4.8 Nechako Moist Very Cold Engelmann Spruce - Subalpine Fir [20]

Location
The ESSFmv1 occurs primarily in the western portion of the guide area at higher elevations. It extends from Stuart Lake in the north to the Naglico Hills in the south. It occurs above either the SBSmc3 or SBSmc2.

Elevation range
1150 - 1550 m

Climate
The ESSFmv1, being situated at high elevation above a relatively high, cold plateau, is the coldest unit in the guide area. It is intermediate in precipitation, with a high proportion of this falling as snow.

Soils, Geology, and Landforms
The upland areas in which this subzone occurs are underlain by more erosion-resistant intrusive and volcanic rocks of predominantly Mesozoic age. Soils consist mostly of Humo-Ferric Podzols, reflecting more intense weathering under the moister conditions at high elevation. Parent materials are predominantly morainal, with textures ranging from gravelly sandy loam to gravelly loam.

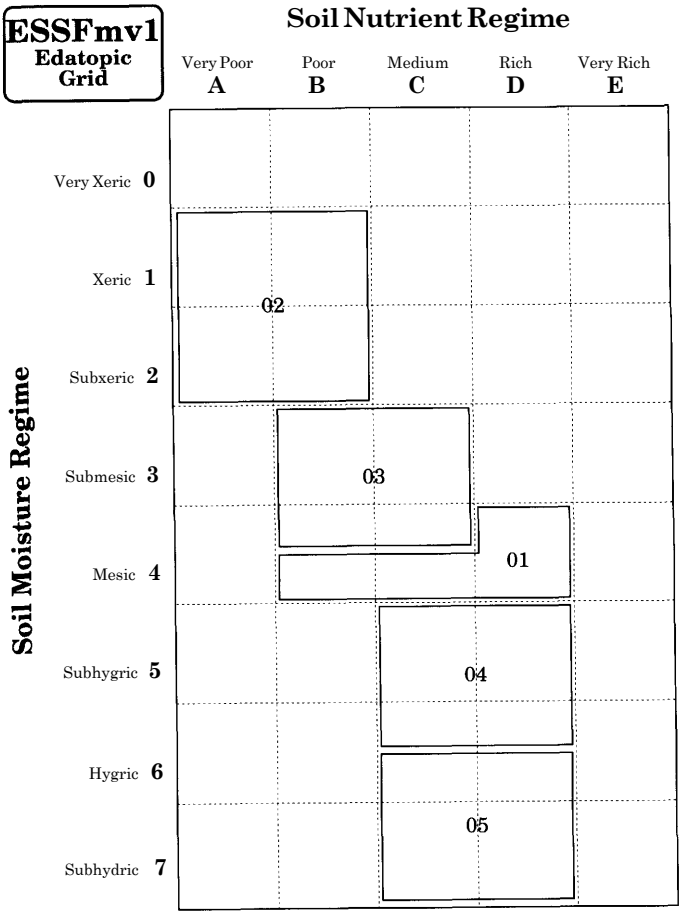
Distinguishing the ESSFmv1 from adjoining biogeoclimatic units
SBSmc3 has:
- more prickly rose, but less white-flowered rhododendron in the shrub layer; and
- trailing raspberry, but less five-leaved bramble in the herb layer on mesic and wetter sites

SBSmc2 has:
- more prickly rose, but less white-flowered rhododendron in the shrub layer; and
- oak fern and devil's club on wetter sites.

Forests
Climax forests are dominated by hybrid white spruce and subalpine fir. Lodgepole pine dominates on drier sites. Black spruce occurs in wetlands and also on upland sites on poor soils in combination with lodgepole pine. Black cottonwood occurs along streams and rivers and is often associated with hybrid white spruce.

Wildlife
Willow and scrub birch subalpine is used until late fall by moose. Pine - fir stands with arboreal lichen are sometimes used during the winter by caribou. Coniferous forests are used by moose, grizzly bear, wolverine, marten, red squirrel, blue grouse, and spruce grouse.

