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The range of alpine fir (*Abies bifolia*) extends north to the milder, moister parts of the Cordillera. The cone scales fall off, leaving behind the slender spike-like cone axes that look like miniature candles (inset). Photo: D. Downing



Arrow-leaved groundsel (*Senecio triangularis*) occurs in moist subalpine and alpine tundra in the southwest part of the Cordillera; it grows to over a metre tall and the thick triangular leaves along its stem are characteristic. Photo: D. Downing



False hellebore (*Veratrum viride*) grows in clumps up to two metres tall in moist, rich alpine meadows in the extreme southwest Northwest Territories where it is uncommon to rare. The greenish flowers are shown in the inset. Photo: R. Decker



Alpine valerian (*Valeriana sitchensis*) is a tall herb of alpine meadows in the extreme southwestern Cordillera and like false hellebore is uncommon to rare. Its small whitish flowers are shown in the inset. Photo: D. Downing/inset R. Decker



The marsh ragwort (*Senecio congestus*) is a common annual plant across Canada and grows in newly exposed wet mineral soils around ponds and in this image adjacent to a flow slide. The flowers are an important source of pollen and nectar for bees and other pollinators during the brief Arctic summer (inset). Photo: R. Decker



The Nahanni aster (*Symphyotrichum nahanniense*) is only found around thermal springs in the southern mountains of the Northwest Territories. Photo: J. C. Semple

Appendix 1. Notable Plant Species of the Cordillera

For the reader's convenience, the following plant species list is sorted by both scientific and common name. Vascular plant scientific and common names follow *NWT Species 2006-2010* (Working Group on General Status of NWT Species (2006).

Scientific names are based on the Flora of North America²³. Non-vascular plant names follow those given in *Alberta Plants and Fungi – Master Species List and Species Group Checklists* (Alberta Environmental Protection 1993).

Abies bifolia A. Murray	alpine fir, Rocky Mountain alpine fir, subalpine fir
Alnus viridis (Chaix.) DC.	green alder
alpine bilberry, bilberry	Vaccinium uliginosum L.
alpine fir, Rocky Mountain alpine fir, subalpine fir	Abies bifolia A. Murray
alpine valerian	Valeriana sitchensis Bong.
Arctostaphylos rubra (Rehd. & Wils.) Fern	red bearberry
Arctostaphylos uva-ursi (L.) Spreng.	common bearberry
arrow-leaved groundsel	Senecio triangularis Hook.
balsam poplar	Populus balsamifera L.
Betula glandulosa Michx., Betula pumila L. var. glandulifera Regel.	dwarf birch, ground birch
Betula occidentalis . Hook.	Water birch
Betula papyrifera Marsh.	paper birch, white birch
black crowberry	Empetrum nigrum L. subsp. hermaphroditum (Lge.) Böcher.
black spruce	Picea mariana (Mill.) BSP.
bulrush	Scirpus sp.
bunchberry, dwarf dogwood	Cornus canadensis L.
Calamagrostis canadensis (Michx.) Beauv.	reed bent-grass, bluejoint
Carex atherodes Spreng.	awned sedge
Carex spp.	sedges
Cassiope tetragona (L.) D. Don	mountain-heather, Arctic white heather
Chamerion angustifolium (L.) Holub	fireweed
Cladonia spp., Cladina spp.	lichens, reindeer lichens
cloudberry, baked-apple	Rubus chamaemorus L.
common bearberry	Arctostaphylos uva-ursi (L.) Spreng.
common Labrador tea	Ledum groenlandicum Oeder
common wild rose, woods rose	Rosa woodsii Lindl.
Cornus canadensis L.	bunchberry, dwarf dogwood
cotton-grass	Eriophorum spp.
Dasiphora fruticosa (L.) Rydberg	shrubby cinquefoil
Delphinium glaucum Wats.	pale larkspur
Downy lyme grass	Leymus innovatus Beal
Dryas integrifolia M.Vahl.	mountain avens (entire-leaved mountain avens)
dwarf birch, ground birch	Betula glandulosa Michx., Betula pumila L. var. glandulifera Regel.
dwarf red raspberry, dewberry	Rubus pubescens Raf.
Empetrum nigrum L. subsp. hermaphroditum (Lge.) Böcher	black crowberry
Equisetum spp.	horsetails
Eriophorum spp.	cotton-grass
Rough fescue	Festuca altaica Trin.
False hellebore	Veratrum viride Ait. subsp. Eschscholtzii (Gray) Löve & Löve
Festuca altaica Trin.	Rough fescue
fireweed	Chamerion angustifolium (L.) Holub.
Galium boreale L.	northern bedstraw
green alder	Alnus viridis (Chaix.) DC.
horsetails	Equisetum spp.
jack pine	Pinus banksiana Lamb.
junipers	Juniperus spp.
larch (tamarack)	Larix laricina (Du Roi) Koch
pale larkspur	Delphinium glaucum Wats.
Larix laricina (Du Roi) Koch	larch (tamarack)
Ledum groenlandicum Oeder	common Labrador tea
Ledum palustre subsp. decumbens (Aiton) Hultén	northern Labrador tea, narrow-leaved Labrador tea
Leymus innovatus Beal	Downy lyme grass

²³ <http://hua.huh.harvard.edu/FNA/>. Information on vascular plant nomenclature sources provided by Suzanne Carrière, Government of the Northwest Territories, February 2007.

Linnaea borealis L.	twinflower
lichens, reindeer lichens	Cladonia spp., Cladina spp.
Lodgepole pine	Pinus contorta Loud.var. latifolia Engelm.
low-bush cranberry, squashberry	Viburnum edule (Michx.) Raf.
Mackenzie mountain aster	Symphyotrichum nahanniense (Cody) Semple
marsh ragwort	Senecio congestus (R.Br.) DC.
moss campion	Silene acaulis L.
mountain avens (entire-leaved mountain avens)	Dryas integrifolia M.Vahl.
mountain cranberry, rock cranberry, bog cranberry	Vaccinium vitis-idaea L.
mountain-heather, Arctic white heather	Cassiope tetragona (L.) D. Don
Nahanni aster, Mackenzie mountain aster	Symphyotrichum nahanniense (Cody) Semple
northern bedstraw	Galium boreale L.
northern Labrador tea, narrow-leaved Labrador tea	Ledum palustre subsp. decumbens (Aiton) Hultén
Nuphar variegata Durand	variegated pond lily
paper birch, white birch	Betula papyrifera Marsh
peat mosses	Sphagnum spp, Drepanocladus spp.
Picea glauca (Moench) Voss	white spruce
Picea mariana (Mill.) BSP.	black spruce
Pinus banksiana Lamb.	jack pine
Pinus contorta Loud.var. latifolia Engelm.	Lodgepole pine
Populus balsamifera L.	balsam poplar
Populus tremuloides Michx.	trembling aspen
prickly rose	Rosa acicularis Lindl.
reed bent-grass, bluejoint	Calamagrostis canadensis (Michx.) Beauv.
red bearberry	Arctostaphylos rubra (Rehd. & Wils.) Fern)
red osier dogwood	Cornus sericea L.
Rosa acicularis Lindl.	prickly rose
Rosa spp.	wild and prickly rose
Rosa woodsii Lindl.	common wild rose, woods rose
rough fescue	Festuca altaica Trin.
Rubus chamaemorus L.	cloudberry, baked-apple
Salix spp.	willows
Scirpus sp.	bulrush
sedges	Carex spp.
Senecio congestus (R.Br.) DC	marsh ragwort
Senecio triangularis Hook.	arrow-leaved groundsel
shrubby cinquefoil	Dasiphora fruticosa (L.) Rydberg.
Silene acaulis L.	moss campion
Sphagnum spp.	peat mosses
Symphyotrichum nahanniense (Cody) Semple	Nahanni aster, Mackenzie mountain aster
trembling aspen	Populus tremuloides Michx.
twinflower	Linnaea borealis L.
Vaccinium uliginosum L.	alpine bilberry, bilberry
Vaccinium vitis-idaea L.	rock cranberry, bog cranberry, mountain cranberry
Valeriana sitchensis Bong.	Alpine valerian
variegated pond lily	Nuphar variegata Durand
Veratrum viride Ait. subsp. Eschscholtzii (Gray) Löve & Löve	False hellebore
Viburnum edule (Michx.) Raf.	squashberry, low-bush cranberry
water birch	Betula occidentalis Hook.
white birch, paper birch	Betula papyrifera Marsh
white spruce	Picea glauca (Moench) Voss
willows	Salix spp.
wild and prickly rose	Rosa spp.

Appendix 2. Changes to 1996 Ecozones and Ecoregions

Introduction

This Appendix summarizes the changes made to the 1996 version of the Taiga Cordillera and Boreal Cordillera Ecoregions as defined by the Ecological Stratification Working Group (1995) that have resulted in the revised Northwest Territories classification presented in this report. The process was similar to revisions applied to the 1996 Taiga Plains and Taiga Shield Ecozones (Ecosystem Classification Group 2007 (revised 2009), 2008), and improvements included:

- Refinements to existing ecoregion and ecozone boundaries;
- Subdivision of existing ecoregions into more ecologically homogeneous map units;
- Inclusion of a climatic component by applying concepts from the 1989 *Ecoclimatic Regions of Canada* classification; and
- Enhancement of ecoregion names to reference not only the geographic locale, but also the main landform, the regional climate, and elevational descriptors.

From 1996 to early 2006, the Canadian National Ecological Framework was used to delineate and describe ecosystem units within the Northwest Territories (Ecological Stratification Working Group 1995; Downing *et al.* 2006). Discussions with other experts in Canada and the United States in May 2006 led to adoption of a North American continental ecosystem classification scheme (refer to Section 1.2 for further discussion).

The North American ecosystem classification system is a multi-level continental framework for delineating and describing ecosystems; the Government of the Northwest Territories use this system for planning and reporting purposes. The top four levels of the continental framework as applied in the Northwest Territories to the Taiga Plains, Taiga Shield and Cordillera are Level I ecoregions, Level II ecoregions, Level III ecoregions, and Level IV ecoregions.

An intensive field program to review the existing 1996 national framework was carried out in July and August 2007 (refer to Section 2 of this report) and over 17,000 geographically referenced digital photographs were collected along with ground survey data throughout the Cordillera. General ecoregion descriptions and map unit delineations were finalized with the participation of Federal and Territorial representatives in two five-day workshops in December 2008 and March 2009.

Record of Changes to 1996 Classification

A three-part naming convention has been adopted for Level IV ecoregions to provide better information on where they are located and what their physiographic and climatic characteristics are. This naming convention is described in Section 1.5.

Compared to the 1996 National Ecological Framework, in which three ecoregions were identified in the Taiga Cordillera Ecozone and one ecoregion in the Boreal Cordillera Ecozone, the revised Northwest Territories ecosystem classification identifies 37 Level IV ecoregions within the Cordillera. Changes between the 1996 and 2010 versions of the Cordillera and adjacent Level II ecoregions and their Level III and Level IV ecoregion components are summarized in Table 4.

The 1996 Cordillera Ecozones and Ecoregions are shown in Figure 41, and the 2010 Level III and Level IV Cordillera Ecoregions are shown in Figure 42. Individual ecoregions are named in Figure 41 but not in Figure 42; patterns and colours corresponding to major physiographic elements in the 2010 Cordillera graphically illustrate these broad-scale changes. The figures do not illustrate the changes to the 1996 Taiga Plains Ecoregion; these are discussed in Table 4 below and graphically presented in Appendix 2, *Ecological Regions of the Northwest Territories: Taiga Plains* (Ecosystem Classification Group 2007 (revised 2009)).

Table 4. Summary of changes between the 1996 Taiga Cordillera, Boreal Cordillera and Taiga Plains Ecozones and Ecoregions and 2010 Level II, Level III and Level IV Ecoregions of the Cordillera. Level III Ecoregions are indicated by the suffixes HS (High Subarctic), LS (Low Subarctic), HB (High Boreal) and MB (Mid-Boreal).

