

TABLE 8 Summary of climate data for biogeoclimatic units within the guide area^a


Climatic characteristics		ICH mm	ICH wk1	ICH wk3	SBS dh	SBS vk ^b	ESSF mm1	ESSF wk1 ^b	ESSF wc3 ^b
Annual precipitation (mm)	Mean	N/A	1214.1	N/A	609.4	1249.6	N/A	1043.9	1408.5
	Range	N/A	867.7–1725.4	N/A	503.1–678.5	989.7–1635.5	N/A	N/A	1177.1–1624.7
Growing-season precipitation (mm)	Mean	280.5	385.4	382.5	237.3	472.0	354.3	426.1	510.3
	Range	232.7–328.2	325.0–460.5	280.9–479.1	177.4–289.1	404.6–583.4	339.4–369.1	378.5–490.9	401.6–631.0
Annual snowfall (cm)	Mean	N/A	587.6	N/A	210.5	N/A	N/A	538.4	782.1
	Range	N/A	374.8–1090.0	N/A	180.3–234.8	N/A	N/A	N/A	N/A
Annual temperature (°C)	Mean	N/A	4.4	4.8	3.7	2.6	N/A	-0.1	-1.0
	Range	N/A	2.3–6.9	3.2–6.2	2.8–4.2	1.3–4.0	N/A	-1.5–1.4	-3.1–1.1
Growing degree-days (>5°C)	Mean	N/A	1364	n/a	1237	N/A	N/A	748	671
	Range	N/A	991–1808	n/a	1134–1332	N/A	N/A	N/A	N/A
Frost-free period (days)	Mean	N/A	121	N/A	92	N/A	N/A	48	75
	Range	N/A	104–149	N/A	76–116	N/A	N/A	N/A	N/A

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 For., Research Branch, Victoria, B.C. Unpublished report.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 The SBSvk, ESSFwk1, and ESSFwc3 are included for comparison. No long-term climate data exist for the ICHwk4 and ESSFwc2 biogeoclimatic units.

Handbook 29 (ESSFwk2, ESSFwc3), or from the Cariboo Region field guide (ICHwk4). The Alpine Tundra zone is not covered within this field guide as site units have not as yet been described.

TABLE 9 *Some important wildlife species that use biogeoclimatic units in the Rocky Mountain trench guide area*

	Occurrence in variants ^a					
	ICH mm	ICH wk1	ICH wk3	SBS dh	ESSF mm1	ESSF wc2
Moose (winter range)	M	M	M	H	-	-
Mule deer (winter range)	L	L	L	M	-	-
White-tailed deer	-	-	-	M	-	-
Elk	-	-	-	L	-	-
Caribou ^b	M	M	M	-	H	H
Grizzly bear ^b	H	H	H	M	VH	VH
Furbearers	M	M	M	H	H	H

a L = Low; M = Medium; H = High; VH = Very High

b Denotes species “blue listed” in 1989 by the Ministry of Environment. Because of major declines in their populations, they are considered sensitive and/or deserving of management attention.

4.5 Raush Moist Mild Engelmann Spruce–Subalpine Fir

Location

The ESSFmm1 is the subalpine variant at middle to upper elevations in the Rocky Mountain Trench and adjacent side valleys from north of McBride (Morkill River, Dore River) to near Mica and Kinbasket reservoir (Hugh Allen Creek). The Robson variant (ESSFmm2), not described in this field guide, occurs only in Mount Robson Park.

Elevation range

990–1800 m

Climate

The moist subalpine climate of the ESSFmm1 is drier than the ESSF variants it borders to the north and south. This is due to the rainshadow effect of the Premier Range to the west of this area. The ESSFmm1 has higher precipitation, cooler temperatures, and, therefore, a shorter growing season than the ICH variants found at lower elevations.

There are only a few short-term climate stations to characterize the climate of this variant. These stations indicate that the mean seasonal (May–Sept.) precipitation is about 350 mm. Although all ESSF biogeoclimatic units are subject to severe and limiting temperature regimes, this variant is judged to be relatively “mild.”

