

TABLE 4.1 Summary of climate data for biogeoclimatic units within the guide area^a

Climatic Characteristics		Biogeoclimatic Unit					
		BWBSdk ₁	ESSFmv ₃	SBSmk ₂	SBSwk ₂	SBSwk ₃	SWBmk
Annual precipitation (mm)	Mean	417 (502) ^b	(743)	692 (543)	952 (759)	608 (622)	579 (664)
	Range	326–513	N/A	N/A	518–1916	518–698	459–699
	SD ^c	(123)	(118)	(77)	(260)	(77)	(116)
Growing-season precipitation (mm)	Mean	221	262	249	335	239	341
	Range	130–278	202–316	209–296	198–583	198–293	254–442
Annual snowfall (cm)	Mean	157	N/A	337	786	209	269
	Range	15–269	N/A	N/A	210–1075	N/A	144–395
Annual temperature (°C)	Mean	-0.3 (-0.7)	(0.4)	1.2 (1.6)	1.4 (1.3)	2.4 (1.7)	-1.5 (-1.7)
	Range	-1.9–2.0	N/A	0.7–1.9	-0.1–5.0	N/A	-3.2–0.5
	SD	(1.2)	(0.7)	(0.6)	(0.7)	(0.5)	(0.7)
Growing degree days (>5 °C)	Mean	953	N/A	1110	1139	1188	667
	Range	595–1897	N/A	N/A	984–1139	866–1510	534–933
Frost-free period (days)	Mean	N/A	N/A	75	91	104	58
	Range	N/A	N/A	N/A	88–95	79–128	37–99

^a Reynolds, G. 1989. Climatic data summaries for the biogeoclimatic zones of British Columbia. B.C. Min. For., Research Branch, Victoria, B.C., unpublished report.

^b Data in brackets are estimated using an overlay of the biogeoclimatic map and climatic maps modelled using the PRISM process (Daly et al. 1997)

^c Standard deviation of the mean.

6 OMINECA MOIST VERY COLD ENGELMANN SPRUCE – SUBALPINE FIR (ESSFmv3)¹

Location

The ESSFmv3 occurs in the Omineca Mountains as far south as Mt. Mackinnon, as far north as the Ingenika River, as far east as Williston Lake and as far west as Babine Lake.

Elevation range

900 – 1300 m

Climate

The ESSFmv3 has a subalpine climate so much of the precipitation falls as snow. Estimated mean annual precipitation is similar to that for the SBSwk2 (Table 4.1). Growing-season precipitation is intermediate between the SBSmk2 and SBSwk2. Estimated mean annual temperature is lower than that in all the SBS biogeoclimatic units in the guide area but higher than in the BWBSdk1 and SWBmk.

Distinguishing the ESSFmv3 from adjoining biogeoclimatic units

BWBSdk1, SBSmk1, SBSwk2, and SBSwk3 have:

- less white-flowered rhododendron but more black twinberry, highbush-cranberry and/or prickly rose in the shrub layer on mesic sites; and
- little or no heart-leaved arnica but more palmate coltsfoot and/or oakfern in the herb layer on mesic sites.

ESSFmc has:

- less white-flowered rhododendron but more false azalea in the shrub layer on mesic sites; and
- less stiff clubmoss but more five-leaved bramble in the herb layer on mesic sites.

SBSmc2 has:

- less white-flowered rhododendron but more black twinberry and/or prickly rose in the shrub layer on mesic sites; and

¹ Formerly ESSFn3

- less stiff clubmoss but more five-leaved bramble in the herb layer on mesic sites.

SWBmk has:

