Sxw - Horsetail (SBSdk/07)

INTERPRETATIONS

Site limitations:  
- very difficult sites to manage; serious consideration should be given to managing these sites as wildlife corridors;  
- sites within this unit with saturated soils are poorly aerated, which slows root development; plant seedlings on naturally or artificially raised microsites.

Silviculture system:  
- see Section 5.1

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

Species choice:  
- Sx, [Pl]

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

Reforestation:  
- advance regeneration should be preserved.
- supplement advance regeneration by planting sturdy stock in groups on available microsites.
- low ground-pressure vehicles should be used when treating these sites.

Concerns:  
- site conditions may lead to frost damage of Sx regeneration, especially in any naturally occurring or artificially created depression; leaving a partial canopy and/or choosing a frost-resistant species (eg., Pl) is advised.
- sites within this unit with fine-textured soils are vulnerable to compaction under wet conditions; restrict traffic to winter operations.
- sites within this unit with thick organic horizons (>10 cm) have increased windthrow hazard; block layouts must have windfirm boundaries, or a wide buffer of standing timber must be left around such sites.
- these units may represent important habitat for wildlife, so prescription should be discussed with wildlife personnel.
- water table will likely rise above the ground surface in the spring, causing seedling mortality.
- this association is critical to the control of runoff and streamflow.
- Warren’s root collar weevil can cause mortality in young stands, especially where duff layers are thick.
### VEGETATION

**Tree Layer:** 45% cover
- *black cottonwood*, [hybrid white spruce]

**Shrub Layer:** 75% cover
- *Cornus stolonifera* (red-osier dogwood)
- *Lonicera involucrata* (black twinberry)
- *Viburnum edule* (highbush-cranberry)
- *Rosa acicularis* (prickly rose)
- hybrid white spruce

**Herb Layer:** 40% cover
- *Calamagrostis canadensis* (bluejoint)
- *Vicia americana* (American vetch)
- *Elymus glaucus* (blue wildrye)
- *Osmorhiza chilensis* (mountain sweet-cicely)
- [*Lathyrus nevadensis* (purple peavine)]

**Moss Layer:** 0% cover

### SOIL AND SITE

- **Moisture Regime:** 5-6 (shg-hg)
- **Nutrient Regime:** D-E (r-vr)
- **Slope Gradient (%):** 0
- **Slope Position:** valley bottom
- **Parent Material:** fluvial
- **Soil Texture:** coarse
- **Coarse Fragments (%):** not available

**DISTRIBUTION:** restricted to active fluvial landforms adjacent to larger rivers
**Act - Dogwood - Prickly rose (SBSdk/08)**

**INTERPRETATIONS**

**Site limitations:**
- very difficult sites to manage; *serious consideration should be given to managing these sites as wildlife corridors.*
- sites within this unit are subject to periodic flooding; *plant seedlings on naturally or artificially raised microsites.*

**Silviculture system:**
- see Section 5.1

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

**Species choice:**
- Act, S x, [Pl]

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

**Reforestation:**
- advance regeneration should be preserved.
- plant sturdy stock in groups, using available raised microsites, rather than evenly across the site.
- site could be left to regenerate naturally to Act.

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

**VEGETATION**

Tree Layer: 25% cover
- black spruce

Shrub Layer: 50% cover
- *Ledum groenlandicum* (Labrador tea)
- *Betula glandulosa* (scrub birch)
- black spruce

Herb Layer: 20% cover
- *Gaultheria hispidula* (creeping-snowberry)
- *Oxycoccus oxyzoccos* (bog cranberry)

Moss Layer: 95% cover
- *Sphagnum* spp.
- *Pleurozium schreberi* (red-stemmed feathermoss)
- *Icmadophila ericetorum* (spraypaint lichen)
- *Cladina* spp.
- *Cladonia* spp.

**SOIL AND SITE**

Moisture Regime: 6-7 (hg-shd)
Nutrient Regime: A-B (vp-p)
* Slope Gradient (%): 0
* Slope Position: depressions
* Parent Material: organic
* Soil Texture: organic
* Coarse Fragments (%): 0

**DISTRIBUTION:** uncommon, and restricted to landscape depressions and edges of some small lakes and ponds
Sb - Creeping snowberry - Sphagnum (SBSdk/09)

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
**VEGETATION**

**Tree Layer:** 30% cover  
black spruce, hybrid white spruce

**Shrub Layer:** 35% cover  
[Betula glandulosa (scrub birch)]  
[Salix barclayi (Barclay's willow)]  
[Ledum groenlandicum (Labrador tea)]  
[Alnus tenuifolia (mountain alder)]  
black spruce

**Herb Layer:** 75% cover  
Carex disperma (soft-leaved sedge)  
Equisetum arvense (common horsetail)  
Equisetum fluviatile (swamp horsetail)  
Potentilla palustris (marsh cinquefoil)

