

**A FIELD GUIDE TO  
FOREST SITE IDENTIFICATION AND  
INTERPRETATION FOR THE  
CARIBOO FOREST REGION**

**O. A. Steen and R. A. Coupé**



Ministry of Forests  
Research Program

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1997

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### Canadian Cataloguing in Publications Data

Steen, O. A.

A field guide to forest site identification and interpretation for the Cariboo Forest Region

Includes bibliographical references: p.  
ISBN 0-7726-3495-5

1. Bioclimatology – British Columbia – Cariboo Region. 2. Forest site quality – British Columbia – Cariboo Region. 3. Biogeography – British Columbia – Cariboo Region. 4. Forest ecology – British Columbia – Cariboo Region. 5. Forest management – British Columbia – Cariboo Region. 6. Cariboo Forest Region (B. C.). I. Coupé, R., 1952- . II. British Columbia. Ministry of Forests. Research Branch.

QH541.5.F6S73 1998 581.7'37'09711 C98-960063-7

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Published by the Research Branch, Ministry of Forests, 712 Yates Street, Victoria, B. C. V8W 3E7

### Citation:

Steen, O.A and R.A. Coupé. 1997. A field guide to forest site identification and interpretation for the Cariboo Forest Region. B.C. Min. For., Victoria, B.C. Land Manage. Handb. No. 39.

Copies of this and other Ministry of Forests titles are available from Crown Publications Inc., 521 Fort Street, Victoria, B.C. V8W 1E7

## ACKNOWLEDGEMENTS

The classification and interpretations presented in this field guide have evolved over the past 20 years through the collective work of several individuals involved in the many phases of the Cariboo Forest Region ecological classification project.

W.J. Watt coordinated the ecological classification project in the Cariboo Forest Region from 1977 to 1983. During this time and in subsequent years, he provided important guidance on observation and interpretation of site and soil attributes. Several individuals summarized and interpreted data and developed preliminary ecological classifications and draft ecosystem guides: R. Annas, C. Bowling, B. Coupé, R. Dawson, K. Iverson, L. Lemmen, I. Leung, S. Mah, K. Mayes, P. McAuliffe, R. Meister, N. Stromberg, A. vonSaken, M. Waterhouse, and A. Yee. A. Yee contributed very significantly towards the development of initial approaches to ecological classification and description in the Cariboo Forest Region. In addition to these individuals, many others collected field data from the more than 3000 plots that form the basis of the classification in this guide. A. Roberts, F. Boas, and W. Noble identified difficult vascular, bryophyte, and lichen specimens.

This field guide is based on the provincially correlated ecological classification made possible by the Ministry of Forests Ecological Classification Correlation Program. D. Meidinger directed this correlation effort and worked closely with all forest regions in the provincial synthesis of ecological classification data. We have benefited from his enthusiasm, technical insights, and supportive role. T. Fleming, S. Mah, C. Cadrin, A. Inselberg, and K. Yearsley provided data analyses and interpretations for the provincial correlation project. D. Lloyd, C. DeLong, F. Nuszdorfer, A. Banner, and others helped to resolve correlation and mapping issues between the Cariboo and other forest regions.

The format and content of this guide have benefited greatly from guides to ecosystems for other forest regions in British Columbia. Many of the site and soil description aids in the appendices have been adapted from these other regional guides. The text of sections 1–3 has been modified from text prepared by T. Braumandl, R. Green, C. DeLong, A. Banner, and D. Meidinger.

Forest health information in Section 7 was provided by L. Rankin. An initial draft of the silviculture considerations tables was modified and further developed with input from several experienced silviculturists in the Cariboo Forest Region. We thank A. Randall, K. Day, P. Hendrix, C. Gibson-Robertson, M. Seilis, D. Harris, D. Greeley, G. White, A. Lacourcier, T. Harding, C. von Hahn, W. Nuyens, K. Peel, G. McIntosh, M. Rungi, N. Daintith, T. Newsome, and the others who contributed to this section.

D. Meidinger made many valuable review comments and suggestions for all sections of the guide. Other valuable review comments were provided by A. MacKinnon, A. Banner, T. Braumandl, E. Hamilton, J. McClarnon, N. Daintith, T. Newsome, and P. Nystedt.

We thank B. Hammerstron of Image House Inc. in Williams Lake for his creativity and very important role in the technical production aspects of this guide.

P. Nystedt and others of the Production Resources Group of the Ministry of Forests Research Branch provided very important assistance in developing the presentation format of this guide and facilitating many aspects of its final production. S. Smith did the English edit.

Plant illustrations by the following artists have been used in the guide: F.L. Beebe, G. Bishop, T.C. Brayshaw, M. Bryant, P. Drukker-Brammall, P. Frank, G.F. Harcombe, A. Hassen, S. Mitchell, B.C. Newton, S.D. Salkeld, E.J. Stephen, and R.A. With. We thank the Royal British Columbia Museum and the British Columbia Ministry of Environment, Lands and Parks for permission to use plant illustrations from their publications.

To all others who provided advice or logistical support in the many phases of this project we extend our thanks.

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**Internet Version  
Appendix 9 to 15**

**1997**

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## APPENDIX 9

### GUIDE TO FIELD SOIL TEXTURING

Soil texture refers to the relative proportion of **sand**, **silt**, and **clay**, which together make up the fine fraction (<2 mm) of the soil. Sand particles are 0.05–2.0 mm in diameter, silt particles are 0.002–0.05 mm in diameter, and clay particles are less than 0.002 mm in diameter. Each of these size classes has their own distinctive properties such as graininess, slipperiness or soapiness, grittiness, and stickiness. The relative proportion of each of these size classes in a sample of soil is estimated through their unique “feel.”

**Sand (except fine and very fine sand)** Felt as individual grains (visible when the soil is smeared on the finger).

**Fine and very fine sand** When dry, feels similar to silt; when wet, it is not soapy or slippery, stiffer than silt (like grinding compound or fine sandpaper).

**Silt** When dry, feels floury; when wet feels slippery and soapy, slightly sticky.

**Clay** When dry, forms hard lumps; when moist it is plastic and pliable like plasticine; when wet it is very sticky.

Most soils are a mixture of sand, silt, and clay, so the degree of graininess, soapiness, or stickiness will vary depending on how much of each particle size is present. As the amount of clay increases, soil particles bind together, form a stronger cast, and can be rolled into thinner, longer, stronger, and more pliable “worms.” As sand and silt increase, the soil binding strength decreases, and only a weak to moderately strong cast can be formed. The various soil texture classes, shown on the textural triangle at the bottom of the “Key to Identification of Soil Texture” below, are named by a combination of the dominant particle sizes. The loam texture class contains a relatively even mix of the three size classes.

## APPENDICES

The **coarse fragment** component of soils consists of particles  $>2$  mm in diameter (for non-spherical particles measure second-largest dimension). It is divided into three classes: **gravels** (2–75 mm), **cobbles** (75–250 mm) and **stones** ( $>250$  mm). Coarse fragment content of a soil is visually estimated as a percentage of the whole soil (by volume). That is the % gravel + % cobbles + % stones + % fine fraction (sand, silt, and clay) = 100% of mineral soil volume.

Field determination of soil texture is subjective and can only be done consistently with training followed by practice. Most coarse fragments (particles  $>2$  mm) must be removed to enable precise assessment of soil texture. A small 2 mm sieve helps. The field tests outlined on Table A9.1 and used in conjunction with the accompanying flowchart, are provided to assist the user in the field determination of soil texture.

**Graininess Test** Rub the soil between your fingers. If sand is present, it will feel “grainy.” Determine whether this makes up more than about 50% of the sample. Sandy soils often sound gritty when worked in the hand.

**Moist Cast Test** Compress some moist (not wet) soil by clenching it in your hand. If the soil holds together in a shape when released (i.e., forms a cast), then test the durability of the cast by tossing it from hand to hand. A very weak cast will immediately break up even when tossed gently. A weak cast will retain its overall shape with one or two gentle tosses but will break up with a larger number or more vigorous tosses. A moderate cast will retain its overall shape with gentle to moderate tosses but the details of the cast such as finger impressions and ridges will quickly be rounded out or subdued and will soon disappear. A strong cast will retain its overall shape with vigorous tosses; details of the cast, including finger impressions and ridges, will be retained after a few moderate tosses but will eventually be subdued with several vigorous tosses. A very strong cast will retain its overall shape as well as the details of its form with moderate to vigorous tosses.