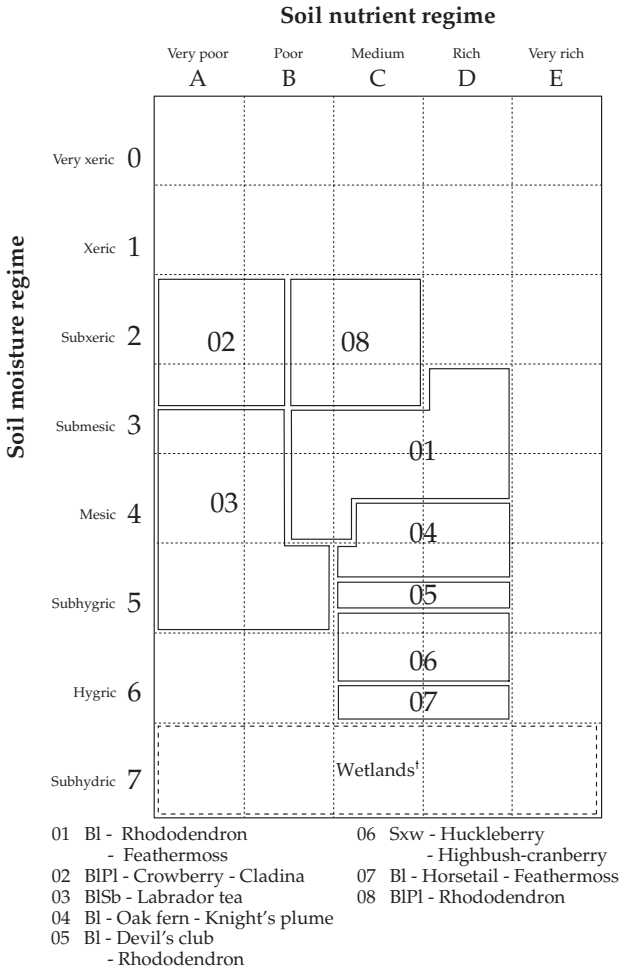
- less white-flowered rhododendron but more scrub birch in the shrub layer on mesic sites; and
- less heart-leaved arnica but more lingonberry in the herb layer on mesic sites.

Forests

Due to the longer periodicity of stand replacement events in this variant, forested areas are often climax forests dominated by hybrid white spruce and subalpine fir. Lodgepole pine is generally only common on sites drier than mesic. Black spruce may occur on upland sites with lodgepole pine on gentle slopes with a cool aspect and in wetlands. Deciduous species are limited to the lower elevations of this variant and then generally only on warmer slopes.

Wildlife

This variant supports good grizzly bear summer habitat and moderate to good mountain caribou habitat. Wolverine use this variant throughout the year. Moose and mule deer use the ESSFmv3 in summer.



[†] See MacKenzie and Moran (2004) for classifying wetlands occurring in the area

FIGURE 6.1 *Edatopic grid displaying site units of the ESSFmv3 variant.*

FIGURE 6.2 ESSFmv3 vegetation table.

Site Series	02	03	08	01	04	05	06	07	
Trees									
<i>Pinus contorta</i>	■	■	■	■					lodgepole pine
<i>Picea mariana</i>		■							black spruce
<i>Abies lasiocarpa</i>			■	■	■	■	■	■	subalpine fir
<i>Picea engelmannii</i>		■		■	■	■	■	■	Engelmann spruce
Shrubs									
<i>Shepherdia canadensis</i>		■							soopolallie
<i>Alnus viridus</i> spp. <i>sinuata</i>	■	■	■	■	■	■	■	■	Sitka alder
<i>Vaccinium membranaceum</i>	■		■	■	■	■	■	■	black huckleberry
<i>Rhododendron albiflorum</i>	■		■	■	■	■	■	■	white-flowered rhododendron
<i>Ledum groenlandicum</i>		■							Labrador tea
<i>Ribes lacustre</i>				■	■	■	■	■	black gooseberry
<i>Oplopanax horridus</i>						■			devil's club
<i>Viburnum edule</i>					■	■	■	■	highbush-cranberry
Herbs and Dwarf Shrubs									
<i>Empetrum nigrum</i>	■								crowberry
<i>Arctostaphylos uva-ursi</i>	■								kinnikinnick
<i>Lycopodium annotinum</i>			■	■	■	■	■	■	stiff clubmoss
<i>Cornus canadensis</i>		■	■	■	■	■	■	■	bunchberry
<i>Arnica cordifolia</i>		■		■			■		heart-leaved arnica
<i>Linnaea borealis</i>		■	■	■			■	■	twinflower
<i>Rubus pedatus</i>				■	■	■	■	■	five-leaved bramble
<i>Gymnocarpium dryopteris</i>					■	■		■	oak fern
<i>Rubus pubescens</i>						■		■	trailing raspberry
<i>Galium boreale</i>							■	■	northern bedstraw
<i>Equisetum arvense</i>								■	common horsetail
Mosses and Lichens									
<i>Cladina</i> spp.	■		■						cladina lichens
<i>Pleurozium schreberi</i>	■	■	■	■	■	■	■	■	red-stemmed feathermoss
<i>Barbilophozia lycopodioides</i>				■	■			■	common leafy liverwort
<i>Dicranum polysetum</i>			■					■	wavy-leaved moss