[20] formerly ESSFv



01 Bl - Rhododendron - Feathermoss
02 Pl - Huckleberry - Cladonia
03 Bl - Huckleberry - Feathermoss
04 Bl - Huckleberry - Gooseberry
05 Bl - Horsetail - Glow moss

FIGURE 23. Edatopic grid displaying site units in the ESSFmv1 variant.

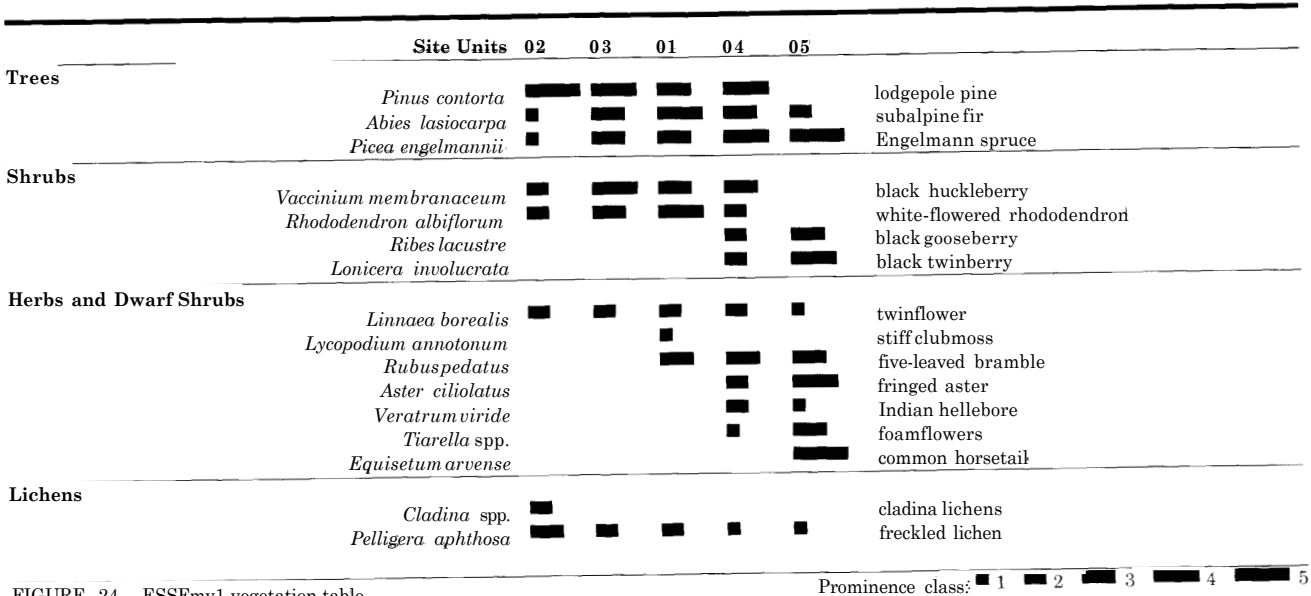


FIGURE 24. ESSFmv1 vegetation table.

1a Water table or evidence of a periodic water table (mottles) generally within 50 cm of the ground surface; *Lonicera involucrata* (p. 48)[21] and *Aster ciliolatus* (p. 117) present.

2a Water table present within 50 cm of ground surface; often thick organic layers (> 25 cm); *Equisetum* spp. (p. 280) abundant.

ESSFmv1/05

2b Water table generally not present within 50 cm of ground surface; organic layer rarely > 25 cm; *Equisetum* spp. low cover (< 5%) or absent.

ESSFmv1/04

1b Water table or evidence of periodic water table generally not present; *Lonicera involucrata* and *Aster ciliolatus* very low cover (< 1%) or absent.

3a Canopy dominated by lodgepole pine; on coarse-textured soils or shallow soils over bedrock *Cladina* spp. (p. 334) present and generally abundant (> 5% cover).

ESSFmv1/02

3b Canopy dominated by lodgepole pine, Engelmann spruce, or subalpine fir; soils variable; *Cladina* spp. low cover (< 5%) or absent.