**Moss Layer:** 75% cover  
Tomentypnum nitens (golden fuzzy fen moss)  
Sphagnum spp. (sphagnum)  
Hylocomium splendens (step moss)  
[Aulacomnium palustre (glow moss)]  
[Drepanocladus spp. (drepanocladus mosses)]  
[Calliergon spp. (water mosses)]  
[Mnium spp. (leafy mosses)]

**SOIL AND SITE**

Moisture Regime: 6-7 (hg-shd)  
Nutrient Regime: C-E (m-vr)  
* Slope Gradient (%): 0  
* Slope Position: level and depressions  
Parent Material: organic  
* Soil Texture: organic  
Coarse Fragments (%): 0

**DISTRIBUTION:** common in landscape depressions and the borders of small lakes and ponds
Sb - Soft-leaved sedge - Sphagnum (SBSdk/10)

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
4.2 Blackwater Dry Warm Sub-Boreal Spruce

Location
In the Prince George Forest Region the SBSdw2 occurs from just north of the Chilako River, where it borders the SBSdw3, south to the southern boundary of the region at the Blackwater River (Figure 1). Its western limit is Tatuk Lake, where it borders the SBSmc3 and its eastern boundary is the Fraser River, where it borders the SBSmh (previously SBS1) (B.C. Ministry of Forests, Cariboo Forest Region 1987). The SBSdw2 reaches its northern limit in the Prince George Region, but extends south of the Blackwater River in the Cariboo Forest Region.

Elevation Range
750 to 1100 m

Climate
The SBSdw2 is dry and warm relative to other biogeoclimatic units in this guide and in the region. The SBSdw2 has the warmest climate of all the variants described in the guide (see Table 8). The warmth of this variant reflects its southern position and lower elevation with respect to the other variants. Winter precipitation is relatively low for the region, with snowpacks generally accumulating up to about 2 m in depth. Climatic growth-limiting factors are drought on drier sites and frost on frost-prone sites.

Soils, geology, and landforms
Bedrock types consist mostly of Palaeozoic sedimentary rocks in the western portion of this subzone and lower Mesozoic volcanic rocks in the eastern portion. Morainal parent materials with gravelly loam and clay loam textures are predominant in this subzone and are associated with Gray Luvisols, including Brunisolic Gray Luvisols. These morainal landscapes also include components of soils formed on organic deposits (Mesisols), colluvium (Brunisolic Gray Luvisols with gravelly loam and sandy loam textures), and glaciofluvial deposits (Dystric Brunisols with gravelly sand textures). Lacustrine deposits with subdued topography occur in the eastern portion of this subzone. Gray Luvisols are associated with the finer textures (silty clay, silty clay loam), while Dystric Brunisols occur on the coarser (loamy sand) lacustrine materials.

Distinguishing the SBSdw2 from adjoining subzones/variants
SBSdw3 has:
- no pinegrass on mesic sites; and
- queen’s cup on mesic and wetter sites.
SBSmc2 has:
- more subalpine fir but no Douglas-fir in the canopy;
- more black huckleberry but no saskatoon in the shrub layer; and
- five-leaved bramble in the herb layer but no pinegrass or wild sarsaparilla.
SBSmc3 has:
- no Douglas-fir or trembling aspen, but more subalpine fir in the canopy;
- less saskatoon but more black huckleberry in the shrub layer; and
- no pinegrass or wild sarsaparilla in the herb layer.

7 Formerly SBSk2

63
SBSnw has:
• more subalpine fir in the canopy;
• no pinegrass but occasional five-leaved bramble on mesic sites; and
• three-leaved foamflower on moist to wet sites.
SBSnh has:
• infrequent occurrence of lodgepole pine in the canopy;
• beaked hazelnut in the shrub layer; and
• Hooker’s fairybells but no pinegrass in the herb layer.

Forests
The forests of the SBSdw2 are some of the most diverse in the region.
Coniferous forests in this unit tend to be mixtures of lodgepole pine, Douglas-
fir, and hybrid white spruce with lodgepole pine and/or Douglas-fir dominating
on drier sites and hybrid white spruce dominating on wetter sites. Subalpine
fir is uncommon at low elevations but increases in abundance at the higher
reaches. Black spruce occurs both in wetlands as well as in combination with
lodgepole pine on poorer upland sites associated with compact morainal or
lacustrine soils. Upland deciduous forests are dominated by trembling aspen,
and black cottonwood is common along rivers and streams.