Prominence class ■ 1 ■ 2 ■ 3 ■ 4 ■ 5

- 1a Canopy dominated by black spruce and lodgepole pine; sites level
ESSFmv3/03
- 1b Canopy dominated by lodgepole pine or Engelmann spruce, black spruce minor or absent; sites of any slope
- 2a Canopy generally dominated by lodgepole pine in old stands (>140 yrs) or if not stand open; soil texture coarse to moderately coarse; *Empetrum nigrum* (p. 79)² abundant (>5% cover); *Cladonia* or *Cladina* lichens abundant (> 5% cover)
ESSFmv3/02
- 2b Canopy often dominated by Engelmann spruce or subalpine fir in old stands (> 140 yrs), *Empetrum nigrum* low cover (< 5% cover) or absent; *Cladonia* or *Cladina* lichens low cover (< 5%) or absent
- 3a Site level or nearly so (slope 0–5%); water table near surface; horsetails (*Equisetum* spp., pp. 281–284) abundant (>10% cover)
ESSFmv3/07
- 3b Site level or sloping; water table usually below 50 cm; horsetails low cover (<2%) or absent
- 4a Soils organic rather than mineral; usually lower slope; *Oplopanax horridus* (p. 36) low cover (<5%) or absent
ESSFmv3/06
- 4b Soils mineral; slope position variable; *Oplopanax horridus* cover variable

² Page numbers refer to the publication *Plants of Northern British Columbia* (MacKinnon et al. 1992).

- 5a Usually lower slope or level; *Oplopanax horridus* moderate cover (>5%)
ESSFmv3/05
- 5b Upper to lower slope or level; *Oplopanax horridus* low cover (<1%) or absent
- 6a Mid to lower slope; *Gymnocarpium dryopteris* moderate to high cover (>5%)
ESSFmv3/04
- 6b Mid to upper slope; *Gymnocarpium dryopteris* low cover (<5%) or absent
- 7a Generally upper slope or if not then on warm slope; *Sorbus* spp. (p. 28) and *Rubus pedatus* (p. 92) low cover (<1%) or absent
ESSFmv3/08
- 7b Mid to upper slope; *Sorbus* spp. (p. 28) and/or *Rubus pedatus* (p. 92) moderate cover (>1%)
ESSFmv3/01



Vaccinium membranaceum



Rhododendron albiflorum



Sorbus scopulina

VEGETATION

Tree Layer: 30% cover
Engelmann spruce, subalpine fir

Shrub Layer: 45% cover
Vaccinium membranaceum (black huckleberry)
Rhododendron albiflorum (white-flowered rhododendron)
Ribes lacustre (black gooseberry)
Sorbus scopulina (western mountain-ash)
[*Alnus viridis* ssp. *sinuata***] (Sitka alder)
[*Vaccinium ovalifolium* (oval-leaved blueberry)]
subalpine fir, Engelmann spruce

Herb Layer: 25% cover
Cornus canadensis (bunchberry)
Orthilia secunda (one-sided wintergreen)
Lycopodium annotinum (stiff clubmoss)
Arnica cordifolia (heart-leaved arnica)
Rubus pubescens (trailing raspberry)
Linnaea borealis (twinflower)
Streptopus amplexifolius (clasping twistedstalk)

Moss Layer: 90% cover
Pleurozium schreberi (red-stemmed feathermoss)
Ptilium crista-castrensis (knight's plume)
Peltigera aphthosa (freckle pelt lichen)
Hylocomium splendens (step moss)