4a Generally found in upper slope positions; *Rubus pedatus* (p. 92) very low cover (< 1%) or absent.

ESSFmv1/03

4b Slope position mid to upper; *Rubus pedatus* generally present.

ESSFmv1/01

[21] Page numbers refer to the publication *Plants of Northern British Columbia* (MacKinnon *et al.* 1992).

ESSFmv1/01

Bl - Rhododendron - Feathermoss

Rhododendron albiflorum

VEGETATION

Tree Layer: 35% cover
subalpine fir, Engelmann spruce, (lodgepole pine)

Shrub Layer: 35% cover

Vaccinium membranaceum	(black huckleberry)
Rhododendron albiflorum	(white-flowered rhododendron)
Alnus crispa ssp. *sinuata*	(Sitka alder)
subalpine fir	

Herb Layer: 20% cover

Orthilia secunda	(one-sided wintergreen)
Linnaea borealis	(twinflower)
Cornus canadensis	(bunchberry)
Lycopodium annotinum	(stiff clubmoss)
Rubus pedatus	(five-leaved bramble)
Arnica cordifolia	(heart-leaved arnica)

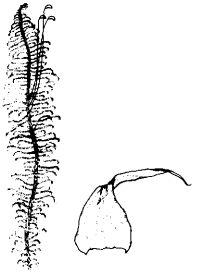
Moss Layer: 95% cover

Pleurozium schreberi	(red-stemmed feathermoss)
Ptilium crista-castrensis	(knight's plume)
Peltigera aphthosa	(freckle lichen)
Dicranum scoparium	(broom moss)

Rubus pedatus

SOIL AND SITE

Moisture Regime:	4 (m)
Nutrient Regime:	B-D (p-r)
Slope Gradient (%):	20 (5-65)
* Slope Position:	generally mid to upper
Parent Material:	morainal
Soil Texture:	variable but often medium
Coarse Fragments (%):	42 (25 - 85)



Ptilium crista-castrensis

DISTRIBUTION: very common, widespread, and often large

Bl - Rhododendron - Feathermoss (ESSFmv1/01)

INTERPRETATIONS

Site limitations:
- sites within this unit with thick organic horizons (> 10 cm) have reduced spring soil temperatures, slowing root development; ***reduce organic horizon thickness during site preparation.***

Silviculture system:
- see Section 5.1
- log on firm snowpack if considering use of advance regeneration.
- if using a partial cutting system, patches of mineral soil should be exposed to promote natural spruce regeneration.
- minimize or align large slash accumulations when logging to help meet site preparation objectives and reduce fire hazard.

Site preparation:
- see Section 5.2

Species choice:
- Bl, Se, [Pl]

Vegetation potential:
- moderate to high (white-flowered rhododendron, fireweed)

Reforestation:
- try to preserve advance regeneration if it is abundant and likely to release and form an acceptable stand.
- advance Bl regeneration should only be accepted if it is likely to reach management objective before it is 150 years old.
- use of advance Se and Bl regeneration that can be protected by the snowpack should be considered if it is abundant and well distributed.
- plant in summer with stock which has already set bud.

Concerns:
- site conditions may lead to frost damage of regeneration, especially in any naturally occurring or artificially created depression; ***leaving a partial canopy and/or choosing a frost resistant species (eg., Pl) are advised:***
- heavy snowpack may cause stem deformity, especially on steep slopes.
- if heavy equipment is used in summer, during or after partial cutting, every attempt should be made to avoid disturbing roots of standing trees.

