

SBSwk3/01

Sxw - OAK FERN

VEGETATION

Tree Layer: 45% cover
 Hybrid white spruce, lodgepole pine, subalpine fir

Shrub Layer: 45% cover
Lonicera involucrata (black twinberry)
Ribes lacustre (black gooseberry)
Vaccinium membranaceum (black huckleberry)
Viburnum edule (high bush-cranberry)
Rubus parviflorus (thimbleberry)
Sorbus scopulina (western mountain-ash)
 subalpine fir
 hybrid white spruce

Herb Layer: 80% cover
Gymnocarpium dryopteris (oak fern)
Rubus pedatus (five-leaved bramble)
Cornus canadensis (bunchberry)
 Lycopodium annotinum (stiff clubmoss)
Petasites palmatus (palmate coltsfoot)
Linnaea borealis (twinflower)
Orthilia secunda (one-sided wintergreen)
Smilacina racemosa (false Solomon's-seal)

Moss Layer: 75% cover
Pleurozium schreberi (red-stemmed feathermoss)
Ptilium crista-castrensis (knight's plume)
Hypnum splendens (step moss)
Barbilophozia lycopodioides (common leafy liverwort)

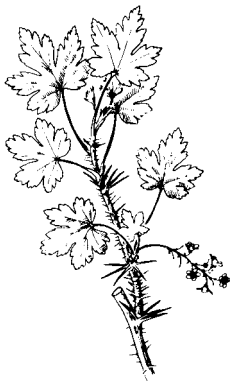
SOIL AND SITE

Moisture Regime: mesic
 Nutrient Regime: medium
 Slope Gradient (%): 13 (0-35; usually less than 20)
 * Slope Position: mid (lower to upper)
 Parent Material: (glacio)fluvial or morainal
 * Soil Texture: usually medium to moderately coarse
 Coarse Fragments (%): 40 (13-61)
 Site Index:
 BI 24 (23-28)
 PI 26 (17-32)
 Sx 27 (24-32)

DISTRIBUTION: common



Lonicera involucrata



Ribes lacustre



Gymnocarpium dryopteris

SXW - OAK FERN (SBSwk3/01)

INTERPRETATIONS

- Logging:
- clearcut (winter); layout and logging methods should facilitate burning
- Site preparation:
- Objective
- reduce debris; prepare planting spots; minimize future brush competition; improve planter access; increase soil temperature
- Mechanical
- patch scarify; mix humus with mineral
- Prescribed fire
- broadcast burn* (remove L horizon)
 - windrow and burn
 - short burning windows will likely necessitate burning in the summer
- Species choice:
- Preferred
Acceptable
- Pl, Sx
- Brush hazard:
- high (trembling aspen, thimbleberry, fireweed, black twinberry)
 - brush competition will require post-planting inspections of harvested sites, particularly if sites mechanically treated; these inspections may indicate the need for control of vegetation competition
 - pre-harvesting control of aspen should be done at least 2 years prior to harvest
 - aspen suckering can be a serious problem on these sites
- Reforestation:
- vigorous stock should be planted immediately after site preparation
- Concerns:
- root rot (if managing for Sx)
 - windthrow

SBSwk3/02

SxwFd - PURPLE PEAVINE

VEGETATION

Tree Layer: 80% cover
Douglas-fir, (hybrid white spruce)

Shrub Layer: 20% cover
Amelanchier alnifolia (saskatoon)
Spiraea betulifolia (birch-leaved spirea)
Cornus sericea (red-osier dogwood)
Ribes lacustre (black gooseberry)
Acer glabrum (Douglas maple)
subalpine fir

Herb Layer: 35% cover
Lathyrus nevadensis (purple peavine)
Aralia nudicaulis (wild sarsaparilla)
Clintonia uniflora (queen's cup)
Thalictrum occidentale (western meadowrue)
Orthilia secunda (one-sided wintergreen)
Aster conspicuus (showy aster)
Smilacina racemosa (false Solomon's-seal)
Goodyera oblongifolia (rattlesnake-plantain)
Disporum hookeri (Hooker's fairybells)

Moss Layer: 30% cover
Pleurozium schreberi (red-stemmed feathermoss)
Hylocomium splendens (step moss)
Ptilium crista-castrensis (knight's plume)

SOIL AND SITE

Moisture Regime: subxeric - xeric
Nutrient Regime: poor - medium
Slope Gradient (%): 21 (2-40)
* Slope Position: upper or level
* Parent Material: morainal or colluvial
* Soil Texture: coarse
Coarse Fragments (%): 55 (50-59)
Site Index: Fd 27
PI 23 (16-30)

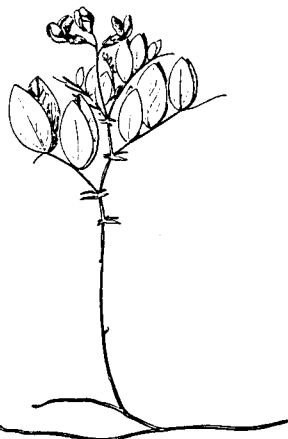
DISTRIBUTION: uncommon, and usually small in size



Douglas-fir



Amelanchier alnifolia



Lathyrus nevadensis

SXWFD - PURPLE PEAVINE (SBSwk3/02)

INTERPRETATIONS

- Management objectives:
- every effort should be made to not harvest these areas because they represent the northernmost extent of Douglas-fir and they represent a unique ecosystem that should be preserved for research

Sxw - HUCKLEBERRY - Highbush-Cranberry

VEGETATION



Vaccinium membranaceum
Cornus canadensis
Clintonia uniflora
Arnica cordifolia
Epilobium angustifolium

Tree Layer: 40% cover
 Lodgepole pine, hybrid white spruce, subalpine fir

Shrub Layer: 35% cover
Vaccinium membranaceum (black huckleberry)
Viburnum edule (highbush-cranberry)
Ribes lacustre (black gooseberry)
Spiraea betulifolia (birch-leaved spirea)
 subalpine fir

Herb Layer: 25% cover
 Smilacina racemosa (false Solomon's-seal)
 Linnaea borealis (twinflower)
 Orthilia secunda (one-sided wintergreen)
 bunchberry
 queen's cup
 (heart-leaved arnica)
 (fireweed)



Viburnum edule

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

SOIL AND SITE

Moisture Regime: submesic - (mesic)
 Nutrient Regime: poor - medium
 Slope Gradient (%): 11 (4-20)
 Slope Position: variable
 Parent Material: morainal or (glacio) fluvial, occasionally colluvial

* Soil Texture: coarse - (medium)
 * Coarse Fragments (%): 43 (8-85; usually more than 30)
 Site Index: BI 23 (17-28)
 PI 28 (26-31)
 Sx 27 (24-29)



Smilacina racemosa

DISTRIBUTION: fairly common

SXW - HUCKLEBERRY - Highbush-Cranberry (SBSwk3/03)

INTERPRETATIONS

Logging:

- clearcut
- full tree harvesting may seriously reduce cones on a site; good cone distribution must be ensured if managing for naturals

Site preparation:

Objective

- enhance natural regeneration; reduce debris; prepare planting spots; improve moisture status; improve planter access; protect thin humus forms

Mechanical

- drag scarify*; patch scarify; disc trench

Prescribed fire

- light broadcast burn (remove L horizon)
- avoid burning sites with a thin humus layer (less than 6 cm)

Species choice:

Preferred
Acceptable

- PI
- Sx

Brush hazard:

- moderate (fireweed, trembling aspen, highbush-cranberry)
- brush competition will likely occur within 3 years of harvesting; sites should be inspected at 3 years to determine if any further treatment is required
- pre-harvesting control of aspen should be done at least 2 years prior to harvest
- aspen suckering can be a serious problem on these sites

Reforestation:

Concerns:

- drought
- windthrow

SBSwk3/04

Sb - LABRADOR TEA

VEGETATION

Tree Layer: 15% cover
Black spruce, lodgepole pine



Black spruce

Shrub Layer: 45% cover
Salix spp. (willows)
Lonicera involucrata (black twinberry)
Vaccinium membranaceum (black huckleberry)
Viburnum edule (highbush-cranberry)

Herb Layer: 95% cover
Equisetum arvense (common horsetail)
Rubus pubescens (trailing raspberry)
Fragaria virginiana (wild strawberry)
Elymus glaucus (blue wildrye)
Galium boreale (northern bedstraw)

Moss Layer: 15% cover
Pleurozium schreberi (red-stemmed feathermoss)
Hylocomium splendens (step moss)
Aulacomnium palustre (glow moss)

SOIL AND SITE

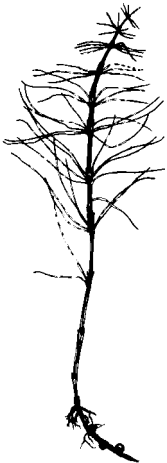


Salix spp.

Moisture Regime: submesic - subhygric
Nutrient Regime: very poor - poor
* Aspect: northerly or flat
* Slope Gradient (%): usually less than 10
Slope Position: mid to lower or level
* Parent Material: glaciofluvial
* Soil Texture: medium to coarse
Coarse Fragments (%): 0-40
Site Index: PI 20
Sx 23

COMMENTS: Often associated with compact soils.

DISTRIBUTION: rare



Equisetum arvense

SB - LABRADOR TEA (SBSwk3/04)

INTERPRETATIONS

Logging:

- clearcut
- full tree harvesting may seriously reduce cones on a site; good cone distribution must be ensured if managing for naturals
- only harvest in the winter or dry part of summer

Site preparation:

Objective

- increase soil temperatures; enhance natural regeneration; reduce debris; improve planter access

Mechanical

- light drag scarify*; mix humus with mineral soil; spot mounding
- a slightly raised microsite may improve growth on areas which are subhygric

Prescribed fire

- light broadcast burn (remove L horizon)

Species choice:

Preferred
Acceptable

- PI

Brush hazard:

- moderate (trembling aspen, fireweed, willows, black twinberry)
- brush competition will likely occur within 3 years of harvesting; sites should be inspected at 3 years to determine if any further treatments are required

Reforestation:

Concerns :

- compact till
- windthrow
- perched water table
- trafficability problems
- mistletoe, gall rust

SBSwk3/05

Sxw - TWINBERRY - COLTSFOOT

VEGETATION

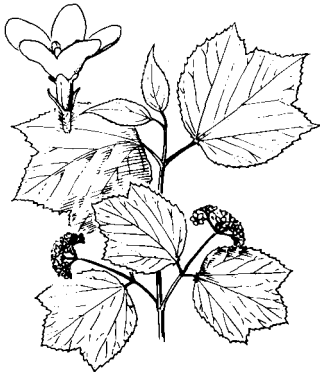
Tree Layer: 35% cover
Hybrid white spruce, subalpine fir, (trembling aspen)

Shrub Layer: 25% cover
Lonicera involucrata (black twinberry)
Ribes lacustre (black gooseberry)
Viburnum edule (highbush-cranberry)
Rubus parviflorus (thimbleberry)
Rosa acicularis (prickly rose)
[Cornus sericea red-osier dogwood])
subalpine fir
hybrid white spruce



Lonicera involucrata

Herb Layer: 30% cover
Cornus canadensis (bunchberry)
Rubus pubescens (trailing raspberry)
Linnaea borealis (twinflower)
Thalictrum occidentale (western meadowrue)
Smilacina racemosa (false Solomon's-seal)
Petasites palmatus (palmate coltsfoot)
Mitella nuda (common mitrewort)
Osmorhiza chilensis (sweet-cicely)
Pyrola asarifolia (rosy wintergreen)