SOIL AND SITE

Moisture Regime: (3-) 4 (-5) ((submesic-) mesic (-subhygric))
Nutrient Regime: B-(C) (medium (-rich))
Slope Gradient (%): 26 (2-60)
* Slope Position: (lower-) mid (-upper)
Parent Material: usually morainal or glaciofluvial
Soil Texture: variable; usually medium
Coarse Fragments (%): 32 (3-77)

DISTRIBUTION: common and widespread

** The name of this species has been updated (see Appendix 1).

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: – 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 12.
- Species choice: – Bl, Se, **[PI]**
- 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.
– young advance Se and Bl regeneration can be protected by a firm snowpack and should be considered if it is abundant and well distributed.
– 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 (e.g., PI) is advised.**
– heavy snowpack may cause stem deformity, especially on steep slopes; **obstacle planting is advised.**
– risk of stem deformity for PI; **chose provenances from high elevation, high snowpack areas to reduce risk.**



lodgepole pine

VEGETATION

Tree Layer: 25% cover
Lodgepole pine

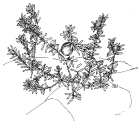
Shrub Layer: 35% cover
Vaccinium membranaceum (black huckleberry)
subalpine fir, lodgepole pine

Herb Layer: 40% cover
Empetrum nigrum (crowberry)
Arctostaphylos uva-ursi (kinnikinnick)
Vaccinium caespitosum (dwarf blueberry)

Moss Layer: 75% cover
Cladina spp. (reindeer lichens)
Dicranum spp.
Cladonia spp. (cladonia lichens)
Pleurozium schreberi (red-stemmed feathermoss)
Stereocaulon tomentosum (eyed foam lichen)

SOIL AND SITE

Moisture Regime: 2-3 (subseric-submesic)
Nutrient Regime: A-B (very poor-poor)
Slope Gradient (%): 9 (8-15)
* Slope Position: mid to upper (or level)
Parent Material: variable
* Soil Texture: usually moderately coarse to coarse
Coarse Fragments (%): 33 (23-50)



Empetrum nigrum



Cladina spp.

DISTRIBUTION: rare

INTERPRETATIONS

- Site limitations: – the combination of very poor productivity and high wildlife value means that these sites should be protected from harvesting.
- Site preparation: – light scarification for seedbed preparation or summer logging with no site preparation.
- Species choice: – **Pl, [Bl, Se]**
- Vegetation potential: – low
- Reforestation: – attempt to regenerate naturally if potential exists.
– Bl and Se acceptable only on moist microsites.
- Concerns: – 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).**
– heavy snowpack may cause stem deformity, especially on steep slopes; **obstacle planting is advised.**
– risk of stem deformity for Pl; **chose provenances from high elevation, high snowpack areas to reduce risk.**



black spruce

*Shepherdia canadensis**Ledum groenlandicum***VEGETATION**

Tree Layer: 20% cover

Lodgepole pine, black spruce

Shrub Layer: 50% cover

Shepherdia canadensis (soopolallie)*Ledum groenlandicum* (Labrador tea)*Rhododendron albiflorum* (white-flowered rhododendron)

black spruce, Engelmann spruce, subalpine fir

Herb Layer: 15% cover

Cornus canadensis (bunchberry)*Arnica cordifolia* (heart-leaved arnica)*Linnaea borealis* (twinflower)*Vaccinium vitis-idaea* (lingonberry)*Vaccinium caespitosum* (dwarf blueberry)*Gaultheria hispidula* (creeping-snowberry)*Empetrum nigrum* (crowberry)

Moss Layer: 90% cover

Pleurozium schreberi (red-stemmed feathermoss)*Ptilium crista-castrensis* (knight's plume)*Hylocomium splendens* (step moss)**SOIL AND SITE**

Moisture Regime: 3–5 (submesic–subhygric)

Nutrient Regime: A–B (very poor–poor)

* Slope Gradient (%): 0

* Slope Position: level

* Parent Material: glaciofluvial, morainal

Soil Texture: variable

Coarse Fragments (%): 51 (24–78)

