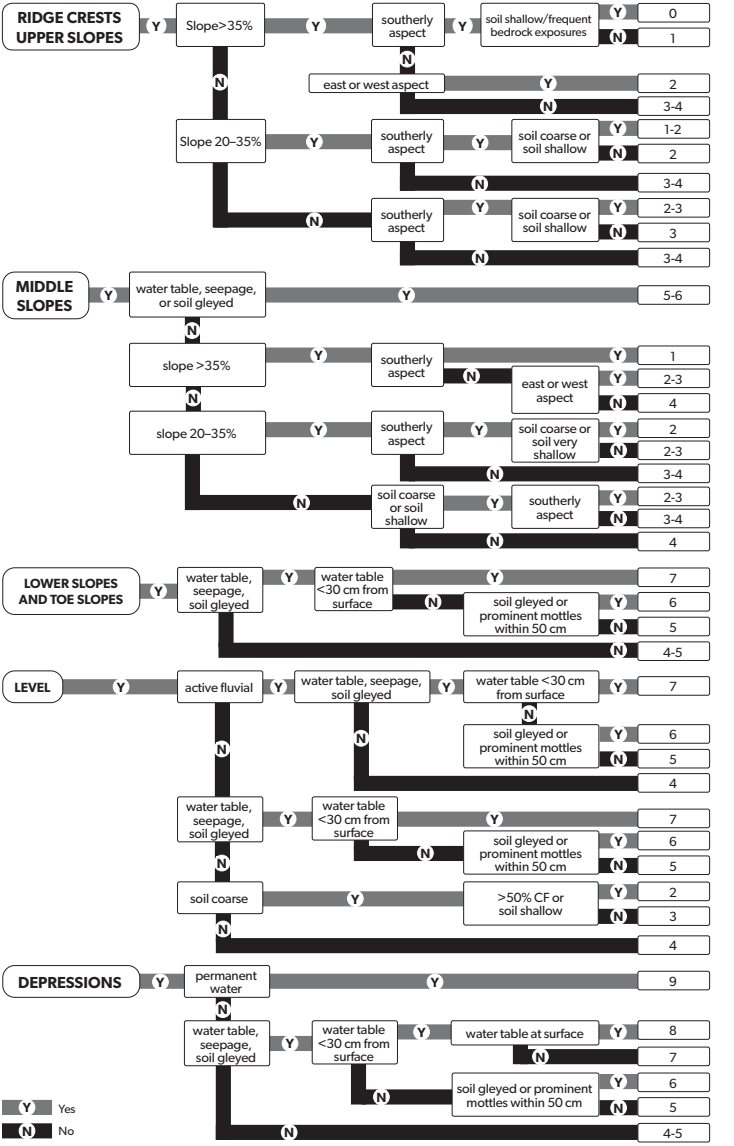


Figure A1-5. Soil Moisture Regime (SMR) flow chart

Site factors	Factors that reduce available moisture (−)			Intermediate moisture (0)	Factors that increase available moisture (+)						
Site position	Crest -15	Upper -8		Middle or Level 0	Lower +3	Toe +5		Depression +10			
Slope gradient		>60% -4	35-60% -2	5-35% 0	0-5% +2						
SELECT ONE: Aspect – Gentle slopes ≤ 20%		S SW SE -2	SE W -1	E NW 0	N NE +1						
SELECT ONE: Aspect – Moderate slopes 20 -35%	S -3	SW SE -2	W -1	NW E 0		N NE +2					
SELECT ONE: Aspect – Steep slopes >35%	S -5	SW SE -4	W -2	NW E 0		N NE +5					
Soil texture	S -10	LS, fS -6	SL -4	SiL, L 0	Si, SCL, CL, SiCL +1		SC, SiC, C +2	Organic >30cm +3			
Coarse fragment content	>90% -10	70-90% -6	50-70% -4	35-50% -3	10-35% -1	0-10% +2					
Soil depth/brx (cm)	0-25 -18	25-50 -8	50-100 -4	>100 0							
SELECT ONE: Depth to water table				Absent 0	100-150 +5	75-100 +25	50-75 +40	30-50 +55	<30 +85	at surface +105	Permanent water >50 cm +130
SELECT ONE: Depth to prominent mottles (cm)				Absent 0	100-150 +5	50-100 +15	25-50 +25	<25 +55			
SELECT ONE: Depth to faint or distinct mottles (cm)				>100 0	50-100 +5	<50 +15					

Adapted from Lloyd et al. 1990

Soil moisture regime classes and codes	Very Xeric 0	Xeric 1	Subxeric 2	Submesic 3	Mesic 4	Subhygric 5	Hygric 6	Subhydric 7	Hydric 8	Aquatic 9
Class ranges	<-32	-32 to -21	-20 to -11	-10 to -5	-4 to +4	+5 to +39	+40 to +70	70-99	99-119	+120

Table A1-4. Soil nutrient regime (SNR) factors and relationship of factors

	Oligotrophic	Submesotrophic	Mesotrophic	Permesotrophic	Eutrophic	Hypereutrophic
	A very poor	**B** poorer than average	**C** medium	**D** richer than average	**E** very rich	**F** saline
Available nutrients	very low	low	average	plentiful	abundant	excess salt accumulations
Humus form	Mor			Moder	Mull	
A horizon	Ae horizon present		A horizon present or absent		Ah horizon present	
Organic matter content	low (light coloured)	medium (intermediate in colour)		high (dark coloured)		
Soil depth	extremely shallow	very shallow to deep				
Soil texture	coarse textured	medium to fine textured				
% coarse fragments	high	moderate to low				
Parent material minerology	base–low	base–medium		base–high		
Soil pH	extremely–moderately acid	moderately acid–neutral		slightly acid–mildly alkaline	mildly alkaline to alkaline	
Water pH (wetlands)	<4–5	4.5–5.5	5.5–6.5	6.5–7.4	7.4+	
Seepage				temporary ≥ permanent		