**Stickiness Test** Wet the soil thoroughly and knead it to a soft putty-like consistency. The correct moisture content is important. If the soil putty flows with the force of gravity it is too wet. If it crumbles when rolled it is too dry. Gently squeeze the putty between the thumb and

forefinger. Determine the stickiness by noting how strongly the soil adheres to your digits when you release the pressure and how much it stretches. Stickiness increases with increasing clay content.

**Taste Test** Work a small amount of soil between your front teeth. Sand particles are distinguished as individual grains (graininess), which grate sharply against the teeth. Silt particles are distinguished as a general fine “grittiness” similar to the grit found in toothpaste. Clay particles have no grittiness.

**Soapy (Slipperiness) Test** Work some wet soil between the thumb and forefinger. The degree of soapiness is determined by how soapy/slippery it feels and how much resistance to slip there is (i.e., from clay and sand particles).

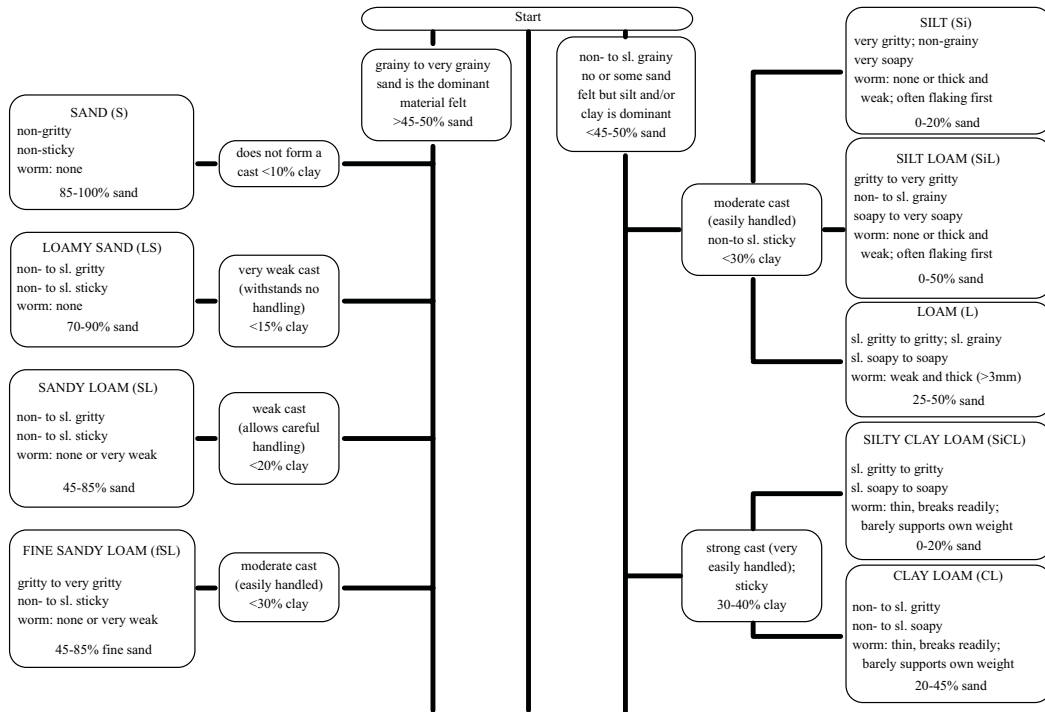
**Worm Test** Roll some of the soil putty in the palm with your finger to form the longest, thinnest “worm” possible. The more clay there is in the soil, the longer, thinner, and more durable and pliable the worm will be. Try with wetter or drier soil to ensure that you have the right moisture content (the best worm).

**Shine Test** A small amount of moist soil is rolled into a ball and rubbed once or twice against a hard, smooth object such as a knife blade or thumb nail. The more shiny the soil the greater the proportion of clay.

Well-decomposed organic matter (humus) imparts some silt-like properties to the soil. These soils feel floury when dry and slippery and spongy when moist, but not sticky or plastic. However, when subjected to the taste test, they feel non-gritty. They are generally very dark when moist or wet, and stain the hands brown or black. Humus-enriched soils often occur on wet sites, under deciduous forests and in grasslands. Humus is not used as a determinant of soil texture; an estimate of the silt content of any humus-enriched mineral soil should be reduced accordingly.

Organic soils and soil horizons are those that contain more than 30% organic matter by weight. Soil texture is not determined on these. Most organic soils and deep organic horizons are found on wet sites, often in depressions or on floodplains, and also in association with dense moss cover.

# Key to Identification of Soil Texture



# Key to Identification of Soil Texture (continued)

A.9 - 5

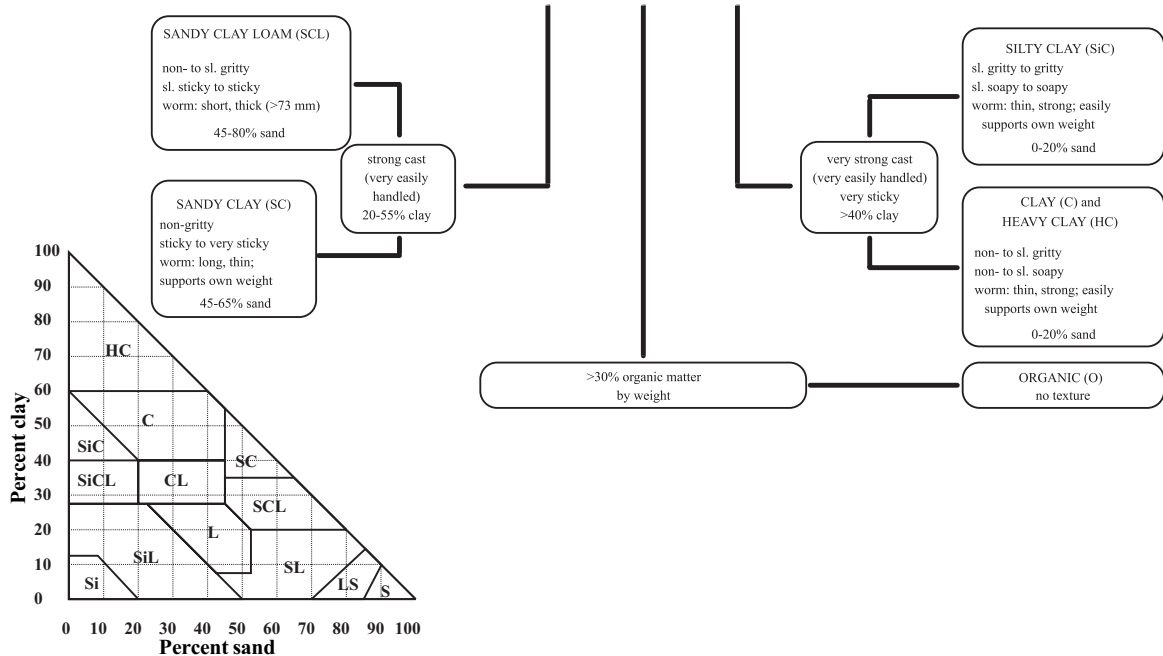


TABLE A9.1 Field test characteristics of soil texture classes<sup>a</sup>

Texture class	Feel test		Moist cast test	Worm test	Taste test	Shine test
	Dry	Wet				
Sand	grainy with no floury material	non- soapy; non- sticky	none	none	non-gritty	n/a
Loamy sand	grainy with small amount of floury material	non- to slightly soapy; slightly sticky	very weak cast, withstands no handling	none	slightly gritty; graininess dominates	n/a
Sandy loam	substantial graininess with considerable amount of floury material	non- to slightly soapy; slightly sticky	weak cast, allows careful handling	none to barely forming a weak worm	slightly gritty; considerable graininess	n/a
Fine sandy loam	substantial fine graininess with a considerable amount of floury material	non- to slightly soapy; slightly sticky	moderate cast, easily handled	weak, coarse worm	gritty to very gritty; (coarser grittiness of fine sand)	n/a
Loam	fairly soft and smooth with evident graininess	slightly soapy to soapy; slightly sticky	moderate cast, readily handled	weak, coarse worm	slightly gritty to gritty; evident graininess	n/a

TABLE A9.1 Field test characteristics of soil texture classes (continued)