Wildlife
Douglas-fir stands in the SBSdw2 provide important winter habitat for mule
deer and are used by black bear, coyote, gray wolf, and cougar. White spruce -
lodgepole pine forests are used by mule deer in the summer, and are also used
by moose, grizzly bear, black bear, gray wolf, wolverine, fisher, marten, and
spruce grouse. Shrub-dominated wetlands below 900 m elevation provide
winter habitat for moose. These wetlands also support furbearers such as
beaver, muskrat, mink, and otter. Deciduous thickets and scattered open
woodlands along the southern edges of this variant support a small population
of sharp-tailed grouse.
FIGURE 11. Edatopic grid displaying site units in the SBSdw2 variant.
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<td><strong>Herbs and Dwarf Shrubs</strong></td>
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FIGURE 12. SBSdw2 vegetation table.
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<td>Equisetum arvense</td>
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<td><strong>Mosses and Lichens</strong></td>
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<td>Hylocomium splendens</td>
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<td>Rhytidium rivulare</td>
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FIGURE 12. SBSdw2 vegetation table (continued).
1a Mid- to upper slope or crest, or level; canopy dominated by lodgepole pine, Douglas-fir, or lodgepole pine - black spruce.

2a On crests of slopes; soils shallow (usually < 50 cm); herb layer sparse (usually < 10%).

2b Mid- to upper slope, or level; soils deep (> 1 m); herb layer well developed (> 20%).

3a Canopy of lodgepole pine - black spruce; often on level sites.

3b Black spruce absent from canopy; slope position variable.

4a Douglas-fir absent from canopy; aspect usually southerly to easterly.

4b Douglas-fir present in canopy; aspect variable.

5a Aspect southerly; canopy dominated by Douglas-fir, sometimes with minor lodgepole pine; *Juniperus communis* (p. 51) usually present.

5b Aspect variable; canopy not as above; *Juniperus communis* usually absent.

6a *Vaccinium myrtilloides* (p. 43) present and generally low to moderate cover (> 2%); hybrid white spruce a minor component of the canopy, or absent.

6b *Vaccinium myrtilloides* low cover (< 1%) or absent; hybrid white spruce often a major component of the canopy.

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*SBSdw2 Site Series Key*

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Page numbers refer to the publication *Plants of Northern British Columbia* (MacKinnon et al. 1992).
7a Upper slope; *Lonicera involucrata* (p. 48) usually absent, *Betula papyrifera* (paper birch) (p. 24) usually present.

7b Mid- to upper slope or level; *Lonicera involucrata* usually present, *Betula papyrifera* usually absent.

7b Mid- to upper slope or level; *Lonicera involucrata* usually present, *Betula papyrifera* usually absent.

1b Mid-slope to toe, or level; canopy dominated by hybrid white spruce, or black spruce (but not black spruce - lodgepole pine).

8a Level sites; soils organic or mineral; bogs.

8b Sites level or on a slope; soils mineral.

9a Canopy of hybrid white spruce and subalpine fir; seepage water present; *Equisetum* spp. (pp. 281-284) moderate to high cover (>10%).

9b Subalpine fir low cover or absent in canopy; seepage water present or absent; *Equisetum* spp. low cover (<5%), or absent.

10a *Oplopanax horridus* (p. 36) present; seepage water usually present.

10b *Oplopanax horridus* absent; seepage water present or absent.

11a Usually toe of slope, or level; Douglas-fir and lodgepole pine, if present, only minor components of the canopy.

11b Mid- to lower slope; Douglas-fir and lodgepole pine often major components of the canopy.
**VEGETATION**

**Tree Layer:** 45% cover
- lodgepole pine, Douglas-fir, hybrid white spruce

**Shrub Layer:** 30% cover
- *Rosa acicularis* (prickly rose)
- *Spirea betulifolia* (birch-leaved spirea)
- *Lonicera involucrata* (black twinberry)
- *Alnus crispa ssp. sinuata* (Sitka alder)
- *Amelanchier alnifolia* (saskatoon)
- *Rubus perrifolius* (thimbleberry)
- *Douglas-fir*
- hybrid white spruce

**Herb Layer:** 50% cover
- *Calamagrostis rubescens* (pinegrass)
- *Linnaea borealis* (twinflower)
- *Cornus canadensis* (bunchberry)
- *Arnica cordifolia* (heart-leaved arnica)
- *Orthilia secunda* (one-sided wintergreen)
- *Aralia nudicaulis* (wild sarsaparilla)
- *Rubus parviflorus* (thimbleberry)
- *Epilobium angustifolium* (fireweed)

**Moss Layer:** 80% cover
- *Pleurozium schreberi* (red-stemmed feathermoss)
- *Ptilium crista-castrensis* (knight's plume)
- *Dicranum polysetum* (wavy-leaved moss)
- *Hylocomium splendens* (step moss)
- *Peltigera aphthosa* (freckle lichen)
- *Rhytidiadelphus triquetrus* (electrifiled cat’s-tail moss)

**SOIL AND SITE**

**Moisture Regime:** 3-4 (sm-m)
**Nutrient Regime:** B-D(p-r)
**Slope Gradient (%):** 0-38
**Slope Position:** lower - upper, occasionally level
**Parent Material:** morainal or (glacio)fluvial; occasionally lacustrine
**Soil Texture:** medium - very coarse
**Coarse Fragments (%):** 0-95