DISTRIBUTION: uncommon and restricted to lower elevational limits of the unit

INTERPRETATIONS

- Site limitations:
- sites within this unit with thick organic horizons (>10 cm) have reduced spring soil temperatures, which slows root development; **reduce organic horizon thickness during site preparation.**
 - soils are saturated in the spring, but may experience drought in summer, both resulting in poor root development; **poor productivity resulting from these limitations should dictate a limited intensive silvicultural investment.**
- Site preparation:
- minimize or align large slash accumulations when logging to help meet site preparation objectives and reduce fire hazard.
 - light scarification for seedbed preparation or summer logging with no site preparation.
 - see Section 12.
- Species choice:
- Bl, Se, [PI], (Sb)
- Vegetation potential:
- low
- Reforestation:
- attempt to regenerate naturally if potential exists.
 - Sb is significantly less productive than other species on these sites.
- Concerns:
- 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).**
 - frost will cause regeneration damage, especially in any naturally occurring or artificially created depressions; **leaving a partial canopy and/or planting a frost-resistant species is advised.**
 - trafficability may be a problem on these sites during the summer.
 - risk of stem deformity for PI; **chose provenances from high elevation, high snowpack areas to reduce risk.**

VEGETATION

Tree Layer: 35% cover
 Subalpine fir, Engelmann spruce

Shrub Layer: 45% cover
Rhododendron albiflorum (white-flowered rhododendron)
Vaccinium membranaceum (black huckleberry)
Ribes lacustre (black gooseberry)
Vaccinium ovalifolium (oval-leaved blueberry)
 [*Lonicera involucrata* (black twinberry)]
 subalpine fir

Herb Layer: 45% cover
Gymnocarpium dryopteris (oak fern)
Rubus pedatus (five-leaved bramble)
Orthilia secunda (one-sided wintergreen)
Streptopus amplexifolius (clasping twistedstalk)
Lycopodium annotinum (stiff clubmoss)
Cornus canadensis (bunchberry)
Valeriana sitchensis (Sitka valerian)
Tiarella trifoliata (three-leaved foamflower)
Veratrum viride (Indian hellabore)

Moss Layer: 95% cover
Pleurozium schreberi (red-stemmed feathermoss)
Ptilium crista-castrensis (knight’s plume)
Hylocomium splendens (step moss)

SOIL AND SITE

Moisture Regime: 4–5 (mesic–subhygric)
 Nutrient Regime: C–D (medium–rich)
 * Slope Gradient (%): 18 (0–38)
 * Slope Position: usually mid to lower
 Parent Material: variable (often morainal)
 Soil Texture: variable
 Coarse Fragments (%): 23 (5–48)

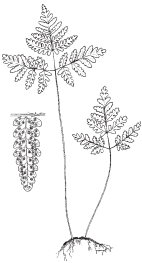
DISTRIBUTION: common



Rhododendron albiflorum



Vaccinium membranaceum



Gymnocarpium dryopteris

INTERPRETATIONS

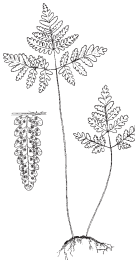
- Site limitations: – sites within this unit with thick organic horizons (>10 cm) have reduced spring soil temperatures, slowing root development; **reduce organic horizon thickness during site preparation.**
- Silviculture system: – log on firm snowpack if considering use of advance regeneration.
– 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 12.
- 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.
– young advance Se and Bl regeneration can be protected by harvesting on a firm snowpack and should be considered if it is abundant and well distributed.
– 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 is 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.
– risk of stem deformity for Pl; **choose provenances from high elevation, high snowpack areas to reduce risk.**



*Rhododendron
albiflorum*



*Oplopanax
horridus*



*Gymnocarpium
dryopteris*

VEGETATION

Tree Layer: 40% cover
Engelmann spruce, subalpine fir

Shrub Layer: 30% cover
Rhododendron albiflorum (white-flowered
rhododendron)
Oplopanax horridus (devil's club)
Ribes lacustre (black gooseberry)
Vaccinium membranaceum (black huckleberry)
Viburnum edule (highbush-cranberry)
Alnus viridis ssp. *sinuata* ** (Sitka alder)
Sorbus scopulina (western mountain-ash)
subalpine fir