1996 Ecozone	1996 Ecoregion	2010 Level II Ecoregion	2010 Level III and Level IV Ecoregion	Main Changes		
Taiga Cordillera	British-Richardson Mountains	Tundra Cordillera	Richardson Plateau HS _{as}	These 2010 Level IV Ecoregions were part of the 1996 Taiga Plains Ecozone (Peel River Plateau Ecoregion), and Taiga Cordillera Ecozone (British-Richardson Mountains Ecoregion), respectively. Boundaries have been redrawn to correspond to a logical break between the Level II Taiga Plains and Level II Tundra Cordillera Ecoregions along the west edge of the Mackenzie Delta, and to reflect topographic and geologic differences.		
			Richardson Mountains HS _a			
	Mackenzie Mountains	Taiga Cordillera	Canyon Ranges HS _{as}	This Ecoregion was split from the adjacent Shattered Range HS _{as} and Northern Backbone Ranges HS _{as} on the basis of relief and geology.		
			Shattered Range HS _{as}	This Ecoregion was split from the adjacent Canyon Ranges HS _{as} and Northern Backbone Ranges HS _{as} on the basis of relief and geology. It is climatically and topographically different from the Tigonankweine Range LS _{as} Ecoregion on its southern boundary.		
			Northern Backbone Ranges HS _{as}	This Ecoregion was split from the adjacent Canyon Ranges HS _{as} and Shattered Range HS _{as} on the basis of relief and geology. It is climatically and topographically different from the Sayunei-Sekwi Ranges LS _{as} Ecoregion on its southern boundary.		
			Tigonankweine Range LS _{as}	This Ecoregion is climatically and topographically different from the Shattered Range HS _{as} Ecoregion on its northern boundary.		
			Sayunei-Sekwi Ranges LS _{as}	This Ecoregion is climatically and topographically different from the Northern Backbone Ranges HS _{as} Ecoregion on its northern boundary.		
	Selwyn Mountains	Taiga Cordillera	Thundercloud Range LS _{as}	This Ecoregion includes lower-elevation generally drier mountains than the Southern Backbone Ranges LS _{as} Ecoregion to the west.		
			Southern Backbone Ranges LS _{as}	This Ecoregion has high-elevation mountains with fewer forested valley bottoms than the Thundercloud Range LS _{as} Ecoregion to the east; the northern third lies within the 1996 Mackenzie Mountains Ecoregion.		
			Canyon Ranges LS _{as}	This Ecoregion is a southern extension of the Canyon Ranges HS _{as} Ecoregion; it has somewhat more subdued topography and the vegetation is indicative of slightly milder climates.		
		Boreal Cordillera	Natla Plateau MB _{as}	This Ecoregion is a high-elevation southward-sloping plateau with hill systems; the northern third is transitional between Mid-Boreal and Low Subarctic ecoclimates.		
			Itsi Mountains MB _{as}	Primarily occurs within the Yukon, where it is part of the Horne-Keele-Itsi Mountains Ecodistrict and the Selwyn Mountains Ecoregion. Higher than the adjacent Natla Plateau MB _{as} Ecoregion.		
			Sapper Ranges MB _{as}	This Ecoregion has higher-elevation terrain than the Natla Plateau MB _{as} Ecoregion to the West, and lower terrain than the Southern Backbone Ranges LS _{as} Ecoregion to the east. The northern third of the Ecoregion is transitional between Mid-Boreal and Low Subarctic ecoclimates.		
			Mount Pike MB _{as}	This Ecoregion primarily occurs to the west within the Yukon, where it is part of the Mount Pike Ecodistrict and the Selwyn Mountains Ecoregion.		
			Logan Mountains MB _{as}	This Ecoregion primarily occurs to the west within the Yukon, where it is part of the Logan Mountains Ecodistrict and the Selwyn Mountains Ecoregion.		
			Ragged Range MB _{as}	High-elevation granite and sedimentary peaks with extensive icefields; vegetation and climate differentiates it from the Southern Backbone Ranges LS _{as} Ecoregion to the east.		
			Ragged Range Valley MB _{bs}	Low-elevation valleys of the Flat and South Nahanni Rivers adjacent to the Ragged Range MB _{as} Ecoregion with diverse and vigorous vegetation growth, particularly along the Flat River.		
		Boreal Cordillera	Hyland Highland	Boreal Cordillera	Rock River MB _{bs}	This Ecoregion primarily occurs to the west and south within the Yukon, where it is part of the Rock River Ecodistrict and the Hyland Highland Ecoregion.
					Hyland Plateau HB _b	This Ecoregion primarily occurs to the south within the Yukon, where it is part of the Hyland Plateau Ecodistrict and the Hyland Highland Ecoregion.
Tlogotsho Range HB _{ab}	This Ecoregion is a high-elevation plateau that was also included as part of the 1996 Taiga Plains Ecozone and 1996 Sibbeston Lake Plain Ecoregion.					
Liard Range MB _{bs}	The western half of this Ecoregion fell within the 1996 Boreal Cordillera Ecozone and the 1996 Hyland Highland Ecoregion. The eastern half was included within the 1996 Taiga Plains Ecozone and Sibbeston Lake Plain Ecoregion.					

Table 4. (continued)

1996 Ecozone	1996 Ecoregion	2010 Level II Ecoregion	2010 Level III and Level IV Ecoregion	Main changes
Taiga Plains	Franklin Mountains	Taiga Cordillera	Franklin Mountains LS _{sa}	The name of this Ecoregion and its approximate boundary remains the same, although its western boundary is set at the 300 mASL contour and not the east side of the Mackenzie River as it was in 1996. It is now assigned to the Cordillera; in 1996 it was considered part of the Taiga Plains Ecozone.
	Peel River Plateau		Arctic Red Plain LS _b	This Ecoregion was part of the 1996 Peel River Plateau Ecoregion and has more pronounced topography than the Carcajou Plain LS _b Ecoregion to the east.
			Carcajou Plain LS _b	This Ecoregion was part of the 1996 Peel River Plateau Ecoregion and is a gently sloping terraced landscape that grades into the Taiga Plains.
			Painted Mountains LS _{sa}	This Ecoregion was part of the 1996 Peel River Plateau Ecoregion; the higher mountains along its western border were included with the 1996 Selwyn Mountains Ecoregion and Taiga Cordillera Ecozone.
			Raven-Redstone Valley LS _{bs}	The Redstone River and Raven's Throat River valley portions of this Ecoregion were part of the 1996 Peel River Plateau Ecoregion. The southern Silverberry River valley portion of this Ecoregion lies within the 1996 Taiga Cordillera Ecozone, Selwyn Mountains Ecoregion.
			Mackenzie Foothills LS _{bs}	The western half of this Ecoregion was part of the 1996 Peel River Plateau Ecoregion.
	Sibbeston Lake Plain	Boreal Cordillera	Sunblood Range HB _{as}	The northern half of this Ecoregion was part of the southern end of the 1996 Peel River Plateau Ecoregion; the southern half was part of the 1996 Nahanni Plateau Ecoregion. Both 1996 Ecoregions were part of the Taiga Plains Ecozone.
			Tundra Ridge HB _{as}	The northern half of this Ecoregion lies within the 1996 Peel River Plateau Ecoregion; the southern half lies within the 1996 Nahanni Plateau Ecoregion. It has less pronounced terrain than the Sunblood Range HB _{as} Ecoregion to the west, and generally more pronounced terrain than the Ram Plateau HB _{bs} Ecoregion to the east.
			Mackenzie Foothills HB _{bs}	The western half of this Ecoregion was part of the 1996 Peel River Plateau Ecoregion; the eastern half was part of the 1996 Mackenzie River Plain Ecoregion. It has lower-relief terrain and a more moderate climate than the Painted Mountains LS _{sa} Ecoregion to the west.
			Nahanni Range HB _{sa}	This Ecoregion, the adjacent Nahanni-Tetcela Valley HB _b Ecoregion and Ram Plateau HB _{bs} Ecoregion to the west and the eastern half of the Liard Range MB _{bs} Ecoregion were part of the 1996 Sibbeston Lake Plain Ecoregion. All four of the above-listed 2010 Ecoregions have distinctive topographic, vegetation, and climatic features.
			Nahanni-Tetcela Valley HB _b	See comments for Nahanni Range HB _{sa} Ecoregion.
			Ram Plateau HB _{bs}	See comments for Nahanni Range HB _{sa} Ecoregion.
			Nahanni Plateau	Liard Plateau HB _{bs}
	Mackenzie River Plain	Taiga Cordillera	Central Mackenzie Plain LS _b	Climates as indicated by vegetation differences north of the Dahadinni River separate this Ecoregion from the Central Mackenzie Valley HB _b Ecoregion to the south; both were part of the 1996 Mackenzie River Plain Ecoregion.
		Boreal Cordillera	Central Mackenzie Valley HB _b	See comments for Central Mackenzie Plain LS _b Ecoregion.

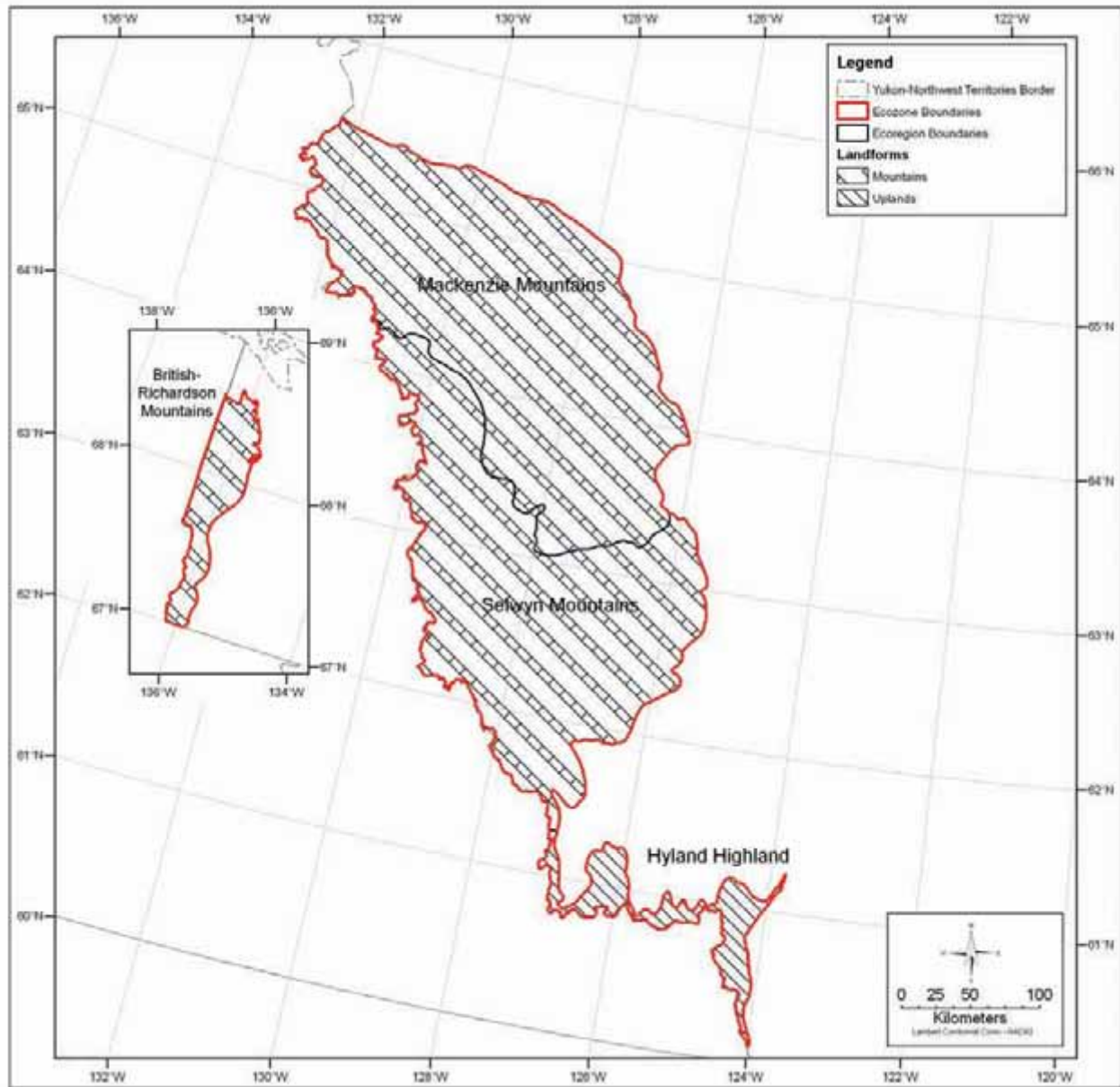


Figure 41. 1996 National Ecological Framework; Ecoregions of the Taiga Cordillera and Boreal Cordillera Ecozones, Northwest Territories. The Taiga Cordillera Ecozone is represented by the crosshatch pattern for mountains (Mackenzie Mountains Ecoregion, Selwyn Mountains Ecoregion, British Richardson Mountains Ecoregion); the Boreal Cordillera Ecozone is represented by the crosshatch pattern for uplands (Hyland Highland). The inset map shows that part of the 1996 Taiga Cordillera Ecozone adjacent to the Mackenzie Delta.