**DISTRIBUTION:** very common, widespread, and often large
INTERPRETATIONS

Site limitations: - sites within this unit 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 (eg., Cu-treated), prescribe natural regeneration, or protect advance regeneration.**

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

Site preparation: - see Section 5.2

Species choice: - Pl, Sx, Fd

Vegetation potential: - moderate (pinegrass, fireweed, prickly rose)

Reforestation: - manage to maintain Fd component.
- attempt natural regeneration if potential exists; if infeasible, plant a mixture of Pl and Fd or Pl and Sx.
- if Fd stems are present, conduct a stand evaluation to assess if a partial cutting system is feasible.
- if a partial cutting system is used and abundant advance Fd regeneration is present, attempt to log in a manner that protects this regeneration.
- fill-planting may be required with partial cuts.
- help maintain stand diversity on sites to be planted with Pl by mapping aspen patches prior to harvest and planting these areas to spruce.

Concerns: - full tree harvesting will lead to nutrient depletion and seriously reduce cones; **woody debris and cones should be distributed across these sites (ie., lop and scatter)**
- site conditions may lead to frost damage of Fd regeneration, especially in any naturally occurring or artificially created depression; **leaving a partial canopy and/or choosing a frost-resistant species (eg., Pl) is advised.**
- comandra blister rust may cause cankers on pine if bastard toad-flax (*Geocaulon lividum*) occurs nearby.
- mountain pine beetle may cause mortality in large-diameter lodgepole pine stands of age class > 7.
- Warren's root collar weevil can cause mortality in young stands, especially where duff layers are thick.
VEGETATION

Tree Layer: 25% cover
- lodgepole pine, Douglas-fir

Shrub Layer: 15% cover
- *Spiraea betulifolia* (birch-leaved spirea)
- *Rosa acicularis* (prickly rose)
- *Juniperus communis* (common juniper)
- Douglas-fir

Herb Layer: 5% cover
- *Calamagrostis rubescens* (pinegrass)
- *Oryzopsis pungens* (short-awned ricegrass)
- *Antennaria neglecta* (field pussytoes)

Moss Layer: 70% cover
- *Pleurozium schreberi* (red-stemmed feathermoss)
- *Polytrichum juniperinum* (juniper haircap moss)
- *Dicranum polysetum* (wavy-leaved moss)
- *Cladina spp.* (cladina lichens)
- *Cladonia spp.* (cladonia lichens)

SOIL AND SITE

Moisture Regime: 1 (x)
Nutrient Regime: B-C(p-m)
Slope Gradient (%): 0
Slope Position: crest
* Parent Material: fluvial or morainal veneers over bedrock
Soil Texture: medium
Coarse Fragments (%): 30-80

COMMENTS: based on limited data

DISTRIBUTION: uncommon, small, and usually associated with bedrock outcrops or very coarse soils
FdPl - Cladonia (SBSdw2/02)

INTERPRETATIONS

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

Silviculture system:  
- see Section 5.1  
- leave enough Fd stems on site to provide shade; this reduces drying and heating of the upper soil horizons.

Site preparation:  
- light scarification for seedbed preparation if not located on xeric, crest veneer soils, or summer logging with no site preparation.

Species choice:  
- Fd, Pl

Vegetation potential:  
- low

Reforestation:  
- manage to maintain Fd component.  
- if disturbance during logging does not expose some mineral soil, then natural Pl and Fd regeneration should be promoted by either light scarification or spot screefing.  
- fill-planting may be required to meet stocking requirements.

Concerns:  
- avoid clearcutting; stand establishment will be difficult because of high surface soil temperatures and drought.  
- these units may represent important early season range for wildlife, so prescription should be discussed with wildlife personnel.  
- site and soil conditions of this unit result in drought hazard for a significant portion of the growing season; leaving a shelterwood overstory can reduce the severity of the drought hazard.  
- 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.  
- comandra blister rust may cause cankers on pine if bastard toad-flax (Geocaulon lividum) occurs nearby.
VEGETATION

**Tree Layer:** 30% cover
- lodgepole pine, [hybrid white spruce]

**Shrub Layer:** 45% cover
- *Vaccinium myrtilloides* (velvet-leaved blueberry)
- *Amelanchier alnifolia* (saskatoon)
- *Spiraea betulifolia* (birch-leaved spirea)
- *Rosa arctida* (prickly rose)
- *Shepherdia canadensis* (soopolallie)
- lodgepole pine

**Herb Layer:** 60% cover
- *Arctostaphylos uva-ursi* (kinnikinnick)
- *Linnaea borealis* (twinflower)
- *Fragaria virginiana* (wild strawberry)
- *Aster ciliatus* (fringed aster)
- *Calamagrostis rubescens* (pinegrass)
- *Cornus canadenesi* (bunchberry)
- *Eriophorum angustifolium* (fireweed)