Forests

Forests of the ESSFmm1 are dominated by subalpine fir and Engelmann spruce. These two species are a major component of most seral stands and are the climax species throughout the variant. At the upper elevations of this zone, where the climate becomes most severe, the forests become more open, and eventually form clumped, stunted stands (krummholz). This area is known as parkland and is designated as a parkland subzone (ESSFmm1p). Lodgepole pine is common on drier sites as a seral component of many ecosystems. At lower elevations of the variant, western hemlock can be quite frequent and the occasional Douglas-fir, western redcedar, or western white pine can be found.

Soils, geology, and landforms

East of the Rocky Mountain Trench, the Selwyn and Park ranges consist predominantly of diverse sedimentary and metamorphic rocks of the Precambrian Miette Group. West of the Trench, in the Cariboo Mountains, including the Premier Ranges, the Precambrian bedrock consists of sedimentary and metamorphic rocks of the Kaza Group (sandstone, conglomerate) and Isaac Formation (including phyllite, argillite, and schist). Soils consist predominantly of Humo-Ferric Podzols formed on steep, sandy colluvial or morainal deposits.

Distinguishing the ESSFmm1 from adjoining biogeoclimatic units

ICHmm has:

- western hemlock and western redcedar present in the canopy of most sites;
- no white-flowered rhododendron present in the shrub layer; and
- more devil's club present on subhygic to hygic sites.

SBSdh has:

- prickly rose present on most sites;
- no white-flowered rhododendron present in the shrub layer;
- Douglas-fir present in the canopy of subxeric to mesic sites; and
- kinnikinnick present on dry sites.

ICHwk3 has:

- western hemlock and western redcedar present in the canopy of most sites;
- no white-flowered rhododendron present in the shrub layer; and
- lady fern present on hygic sites.

ESSFwc2 has:

- falsebox present on dry sites;
- less false azalea present on wet sites;
- more oak fern present on wet sites; and
- little or no red-stemmed feathermoss present on wet sites.

ESSFwc3 has:

- more oak fern present on dry sites;
- more black twinberry present on wet sites; and
- less bunchberry present in the herb layer of most sites.

ICHwk1 has:

- western hemlock and western redcedar present in the canopy of most sites;
- no white-flowered rhododendron present in the shrub layer; and
- devil's club present on mesic sites.

ESSFwk1 has:

- more white-flowered rhododendron present on dry sites;
- more oval-leaved blueberry present on xeric to mesic sites;
- more black twinberry present on wet sites; and
- more oak fern present on dry sites.

Ecosystem management

These forest ecosystems were historically usually even-aged but extended post-fire regeneration periods produce stands that are uneven-aged and possess multistoreyed canopies. Stand-destroying wildfires were often of moderate size (20–1000 ha) with patches of unburned areas due to chance, sheltering terrain features, or higher site moisture. Many larger fires occurred after periods of extended drought but the landscape was dominated by extensive areas of mature forest surrounding patches of younger forest. Stand-destroying fires are more common on southern aspects, hence mature forest is more prevalent and widespread on northern aspects. Return cycles for stand-initiating events were approximately 200 years.