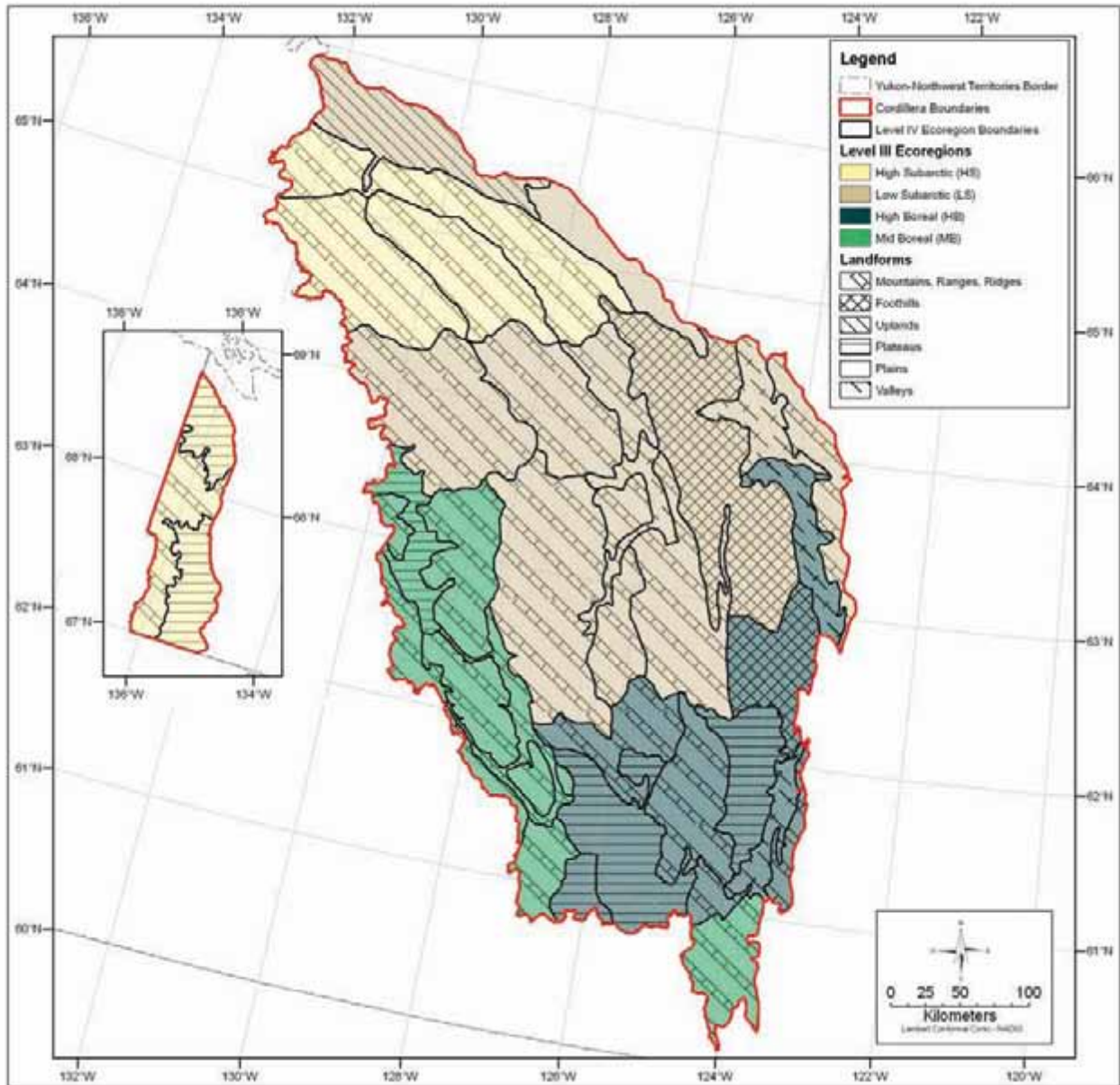


Figure 42. 2010 Level III and Level IV Ecoregions and major physiographic elements of the Cordillera, Northwest Territories. Refer to Appendix 3 for Ecoregion labels and legend. The Level II Taiga Cordillera Ecoregion includes the Level III High Subarctic and Low Subarctic Ecoregions except for the Richardson Mountains (inset map lower left) that belong to the Level II Tundra Cordillera Ecoregion. The Level II Boreal Cordillera Ecoregion includes the Level III High Boreal and Mid-Boreal Ecoregions.

Appendix 3. Ecological Regions of the Northwest Territories CORDILLERA

Ecoregion Labels
(Figure 43, facing page)

Level I Tundra Ecoregion (ecoregion label 2)
Level II Tundra Cordillera Ecoregion (ecoregion label 2.3)
Level III Tundra Cordillera High Subarctic (HS) Ecoregion (ecoregion label 2.3.1; report section 3.4)
2.3.1.1 Richardson Plateau HSas
2.3.1.2 Richardson Mountains HSa

Level I Taiga Ecoregion (ecoregion label 3)
Level II Taiga Cordillera Ecoregion (ecoregion label 3.2)
Level III Taiga Cordillera High Subarctic (HS) Ecoregion (ecoregion label 3.2.3; report section 3.5)
3.2.3.1 Canyon Ranges HSas
3.2.3.2 Shattered Range HSas
3.2.3.3 Northern Backbone Ranges HSas
Level III Taiga Cordillera Low Subarctic (LS) Ecoregion (ecoregion label 3.2.2; report section 3.6)
3.2.2.1 Arctic Red Upland LSb
3.2.2.2 Carcajou Plain LSb
3.2.2.3 Canyon Ranges LSsa
3.2.2.4 Tigonankweine Range LSas
3.2.2.5 Sayunei-Sekwi Ranges LSas
3.2.2.6 Southern Backbone Ranges LSas
3.2.2.7 Thundercloud Range LSas
3.2.2.8 Painted Mountains LSsa
3.2.2.9 Raven-Redstone Valley LSbs
3.2.2.10 Mackenzie Foothills LSbs
3.2.2.11 Central Mackenzie Plain LSb
3.2.2.12 Franklin Mountains LSsa

Level I Northwestern Forested Mountains Ecoregion (ecoregion label 6)
Level II Boreal Cordillera Ecoregion (ecoregion label 6.1)
Level III Boreal Cordillera High Boreal (HB) Ecoregion (ecoregion label 6.1.5; report section 3.7)
6.1.5.1 Central Mackenzie Valley HBb
6.1.5.2 Mackenzie Foothills HBbs
6.1.5.3 Nahanni Range HBsa
6.1.5.4 Nahanni-Tetcela Valley HBb
6.1.5.5 Ram Plateau HBsb
6.1.5.6 Tundra Ridge HBas
6.1.5.7 Sunblood Range HBas
6.1.5.8 Liard Plateau HBbs
6.1.5.9 Tlogotsho Range HBab
6.1.5.10 Hyland Plateau HBbs
Level III Boreal Cordillera Mid-Boreal (MB) Ecoregion (ecoregion label 6.1.6; report section 3.8)
6.1.6.1 Natla Plateau MBas
6.1.6.2 Sapper Ranges MBas
6.1.6.3 Itsi Mountains MBas
6.1.6.4 Mount Pike MBas
6.1.6.5 Ragged Range MBas
6.1.6.6 Ragged Range Valley MBbs
6.1.6.7 Logan Mountains MBas
6.1.6.8 Rock River Upland MBbs
6.1.6.9 Liard Range MBbs

Note: The horizontally patterned area on the map adjacent to the Yukon – Northwest Territories border indicates a transition between Low Subarctic and Mid-Boreal ecoclimates, explained in the descriptions for the Natla Plateau MBas and Sapper Ranges MBas Ecoregions in Section 3.8 of the report.

ECOLOGICAL REGIONS OF THE NORTHWEST TERRITORIES CORDILLERA

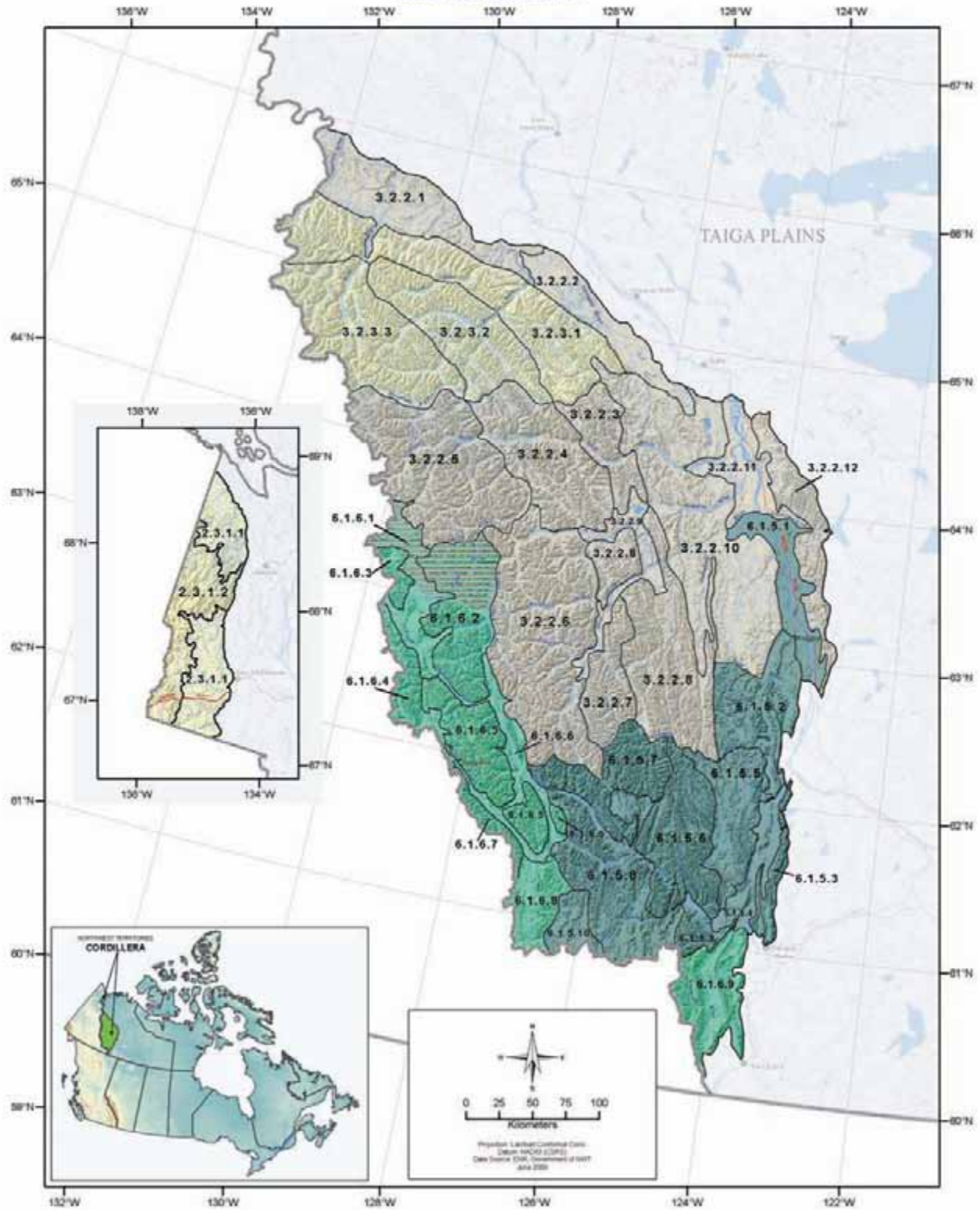


Figure 43. Ecoregions of the Cordillera. Level IV ecoregion names corresponding to the numbered ecoregion labels are provided on the facing page, and a large fold-out map is enclosed in the pocket sleeve at the back of the print version of the report. Level I, II, and III ecoregions are explained in Sections 1 and 3 of the report.

Appendix 4. Modelling climatic regions in the Cordillera using tree line as a guide

High Subarctic and Low Subarctic ecoclimates may be differentiated on the basis of terrain and vegetation features such as peatland type, the presence or absence of patterned ground, and vegetation structure and composition. Peatland forms such as polygonal peat plateaus and peat plateaus are widespread indicators of transitions in climate from High Subarctic to Low Subarctic conditions in extensive low-relief areas of the Taiga Shield and Taiga Plains Ecoregions to the east, but such peatland forms are too scattered to be useful determinants of the southern limits of the High Subarctic ecoclimatic region in the mountainous Cordillera landscapes. The structure and appearance of forest vegetation is a characteristic that is, however, widespread in valley bottoms and on lower valley slopes in the Cordillera, and can be used to help define the southern limits of the High Subarctic ecoclimate.

High Subarctic woodlands tend to be very open, with narrow-crowned widely spaced conifers that are usually shorter than about 10 m; refer to Figure 44 below. However, upper subalpine forests can also have the same general appearance due to harsher growing conditions at higher elevations, as

shown in Figure 45, and sometimes due to groundwater seepage that impedes tree growth. A reasonable delineation of regional High Subarctic climatic influences based on the appearance of woodlands therefore needs to account for the effects of elevation; the appearance of forest stands in valley bottoms is the key.

Tree line, the latitude or elevation above which trees do not occur because the growing season is too short for reproduction and establishment, was indirectly used to define the southern boundary of the Level III High Subarctic Ecoregion. The first step was to determine the relationship between observed tree line elevations and geographic location; therefore, latitude and longitude were chosen as the two independent quantitative variables to develop a regression model that would allow tree line to be predicted for any location within the Cordillera. The second step was to examine woodland distribution and form in valley bottoms using the geographically referenced 2007 digital image library collected during transect surveys and decide whether the woodland was more strongly influenced by regional climates or by elevationally-induced local climates.



Figure 44. This very open spruce woodland along Tawu Creek in the Level IV Canyon Ranges HSsa Ecoregion occurs at an elevation of about 850 mASL and location 65° N and 130° W. Its appearance is typical of High Subarctic forests in the Taiga Plains and Taiga Shield, and it was used as a visual reference for comparison to other stands that might indicate High Subarctic ecoclimates. At this latitude and longitude, tree line would be at about 1280 mASL, so tree growth in this locale is more likely influenced by regional High Subarctic climates than by local elevationally-induced climates.



Figure 45. This spruce woodland occupies a high subalpine valley just north of the Raven’s Throat River in the Level IV Painted Mountains LSsa Ecoregion at an elevation of about 1100 mASL at location 63° N and 126° W. Although it looks like the High Subarctic forest in Figure 44, its elevation is over 150 m higher than the predicted elevation for a High Subarctic stand at this latitude and longitude, so forest cover development is probably more strongly influenced by local elevationally-induced climates than by regional climates.

Tree line modelling method

Eighty-four elevations collected at representative locations on southerly slopes between latitude 62 degrees north and latitude 66 degrees north were used to assess the relationship between tree line elevation and geographic location. Southerly slopes were used because most of the tree line observations were collected on southeast to west facing slopes, and northerly observations were not equally distributed throughout the sampling area. Northerly slopes receive less solar energy and the growing season is apparently shorter, as indicated by lower tree lines in the same valley and by the increased frequency of permafrost features on north-facing slopes relative to south-facing slopes. The results of analysis would likely reveal less informative trends if observations of elevation from northerly slopes had been included.