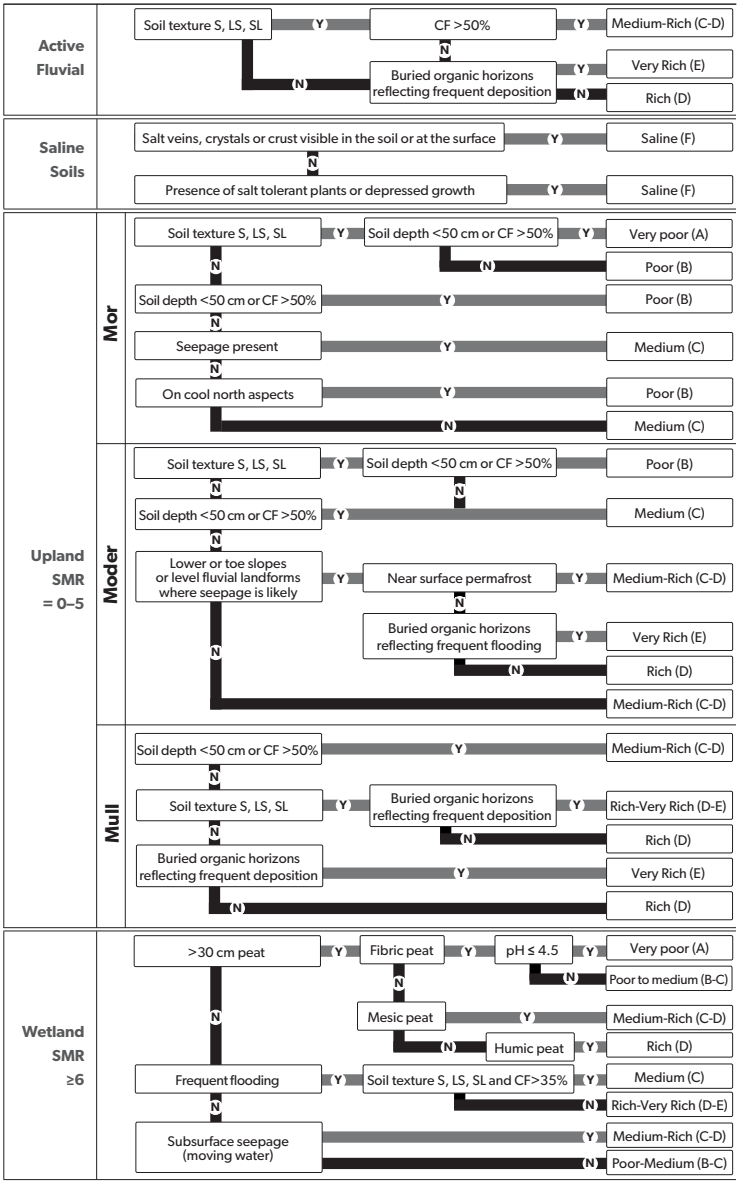


Figure A1-7. Soil Nutrient Regime (SNR) flow chart

Figure A1-8. Soil nutrient regime (SNR) for upland soils additive chart

*Site factors	Factors that reduce available nutrients —		Intermediate nutrients 0	Factors that increase available nutrients +		
Site position		Crest -3	Upper slope, depression -2	Level or mid slope 0	Lower slope +3	Toe, Fluvial +5	
Soil depth (cm)	<10 -7	10-25 -5	25-50 -2	>50 0			
Soil texture	S,LS -6	fS,SL -3		SiL, L, Si 0	SCL,CL, SiCL +1	SC, SiC, C +2	Organic +3
Coarse fragment content	>70% -6		35-70% -2	10-35% -1	0-10% +1		
Humus form	Mor; Fm or Of >24 cm -8	Mor; Fm or Of 10-24 cm -4	Mor; Fm or Of <10 cm -2			Moder +3	Mull +6
A horizon		Ae >3 cm -3	Ae 1-3 cm -1	Thin or Absent 0	Ah 1-5 cm +3	Ah >5 cm +6	
pH of rooting zone		Acid <4.5 -4	Med acid 4.5-5.4 -2	Neutral pH 5.5-6.5 0	Slightly alkaline 6.5-7.4 +3		Alkaline ≥7.5 +3 *See calcareous or saline soil*
Calcareous or saline soil		Calcareous at surface -2	Calcareous within rooting zone -1	Calcareous below rooting zone 0			Salts present within 50 cm +35
Water table within 50 cm				Absent 0	Temporary seepage +3	Continuous seepage +5	Alluvial +7
Coarse fragment geology	Light colour -3	Coarse crystals -2	Hard -1	Medium 0	Soft, fine crystals +1	Dark +3	

*Totalling the values for each site factor gives an estimate of soil nutrient regime

Nutrient regime classes and codes	Very Poor A	Poor B	Medium C	Rich D	Very Rich E	Saline F
Class ranges	≤ -13	-12 to -6	-5 to +5	+6 to +12	+13 to +16	≥+17

Site factors	Factors that reduce available nutrients (−)		Intermediate nutrients (0)	Factors that increase available nutrients (+)		
Soil Texture	LS, S −2	SL, fS −1	SiL, L, Si 0	SCL, CL, SiCL +1	SC, SiC, C +2	
Organic materials	Fibric −2		Mesic 0		Humic +3	
Depth to mineral soil	>100 cm −3	30–100 cm −2	10–29cm 0	2–9 cm +1	<2 cm +3	
Humus form		Mor −2	Moder 0	Mull +2		
Depth water table	>30 cm −3	← −1 →	Intermediate 0	← +2 →	At surface +3	
Water source	Precipitation/ permafrost −3			Ground-water +3	Rare-occasional flooding; stream subirrigation +5	Frequent flooding; stream subirrigation +8
Water pH	≤ 4.5 −3	4.5–5.4 −2	5.5–6.4 0	6.5–7.4 +2	≤ 7.5 +2 *Check for salinity*	Saline +35
Permafrost at <1 m		Present −2		Absent +2		

SNR classes / SNR codes	Very Poor A	Poor B	Medium C	Rich D	Very Rich E	Saline F
Class ranges	≤−13	−12 to −6	−5 to +5	+6 to +12	+13 to +29	>+30

Figure A1-9. Soil nutrient regime (SNR) for wetland soils additive chart

Table A1-5. Drainage class: codes and descriptions

Code	Drainage class	Description
VR	**Very rapidly drained**	Water is removed from the soil very rapidly in relation to supply. Water source is precipitation and available water storage capacity following precipitation is essentially nil. Soils are typically fragmental or skeletal, shallow, or both.
R	**Rapidly drained**	Water is removed from the soil rapidly in relation to supply. Excess water flows downward if underlying material is pervious. Subsurface flow may occur on steep gradients during heavy rainfall. Water source is precipitation. Soils are generally coarse textured or shallow.
W	**Well drained**	Water is removed from the soil readily, but not rapidly. Excess water flows downward readily into underlying pervious material or laterally as subsurface flow. Water source is precipitation. On slopes, subsurface flow may occur for short durations, but additions are equaled by losses. Soils are generally intermediate in texture and lack restricting layers.
MW	**Moderately well drained**	Water is removed from the soil somewhat slowly in relation to supply because of imperviousness or lack of gradient. Precipitation is the dominant water source in medium-to-fine-textured soils; precipitation and significant additions by subsurface flow are necessary in coarse-textured soils.
I	**Imperfectly drained**	Water is removed from the soil sufficiently slowly in relation to supply to keep the soil wet for a significant part of the growing season. Excess water moves slowly downward if precipitation is the major source. If subsurface water or groundwater (or both) is the main source, the flow rate may vary but the soil remains wet for a significant part of the growing season. Precipitation is the main source if available water storage capacity is high; contribution by subsurface or groundwater flow (or both) increases as available water storage capacity decreases. Soils generally have a wide range of texture, and some mottling is common.
P	**Poorly drained**	Water is removed so slowly in relation to supply that the soil remains wet for much of the time that it is not frozen. Excess water is evident in the soil for a large part of the time. Subsurface or groundwater flow (or both), in addition to precipitation, are the main water sources. A perched water table may be present. Soils are generally mottled and/or gleyed or organic and are often associated with wetlands.
VP	**Very poorly drained**	Water is removed from the soil so slowly that the water table remains at or near the surface for most of the time the soil is not frozen. Groundwater flow and subsurface flow are the major water sources. Precipitation is less important, except where there is a perched water table with precipitation exceeding evapotranspiration. Typically associated with wetlands. Soils are gleyed or organic.

Source of descriptions: Expert Committee on Soil Survey 1982

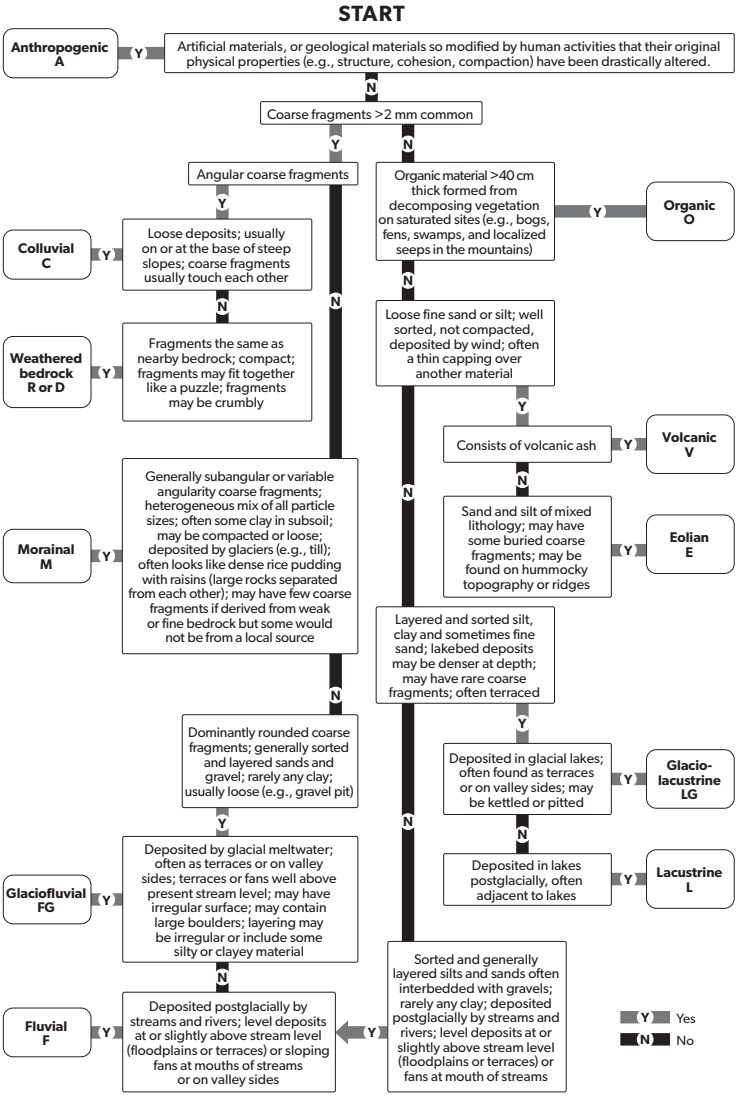


Figure A1-10. Guide to parent material

Source: Adapted from B.C. Ministry of Environment and B.C. Ministry of Forests and Range (2010); Braumandl and Curran (1992); and Lloyd et al. (1990).