Texture class	Feel test		Moist cast test	Worm test	Taste test	Shine test
	Dry	Wet				
Silt loam	floury; slight graininess	soapy to very soapy; slightly sticky	moderate cast, readily handled	weak, coarse worm, flakes rather than forms worm	gritty to very gritty; slight graininess	n/a
Silt	very floury; non-grainy	very soapy; slightly sticky	moderate cast, readily handled	weak, coarse worm, flakes rather than forms worm	very gritty; little or no sand felt	n/a
Sandy clay loam	non- to slightly floury; substantial graininess	slightly soapy to soapy; slightly sticky to sticky	strong cast, very easily handled	forms a moderately thick worm that breaks relatively easily	non-gritty to slightly gritty	slightly shiny
Clay loam	non- to slightly floury; moderate graininess	non-soapy to slightly soapy; sticky	strong cast, very easily handled	forms a thin worm that breaks readily and barely supports its own weight	non-gritty to slightly gritty	slightly shiny

TABLE A9.1 Field test characteristics of soil texture classes (continued)

Texture class	Feel test		Moist cast test	Worm test	Taste test	Shine test
	Dry	Wet				
Silty clay loam	smooth and floury; non-grainy to slightly grainy	slightly soapy to soapy; sticky	strong cast, very easily handled	forms a fairly thin but weak worm that barely supports its own weight and breaks easily	slightly gritty to gritty	slightly shiny
Sandy clay	substantial graininess	non- to slightly soapy; sticky to very sticky	strong cast, very easily handled	forms a thin, relatively long worm that supports its own weight and is relatively pliable	non-gritty; substantial amount of sand grains felt	moderately shiny
Silty clay	smooth, without graininess	slightly soapy to soapy; very sticky	very strong cast, very easily handled	forms a strong, very pliable, thin worm that easily supports its own weight	slightly gritty to gritty; little or no sand felt	moderately shiny
Clay and heavy clay	smooth, with little to moderate graininess	non- to slightly soapy; very sticky	very strong cast, very easily handled	forms a strong, very pliable, thin worm that easily supports its own weight	non- to slightly gritty; little to moderate amount of sand felt	very shiny

<sup>a</sup>Adapted from Bélisle, J. (editor). 1980. Field manual for describing soils. Ontario Institute of Pedology. Guelph, Ont.

## APPENDIX 10

### SOIL PARTICLE SIZE CLASSIFICATION

Soil particle size classification is based on the proportion (relative volume) of all particle size classes in the soil, including the proportion of sand (0.05–2.0 mm), silt (0.002–0.05 mm), and clay (<0.002 mm) sized particles as well as the proportion of coarse fragments (>2.0 mm), including gravels (2–75 mm), cobbles (75–250 mm), and stones (>250 mm). The classification on the following table was developed for, and is intended only for purposes of, this guide to ecosystems of the Cariboo Forest Region. See Appendix 9 for a guide to identification of soil texture classes.

TABLE A10.1 Soil particle size classification

Particle size class	Soil texture class and coarse fragment content by volume
Very coarse	<ul style="list-style-type: none"> <li>• sand and loamy sand textures (except very fine sand and loamy very fine sand <sup>a</sup>) with &gt;35% coarse fragments</li> </ul>
Coarse	<ul style="list-style-type: none"> <li>• sand and loamy sand textures (except very fine sand and loamy very fine sand) with &lt;35% coarse fragments</li> <li>• very fine sand and loamy very fine sand textures with &gt;35% coarse fragments</li> <li>• sandy loam, loam, and sandy clay loam soils with &gt;70% coarse fragments</li> </ul>
Medium	<ul style="list-style-type: none"> <li>• very fine sand and loamy very fine sand textures with &lt;35% coarse fragments</li> <li>• sandy loam, loam, and sandy clay loam textures with &lt;70% coarse fragments</li> <li>• silt loam and silt textures with &gt;20% coarse fragments</li> <li>• silty clay loam and clay loam textures with &gt;35% coarse fragments</li> </ul>
Fine	<ul style="list-style-type: none"> <li>• silt loam and silt textures with &lt;20% coarse fragments</li> <li>• silty clay loam, clay loam, sandy clay, silty clay, clay, and heavy clay soils with &lt;35% coarse fragments</li> </ul>

<sup>a</sup> Very fine sand and loamy very fine sand are sand and loamy sand textures respectively in which more than 50% of the sand-sized particles are smaller than 0.10 mm in diameter. They are close to silt and silt loam textures.

## APPENDIX 11

### GUIDE TO THE IDENTIFICATION OF SOIL ORDERS AND GREAT GROUPS

The following guide to soil orders and great groups is designed to aid field staff in identifying soil orders and great groups that occur in the Cariboo Forest Region. Soil order and great group nomenclature follows the Canadian system of soil classification (Agriculture Canada Expert Committee on Soil Survey 1987). This guide provides relatively non-technical summaries of Agriculture Canada Expert Committee on Soil Survey (1987) definitions and is intended for general field classification with few chemical tests or detailed colour descriptions. It will correctly assist the classification of most but not all soils in the Cariboo Forest Region. See Agriculture Canada Expert Committee on Soil Survey (1987) for a comprehensive and more detailed definition of soil orders and great groups. Soil horizons that are important for classifying soils to the great group level in the Cariboo Forest Region are described below.

Designation	Definition
Ae	Surface mineral horizon from which iron, aluminum, organic matter, or clay have been partially leached out alone or in combination. When dry, an Ae is usually lighter coloured than the underlying B horizon.
Ah	Surface mineral horizon darkened (compared to parent material) due to enrichment with organic matter.
Ahe	Surface mineral horizon characterized by streaks and splotches of different shades of grey due to enrichment with organic matter but leaching out of iron, aluminum, or clay. It is often overlain by an Ah and underlain by an Ae.
Bf	A subsurface horizon that is reddish brown to red due to enrichment with iron and aluminum but with little organic matter enrichment.