Results of tree line model

The analysis employed two-variable linear regression. SPSS ® statistical software was used to derive the following predictive equation:

$$\text{tree line elevation} = 6455.8 - 150.66 * \text{latitude} - 35.52 * \text{longitude}$$

The adjusted R² value, a measure of how well the regression line fits the observations, is 0.382, meaning that about 38 percent of the variability in tree line elevation on southerly slopes is explained by latitude and longitude together. The regression coefficients for both latitude and longitude were significant, meaning that there is a statistically significant relationship between observed tree line elevations and both latitude and longitude. The summary below (Table 5) indicates that the regression equation (predicted mean values on right side of table) fits the observed data (summarized ranges, medians and means on left side of table) reasonably well.

Observed and predicted tree line elevations decline to the north and east, with the highest observed elevations in the southwest quarter of the Cordillera and the lowest elevations in the Richardson Mountains in the far north. The rate of tree line elevation decline is about 1.3 m of elevation for every km northward along a longitudinal line, and about 0.3 m of elevation for every km eastward along a latitudinal line.

Table 5. Actual and predicted tree line elevations (mASL) based on 84 observations from southerly slopes throughout the Cordillera.

Statistics calculated from observations (n=84)					Predicted mean (minimum predicted elevations in the east to maximum predicted elevations in the west in parentheses)
Latitude	25 th ptile*	median	75 th ptile	mean	
62	1382.5	1513	1640	1502	1590m (1448 to 1768) - within 100m of observed mean and median at latitude 62
63	1380	1440	1554	1456	1457m (1300 to 1620) - within 20m of observed mean and median at latitude 63
64	1245	1400	1455	1357	1306m (1150 to 1470) - within 100m of observed median and 50m of observed mean at latitude 64
65	945	1160	1230	1113	1160m (1000 to 1300) - equal to observed median and within 50m of observed mean at latitude 65

*ptile = percentile. The 25th percentile is the value below which 25 percent of the observations occur; the 75th percentile is the value below which 75 percent of the observations occur.

Application to ecoregion boundary delineation

The tree line elevation model was used to predict the maximum elevation of valley bottoms that would support woodlands characteristic of the High Subarctic ecoclimate. Stands such as the one in Figure 44, which is at an elevation well below tree line and is clearly influenced by High Subarctic conditions along the front ranges, were used as visual references. A number of these stands were examined from oblique digital images collected during the 2007 field season. For those that appeared similar and were not obviously open because of local site features such as seepage, the ground elevations at which they occurred were derived from National Topographic Series 1:250,000 scale topographic maps.

The visual reference woodland for the High Subarctic ecoclimatic region occurred along the front ranges at an elevation of 850 mASL and at a latitude of 65 degrees north and a longitude of 130 degrees west, and is shown in Figure 44 above. At this latitude and longitude, tree line is predicted to occur at 1280 mASL. The reference woodland is about 400m below tree line, below the influence of subalpine conditions, and is therefore assigned to a High Subarctic ecoclimatic region.

Oblique aerial digital images collected in 2007 from about 40 locations across the northern third of the Level II Taiga Cordillera Ecoregion were examined with reference to predicted elevation guidelines in Table 6. For example, an open spruce woodland with a similar appearance to the reference woodland that occurs at latitude 64 and longitude 128 could be indicative of High Subarctic ecoclimate influences if it were at 930 mASL, about 400 m lower than predicted tree line at this location.

Subjective judgement was necessary with respect to the application of these guidelines because it was not always clear whether elevation or regional climate was more influential and because of inherent inaccuracies in the model, and values of up to 100 m above the predicted baseline were allowed. The Mountain River and Carcajou River valleys at about latitude 64°30' N provide a reasonable southern limit between Low Subarctic and High Subarctic ecoclimates based on the observations and predictions but as with most ecoclimatic boundaries the line can be several kilometres wide.

Table 6. Predicted valley bottom elevations for woodlands that are indicative of High Subarctic ecoclimatic conditions.

Longitude		-130	-129	-128	-127	-126
Latitude	65	850	815	779	744	708
	64.5	926	890	855	819	784
	64	1001	966	930	895	859
	63.5	1076	1041	1005	970	934
	63	1152	1116	1081	1045	1010
	62.5	1227	1192	1156	1121	1085

Appendix 5. Glossary of Terms

The following definitions are taken mainly from *Terminology of Ecological Land Classification in Canada* (Cauboue *et al.* 1999) and *Soil and Environmental Science Dictionary* (Gregorich *et al.* 2001), supplemented by *Glossary of terms in Soil Science* (Canadian Society of Soil Science 1976), *Multi-language glossary of permafrost and related ground-ice terms* (van Everdingen, 2005), *Glossary of Permafrost and Related Ground-ice Terms* (National Research Council 1988), and *Wetlands of Canada* (National Wetlands Working Group 1988). W.W. Pettapiece compiled most of this glossary from the listed sources; many of the permafrost terms are referenced in van Everdingen (2005) and National Research Council (1988).

A horizon – A mineral horizon formed at or near the surface in the zone of removal of materials in solution and suspension, or maximum accumulation of organic carbon, or both.

Ae – A horizon that has been eluviated of clay, iron, aluminum, or organic matter, or all of these.

Ah – A horizon in which organic matter has accumulated as a result of biological activity.

Ap – A horizon markedly disturbed by cultivation or pasture.

abiotic – Describing the nonliving components of an ecosystem.

Abundance – dominance – This term expresses the number of individuals of a plant species and their coverage in a phytosociological survey. The scale generally used is that of J. Braun-Blanquet from which stemmed many variations. It is based on the coverage of individuals for classes with coverage higher than 5 percent and on the abundance for classes with a lower percentage; frequently, this is also referred to as “cover-abundance”. See **Braun-Blanquet method**.

acid igneous rock – Describing igneous rock composed of >66% silica.

acidic (soil) – Having a pH value of less than 7.0.

active delta marsh – A marsh occupying lowlands on deltas, usually with drainage connections to active river channels. The marsh is subject to inundation at least once during a season, followed by a slow drawdown of the water levels. A high rate of sedimentation may occur in many parts of the marsh.

active layer – The seasonal thaw zone at the surface of permafrost terrain.

advance regeneration – Young trees under existing stands. Regeneration established before logging that has survived the logging operation.

aeolian (eolian) – Referring to mineral particles moved and sorted by wind, usually fine sands and coarse silt. See dune and loess.

aerobic – Occurring in the presence of oxygen as applied to chemical and biochemical processes; opposite of anaerobic.

aggregate – A group of soil particles cohering in such a way that they behave mechanically as a unit.

albedo – A measurement of reflected energy. Albedo is the coefficient of reflectance, usually applying only to short-wave radiation.

alkaline – Having a pH value of >7.0.

alliance – A vegetation classification level in the Braun-Blanquet system, a collection of associations with similar physiognomy and the same dominant and constant species. See **Braun-Blanquet method**.

alluvium – Mineral material deposited by flowing water, usually sands, silts and gravels.

alpine – The ecological zone that occurs above an elevational tree line, characterized by a distinct climate and vegetation.

alvar – Swedish term for an unusual landform which occurs when soils are scraped away from bare limestone bedrock by ice, wind, and water. Alvars and associated biota are globally rare features.

anaerobic – Occurring in the absence of oxygen as applied to chemical and biochemical processes.

anthropogenic – Human-made or human-modified materials such that their initial physical properties have been drastically altered.

aquatic – Living or growing in water.

arable land – Land that is cultivated or suitable for cultivation (as opposed to grazing or non-cultivated land).

arctic – The ecological zone north of the latitudinal tree line, characterized by a distinct climate and vegetation.

arid – Describing a soil, climate or region where vegetation may not grow due to a severe lack of water.

aspect – The orientation of a slope face, expressed using a compass direction.

association –

1. A classification level in the Braun-Blanquet system, which is a subdivision of a formation based on floristic composition, an abstract plant community.
2. Sometimes used as a general term for a collection of vegetation stands with similar composition and structure.

avalanche – A form of mass wasting involving snow and ice.

Azonal – Vegetation (or soil) that develops on atypical conditions such as flooded or rapidly drained sites.

B horizon – A subsoil horizon characterized by one of:

- a) An enrichment in clay, iron, aluminum, or humus (Bt or Bf).
- b) A prismatic or columnar structure that exhibits pronounced coatings or stainings associated with significant amounts of exchangeable sodium (Bn or Bnt).
- c) An alteration by hydrolysis, reduction, or oxidation to give a change in colour or structure from the horizons above or below, or both (Bm).

basal area – The area occupied by a plant near the ground surface; measured across the stem of a tree 1.3 to 1.5 m above the ground surface, or across a clump in the case of graminoids, usually 2 to 3 cm above the ground surface.

bedrock – The solid rock underlying soils and the regolith or exposed at the surface.

bioclimate – All the climatic conditions (climate factors) of a region that have a fundamental influence on the survival, growth, and reproduction of living organisms.

biocoenosis – A group of interacting organisms including both plants and animals.

biodiversity – Totality of the richness of biological variation, ranging from within-species genetic variation, through subspecies and species, to communities, and the pattern and dynamics of these on the landscape.

Biogeoclimatic Ecosystem Classification (BEC) in British Columbia – A hierarchical ecosystem classification system applied in British Columbia that describes the variation in climate, vegetation, and site conditions throughout the province.

biogeoclimatic zone – A level in the British Columbia Biogeoclimatic ecosystem classification system that represents areas with the same regional climate. See **ecoclimatic region**, **ecoregion**, and **ecological region**.

biogeocoenosis – A group of interacting organisms living together in a particular environment, an ecosystem.

biogeography – A branch of biology or of geography that deals with the geographical distribution of plants and animals.

biomass – The mass of living organisms within a defined space, usually expressed in kg/ha or g/m² of dry matter.

biome – Major biotic community composed of all the plants and animals and smaller biotic communities. The smaller communities in a biome possess similarities in gross external appearances (deciduous trees, grasslands, etc.) and gross climatic conditions (desert, tropical, etc.). A particular biome is defined in terms of the characteristic vegetation forms (or life forms).

Biophysical Land Classification – An approach to land classification that combines the physical and biological components of the environment. This hierarchical classification system originally included four levels, within which the physical components of classification are sometimes more heavily weighted than the biological components. The term biophysical was subsequently replaced by "ecological".

biota – The living component of an ecosystem.

biotic – Pertaining to life.

Black – A soil classification Great Group or Subgroup designation indicating a surface (Ah or Ap horizon) colour value darker than 3.5 moist and dry, with a chroma less than 2, dry (grassland or parkland soils with generally greater than 4 percent organic matter).

bog – Ombrotrophic (nutrient poor) peatland that is acidic (generally unaffected by nutrient-rich groundwater) and usually dominated by heath shrubs and *Sphagnum* mosses and that may include open-growing, stunted woodlands of black spruce or other tree species.

boreal –

1. Pertaining to the north.
2. A climatic and ecological zone that occurs south of the subarctic, but north of the temperate hardwood forests of eastern North America, the parkland of the Great Plains region, and the montane forests of the Canadian cordillera.

boulder – Rock fragment over 60 cm in diameter. In engineering, practice boulders are over 20 cm in diameter.

brackish – Water with a salt content between that of fresh and sea water. Brackish water usually has 5-10 parts of salt per thousand.

Braun-Blanquet method – An approach to classifying vegetation that utilizes floristic composition (i.e. characteristic species and associations), developed in central and southern Europe. Includes the Zurich-Montpellier School of Phytosociology.

break of slope – An abrupt change in slope steepness.

breccia – Bedrock formed from angular particles cemented together by hardened clay.

broadleaved forest – See **deciduous forest**.

Brown – A soil classification Great Group or Subgroup designation indicating a surface (Ah or Ap horizon) colour value darker than 3.5 moist and 5.5 dry with a chroma less than 3.5 moist (grassland soils with less than about 2% organic matter).

Brunisol – A soil of the Brunisolic Order.

Brunisolic –

1. An Order of soils whose horizons are developed sufficiently to exclude them from the Regosolic Order but lack the degrees or kinds of horizon development specified for soils in other orders. They always have Bm or Btj horizons. The order consists of Melanic, Eutric, Sombric and Dystric Great Groups.
2. A soil classification Subgroup designation indicating the formation of a Bm or Btj horizon within the Ae of a Luvisolic soil (a strongly degraded Luvisol).

bulk density, soil – The mass of dry soil per unit bulk volume.

C horizon – A mineral horizon comparatively unaffected by the pedogenic processes operative in the A and B horizons except for the process of gleying (Cg) or the accumulation of calcium carbonate (Cca) or other salts (Csa). A naturally calcareous C horizon is designated Ck.

calcareous soil – Soil containing sufficient calcium carbonate (often with magnesium carbonate) to effervesce visibly when treated with cold 0.1 N hydrochloric acid.

C:N ratio – The ratio of the weight of organic carbon to the weight of total nitrogen in a soil or in an organic material.

Canadian System of Soil Classification – Hierarchical soil classification system in which the conceptual classes are based upon the generalization of properties of real bodies of soil. Taxa are defined on the basis of observable and measurable soil properties that reflect processes of soil genesis and environmental factors.

canopy – The more or less continuous cover of branches and foliage formed by the crowns of trees.

canopy closure – The degree of canopy cover relative to openings.

capability – A natural ability to support a selected activity such as agriculture or recreation.

catchment area – See **drainage basin**.

channel marsh – A marsh occurring in well-defined, abandoned channels where stream flow is discontinuous or blocked.

characteristic species –

1. A diagnostic species used to separate plant community types within the Braun-Blanquet vegetation classification system.
2. Characteristic species may occur in more than *one* community, but are significant (e.g., much more abundant) in only one community.
3. A species with high cover (abundance) and presence.