Viburnum edule

Moss Layer: 85% cover
Pleurozium schreberi (red-stemmed feathermoss)
Ptilium crista-castrensis (knight's plume)
Hylocomium splendens (step moss)
Rhytidiadelphus triquetrus (electrified cat's-tail moss)

SOIL AND SITE

Moisture Regime: (mesic) - subhygric
Nutrient Regime: poor - medium
* Aspect: generally not northerly
* Slope Gradient (%): 15 (2-30)
* Slope Position: mid (upper to lower)
Parent Material: glaciofluvial (and morainal)
* Soil Texture: moderately coarse to medium
Coarse Fragments (%): 36 (24-66)
Site Index: BI 17 (14-24)
PI 20 (14-26)
Sx 27 (23-36)

DISTRIBUTION: uncommon



Petasites palmatus

SXW - TWINBERRY - COLTSFOOT (SBSwk3/05)

INTERPRETATIONS

Logging: - clearcut

Site preparation:

Objective - reduce debris; prepare planting spots; minimize future brush competition; improve planter access; protect thin humus forms

Mechanical - patch scarify; mix humus with mineral

Prescribed fire - broadcast burn* (remove L horizon)
- windrow and burn
- avoid burning sites with a thin humus layer (less than 6 cm)

Species choice:

Preferred
Acceptable - Sx, PI

Brush hazard:

- high (aspen, fireweed, thimbleberry, black twinberry)
- post-planting inspections of harvested sites should be carried out to determine the need for vegetation control
- pre-harvesting control of aspen should be done at least 2 years prior to harvest
- aspen suckering may be a problem on these sites

Reforestation:

- vigorous stock should be planted immediately after site preparation

Concerns:

- root rot (if managing for Sx)
- windthrow

SBSwk3/06

Sxw - DEVIL'S CLUB

VEGETATION

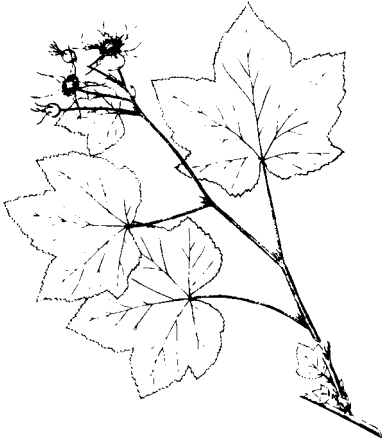


Oplopanax horridus

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

Shrub Layer: 60% cover
Oplopanax horridus (devil's club)
Ribes lacustre (black gooseberry)
Rubus parviflorus (thimbleberry)
Viburnum edule (highbush-cranberry)
Vaccinium membranaceum (black huckleberry)
Lonicera involucrata (black twinberry)
subalpine fir

Herb Layer: 30% cover
Gymnocarpium dryopteris (oak fern)
Streptopus amplexifolius (clasping twistedstalk)
Actaea rubra (baneberry)
Rubus pedatus (five-leaved bramble)
Cornus canadensis (bunchberry)
Galium triflorum (sweet-scented bedstraw)
Tiarella trifoliata (three-leaved foamflower)
Dryopteris assimilis (spiny wood fern)
Lycopodium annotinum (stiff clubmoss)

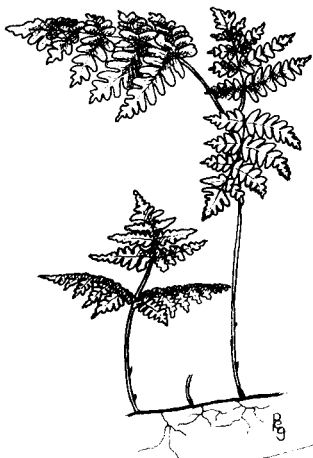


Rubus parviflorus

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

SOIL AND SITE

Moisture Regime: (mesic) - hygric
Nutrient Regime: medium - rich
Slope Gradient (%): 26 (5-49)
* Slope Position: usually mid to lower; may be upper on north aspects
Parent Material: morainal or (glacio)fluvial
Soil Texture: variable
Coarse Fragments (%): 34 (18-66)
Site Index: BI 26 (23-31)
PI 25 (21-31)
Sx 28 (25-34)



Gymnocarpium dryopteris

DISTRIBUTION: fairly common

SXW - DEVIL'S CLUB (SBSwk3/06)

INTERPRETATIONS

Logging:

- clearcut (winter); layout and logging methods should facilitate burning
- inspect the site to determine if there is a fine textured soil, in which case the use of low ground pressure vehicles to prevent compaction is recommended

Site preparation:

Objective

- reduce debris; prepare planting spots; minimize future brush competition; improve planter access; increase soil temperature

Mechanical

- patch scarify; mound*; plow
- natural raised microsites provide the best planting spots on these sites

Prescribed fire

- broadcast burn*
- short burning windows will likely necessitate burning in the summer
- a secondary treatment such as mounding may be required after burning to meet site preparation objectives

Species choice:

Preferred
Acceptable

- Sx
- BI

Brush hazard:

- very high (fireweed, thimbleberry, black twinberry)
- post-planting inspections of harvested sites should be carried out to determine the need for vegetation control

Reforestation:

- use large vigorous planting stock

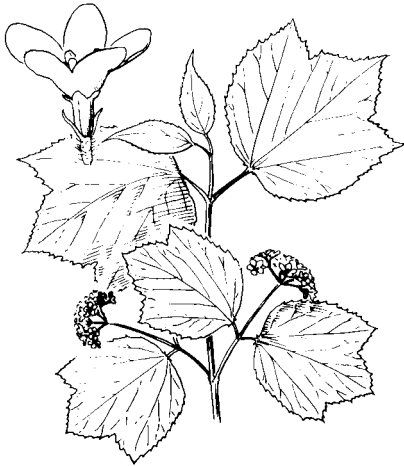
Concerns:

- windthrow
- root rot

SBSwk3/07

Sxw - HORSETAIL

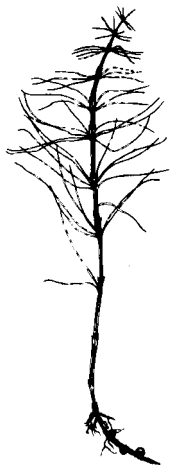
VEGETATION



Viburnum edule



Lonicera involucrata



Equisetum arvense

Tree Layer: 25% cover
Hybrid white spruce, (subalpine fir, black spruce)

Shrub Layer: 35% cover
Viburnum edule (highbush-cranberry)
Lonicera involucrata (black twinberry)
Rosa acicularis (prickly rose)
Ribes lacustre (black gooseberry)
Salix spp. (willows)
Rubus idaeus (red raspberry)
Vaccinium membranaceum (black huckleberry)

Herb Layer: 60% cover
Equisetum spp. (arvense, sylvaticum) (horsetails)
Cornus canadensis (bunchberry)
Petasites palmatus (palmate coltsfoot)
Mitella nuda (common mitrewort)
Galium boreale (northern bedstraw)
Rubus pubescens (trailing raspberry)
Linnaea borealis (twinflower)
Rubus pedatus (five-leaved bramble)

Moss Layer: 50% cover
Ptilium crista-castrensis (knight's plume)
Hylocomium splendens (step moss)
Pleurozium schreberi (red-stemmed feathermoss)
Mnium spp. (leafy mosses)]

SOIL AND SITE

Moisture Regime: hygric
Nutrient Regime: medium - rich
* Slope Gradient (%): 2 (0-5)
* Slope Position: level or depression
* Parent Material: fluvial or lacustrine
Soil Texture: coarse to fine
Coarse Fragments (%): variable
Site Index:

DISTRIBUTION: common but generally small in size

SXW - HORSETAIL (SBSwk3/07)

INTERPRETATIONS

Logging:

- clearcut
- trafficability will be a problem on this site during the summer

Site preparation:

Objective

- reduce debris; prepare raised planting spots; minimize future brush competition; improve planter access; increase soil temperature

Mechanical

- mound*

Prescribed fire

- broadcast burn

Species choice:

Preferred
Acceptable

- Sx

Brush hazard:

- very high (black twinberry, fireweed, willows, bluejoint)
- post-planting inspections of harvested sites should be carried out to determine the need for vegetation control

Reforestation:

- plant after water table drops below ground level and plant on drier microsites
- use large vigorous planting stock

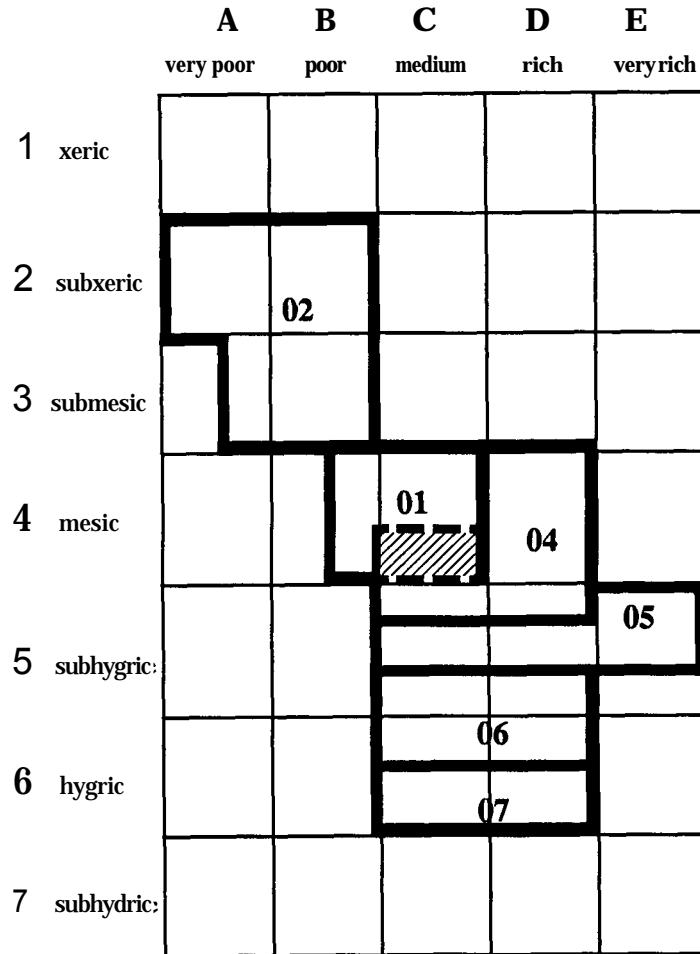
Concerns:

- windthrow
- root rot
- compaction
- this association is critical to the control of runoff and stream flow
- water table will likely rise above the ground surface in the spring causing seedling mortality
- herbicide use to control brush competition may conflict with fish and wildlife needs

7 THE ESSFmv3 VARIANT

ESSFmv3 Omineca ESSFmv

Soil Nutrient Regime



Site Series
01 BI- Rhododendron - Feathermoss
02 BIPI - Crowberry - Cladina
03 BISb - Labrador tea
04 BI - Oak fern - Knight's plume
05 BI - Devil's club - Rhododendron
06 Sxw - Huckleberry - Highbush-cranberry
07 BI - Horsetail - Feathermoss

FIGURE 5. Edatopic grid displaying site series in the ESSFmv3 variant.