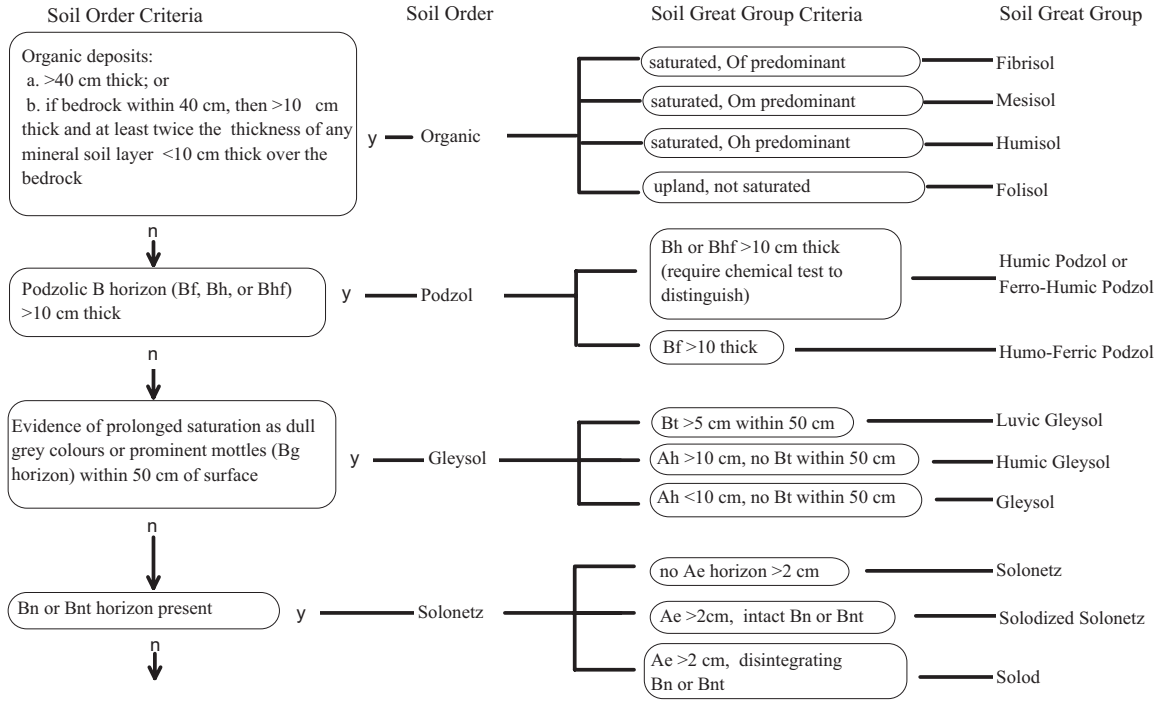
## APPENDICES

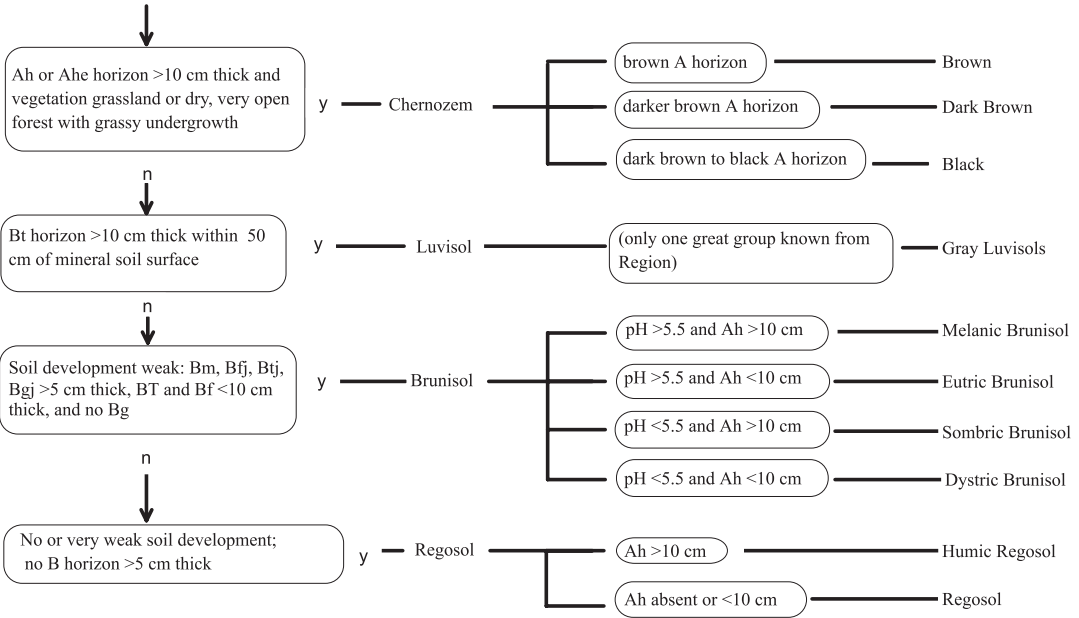
- Bg A subsurface or surface horizon with gleyed (dull grey) colours or mottles (orange or reddish splotches) indicative of persistent or periodic anaerobic saturation.
- Bh A subsurface horizon that is dark brown to black due to accumulation of organic compounds moved downward from the A horizon; little iron or aluminum enrichment.
- Bhf A subsurface horizon that is dark reddish brown due to enrichment with iron, aluminum, and organic matter.
- Bm A subsurface or surface horizon that is brownish or slightly reddish due to only slight alteration by oxidation, leaching, or weathering. The accumulation of iron and aluminum or clay is too slight to qualify as Bf or Bt.
- Bn A subsurface horizon with prismatic or columnar structure that is hard when dry; dark organic coatings are usually present on surface of soil peds.
- Bnt A subsurface horizon that meets definition of both the Bn and Bt.
- Bt A subsurface horizon that is enriched with clay, moved downward from an A horizon. It is often browner than overlying or underlying layers. A Bt horizon must be at least 5 cm thick.
- j Symbol used with suffixes “e”, “f”, “g”, and “t” to indicate that criteria for the suffix are weakly expressed or “juvenile” and do not meet specified limits (e.g., Bgj).

Of, Om, Oh      Organic horizons developed mainly from mosses, sedges, rushes, and woody materials under anaerobic water saturation. The suffix indicates the state of decomposition:  
f - fibric; little decomposed;  
m - mesic; moderately decomposed;  
h - humic, well decomposed.

# Guide to the identification of soil orders and great groups in the Cariboo Forest Region

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**Reference**

Agriculture Canada Expert Committee on Soil Survey. 1987. The Canadian system of soil classification. 2nd edition. Agric. Can. Publ. 1646.

## APPENDIX 12

### CHARACTERISTICS OF HUMUS FORM ORDERS

The following table is provided as an aid to identification of humus forms to the order level through readily observable characteristics. Some of these characteristics are most easily observed with a 10X hand lens.

Definition of terms:

**Ah horizon** is a mineral soil horizon formed at or near the soil surface and enriched with organic matter, resulting in a darkened colour.

**L F H horizons** are soil surface organic horizons in which the organic material is derived primarily from the accumulation of leaves, twigs, and woody materials with or without a minor component of mosses; usually not saturated with water for long periods of time.

**L horizon** is a surface organic horizon (litter layer) consisting of relatively fresh organic residue with relatively little decomposition and in which virtually entire original structures are discernible (foliage, twigs, wood, etc.).

**F horizon** is a surface organic horizon (fermented layer) in which organic residues are partially decomposed but may still be identified as to their origin.

**H horizon** is a surface organic horizon (humus layer) dominated by well-decomposed organic material where the original structures are no longer discernible.

**O horizons** are horizons of an organic soil (see Appendix 11) in which the organic materials (Of, Om, Oh) are derived primarily from mosses, sedges, rushes, and woody materials; humus-forming processes are characteristically influenced by saturated soil conditions.

**Fungal mycelia** are a mass of thread-like filaments that constitute the “vegetative” phase of fungal development; many are coloured (brown, black, grey, white, red, or yellow), others are transparent; abundant in F horizon of Mor humus forms.

TABLE A12.1 Distinguishing characteristics of humus form

Criteria	Mor	Moder	Mull
Mode of decomposition	predominantly fungi	soil fauna, bacteria and fungi	soil fauna, including earthworms, and bacteria
Structure of F horizon	matted; fungal mycelia common to abundant	loose; few fungal mycelia, insect droppings visible	F horizon usually very thin or absent
Mineral and organic material intermixing	uncommon; usually a sharp boundary between organic and mineral horizons	often some mineral particles mixed into the H horizon	high degree of incorporation of organic material into mineral soil (Ah >2 cm)

For a complete classification of humus forms to the group level see Green, R., R.L. Trowbridge, and K. Klinka. 1993. Towards a taxonomic classification of humus forms. For. Sci. Monogr. 29.

**APPENDIX 13**  
**COMMON AND SCIENTIFIC NAMES OF PLANT**  
**SPECIES MENTIONED IN THIS GUIDE**

<b>Common Name</b>	<b>Scientific Name</b>
alder, mountain	<i>Alnus tenuifolia</i>
alder, red	<i>Alnus rubra</i>
alder, Sitka	<i>Alnus crispa</i> ssp. <i>sinuata</i>
alumroot, round-leaved	<i>Heuchera cylindrica</i>
arnica	<i>Arnica</i> spp.
arnica, heart-leaved	<i>Arnica cordifolia</i>
arnica, mountain	<i>Arnica latifolia</i>
aspen, trembling	<i>Populus tremuloides</i>
aster, great northern	<i>Aster modestus</i>
aster, Lindley's	<i>Aster ciliolatus</i>
aster, showy	<i>Aster conspicuus</i>
avens, large-leaved	<i>Geum macrophyllum</i>
avens, water	<i>Geum rivale</i>
balsamroot, arrow-leaved	<i>Balsamorhiza sagittata</i>
baneberry	<i>Actaea rubra</i>
bastard toad-flax	<i>Geocaulon lividum</i>
bedstraw, sweet-scented	<i>Galium triflorum</i>
birch, paper	<i>Betula papyrifera</i>
birch, scrub	<i>Betula glandulosa</i>
birch, water	<i>Betula occidentalis</i>
blue flax, western	<i>Linum perenne</i> ssp. <i>lewisii</i>
blueberry, Alaskan	<i>Vaccinium alaskaense</i>
blueberry, dwarf	<i>Vaccinium caespitosum</i>
blueberry, oval-leaved	<i>Vaccinium ovalifolium</i>
blueberry, velvet-leaved	<i>Vaccinium myrtilloides</i>
bluegrass, alpine	<i>Poa alpina</i>
bluegrass, Sandberg's	<i>Poa secunda</i>
bog-laurel, western	<i>Kalmia microphylla</i>
bog-rosemary	<i>Andromeda polifolia</i>