Community Structure

Structure is used to describe the appearance of a stand or community using the characteristic life form (stratum) and certain physical attributes. "Structure" can depict stand development features along a trajectory that is characteristic for the vegetation, e.g., development of a forest type, or refer to a certain type of vegetation, e.g., herb community. Choose one of the following codes.

1. **Non-vegetated**
   recent disturbance, e.g., fire, flood, and no vegetation, or less than 5% cover of vegetation has established.

2. **Sparse/cryptogram**
   either the initial stages of primary succession or a cryptogram community maintained by environmental conditions (e.g., bedrock, talus). Sparse tree, shrub and herb cover. Either sparsely vegetated overall (low cover of vascular plants and cryptogams, if present), or dominated by cryptogams.
   - **2a Sparse**– 5 to 10% vegetation cover
   - **2b Bryoid** – bryophyte-dominated
   - **2c Lichen** – lichen-dominated

3. **Herb**
   early successional stage (e.g., post-fire forest succession) or a herb community maintained by environmental conditions or disturbance. Vegetation dominated by herbs (forbs, graminoids, ferns), although herb cover can be low if sparsely vegetated overall as long as herbs characterize the vegetation. Trees and shrubs are usually absent or sparse; however, shrub cover and stature as compared to herb cover and stature determines whether the site is considered herbaceous.
   - **3a Forb-dominated** – includes non-graminoid herbs and ferns
   - **3b Graminoid-dominated** – includes grasses, sedges, reeds and rushes
   - **3c Aquatic** – floating or submerged plants dominate
   - **3d Ground shrub-dominated** – dominated by dwarf woody species such as kinnikinnick or dwarf willows

4. **Shrub**
   early successional stage of a forest or a shrub community maintained by environmental conditions or disturbance. Either dominated by shrubby vegetation, including tree seedlings/saplings, or if sparsely vegetated overall, the dominance of shrubs characterizes the community as a shrubland.
   - **4a Tall shrub** – dominated by woody plants >2m and ≤7 cm dbh
   - **4b Low shrub** – dominated by woody plants <2m

5. **Treed: pole/sapling**
   trees >5 m tall and >7 cm dbh, typically densely stocked. Self-thinning and vertical structure are not yet evident in the canopy. Younger stands are vigorous (usually >15–20 years old); older stagnated stands (up to 100 years old) are also included; time since disturbance usually <40 years; up to 100+ years for dense (5,000–15,000+ stems per ha) stagnant stands.

6. **Treed: young forest**
   self-thinning has become evident and the forest canopy has begun to differentiate into distinct layers. A more open stand than the pole/sapling stage.

7. **Treed: mature forest**
   trees established after the last stand-replacing disturbance have matured; a second cycle of shade tolerant trees may have become established; shrub and herb understories become well developed as the canopy opens up.

8. **Treed: old forest**
   stands of old age with complex structure; patchy shrub and herb understories are typical; regeneration is usually of shade-tolerant species, with composition similar to the overstorey.

9. **Treed: very old forest**
   very old stands having complex structure with abundant large-sized trees, snags and coarse woody debris (CWD); snags and CWD occurring in all stages of decomposition; stands are comprised entirely of shade-tolerant overstorey species with well-established canopy gaps.