KEY TO SITE UNITS OF THE ESSFmv3

- 1a Canopy dominated by black spruce and lodgepole pine; sites level ESSFmv3/03
- 1 b Canopy dominated by lodgepole pine or Engelmann spruce, black spruce minor or absent
- 2a Canopy dominated by lodgepole pine, Engelmann spruce low cover (>5% of canopy) or absent ESSFmv3/02
- 2b Canopy dominated by Engelmann spruce or subalpine fir, lodgepole pine low cover (5% of canopy) or absent
- 3a Site level or nearly so (slope 0-5%); water table near surface; horsetails (Equisetum spp., p. 24)¹² moderately abundant (>10%) 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. 10) lower cover (<2%) or absent ESSFmv3/06
- 4b Soils mineral; slope position variable; Oplopanax horridus cover variable
- 5a Usually lower slope or level; Oplopanax horridus low to moderate cover (>5%) ESSFmv3/05
- 5b Upper to lower slope; Oplopanax horridus very low cover (<1%) or absent
- 6a Mid to lower slope; Gymnocarpium dryopteris (p. 26) moderate cover (>15%) ESSFmv3/04
- 6b Mid to upper slope; Gymnocarpium dryopteris low cover (<1%) or absent ESSFmv3/01

¹² Page numbers refer to the publication "Some Common Plants of the Sub-Boreal Spruce Zone" (Pojar et al. 1982).

BI- RHODODENDRON - FEATHERMOSS

VEGETATION



V. membranaceum

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 pedatus (five-leaved bramble)
Linnaea borealis (twinflower)
Streptopus amplexifolius (clasping twisted stalk)

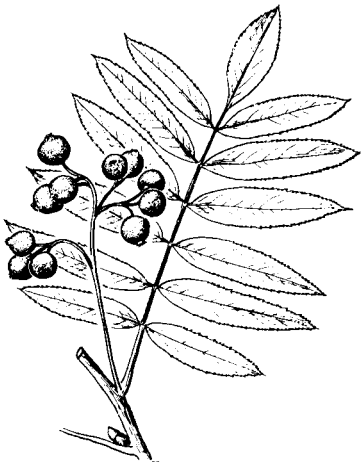


Moss Layer: 90% cover
Pleurozium schreberi (red-stemmed feathermoss)
Ptilium crista-castrensis (knight's plume)
Peltigera aphthosa
Hylocomium splendens (step moss)
subalpine fir

SOIL AND SITE

Rhododendron albiflorum

Moisture Regime: (submesic-) mesic (-subhygric)
Nutrient Regime: medium (-rich)
Slope Gradient (%): 26 (2-60)
Slope Position: (lower-) mid (-upper)
Parent Material: usually morainal or glaciofluvial occ. colluvial
Soil Texture: variable; usually medium
Coarse Fragments (%): 32 (3-77)
Site Index: Se 25 (17-33)
PI 25 (17-32)
BI 23 (15-33)



Sorbus scopulina

DISTRIBUTION: common and widespread

BL - RHODODENDRON - FEATHERMOSS (ESSFmv3/01)

INTERPRETATIONS

- Logging:
- clearcut (winter); log on firm deep snowpack if considering use of advanced regeneration
- Site preparation:
- Objective
- reduce debris; prepare planting spots; minimize future brush competition; improve planter access; increase soil temperature
- Mechanical
- patch scarify; piling
 - low ground pressure vehicles should be considered if mechanical site preparation is conducted on medium- to fine-textured soils
- Prescribed fire
- broadcast burn* (remove L horizon) or windrow and burn
 - short burning windows will likely necessitate burning in the summer
 - beware of burning sites with humus depths less than 7 cm
- Species choice:
- Preferred
- Se
- Acceptable
- BI
- Brush hazard:
- high (white-flowered rhododendron, fireweed)
 - post-planting inspections of harvested sites should be carried out to determine the need for vegetation control
- Reforestation:
- use of advanced Se and BI regeneration less than 1 m tall should be considered if it is abundant and well distributed. Advanced regeneration greater than 1 m tall will be difficult to protect and should be removed during logging.
 - plant large stock in summer
 - avoid planting in depressions and frost pockets
- Concerns:
- windthrow
 - heavy snowpack
 - frost
 - snowmold

ESSFmv3/02

BIPI - CROWBERRY - CLADINA

VEGETATION

Tree Layer: 25% cover
Lodgepole pine, (Engelmann spruce)



lodgepole pine

Shrub Layer: 35% cover
Vaccinium membranaceum (black huckleberry)
Rhododendron albiflorum (white-flowered rhododendron)
Alnus viridis ssp. sinuata (Sitka alder)
Subalpine fir

Herb Layer: 40% cover
Empetrum nigrum (crowberry)
Lycopodium ssp. (annotinum, complanatum) (clubmosses)
Cornus canadensis (bunchberry)
Epilobium angustifolium (fireweed)
Orthilia secunda (one-sided wintergreen)
Chimaphila umbellata (prince's pine)

Moss Layer: 75% cover
Pleurozium schreberi (red-stemmed feathermoss)
Polytrichum juniperinum (juniper haircap moss)
Cladina spp.
Cladonia spp.

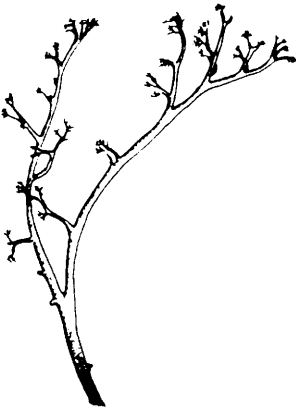


Empetrum nigrum

SOIL AND SITE

Moisture Regime: subxeric - submesic
Nutrient Regime: poor
Slope Gradient (%): 17 (8-33)
* Slope Position: mid to upper (or level)
Parent Material: variable
* Soil Texture: moderately coarse to coarse
Coarse Fragments (%): 33 (23-50)
Site Index: PI 24 (18-31)

DISTRIBUTION: rare



Cladina spp.

BLPL - CROWBERRY - CLADINA (ESSFmv3/02)

INTERPRETATIONS

Logging:

- clearcut
- attempt to reduce slash accumulations when logging to help meet site preparation objectives
- full tree harvesting may seriously reduce cones on a site; good cone distribution must be ensured if managing for naturals

Site preparation:

- | | |
|-----------------|---|
| Objective | - enhance natural regeneration; reduce debris; improve planter access; protect thin humus forms |
| Mechanical | - light drag scarify*; mix humus with mineral soil |
| Prescribed fire | - do not burn |

Species choice:

- | | |
|-------------------------|------|
| Preferred
Acceptable | - PI |
|-------------------------|------|

Brush hazard:

- low

Reforestation:

- conduct a PI cone survey. If cones are insufficient and competition is low, plant PI stock without site preparation.

Concerns:

- drought
- heavy snowpack
- large silviculture expenditures on these sites may be difficult to justify because of their low productivity, and management must ensure that productivity is not further reduced

ESSFmv3/03

BISb - LABRADOR TEA

VEGETATION

Tree Layer: % cover
Lodgepole pine, black spruce



black spruce

Shrub Layer: % cover
Shepherdia canadensis (soopolallie)
Ledum groenlandicum (Labrador tea)
Rhododendron albiflorum (white-flowered rhododendron)
black spruce
Engelmann spruce
subalpine fir

Herb Layer: % cover
Cornus canadensis (bunchberry)
Arnica cordifolia (heart-leaved arnica)
Linnaea borealis (twinfleur)
Vaccinium vitis-idaea (lingonberry)
Vaccinium caespitosum (dwarf blueberry)
Gaultheria hispida (creeping-snowberry)
Empetrum nigrum (crowberry)



S. canadensis

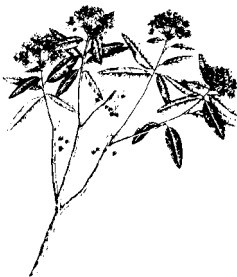
Moss Layer: % cover
Pleurozium schreberi (red-stemmed feathermoss)
Ptilium crista-castrensis (knight's plume)
Hylocomium splendens (step moss)

SOIL AND SITE

Moisture Regime: submesic - subhygric
Nutrient Regime: poor
* Slope Gradient (%): 0
* Slope Position: level
* Parent Material: morainal
Soil Texture: variable
Coarse Fragments (%): 51 (24-78)
Site Index: PI 23 (on limited data)
Sb 19 (on limited data)
Se 17 (on limited data)

COMMENTS: Seepage water may be present; rooting usually shallow.

DISTRIBUTION: rare



Ledum groenlandicum

BLSB - LABRADOR TEA (ESSFmv3/03)

INTERPRETATIONS

Logging:

- clearcut
- attempt to reduce slash accumulations when logging to help meet site preparation objectives
- full tree harvesting may seriously reduce cones on a site; good cone distribution must be ensured if managing for naturals

Site preparation:

Objective

- reduce debris; prepare planting spots; minimize future brush competition; improve planter access; increase soil temperature; enhance natural regeneration; protect thin humus forms

Mechanical

- drag scarify; patch scarify; piling

Prescribed fire

- windrow and burn

Species choice:

Preferred
Acceptable

- PI
- Sx

Brush hazard:

- low to moderate (white-flowered rhododendron, fireweed)

Reforestation:

- conduct a PI cone survey. If cones are insufficient and competition low, plant PI stock without site preparation.
- PI may suffer snow press damage in areas of high snow accumulation

Concerns:

- windthrow
- heavy snowpack
- frost
- large silviculture expenditures on these sites may be difficult to justify because of their low productivity, and management must ensure that productivity is not further reduced

ESSFmv3/04

BI - OAK FERN - KNIGHT'S PLUME

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 twisted stalk)
Lycopodium annotinum (stiff clubmoss)
Cornus canadensis (bunchberry)
Valeriana sitchensis (Sitka valerian)
Tiarella trifoliata (three-leaved foamflower)
Veratrum viride (Indian hellebore)

Moss Layer: 95% cover
Pleurozium schreberi (red-stemmed feathermoss)
Ptilium crista-castrensis (knight's plume)
Hylocomium splendens (step moss)
Barbilophozia lycopodioides (common leafy liverwort)
Peltigera aphthosa

SOIL AND SITE

Moisture Regime: mesic - subhygric
 Nutrient Regime: 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)
 Site Index: Se 26 (19-30)
 Pl 30 (on limited data)
 BI 22 (16-33)

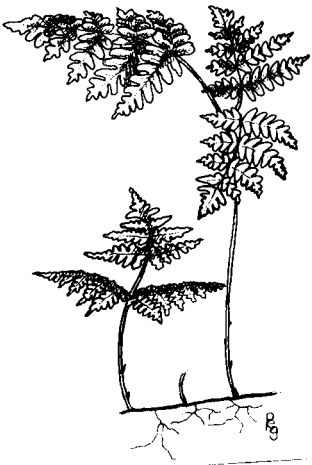
DISTRIBUTION: fairly common



R. albiflorum



Vaccinium membranaceum



Gymnocarpium dryopteris

BL - OAKFERN - KNIGHT'S PLUME (ESSFmv3/04)

INTERPRETATIONS

Logging: - clearcut (winter); log on firm, deep snowpack if considering use of advanced regeneration

Site preparation:

Objective - reduce debris; prepare planting spots; minimize future brush competition; improve planter access; increase soil temperature

Mechanical - patch scarify; piling
- low ground pressure vehicles should be considered if mechanical site preparation is conducted on medium- to fine-textured soils