## APPENDICES

### Common Name

### Scientific Name

brown mosses	<i>Tomenthypnum nitens</i> and/or <i>Aulacomnium palustre</i> and/or <i>Drepanocladus</i> spp. and others
bunchberry	<i>Cornus canadensis</i>
burnet, Sitka	<i>Sanguisorba canadensis</i>
butterweed, Rocky Mountain	<i>Senecio streptanthifolius</i>
butterweed, streambank	<i>Senecio pseud aureus</i>
cherry, choke	<i>Prunus virginiana</i>
cinquefoil, diverse-leaved	<i>Potentilla diversifolia</i>
cinquefoil, marsh	<i>Potentilla palustris</i>
cladina lichens	<i>Cladina</i> spp.
cladonia lichens	<i>Cladonia</i> spp.
clubmoss, stiff	<i>Lycopodium annotinum</i>
coltsfoot, palmate	<i>Petasites frigidus</i> var. <i>palmatus</i>
columbine, red	<i>Aquilegia formosa</i>
comandra, pale	<i>Comandra umbellata</i> var. <i>pallida</i>
cotton-grasses	<i>Eriophorum</i> spp.
cottonwood, black	<i>Populus balsamifera</i> spp. <i>trichocarpa</i>
cow-parsnip	<i>Heracleum lanatum</i>
cranberry, bog	<i>Oxycoccus oxycoccus</i>
creeping-snowberry	<i>Gaultheria hispidula</i>
crowberry	<i>Empetrum nigrum</i>
currant, skunk	<i>Ribes glandulosum</i>
daisy, cut-leaved	<i>Erigeron compositus</i>
daisy, line-leaved	<i>Erigeron linearis</i>
daisy, subalpine	<i>Erigeron peregrinus</i>
death-camas, meadow	<i>Zigadenus venenosus</i>
desert-parsley, large-fruited	<i>Lomatium macrocarpum</i>
devil's club	<i>Oplopanax horridum</i>
dog lichen	<i>Peltigera canina</i>
dogbane, spreading	<i>Apocynum androsaemifolium</i>
dogwood, red-osier	<i>Cornus stolonifera</i>
Douglas-fir	<i>Pseudotsuga menziesii</i>
drabas	<i>Draba</i> spp.
dropseed, sand	<i>Sporobolus cryptandrus</i>
elderberry, red	<i>Sambucus racemosa</i>

Common Name	Scientific Name
enchanter's nightshade	<i>Circaea alpina</i>
fairybells, Hooker's	<i>Disporum hookeri</i>
fairybells, rough-fruited	<i>Disporum trachycarpum</i>
false azalea	<i>Menziesia ferruginea</i>
false Solomon's-seal	<i>Smilacina racemosa</i>
false Solomon's-seal, star-flowered	<i>Smilacina stellata</i>
falsebox	<i>Pachistima myrsinities</i>
feathermoss, red-stemmed	<i>Pleurozium schreberi</i>
feathermosses (boreal)	<i>Pleurozium schreberi</i> , <i>Ptilium crista-castrensis</i> , <i>Hylocomium splendens</i>
fern, lady	<i>Athyrium filix-femina</i>
fern, oak	<i>Gymnocarpium dryopteris</i>
fern, ostrich	<i>Matteuccia struthiopteris</i>
fern, spiny wood	<i>Dryopteris expansa</i> syn. = <i>D. assimilis</i>
fescue, Altai	<i>Festuca altaica</i>
fescue, Rocky Mountain	<i>Festuca saximontana</i>
fescue, western	<i>Festuca occidentalis</i>
fir, amabilis	<i>Abies amabilis</i>
fir, subalpine	<i>Abies lasiocarpa</i>
fireweed	<i>Epilobium angustifolium</i>
five-leaved bramble	<i>Rubus pedatus</i>
foamflowers	<i>Tiarella trifoliata</i>
foamflower, one-leaved	<i>Tiarella trifoliata</i> var. <i>unifoliata</i>
foamflower, three-leaved	<i>Tiarella trifoliata</i> var. <i>trifoliata</i>
globeflower	<i>Trollius laxus</i>
goldenrod, northern	<i>Solidago multiradiata</i>
goldenrod, spike-like	<i>Solidago spathulata</i>
golden-saxifrage, northern	<i>Chrysosplenium tetrandrum</i>
gooseberry, black	<i>Ribes lacustre</i>
gooseberry, northern	<i>Ribes oxycanthoides</i>
grass, needle-and-thread	<i>Stipa comata</i>
grass, short-awned porcupine	<i>Stipa curtisetia</i>
grass-of-Parnassus, fringed	<i>Parnassia fimbriata</i>
groundsel, arrow-leaved	<i>Senecio triangularis</i>
grouseberry	<i>Vaccinium scoparium</i>

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hairgrass, mountain	<i>Vahlodea atropurpurea</i>
hawkweed, white	<i>Hieracium albiflorum</i>
hazelnut, beaked	<i>Corylus cornuta</i>
hemlock, western	<i>Tsuga heterophylla</i>
hemlock, mountain	<i>Tsuga mertensiana</i>
highbush-cranberry	<i>Viburnum edule</i>
honeysuckle, Utah	<i>Lonicera utahensis</i>
horsetails	<i>Equisetum</i> spp.
horsetail, common	<i>Equisetum arvense</i>
horsetail, meadow	<i>Equisetum pratense</i>
huckleberry, black	<i>Vaccinium membranaceum</i>
Indian hellebore	<i>Veratrum viride</i>
Jacob's-ladder, tall	<i>Polemonium caeruleum</i>
junegrass	<i>Koeleria macrantha</i>
juniper, common	<i>Juniperus communis</i>
juniper, Rocky Mountain	<i>Juniperus scopulorum</i>
kinnikinnick	<i>Arctostaphylos uva-ursi</i>
knight's plume	<i>Ptilium crista-castrensis</i>
Labrador tea	<i>Ledum groenlandicum</i>
lemonweed	<i>Lithospermum ruderale</i>
lily, tiger	<i>Lilium columbianum</i>
lousewort	<i>Pedicularis</i> spp.
lousewort, bracted	<i>Pedicularis bracteosa</i>
lupine, arctic	<i>Lupinus arcticus</i>
maple, Douglas	<i>Acer glabrum</i>
meadowrue, western	<i>Thalictrum occidentale</i>
milk-vetch, timber	<i>Astragalus miser</i>
mitrewort, common	<i>Mitella nuda</i>
moss, electrified cat's-tail	<i>Rhytidiadelphus triquetrus</i>
moss, glow	<i>Aulacomnium palustre</i>
moss, golden fuzzy fen	<i>Tomenthypnum nitens</i>
moss, grey frayed-cap	<i>Racomitrium canescens</i>
moss, juniper haircap	<i>Polytrichum juniperinum</i>
mosses, leafy	<i>Mnium</i> spp., <i>Plagiomnium</i> spp., <i>Rhizomnium</i> spp.
moss, pipecleaner	<i>Rytidiopsis robusta</i>
moss, sickle	<i>Sanionia uncinatus</i> syn. = <i>Drepanocladus uncinatus</i>

Common Name	Scientific Name
moss, sphagnum	<i>Sphagnum</i> spp.
moss, step	<i>Hylocomium splendens</i> and/or <i>Rhizomnium</i> spp.
moss, wavy-leaved	<i>Dicranum polysetum</i>
moss, woody ragged	<i>Brachythecium hylotapetum</i>
mountain-ash, western	<i>Sorbus scopulina</i>
mountain-heather, pink	<i>Phyllodoce empetriformis</i>
nagoonberry	<i>Rubus arcticus</i>
needlegrass, spreading	<i>Stipa richardsonii</i>
oatgrass, timber	<i>Danthonia intermedia</i>
onion, nodding	<i>Allium cernuum</i>
Oregon-grape, tall	<i>Mahonia aquifolium</i>
paintbrushes	<i>Castilleja</i> spp.
partridgefoot	<i>Luetkea pectinata</i>
pasqueflower, western	<i>Anemone occidentalis</i>
peavine, creamy	<i>Lathyrus ochroleucus</i>
pelt lichens	<i>Peltigera</i> spp.
pelt, apple	<i>Peltigera malacea</i>
pelt, felt	<i>Peltigera, rufescens</i>
pelt, freckle	<i>Peltigera aphthosa</i>
penstemon, shrubby	<i>Penstemon fruticosus</i>
pine, lodgepole	<i>Pinus contorta</i>
pine, ponderosa	<i>Pinus ponderosa</i>
pine, western white	<i>Pinus monticola</i>
pine, whitebark	<i>Pinus albicaulis</i>
pinegrass	<i>Calamagrostis rubescens</i>
prickly-pear cactus, brittle	<i>Opuntia fragilis</i>
prince's pine	<i>Chimaphila umbellata</i>
pussytoes, field	<i>Antennaria neglecta</i>
pussytoes, low	<i>Antennaria dimorpha</i>
pussytoes, racemose	<i>Antennaria racemosa</i>
pussytoes, umber	<i>Antennaria umbrinella</i>
queen's cup	<i>Clintonia uniflora</i>
rabbit-brush, common	<i>Chrysothamnus nauseosus</i>
raspberry, red	<i>Rubus idaeus</i>
raspberry, trailing	<i>Rubus pubescens</i>
rattlesnake-plantain	<i>Goodyera oblongifolia</i>
redcedar, western	<i>Thuja plicata</i>
reedgrass, bluejoint	<i>Calamagrostis canadensis</i>