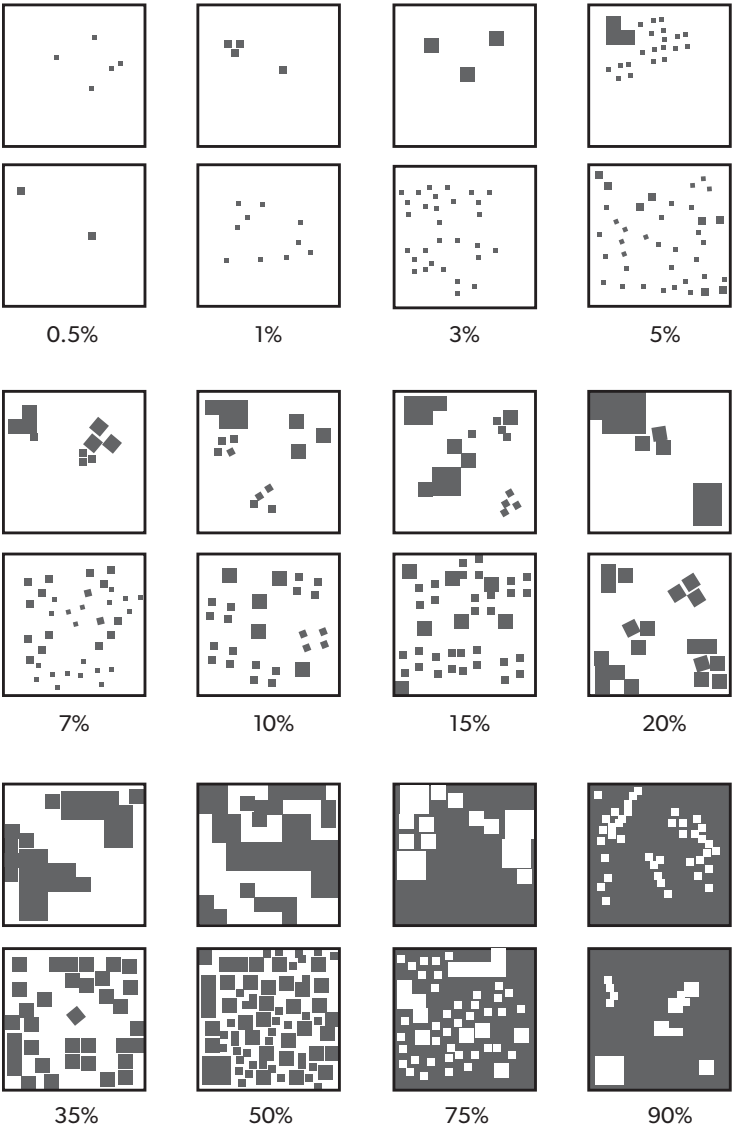


Figure A1-11. Visual aid for determining per cent cover of plant species

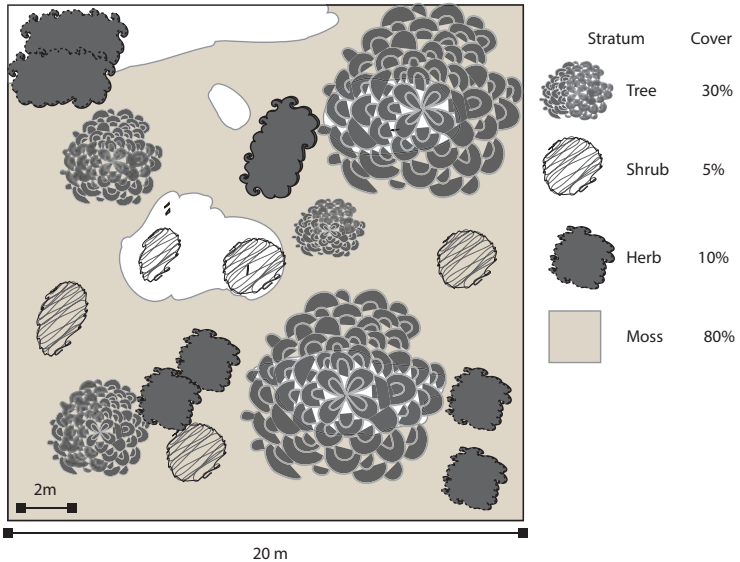


Figure A1-12. Determining per cent cover of plant species: example

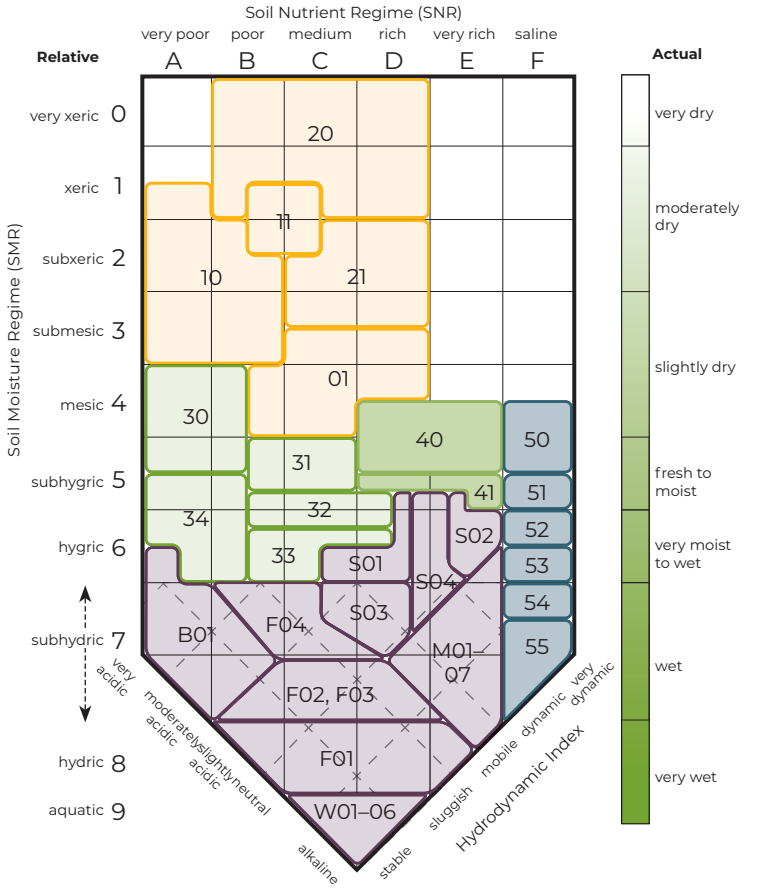


Figure A2-1. Edatopic grid for BOLsl ecosites

Ecosite	Ecosite grouping and name
	DRY TO MESIC ECOSITES
10	PSw – Lichen Woodland
11	B – Baikal Sedge Dunes
20	Pasture Sage Grassland
21	A – Purple Reedgrass Woodland
01	SwAP – Twinflower Forest
	MESIC TO MOIST ECOSITES
30	Sw – Labrador Tea Forest
31	Sw – Red Bearberry Forest
32	Sw – Shrub Birch Woodland
33	Sw – Willow Forest
34	SbSw – Labrador Tea Forest
	FLOODPLAIN ECOSITES
40	Sw – Riparian Forest
41	B – Riparian Forest
	SALINE ECOSITES
50	Sw – Baltic Rush Saline Forest
51	Foxtail Barley Saline Meadow
52	Sea Milkwort Saline Meadow
53	Nuttall's Alkaligrass Saline Meadow
54	Horned Sea-blite Saline Meadow
55	Red Glasswort Saline Meadow

Ecosite	Ecosite grouping and name
	WETLAND ECOSITES
	BOG
B01	SbSw – Labrador Tea Bog
	FEN
F01	Water Sedge Fen
F02	Shrub Birch Fen
F03	Willow – Water Sedge Fen
F04	Sw – Water Sedge Fen
	SWAMP
S01	Willow – Bluejoint Swamp
S02	River Alder Swamp
S03	Tea-leaved Willow – Water Sedge Swamp
S04	Willow – Horsetail Swamp
	MARSH
M01	Beaked – Water Sedge Marsh
M02	Water Horsetail Marsh
M03	Seaside Arrow-grass Marsh
M04	Short-awn Foxtail Marsh
M05	Creeping Spike-rush Marsh
M06	Mannagrass Marsh
M07	Least Spike-rush Marsh
	SHALLOW WATER
W01	Thread-leaf Pondweed Shallow Water
W02	Sago Pondweed – Muskgrass Shallow Water
W03	Muskgrass Shallow Water
W04	Mare's-tail Shallow Water
W05	Northern Arrowhead Shallow Water
W06	Pondweed Shallow Water

Figure A2-2. Names and codes of ecosites

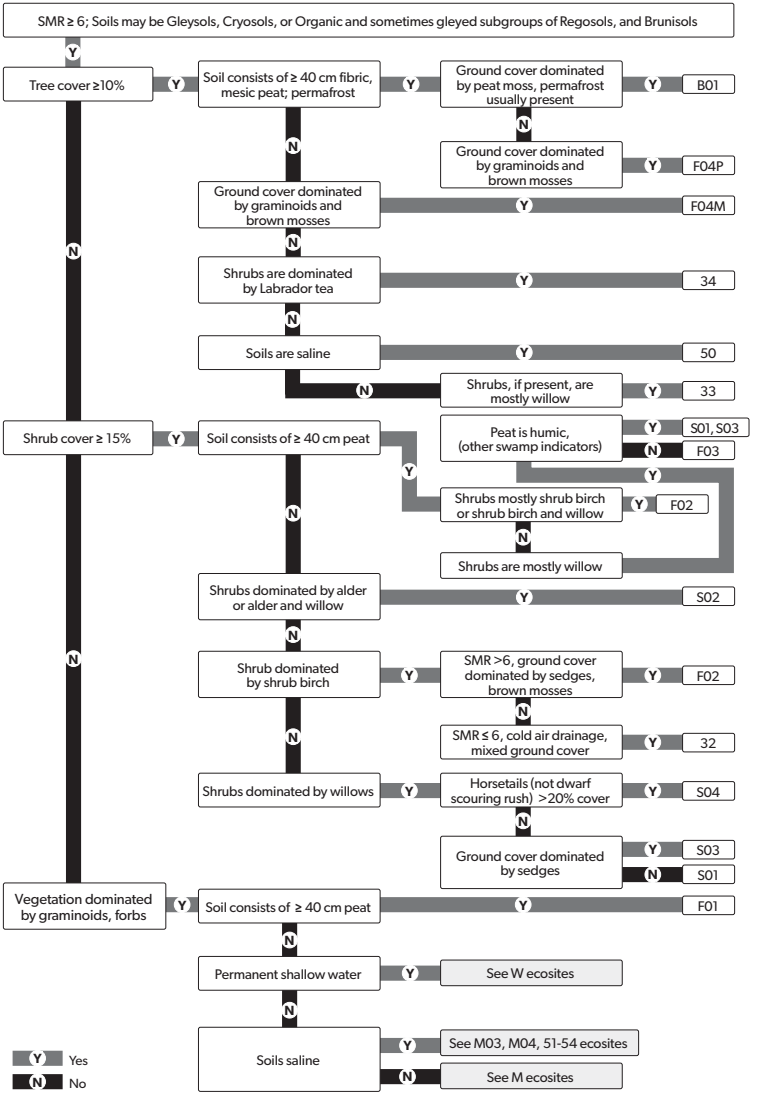


Figure A2-3. Flow chart: identifying BOLsl wetland and near-wetland ecosites

Table A2-1. Species list for ecosites, Southern Lakes Boreal Low Subzone – Compiled from vegetation tables and descriptions