Prescribed fire - broadcast burn* (remove L horizon) or windrow and burn
- short burning windows will likely necessitate burning in the summer

Species choice:

Preferred - Se
Acceptable - BI

Brush hazard: - very high (white flowered rhododendron, black twinberry, fireweed)
- post-planting inspections of harvested sites should be carried out to determine the need for vegetation control

Reforestation: - use of advanced Se and BI regeneration less than 1 m tall should be considered if it is abundant and well distributed. Advanced regeneration greater than 1 m tall will be difficult to protect and should be removed during logging.
- plant large stock in summer
- avoid planting in depressions and frost pockets

Concerns: - windthrow
- heavy snowpack
- frost
- snowmold

ESSFmv3/05

BI - DEVIL'S CLUB - RHODODENDRON

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

R. albiflorum

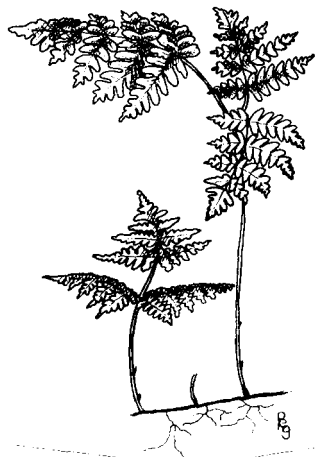


Herb Layer: 50% cover
Gymnocarpium dryopteris (oak fern)
Rubus pedatus (five-leaved bramble)
Cornus canadensis (bunchberry)
Tiarella trifoliata (three-leaved foamflower)
Lycopodium annotinum (stiff clubmoss)
Streptopus amplexifolius (clasping twistedstalk)
Orthilia secunda (one-sided wintergreen)

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

SOIL AND SITE

Oplopanax horridus



Moisture Regime: (mesic-) subhygric
 Nutrient Regime: (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)
 * Seepage Water: often present
 Site Index: Se 26 (24-29)
 PI 25 (on limited data)
 BI 26 (23-29)

DISTRIBUTION: uncommon

Gymnocarpium dryopteris

BL - DEVIL'S CLUB - RHODODENDRON (ESSFmv3/05)

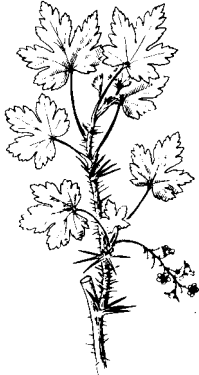
INTERPRETATIONS

- Logging:
- clearcut (winter); log on firm deep snowpack if considering use of advanced regeneration
- Site preparation:
- Objective
- reduce debris; prepare planting spots; minimize future brush competition; improve planter access; increase soil temperature
- Mechanical
- patch scarify; piling
 - low ground pressure vehicles should be considered if mechanical site preparation is conducted
- Prescribed fire
- broadcast burn* (remove L horizon) or windrow and burn
 - short burning windows will likely necessitate burning in the summer
- Species choice:
- Preferred
- Se
- Acceptable
- BI
- Brush hazard:
- very high (white-flowered rhododendron, fireweed, highbush-cranberry, Sitka alder)
 - post-planting inspections of harvested sites should be carried out to determine the need for vegetation control
- Reforestation:
- use of advanced Se and BI regeneration less than 1 m tall should be considered if it is abundant and well distributed. Advanced regeneration greater than 1 m tall will be difficult to protect and should be removed during logging.
 - plant large stock in summer
 - natural raised microsites provide the best planting spots on these sites; avoid planting in depressions and frost pockets
- Concerns:
- windthrow
 - heavy snowpack
 - frost
 - snowmold

Sxw - HUCKLEBERRY - Highbush-Cranberry

VEGETATION

Tree Layer: 20% cover
Engelmann spruce, subalpine fir



Ribes lacustre

Shrub Layer: 30% cover
Ribes lacustre (black gooseberry)
Lonicera involucrata (black twinberry)
Viburnum edule (highbush-cranberry)
Vaccinium membranaceum (black huckleberry)
Alnus viridis ssp. sinuata (Sitka alder)
Rosa acicularis (prickly rose)
Sorbus scopulina (western mountain-ash)
 subalpine fir

Herb Layer: 15% cover
Linnaea borealis (twinline)
Cornus canadensis (bunchberry)
Rubus pubescens (five-leaved bramble)
Mertensia paniculata (tall bluebells)
Lycopodium annotinum (stiff clubmoss)
Petasites galmatus (palmate colt's-foot)
Arnica cordifolia (heart-leaved arnica)
Orthilia secunda (one-sided wintergreen)
Delphinium glaucum (tall larkspur)
Listera cordata (heart-leaved twayblade)

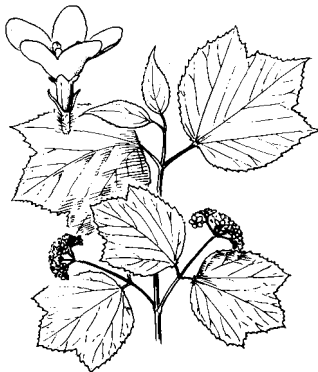


Vaccinium membranaceum

Moss Layer: 95% cover
Pleurozium schreberi (red-stemmed feathermoss)
Ptilium crista-castrensis (knight's plume)
Hylocomium splendens (step moss)
Peltigera aphthosa
Barbilophozia lycopodioides (common leafy liverwort)

SOIL AND SITE

Moisture Regime: subhygric - hygric
 Nutrient Regime: (medium-) rich
 Slope Gradient (%): 13 (3-20)
 * Slope Position: (mid-) lower
 * Parent Material: organic
 Coarse Fragments (%): 13 (5-23)
 Site Index: Se 25 (20-30)
 Pl 36 (on limited data)
 Bl 30 (on limited data)



Viburnum edule

DISTRIBUTION: uncommon

SXW - HUCKLEBERRY - HIGHBUSH-CRANBERRY (ESSFmv3/06)

INTERPRETATIONS

- Logging:
- clearcut or selective log
 - if age distribution allows, selective log the stand protecting the advance Se regeneration with the aid of a good snowpack
 - use a designated skidroad layout

Site Preparation:

- Objective
- reduce debris; prepare planting spots; minimize future brush competition; improve planter access; increase soil temperature
- Mechanical
- patch scarify; piling
 - low ground pressure vehicles should be considered if mechanical site preparation is conducted
- Prescribed fire
- broadcast burn or windrow and burn
 - short burning windows will likely necessitate burning in the summer

Species choice:

- Preferred
- Se
- Acceptable
- BI

Brush hazard:

- very high (black twinberry, Sitka alder, fireweed)
- post-planting inspections of harvested sites should be carried out to determine the need for vegetation control

Reforestation:

- plant in summer
- natural raised microsites provide the best planting spots on these sites; avoid planting in depressions and frost pockets

Concerns:

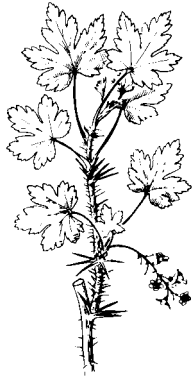
- windthrow
- root rot
- herbicide use to control brush competition may conflict with wildlife needs

BI-HORSETAIL-FEATHERMOSS

VEGETATION

Tree Layer: 20% cover
Engelmann spruce, lodgepole pine

Shrub Layer: 35% cover
Ribes lacustre (black gooseberry)
Viburnum edule (highbush-cranberry)
Lonicera involucrata (black twinberry)
Rosa acicularis (prickly rose)
Alnus viridis ssp. sinuata (Sitka alder)
 subalpine fir



Ribes lacustre

Herb Layer: 80% cover
Equisetum spp. (arvense,
sylvaticum) (horsetails)
Galium spp. (boreale,
triflorum) (bedstraws)
Rubus pubescens (trailing raspberry)
Cornus canadensis (bunchberry)
Mertensia paniculata (tall bluebells)
Linnaea borealis (twinflower)
Petasiles palmatus (palmate colt's-foot)
Epilobium anagallidifolium (alpine willowherb)
Mitella nuda (common mitrewort)



Equisetum arvense

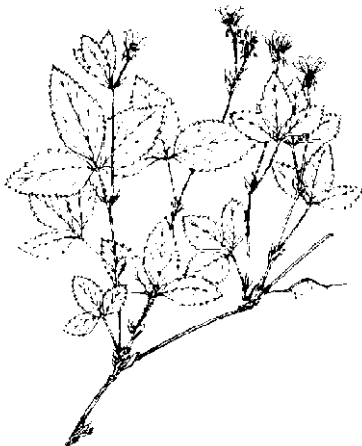
Moss Layer: 70% cover
Pleurozium schreberi (red-stemmed feathermoss)
Ptilium crista-sastrensis (knight's plume)
Hylocomium splendens (step moss)]

SOIL AND SITE

Moisture Regime:	subhygric - hygric
Nutrient Regime:	medium
* Slope Gradient (%):	4 (2-6)
* Slope Position:	level or depression
Parent Material:	variable
Soil Texture:	usually coarse
Coarse Fragments (%):	30 (3-45)
* Seepage Water:	generally present
Site Index:	Se 24 (on limited data) PI 28 (on limited data)

COMMENTS: Water table at or near surface.

DISTRIBUTION: uncommon



Rubus pubescens

BL - HORSETAIL - FEATHERMOSS (ESSFmv3/07)

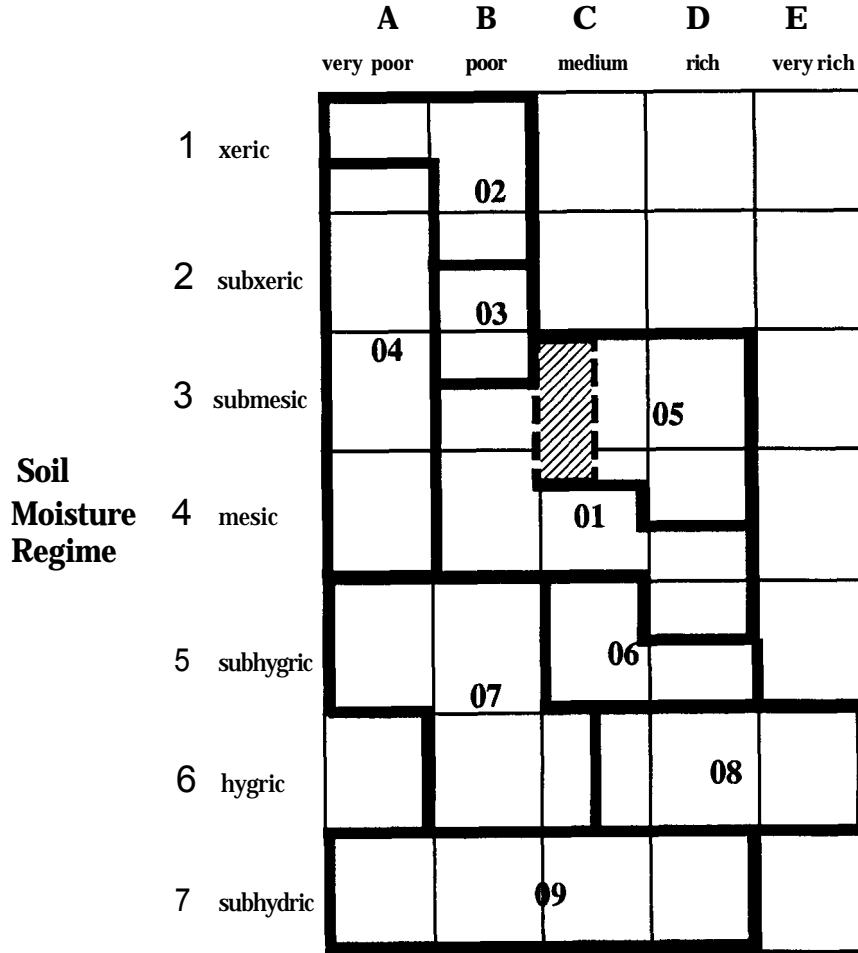
INTERPRETATIONS

- Logging:
- clearcut
 - trafficability will be a problem on this site during the summer
- Site preparation:
- Objective
- reduce debris; prepare raised planting spots; minimize future brush competition; improve planter access; increase soil temperature
- Mechanical
- mound
- Prescribed fire
- broadcast burn
- Species choice:
- Preferred
Acceptable
- Sx
- Brush hazard:
- very high (black twinberry, Sitka alder, willows)
 - post-planting inspections of harvested sites should be carried out to determine the need for vegetation control
- Reforestation:
- plant after water table drops below ground level and plant on drier microsites
 - use large vigorous planting stock
- Concerns:
- windthrow
 - root rot
 - compaction
 - this association is critical to the control of runoff and stream flow
 - water table will likely rise above the ground surface in the spring causing seedling mortality
 - herbicide use to control brush competition may conflict with fish and wildlife needs