**Moss Layer:** 90% cover
- *Pleurozium schreberi* (red-stemmed feathermoss)
- *Dicranum polysetum* (wavy-leaved moss)
- *Peltigera aphthosa* (freckle lichen)
- *Cladina rangiferina* (grey reindeer lichen)
- *Ptilium crista-castrensis* (knight’s plume)
- *Hylocomium splendens* (step moss)

SOIL AND SITE

- **Moisture Regime:** 2 (sx)
- **Nutrient Regime:** A-B (yp-p)
- **Slope Gradient (%):** 10-35
- **Slope Position:** mid-crest or level
- **Aspect:** southerly to easterly
- **Parent Material:** glaciofluvial
- **Soil Texture:** coarse
- **Coarse Fragments (%):** 45-54

DISTRIBUTION: common adjacent to larger rivers on upper terraces or on old glacial meltwater channels with deposits of coarse soils
Pl - Kinnikinnick - Wavy-leaved moss (SBSdw2/03)

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

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

Species choice: - Pl, Fd

Vegetation potential: - low

Reforestation: - attempt to regenerate naturally if potential exists.
- if natural regeneration is not feasible, plant Pl.
- Fd may be planted on moister microsites.

Concerns: - full tree harvesting will lead to nutrient depletion and seriously reduce cones; woody debris and cones should be distributed across these sites (ie., 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.
- 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.
- comandra blister rust may cause cankers on pine if bastard toad-flax (Geocaulon lividum) occurs nearby.
Fd - Pinegrass - Aster

VEGETATION

Tree Layer: 30% cover
Douglas-fir, (lodgepole pine)

Shrub Layer: 20% cover
Shepherdia canadensis (soopolallie)
Rosa acicularis (prickly rose)
Amelanchier alnifolia (saskatoon)
Juniperus communis (common juniper)
Douglas-fir

Herb Layer: 35% cover
Achillea millefolium (yarrow)
Calamagrostis rubescens (pinegrass)
Arctostaphylos uva-ursi (kinnikinnick)
Sorption spathulata (spike-like goldenrod)
Fragaria virginiana (wild strawberry)
Lathyrus ochroleucus (creamy peavine)
Aster conspicuus (showy aster)
Galium boreale (northern bedstraw)
Vicia americana (American vetch)
Disporum trachycarpum (rough-fruit fairybells)

Moss Layer: 15% cover
Pleurozium schreberi (red-stemmed feathermoss)
Dicranum polysetum (wavy-leaved moss)
Peltigera spp. (peltigera lichens)

SOIL AND SITE

Moisture Regime: 2 (sx)
Nutrient Regime: B - D (p-r)
* Slope Gradient (%): 33-104
* Slope Position: mid - upper
Parent Material: glaciofluvial - colluvial
Soil Texture: medium to coarse
Coarse Fragments (%): 30-54
* Aspect: southerly (SE-SW)

DISTRIBUTION: uncommon, generally small, on moderate to very steep warm aspects
Fd - Pinegrass - Aster (SBSdw2/04)

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
- enough Fd stems should be left to provide shade to the site, thereby reducing excessive drying and heating of the upper soil horizons.
- if a partial cutting system is used, refer to Cariboo Region mule deer guidelines (Land Management Handbook #13).

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

Species choice: - Fd, Pl

Vegetation potential: - low

Reforestation: - manage to maintain Fd component.
- if disturbance during logging does not expose some mineral soil, then natural Pl and Fd regeneration should be promoted by light scarification or spot screeving.
- fill-planting may be required to meet stocking requirements.

Concerns: - these units may represent important early season range for wildlife, so prescription should be discussed with wildlife personnel.
- site and soil conditions of this unit result in drought hazard for a significant portion of the growing season; leaving a shelterwood overstory can reduce the severity of the drought hazard.
**VEGETATION**

**Tree Layer:** 45% cover
- Douglas-fir, hybrid white spruce, lodgepole pine, paper birch

**Shrub Layer:** 15% cover
- *Rosa acicularis* (prickly rose)
- *Spiraea betulifolia* (birch-leaved spirea)
- *Amelanchier alnifolia* (saskatoon)
- *Viburnum edule* (highbush cranberry)

**Herb Layer:** 20% cover
- *Linnaea borealis* (twinflower)
- *Orthilia secunda* (one-sided wintergreen)
- *Aralia nudicaulis* (wild sarsaparilla)
- *Cornus canadensis* (bunchberry)
- *Arnica cordifolia* (heart-leaved arnica)
- *Fragaria virginiana* (wild strawberry)
- *Geocaulon lityatum* (bastard toad-flax)
- *Mitella nuda* (common mitrewort)