ESSFmv1/02

Pl - Huckleberry - Cladonia

Spiraea betulifolia

Juniper communis

Pleurozium schreberi

VEGETATION

Tree Layer: 25% cover
lodgepole pine

Shrub Layer: 20% cover

Vaccinium membranaceum	(black huckleberry)
Spiraea betulifolia	(birch-leaved spirea)
Alnus crispa ssp. *sinuata*	(Sitka alder)
Juniperus communis	(common juniper)
lodgepole pine	
subalpine fir	

Herb Layer: 15% cover

Linnaea borealis	(twinflower)
Arnica cordifolia	(heart-leaved arnica)
Orthilia secunda	(one-sided wintergreen)
Calamagrostis canadensis	(bluejoint)
Vaccinium caespitosum	(dwarf blueberry)

Moss Layer: 85% cover

Pleurozium schreberi	(red-stemmed feathermoss)
Peltigera aphthosa	(freckle lichen)
Polytrichum juniperinum	(juniper haircap moss)
Cladina arbuscula	
Stereocaulon tomentosum	(woolly coral lichen)

SOIL AND SITE

Moisture Regime:	1-2 (x-sx)
Nutrient Regime:	A-B (vp-p)
Slope Gradient (%):	15 (5-25)
* Slope Position:	upper or crest
* Parent Material:	glaciofluvial or morainal veneer over rock
* Soil Texture:	generally coarse
Coarse Fragments (%):	30 (15-50)

DISTRIBUTION: uncommon, and small in size

Pl - Huckleberry - Cladonia (ESSFmv1/02)

INTERPRETATIONS

Site limitations:
- site and soil conditions of this unit result in marginal forest productivity; ***serious consideration should be given to excluding logging from this unit.***
- sites within this unit with high coarse fragment content (> 70%) will have significantly reduced soil moisture retention and will be extremely difficult to plant; ***attempt to regenerate naturally by retaining Pl cones or retain advance regeneration.***

Silviculture system:
- see Section 5.1
- minimize or align large slash accumulations when logging to help meet site preparation objectives and reduce fire hazard.

Site preparation:
- light scarification for seedbed preparation or summer logging with no site preparation

Species choice:
- Pl, ***(Bl)***

Vegetation potential:
- low

Reforestation:
- attempt to regenerate naturally if potential exists.
- if natural regeneration is not feasible, plant Pl.

Concerns:
- heavy snowpack may cause stem deformity, especially on steep slopes.
- full tree harvesting will lead to nutrient depletion and seriously reduce cones; ***woody debris and cones should be distributed across these sites (i.e. lop and scatter).***

ESSFmv1/03

Bl-Huckleberry-Feathermoss

Vaccinium membranaceum

Cornus canadensis

Peltigera aphthosa

VEGETATION

Tree Layer: 35% cover
lodgepole pine, [Engelmann spruce, subalpine fir]

Shrub Layer: 30% cover
Vaccinium membranaceum (black huckleberry)
Rhododendron albiflorum (white-flowered rhododendron)
subalpine fir

Herb Layer: 15% cover
Cornus canadensis (bunchberry)
Orthilia secunda (one-sided wintergreen)
Linnaea borealis (twinflower)
Arnica cordifolia (heart-leaved arnica)
Epilobium angustifolium (fireweed)
Lycopodium annotinum (stiff clubmoss)

Moss Layer: 95% cover
Pleurozium schreberi (red-stemmed feathermoss)
Ptilium crista-castrensis (knight's plume)
Peltigera aphthosa (freckle lichen)
Polytrichum juniperinum (juniper haircap moss)
Hylocomium splendens (step moss)

SOIL AND SITE

Moisture Regime:	3 (sm)
Nutrient Regime:	B-C (p-m)
Slope Gradient (%):	21 (0 - 50)
* Slope Position:	upper - (mid) or level
* Parent Material:	morainal veneer over rock or glaciofluvial
* Soil texture:	coarse - medium
Coarse Fragments (%):	30 (12 - 47)

DISTRIBUTION: common, and widespread

Bl - Huckleberry - Feathermoss (ESSFmv1/03)

INTERPRETATIONS

Site limitations:
- sites within this unit with high coarse fragment content (> 70%) will have significantly reduced soil moisture retention and will be extremely difficult to plant; ***attempt to regenerate naturally by retaining Pl cones or retain advance regeneration.***

Silviculture system:
- see Section 5.1
- minimize or align large slash accumulations when logging to help meet site preparation objectives and reduce fire hazard.