Chernozem – A soil of the Chernozemic Order.

Chernozemic – An Order of soils that have developed under xerophytic or mesophytic grasses and forbs, or under grassland – forest transition vegetation, in cool to cold, subarid to subhumid climates. The soils have a dark-coloured surface (Ah, Ahe or Ap) horizon and a B or C horizon, or both, of high base saturation. The order consists of Brown, Dark Brown, Black and Dark Gray Great Groups.

Chinook – A warm, dry wind characteristic of southern Alberta and northern Montana created by moisture condensation and precipitation on the western side of the mountains and compression as the dry air descends onto the plains. In the Northwest Territories, similar conditions produce Chinook-like winds in the Fort Liard area.

chroma – A measure of colour strength in the Munsell Soil Colour Chart.

chronosequence – A chronosequence is a sequence through time. Often, it refers to a secondary successional sequence within a set of plant communities.

classification – The systematic grouping and organization of objects, usually in a hierarchical manner.

clay –

1. Mineral particles <0.002 mm in diameter.
2. Soil and texture class with approximately a 40 to 60% composition of clay size particles.

climate – The accumulated long-term effects of weather that involve a variety of heat and moisture exchange processes between the earth and the atmosphere.

climatic climax – Stable, self-perpetuating vegetation developed through succession in response to long-term climatic conditions, as opposed to edaphic climax. **Edaphic climax** – Stable, self-perpetuating vegetation developed through succession on azonal sites. See also **climax**.

climatic index – Number indicating a combination of climatic factors, most often temperature and precipitation, in order to describe the vegetation distribution.

climax – Stable, self-perpetuating vegetation that represents the final stage of succession.

cluster analysis – A multidimensional statistical analysis technique used to group samples according to their degree of similarity.

classification, soil – The systematic arrangement of soils into categories and classes on the basis of their characteristics. Broad groupings are made on the basis of general characteristics and subdivisions on the basis of more detailed differences in specific properties.

clay – As a particle-size term: a size fraction mm equivalent diameter.

clod – A compact, coherent mass of soil produced by digging or plowing.

coarse fragments – Rock or mineral particles 2.0 mm in diameter.

coarse texture – The texture exhibited by sands, loamy sands, and sandy loams except very fine sandy loam. A soil containing large quantities of these textural classes.

codominant – Trees with crowns forming the general level of the main canopy in an even-aged stand of trees. Two plant species of similar stature and cover that occur on the same site.

collapse scar – That portion of a peatland where the whole or part of a palsa or peat plateau has thawed and collapsed to the level of the surrounding peatland.

collapse scar bog – A circular or oval-shaped wet depression in a perennially frozen peatland. The collapse scar bog was once part of the perennially frozen peatland, but the permafrost thawed, causing the surface to subside. The depression is poor in nutrients, as it is not connected to the minerotrophic fens in which the palsa or peat plateau occurs.

collapse scar fen – A fen with circular or oval depressions, up to 100 m in diameter, occurring in larger fens, marking the subsidence of thawed permafrost peatlands. Dead trees, remnants of the subsided vegetation of permafrost peatlands, are often evident.

colluvium – Unconsolidated materials moved by gravity, often occurring at the base of a slope.

community – An assemblage of organisms that interact and exist on the same site.

community type – A group of vegetation stands that share common characteristics, an abstract plant community.

companion species – In phytosociology, a species occurring in several associations with relatively the same frequency, or a species characteristic of another association, but having a lower frequency.

competition – The interaction between organisms resulting from common use of a limited resource. Intraspecific competition occurs within the same species, while interspecific competition arises between different species.

conglomerate – Bedrock formed from rounded particles cemented together by hardened clay.

conifer – A cone-bearing plant (except for the taxaceous family) belonging to the taxonomic group Gymnospermae.

coniferous forest – A plant community with a cover made up of 75% or more conifers.

consistence – The degree of soil cohesion and adhesion based on its resistance to deformation.

consociation – A classification level within the Scandinavian approach to vegetation classification, a collection of sociations with the same dominant species.

constant species – A species occurring more than 80% of the time within a particular plant community type.

constraint – A factor that limits the optimal condition, such as steep slopes or cold temperatures, usually associated with land use capability assessments.

continuous permafrost – Permafrost occurring everywhere beneath the exposed land surface throughout a geographic region with the exception of widely scattered sites, such as newly deposited unconsolidated sediments, where the climate has just begun to impose its influence on the thermal regime of the ground, causing the development of continuous permafrost.

continuous permafrost zone – The major subdivision of a permafrost region in which permafrost occurs everywhere beneath the exposed land surface with the exception of widely scattered sites.

control section – The minimum depth used to classify a soil, usually 1.0 m for mineral soils and 1.6 m for organic deposits.

cordillera – An elongated range of mountains.

corridor – In a landscape, a narrow strip of land that differs from the matrix on either side. Corridors may be isolated strips, but are usually attached to a patch of somewhat similar vegetation.

coulee – A western Canadian term for a steep-sided prairie valley. It may refer to valleys that have a relatively broad bottom, often as a result of a glacial meltwater channel or to v-shaped gullies caused by more recent erosion.

cover – The area of ground covered with plants of one or more species, usually expressed as a percentage.

cover type – A very general unit of vegetation classification and mapping based on existing plant cover, e.g., closed-canopied deciduous forest, pasture, or native prairie.

cryoplanation terrace – Large benches carved in hillslopes in the tundra zone of unglaciated areas. Accumulation of snow against the proximal part of a terrace surface and its subsequent melt bring about processes of frost shattering, mass movement, rill wash, and slope wash.

Cryosol – A soil of the Cryosolic Order.

Cryosolic – An Order of soils formed in either mineral or organic materials that have perennially frozen material within 1 m of the surface in some part of the soil body (or within 2 m if the pedon has been strongly cryoturbated). The mean annual temperature is less than 0°C. The order consists of Turbic, Static or Organic Great Groups based on degree of cryoturbation and the nature of the soil material.

cryoturbation – Irregular structures formed in earth materials by deep frost penetration and frost action processes,

and characterized by folded, broken and dislocated beds and lenses of unconsolidated deposits, included organic horizons and even bedrock. Terms such as “frost churning” and “frost stirrings” are not recommended.

- Cumulic** – A soil classification Subgroup designation indicating successive mineral layers that result from deposition of materials (e.g., flood plain deposits).
- Dark Brown** – A soil classification Great Group or Subgroup designation indicating a surface (Ah or Ap horizon) colour value darker than 3.5 moist and 4.5 dry with a chroma greater than 1.5, dry (grassland soils with organic matter content in the 2% to 4% range).
- Dark Gray** – A soil classification Great Group or Subgroup designation indicating a surface (Ah or Ap horizon) colour value darker than 3.5 moist and 3.5 to 4.5 dry with a chroma of 1.5 or less (transition forest soils with less than about 2% organic matter).
- dbh** – The diameter of a tree at breast height. Diameter is measured at 1.3 to 1.5 m above ground surface.
- deciduous** – Refers to perennial plants from which the leaves abscise and fall off at the end of the growing season.
- deciduous forest** – A plant community with a cover made up of 75% or more of deciduous trees. *Syn.* broadleaved forest.
- degree-day** – A measure of temperature above or below a reference temperature that is generally added up for a certain period. Thus it is a cumulative measurement of the quantity of energy available for growth that makes it possible to compare growth conditions between regions.
- delta** – Alluvial deposits at the mouth of a river, usually triangular in outline with low relief.
- deposit** – See surficial materials.
- depression** – An area that is lower than the general surrounding landscape, usually less well-drained than the surrounding terrain.
- diagnostic species** – Plant species used to distinguish plant communities based on their presence or absence and on their abundance.
- differential species** – A diagnostic species that occurs primarily within one or a few plant community types, but that is less abundant and with lower constancy than characteristic species. It may be present in other communities, but with lower abundance and constancy.
- discontinuous permafrost** – Permafrost occurring in some areas beneath the exposed land surface throughout a geographic region where other areas are free of permafrost.
- diversity** – The richness of species within a given area. Diversity includes two distinct concepts:
1. Richness of species.
 2. Evenness in the abundance of the species.
- domain** – Territory including all the regions having the same vegetation or climatic groups on modal sites.
- dominant** – A plant with the greatest cover and/or biomass within a plant community. The tallest trees within a forest stand, which extend above the general canopy.
- drainage** – The removal of excess water from soil as a result of gravitational flow. Soil drainage refers to the frequency and duration of periods when the soil is not saturated. Terms used are – excessively, well, moderately, imperfectly and poorly-drained.
- drainage basin** – Area tributary to or draining to a lake, stream, reservoir or other body of water. *Syn.* catchment area. See also **watershed**.
- drift** – A glacial deposit.
- droughty soil** – A soil with low water supplying capacity (sandy or very rapidly drained soil).
- drumlin** – A smooth, elongated hill created by flowing glacial ice. The long axis and tapered end are oriented in the direction of glacial ice flow.
- dryland farming** – The practice of crop production in low-rainfall areas without irrigation.
- duff** – A general term for the litter and humus layers of the forest floor.
- dune** – A low hill or ridge of sand that has been sorted and deposited by wind.

- Dystric** – A soil classification Great Group designation indicating Brunisolic soils with an acidic solum – a pH (0.01M Ca Cl₂) of less than 5.5 for at least 25 cm starting at the top of the B horizon.
- dystrophic** – Referring to a physical environment very unbalanced from a nutritive standpoint due to an excess or a significant lack of a mineral or organic element.
- earth hummock** – A hummock having a core of silty and clayey mineral soil which may show evidence of cryoturbation. Earth hummocks are a type of nonsorted circle (see also *patterned ground*) commonly found in the zone of continuous permafrost. They develop in materials of a high silt and clay content and/or of high ice content.
- ecoclimatic province** – A broad complex of ecoclimatic regions that have similar climatic conditions as reflected by vegetation. Examples of such units generally approximate continental climatic zones. See **vegetation zone**.
- ecoclimatic region** – An area characterized by a distinctive regional climate as expressed by vegetation. Equivalent to a **domain**.
- ecodistrict** – A subdivision of an ecoregion based on distinct assemblages of relief, geology, landform, soils, vegetation, water, and fauna. Canadian ecological land classification (ELC) system unit. Scale 1:500,000 to 1:125,000. The subdivision is based on distinct physiographic and/or geological patterns. Originally referred to as a land district. See **ecological district**.
- ecological district** – Portion of land characterized by a distinctive pattern of relief, geology, geomorphology, and regional vegetation. See **ecodistrict**.
- ecological factor** – Element of the site that can possibly influence living organisms (e.g., water available for plants). This term is also frequently used to refer to ecological descriptors.
- Ecological Land Classification (ELC)** – The classification of lands from an ecological perspective, an approach that attempts to identify ecologically similar areas. The original system proposed by the Subcommittee on Biophysical Land Classification in 1969 included four hierarchical levels that are currently called ecoregion, ecodistrict, ecosection, and ecosite. Ecozone, ecoprovince and ecoelement were later added to the upper and lower levels of the hierarchy.
- ecological range** – Interval included between the lower and upper limits of an ecological factor allowing the normal development of a specific organism (or a group of organisms). *Syn.* range of tolerance or ecological amplitude.
- ecological region** – A region characterized by a distinctive regional climate as expressed by vegetation.
- ecological unit** – Very general term used to refer to a mapping or classification unit of any rank and based on ecological criteria.
- ecology** – Science that studies the living conditions of living beings and all types of interactions that take place between living beings on the one hand, and living beings and their environment on the other hand.
- ecoprovince** – A subdivision of an ecozone that is characterized by major assemblages of landforms, faunal realms, and vegetation, hydrological, soil and climatic zones. Canadian ecological land classification (ELC) system unit.
- ecoregion** – An area characterized by a distinctive regional climate as expressed by vegetation. Canadian ecological land classification (ELC) system unit. Scale 1:3,000,000 to 1:1,000,000. Originally referred to as a land region. See **ecological region** and **biogeoclimatic zone**.
- ecosite** –
1. A subdivision of an ecosection that consists of an area of land with a particular parent material, having a homogeneous combination of soils and vegetation. A Canadian ecological classification (EC) system mapping unit usually mapped at a scale of 1:50,000 to 1:10,000. Originally referred to as a "land type".
 2. In Alberta, ecosite is defined as an area with a unique recurring combination of vegetation, soil, landform, and other environmental components.
- ecosystem** –
1. A complex interacting system that includes all plants, animals, and their environment within a particular area.
 2. The sum total of vegetation, animals, and physical environment in whatever size segment of the world is chosen for study.