**Moss Layer:** 90% cover
- *Pleurozium schreberi* (red-stemmed feathermoss)
- *Hylocomium splendens* (step moss)
- *Ptilium crista-castrensis* (knight’s plume)
- *Rhytidiadelphus triquetrus* (electrified cat’s-tail moss)
- *Peltigera aphthosa* (freckle lichen)
- *Dicranum polysetum* (wavy-leaved moss)

**SOIL AND SITE**

**Moisture Regime:** 3 (sm)
**Nutrient Regime:** A-C (vp-m)
* Slope Gradient (%): 55-68
* Slope Position: upper
* Parent Material: colluvial, morainal, or glaciofluvial
* Soil Texture: medium - very coarse
* Coarse Fragments (%): 9-50
* Aspect: usually northerly

**COMMENTS:** based on limited data

**DISTRIBUTION:** uncommon, on moderate to steep cool aspects
SxwFd - Cat’s-tail moss (SBSdw2/05)

**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
- if a partial cutting system is used, refer to Cariboo Region mule deer guidelines (Land Management Handbook #13).

**Site preparation:**
- see Section 5.2

**Species choice:**
- Fd, Pl

**Vegetation potential:**
- low

**Reforestation:**
- manage to maintain Fd component.
- retain enough Fd stems to provide seed to as much of the site as possible.
- natural Pl and Fd regeneration should be promoted by light scarification or spot screeing.
- fill-planting may be required to meet stocking requirements.

**Concerns:**
- site and soil conditions of this unit result in drought hazard for a significant portion of the growing season; leaving a shelterwood overstory can reduce the severity of the drought hazard.
- comandra blister rust may cause cankers on pine if bastard toad-flax (Geocaulon lividum) occurs nearby.
VEGETATION

Tree Layer: 15% cover
lodgepole pine, Douglas-fir

Shrub Layer: 45% cover
Vaccinium myrtilloides (velvet-leaved blueberry)
Rosa acicularis (prickly rose)
Spiraea betulifolia (birch-leaved spirea)
Alnus crispa ssp. sinuata (Sitka alder)
Amelanchier alnifolia (saskatoon)
Douglas-fir
trembling aspen

Herb Layer: 60% cover
Calamagrostis rubescens (pinegrass)
Linnaea borealis (twinflower)
Arctostaphylos uva-ursi (kinnikinnick)
Epilobium angustifolium (fireweed)
Chimaphila umbellata (prince's pine)
Fragaria virginiana (wild strawberry)
Achillea millefolium (yarrow)
Cornus canadensis (bunchberry)
Orthilia secunda (one-sided wintergreen)

Moss Layer: 80% cover
Pleurozium schreberi (red-stemmed feathermoss)
Dicranum polysetum (wavy-leaved moss)
Peltigera aphthosa (freckle lichen)

SOIL AND SITE

Moisture Regime: 3 (sm)
Nutrient Regime: A-D (p-r)
Slope Gradient (%): 0-65
Slope Position: mid - upper slope, occasionally level
Parent Material: morainal, lacustrine, or glaciofluvial; occasionally colluvial
Soil Texture: medium - very coarse
Coarse Fragments (%): 0-75

DISTRIBUTION: common, widespread, and often large
**Pl - Pinegrass-Feathermoss (SBSdw2/06)**

### 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.
- If a partial cutting system is used, refer to Cariboo Region mule deer guidelines (Land Management Handbook #13).

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

**Species choice:**
- Pl, Fd, SX

**Vegetation potential:**
- Low to moderate (pinegrass, fireweed, prickly rose)

**Reforestation:**
- Attempt to regenerate naturally if potential exists.
- If natural regeneration is not feasible, plant Pl.
- If Fd stems are present, conduct a stand evaluation to assess if a partial cutting system is feasible.
- If abundant advance regeneration is present, attempt to log in a manner that protects this regeneration.
- Fill-planting may be required to meet stocking requirements if a partial cutting system is used.
- SX may be planted on moister microsites.

**Concerns:**
- Full tree harvesting will lead to nutrient depletion and seriously reduce cones; *woody debris and cones should be distributed across these sites (i.e., lop and scatter).*
- Site conditions may lead to frost damage of Fd regeneration, especially in any naturally occurring or artificially created depression; *leaving a partial canopy and/or choosing a frost-resistant species (eg., Pl) is advised.*
- Comandra blister rust may cause cankers on pine if bastard toad-flax (*Geocaulon lividum*) occurs nearby.
- Mountain pine beetle may cause mortality in large-diameter lodgepole pine stands of age class > 7.
VEGETATION

Tree Layer: 25% cover
- lodgepole pine, black spruce, hybrid white spruce

Shrub Layer: 60% cover
- Vaccinium myrtilloides (velvet-leaved blueberry)
- Rosa acicularis (prickly rose)
- Spiraea betulifolia (birch-leaved spirea)
- black spruce
- lodgepole pine
- hybrid white spruce