BWBSdkl Stikine BWBSdk

8 THE BWBSdk1 VARIANT

Soil Nutrient Regime



Site Series
01 Sw - Knight's plume - Step moss
02 Pl - Lingonberry - Feathermoss
03 Sw - Wildrye - Toad-flax
04 Sb - Lingonberry - Knight's plume
05 Sw - Soopolallie - Twinflower
06 Sw - Scouring-rush - Step moss
07 Sb - Lingonberry - Coltsfoot
08 Sw - Currant - Horsetail
09 Sb - Horsetail - Sphagnum

FIGURE 6. Edatopic grid displaying site series in the BWBSdk1 variant.

SIMPLIFIED KEY TO ECOSYSTEM UNITS OF BWBSdk1

- 1a Canopy dominated by black spruce; lower slope to toe or depression
 - 2a Usually organic soils; moss layer dominated by Sphagnum spp. (p.63)¹³ BWBSdk1/08
 - 2b Usually mineral soils; moss layer dominated by feather mosses BWBSdk1/06
- 1b Black spruce, if present in canopy, with lodgepole pine; slope position variable
 - 3a Canopy dominated by white spruce
 - 4a Lower slope to toe, or level; Ledum groenlandicum (p. 9) or Equisetum spp. (p. 24) moderate to high cover (>5%)
 - 5a Level; soils fluvial; black spruce absent from canopy; Ledum groenlandicum absent, Alnus incana (p. 7) present BWBSdk1/07
 - 5b Lower slope to toe; soils variable but usually not fluvial; black spruce present in canopy; Ledum groenlandicum present, Alnus incana absent BWBSdk1/06
 - 4b Slope position variable; Ledum groenlandicum and Equisetum spp. low cover (<1%) or absent
 - 6a Mid to lower slope; fine- to medium-textured soils; poorly developed shrub and herb layers BWBSdk1/05
 - 6b Slope position variable but often mid; medium- to coarse-textured soils; fairly well-developed shrub and herb layer BWBSdk1/01
 - 3b Canopy dominated by lodgepole pine or lodgepole pine - black spruce

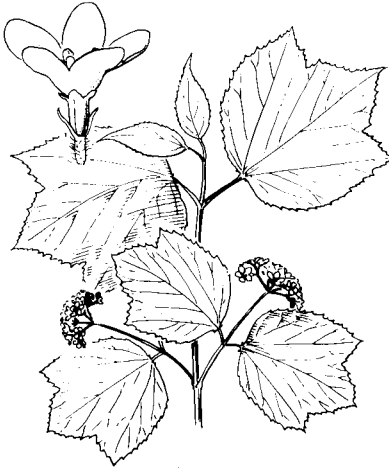
¹³ Page numbers refer to the publication "Some Common Plants of the Sub-boreal Spruce Zone" (Pojar et al. 1982).

- 7a Black spruce moderate to high cover (>5%) in tree or shrub layer; Ledum groenlandicum present and often abundant (>5% cover)
- 8a Mid-slope to crest or level; seepage water usually absent
BWBSdk1/04
- 8b Lower slope to toe; seepage water usually present
BWBSdk1/06
- 7b Black spruce low cover (<5%) or absent in tree or shrub layer; Ledum groenlandicum low cover (<1%) or absent
- 9a Coarse-textured fluvial soils or shallow soils over bedrock; Viburnum edule (p. 15) absent, Cladina spp. (p. 55) moderate to high cover (>5%)
BWBSdk1/02
- 9b Soils variable but never shallow over bedrock; Viburnum edule usually present, Cladina spp. low cover (<1%) or absent
- 10a Mid-slope to crest; soils often coarse; Elymus innovatus (fuzzy-spiked wild rye) often abundant (>5%)
BWBSdk1/03
- 10b Slope position variable but often mid; soils variable; Elymus innovatus usually low cover (<5%) or absent
BWBSdk1/01

BWBSdk1/01

Sw - KNIGHT'S PLUME - STEP MOSS

VEGETATION



Viburnum edule

Tree Layer: 60% cover
White spruce, lodgepole pine

-Shrub Layer: 50% cover
Viburnum edule (highbush-cranberry)
Rosa acicularis (prickly rose)
Shepherdia canadensis (soopolallie)
white spruce
subalpine fir

Herb Layer: 25% cover
Orthilia secunda (one-sided wintergreen)
Linnaea borealis (twinflower)
Cornus canadensis (bunchberry)
Epilobium angustifolium (fireweed)
Petasites palmatus (palmate coltsfoot)
Mertensia paniculata (tall bluebells)
Pyrola asarifolia (rosy wintergreen)

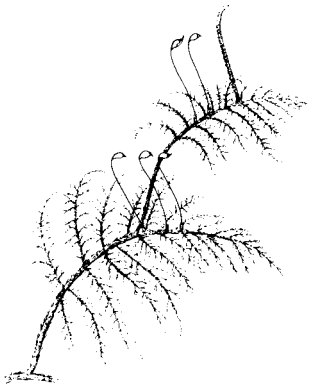


Orthilia secunda

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

SOIL AND SITE

Moisture Regime: submesic - subhygric
Nutrient Regime: poor - medium (-rich)
Slope Gradient (%): 0-85, usually less than 30
Slope Position: upper - lower or level
Parent Material: variable but usually morainal or glaciofluvial
* Soil Texture: medium-coarse
Coarse Fragments (%): 0-75
Site Index: PI 24 (16-33)
Sw 25 (13-34)



Hylocomium splendens

DISTRIBUTION: very common

SW - KNIGHT'S PLUME - STEP MOSS (BWBSdk1/01)

INTERPRETATIONS

Logging:

- clearcut
- full tree harvesting may seriously reduce cones on a site; good cone distribution must be ensured if managing for naturals
- harvest fine-textured moraines during the dry part of summer or in winter
- trafficability may be a problem if long durations of heavy rainfall occurs

Site preparation:

Objective

- reduce debris; prepare planting spots; minimize future brush competition; improve planter access; increase soil temperature; enhance natural regeneration

Mechanical

- drag scarify*; disc trench; C & H plow; piling; mix humus with mineral

Prescribed fire

- light broadcast burn on south aspect; higher intensity burn on north aspect

Species choice:

Preferred
Acceptable

- Sw, PI

Brush hazard:

- moderate (fireweed, highbush -cranberry, prickly rose)

Reforestation:

- conduct a PI cone survey to determine if enough seed is present to establish a natural PI stand. If so, drag scarify the site.
- plant PI on south aspect, plant Sw on north aspect
- plant as soon as the frost is out of the ground

Concerns:

- aspect is one of the most important factors affecting site productivity on this ecosystem. Managers should tailor their prescriptions accordingly.

BWBSdk1/02

PI - LINGONBERRY - FEATHERMOSS

VEGETATION

Tree Layer: 20% cover
Lodgepole pine, white spruce

Shrub Layer: 20% cover
Shepherdia canadensis (soopolallie)
lodgepole pine
white spruce
subalpine fir



lodgepole pine

Herb Layer: 10% cover
Linnaea borealis (twinflower)
Vaccinium vitis-idaea (lingonberry)
Arctostaphylos uva-ursi (kinnikinnick)
Vaccinium caespitosum (dwarf blueberry)
Cornus canadensis (bunchberry)

Moss Layer: 70% cover
Cladina spp. (red-stemmed feathermoss)
Pleurozium schreberi
Cladonia spp.
Peltigera apthosa
Stereocaulon tomentosum
Polytrichum juniperinum (juniper haircap moss)



S. canadensis

SOIL AND SITE

Moisture Regime: xeric - subxeric
Nutrient Regime: very poor - poor
Slope Gradient (%): 0-30
Slope Position: variable
* Parent Material: glaciofluvial or colluvium over rock
* Soil Texture: coarse - medium
Coarse Fragments (%): 30-80
Site Index: PI 19 11-26

COMMENTS:
Moss layer can be dominated by feathermoss or lichens.

DISTRIBUTION: uncommon



Vaccinium vitis-idaea

PL - LINGONBERRY - FEATHERMOSS (BWBSdk1/02)

INTERPRETATIONS

- Logging:
- clearcut
 - full tree harvesting may seriously reduce cones on a site; good cone distribution must be ensured if managing for naturals
- Site preparation:
- Objective
- enhance natural regeneration; reduce debris; prepare planting spots; improve moisture status; improve planter access
- Mechanical
- drag scarify*; disc trench
- Prescribed fire
- do not burn
- Species choice:
- Preferred
Acceptable
- PI
- Brush hazard:
- low
- Reforestation:
- conduct a PI cone survey to see if enough seed is present to have a natural PI stand established. If cone survey results indicate little seed then plant PI, but expect heavy mortality due to droughty conditions.
- Concerns:
- severe drought period
 - mistletoe
 - expect stocking levels to take 10 years to achieve
 - because these sites are marginal for timber production, silvicultural investment may be difficult to justify, and management must ensure that productivity is not further reduced

BWBSdk1/03

Sw - WILDRYE - TOAD-FLAX

VEGETATION

Tree Layer: 35% cover
Lodgepole pine, white spruce

Shrub Layer: 30% cover
Rosa acicularis (prickly rose)
Viburnum edule (highbush-cranberry)
Shepherdia canadensis (soopolallie)
white spruce

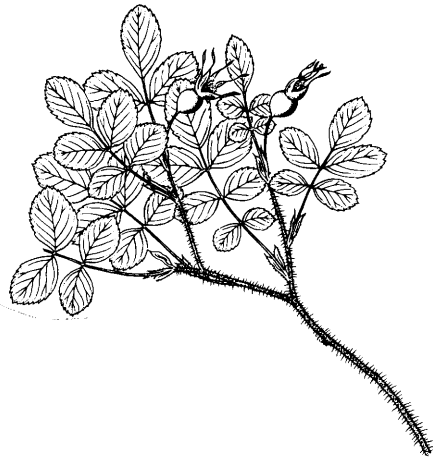
Herb Layer: 20% cover
Linnaea borealis (twinflower)
Cornus canadensis (bunchberry)
Orthilia secunda (one-sided wintergreen)
Epilobium angustifolium (fireweed)
Elymus innovatus (fuzzy-spiked wildrye)
Mertensia paniculata (tall bluebells)