3. A volume of earth – space that is set apart from other volumes of earth – space in order to study the processes and products of production, particularly those transactions between a community of organisms and its nonliving environment.

ecotone – The transition zone between two adjacent types of vegetation that are different.

ecotype – A group of individuals of the same species that are genetically adapted to local ecological conditions.

ecozone – An area of the earth's surface representing large and very generalized ecological units characterized by interacting abiotic and biotic factors; the most general level of the Canadian ecological classification (EC) system.

edaphic – Related to the soil.

edaphic climax – See **climax**.

edaphic grid – A two-dimensional graphic illustrating the relationship between soil moisture and soil fertility.

edatopic grid – See **edaphic grid**.

elevation zone – Altitudinal zonation of vegetation.

elfinwood – See **krummholz**.

eluviation – The general process of removing, or leaching of, materials from a soil horizon in solution or suspension.

emergent vegetation – Plant species that have a part extending below the normal water level. Such plants are adapted to periodic flooding and include genera such as *Carex*, *Scirpus*, and *Typha*.

endangered species – Any indigenous species of fauna or flora whose existence in Canada is threatened with immediate extinction throughout all or a significant portion of its range, owing to the actions of humans.

endemic – An organism confined to a certain geographical area.

environment – The summation of all living and nonliving factors that surround and potentially influence an organism.

eoian – See **aeolian**.

erosion – The wearing away of the land surface by running water, wind, ice, or other geological agents, including such processes as gravitational creep.

esker – A long, usually narrow ridge of coarse-textured materials deposited on or under glaciers by flowing meltwaters. Eskers can be tens of metres high and hundreds of kilometres long.

Eutric – A soil classification Great Group designation indicating Brunisolic soils with a relatively high degree of base saturation – a pH (0.01M Ca Cl₂) of 5.5 or higher for 25 cm starting at the top of the B horizon.

eutrophic – Refers to nutrient rich status and little or no acid.

evapotranspiration – The combined loss of water by evaporation from the soil surface and by transpiration from plants.

exposure – Location of a site with respect to an environmental factor such as the sun, rain or wind.

fan (alluvial fan) – Unconsolidated materials at the base of a steep slope that were carried and deposited by flowing water; these deposits generally have a conical shape.

fauna –

1. A general term for animals.
2. A list of the animal species present in an area.

fen – A peat-covered or peat-filled wetland with a water table which is usually at or above the surface. The waters are mainly nutrient-rich, minerotrophic waters from mineral soils. The vegetation consists mainly of sedges, grasses, reeds and brown mosses with some shrub cover and at times, a scanty tree layer.

fertility, soil – The status of a soil with respect to the amount and availability of elements necessary for plant growth.

field guide – A field document with keys to identify a plant community, a forest type or a site from biological and physical criteria. These keys may include complete descriptions of plant communities, forest types or

forest sites of the region concerned.

fibric – An organic layer containing large amounts of weakly decomposed material whose origins are readily identifiable.

fine texture – Consisting of or containing large quantities of the fine fractions, particularly of silt and clay.

fire climax – Plant community that is maintained by repeated fires.

flark – A Swedish term to designate an elongated, wet, and muddy depression in a patterned peatland.

flat bog – A bog having a flat, featureless surface and occurring in broad, poorly defined depressions.

flood plain – An area adjacent to a stream or river, consisting of alluvial sediments, that is periodically inundated during periods of high stream flow.

flora –

1. A general term for plants.
2. A list of the plant species present in an area.

fluvial – Related to stream flow and its associated erosional/depositional processes.

fluvioeolian – Referring to sediments that have been deposited or reworked by both fluvial and aeolian processes; the deposits cannot be separated as either fluvial or aeolian.

fluvio-glacial – See **glaciofluvial**.

fluviolacustrine – Describing lacustrine deposits that have been partially reworked by fluvial processes.

floodplain – The land bordering a stream, built up of sediments from overflow of the stream and subject to inundation when the stream is at flood stage.

fluvial – Material that has been transported and deposited by streams and rivers (also alluvial).

foothills – Low subsidiary hills at the foot of a mountain.

forb – "Forb" is only used for herbaceous plants, and is generally used for broad-leaved herbs, regardless of whether they are monocots or dicots (e.g., *Maianthemum* is a forb).

forest – A relatively large assemblage of tree-dominated stands.

forest floor – Organic layer on soil surface consisting of one or more of L, F, and H horizons.

forest region – A major geographical zone characterized by a broadly uniform topography and the same dominant tree species.

forest site –

1. Portion of land whose physical and biological characteristics are sufficiently homogeneous to justify a specific silviculture, for a given species, with an expected productivity falling within known limits.
2. Forest planning unit whose bioclimatic, physical and plant characteristics imply some given silvicultural potential and constraints.

forest site type – Summary and synthesis of the characteristics of similar forest sites grouped according to topographic and geomorphological location, nature of soil, floristic composition and vegetation dynamics, etc. It is a classification unit but is often used to name a portion of an area as well as a typological unit.

forest type – An assemblage of forest sample plots with similar floristic composition, forest productivity, and site properties. See **vegetation type** and **association**.

forest typology – Study and classification of forest site (or forest types) according to growing sites, composition and stand evolution.

formation –

1. A regional vegetation zone composed of plants with similar physiognomy and environmental conditions.
2. A primary unit of bedrock in stratigraphy.

friable – A consistency term pertaining to the ease of crumbling of soils.

frost-free period – Season of the year between the last frost of spring and first frost of fall.

frost boil – See **earth hummock**

genotype – The genetic constitution of an individual that may be transmitted.

geomorphology – The study of landforms and their origin.

glaciation – The formation, movement, and recession of glaciers or ice sheets.

glacier – A mass of ice that develops as a result of snow and ice accumulation over a long period of time and that moves laterally from the centre of accumulation.

glaciofluvial – Pertaining to the meltwater streams, flowing from wasting glacier ice and especially to the deposits and landforms produced by streams; relating to the combined action of glaciers and streams.

glaciolacustrine – Pertaining to or characterized by glacial and lacustrine conditions. Said of deposits made in lakes affected by glacier ice or by meltwaters flowing directly from glaciers.

Gleysol – A soil of the Gleysolic Order .

Gleysolic – An Order of soils developed under wet conditions and permanent or periodic reduction. These soils have low chromas, or prominent mottling, or both, in some horizons. The Order includes Gleysol, Humic Gleysol and Luvic Gleysol Great Groups.

gradient (ecological gradient) – Continuous and regular variation of one or more ecological factors.

graminoid – A plant that is grass-like; the term refers to grasses and plants that look like grasses, i.e. only narrow-leaved herbs; in the strictest sense, it includes plants belonging only to the family *Poaceae*.

grassland – Vegetation consisting primarily of grass species occurring on sites that are arid or at least well-drained.

gravel – Rounded rock particles with sizes ranging from 2 mm to 75 mm in diameter. **gravelly** – Containing appreciable or significant amounts of gravel.

Gray – A soil classification Great Group designation indicating a surface (Ae or Ap horizon) colour value 5 or higher, dry (forest soils with organic matter content less than 2 percent).

Great Group – A subdivision of a soil order having some properties that reflect differences in the strength of soil-forming processes.

ground cover – The overall canopy cover of a plant community without reference to different strata.

groundwater – The subsurface water that is below the water table. That portion of the hydrosphere which at any particular time is either passing through or standing in the soil and the underlying strata and is free to move under the influence of gravity.

growing degree-days – Accumulated heat units above a threshold temperature of 5⁰C. See **degree-day**.

growing season – Number of days where the mean temperature is equal to or above 5⁰C.

habitat – The place in which an animal or plant lives. The sum of environmental circumstances in the place inhabited by an organism, population or community.

hardwood – A tree with broad leaves such as *Acer*, *Fraxinus*, *Populus*, and *Quercus*.

heath – Uncultivated land generally dominated by shrubs, such as ericaceous ones.

herb (herbaceous) – A nonwoody vascular plant.

high-centre polygons – See **low-centre polygons**.

hill – A prominence smaller than a mountain, usually <300 m.

hilly – Large landform elements with local relief in the 200 to 500 m range. This includes foothills, dissected plateaus and major uplands.

horizon – The basic unit of soil classification that is a horizontal layer of mineral or organic material having differentiated characteristics as a result of soil-forming processes.

horizontal fen – A fen with a very gently sloping, featureless surface. This type of fen occupies broad, often ill-defined depressions, and may be interconnected with other fens. Peat accumulation is generally uniform.

hue – One of the three variables of colour. A colour or shade of colour in the Munsell Soil Colour Chart such as red, green, or blue.

humic – An organic layer of highly decomposed material containing little fibre.

humification – The processes by which organic matter decomposes to form humus.

humus – A general term for partially or completely decomposed plant litter; well decomposed organic matter.

humus form – Group of soil horizons located at or near the surface of a pedon, which have formed from organic residues, either separate from, or intermixed with, mineral materials.

hummocky – A landform characterized by a complex surface of low- to moderate-relief (local relief generally less than 10 m) knolls and mounds of glacial sediments separated by irregular depressions, all of which lack linear or lobate forms (also called knob and kettle). Slopes are generally less than 0.8 km with gradients greater than 5 percent and up to 30 percent,

hydromorphic soil – A general term for soils that develop under conditions of poor drainage in marshes, swamps, seepage areas, or flats.

hydrophyte – A plant growing in water. In some cases, only the inflorescence lives out of the water.

ice-contact deposit – Deposits that occur when in contact with ice, such as kames and eskers.

ice-wedge polygon – A feature associated with areas of continuous permafrost in dry to moist mineral soil. When soil cools quickly, it shrinks and cracks form. Spring and summer meltwater flow into the cracks and freeze upon contacting the permafrost, creating ice wedges. This ice wedge cracks in subsequent years and ice accretion continues; the ice wedge can become a metre or more in width.

igneous rock – A type of rock that forms from the solidification of magma.

immature soil – A soil with indistinct or only slightly developed horizons.

impeded drainage – A condition which hinders the movement of water through soils under the influence of gravity.

impervious – Resistant to penetration by fluids or by roots.

inactive delta marsh – A marsh occupying higher portions of a delta, usually some distance from active river channels. The marsh is inundated only during very high flood stages or by wind-driven waves. Shallow water may be impounded for long periods of time.

indicator species – Species, usually plants, used to indicate an ecological condition such as soil moisture or nutrient regime that may not be directly measured.

insolation – Radiant energy received from the sun.

inventory – The systematic survey, sampling, classification, and mapping of natural resources.

irrigation – The artificial application of water to the soil for the benefit of growing crops.

isohyet – Lines of equal precipitation.

isostatic rebound – A general rise in the land surface following the removal of thick glacial ice.

isotherm – Lines of equal temperature.

kame – A conical hill or irregular ridge of sand and gravel that was deposited in contact with glacier ice.

karst – Surface and subsurface features created by the dissolving of soluble rock such as limestone or gypsum, which results in such features as caverns and sinkholes.

kettle – A depression created by the melting of glacial ice that was buried in moraine.

key – A taxonomic tool used to identify unknown objects (e.g., plants or plant communities) through the use of paired questions.

krummholz – Scrubby, stunted growth form of trees, often forming a characteristic zone at the limit of tree growth in mountains.

lacustrine – Material deposited in lake water and later exposed; sediments generally consisting of stratified fine sand, silt, and clay.

landform –

1. A topographic feature.
2. The various shapes of the land surface resulting from a variety of actions such as deposition or

sedimentation, erosion, and earth crust movements.

landscape –

1. All the natural features such as fields, hills, forests, water, etc., which distinguish one part of the earth's surface from another part. Usually that portion of land or territory which the eye can comprehend in a single view, including all its natural characteristics.
2. A heterogeneous land area composed of a cluster of interacting ecosystems that are repeated in similar form throughout. Landscapes can vary in size, down to a few kilometres in diameter.

landscape ecology –

1. A study of the structure, function, and change in a heterogeneous land area composed of interacting ecosystems.
2. The scientific basis for the study of landscape units from the smallest mappable landscape cell to the global ecosphere landscape in their totality as ordered ecological, geographical and cultural wholes.

Remark.: This concept fluctuates greatly from one author to the other. Nevertheless, the concept generally recognizes the importance of interactions between landscape elements, the necessity of a global approach and the importance of human activities. Impact of human activities on the landscape is recognized with the concept but it also recognizes the constraints imparted by the biophysical properties of the landscape.

landscape element – The basic, relatively homogeneous, ecological unit, whether of natural or human origin, on land at the scale of a landscape.

Layer – See **stratum**.

leaching – The removal of soluble materials from a soil horizon by percolating water.

levee – Flood-deposited fluvial materials; when floodwaters overflow streambanks, the resulting fluvial deposits accumulate and raise the streambanks above the adjacent floodplain.

level – Refers to land without slope.

limiting factor – Ecological factor that limits the development of an organism by its presence, absence or quantity irrespective of the state of other factors.

lithic – A feature of a soil subgroup which indicates a bedrock contact within the limits of the control section.

litter – The uppermost portion of plant debris on the soil surface, usually not decomposed.

loess – Material transported and deposited by wind and consisting of predominantly silt-sized particles.

lowland – Extended plains or land that occur below a significantly elevated area.

low-centre polygon – A feature of continuous permafrost in wet terrain (e.g., drained lakes). Ice wedges develop in cracks, pushing up soil ridges adjacent to the wedges and creating dams that trap water inside the resulting polygons. The features appear as high-rimmed ridges surrounding wet shallow central pools of water. Over hundreds or thousands of years, peat deposits build up and eventually create a dome-shaped surface; these features are referred to as **high-centre polygons**.

loam – See **soil texture**. A mixture of sand, silt and clay.

loose – A soil consistency term.

Luvisol – A soil of the Luvisolic Order.