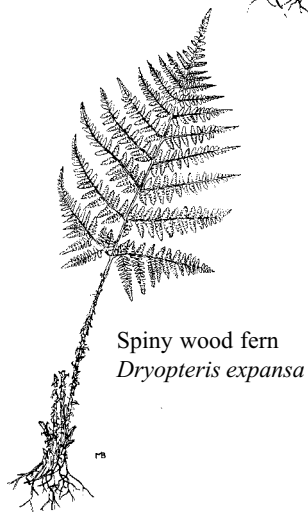
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<b>Common Name</b>	<b>Scientific Name</b>
reedgrass, purple	<i>Calamagrostis purpurascens</i>
rhododendron, white-flowered	<i>Rhododendron albiflorum</i>
ricegrass, rough-leaved	<i>Oryzopsis asperifolia</i>
ricegrass, short-awned	<i>Oryzopsis pungens</i>
rockcress, Holboell's	<i>Arabis holboellii</i>
rose, prickly	<i>Rosa acicularis</i>
sage, prairie	<i>Artemisia frigida</i>
sagebrush, big	<i>Artemisia tridentata</i>
sagewort, mountain	<i>Artemisia norvegica</i>
salsify, meadow	<i>Tragopogon pratensis</i>
saskatoon	<i>Amelanchier alnifolia</i>
saxifrage, leatherleaf	<i>Leptarrhena pyrolifolia</i>
scouring-rush, dwarf	<i>Equisetum scirpoides</i>
sedges	<i>Carex</i> spp.
sedge, water	<i>Carex aquatilis</i>
sedge, northwestern	<i>Carex concinoides</i>
sedge, soft-leaved	<i>Carex disperma</i>
selaginella, compact	<i>Selaginella densa</i>
skunk cabbage	<i>Lysichiton americanum</i>
snowberry, common	<i>Symphoricarpos albus</i>
soopolallie	<i>Shepherdia canadensis</i>
spirea, birch-leaved	<i>Spiraea betulifolia</i>
spirea, pink	<i>Spiraea douglasii</i> ssp. <i>menziesii</i>
spruce, black	<i>Picea mariana</i>
spruce, Engelmann	<i>Picea engelmannii</i>
spruce, hybrid white	<i>Picea engelmannii</i> x <i>glauca</i>
spruce, Sitka	<i>Picea sitchensis</i>
spruce, white	<i>Picea glauca</i>
stinging nettle	<i>Urtica dioica</i>
stonecrop	<i>Sedum</i> spp.
stonecrop, lance-leaved	<i>Sedum lanceolatum</i>
strawberry, wild	<i>Fragaria virginiana</i>
sweet-cicely, mountain	<i>Osmorhiza chilensis</i>
thimbleberry	<i>Rubus parviflorus</i>
trapper's tea	<i>Ledum glandulosum</i>
twayblade, heart-leaved	<i>Listera cordata</i>
twinflower	<i>Linnaea borealis</i>

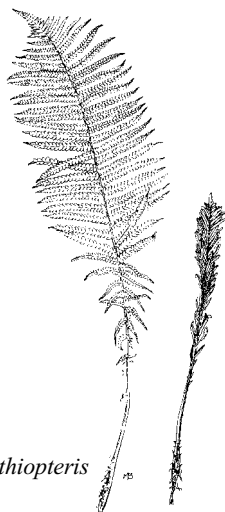
<b>Common Name</b>	<b>Scientific Name</b>
twistedstalk, clasping	<i>Streptopus amplexifolius</i>
twistedstalk, rosy	<i>Streptopus roseus</i>
valerian, Sitka	<i>Valeriana sitchensis</i>
vetch, American	<i>Vicia americana</i>
violet, Canada	<i>Viola canadensis</i>
violet, early blue	<i>Viola adunca</i>
wheatgrass, bluebunch	<i>Elymus spicatus</i> syn. = <i>Agropyron spicatum</i>
wild sarsaparilla	<i>Aralia nudicaulis</i>
wildrye, blue	<i>Elymus glauca</i>
willows	<i>Salix</i> spp.
willow, Bebb's	<i>Salix bebbiana</i>
willow, bog	<i>Salix pedicellaris</i>
willow, grey-leaved	<i>Salix glauca</i>
willow, Scouler's	<i>Salix scouleriana</i>
willows, dwarf	<i>Salix arctica</i> and <i>S. reticulata</i> ssp. <i>nivalis</i>
wintergreen, one-sided	<i>Orthilia secunda</i>
wintergreen, pink	<i>Pyrola asarifolia</i>
wintergreen, white-veined	<i>Pyrola picta</i>
wood-reed, nodding	<i>Cinna latifolia</i>
yarrow	<i>Achillea millefolium</i>
yellow-cedar	<i>Chamaecyparis nootkatensis</i>
yew, western	<i>Taxus brevifolia</i>



Lady fern  
*Athyrium filix-femina*

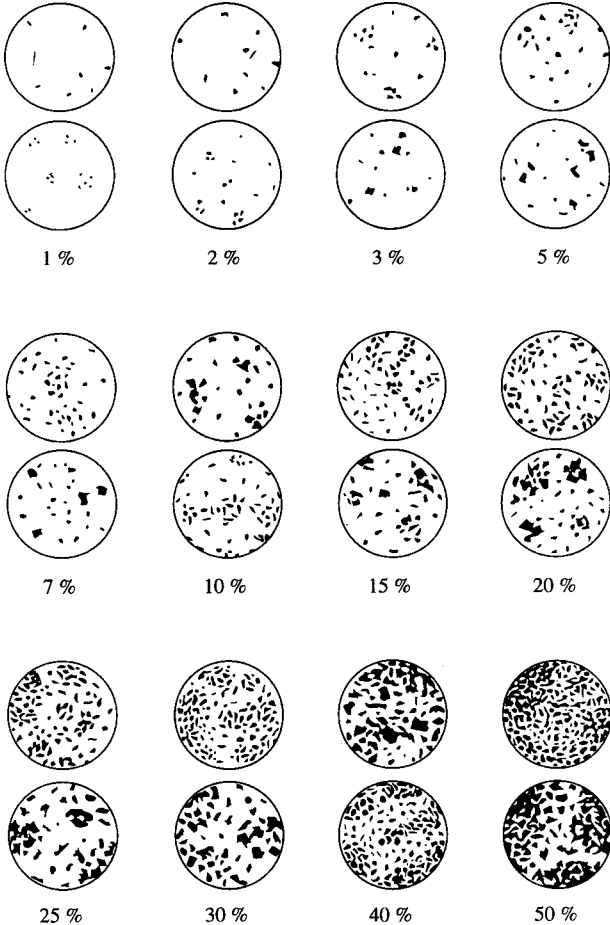


Spiny wood fern  
*Dryopteris expansa*



Ostrich fern  
*Matteuccia struthiopteris*

APPENDIX 14  
COMPARISON CHARTS FOR VISUAL  
ESTIMATION OF FOLIAGE COVER<sup>a</sup>



<sup>a</sup> From Luttmerding *et al.* (1990)

## APPENDICES

### Reference

Luttmerding, H.A., D.A. Demarchi, E.C. Lea, D.V. Meidinger, and T. Vold (editors). 1990, Describing ecosystems in the field, 2nd ed. B.C. Min. Environ., Victoria, B.C. Manual No. 11.

## APPENDIX 15

### DESCRIPTION OF VEGETATION SUBCOMPLEXES LISTED IN SILVICULTURE CONSIDERATIONS TABLES

Newton and Comeau (1990) list 22 vegetation complexes for British Columbia. Nine of these dominate at least some cutover sites in the Cariboo Forest Region: Dry alder, Dry shrub, Ericaceous shrub, Fern, Mixed hardwood, Mixed shrub, Pinegrass, Subalpine herb, and Fireweed. Other vegetation complexes including the Cottonwood, Cottonwood-alder, Aspen, Boreal poplar, Wet alder, Willow, Reedgrass, and Introduced grasses are also present but are either not common or do not dominate cutover sites.