Scientific Name	Yukon ELC Common Name	Cody Synonym
Abietinella abietina	wiry fern moss	
Achillea millefolium	common yarrow	
Aconitum delphiniifolium	mountain monkshood	
Alnus incana	river alder	
Alnus sp.	alder	
Alnus viridis	green alder	
Alopecurus aequalis	short-awned foxtail	
Androsace septentrionalis	northern fairy candelabra	
Anemone multifida	cut-leaved anemone	
Anemone patens	prairie crocus	
Anticlea elegans	mountain death camas	*Zygadenus elegans*
Arctostaphylos uva-ursi	kinnikinnick	
Arctous rubra	red bearberry	*Arctostaphylos rubra*
Arnica cordifolia	heart-leaved arnica	
Artemisia campestris	field wormwood	
Artemisia frigida	pasture sage	
Astragalus alpinus	alpine milk-vetch	
Astragalus americanus	American milk-vetch	
Aulacomnium palustre	glow moss	
Aulacomnium sp.	groove moss	
Aulacomium/Tomentypnum	brown mosses	
Betula glandulosa	glandular shrub birch	
Betula neoalaskana	Alaska paper birch	
Brachythecium sp.	ragged moss	
Brachythecium spp.	ragged mosses	
Bromus pumpellianus	Pumpelly brome	
Bryophyta	mosses, hornworts, liverworts	
Bryum caespiticium	tufted thread moss	
Bryum sp.	thread moss	
Calamagrostis canadensis	bluejoint reedgrass	
Calamagrostis purpurascens	purple reedgrass	
Calamagrostis stricta	slimstem reedgrass	
Calliergon giganteum	giant water moss	
Calliergon sp.	water moss	
Callitriche verna	vernal water-starwort	
Carex aquatilis	water sedge	
Carex concinna	low northern sedge	
Carex duriuscula	needle-leaved sedge	*Carex stenophylla* spp. *eleocharis*
Carex filifolia	thread-leaved sedge	

Table A2-1. Species List (continued)

Scientific Name	Yukon ELC Common Name	Cody Synonym
Carex obtusata	blunt sedge	
Carex podocarpa	graceful mountain sedge	
Carex sabulosa	Baikal sedge	
Carex sp.	sedge	
Carex spp.	sedges	
Carex utriculata	beaked sedge	
Ceratodon purpureus	fire moss	
Cetraria/Flavocetraria sp.	Cetraria lichen	
Cetraria/Flavocetraria spp.	Cetraria lichens	
Chamaerhodos erecta	chamaerhodos	
Chamerion angustifolium	fireweed	*Epilobium angustifolium*
Chara sp.	muskgrass	
Chara spp.	muskgrasses	
Cladina mitis	green reindeer lichen	
Cladina sp.	reindeer lichen	
Cladina spp.	reindeer lichens	
Cladonia spp.	Cladonia lichens	
Climacium dendroides	northern tree moss	
Comarum palustre	marsh cinquefoil	*Potentilla palustris*
Cornus canadensis	bunchberry	
Dasiphora fruticosa	shrubby cinquefoil	*Potentilla fruticosa*
Deschampsia cespitosa	tufted hairgrass	
Dicranum sp.	heron's-bill moss	
Dicranum spp.	heron's-bill mosses	
Drepanocladus sp.	hook-moss	
Drepanocladus spp.	hook-mosses	
Eleocharis acicularis	least spike-rush	
Eleocharis palustris	creeping spike-rush	
Elymus lanceolatus	thickspike wildrye	*Elymus calderi*
Elymus trachycaulus	slender wheatgrass	
Empetrum nigrum	black crowberry	
Equisetum arvense	common horsetail	
Equisetum fluviatile	water horsetail	
Equisetum palustre	marsh horsetail	
Equisetum scirpoides	dwarf scouring-rush	
Equisetum sp.	horsetail	
Equisetum spp.	horsetails	
Equisetum variegatum	variagated scouring-rush	
Eurybia sibirica	Siberian aster	*Aster sibiricus*
Festuca altaica	Altai fescue	

Table A2-1. Species List (continued)

Scientific Name	Yukon ELC Common Name	Cody Synonym
Festuca saximontana	Rocky Mountain fescue	
Flavocentria nivalis	ragged paperdoll	
Galium boreale	northern bedstraw	
Gentianella propinqua	four-parted gentian	
Geocaulon lividum	orange berry bastard toadflax	
Geum macrophyllum	large-leaved avens	
Glyceria borealis	boreal mannagrass	
Glyceria grandis	tall mannagrass	
Hedysarum alpinum	alpine sweet-vetch	
Heracleum maximum	cow parsnip	*Heracleum lanatum*
Hippuris vulgaris	common mare's-tail	
Hordeum brachyantherum	foxtail barley	*Hordeum jubatum* spp. *breviaristatum*
Hylocomium/Pleurozium	feathermosses	
Hylocomium splendens	step moss	
Juncus sp.	rush	
Juncus balticus	Baltic rush	
Juniperus communis	common juniper	
Juniperus horizontalis	creeping juniper	
Lemna minor	common duckweed	
Linnaea borealis	twinflower	
Lupinus arcticus	arctic lupine	
Lupinus kuschei	Yukon lupine	
Lupinus sp.	lupine	
Lycopodium annotinum	bristly clubmoss	
Lysimachia maritima	sea milkwort	*Glaux maritima*
Mertensia paniculata	tall bluebells	
Minuartia obtusiloba	alpine sandwort	
Minuartia sp.	sandwort	
Mnium sp.	leafy moss	
Moneses uniflora	single delight	
Myriophyllum sibiricum	Siberian water milfoil	
Orthilia secunda	one-sided wintergreen	
Oxytropis campestris	yellow locoweed	
Parnassia palustris	northern grass-of-Parnassus	
Pedicularis labradorica	Labrador lousewort	
Peltigera aphthosa	freckle pelt lichen	
Peltigera sp.	pelt lichen	
Peltigera spp.	pelt lichens	
Penstemon gormanii	Gorman's penstemon	

Table A2-1. Species List (continued)

Scientific Name	Yukon ELC Common Name	Cody Synonym
Persicaria amphibia	water smartweed	*Polygonum amphibium*
Petasites frigidus	Arctic sweet coltsfoot	
Picea glauca	white spruce	
Picea mariana	black spruce	
Pinus contorta	lodgepole pine	
Pleurozium schreberi	red-stemmed feathermoss	
Poa glauca	glaucous bluegrass	
Poa pratensis	Kentucky bluegrass	
Poaceae	grasses	
Pohlia sp.	nodding-cap moss	
Polemonium pulcherrimum	showy Jacob's ladder	
Polytrichum juniperinum	juniper haircap moss	
Polytrichum spp.	haircap mosses	
Populus balsamifera	balsam poplar	
Populus tremuloides	trembling aspen	
Potamogeton alpinus	northern pondweed	
Potamogeton richardsonii	Richardson's pondweed	
Potentilla anserina	common silverweed	
Potentilla pensylvanica	Pennsylvania cinquefoil	
Ptilium crista-castrensis	knight's plume moss	
Puccinellia nuttalliana	Nuttall's alkaligrass	
Pyrola asarifolia	pink wintergreen	
Ranunculus aquatilis	white water crowfoot	
Rhododendron groenlandicum	common Labrador tea	*Ledum groenlandicum*
Ribes lacustre	black gooseberry	
Ribes triste	wild red currant	
Rosa acicularis	prickly rose	
Rubus arcticus	arctic raspberry	
Rubus chamaemorus	cloudberry	
Rumex maritimus	golden dock	
Ruppia cirrhosa	spiral ditchgrass	*Ruppia spiralis*
Sagittaria cuneata	northern arrowhead	
Salicornia borealis	arctic glasswort	*Salicornia europeaea*
Salix arbusculoides	littletree willow	
Salix glauca	grey-leaved willow	
Salix myrtillifolia	blueberry willow	
Salix planifolia	tea-leaved willow	
Salix pseudomonticola	false mountain willow	*Salix monticola*
Salix sp.	willow	
Salix spp.	willows	

Table A2-1. Species List (continued)