Herb Layer: 55% cover
- Calamagrostis rubescens (pinegrass)
- Cornus canadensis (bunchberry)
- Epilobium angustifolium (fireweed)
- Linnaea borealis (twinflower)
- Geocaulon lividum (bastard toad-flax)
- Fragaria virginiana (wild strawberry)
- Vaccinium caespitosum (dwarf blueberry)
- Aster ciliolatus (fringed aster)
- Arnica cordifolia (heart-leaved arnica)

Moss Layer: 95% cover
- Pleurozium schreberi (red-stemmed feathermoss)
- Ptilium crista-castrensis (knight’s plume)
- Hylocomium splendens (step moss)
- Dicranum polysetum (wavy-leaved moss)
- Peltigera aphthosa (freckle lichen)

SOIL AND SITE

Moisture Regime: 3-5 (sm-shg)
Nutrient Regime: A-B (vp-p)
* Slope Gradient (%): 0-4 (usually 0)
* Slope Position: level or mid-slope
Parent Material: lacustrine, morainal or glaciofluvial
Soil Texture: fine - medium - coarse
Coarse Fragments (%): 0-30

DISTRIBUTION: uncommon, often in areas of cold air accumulation or with poor air drainage and cold soils
INTERPRETATIONS

Site limitations:  - compact soil layers and/or low aeration porosity associated with fine-textured soils will have a reduced root zone and decreased productivity over a rotation; regenerate naturally whenever possible.
  - soils are saturated in the spring, but may experience drought in summer, both resulting in poor root development; the poor productivity resulting from these limitations should dictate a limited intensive silvicultural investment.

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, (Sx, Sb)

Vegetation potential:  - low

Reforestation:  - attempt to regenerate naturally if potential exists.
  - if natural regeneration is not feasible, plant Pl.
  - Sx and Sb are generally significantly less productive than Pl on this unit.

Concerns:  - full tree harvesting will lead to nutrient depletion and seriously reduce cones; woody debris and cones should be distributed across these sites (ie., lop and scatter).
  - site conditions may lead to frost damage of Sx regeneration, especially in any naturally occurring or artificially created depression; leaving a partial canopy and/or choosing a frost-resistant species (eg., Pl) is advised.
  - comandra blister rust may cause cankers on pine if bastard toad-flax (Geocaulon lividum) occurs nearby.
  - mountain pine beetle may cause mortality in large-diameter lodgepole pine stands of age class > 7.
  - Warren’s root collar weevil can cause mortality in young stands, especially where duff layers are thick.
**VEGETATION**

**Tree Layer:** 40% cover  
hybrid white spruce, [trembling aspen]

**Shrub Layer:** 35% cover  
* Lonicera involucrata (black twinberry)  
* Rosa acicularis (prickly rose)  
* Viburnum edule (highbush cranberry)  
* Ribes lacustre (black gooseberry)  
* Amelanchier alnifolia (saskatoon)  
hybrid white spruce

**Herb Layer:** 50% cover  
* Cornus canadensis (bunchberry)  
* Rubus pubescens (trailing raspberry)  
* Mitella nuda (common mitrewort)  
* Osmorhiza chilensis (mountain sweet-cicely)  
* Petasites frigidus var. palmatus (palmate coltsfoot)  
* Cornus canadensis (bunchberry)  
* Rubus pubescens (trailing raspberry)  
* Mitella nuda (common mitrewort)  
* Osmorhiza chilensis (mountain sweet-cicely)  
* Petasites frigidus var. palmatus (palmate coltsfoot)  
* Linnaea borealis (twinflower)  
* Equisetum arvense (common horsetail)  
* Aralia nudicaulis (wild sarsaparilla)  
* Pyrola asarifolia (pink wintergreen)  
* Aster ciliolatus (fringed aster)  

**Moss Layer:** 75% cover  
* Rhytidiadelphus triquetrus (electrified cat’s-tail moss)  
* Pleurozium schreberi (red-stemmed feathermoss)  
* Ptilium crista-castrensis (knight’s plume)  
* Hylocomium splendens (stepmoss)  
* Mnium spp. (leafy mosses)

**SOIL AND SITE**

- **Moisture Regime:** 5-6 (shg-hg)  
- **Nutrient Regime:** B-D (p-r)  
- **Slope Gradient (%):** 0-65 (usually < 10)  
- **Slope Position:** variable  
- **Parent Material:** variable  
- **Soil Texture:** (coarse -) medium - fine  
- **Coarse Fragments (%):** 0-64  
- **Seepage Water:** sometimes present

**DISTRIBUTION:** common, generally small, and often associated with streams
Sxw - Twinberry (SBSdw2/08)

INTERPRETATIONS

Site limitations:
- sites within this unit 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 (eg., Cu-treated), prescribe natural regeneration, or protect advance regeneration.*
- sites within this unit with saturated soils are poorly aerated, which slows root development; *plant seedlings on naturally or artificially raised microsites.*
- sites within this unit with saturated soils are poorly aerated, which slows root development; *plant seedlings on naturally or artificially raised microsites.*