The nine vegetation complexes that dominate cutover areas in the Cariboo Forest Region have been subdivided into a total of 31 vegetation subcomplexes based on differences in vegetation structure or species composition. The tables on the following pages summarize the structure and some of the principal species making up the vegetation of each of these subcomplexes.

Structure of the vegetation of these subcomplexes is summarized in the tables by describing the abundance (ground cover) of each of the following vegetation strata:

- tall shrubs**      all woody plants 2–10 m tall;
- low shrubs**      all woody plants less than 2 m tall, except those considered to be dwarf shrubs;
- dwarf shrubs**    woody or semiwoody plants that are decumbent or lying on the soil surface and less than 10 cm tall;
- tall herbs**      herbaceous species (forbs and grass-like plants) that typically have a significant proportion of their leafy material at heights greater than 25 cm above the surface;
- low herbs**      herbaceous species less than 25 cm tall or, if taller, that do not have a significant proportion of their leafy material more than 25 cm above the surface.

## APPENDICES

Abundance (ground cover) of the vegetation strata is described according to the following cover classes:

<b>none</b>	vegetation stratum absent or virtually absent;
<b>very low</b>	vegetation stratum present but total cover typically less than 2%;
<b>low</b>	vegetation stratum total cover typically 2–20%;
<b>moderate</b>	vegetation stratum total cover typically 21–50%;
<b>high</b>	vegetation stratum total cover typically >50%

Principal species listed under each vegetation stratum are present on most sites of the subcomplex and typically are among the species with the greatest percent cover values within the stratum. Abundance classes of moderate and high are bolded and underlined for emphasis.

TABLE A15.1 Description of vegetation subcomplexes listed in Silviculture Consideration Tables

Vegetation Subcomplex	Ground Cover and Principal Species by Vegetation Stratum				
	Tall Shrub	Low Shrub	Dwarf Shrub	Tall Herb	Low Herb
Dry alder - pinegrass	<b><u>moderate</u></b> <i>Sitka alder</i>	low <i>black huckleberry, birch-leaved spirea</i>	low <i>kinnikinnick, dwarf blueberry</i>	very low	<b><u>moderate</u></b> <i>pinegrass, northwestern sedge, heart-leaved arnica, twinflower</i>
Dry shrub - bunchgrass	low <i>Rocky Mountain juniper</i>	low <i>saskatoon, common snowberry, common juniper</i>	low <i>kinnikinnick</i>	none	<b><u>moderate</u></b> <i>bluebunch wheatgrass</i>
Dry shrub - dwarf ericaceous shrubs	none	low <i>common juniper, soopolallie</i>	<b><u>moderate</u></b> <i>grouseberry, crowberry, kinnikinnick</i>	none	low <i>heart-leaved arnica, twinflower, yarrow</i>

TABLE A15.1 (continued)

Vegetation Subcomplex	Ground Cover and Principal Species by Vegetation Stratum				
	Tall Shrub	Low Shrub	Dwarf Shrub	Tall Herb	Low Herb
Dry shrub - falsebox	none	low - <b>moderate</b> <i>falsebox,</i> <i>common juniper,</i> <i>tall Oregon-grape,</i> <i>saskatoon,</i> <i>black huckleberry</i>	low <i>kinnikinnick</i>	none	low - <b>moderate</b> <i>twinflor,</i> <i>prince's pine,</i> <i>white-flowered</i> <i>hawkweed</i>
Dry shrub - kinnikinnick	none	low <i>common juniper,</i> <i>saskatoon, prickly</i> <i>rose, soopolallie</i>	<b>moderate - high</b> <i>kinnikinnick</i>	none	low <i>bunch- and sod-</i> <i>grasses</i>
Dry shrub - pinegrass	none	low <i>soopolallie,</i> <i>common juniper,</i> <i>prickly rose</i>	low <i>kinnikinnick</i>	none	<b>moderate - high</b> <i>pinegrass, heart-</i> <i>leaved arnica,</i> <i>showy aster, yarrow</i>

TABLE A15.1 (continued)

Vegetation Subcomplex	Ground Cover and Principal Species by Vegetation Stratum				
	Tall Shrub	Low Shrub	Dwarf Shrub	Tall Herb	Low Herb
Dry shrub - trapper's tea	none	<b>high</b>  <i>trapper's tea,</i> <i>soopolallie</i>	<b>high</b>  <i>large patches of</i> <i>crowberry,</i> <i>grouseberry</i>	none	low  <i>twinflor,</i> <i>heart-</i> <i>leaved arnica,</i> <i>yarrow, red</i> <i>columbine</i>
Ericaceous shrub - low shrub	none - very low  <i>occasionally</i> <i>scattered Sitka</i> <i>alder or Douglas</i> <i>maple</i>	low - <b>moderate</b>  <i>black huckleberry,</i> <i>velvet-leaved</i> <i>blueberry, falsebox,</i> <i>birch-leaved spirea</i>	none	low  <i>fireweed, bluejoint</i>	low  <i>queen's cup,</i> <i>twinflor,</i> <i>heart-</i> <i>leaved arnica, one-</i> <i>sided wintergreen</i>
Ericaceous shrub - rhododendron	none	<b>moderate - high</b>  <i>white-flowered</i> <i>rhododendron,</i> <i>black huckleberry,</i> <i>oval-leaved</i> <i>blueberry, Sitka</i> <i>mountain-ash</i>	none	low  <i>Indian hellebore,</i> <i>Sitka valerian,</i> <i>fireweed</i>	low - <b>moderate</b>  <i>foamflower, queen's</i> <i>cup, five-leaved</i> <i>bramble, rosy</i> <i>twistedstalk</i>

TABLE A15.1 (continued)

Vegetation Subcomplex	Ground Cover and Principal Species by Vegetation Stratum				
	Tall Shrub	Low Shrub	Dwarf Shrub	Tall Herb	Low Herb
Fern - ostrich fern	<b><u>moderate</u></b> <i>dense patches of mountain alder, red elderberry</i>	low <i>red-osier dogwood, thimbleberry, skunk currant</i>	none	<b><u>high</u></b> <i>ostrich fern, stinging nettle, western meadowrue</i>	<b><u>moderate</u></b> <i>foamflower, enchanter's nightshade, large-leaved avens, sweet-scented bedstraw</i>
Mixed hardwood - dry shrub	<b><u>moderate - high</u></b> <i>immature aspen, paper birch and black cottonwood</i>	low - <b><u>moderate</u></b> <i>falsebox, black huckleberry, birch-leaved spirea, prickly rose</i>	none	none	low - <b><u>moderate</u></b> <i>American vetch, yarrow, bunch-berry, Indian paintbrush</i>
Mixed hardwood - moist shrub	<b><u>moderate - high</u></b> <i>immature aspen, paper birch, and black cottonwood</i>	<b><u>moderate - high</u></b> <i>black twinberry, red-osier dogwood, thimbleberry, black gooseberry</i>	none	<b><u>moderate</u></b> <i>lady fern, cow-parsnip, baneberry, false Solomon's seal</i>	<b><u>moderate - high</u></b> <i>sweet-scented, bedstraw, American vetch, queen's cup, oak fern, foamflower</i>

TABLE A15.1 (continued)

Vegetation Subcomplex	Ground Cover and Principal Species by Vegetation Stratum				
	Tall Shrub	Low Shrub	Dwarf Shrub	Tall Herb	Low Herb
Mixed hardwood - willow	<b>moderate - high</b> <i>willows, aspen, paper birch, black cottonwood</i>	<b>moderate - high</b> <i>black twinberry, thimbleberry, prickly rose, black huckleberry</i>	none	low - <b>moderate</b> <i>fireweed, false Solomon's-seal</i>	<b>moderate - high</b> <i>arctic lupine, American vetch, queen's cup, oak fern, foamflower</i>
Mixed shrub - dry shrub	low <i>willows, aspen, paper birch, black cottonwood</i>	<b>moderate</b> <i>thimbleberry, birch-leaved spirea, saskatoon, falsebox, black twinberry</i>	none	low <i>fireweed, false Solomon's-seal, showy aster</i>	<b>moderate</b> <i>queen's cup, arctic lupine, foamflower, heart-leaved arnica, twinflower</i>
Mixed shrub - grass	none - low <i>Douglas maple</i>	<b>moderate</b> <i>soopolallie, prickly rose, falsebox, tall Oregon-grape, saskatoon</i>	none	none	<b>moderate - high</b> <i>pinegrass, bluejoint, showy aster, creamy peavine, heart-leaved arnica</i>