Site preparation:
- drag scarify; mix humus with mineral or light broadcast burn.

Species choice:
- Bl, Se, Pl

Vegetation potential:
- low

Reforestation:
- attempt to regenerate naturally if potential exists.
- if natural regeneration is not feasible, plant mixtures of Pl, Se, and Bl.

Concerns:
- sites within this unit with shallow and/or coarse-textured soils are vulnerable to nutrient deficiency if forest floors are reduced; ***site preparation methods that reduce forest floor thickness, such as slashburning or brushblading, must be avoided.***
- full tree harvesting will lead to nutrient depletion and seriously reduce cones; ***woody debris and cones should be distributed across these sites (i.e. lop and scatter).***

ESSFmv1/04

Bl- Huckleberry - Gooseberry

Ribes lacustre

Aster ciliolatus

Pyrola asarifolia

VEGETATION

Tree Layer: 40% cover
Engelmann spruce, lodgepole pine, [subalpine fir]

Shrub Layer: 25% cover

Vaccinium membranaceum	(black huckleberry)
Ribes lacustre	(black gooseberry)
Lonicera involucrata	(black twinberry)
Sorbus scopulina	(western mountain-ash)
subalpine fir	

Herb Layer: 25% cover

Linnaea borealis	(twinflower)
Aster ciliolatus	(fringed aster)
Amica cordifolia	(heart-leaved arnica)
Pyrola asarifolia	(rosy wintergreen)
Orthilia secunda	(one-sided wintergreen)
Petasites frigidus var. *palmatus*	(palmate coltsfoot)
Osmorhiza chilensis	(mountain sweet-cicely)
Pyrola chlorantha	(green wintergreen)
Rubus pedatus	(five-leaved bramble)
Veratrum viride	(Indian hellebore)
Cornus canadensis	(bunchberry)
Tiarella trifoliata	(three-leaved foamflower)

Moss Layer: 95% cover

Pleurozium schreberi	(red-stemmed feathermoss)
Ptilium crista-castrensis	(knight's plume)
Dicranum fuscescens	(curly heron's-bill moss)
Peltigera aphthosa	(freckle lichen)

SOIL AND SITE

Moisture Regime:	5-6 (shg-hg)
Nutrient Regime:	C-D (m-r)
* Slope Gradient (%):	12 (0-15)
* Slope Position:	mid - toe or depression
Parent Material:	morainal or glaciofluvial
* Soil Texture:	medium - fine
Coarse Fragments (%):	40 (25-65)

DISTRIBUTION: common, but generally not large

Bl - Huckleberry - Gooseberry (ESSFmv1/04)

INTERPRETATIONS

Site limitations:
- sites within this unit with thick organic horizons (> 10 cm) have reduced spring soil temperatures, slowing root development; ***reduce organic horizon thickness during site preparation.***

Silviculture system:
- see Section 5.1
- log on firm snowpack if considering use of advance regeneration.
- if using a partial cutting system, patches of mineral soil should be exposed to promote natural spruce regeneration.
- minimize or align large slash accumulations when logging to help meet site preparation objectives and reduce fire hazard.

Site preparation:
- see Section 5.2

Species choice:
- Bl, Se, [Pl]

Vegetation potential:
- moderate to high (white-flowered rhododendron, fireweed)

Reforestation:
- try to preserve advance regeneration if it is abundant and likely to release and form an acceptable stand.
- advance Bl regeneration should only be accepted if it is likely to reach management objective before it is 150 years old.
- use of advance Se and Bl regeneration that can be protected by the snowpack should be considered if it is abundant and well distributed.
- plant in summer with stock which has already set bud.