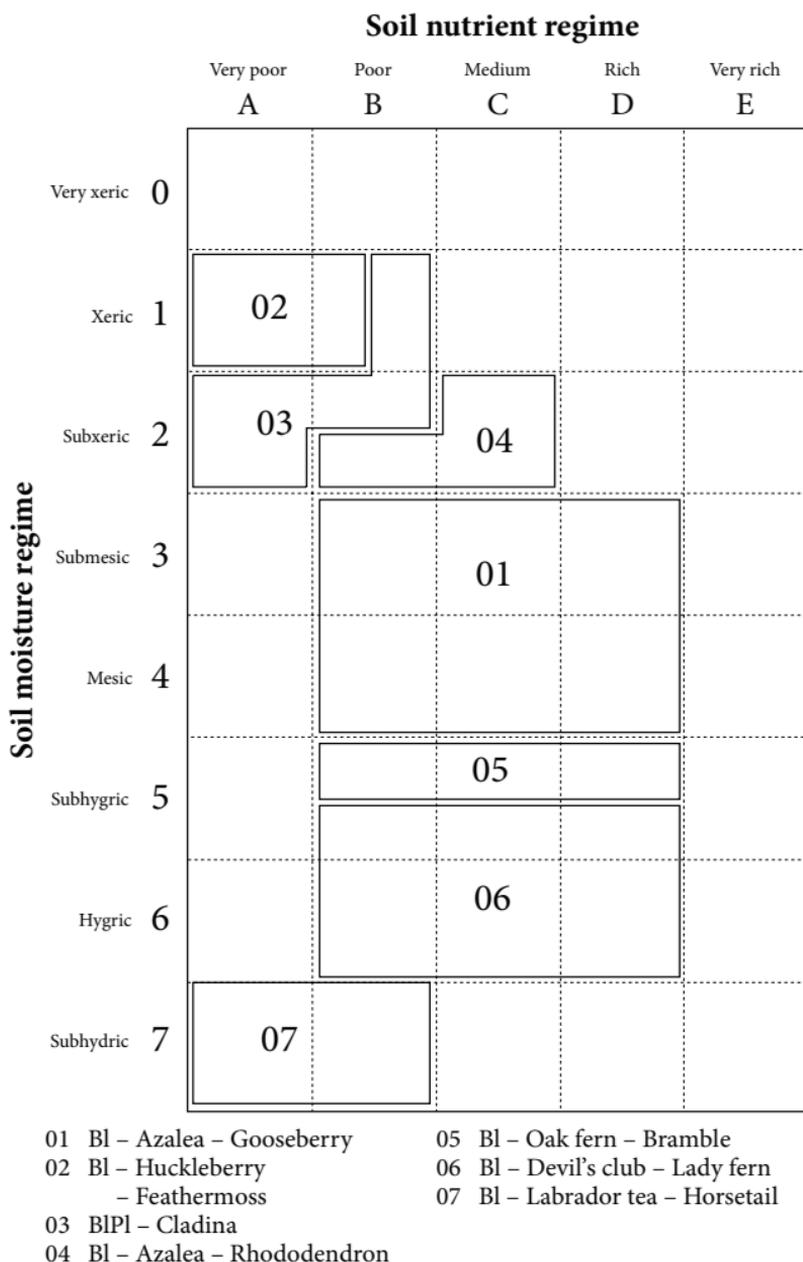


FIGURE 18 *Edatopic grid displaying site units of the ESSFmm1 variant.*

- 1a Organic soils, or thick humus (>15 cm) over wet, poorly drained mineral soils; *Ledum groenlandicum* (Labrador tea) (p. 40)¹¹ moderate to high cover (>5%).
ESSFmm1/07
- 1b Mineral soils, usually with thinner humus layer over better-drained soils; *Ledum groenlandicum* absent.
- 2a *Oplopanax horridus* (devil's club) (p. 36) moderate to high cover (usually >2%), *Mnium* spp. (leafy mosses) (pp. 307–308) moderate to high cover (usually >2%); seepage water may be present.
ESSFmm1/06
- 2b *Oplopanax horridus* absent, *Mnium* spp. low cover (<1%) or absent; seepage water usually absent.
- 3a *Gymnocarpium dryopteris* (oak fern) (p. 293) moderate to high cover (usually >5%); *Dryopteris expansa* (spiny wood fern) (p. 292) moderate cover (usually >2%); lower to toe slope.
ESSFmm1/05
- 3b *Gymnocarpium dryopteris* low cover (<2%) or absent; *Dryopteris expansa* absent; mid- to upper slope.
- 4a *Vaccinium myrtilloides* (velvet-leaved blueberry) (p. 42) and *Cladina* spp. (reindeer lichens) (p. 334) high cover (>10%); colluvial veneer over bedrock.
ESSFmm1/03
- 4b *Vaccinium myrtilloides* and *Cladina* spp. low to moderate cover (usually <10% combined) or absent; various soil parent materials.
- 5a *Menziesia ferruginea* (false azalea) and *Rhododendron albiflorum* (white-flowered rhododendron) (p. 41) low cover (<1%) or absent; steep colluvial veneer over bedrock, or glaciofluvial.
ESSFmm1/02

¹¹ Page numbers refer to the publication *Plants of Northern British Columbia* (MacKinnon et al. 1992).