Herb Layer: 50% cover
Gymnocarpium dryopteris (oak fern)
Rubus pedatus (five-leaved bramble)
Cornus canadensis (bunchberry)
Tiarella trifoliata (three-leaved foamflower)
Lycopodium annotinum (stiff clubmoss)
Streptopus amplexifolius (clasping twistedstalk)
Orthilia secunda (one-sided wintergreen)

Moss Layer: 65% cover
Pleurozium schreberi (red-stemmed feathermoss)
Ptilium crista-castrensis (knight's plume)
Hylocomium splendens (step moss)
[*Mnium* spp. (leafy mosses)]

SOIL AND SITE

Moisture Regime: 5 (subhygric)
Nutrient Regime: C–D (medium–rich)
* Slope Gradient (%): 13 (0–25)
* Slope Position: (mid–) lower–level
Parent Material: morainal or glaciofluvial
* Soil Texture: variable (usually moderately
fine)
Coarse Fragments (%): 25 (16–39)

DISTRIBUTION: uncommon

** The name of this species has been updated (see Appendix 1).

INTERPRETATIONS

- Site limitations: – sites within this unit with thick organic horizons (>10 cm) have reduced spring soil temperatures, which slows root development; **reduce organic horizon thickness during site preparation.**
- Silviculture system: – log on firm snowpack to protect advance regeneration.
– under a partial cutting system, spruce regeneration requires mineral soil exposure and/or planting.
– reduce spruce beetle hazard by avoiding high stumps and shaded slash >15 cm diameter.
- Site preparation: – see Section 12.
- Species choice: – Bl, Se, (**Pl**)
- Vegetation potential: – very high (white-flowered rhododendron, fireweed, thimbleberry)
- Reforestation: – try to preserve advance regeneration if it is abundant and likely to release and form an acceptable stand.
– young advance Se and Bl regeneration can be protected by a firm snowpack and should be considered if it is abundant and well distributed.
– plant stock with large caliper and low shoot-to-root ratio immediately after harvest.
- 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 preserving advance regeneration is advised.**
– sites within this unit with fine-textured soils are vulnerable to compaction under wet conditions; **restrict traffic to winter operations.**
– sites within this unit with thick organic horizons (>10 cm) have increased windthrow hazard; **block layouts must have windfirm boundaries, or a wide buffer of standing timber must be left around such sites.**
– risk of stem deformity for Pl; **chose provenances from high elevation, high snowpack areas to reduce risk.**

VEGETATION

Tree Layer: 20% cover
Engelmann spruce, subalpine fir

Shrub Layer: 30% cover

<i>Ribes lacustre</i>	(black gooseberry)
<i>Lonicera involucrata</i>	(black twinberry)
<i>Viburnum edule</i>	(highbush-cranberry)
<i>Vaccinium membranaceum</i>	(black huckleberry)
<i>Alnus viridis</i> ssp. <i>sinuata</i> **	(Sitka alder)
<i>Sorbus scopulina</i>	(western mountain-ash)
subalpine fir	



Ribes lacustre

Herb Layer: 15% cover

<i>Linnaea borealis</i>	(twinflower)
<i>Cornus canadensis</i>	(bunchberry)
<i>Rubus pedatus</i>	(five-leaved bramble)
<i>Mertensia paniculata</i>	(tall bluebells)
<i>Gymnocarpium dryopteris</i>	(oak fern)
<i>Lycopodium annotinum</i>	(stiff clubmoss)
<i>Petasites frigidus</i>	
var. <i>palmatus</i>	(palmate coltsfoot)
<i>Arnica cordifolia</i>	(heart-leaved arnica)
<i>Orthilia secunda</i>	(one-sided wintergreen)
<i>Delphinium glaucum</i>	(tall larkspur)
<i>Listera cordata</i>	(heart-leaved twayblade)



Vaccinium membranaceum

Moss Layer: 95% cover

<i>Pleurozium schreberi</i>	(red-stemmed feathermoss)
<i>Ptilium crista-castrensis</i>	(knight's plume)
<i>Hylocomium splendens</i>	(step moss)
<i>Peltigera aphthosa</i>	(freckle pelt lichen)
<i>Barbilophozia lycopodioides</i>	(common leafy liverwort)