Luvisolic – An Order of soils that have eluvial (Ae) horizons, and illuvial (Bt) horizons in which silicate clay is the main accumulation product. The soils developed under forest or forest-grassland transition in a moderate to cool climate. The Order includes Gray Brown Luvisol and Gray Luvisol Great Groups (the latter is the most common in western Canada).

macroclimate – Regional climate related to geographical location and relief.

mapping unit – Unit that allows the definition of a geographical reference context.

marsh – A wetland with a mineral or peat substrate inundated by nutrient rich water and characterized by emergent graminoid vegetation.

massif – A large mountain mass, or a group of connected mountains that form a mountain range.

meadow – A moist area usually dominated by grasses or forbs.

mean – The average of a range of numeric values.

meander – Looped pattern of a stream course.

median – The midpoint value above and below which 50 percent of numeric observations fall.

medium texture – Intermediate between fine-textured and coarse-textured (soils). (It includes the following textural classes: very fine sandy loam, loam, silt loam, and silt).

meltwater channel – A valley-like feature created by flowing water that originated from the melting of glacial ice.

mesic –

1. Describing the sites that are neither humid (hydic) nor very dry (xeric). Average moisture conditions for a given climate.
2. An organic layer of intermediately decomposed material (between that of fibric and humic).

mesoclimate – Macroclimate that undergoes local modifications to many of its elements. The climate of a forest or a slope is a mesoclimate.

mesotrophic – Medium nutrient status and moderately acidic.

metamorphic rock – Rock formed from preexistent rock after undergoing natural geological processes such as heat or pressure. It differs from the original rock in terms of its physical, chemical or mineral properties.

microclimate – Localized climatic conditions ranging down to conditions at the stand or even individual plant environment level.

mineral soil – A soil that is largely composed of unconsolidated mineral matter.

minerotrophic – Nourished by mineral water. It refers to wetlands that receive nutrients from mineral groundwater in addition to precipitation by flowing or percolating water.

mixed-wood – Forest stands composed of conifers and angiosperms each representing between 25 and 75% of the cover; for example, trembling aspen and white spruce mixed-wood forests.

modal site – A well to moderately well-drained site without topographic or edaphic extremes that could reflect the influences of regional climate rather than local site conditions. Also used to describe typical site conditions for an ecosystem unit. See **normal, zonal** and **reference site**.

moder – Partially decomposed litter as a result of soil faunal activity, usually not matted.

moderately-coarse texture – Consisting predominantly of coarse particles. (In soil textural classification, it includes all the sandy loams except the very fine sandy loam).

moderately-fine texture – Consisting predominantly of intermediate and fine sized particles. (In soil textural classification, it includes clay loam, sandy clay loam, and silty clay loam).

moisture deficit – A condition that occurs when evaporation and/or transpiration exceeds the available water supply.

moisture regime – Refers to the available moisture supply for plant growth estimated in relative or absolute terms.

mor – Raw plant litter, usually matted, with a distinctive boundary that occurs at the mineral soil surface, in which fungal activity is the primary method of decomposition.

moraine – A mound, ridge, or other distinct accumulation of generally unsorted, unstratified glacial drift, predominantly till, deposited chiefly by direct action of glacier ice, in a variety of topographic landforms that are independent of control by the surface on which the drift lies (19).

morphology, soil – The physical constitution, particularly the structural properties, of a soil profile as exhibited by the kinds, thickness and arrangement of the horizons and by the structure, consistence and porosity of each horizon.

mountain – Land with large differences in relief, usually refers to areas with more than 600 m of relief.

Munsell colour system – A colour designation system that specifies the relative degree of the three simple variables of colour: hue, value, and chroma. For example: 10YR 6/4 is a colour with a hue 10-YR, value - 6, and chroma -4. These notations can be translated into several different systems of colour names as desired. See chroma, hue, and value.

mull – Decomposed organic matter that has been incorporated with mineral soil; could represent an Ah horizon,

Munsell Soil Colour Chart – A booklet of standardized colour chips used to describe soil horizon colours.

mycorrhiza – The symbiotic association of fungi with the roots of seed plants.

natural province – Vast land mass (of the order of 100,000 km²) with characteristic features determined by major geological events. There are 3 Natural Provinces recognized in Alberta).

natural region – In Alberta, an extensive land mass (of the order of 20,000 km²) characterized by permanent geographic boundaries (geological, physiographic, etc.) and a certain uniformity and individuality of climatic, topographical, geomorphological and biological conditions.

natural subregion – In Alberta, an extensive land mass (of the order of 10,000 km²) characterized by permanent geographic boundaries (geological, physiographic, etc.) and a certain uniformity and individuality of climatic, topographical, geomorphological and biological conditions.

neutral soil – A soil having a pH value of approximately 7.0 in the surface horizons.

niche – A unique habitat or set of conditions that allows a species to exist with minimal competition from other species.

nonsoil – rock, water, snow or ice, mineral or organic material <10 cm thick over rock or soil materials displaced by unnatural processes such as earth fill.

non-sorted circle – A nonsorted circle is a *patterned ground* form that is equidimensional in several directions, with a dominantly circular outline which lacks a border of stones.

normal site – A site with deep loamy soils, with neither a lack nor an excess of soil nutrients, located in well-drained positions in the landscape and neither protected from, nor exposed to, local climatic extremes. See **zonal, modal** and **reference** site.

northern ribbed fen – A fen with parallel, low peat ridges (“strings”) alternating with wet hollows or shallow pools, oriented across the major slope at right angles to water movement. The depth of peat exceeds 1 m.

nutrient – Usually refers to one of a specific set of primary elements found in soil that are required by plants for healthy growth, such as nitrogen, phosphorus, potassium, calcium, magnesium, and sulphur.

nutrient regime – The relative level of nutrient availability for plant growth.

old growth – A stand of mature or overmature trees relatively uninfluenced by human activity.

oligotrophic – A condition of low nutrient status and acidic reaction).

ombrotrophic – An ecological system that derives its nutrients solely (or primarily) from precipitation.

Order – The highest taxonomic level in the Canadian System of Soil Classification, reflecting the nature of soil environment and the effects of dominant soil-forming processes.

Organic –

1. An Order of soils that have developed dominantly from organic deposits. The majority of organic soils are saturated for most of the year, unless artificially drained. The Great Groups include Fibrisol, Mesisol, Humisol and Folisol.
2. A soil classification Great Group designation indicating a Cryosolic soil formed in organic materials (e.g., a bog with permafrost).

organic matter – The decomposition residues of biological materials derived from: (a) plant and animal materials deposited on the surface of the soils; and (b) roots and micro-organisms that decay beneath the surface of the soil.

Orthic – A soil classification Subgroup designation indicating the usual or typical (central concept) for the Great Group.

outcrop – Exposure of bedrock at the ground surface.

outwash – Materials washed from a glacier by flowing water and laid down as stratified sorted beds. Generally, it is made up of stratified sand and/or gravel.

overstorey – The uppermost continuous layer of a vegetation cover, e.g., the tree canopy in a forest ecosystem or the uppermost layer of a shrub stand.

paralithic – Poorly consolidated bedrock which can be dug with a spade when moist. It is severely constraining but not impenetrable to roots.

palsa – A peaty permafrost mound possessing a core of alternating layers of segregated ice and peat or mineral soil material. Palsas are typically between 1 and 7 metres in height and a few metres to 100 metres in diameter.

parent material – The unconsolidated and more or less chemically unweathered material from which soil develops by pedogenic processes.

parkland – Relatively open forest at both low and high elevations; open in nature.

particle size – The size of a mineral particle as measured by sedimentation, sieving, or micrometric methods. Also referred to as grain size.

patterned ground – A general term for circles, polygons, strips, nets, and steps created by frost action.

peat – An accumulation of partially decomposed plant matter under saturated conditions.

peat moss – In scientific literature, peat material is classified on the basis of its botanical composition. The most common moss peat materials are feather moss peat, brown moss peat, *Drepanocladus* moss peat, and *Sphagnum* peat.

peat plateau bog – A bog composed of perennially frozen peat, rising abruptly about 1 m from the surrounding unfrozen fen. The surface is relatively flat and even, and often covers very large areas. The peat was originally deposited in a non-permafrost environment and is often associated with collapse scars or fens.

peaty – A soil classification phase designation indicating an accumulation of 15 cm to 40 cm of surface peat (15 – 60 cm if fibric).

peatland – Peatlands (organic wetlands) are characterized by more than 40 cm peat accumulation on which organic soils (excluding Folisols) develop.

ped – A unit of soil structure such as a prism or granule, which is formed by natural aggregates.

pediment – Any relatively flat surface of bedrock (exposed or veneered with alluvial soil or gravel) that occurs at the base of a mountain or as a plain having no associated mountain.

Pedogenesis – The mode of origin of the soil, especially the processes or soil-forming factors responsible for the development of the solum.

pedology – The aspects of soil science dealing with the origin, morphology, genesis, distribution, mapping, and taxonomy of soils.

pedon – A real unit of soil, the smallest homogenous, three-dimensional unit that can be considered a soil.

percolation, soil water – The downward movement of water through soil; especially, the downward flow of water in saturated or nearly saturated soil at hydraulic gradients of the order of 1.0 or less.

periglacial – The processes, conditions, areas, climates, and topographic features at the immediate margins of former and existing glaciers and ice sheets, and influenced by the cold temperature of the ice. Permafrost is a periglacial process.

permafrost – Ground (soil or rock and included ice and organic materials) that remain at or below 0°C for at least two consecutive years.

pH – A measure of acidity or alkalinity of a solution, based on hydrogen ion concentration.

phase – Judged to meaningfully subdivide the unit, especially for management purposes. The phase is not a formal category in the taxonomy.

phenotype – The observable structural and functional properties of an organism that derive from the interaction between its genotype and its environment.

physiognomy – The general appearance of vegetation by broadly defined life forms, such as forest or grassland.

physiographic region – Topographically similar landscapes with similar relief, structural geology and elevation at a mapping scale of 1:1,000,000 to 1:3,000,000.

physiographic subregion – A subdivision of a physiographic region based on distinct patterns of relief, geology and geomorphology, and drainage pattern and density at a mapping scale of 1:250,000 to 1:1,000,000.

physiography – The study of the genesis and evolution of land forms.

pingo – A mound of earth-covered ice found in the Arctic, Subarctic, and Antarctica that can reach up to 70 metres in height and up to 2 kilometres in diameter. The term originated as the Inuit word for a small hill.

pioneer species – Plant species that initially invade a newly exposed surface.

plain – A relatively large, level, featureless topographic surface.

plant community – A concrete or real unit of vegetation or a stand of vegetation.

plateau – An elevated area with steep-sided slopes and a relatively level surface

platy – Consisting of soil aggregates that are developed predominately along the horizontal axes, laminated; flaky.

plot – A vegetation sampling unit used to delineate a fixed amount of area for the purpose of estimating plant cover, biomass, or density. Plots can vary in their dimensions depending on the purpose of the study and the individual researcher.

polygonal peat plateau bog – A perennially frozen bog, rising about 1 m above the surrounding fen. The surface is relatively flat, scored by a polygonal pattern of trenches that developed over ice wedges. The permafrost and ice wedges developed in peat originally deposited in a non-permafrost environment. Polygonal peat plateaus are commonly found near the boundary between the zones of discontinuous and continuous permafrost.

population – A group that includes all possible members of a species in a territory at a given time.

postglacial – Occurring after glaciation.

potential – General evaluation of the possible biological productivity or carbon production potential of a site resource (or an area) usually expressed in terms of values to an appropriate management regime. It may be generally established or estimated from site components that represent a permanent character (e.g., soil quality).

potential climax – The species or plant community that will form the climax vegetation on a site. The existing species or plant association may be different from the potential climax due to site disturbance and successional stage.

prairie – An extensive area of native upland grass with a semi-arid to arid climate.

precipitation – A collective term for snowfall and rainfall.

primary succession – See **succession**.

pristine – An undisturbed natural condition.

productivity – A measure of the physical yield of a particular crop. It should be related to a specified management. Merchantable wood volume productivity is generally expressed in m³/ha/yr. It may be further subdivided into types (gross, net, primary) or allocations (leaves, wood, above ground, below ground).

profile, soil – A vertical section of the soil through all its horizons and extending into the parent material.

proglacial – Pertaining to all observable phenomena on the face of a glacier or just beyond its ablation area.

quadrat – A vegetation sampling unit with specific dimensions and shape.

quartzite – A hard, metamorphic rock derived from sandstone through heating and pressure. Pure quartzite is usually white to grey. Quartzites often occur in various shades of pink and red due to varying amounts of iron oxide. It is resistant to weathering, and because of the nearly pure silica content, breaks down to sand particles and provides little in the way of soil-forming materials.

reaction, soils – The degree of acidity or alkalinity of soil, usually expressed as a pH value.

range – An extended group or series, especially a row or chain of mountains.

rare species – Any indigenous species of fauna or flora that, because of its biological characteristics, or because it occurs at the fringe of its range, or for some other reasons, exists in low numbers or in very restricted areas of Canada but is not a threatened species.

reconnaissance – A level of field analysis that involves relatively quick sampling for the purpose of obtaining general information about an area. In some cases, sampling quality may be high, but the intensity of

sampling is very low relative to the size of the total area being studied.

reference site – A site that serves as a normal or modal condition, an "average" or benchmark in terms of vegetation, soil and general site conditions. See **modal**, **normal** and **zonal site**.

regeneration – The renewal of a forest crop by natural or artificial means. Also the new crop so obtained. The new crop is generally less than 1.3 metres in height.

Rego – A soil classification Subgroup designation indicating a soil profile with little or no B horizon – an AC profile (often caused by erosion truncation)

regolith – The unconsolidated mantle of weathered rock and soil material overlying solid rock.