Moss Layer: 80% cover
Pleurozium schreberi (red-stemmed feathermoss)
Hylocomium splendens (step moss)
Ptilium crista-castrensis (knight's plume)
Peltigera aphthosa

SOIL AND SITE

Moisture Regime: submesic - mesic
Nutrient Regime: poor - (medium)
* Slope Gradient (%): 5-90 usually less than 30
* Slope Position: mid to crest or level
Parent Material: glaciofluvial or morainal
* Soil Texture: coarse to medium
Coarse Fragments (%): 0-75
Site Index: PI 23 (18-31)
Sw 21 (12-28)

DISTRIBUTION: common



Rosa acicularis



S. canadensis



Elymus innovatus

SW - WILDRYE - TOAD-FLAX (BWBSdk1/03)

INTERPRETATIONS

- Logging:
- clearcut
 - full tree harvesting may seriously reduce cones on a site; good cone distribution must be ensured if managing for naturals
- Site preparation:
- Objective
- enhance natural regeneration; reduce debris; prepare planting spots; improve moisture status; improve planter access
- Mechanical
- drag scarify*; disc trench
- Prescribed fire
- light broadcast burn on deeper humus
- Species choice:
- Preferred
Acceptable
- PI
- Brush hazard:
- low
 - grass competition is possible
- Reforestation:
- conduct a PI cone survey to see if enough seed is present to have a natural PI stand established and to see if drag scarification is required. If cone survey results indicate little seed, then plant PI, but expect mortality due to droughty conditions.
- Concerns:
- drought
 - mistletoe

BWBSdk1/04

Sb - LINGONBERRY - KNIGHT'S PLUME

VEGETATION

Tree Layer: 35% cover
Lodgepole pine, white spruce, black spruce

Shrub Layer: 35% cover
Ledum groenlandicum (Labrador tea)
Shepherdia canadensis (soopolallie)
black spruce



black spruce

Herb Layer: 15% cover
Vaccinium vitis-idaea (lingon berry)
Cornus canadensis (bunchberry)
Linnaea borealis (twinflower)
Empetrum nigrum (crowberry)
Elymus innovatus (fuzzy-spiked wildrye)

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



Ledum groenlandicum

SOIL AND SITE

Moisture Regime: subxeric - submesic (-mesic)
Nutrient Regime: (very poor) - poor
Slope Gradient (%): 0-45
* Aspect: usually north if sloping
* Slope Position: mid to crest or level
Parent Material: glaciofluvial or morainal
Soil Texture: medium to coarse
Coarse Fragments (%): 0-80
Site Index: PI 20 (16-23)
Sw 21 (18-25)

DISTRIBUTION: uncommon



Vaccinium vitis-idaea

SB - LINGONBERRY - KNIGHT'S PLUME (BWBSdk1/04)

INTERPRETATIONS

Logging:

- clearcut
- full tree harvesting may seriously reduce cones on a site; good cone distribution must be ensured if managing for naturals

Site preparation:

Objective

- enhance natural regeneration; reduce debris; prepare planting spots; improve moisture status; improve planter access

Mechanical

- drag scarify*

Prescribed fire

- do not burn

Species choice:

Preferred
Acceptable

- PI

Brush hazard:

- low

Reforestation:

- conduct a PI cone survey to see if enough seed is present to have a natural PI stand established. If cone survey results indicate little seed, then plant PI, but expect heavy mortality due to droughty conditions.

Concerns:

- drought
- mistletoe
- expect stocking levels to take 10 years to achieve
- because these sites are marginal for timber production, silvicultural investment may be difficult to justify, and management must ensure that productivity is not further reduced

BWBSdk1/05

Sw - SOOPOLLIE - TWINFLOWER

VEGETATION

Tree Layer: 60% cover
Lodgepole pine

Shrub Layer: 45% cover
Shepherdia canadensis
Rosa acicularis
Viburnum edule
lodgepole pine

(soopolallie)
(prickly rose)
(highbush-cranberry)

Herb Layer: 70% cover
Linnaea borealis
Arctostaphylos uva-ursi
Geocaulon lividum
Arnica cordifolia
Cornus canadensis

(twinflower)
(kinnikinnick)
(bastard toad-flax)
(heart-leaved arnica)
(bunchberry)



lodgepole pine

Moss Layer: 20% cover
Polytrichum spp.
Pleurozium schreberi

(red-stemmed feathermoss)

SOIL AND SITE

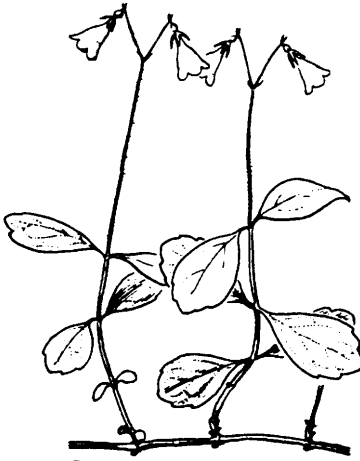
Moisture Regime:
Nutrient Regime:
Slope Gradient (%):
* Aspect:
* Slope Position:
Parent Material:
Soil Texture:
Coarse Fragments (%):

submesic (-mesic)
medium-rich
0-5
N/A
level
(glacio-) fluvial
medium - moderately coarse
variable



S. canadensis

DISTRIBUTION: uncommon



Linnaea borealis

SW - SOOPOLALLIE - TWINFLOWER (BWBSdk1/05)

INTERPRETATIONS

Logging:

- clearcut
- full tree harvesting may seriously reduce cones on a site; good cone distribution must be ensured if managing for naturals
- harvest fine-textured moraines during the dry part of summer or in winter
- trafficability may be a problem if long durations of heavy rainfall occurs

Site preparation:

Objective

- reduce debris; prepare planting spots; improve planter access; increase soil temperature; enhance natural regeneration

Mechanical

- drag scarify*; piling; mix humus with mineral

Prescribed fire

- light broadcast burn

Species choice:

Preferred
Acceptable

- PI, (Sw)

Brush hazard:

- low (fireweed, highbush-cranberry, prickly rose)

Reforestation:

- conduct a PI cone survey to determine if enough seed is present to establish a natural PI stand. If so, drag scarify the site.
- plant as soon as the frost is out of the ground

Concerns:

BWBSdk1/06

Sw - SCOURING-RUSH - STEP MOSS

VEGETATION

Tree Layer: 40% cover
White spruce

Shrub Layer: 10% cover
white spruce

Herb Layer: 7% cover
Linnaea borealis
Arctostaphylos rubra
Equisetum scirpoides
Festuca altaica
Empetrum nigrum
[Vaccinium vitis-idaea]

(twinflower)
(red bearberry)
(dwarf scouring-rush)
(Altai fescue)
(crowberry)
(lingonberry)]

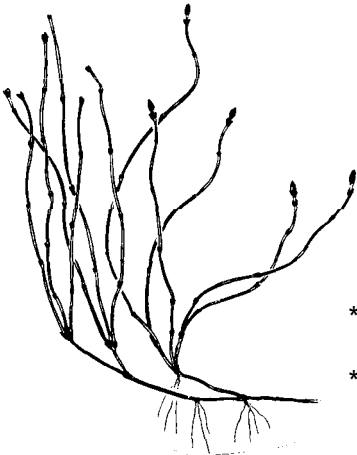


Arctostaphylos rubra Moss Layer: 90% cover
Hylocomium splendens

(step moss)

Peltigera spp.
Pleurozium schreberi
Dicranum spp.

(red-stemmed feathermoss)



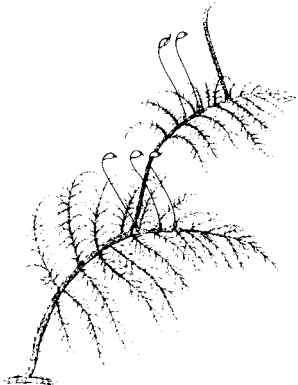
Equisetum scirpoides

SOIL AND SITE

Moisture Regime:
Nutrient Regime:
Slope Gradient (%):
* Slope Position:
Parent Material:
* Soil Texture:
Coarse Fragments (%):
Site Index:

subhygric
medium - rich
5-15
lower to mid
variable
fine to medium
0-75
Sw 26 (21-32)
PI 26 (21-33)

DISTRIBUTION: uncommon



Hylocomium splendens

SW - SCOURING-RUSH- STEPMOSS (BWBSdk1/06)

INTERPRETATIONS

- Logging: - clearcut
- Site preparation:
- Objective - reduce debris; prepare planting spots; minimize future brush competition; improve planter access; increase soil temperature; enhance natural regeneration
 - Mechanical - patch scarify; mix humus with mineral soil
 - Prescribed fire - light broadcast burn*; pile and burn
- Species choice:
- Preferred - PI, Sw
 - Acceptable
- Brush hazard:
- moderate (trembling aspen, fireweed)
 - brush competition will likely occur within 3 years of harvesting; sites should be inspected at 3 years to determine if any further treatment is required
 - pre-harvesting hack-and-squirt should be done at least 2 years prior to harvest
 - aspen suckering can be a problem on these sites
- Reforestation: - vigorous stock should be planted immediately after site preparation
- Concerns: - aspen competition

BWBSdk1/07

Sb - LINGONBERRY - COLTSFOOT

VEGETATION

Tree Layer: 30% cover
Lodgepole pine, white spruce, black spruce

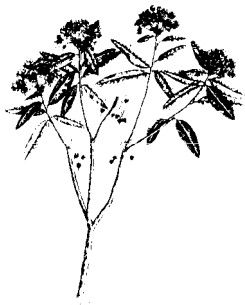


black spruce

Shrub Layer: 30% cover
Ledum groenlandicum (Labrador tea)
Rosa acicularis (prickly rose)
Salix spp. (willows)
black spruce

Herb Layer: 15% cover
Vaccinium vitis-idaea (lingonberry)
Cornus canadensis (bunchberry)
Linnaea borealis (twinflower)
Mertensia paniculata (tall bluebells)
Equisetum scirpoides (dwarf scouring-rush)
Orthilia secunda (one-sided wintergreen)
Petasites palmatus (palmate coltsfoot)
Pyrola asarifolia (rosy wintergreen)

Moss Layer: 95% cover
Hylocomium splendens (step moss)
Pleurozium schreberi (red-stemmed feathermoss)
Cladina spp.
Peltigera aphthosa



Ledum groenlandicum *

SOIL AND SITE

Moisture Regime: subhygric - hygric
Nutrient Regime: poor - medium
Slope Gradient (%): 0-45
Slope Position: lower - toe, occasionally mid
Parent Material: morainal, fluvial or organic
Soil Texture: medium to coarse
Coarse Fragments (%): 0-80
Site Index: PI 23 (22-24)
Sw 20 (17-23)

DISTRIBUTION: uncommon



Vaccinium vitis-idaea

SB - LINGONBERRY - COLTSFOOT (BWBSdk1/07)