Viburnum edule

SOIL AND SITE

Moisture Regime:	5–6 (subhygric–hygric)
Nutrient Regime:	(C)–D ((medium–) rich)
Slope Gradient (%):	13 (3–20)
* Slope Position:	(mid–) lower
* Parent Material:	organic
Coarse Fragments (%):	0

DISTRIBUTION: uncommon

** The name of this species has been updated (see Appendix 1).

INTERPRETATIONS

- Site limitations:
- sites within this unit with saturated soils are poorly aerated, which slows root development; **plant seedlings on naturally or artificially raised microsities.**
 - 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.**
- Site preparation:
- see Section 12.
 - creating an excessive number of mounds (i.e., >300/ha) should be avoided, especially on sites within this unit with a water table <30 cm from the surface.
- Species choice:
- Se, Bl, [PI]
- Vegetation potential:
- high (black twinberry, fireweed, bluejoint)
- Reforestation:
- plant large planting stock on raised microsities.
 - plant stock in groups, using available raised microsities, rather than evenly across the site.
 - young advance Se and Bl regeneration can be protected by a firm snowpack and should be considered if it is abundant and well distributed.
 - plant stock with large caliper and low shoot-to-root ratio immediately after harvest.
 - 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 (e.g., PI) is 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 on non-elevated sites.
 - risk of stem deformity for PI; **chose provenances from high elevation, high snowpack areas to reduce risk.**

VEGETATION

Tree Layer: 20% cover

Engelmann spruce, lodgepole pine

*Ribes lacustre*

Shrub Layer: 35% cover

Ribes lacustre (black gooseberry)
Viburnum edule (highbush-cranberry)
Lonicera involucrata (black twinberry)
Alnus viridis ssp. *sinuata*** (Sitka alder)
 subalpine fir

Herb Layer: 80% cover

Equisetum spp. (horsetails)
 (*arvense*, *sylvaticum*)
Galium spp. (bedstraws)
 (*boreale*, *triflorum*)
Rubus pedatus (five-leaved bramble)
Cornus canadensis (bunchberry)
Mertensia paniculata (tall bluebells)
Linnaea borealis (twinflower)
Petasites frigidus
 var. *palmatus* (palmate coltsfoot)
Epilobium anagallidifolium (alpine willowherb)
Mitella nuda (common mitrewort)

*Equisetum arvense*

Moss Layer: 70% cover

Pleurozium schreberi (red-stemmed feathermoss)
Ptilium crista-castrensis (knight's plume)
Dicranum polysetum (wavy-leaved moss)
 [*Hylocomium splendens* (step moss)]

SOIL AND SITE

Moisture Regime: 6 (hygric)
 Nutrient Regime: C (medium)
 * Slope Gradient (%): 4 (2–6)
 * Slope Position: level or depression
 Parent Material: variable
 Soil Texture: usually coarse
 Coarse Fragments (%): 30 (3–45)

*Rubus pedatus***DISTRIBUTION:** uncommon

** The name of this species has been updated (see Appendix 1).

INTERPRETATIONS

- Site limitations:
- very difficult sites to manage; **serious consideration should be given to managing these sites as wildlife corridors.**
 - sites within this unit with thick organic horizons (>10 cm) have reduced spring soil temperatures, which slows root development; **reduce organic horizon thickness during site preparation.**
 - saturated soils are poorly aerated, which slows root development; **plant seedlings on naturally or artificially raised microsites.**
- Site preparation:
- clearcut (winter) or partial cut.
 - creating an excessive number of microsites (i.e., >300/ha) should be avoided, especially on sites with a water table <30 cm from the surface.
 - see Section 12.
- Species choice:
- **Bl, Se, [Pl]**
- Vegetation potential:
- very high (white-flowered rhododendron, fireweed)
- Reforestation:
- plant stock in groups, using available raised microsites, rather than evenly across the site.
 - try to preserve advance regeneration if it is abundant and likely to release and form an acceptable stand.
 - young advance Se and Bl regeneration can be protected by a firm snowpack and should be considered if it is abundant and well distributed.
 - plant stock with large caliper and low shoot-to-root ratio immediately after harvest.
 - 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 preserving advance regeneration is advised.**
 - sites within this unit with high water tables, combined with thick organic horizons (>10 cm), have increased windthrow hazard; **block layouts must have windfirm boundaries.**
 - water table will likely rise above the ground surface in the spring, causing seedling mortality on non-elevated sites.
 - these units represent important wildlife habitat; **discuss prescription with fish and wildlife personnel.**
 - this unit is critical to the control of runoff streamflow.
 - risk of stem deformity for Pl; **chose provenances from high elevation, high snowpack areas to reduce risk.**