Scientific Name	Yukon ELC Common Name	Cody Synonym
Sanionia uncinata	sickle-moss	
Saxifraga tricuspidata	prickly saxifrage	
Senecio lugens	black-tipped groundsel	
Shepherdia canadensis	soapberry	
Solidago multiradiata	northern goldenrod	
Solidago simplex	sticky goldenrod	
Sparganium angustifolium	narrowleaf bur-reed	
Sparganium spp.	burreeds	
Sphagnum sp.	peat moss	
Sphagnum spp.	peat mosses	
Stereocaulon spp.	foam lichens	
Stereocaulon tomentosum	woolly foam lichen	
Stuckenia filiformis	thread-leaved pondweed	*Potamogeton filiformis*
Stuckenia pectinata	sago pondweed	*Potamogeton pectinatus*
Symphyotrichum boreale	northern bog aster	*Aster borealis*
Symphyotrichum falcatum	little gray aster	*Aster falcatus*
Tomentypnum nitens	golden fuzzy fen moss	
Triglochin maritima	bog arrow-grass	
Utricularia intermedia	flat-leaved bladderwort	
Utricularia minor	lesser bladderwort	
Vaccinium uliginosum	blueberry	
Vaccinium vitis-idaea	lowbush cranberry	
Viburnum edule	highbush cranberry	

Plant species combinations

In most vegetation tables in this guide, some species were combined for presentation purposes; these are presented in Table A1-1. Combining species was necessary due to the resolution of the data; some plots had plant identifications to the species level, others only to the genus or family level. The combining was also done to help the users focus on the important differences; sometimes it is not as critical from an ecological perspective to know the species as it is to know the genus or family. The following combined species groups were generally used in the guide. Not all species would be present in any one ecosystem, but generally two or more species could be present. There are also some cases where, in order to help with understanding and identification, species in this table were not combined.

Table A3-1. Plant species list for the Boreal Low Zone

Combined Name	Component Species	Common Name
Betula neoalaskana	*Betula neoalaskana*	Alaska paper birch
	Betula papyrifera	paper birch
***Salix* spp.**	*Salix alaxensis*	Alaska willow
	Salix arbusculoides	little-tree willow
	Salix athabascensis	Athabasca willow
	Salix barclayi	Barclay's willow
	Salix bebbiana	Bebb's willow
	Salix brachycarpa	short-fruited willow
	Salix commutata	under-green willow
	Salix discolor	pussy willow
	Salix glauca	grey-leaved willow
	Salix maccalliana	MacCalla's willow
	Salix planifolia	plane-leaved willow
	Salix pseudomonticola	serviceberry willow
	Salix pulchra	diamond-leaved willow
	Salix richardsonii	Richardson's willow
	Salix scouleriana	Scouler's willow
	Salix sp.	willow
Poaceae	*Agropyron* sp.	wheatgrass
	Arctagrostis latifolia	polargrass
	Bromus ciliatus	fringed brome
	Bromus inermis	smooth brome
	Bromus pumpellianus	Pumpelly brome
	Bromus sp.	brome
	Calamagrostis canadensis	bluejoint reedgrass
	Calamagrostis lapponica	Lapland reedgrass
	Calamagrostis purpurascens	purple reedgrass
	Calamagrostis sp.	reedgrass
	Calamagrostis stricta	slimstem reedgrass
	Elymus lanceolatus	thickspike wildrye

Table A3-1. (continued)

Combined Name	Component Species	Common Name
Poaceae continued	*Elymus trachycaulus*	slender wheatgrass
	Festuca altaica	Altai fescue
	Festuca brachyphylla	alpine fescue
	Festuca brevissima	Alaska fescue
	Festuca saximontana	Rocky Mountain fescue
	Festuca sp.	fescue
	Festuca trachyphylla	hard fescue
	Hesperostipa comata	needle-and-thread grass
	Leymus innovatus	fuzzy-spiked wildrye
	Poa arctica	arctic bluegrass
	Poa glauca	glaucous bluegrass
	Poa nemoralis	wood bluegrass
	Poa palustris	fowl bluegrass
	Poa pratensis	Kentucky bluegrass
	Poa secunda	Sandberg's bluegrass
	Poa sp.	bluegrass
	Trisetum sp.	trisetum
	Trisetum spicatum	spike trisetum
Arctous ruber	*Arctous alpinus*	alpine bearberry
	Arctous ruber	red bearberry
***Cetraria* spp.**	*Cetraria cuculatta*	furled paperdoll
	Cetraria ericetorum	icelandmoss
	Cetraria islandica	Iceland lichen
	Cetraria nivalis	ragged paperdoll
	Cetraria sp.	Iceland lichen
***Cladina* spp.**	*Cladina mitis*	green reindeer lichen
	Cladina rangiferina	grey reindeer lichen
	Cladina sp.	reindeer lichens
	Cladina stellaris	star reindeer lichen
***Cladonia* spp.**	*Cladonia acuminata*	branching pebblehorn
	Cladonia amaurocraea	quill clad
	Cladonia bellidiflora	toy soldiers
	Cladonia borealis	boreal pixie-cup
	Cladonia cariosa	peg-leg soldiers
	Cladonia cenotea	miner's funnel
	Cladonia chlorophaea	mealy pixie-cup
	Cladonia coccifera	madame's pixie-cup
	Cladonia cornuta	bighorn pixie-cup
	Cladonia crispata	organpipe lichen
	Cladonia deformis	lesser sulphur-cup
	Cladonia ecmocyna	orange-footed pixie-cup
	Cladonia gracilis	smooth clad
	Cladonia multiformis	slotted clad
	Cladonia phyllophora	greater felt-soldiers
	Cladonia pleurota	mind-altering pixie-cup

Table A3-1. (continued)

Combined Name	Component Species	Common Name
***Cladonia* spp.** continued	*Cladonia pyxidata*	pebbled pixie-cup
	Cladonia sp.	clad lichens
	Cladonia squamosa	dragon funnel
	Cladonia subulata	antlered powderhorn
	Cladonia sulphurina	greater sulphur-cup
	Cladonia uncialis	thorn clad
***Dicranum* spp.**	*Dicranum acutifolium*	sharp-leaved broom moss
	Dicranum brevifolium	short-leaved broom moss
	Dicranum fuscescens	curly heron's-bill moss
	Dicranum sp.	heron's-bill moss
***Peltigera* spp.**	*Peltigera aphthosa*	freckle pelt lichen
	Peltigera canina	dog lichen
	Peltigera evansiana	peppered pelt
	Peltigera lepidophora	butterfly pelt
	Peltigera leucophlebia	freckle plet
	Peltigera malacea	apple pelt
	Peltigera neopolydactyla	greater frog pelt
	Peltigera ponojensis	felt pelt
	Peltigera retifoveata	sponge pelt
	Peltigera rufescens	felt peltigera
	Peltigera scabrosa	toad pelt
	Peltigera sp.	pelt lichens
***Polytrichum* spp.**	*Polytrichum commune*	common haircap moss
	Polytrichum juniperinum	juniper haircap moss
	Polytrichum piliferum	awned haircap moss
	Polytrichum sp.	haircap moss
	Polytrichum strictum	bog haircap moss
***Sphagnum* spp.**	*Sphagnum rubellum*	red peat moss
	Sphagnum sp.	peat moss
***Stereocaulon* spp.**	*Stereocaulon alpinum*	alpine foam
	Stereocaulon paschale	cottontail foam
	Stereocaulon spp.	foam lichens
	Stereocaulon tomentosum	woolly foam lichen
Bryophyta		unknown mosses

Table A3-2. Codes for soil orders, great groups and subgroups

Codes for soil orders, great groups and subgroups likely found in the Boreal Low Zone and which may be mentioned in this guide are listed here. The list is compiled from Soil Classification Working Group (CSSC 1998).