INTERPRETATIONS

- Logging:
- clearcut
 - trafficability will be a problem on these sites during the summer
- Site preparation:
- Objective
- reduce debris; prepare planting spots; minimize future brush competition; improve planter access; increase soil temperature; prepare raised planting sites
- Mechanical
- plow; mound*
- Prescribed fire
- broadcast burn
- Species choice:
- Preferred
- Sw
- Acceptable
- PI
- Brush hazard:
- high (willows, prickly rose, fireweed)
 - post-planting inspections of harvested sites should be carried out to determine the need for vegetation control
- Reforestation:
- plant after water table drops below ground level and plant on drier microsites
 - use large planting stock
- Concerns:
- root rot (if managing for Sw)
 - compaction
 - windthrow hazard is extreme
 - this association is critical to the control of runoff and stream flow
 - water table on level sites will likely rise above the ground surface in the spring causing seedling mortality
 - herbicide use to control brush competition may conflict with wildlife needs

BWBSdk1/08

Sw - CURRANT - HORSETAIL

VEGETATION

Tree Layer: 40% cover
White spruce

Shrub Layer: 25% cover

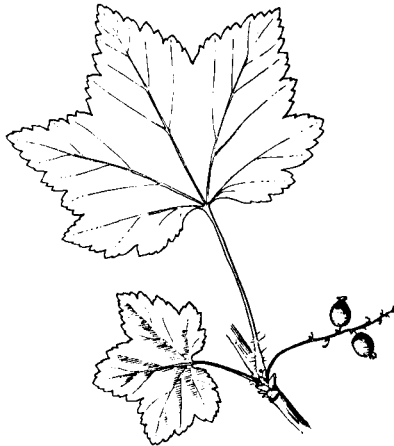
Alnus incana ssp. tenuifolia, (mountain alder)
Rosa acicularis (prickly rose)
Ribes lacustre (black gooseberry)
Viburnum edule (highbush-cranberry)
Ribes triste (red swamp currant)
white spruce



Alnus incana ssp.
tenuifolia

Herb Layer: 60% cover
Equisetum spp. (pratense,
arvense)

Cornus canadensis (bunchberry)
Linnaea borealis (twinline)
Mertensia paniculata (tall bluebells)
Mitella nuda (common mitrewort)
Rubus pubescens (trailing raspberry)
Orthilia secunda (one-sided wintergreen)



Ribes triste

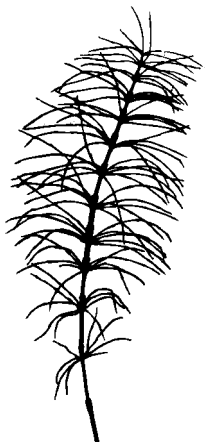
Moss Layer: 95% cover
Hylocomium splendens
Pleurozium schreberi
Ptilium crista-castrensis
Minium spp.

(step moss)
(red-stemmed feathermoss)
(knight's plume)
(leafy mosses)

SOIL AND SITE

Moisture Regime: subhygric - hygric
Nutrient Regime: rich
* Slope Gradient (%): 0-3
* Slope Position: level or toe
* Parent Material: fluvial or organic
Soil Texture: medium to coarse
Coarse Fragments (%): 0
Site Index: Sw 28 (26-31)

DISTRIBUTION: rare



Equisetum pratense

SW - CURRANT - HORSETAIL (BWBSdk1/08)

INTERPRETATIONS

Logging:

- clearcut
- trafficability will be a problem on these sites during the summer

Site preparation:

Objective

- reduce debris; prepare planting spots; minimize future brush competition; improve planter access; increase soil temperature; prepare raised planting sites

Mechanical

- plow; mound*

Prescribed fire

- broadcast burn

Species choice:

Preferred
Acceptable

- Sw

Brush hazard:

- very high (mountain alder, prickly rose, fireweed)
- post-planting inspections of harvested sites should be carried out to determine the need for vegetation control

Reforestation:

- plant as soon as frost is out of the ground
- use large planting stock

Concerns:

- herbicide use to control brush competition may conflict with wildlife needs
- windthrow
- root rot
- compaction
- this association is critical to the control of runoff and stream flow
- water table will likely rise above the ground surface in the spring causing seedling mortality

BWBSdk1/09

Sb - HORSETAIL - SPHAGNUM

VEGETATION

Tree Layer: 15% cover
Black spruce

Shrub Layer: 70% cover
Ledum groenlandicum
Salix spp.
black spruce

(Labrador tea)
(willows)



Ledum groenlandicum

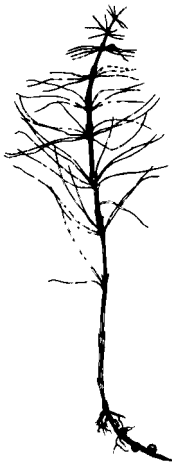
Herb Layer: 70% cover
Equisetum spp. (arvense,
scirpoides)
Carex spp.
Vaccinium ssp. (vitis-idaea,
oxycoccus)

(horsetails)
(sedges)

(lingonberry, bog cranberry)

Moss Layer: 90% cover
Sphagnum spp.
Hylocomium splendens
Aulacomnium palustre

(sphagnum mosses)
(step moss)
(glow moss)



Equisetum arvense

SOIL AND SITE

Moisture Regime:
Nutrient Regime:
* Slope Gradient (%):
* Slope Position:
* Parent Material:
Soil Texture:
Coarse Fragments (%):
Site Index:

hygric - subhydric
poor - medium
0-12 (usually less than 5)
level, toe or depression
organic
fibric or humic
0
Sb 15

DISTRIBUTION: common



Sphagnum spp.

SB - HORSETAIL - SPHAGNUM (BWBSdk1/9)

INTERPRETATIONS

Management objectives : - non-commercial at this time

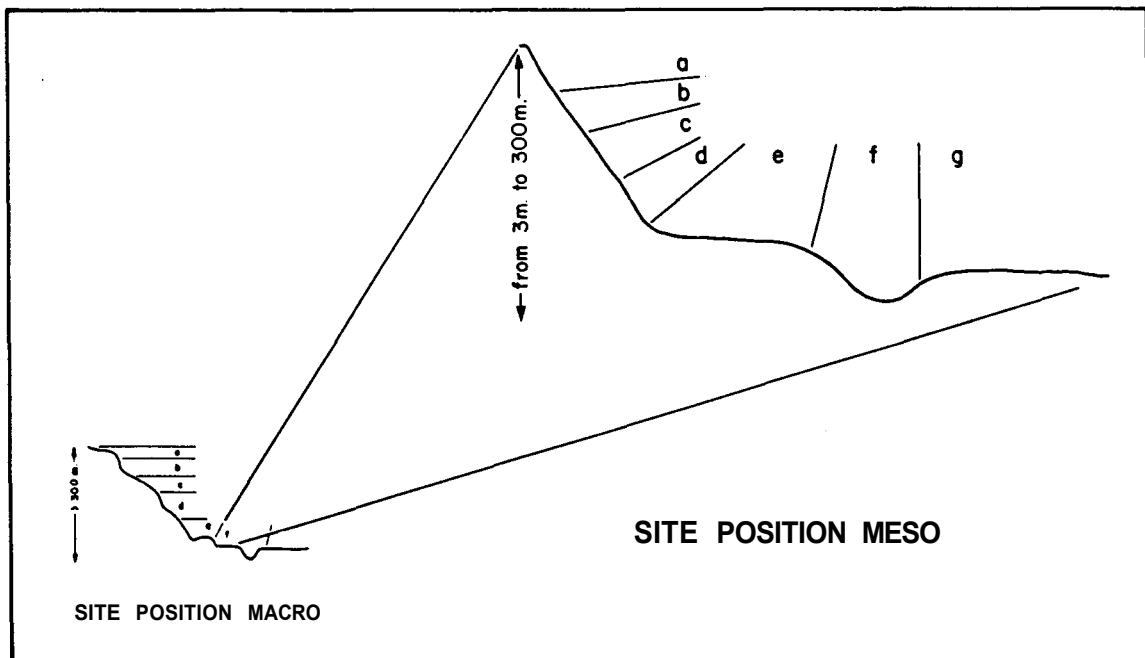
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APPENDIX 1. Meso slope position diagram

- a. Crest - the generally convex uppermost portion of a hill (meso scale); it is usually convex in all directions; no distinct aspect.
- b. Upper Slope - the generally convex upper portion of the slope of a hill (meso scale) immediately below the crest; it has a convex surface profile with a specific aspect.
- c. Middle Slope - the area of the slope of a hill between the upper slope and the lower slope, where the slope profile is not generally concave or convex; it has a straight or somewhat sigmoid surface profile with a specific aspect.
- d. Lower Slope - the area toward the base of the slope of the hill. It generally has a concave surface profile with a specific aspect.
- e. Toe - area defined by extent of homogeneous site of slight slope; clearly demarcated by an abrupt decrease in the slope (below and adjacent to the lower slope).
- f. Depression - any area that is concave in all directions; generally at the foot of a meso scale hill or in generally level area.
- g. Level - any level meso scale area not adjacent to a meso scale hill. The surface profile is generally horizontal with no significant aspect.



APPENDIX 2. Hand texturing field guide

Soil texture refers to the relative proportions of the sand, silt, and clay separates within a soil. These separates have their own distinctive properties of "feel", allowing one to estimate their proportions in a sample of soil by hand texturing. Texture can be estimated very roughly from a dry sample. Clayey materials are very hard, loamy and silty materials are slightly hard to soft, and sandy materials are loose grained. To be more precise, hand texturing should be done using the wet sample procedure given below.

Step 1

Obtain a small handful of soil, crush it in the hand, and remove coarse fragments (particles greater than 2 mm in diameter).

Step 2

Gradually add water to the soil and work it into a moist putty with a soil knife or fingers. The correct moisture content is important. If the putty flows with the force of gravity, then it is too wet. If it crumbles when rolled, then it is too dry. It should have the consistency of a filler putty.

Step 3

Determine stickiness of the soil putty by working it between the thumb and forefinger, pressing and then separating the fingers. An estimate of clay content can be made in this way. (Clay limits below are approximate.)

NONSTICKY: practically no soil material adheres to the thumb and forefinger (less than 10% clay).

SLIGHTLY STICKY: soil material adheres only to one of the fingers and comes off the other rather cleanly. The soil does not stretch appreciably when fingers are separated (less than 25% clay).

STICKY: soil material adheres to both fingers and stretches slightly before breaking when fingers are pulled apart (25-40% clay).

VERY STICKY: soil putty adheres strongly to both fingers and stretches distinctly before breaking (greater than 40% clay).

Step 4

Determine the grittiness of the soil putty by rubbing it between thumb and forefinger. An estimate of sand content can be made in this way. (Sand limits below are approximate.)

NONGRITTY: Little or no grit can be felt (less than 20% sand).

SLIGHTLY GRITTY: Some grit is felt but non gritty material (silt and clay) is dominant (20-50% sand).

GRITTY: Sand is felt as the dominant material. Some non gritty material can be felt between sand grains (50-80% sand).

VERY GRITTY: Sand is the only material that is felt. Little or no non gritty material present (greater than 80% sand).