Vaccinium membranaceum



Lycopodium annotinum



Pleurozium schreberi

VEGETATION

Tree Layer: 25% cover

Lodgepole pine, Engelmann spruce, subalpine fir

Shrub Layer: 40% cover

Vaccinium membranaceum (black huckleberry)

Rhododendron albiflorum (white-flowered rhododendron)

[*Alnus viridis* ssp. *sinuata*** (Sitka alder)]
subalpine fir, Engelmann spruce

Herb Layer: 15% cover

Cornus canadensis (bunchberry)

Orthilia secunda (one-sided wintergreen)

Arnica cordifolia (heart-leaved arnica)

Epilobium angustifolium (fireweed)

Linnaea borealis (twinline)

Lycopodium annotinum (stiff clubmoss)

Moss Layer: 80% cover

Pleurozium schreberi (red-stemmed feathermoss)

Cladina spp. (reindeer lichens)

Dicranum spp.

Ptilium crista-castrensis (knight's plume)

SOIL AND SITE

Moisture Regime: 3–4 (submesic–mesic)

Nutrient Regime: B–C (poor–medium)

Slope Gradient (%): 25 (10–60)

* Slope Position: mid–upper (level)

Parent Material: usually morainal or colluvial

Soil Texture: variable

Coarse Fragments (%): 32 (3–77)

DISTRIBUTION: uncommon

** The name of this species has been updated (see Appendix 1).

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: – 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 12.
- Species choice: – Bl, Se, [**PI**]
- Vegetation potential: – moderate (white-flowered rhododendron, fireweed)
- Reforestation: – try to preserve advance regeneration if it is abundant and likely to release and form an acceptable stand.
– young advance Se and Bl regeneration can be protected by a firm snowpack and should be considered if it is abundant and well distributed.
– plant in summer with stock that has already set bud.
- Concerns: – heavy snowpack may cause stem deformity, especially on steep slopes; **obstacle planting is advised.**
– risk of stem deformity for PI; **chose provenances from high elevation, high snowpack areas to reduce risk.**

TABLE 13.1 *Some important wildlife species that utilize biogeoclimatic units within the guide area*

Occurrence of species by unit						
Species	BWBSdki	ESSFmv3	SBSmk2	SBSwk2	SBSwk3 ^b	SWBmk
Mountain goat	ps	Y	ps	ps	ps	Y
Stone sheep	ps	ps	-	-	-	Y
Caribou (northern pop.)	Y	Y	y	y	y	Y
Elk	y	sa	y	y	y	Y
Moose	Y	pSA	Y	Y	Y	Y
Grizzly bear ^a	Y	Y	y	Y	Y	Y
Gray wolf	Y	Y	Y	Y	Y	Y
Wolverine ^a	Y	Y	Y	Y	Y	Y
Fisher ^a	Y	y	Y	Y	Y	y
Marten	Y	Y	Y	Y	Y	Y

^a Species considered to be threatened or endangered (“red-listed”) or of special concern (“blue-listed”) (B.C. Conservation Data Centre 2003.)

^b Includes SBSwk3a

Key to coding

Abundance:

Uppercase letter = common to very common and abundant

Lowercase letter = rare, scarce, or uncommon and scattered

Timing:

Y, y = yearlong; P, p = spring (approximately March–May); S, s = summer (approximately June–August); A, a = autumn (approximately September–November);

Example: pSA = scarce in spring, common–abundant in summer and autumn

Fisher – uses pole-sapling and young mixed forest in summer, mature forest and old growth in winter, possibly for snow interception; requires >50% crown closure; natal dens in large tree cavities; also uses coarse woody debris, slash piles, edges/ecotones.

Striped skunk – opportunistic omnivore; prefers open forest and forest edge.

Ermine – dependent on small mammals, chiefly voles; most common in early seral stages.