- 5b *Menziesia ferruginea* and *Rhododendron albiflorum* moderate to high cover (usually >2%); various soil parent materials.
- 6a Herb layer reasonably well developed (>15% cover); *Orthilia secunda* (one-sided wintergreen) (p. 183), *Lycopodium annotinum* (stiff club-moss) (p. 287), and *Rubus pedatus* (five-leaved bramble) (p. 92) usually present; mid-to lower slope.
- ESSFmm1/01**
- 6b Herb layer poorly developed (<10% cover); two or more of *Orthilia secunda*, *Lycopodium annotinum*, and *Rubus pedatus* absent; upper slope position.
- ESSFmm1/04**

VEGETATION

Tree Layer: 50% cover

Engelmann spruce, subalpine fir, [lodgepole pine]

Shrub Layer: 65% cover

Menziesia ferruginea (false azalea)
Vaccinium membranaceum (black huckleberry)
Ribes lacustre (black gooseberry)
 [*Rhododendron albiflorum* (white-flowered
 rhododendron)]
 subalpine fir

Herb Layer: 25% cover

Orthilia secunda (one-sided wintergreen)
Lycopodium annotinum (stiff club-moss)
Cornus canadensis (bunchberry)
Rubus pedatus (five-leaved bramble)
Listera cordata (heart-leaved twayblade)

Moss Layer: 75% cover

Pleurozium schreberi (red-stemmed feathermoss)
Ptilium crista-castrensis (knight's plume)
Barbilophozia lycopodioides (common leafy liverwort)
Hylocomium splendens (step moss)

SOIL AND SITE

Moisture Regime: 3-4 (submesic-mesic)
 Nutrient Regime: B-D (poor-rich)
 Slope Gradient (%): 29 (0-67)
 * Slope Position: mid-lower
 Parent Material: variable
 * Soil Texture: medium-coarse
 Coarse Fragments (%): 45 (1-75)

DISTRIBUTION: common*Menziesia
ferruginea**Cornus
canadensis**Pleurozium
schreberi*

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 and/or leaving Fd seed trees on site.**
- 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: – see Section 5.2.
- Species choice: – Bl, Se, [Pl].
- Vegetation potential: – moderate (false azalea, red raspberry, thimbleberry, fireweed).
- Reforestation: – plant stock with large caliper and low shoot-to-root ratio immediately after harvest.
– under a partial-cutting system, spruce regeneration requires mineral soil exposure and/or planting.
– log on firm snowpack to protect advance regeneration.
– heavy snowpack may cause stem deformity of Pl, especially on steep slopes.
– planting Pl may be an option on these sites below 1100 m, but provenances from high-elevation, high-snowpack areas must be used.
- Concerns: – trafficability may be a problem on these sites during the summer.
– spruce beetle may infest partial-cut stands after harvesting; **minimize blowdown and avoid mechanical damage to residuals.**
– heavy snowpack may cause stem deformity, especially on steep slopes; **obstacle planting is advised.**
– 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.**
– this unit is critical to the control of runoff streamflow.



*Vaccinium
membranaceum*



*Chimaphila
umbellata*

*Dicranum
scoparium*

VEGETATION

Tree Layer: 25% cover

Engelmann spruce, subalpine fir, lodgepole pine

Shrub Layer: 50% cover

Vaccinium membranaceum (black huckleberry)
Amelanchier alnifolia (saskatoon)
Sorbus scopulina (western mountain-ash)
 subalpine fir
 hybrid white spruce

Herb Layer: 5% cover

Chimaphila umbellata (prince's pine)

Moss Layer: 90% cover

Pleurozium schreberi (red-stemmed feathermoss)
Dicranum scoparium (broom-moss)
Aulacomnium palustre (glow moss)
Barbilophozia spp. (leafy liverworts)
Cladina mitis (green reindeer lichen)
Hylocomium splendens (step moss)
Peltigera aphthosa (freckle lichen)

SOIL AND SITE

Moisture Regime: 1 (xeric)
 Nutrient Regime: A-B (very poor-poor)
 * Aspect: southerly
 * Slope Gradient (%): steep
 Slope Position: mid- to upper
 * Parent Material: colluvial veneer
 Soil Texture: coarse
 Coarse Fragments (%): high

COMMENTS: limited data because of the rarity of the ecosystem

DISTRIBUTION: rare and dispersed

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 and/or leaving Fd seed trees on site.**
- 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: – see Section 5.2.
- Species choice: – **Bl, Pl, Se.**
- Vegetation potential: – low.
- Reforestation: – plant Bl and Se on moister microsites.
– heavy snowpack may cause stem deformity, especially on steep slopes; **obstacle planting is advised.**
- 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).**
– site and soil conditions of this unit result in drought hazard for a significant portion of the growing season; **natural regeneration is generally more adapted to surviving these conditions, especially during establishment.**



*Vaccinium
myrtilloides*

Cladonia spp.