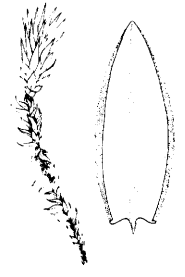
Concerns:
- site conditions may lead to frost damage of regeneration, especially in any naturally occurring or artificially created depression; ***leaving a partial canopy and/or choosing a frost-resistant species (eg., Pl) are advised.***
- sites within this unit with fine-textured soils are vulnerable to compaction under wet conditions; ***restrict traffic to winter operations or dry soil conditions.***
- heavy snowpack may cause stem deformity, especially on steep slopes.
- if heavy equipment is used in summer, during or after partial cutting, every attempt should be made to avoid disturbing roots of standing trees.

ESSFmv1/05

B1 - Horsetail - Glow moss

Lonicera involucrata

Equisetum arvense



Aulacomnium palustre

VEGETATION

Tree Layer: 30% cover
Engelmann spruce

Shrub Layer: 35% cover

Lonicera involucrata	(black twinberry)
Ribes lacustre	(black gooseberry)
Salix spp.	(willows)
subalpine fir	

Herb Layer: 90% cover

Equisetum arvense	(common horsetail)
Aster ciliolatus	(fringed aster)
Tiarella trifoilata	(three-leaved foamflower)
Rubus pedatus	(five-leaved bramble)
Calamagrostis canadensis	(bluejoint)
Mitella nuda	(common mitrewort)
Valeriana sitchensis	(Sitka valerian)
Senecio triangularis	(arrow-leaved groundsel)

Moss Layer: 95% cover

Aulacomnium palustre	(glow moss)
Drepanocladus fluvitans	(_____)
Hylocomium splendens	(step moss)
Pleurozium schreberi	(red-stemmed feathermoss)

SOIL AND SITE

Moisture Regime:	6-7 (hg-shd)
Nutrient Regime:	C-D (m-r)
* Slope Gradient (%):	2
* Slope Position:	level or depression
Parent Material:	organic or fluvial
Soil Texture:	variable
Coarse Fragments (%):	15
* Seepage Water:	generally present

DISTRIBUTION: uncommon, and small in size; associated with areas of poor soil moisture drainage

Bl - Horsetail - Glow moss (ESSFmv1/05)

INTERPRETATIONS

Site limitations:
- sites within this unit with saturated soils are poorly aerated, which slows root development; ***plant seedlings on naturally or artificially raised microsites.***
- sites within this unit with thick organic horizons (> 10 cm) have reduced spring soil temperatures, slowing root development; ***reduce organic horizon thickness during site preparation.***
- very difficult sites to manage; ***serious consideration should be given to managing these sites as wildlife corridors.***

Silviculture system:
- see Section 5.1

Site preparation:
- see Section 5.2
- creating an excessive number of mounds (eg., >300/ha) should be avoided, especially on sites within this unit with a water table < 30 cm from the surface.

Species choice:
- ***Se, Bl, [Pl]***

Vegetation potential:
- high (black twinberry, fireweed, bluejoint)

Reforestation:
- plant large planting stock on raised microsites.
- plant stock in groups, using available raised microsites, rather than evenly across the site.
- young Bl regeneration (< 3 m tall) may be susceptible to heavy browsing by moose.
- plant in summer with stock that has already set bud.

Concerns:
- site conditions may lead to frost damage of regeneration, especially in any naturally occurring or artificially created depression; ***leaving a partial canopy and/or choosing a frost-resistant species (eg., Pl) are advised.***
- sites within this unit with high water tables, combined with thick organic horizons (> 10 cm), increase the windthrow hazard; ***block layouts must have windfirm boundaries, or a wide buffer of standing timber must be left around such sites.***
- water table will likely rise above the ground surface in the spring, causing seedling mortality.
- these units represent important wildlife habitat, so prescription should be discussed with fish and wildlife personnel.
- this unit is critical to the control of runoff stream flow.

Compared to the ESSFxv, however, the forests are dominated primarily by Engelmann spruce and subalpine fir, feathermosses are more prevalent, ground lichens are less abundant, and pinegrass is present on south-facing slopes. Douglas-fir is also present within the ESSFxc on the Marble Range.