Brunisolic Order (B)

Melanic Brunisol MB

Orthic O.MB
Eluviated E.MB
Gleyed GL.MB
Gleyed Eluviated GLE.MB

Eutric Brunisol EB

Orthic O.EB
Eluviated E.EB
Gleyed GL.EB
Gleyed Eluviated GLE.EB

Sombric Brunisol SB

Orthic O.SB
Eluviated E.SB
Duric DU.SB
Gleyed GL.SB
Gleyed Eluviated GLE.SB

Dystric Brunisol DYB

Orthic O.DYB
Eluviated E.DYB
Duric DU.DYB
Gleyed GL.DYB
Gleyed Eluviated GLE.DYB

Chernozemic Order (CH)

Brown Chernozem BC

Orthic O.BC
Rego R.BC
Calcareous CA.BC

Dark Brown Chernozem DBC

Eluviated E.DBC
Gleyed GL.DBC
Gleyed Rego GLR.DBC
Gleyed Calcareous GLCA.DBC
Gleyed Eluviated GLE.DBC

Black Chernozem BLC

Orthic O.BLC
Rego R.BLC
Calcareous CA.BLC
Eluviated E.BLC
Gleyed GL.BLC
Gleyed Rego GLR.BLC
Gleyed Calcareous GLCA.BLC
Gleyed Eluviated GLE.BLC

Cryosolic Order (CY)

Turbic Cryosol TC

Orthic Eutric OE.TC
Orthic Dystric OD.TC
Brunisolic Eutric BRE.TC
Brunisolic Dystric BRD.TC
Histic Eutric HE.TC
Histic Dystric HD.TC
Histic Regosolic HR.TC
Regosolic R.TC
Gleysolic GL.TC

Static Cryosol SC

Orthic Eutric OE.SC
Orthic Dystric OD.SC
Brunisolic Eutric BRE.SC
Brunisolic Dystric BRD.SC
Histic Eutric HE.SC
Histic Dystric HD.SC
Histic Regosolic HR.SC
Gleysolic Static Cryosol GL.SC
Regosolic Static Cryosol R.SC

Organic Cryosol OC

Fibric FI.OC
Mesic ME.OC
Humic HU.OC
Terric Fibric TFI.OC
Terric Mesic TME.OC
Terric Humic THU.OC
Glacic GC.OC

Table A3-2. (continued)

Gleysolic Order (G)

Luvic Gleysol LG
Humic HU.LG
Fera FE.LG
Orthic O.LG

Humic Gleysol HG
Fera Humic FE.HG
Orthic Humic O.HG
Rego Humic R.HG

Gleysol G
Fera FE.G
Orthic O.G
Rego R.G

Luvisolic Order (L)

Gray Luvisol GL
Orthic O.GL
Brunisolic BR.GL
Gleyed GL.GL
Gleyed Brunisolic GLBR.GL

Organic Order (O)

Humisol H
Typic TY.H
Fibric FI.H
Mesic ME.H
Limnic LM.H
Cumulic CU.H
Terric T.H
Terric Fibric TFI.H
Terric Mesic TME.H
Hydric HY.H

Folisol FO
Hemic HE.FO
Humic HU.FO
Lignic LI.FO
Histic HI.FO

Fibrisol F
Typic TY.F
Mesic ME.F
Humic HU.F
Limnic LM.F
Cumulic CU.F
Terric T.F
Terric Mesic TME.F
Terric Humic THU.F
Hydric HY.F

Mesisol M
Typic TY.M
Fibric FI.M
Humic HU.M
Limnic LM.M
Cumulic CU.M
Terric T.M.
Terric Fibric TFI.M
Terric Humic THU.M
Hydric HY.M

Podzolic Order (P)

Humo-Ferric Podzol HFP
Orthic O.HFP
Sombric SM.HFP
Luvisolic L.HFP
Gleyed GL.HFP
Gleyed Sombric GLSM.HFP

Regosolic Order (R)

Regosol R
Orthic O.R
Cumulic CU.R
Gleyed GL.R
Gleyed Cumulic GLCU.R

Humic Regosol HR
Orthic O.HR
Cumulic CU.HR
Gleyed GL.HR
Gleyed Cumulic GLCU.HR

Table A3-3. Soil horizon codes and modifiers

These are soil codes and modifiers used in this manual and in the keys. A complete list of soil horizons is available in the *Field Manual for Describing Yukon Ecosystems* (2016) and Soil Classification Working Group (1998).

Codes	Major soil horizons and modifiers
L	An upland horizon consisting of relatively fresh organic residues that are readily identifiable as to origin.
F	An upland horizon comprised of partly decomposed plant residues in which fragmented plant structures are generally recognizable as to origin. **Fm**–(mycogenous): an F horizon in which plant residues are aggregated in a matted structure, with a tenacious consistence. The matted tenacious fabric typically features a felty character due to abundant fungal mycelia. Roots may be abundant contributing to the formation of the matted fabric. **Fz**–(zoogenous): an F horizon in which plant residues are weakly aggregated with a loose or friable consistency. The friable fabric reflects the presence of active populations of soil meso- and microfauna. Faunal droppings are typically numerous and easily observed under magnification with a hand lens or binocular microscope. Fungal mycelia may be present, but rarely in large amounts. Root residues comprise a moderate proportion of plant residues and are typically less abundant than in Fm horizons (Babel 1975). **Fa**–(amph•): an F horizon in which plant residues are aggregated in a weak to moderate, noncompact matted structure. This is an intergrade between the Fm and Fz horizons, and as such, reflects properties of both.
H	An upland horizon comprised of well-decomposed plant residues in which plant structures are generally not recognizable. **Hh**–H horizon dominated by fine substances with few, if any, recognizable plant residues. **Hr**–H horizon dominated by fine substances but that also contains recognizable fine roots, wood or bark or other plant residues. **Hz**–H horizon dominated by fine substances with very few, if any, recognizable plant residues; faunal droppings constitute most of the fabric.
O	A wetland organic horizon comprised of materials in varying degrees of decomposition. **Of**–O horizon that consists largely of fibric material that are readily identifiable as to botanical origin. Contains more than or equal to 40% rubbed fibre by volume. Von Post scale of decomposition (VP) =1-4. **Om**–O horizon that consists of mesic material, intermediate in composition between fibric and humic materials. Rubbed fibre content ranges from 10-40%. VP=5-6. **Oh**–O horizon that consists of humic material at an advanced stage of decomposition. Rubbed fibre content is <10%. VP= 7-10.
A	Mineral horizon, containing <17% organic C by mass, that has formed at or near the soil surface in the zone of leaching or eluviation of organic materials in solution or suspension (Ae), or of maximum *in situ* accumulation of organic matter (Ah), or both.
B	Mineral horizon characterized by enrichment in organic matter, sesquioxides, or clay; or by the development of soil structure; or by a change of colour denoting hydrolysis, reduction, or oxidation.
C	Mineral horizon comparatively unaffected by the pedogenic processes operative in the A and B horizons, except the process of gleying (Cg), and the accumulation of calcium and magnesium carbonates (Cca) and more soluble salts (Cs, Csa).

Table A3-3. (continued)

Codes	Mineral Horizon Modifiers
b	Buried soil horizon[1]
e	Horizon characterized by the eluviation of clay, Fe, Al, or organic matter alone or in combination.
g	Horizon characterized by grey colours, or prominent mottling, or both, which indicates of permanent or periodic intense reduction. Chromas of the matrix are generally one or less. It is used with the Aeg, Bg, Bfg, Bgf, Bhfg, Btg, Cg, Ckg codes and others. When used with the Ae, Bf, Bhf, and Bt codes, the limits set for the other modifiers must be met. The Bgf horizons are usually prominently mottled; more than half of the soil material occurs as mottles of high chroma. The Bgf horizons occur in Fera Gleysols and Fera Humic Gleysols and possibly below the Bfg of gleyed Podzols.
h	Horizon enriched with organic matter. It is used with the Ah, Ahe, Bh, and Bhf codes. **Ah** - An A horizon enriched with humified organic matter; at least one colour value unit lower that the underlying horizon, or 0.5% more organic C than the C horizon or both.
j	Used with e, f, g, n, and t to denote an expression of, but failure to meet, the specified limits of the letter code it modifies. It is placed to the right of the letter it modifies.
k	Denotes the presence of carbonate as indicated by visible effervescence when a dilute HCl solution is added.
m	Horizon slightly altered by hydrolysis, oxidation, or solution, or all three to give a change in colour or structure, or both. It is used with the Bm, Bmgj, Bmk, and Bms codes. It has: 1. Evidence of one of or more of the following: • higher chromas and redder hues than the underlying horizons; • enrichment or complete removal of carbonates either as Bmk or Bm; and/or • change in structure from that of the original material. 2. Illuviation too slight to meet requirements of a Bt or podzolic B. 3. No cementation or induration and lacks a brittle consistence when moist.
s	Horizon with salts, including gypsum, which may be detected as crystal or veins, or as surface crusts of salt crystals. It is used with any combination of horizon codes.
sa	Horizon >10 cm thick with secondary enrichment of salts more soluble than Ca and Mg carbonates; the concentration of salts exceeds that in the unenriched parent material.
y	Horizon affected by cryoturbation. It is used with any combination of horizon codes.[1]
z	A frozen layer, it may be used with any horizon or layer code[1].