*Pleurozium
schreberi*

VEGETATION

Tree Layer: 25% cover

lodgepole pine, [Engelmann spruce, subalpine fir]

Shrub Layer: 55% cover

Vaccinium myrtilloides (velvet-leaved blueberry)

Menziesia ferruginea (false azalea)

Vaccinium membranaceum (black huckleberry)

subalpine fir

lodgepole pine

Herb Layer: 5% cover

Cornus canadensis (bunchberry)

Linnaea borealis (twinflower)

Moss Layer: 80% cover

Pleurozium schreberi (red-stemmed feathermoss)

Cladonia spp. (cladonia lichens)

Peltigera aphthosa (freckle lichen)

[*Cladina mitis* (green reindeer lichen)]

SOIL AND SITE

Moisture Regime: 1–2 (xeric–subxeric)

Nutrient Regime: A–B (very poor–poor)

Slope Gradient (%): 12 (6–18)

Slope Position: mid

* Parent Material: glaciofluvial

* Soil Texture: coarse or moderately coarse

Coarse Fragments (%): 65 (54–75)

COMMENTS: limited data because of the rarity of the ecosystem

DISTRIBUTION: rare

INTERPRETATIONS

- Site limitations:
- sites 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 and/or leaving Fd seed trees on site.**
 - very difficult sites to manage; **serious consideration should be given to managing these sites as wildlife corridors.**
- 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:
- see Section 5.2.
- Species choice:
- Pl, (Bl, Se).
- Vegetation potential:
- low.
- Reforestation:
- Bl and Se will be significantly less productive than Pl on these sites.
 - advance Bl regeneration should only be preserved if it meets size and acceptability criteria (Section 5.1).
 - try to preserve advance regeneration if it is abundant and likely to release and form an acceptable stand.
- Concerns:
- site and soil conditions of this unit result in drought hazard for a significant portion of the growing season; **natural regeneration is generally more adapted to surviving these conditions, especially during establishment.**
 - 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).**
 - sites 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.**
 - these units represent important wildlife habitat; **discuss prescription with fish and wildlife personnel.**

VEGETATION

Tree Layer: 35% cover

subalpine fir, Engelmann spruce, [lodgepole pine]

Shrub Layer: 85% cover

Menziesia ferruginea

(false azalea)

Rhododendron albiflorum(white-flowered
rhododendron)*Vaccinium membranaceum*

(black huckleberry)

subalpine fir

Herb Layer: 5% cover

[*Cornus canadensis*

(bunchberry)]

Moss Layer: 90% cover

Pleurozium schreberi

(red-stemmed feathermoss)

Dicranum fuscescens

(curly heron's-bill moss)

Barbilophozia lycopodioides

(common leafy liverwort)

Cladonia spp.

(cladonia lichens)

Ptilium crista-castrensis

(knight's plume)

[*Barbilophozia floerkei*

(mountain leafy liverwort)]

SOIL AND SITE

Moisture Regime:

2 (subxeric)

Nutrient Regime:

B-C (poor-medium)

Slope Gradient (%):

45 (22-60)

* Slope Position:

upper

Parent Material:

morainal or colluvial

* Soil Texture:

coarse

Coarse Fragments (%):

62 (39-75)

COMMENTS: often shallow soils over bedrock

DISTRIBUTION: common

*Menziesia
ferruginea**Rhododendron
albiflorum**Pleurozium
schreberi*

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 and/or leaving Fd seed trees on site.**
- 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: – see Section 5.2.
- Species choice: – Bl, Se, [Pl].
- Vegetation potential: – moderate (false azalea, fireweed).
- Reforestation: – 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.
– try to preserve advance regeneration if it is abundant and likely to release and form an acceptable stand.
– advance Bl regeneration should only be preserved if it meets size and acceptability criteria (Section 5.1).
– if heavy equipment is used in summer, during or after partial cutting, every attempt should be made to avoid disturbing roots of standing trees.
– trafficability may be a problem on these sites during the summer.
– fill-planting may be required to meet stocking requirements if a partial-cutting system is used.
- 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.**
– heavy snowpack may cause stem deformity of Pl, especially on steep slopes; **obstacle planting is advised.**
– spruce beetle may infest partial-cut stands after harvesting; **minimize blowdown and avoid mechanical damage to residuals.**
– this unit is critical to the control of runoff streamflow.