Regosol – A soil of the Regosolic Order.

Regosolic – An Order of soils having no horizon development or development of the A and B horizons insufficient to meet the requirements of the other orders. Included are Regosol and Humic Regosol Great Groups.

relief – The difference between extreme elevations within a given area (local relief).

remote sensing – The gathering and interpretation of land-based information by indirect methods such as aerial photography or satellite imagery.

residual material – Unconsolidated and partly weathered mineral materials accumulated by disintegration of consolidated rock in place.

residual soil – Soil formed from, or resting on, consolidated rock of the same kind as that from which it was formed and in the same location.

ridge – An elongate crest or a linear series of crests; a range of hills or mountains.

riparian – Refers to terrain, vegetation or simply a position adjacent to or associated with a stream, flood plain, or standing waterbody.

rock – A consolidated mass of mineral matter; a general term for stones.

rolling – A landform characterized by a regular sequence of moderate slopes producing a wavelike pattern of moderate relief (20 to 100 metres). Slope lengths are often 1.6 km or greater with gradients usually greater than 5 percent.

runnel – A pattern of alternating flow channels and interchannel uplands perpendicular to contour. In permafrost-affected areas, light and dark-striped patterns on hill slopes are runnels; the light stripes are usually sparsely treed, lichen covered interchannel areas with permafrost close to the surface, and the dark stripes are shallow drainage channels vegetated by dwarf birch, willow and other shrubs with a thicker active layer.

runoff (run-off) – The portion of the total precipitation in an area that flows on the surface of the land, without entering the soil, reaches streams, and flows away through stream channels.

saline soil – A nonalkali soil containing soluble salts in such quantities that they interfere with the growth of most crop plants. The conductivity of the saturation extract is greater than 4 dS/m (formerly mmhos/cm), the exchangeable-sodium percentage is less than 15, and the pH is usually less than 8.5.

salinization – The process of accumulation of salts in soils.

sand – A soil particle between 0.05 and 2.0 mm in diameter.

saturation percentage – The amount of water required to saturate a unit of soil (often correlated with sodicity).

silt – A soil separate consisting of particles between 0.05 to 0.002 mm in equivalent diameter.

soil – The unconsolidated mineral material on the immediate surface of the earth that serves as a natural medium for the growth of land plants.

sand – Mineral particles with diameters ranging from 0.05 to 2.0 mm.

saprolite – See **residual soil**.

scree – See **talus**.

secondary succession – See **succession**.

sedimentary rock – A rock formed from materials deposited from suspension or precipitated from solution and usually more or less consolidated.

seepage – The slow movement of water near the soil surface, often occurring above an impermeable subsoil layer or at the boundary between bedrock and unconsolidated material that is exposed at ground surface, usually occurs downslope of the recharge area.

seral – Recognizably different succession stages along a successional path or sere.

seral stag – See **successional stage**.

shade tolerant – Plants capable of growing and successfully reproducing beneath the shading canopy of other species.

shield rock – Crystalline Precambrian rock that forms the core of continents.

shrub – A perennial plant usually with a woody stem, shorter than a tree, often with a multi-stemmed base.

shrubland – An area dominated by shrubs, usually individual plants not in contact and with a herbaceous ground cover.

silt – Mineral particles with a diameter of 0.05 to 0.002 mm.

site –

1. The place or the category of places, considered from an environmental perspective that determines the type and quality of plants that can grow there.
2. All the physical elements of a forest site (climate, deposit, drainage, etc.). It is a relatively homogeneous area in its physical permanent conditions.

site index (SI) – An expression of forest site quality based on the height of dominant and co-dominant trees at a specific age.

slope –

1. An inclined surface.
2. The steepness of an inclined surface, measured in degrees or percentages from the horizontal.

slope fen – A fen occurring mainly on slowly draining, nutrient enriched seepage slopes. Pools are usually absent, but wet seepage tracks may occur. Peat thickness seldom exceeds 2 metres.

slough – A Western Canadian term for a shallow prairie pond that largely disappears in late summer, often with a muddy bottom.

softwood – A coniferous tree such as *Pinus* (pine) or *Picea* (spruce) and/or forest type with a cover made up of 76 to 100 percent conifers.

soil – Unconsolidated mineral material or organic material >10 cm thick that occurs at the earth's surface and is capable of supporting plant growth. It is also the zone where the biological, physical, and atmospheric components of the environments interact.

soil map – A map showing the distribution of soil types or other soil mapping units in relation to the prominent physical and cultural features of the earth's surface.

soil moisture – Water contained in the soil.

soil profile – A vertical section of the soil through all its horizons and extending into parent material.

soil structure – The combination or arrangement of primary soil particles into secondary compound units or peds. The secondary units are characterized and classified on the basis of size, shape, and degree of distinctness into classes, types, and grades, respectively. Common terms for kind of structure are single grain, amorphous, blocky, subangular blocky, granular, platy, prismatic and columnar.

soil survey – The systematic classification, analysis, and mapping of soils within an area.

soil zone – A large area dominated by a zonal soil that reflects the influence of climate and vegetation.

solar radiation – See **insolation**.

Solonetz – A soil of the Solonetzic Order.

Solonetzic – An Order of soils developed mainly under grass or grass-forest vegetative cover in semi-arid to subhumid climates. The soils have a stained brownish or blackish solonetzic B (Bn, Bnt) horizon that can

be very hard when dry and a saline C-horizon. The order includes the Solonetz, Solodized Solonetz and Solod Great Groups.

solum – The upper horizons of a soil in which the parent material has been modified and in which most plant roots are contained. It usually consists of A and B horizons.

species – A group of organisms having a common ancestry that are able *to* reproduce only among themselves.

spring fen – A fen nourished by a continuous discharge of groundwater. The surface is marked by pools, drainage tracks and occasionally somewhat elevated “islands”. The nutrient level of water is highly variable between locations.

stand – A collection of plants having a relatively uniform composition and structure, and age in the case of forests.

stand density – A quantitative measure of tree cover on an area in terms of biomass, crown closure, number of trees, basal area, volume, or weight.

stand structure – The distribution of trees in a stand or group by age, size, or crown classes.

stratum – Horizontal levels in vegetation (e.g., canopy, shrub stratum, herb stratum) or soil (soil layers or strata).

string bog – a pattern of narrow (2-3 metres wide), low (less than 1 metre deep) ridges oriented at right angles to the direction of drainage. Wet depressions or pools occur between the ridges. The water and peat are very low in nutrients, as the water has been derived from ombrotrophic wetlands. Peat thickness exceeds 1 metre.

stone – Rock fragment with a diameter ranging from 25 to 60 cm.

story – A horizontal stratum or layer in a plant community; in forest appearing as one or more canopies.

subalpine – A zone in the mountains that occurs below the alpine.

subarctic – A zone immediately south of the Arctic characterized by stunted, open-growing spruce vegetation.

subclimax – Successional stage of a plant community preceding the climax.

subgroup – A subdivision of a soil great group, differentiated on the basis of the kind and arrangement of horizons that indicate conformity to the central concept of the great group, intergrading towards soils of another order, or other special features.

subsoil – A general term referring to the underlying part of the soil itself and that is often considered as being located under the A horizon.

substrate – The medium on which a plant grows.

succession – The progression within a community whereby one plant species is replaced by another until a stable assemblage for a particular environment is attained. **Primary succession** occurs on newly created surfaces, while **secondary succession** involves the development or replacement of one stable successional species by another on a site having a developed soil. Secondary succession occurs on a site after a disturbance (fire, cutting, etc.) in existing communities.

successional stage – Stage in a vegetation chronosequence in a given site. *Syn.* seral stage.

surficial materials – Unconsolidated materials that occur on the earth's surface.

swamp – A mineral-rich wetland characterized by a dense cover of deciduous or coniferous trees, or shrubs.

taiga – Refers to a coniferous boreal forest. Often, this term is used to refer to the vegetation zone of transition between boreal forest and tundra. This vegetal formation corresponds to a forest – tundra.

talus – A collection of fallen disintegrated material that has formed a pile at the foot of a steep slope.

terrace – Relatively level benches that are created and occur adjacent to streams or rivers, sometimes sharp or low breaks occur between individual terrace surfaces. These features are formed during a period of fluvial stability followed by a period of down cutting by a stream.

terrain See **topography**.

terrestrial – Pertaining to land as opposed to water.

Terric – A soil classification Subgroup designation indicating a mineral substrate within 40 cm to 140 cm of the surface (shallow peat).

texture – The relative proportions of sand, silt and clay (the soil separates) and coarser materials in a mineral sample. It is described in terms such as sand, loamy sand, sandy loam, loam, silt loam, clay loam, silty clay loam and clay that are often grouped into classes according to specific needs (fine texture, medium texture, moderately coarse texture, etc.).

thermokarst – The process by which characteristic landforms result from the thawing of ice-rich permafrost or the melting of massive ice.

thermokarst lake – A lake occupying a closed depression formed by settlement of the ground following thawing of ice-rich permafrost or the melting of massive ice.

threatened species – Any indigenous species of fauna or flora that is likely to become endangered in Canada if the factors affecting its vulnerability are not reversed.

till (glacial till) – Unstratified drift, deposited directly by a glacier without being reworked by meltwater. See also **moraine**

tor – Isolated rock outcrops; heavily weathered pillar-like remnants atop flat ridges; castellation above the surrounding terrain. Tors typically contain jointed blocks piled one upon the other.

topography – The physical features of an area such as land shape and relief.

toposequence – A sequence of related soils that differ one from the other primarily because of topography and its influence on soil-forming processes. The relationship between soil and vegetation types, primarily a response to different relief.

tree – A woody plant usually with a single main stem.

tree line – The uppermost elevation or northern limit of tree growth, usually on upland sites.

tundra – Treeless terrain, with a continuous cover of vegetation, found at both high latitudes and high altitudes. Tundra vegetation comprises lichens, mosses, sedges, grasses, forbs and low shrubs, including heaths, and dwarf willows and birches. This vegetation cover occurs most widely in the zone immediately north of the boreal forest including the treeless parts of the forest-tundra ecotone adjacent to the tree line. In high altitudes, tundra occurs immediately above the forest zone, and the upper altitudinal timberline. The term “tundra” is used to refer to both the region and the vegetation growing in the region. It should not be used as an adjective to describe lakes, polygons or other physiographic features. Areas of discontinuous vegetation in the polar semi-desert of the High Arctic are better termed **barrens**. Unvegetated areas of polar desert may be caused by climatic (too cold or too dry) or edaphic (low soil nutrients or toxic substrate) factors or a combination of both.

Typic – A soil classification Subgroup designation indicating a depth of more than 140 cm of organic material.

undergrowth – All the shrubs, herbaceous plants and mosses growing under a canopy.

understory – Vegetation growing beneath taller plants such as trees or tall shrubs.

undulating – A landform with a regular sequence of gentle slopes producing a wavelike pattern of low local relief. Slopes are generally less than 0.8 km long with gradients of less than 5 percent.

uneven-aged – Of a forest, stand, or forest type in which intermingling trees differ markedly in age.

upland –

1. A general term for an area that is elevationally higher than the surrounding area, but not a plateau.
2. An area that is not a wetland and that is also not imperfectly or poorly-drained.

valley – Any hollow or low-lying area bounded by hill or mountain ranges, and usually traversed by a stream.

value, colour – One of the three variables of colour. A Munsell Soil Colour Chart notation that indicates the lightness of a colour.

vegetation – The general cover of plants growing on the landscape.

vegetation structure – The vertical stratification associated with a plant community.

vegetation type –

1. An abstract vegetation classification unit, not associated with any formal system of classification.
2. In phytosociology, the lowest possible level to be described. See **forest type** and **association**.

vegetation zone – A naturally occurring band of vegetation that occupies a particular environment such as an

elevational zone (e.g., subalpine zone).

veneer – A thin layer of unconsolidated material between 10 and 100 cm thick that does not mask the topographic character of the underlying terrain.

veneer bog – A bog occurring on gently sloping terrain underlain by generally discontinuous permafrost. Although drainage is predominantly below the surface, overland flow occurs in poorly defined drainage ways during peak runoff. Peat thickness is generally less than 1.5 metres.

von Post humification scale – A manual method for estimating degree of decomposition of peat materials. It is a 10 point scale with assessment based on colour of drained water and structure of hand squeezed material.

watershed – All lands enclosed by a continuous hydrologic – surface drainage divide and lying upslope from a specified point on a stream. See **drainage basin**.

water table – The upper surface of groundwater or that level below which the soil is saturated with water.

weathering – The physical and chemical disintegration, alteration and decomposition of rocks and minerals at or near the earth's surface by atmospheric agents.

wetland – Land that is saturated with water long enough to promote hydric soils or aquatic processes as indicated by poorly-drained soils, hydrophytic vegetation, and various kinds of biological activity that are adapted to wet environments.

wildlife – Natural fauna, usually limited to macro-organisms such as mammals, birds, reptiles, and amphibians.

windfall – A tree uprooted or broken off by wind, and areas containing such trees.

woodland – woody plants 2-8 metres tall growing somewhat closely spaced.

xeric – Describes a dry site.

zonal – Describing a soil that reflects the influence of climate and climactic vegetation (e.g., Luvisol).

zonal site – Site with conditions that could potentially support climatic climax plant communities and their associated soils and thus reflect the regional climate. See **normal**, **modal** and **reference** site.

zonation – The natural stratification of the landscape in response to significant area differences.