ESSFdc2 Variant The ESSFdc2 occurs primarily on the Thompson Plateau in the Kamloops Forest Region (Lloyd *et al*. 1990) but has a small extent along the southeast border of the Cariboo Forest Region in the Bowers Lake to Bonaparte Lake area. Here, it occurs on relatively low, rounded summits above the SBSmc and SBSmm, at elevations of 1400–1900 m.

The ESSFdc2 has a climate drier than that of the ESSFwk1 and ESSFwc3 but wetter than that of the ESSFxc or ESSFxv. Mean annual temperatures are similar to the ESSFwk1.

Vegetation of the ESSFdc2 is distinguished from other ESSF units of the Region by the presence of grouseberry and abundant white-flowered rhododendron and by the absence of black crowberry. Seral stands of lodgepole pine cover the ESSFdc2 landscape in the Cariboo Forest Region. Subalpine fir and Engelmann spruce are common in the understory. The shrubby undergrowth includes white-flowered rhododendron, black huckleberry, and grouseberry.

ESSFmv1 Variant The ESSFmv1 occurs primarily in the Prince George Forest Region and has only a very small extent (12 km^2) within the Cariboo Forest Region. It is present on the relatively low, rounded summits in the Blackwater–Nazko area west of Pantage Lake at elevations above 1400 m. The climate is drier than that of the ESSFwk and ESSFwc but wetter than all other ESSF climates in the Region. Refer to DeLong *et al.*(1993) for a description of this variant.

ESSFwk1 Variant The ESSFwk1 includes the largest portion of the ESSF Zone (3610 km^2) within the Quesnel Highland. It occurs between 1200 and 1500 m elevation from the northern limits of the Quesnel Highland in the Prince George Forest Region south to about Canim and Mahood lakes. South of the Cariboo River, it occurs above the ICHwk, while to the north it occurs above the SBSwk. Throughout its range, it occurs below the ESSFwc3. Topography of the ESSFwk1 ranges from

ESSFmv1
ENGELMANN SPRUCE–SUBALPINE FIR MOIST VERY COLD SUBZONE NECHAKO VARIANT

The ESSFmv1 includes a very small area (12 km^2) of the Cariboo Forest Region near the confluence of the Nazko and Blackwater rivers. Here it occurs on the summits of high hills at elevations above approximately 1400 m. The ESSFmv1 is much more extensive in the southwest portion of the Prince George Forest Region from Stuart Lake in the north to the Naglico Hills in the south (DeLong *et al*. 1993).

Distinguishing Adjacent Units from the ESSFmv1 (Cariboo Forest Region only)

The **SBSmc2** occurs at elevations below the ESSFmv1 in the Cariboo Forest Region.

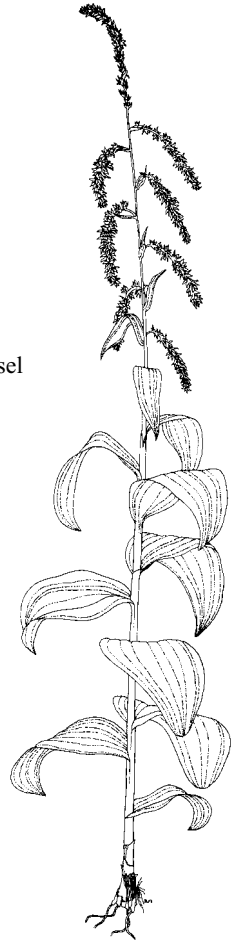
In the **SBSmc2**, zonal sites have:
• little or no white-flowered rhododendron or Sitka valerian.

Site Units of the ESSFmv1

Site units of the ESSFmv1 have been described for the Prince George Forest Region by DeLong *et al.* (1993) ("A Field Guide for Site Identification and Interpretation for the Southwest Portion of the Prince George Forest Region") and generally apply to the ESSFmv1 in the Cariboo Forest Region. The reader should refer to this guide for a description of site units of the ESSFmv1 in the Cariboo Forest Region.

Five-leaved bramble
Rubus pedatus

Arrow-leaved groundsel
Senecio triangularis



Indian hellebore
Veratrum viride