VEGETATION

Tree Layer: 40% cover
subalpine fir, Engelmann spruce

Shrub Layer: 85% cover

Menziesia ferruginea (false azalea)
Vaccinium membranaceum (black huckleberry)
Ribes lacustre (black gooseberry)
Vaccinium ovalifolium (oval-leaved blueberry)
 [*Rhododendron albiflorum* (white-flowered
 rhododendron)]
 subalpine fir

*Menziesia
ferruginea*



Rubus pedatus



*Gymnocarpium
dryopteris*

Herb Layer: 40% cover

Rubus pedatus (five-leaved bramble)
Tiarella spp. (foamflowers)
Lycopodium annotinum (stiff club-moss)
Gymnocarpium dryopteris (oak fern)
Dryopteris expansa (spiny wood fern)
Orthilia secunda (one-sided wintergreen)
Listera cordata (heart-leaved twayblade)
Cornus canadensis (bunchberry)
 [*Valeriana sitchensis* (Sitka valerian)]

Moss Layer: 90% cover

Pleurozium schreberi (red-stemmed feathermoss)
Ptilium crista-castrensis (knight's plume)
Barbilophozia spp. (leafy liverworts)
 [*Hylocomium splendens* (step moss)]

SOIL AND SITE

Moisture Regime: 5 (subhygric)
 Nutrient Regime: B–D (poor–rich)
 Slope Gradient (%): 30 (14–64)
 * Slope Position: lower–toe, or mid-
 with northerly aspect
 Parent Material: variable
 * Soil Texture: variable
 Coarse Fragments (%): 42 (12–80)

DISTRIBUTION: common

INTERPRETATIONS

- Site limitations: – sites with medium- to fine-textured lacustrine soils often have poor soil structure, leading to poor root growth; **plant stock that will achieve better lateral root development (e.g., Cu-treated), prescribe natural regeneration, or protect advance regeneration.**
- Silviculture system: – see Section 5.1.
- Site preparation: – see Section 5.2.
- Species choice: – Bl, Se, [Pl].
- Vegetation potential: – very high (false azalea, red raspberry, fireweed).
- Reforestation: – 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.
 – try to preserve advance regeneration if it is abundant and likely to release and form an acceptable stand.
 – advance Bl regeneration should only be preserved if it meets size and acceptability criteria (Section 5.1).
 – if heavy equipment is used in summer, during or after partial cutting, every attempt should be made to avoid disturbing roots of standing trees.
 – plant stock with large caliper and low shoot-to-root ratio immediately after harvest.
- Concerns: – sites within this unit with silty soils are susceptible to frost heaving; **bareroot stock will likely resist frost heaving better than plug stock.**
 – sites unit with thick organic horizons (>10 cm) have increased windthrow hazard; **block layouts must have wind-firm boundaries, or a wide buffer of standing timber must be left around such sites.**
 – sites 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 of Pl, especially on steep slopes; **obstacle planting is advised.**
 – trafficability may be a problem on these sites during the summer.
 – this unit is critical to the control of runoff streamflow.



*Oplopanax
horridus*



*Gymnocarpium
dryopteris*

Mnium spp.

VEGETATION

Tree Layer: 45% cover

Engelmann spruce, subalpine fir

Shrub Layer: 75% cover

<i>Oplopanax horridus</i>	(devil's club)
<i>Menziesia ferruginea</i>	(false azalea)
<i>Ribes lacustre</i>	(black gooseberry)
<i>Vaccinium membranaceum</i>	(black huckleberry)
<i>Rubus idaeus</i>	(red raspberry)
[<i>Vaccinium ovalifolium</i>	(oval-leaved blueberry)]
[<i>Rubus parviflorus</i>	(thimbleberry)]
subalpine fir	

Herb Layer: 55% cover

<i>Gymnocarpium dryopteris</i>	(oak fern)
<i>Rubus pedatus</i>	(five-leaved bramble)
<i>Dryopteris expansa</i>	(spiny wood fern)
<i>Cornus canadensis</i>	(bunchberry)
<i>Lycopodium annotinum</i>	(stiff club-moss)
<i>Tiarella</i> spp.	(foamflowers)
<i>Streptopus amplexifolius</i>	(clasping twistedstalk)
<i>Athyrium filix-femina</i>	(lady fern)
<i>Equisetum</i> spp.	(horsetails)