TABLE A15.1 (continued)

Vegetation Subcomplex	Ground Cover and Principal Species by Vegetation Stratum				
	Tall Shrub	Low Shrub	Dwarf Shrub	Tall Herb	Low Herb
Mixed shrub - low forb	none	low <i>black huckleberry, falsebox, birch- leaved spirea, black gooseberry</i>	low <i>dwarf blueberry</i>	none - low <i>fireweed</i>	low - <b><u>moderate</u></b> <i>twinflower, heart- leaved arnica, one- sided wintergreen, yarrow, pinegrass</i>
Mixed shrub - moist forb	none - low <i>immature hardwoods, Sitka alder</i>	<b><u>moderate</u></b> <i>black huckleberry, oval-leaved blueberry, black twinberry, thimbleberry</i>	none - low <i>dwarf blueberry</i>	<b><u>moderate</u></b> <i>fireweed, false Solomon's-seal, spiny wood fern</i>	<b><u>moderate - high</u></b> <i>oak fern, rosy twistedstalk, foamflower, twinflower, queen's cup, sweet-scented bedstraw</i>

TABLE A15.1 (continued)

Vegetation Subcomplex	Ground Cover and Principal Species by Vegetation Stratum				
	Tall Shrub	Low Shrub	Dwarf Shrub	Tall Herb	Low Herb
Mixed shrub - moist shrub	none - low  <i>mountain alder,</i> <i>willow</i>	<b><u>moderate - high</u></b>  <i>black twinberry,</i> <i>highbush-cranberry,</i> <i>black gooseberry,</i> <i>red-osier dogwood,</i> <i>prickly rose</i>	none	low - <b><u>moderate</u></b>  <i>lady fern, spiny</i> <i>wood fern, Indian</i> <i>hellebore, cow-</i> <i>parsnip, false</i> <i>Solomon's-seal</i>	low - <b><u>moderate</u></b>  <i>trailing raspberry,</i> <i>common mitrewort,</i> <i>heart-leaved arnica,</i> <i>Lindley's aster,</i> <i>palmate coltsfoot,</i> <i>mountain sweet-</i> <i>cicely</i>
Mixed shrub - pink spirea	none	<b><u>moderate - high</u></b>  <i>pink spirea, black</i> <i>twinberry,</i> <i>thimbleberry</i>	low  <i>creeping-</i> <i>snowberry, dwarf</i> <i>blueberry</i>	low  <i>lady fern, bluejoint,</i> <i>Indian hellebore</i>	<b><u>moderate</u></b>  <i>palmate coltsfoot,</i> <i>great northern</i> <i>aster, trailing</i> <i>raspberry,</i> <i>twinflorwer, common</i> <i>mitrewort, five-</i> <i>leaved bramble</i>

TABLE A15.1 (continued)

Vegetation Subcomplex	Ground Cover and Principal Species by Vegetation Stratum				
	Tall Shrub	Low Shrub	Dwarf Shrub	Tall Herb	Low Herb
Mixed shrub - rose	none - low  <i>mountain alder,</i> <i>willow</i>	<b><u>moderate - high</u></b>  <i>prickly rose,</i> <i>common snowberry,</i> <i>black twinberry,</i> <i>northern black</i> <i>currant, red-osier</i> <i>dogwood</i>	none	none	low - <b><u>moderate</u></b>  <i>Lindley's aster,</i> <i>twinflower, sweet-</i> <i>scented bedstraw,</i> <i>trailing raspberry,</i> <i>star-flowered false</i> <i>Solomon's-seal</i>
Mixed shrub - scrub birch	low  <i>willows</i>	<b><u>moderate - high</u></b>  <i>scrub birch,</i> <i>willows,</i> <i>black twinberry</i>	none - very low	none	low  <i>sedges, grasses</i>
Mixed shrub - sphagnum	none	<b><u>moderate - high</u></b>  <i>Labrador tea, scrub</i> <i>birch, willows</i>	low - <b><u>moderate</u></b>  <i>bog cranberry,</i> <i>creeping snowberry,</i> <i>bog rosemary</i>	none	low - <b><u>moderate</u></b>  <i>sedges, coltsfoot</i>

TABLE A15.1 (continued)

Vegetation Subcomplex	Ground Cover and Principal Species by Vegetation Stratum				
	Tall Shrub	Low Shrub	Dwarf Shrub	Tall Herb	Low Herb
Mixed shrub - tall fern	low  <i>mountain alder, tall willows, or Sitka alder in subalpine</i>	<b><u>moderate</u></b>  <i>thimbleberry, black twinberry, red elderberry, Douglas maple</i>	none - very low	<b><u>high</u></b>  <i>lady fern, spiny wood fern, false Solomon's-seal, baneberry</i>	<b><u>moderate - high</u></b>  <i>foamflower, trailing raspberry, bunchberry</i>
Mixed shrub - tall shrub	<b><u>moderate - high</u></b>  <i>water birch</i>	low - <b><u>moderate</u></b>  <i>black gooseberry, black twinberry, north. gooseberry</i>	none - very low	none - very low	low  <i>northwestern sedge, bastard toad-flax, western meadowrue</i>
Mixed shrub - wet forb	low - <b><u>moderate</u></b>  <i>mountain alder, willow</i>	<b><u>moderate</u></b>  <i>black twinberry, willows, red-osier dogwood, prickly rose</i>	none	low	<b><u>moderate - high</u></b>  <i>horsetails, common sedge, soft-leaved sedge, nodding wood-reed, fringed aster, star-flowered false Solomon's-seal</i>

TABLE A15.1 (continued)

Vegetation Subcomplex	Ground Cover and Principal Species by Vegetation Stratum				
	Tall Shrub	Low Shrub	Dwarf Shrub	Tall Herb	Low Herb
Pinegrass - bunchgrass	low	low	low	none	<b><u>moderate - high</u></b>
	<i>Rocky Mountain juniper</i>	<i>saskatoon, common snowberry, prickly rose</i>	<i>kinnikinnick</i>		<i>bluebunch wheatgrass, pine- grass, junegrass</i>
Pinegrass - kinnikinnick	none - very low	low	<b><u>moderate</u></b>	none	low - <b><u>moderate</u></b> ;
	<i>occasionally few scattered Sitka alder</i>	<i>prickly rose, soopolallie</i>	<i>large patches of kinnikinnick</i>		<i>pinegrass, bunchberry, spike- like goldenrod, twinflower, fireweed</i>
Pinegrass - low forb	none	low - <b><u>moderate</u></b>	low - <b><u>moderate</u></b>	none	<b><u>moderate - high</u></b>
		<i>prickly rose, soopolallie, birch- leaved spirea, saskatoon</i>	<i>kinnikinnick, dwarf blueberry</i>		<i>pinegrass, showy aster, wild strawberry, twinflower, heart- leaved arnica</i>

TABLE A15.1 (concluded)

Vegetation Subcomplex	Ground Cover and Principal Species by Vegetation Stratum				
	Tall Shrub	Low Shrub	Dwarf Shrub	Tall Herb	Low Herb
Subalpine herb	none	low	none	<b><u>moderate</u></b>	<b><u>moderate - high</u></b>
		<i>black twinberry, white-flowered rhododendron, black huckleberry, black gooseberry</i>		<i>lady fern, Sitka valerian, Indian hellebore, cow- parsnip, arrow- leaved groundsel</i>	<i>mountain hairgrass, rosy twistedstalk, foamflower, globeflower, oak fern</i>
Fireweed - low forb	none	low	none	<b><u>moderate</u></b>	<b><u>moderate</u></b>
		<i>black huckleberry, falsebox</i>		<i>fireweed</i>	<i>bunchberry, five- leaved bramble, queen's cup, one- sided wintergreen</i>
Fireweed - moist forb	none	low	none	<b><u>high</u></b>	<b><u>high</u></b>
		<i>black huckleberry, oval-leaved blueberry, thimbleberry, black twinberry, alder</i>		<i>fireweed, false Solomon's-seal, lady fern</i>	<i>foamflower, one- sided wintergreen, oak fern, rosy twistedstalk, heart- leaved arnica</i>

**Reference**

Newton, M. and P.G. Comeau. 1990. Control of competing vegetation. *In* regenerating British Columbia's forests. D.P. Lavender, R. Parish, C.M. Johnson, G. Montgomery, A. Vyse, R.A. Willis, and D. Winston (editors). Univ. B.C. Press, Vancouver, B.C. Chap. 19, pp. 256-265.