1. This may also be used with organic horizons.

von Post scale of decomposition (for wetland O horizons)

Peats are classified on the basis of their degree of decomposition (or aging). This indicates the layer they came from: a young peat is taken from nearer the surface, rather than from farther down. The von Post scale classifies peat decomposition from 1 (completely undecomposed, with all plant tissues identifiable) to 10 (completely humified with little or no plant tissue identifiable).

Squeeze a sample of the O horizon between your fingers and observe the colour of the solution that is squeezed out, the nature of the fibre, and the proportion of the original sample that remains in your hand. Record the class on the form, using Table A3-4 for reference.

Table A3-4. von Post scale of decomposition

Code/Class	Description
1	Undecomposed; plant structure unaltered; yields only clear water that is coloured light yellow-brown
2	Almost undecomposed; plant structure distinct; yields only clear water that is coloured light yellow-brown
3	Very weakly decomposed; plant structure distinct; yields distinctly turbid brown water, no peat substance passes between the fingers, residue not mushy
4	Weakly decomposed; plant structure distinct; yields strongly turbid water, no peat substance escapes between the fingers, residue rather mushy
5	Moderately decomposed; plant structure evident, but becoming indistinct; yields much turbid brown water, some peat escapes between the fingers, residue very mushy
6	Strongly decomposed; plant structure somewhat indistinct, but more evident in the squeezed residue than in the undisturbed peat; about one-third of the peat escapes between the fingers, residue strongly mushy
7	Strongly decomposed; plant structure indistinct, but recognizable; about one-half of the peat escapes between the fingers
8	Very strongly decomposed; plant structure very indistinct; about two-thirds of the peat escapes between the fingers, residue almost entirely resistant remnants such as root fibres and wood
9	Almost completely decomposed; plant structure almost unrecognizable; nearly all the peat escapes between the fingers
10	Completely decomposed; plant structure unrecognizable; all the peat escapes between the fingers

Table A3-5. Selected annual and derived climate variables, 1971–2000, summarized by Bioclimate Zone

CLIMATE CHARACTERISTICS BY BIOCLIMATE ZONE		Boreal Low	Boreal High	Boreal Subalpine	Subarctic Woodland	Subarctic Subalpine	Arctic Tundra Low Shrub	Arctic Tundra Dwarf Shrub	Boreal Alpine	Subarctic Alpine	Pacific Maritime Glacierized
Mean annual precipitation (mm)	Mean	370	432	626	346	518	209	304	838	707	3632
	95% CI	359–381	418–447	588–665	338–354	508–527	203–215	295–314	794–881	693–721	3,394–3,870
	SD	98	128	343	71	83	53	83	384	127	2102
Mean growing season (May to September) precipitation (mm)	Mean	213	250	340	213	302	129	183	442	405	1474
	95% CI	207–218	243–256	324–356	208–218	297–307	125–133	178–188	423–460	398–413	1,397–1,552
	SD	50	59	141	44	42	33	48	167	67	684
Mean precip. as snow (mm) between August (previous year) and July	Mean	161	202	340	157	268	102	152	507	400	3104
	95% CI	154–167	193–212	310–369	153–161	261–274	100–105	147–157	471–544	388–411	2,902–3,306
	SD	56	86	259	36	60	22	43	320	98	1787
Mean annual temp. (°C)	Mean	–2.4	–3.5	–4.2	–6.5	–6.3	–8.6	–7.9	–5.2	–6.9	–10.0
	95% CI	–2.5 to –2.3	–3.6 to –3.4	–4.3 to –4.0	–6.7 to –6.4	–6.4 to –6.2	–8.8 to –8.5	–8.0 to –7.8	–5.4 to –5.0	–7.0 to –6.8	–10.3 to –9.6
	SD	0.9	1.1	1.4	1.2	1.0	1.0	1.1	1.8	0.9	3.1
Degree-days below 0°C	Mean	2491	2687	2660	3686	3337	4090	3850	2,806	3,364	3,843
	95% CI	2,451–2,531	2,645–2,730	2,616–2,704	3,641–3,730	3,301–3,373	4,067–4,113	3,824–3876	2,751–2,862	3,337–3,392	3,750–3,936
	SD	351	374	390	394	317	204	228	489	240	825
Degree-days above 5°C	Mean	856	703	499	720	493	441	455	347	351	76
	95% CI	843–870	688–718	485–512	709–731	480–505	427–455	438–473	334–360	338–363	67–86
	SD	118	132	123	99	108	121	151	118	109	84
No. of frost-free days	Mean	120	109	93	107	88	96	96	73	67	20
	95% CI	120–121	108–110	91–95	106–108	86–89	95–96	95–98	70–75	65–69	17–22
	SD	8	10	16	9	15	8	10	23	20	25
Frost-free period	Mean	73	67	54	79	61	70	70	46	50	124
	95% CI	72–74	66–68	53–56	78–80	60–63	69–71	69–71	44–48	48–51	114–134
	SD	9	10	12	8	11	6	8	16	10	87

Source: Climate normals for the period 1971–2000 were generated from 300 random points for each bioclimate zone using Climate WNA
SD: Standard Deviation; 95% CI: 95% Confidence Interval

Table A3-6. Selected annual and derived climate variables, 1971–2000, summarized by Bioclimate Subzone

BOREAL LOW SUBZONES		BOLal	BOLkp	BOLlb	BOLmp	BOLrr	BOLsl	BOLyc	BOLyn
Mean annual precipitation (mm)	Mean	754	291	451	549	309	308	298	328
	95% CI	713–794	286–296	445–458	543–554	306–312	302–314	294–301	323–333
	SD	356	45	60	48	27	55	32	45
Mean growing season (May-September) precipitation (mm)	Mean	348	178	241	357	215	179	186	199
	95% CI	331–366	174–181	237–245	353–360	213–217	176–181	184–188	196–202
	SD	155	28	37	31	21	24	17	26
Mean precipitation as snow (mm) between August (previous year) and July	Mean	387	119	213	183	109	132	116	134
	95% CI	366–408	116–122	210–217	181–186	108–110	128–136	114–118	131–136
	SD	186	25	32	24	9	39	18	21
Mean annual temperature (°C)	Mean	–1.1	–4.0	–2.3	–0.9	–3.5	–1.7	–2.6	–3.1
	95% CI	1.2 to –1.0	–4.0 to –3.9	–2.4 to –2.3	–0.9	–3.5	–1.8 to –1.6	–2.7 to –2.5	–3.2 to –3.1
	SD	0.9	0.4	0.7	0.3	0.3	0.7	0.6	0.5
Degree-days below 0°C	Mean	1949	3200	2442	2142	2692	2178	2593	2865
	95% CI	1,921–1,977	3,187–3,213	2,418–2,466	2,129–2,154	2,678–2,707	2,155–2,201	2,572–2,613	2,844–2,887
	SD	247	112	214	109	126	206	181	191
Degree-days above 5°C	Mean	772	1004	822	1005	696	791	878	957
	95% CI	765–780	998–1009	812–831	992–1018	691– 700	782–800	869–886	947–966
	SD	67	50	84	113	41	78	74	80
Number of frost-free days	Mean	122	123	120	134	107	118	119	122
	95% CI	121–124	122–123	119–121	134–135	106–107	117–119	118–120	121–123
	SD	11	3	7	5	2	7	6	5
Frost-free period	Mean	73	83	73	92	57	66	70	75
	95% CI	72–75	83–84	73–74	91–93	57–58	65–67	69–70	75–76
	SD	13	5	7	6	4	7	7	7

Source: Climate normals for the period 1971–2000 were generated from 60 random points for each bioclimatic subzone, using ClimateWNA (Hamann et al. 2013)
SD: Standard Deviation; 95% CI: 95% Confidence Interval