Moss Layer: 60% cover

<i>Mnium</i> spp.	(leafy mosses)
<i>Pleurozium schreberi</i>	(red-stemmed feathermoss)
<i>Ptilium crista-castrensis</i>	(knight's plume)
<i>Barbilophozia lycopodioides</i>	(common leafy liverwort)
<i>Hylocomium splendens</i>	(step moss)

SOIL AND SITE

Moisture Regime:	5–6 (subhygric–hygric)
Nutrient Regime:	B–D (poor–rich)
Slope Gradient (%):	28 (7–52)
* Slope Position:	lower–toe
Parent Material:	variable
Soil Texture:	variable
Coarse Fragments (%):	49 (10–83)

COMMENTS: this association is very similar to the ESSFmm1/05, although it is more productive and tends to be found at lower elevations within the variant

DISTRIBUTION: fairly common

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 and/or leaving Fd seed trees on site.**
- Silviculture system: – see Section 5.1.
- Site preparation: – see Section 5.2.
- Species choice: – Bl, Se, [Pl].
- Vegetation potential: – very high (red raspberry, fireweed, devil's club).
- Reforestation: – 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.
 – try to preserve advance regeneration if it is abundant and likely to release and form an acceptable stand.
 – advance Bl regeneration should only be preserved if it meets size and acceptability criteria (Section 5.1).
 – if heavy equipment is used in summer, during or after partial cutting, every attempt should be made to avoid disturbing roots of standing trees.
 – trafficability may be a problem on these sites during the summer.
 – plant stock with large caliper and low shoot-to-root ratio immediately after harvest.
 – fill-planting may be required after partial cutting.
- Concerns: – water table will likely rise above the ground surface in the spring, causing seedling mortality.
 – this unit is critical to the control of runoff streamflow.
 – sites within this unit with fine-textured soils are vulnerable to compaction under wet conditions; **restrict traffic to winter operations or dry soil conditions.**
 – 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.**

VEGETATION

Tree Layer: 20% cover

hybrid white spruce, subalpine fir

Shrub Layer: 75% cover

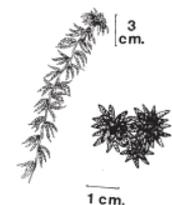
Ledum groenlandicum (Labrador tea)
Lonicera involucrata (black twinberry)
Ribes lacustre (black gooseberry)
Menziesia ferruginea (false azalea)
Salix spp. (willows)
 subalpine fir
 hybrid white spruce



*Ledum
groenlandicum*



*Equisetum
arvense*



Sphagnum spp.

Herb Layer: 65% cover

Equisetum arvense (common horsetail)
Carex spp. (sedges)
Calamagrostis canadensis (bluejoint)
Petasites frigidus var. *palmatus* (palmate coltsfoot)
Rubus pedatus (five-leaved bramble)
Pyrola asarifolia (pink wintergreen)
Lycopodium annotinum (stiff club-moss)
Cornus canadensis (bunchberry)
Epilobium angustifolium (fireweed)
Gymnocarpium dryopteris (oak fern)
Leptarrhena pyrolifolia (leatherleaf saxifrage)
Vaccinium caespitosum (dwarf blueberry)

Moss Layer: 65% cover

Sphagnum spp. (sphagnums)
Pleurozium schreberi (red-stemmed feathermoss)
Hylocomium splendens (step moss)
Mnium spp. (leafy mosses)
Aulacomnium palustre (glow moss)
Ptilium crista-castrensis (knight's plume)
Marchantia polymorpha (green-tongue liverwort)

SOIL AND SITE

Moisture Regime: 7 (subhydric)
 Nutrient Regime: A-B (very poor-poor)
 * Slope Gradient (%): 8 (3-13)
 * Slope Position: lower-toe
 * Parent Material: fluvial, sometimes with
 organic capping
 Soil Texture: medium-fine or organic
 Coarse Fragments (%): 14 (0-35)

DISTRIBUTION: rare and small in area

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.*
- Silviculture system: – avoid logging.