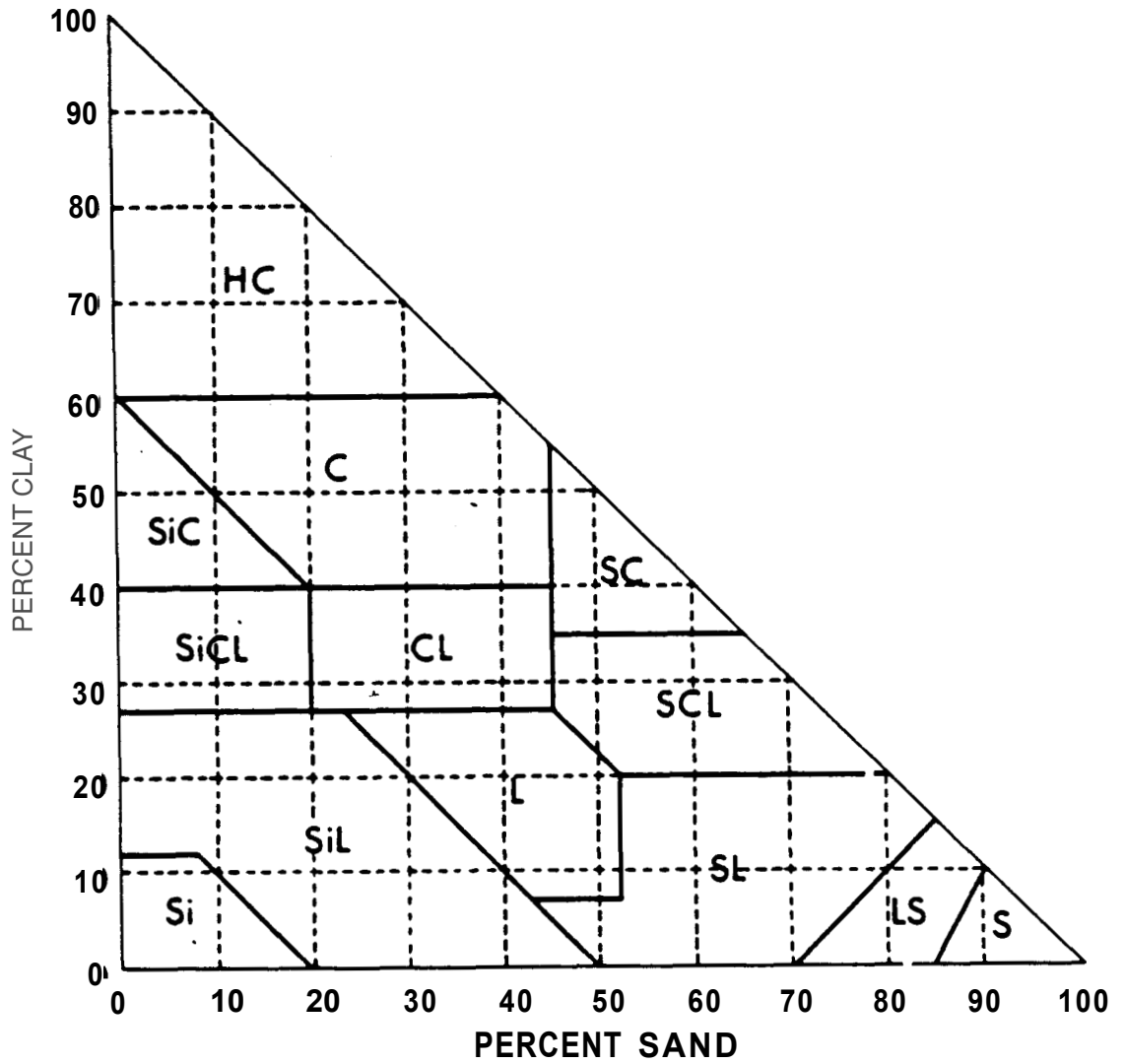
Step 5

After stickiness and grittiness have been determined, the hand texturing table can be used as an approximate guide to the textural class of the soil. The textural triangle (Figure 14) can be used for a more accurate determination of the textural class.

	NONGRITTY (<u><20% sand</u>) ^a	SLIGHTLY GRITTY (<u>20-50% sand</u>)	GRITTY (<u>50-80% sand</u>)	VERY GRITTY (<u>>80% sand</u>)
VERY STICKY (<u>>40% clay</u>) ^a	SILTY CLAY	CLAY	SANDY CLAY	--
STICKY (<u>25-40% clay</u>)	SILTY CLAY LOAM	CLAY LOAM	SANDY CLAY LOAM	--
SLIGHTLY STICKY (<u>10-25% clay</u>)	SILT LOAM or SILT	LOAM ^b	SANDY LOAM	--
NON STICKY (<u><10% clay</u>)	—	—	—	LOAMY SAND or SAND

^a Sand and clay limits are approximate.

^b A loam is a textural class exhibiting physical properties intermediate between those of sand, silt, and clay.



Soil textural triangle.

APPENDIX 3. Identification of upland humus forms

- Mors: - matted F horizon^a
 - common fungal mycelium (white or yellow)
 - little or no intermixing of organic and mineral materials
 - abrupt boundary between organic and mineral horizons
- Moders: - loosely arranged F horizon^a
 - friable
 - insect droppings
 - fungal mycelium and soil organisms (arthropods and occasional earthworms)
 - intermixing of organic and mineral horizons
 - gradual transition between mineral and organic horizons
- Mulls: - often no F^a or H horizons (thin if present)
 - insect droppings abundant
 - usually many soil organisms but may form from decomposition of a dense network of roots (usually abundant earthworms)
 - considerable intermixing of mineral and organic layers, with incorporation of organic matter into surface mineral soil (Ah horizon)
-

^aF horizon: horizon in which partial (rather than entire), macroscopically recognizable vegetative structures are dominant (i.e., the horizon is partially decomposed).

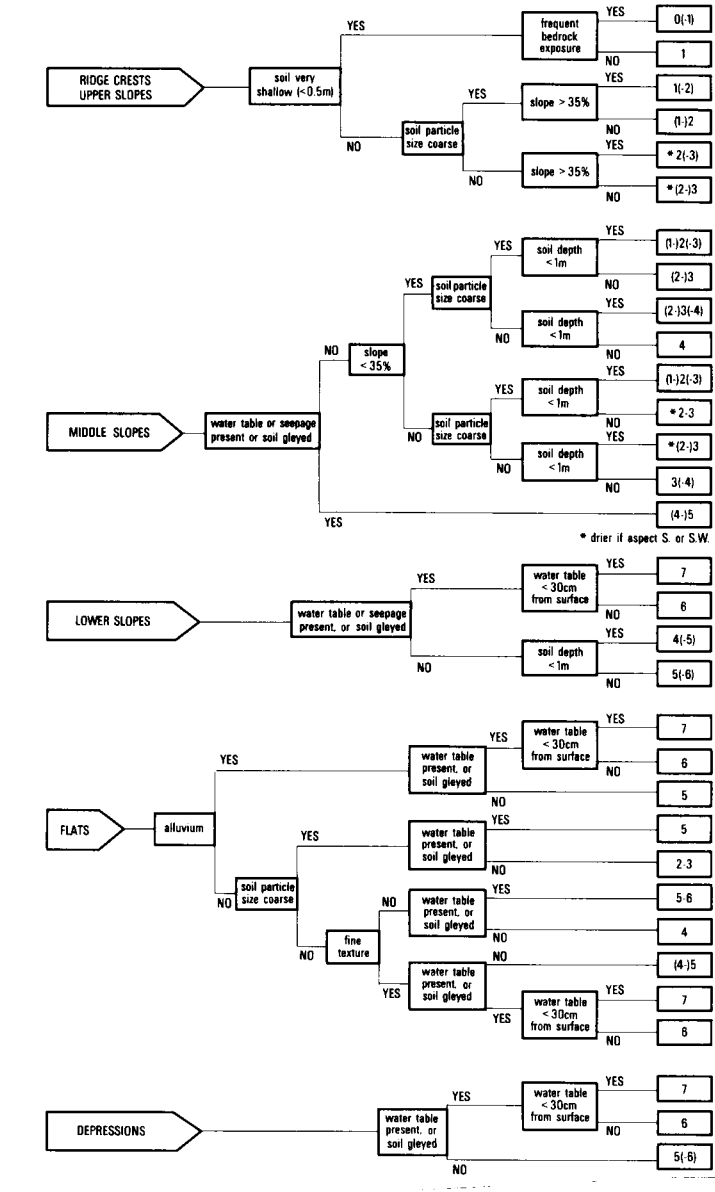
APPENDIX 4. Key to the identification of potential moisture regime (part 1)
(from Green et al. 1984)

This key was devised to aid field staff in identifying potential moisture regimes using readily observable environmental features. It should be applied with caution on ridge crests, upper slopes, and middle slopes which have soils with thick (>20 cm) organic layers. Moisture regime in these cases will generally be higher than indicated. The table below provides definitions for the categories used in the key.

Category	Definition
Ridge crest	height of land; usually convex slope shape.
Upper slope	the generally convex shaped, upper portion of a slope.
Middle slope	the portion of a slope between the upper and lower slopes; the slope shape is usually straight.
Lower slope	the area towards the base of a slope; the slope shape is usually concave. It includes toe slopes which are generally level areas located directly below and adjacent to the lower slope.
Flat	any level area (excluding toe slopes); the surface shape is generally horizontal with no significant aspect.
Alluvium	post-glacial, active floodplain deposits along rivers and streams in valley bottoms; usually a series of low benches and channels.
Depression	any area that is concave in all directions; usually at the foot of a slope or in flat topography.
Soil depth	depth from the mineral soil surface to a restricting layer such as bedrock, strongly compacted, or strongly cemented materials (e.g. "hardpan").
Gleyed	soils that have orange coloured mottles indicative of a fluctuating watertable. Permanently gleyed soils are dull yellowish, blue, or olive in colour.
Soil particle size coarse	sandy ^a with > 35% volume of coarse fragments, or loamy ^a with > 70% volume of coarse fragments.
Fine texture	silty ^a or clayey ^a with a low coarse fragment volume.

^a Sandy - LS, S; loamy - SL, L, SCL; clayey - SiCL, CL, SC, SiC, C; silty - SiL, Si.

Appendix 4. Key to the identification of potential moisture regime (part 2)



APPENDIX 5. Key to the identification of soil nutrient regime^a

1a Coarse-textured

2a Very high coarse fragments (>50%) or very shallow (<30 cm) soil.

3a Mor humus form

Very Poor

3b Moder humus form

Poor - Medium

2b Low or zero coarse fragments, deep soil

4a Mor humus form

Poor

4b Moder humus form

Medium

4c Mull humus form

Rich - Very Rich

1b Moderately coarse- and medium-textured

5a Very high coarse fragments (>50%); or very shallow soil (<30 cm); or shallow rooting depth

6a Mor humus form

Poor

6b Moder

Medium

5b Low or zero coarse fragments without restricted rooting depth

^a The presence of base-rich parent materials (limestone, shales, basalt) may improve the nutrient status.

7a Mor humus form	<u>Poor - Medium</u>
7b Moder humus form	<u>Medium - rich</u>
7c Mull humus form	<u>Very rich</u>
1c Moderately fine- and fine-textured	
8a Very high coarse fragments (rare); or very shallow soil; or shallow rooting depth (<15 cm)	
9a Mor humus form	<u>Poor - Very Poor</u>
9b Moder humus form	<u>Medium - Poor</u>
9c Mull humus form	<u>Rich</u>
8b Low or zero coarse fragments, with good rooting depth (>20 cm)	
10a Mor humus form	<u>Medium</u>
10b Moder humus form	<u>Rich</u>
10c Mull humus form	<u>Very Rich</u>