Silviculture system:
- see Section 5.1

Site preparation:
- see Section 5.2

Species choice:
- Pl, Sx, Fd, [Bl]

Vegetation potential:
- moderate (black twinberry, fireweed)

Reforestation:
- preserve vigorous advance Fd or Sx regeneration when feasible.
- plant sturdy stock as soon after harvesting as possible.
- fill-planting will likely be required if stand is partially cut.
- help maintain stand diversity on sites to be planted with Pl by mapping aspen patches prior to harvest and planting these areas to spruce.
- young Bl regeneration (<3 m tall) may be susceptible to heavy browsing by moose.

Concerns:
- site conditions may lead to frost damage of Fd, Sx, and Bl regeneration, especially in any naturally occurring or artificially created depression; *leaving a partial canopy and/or choosing a frost-resistant species (eg., Pl) is advised.*
- sites within this unit with silty soils are susceptible to frost-heaving; *bareroot stock will likely resist frost-heaving better than plug stock.*
- sites within this unit with fine-textured soils are vulnerable to compaction under wet conditions; *restrict traffic to winter operations or dry soil conditions.*
- Warren's root collar weevil can cause mortality in young stands, especially where duff layers are thick.
**VEGETATION**

Tree Layer: 15% cover
- hybrid white spruce, Douglas-fir, lodgepole pine, subalpine fir

Shrub Layer: 25% cover
- Oplopanax horridus (devil’s club)
- Ribes lacustre (black gooseberry)
- Lonicera involucrata (black twinberry)
- Alnus tenuifolia (mountain alder)
- Rosa acicularis (prickly rose)
- Acer glabrum (Douglas maple)
- Ribes triste (red swamp currant)
- subalpine fir
- hybrid white spruce

Herb Layer: 30% cover
- Gymnocarpium dryopteris (oak fern)
- Dryopteris expansa (spiny wood fern)
- Streptopus amplexifolius (clasping twistedstalk)
- Galium triflorum (sweet-scented bedstraw)
- Mitella nuda (common mitrewort)
- Athyrium filix-femina (lady fern)
- Cornus canadensis (bunchberry)
- Rubus pedatus (five-leaved bramble)

Moss Layer: 40% cover
- Ptilium crista-castrensis (knight’s plume)
- Mnium spp. (leafy mosses)
- Pleurozium schreberi (red-stemmed feathermoss)
- Rhytidiodaphus triquetrus (elctrified cat’s-tail moss)
- Peltigera spp. (peltigeralichens)

**SOIL AND SITE**

- Moisture Regime: 5-6 (shg-hg)
- Nutrient Regime: C-E (m-vr)
- Slope Gradient (%): 2-28
- * Slope Position: (mid) - toe
- Parent Material: fluvial or morainal
- Soil Texture: fine - medium
- Coarse Fragments (%): 13-26
- * Seepage Water: usually present

**DISTRIBUTION:** rare, generally small, and found on cool (north) seepage slopes
INTERPRETATIONS

Site limitations: - sites within this unit with saturated soils are poorly aerated, which slows root development; plant seedlings on naturally or artificially raised microsites.

Silviculture system: - see Section 5.1

Site preparation: - see Section 5.2

Species choice: - Pl, Sx, Fd, [Bl]

Vegetation potential: - high (black twinberry, fireweed, mountain alder)

Reforestation: - preserve vigorous advance Fd or Sx regeneration when feasible.
- plant sturdy stock as soon after harvesting as possible.
- plant Fd on raised microsites if water table within 50 cm of surface.
- young Bl regeneration (<3 m tall) may be susceptible to heavy browsing by moose.
- fill-planting will likely be required if stand is partially cut.

Concerns: - site conditions may lead to frost damage of Fd, Sx, and Bl regeneration, especially in any naturally occurring or artificially created depression; leaving a partial canopy and/or choosing a frost-resistant species (eg., Pl) is advised.
- sites within this unit with silty soils are susceptible to frost-heaving; bareroot stock will likely resist frost-heaving better than plug stock.
- 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 high water tables, combined with thick organic horizons (> 10 cm), increase the windthrow hazard; block layouts must have windfirm boundaries, or a wide buffer of standing timber must be left around such sites.
- Warren's root collar weevil can cause mortality in young stands, especially where duff layers are thick.
VEGETATION

Tree Layer: 30% cover
- hybrid white spruce, subalpine fir

Shrub Layer: 30% cover
- *Lonicera involucrata* (black twinberry)
- *Rosa acicularis* (prickly rose)
- *Ribes triste* (red swamp currant)
- *Ribes lacustre* (black gooseberry)
- *Viburnum edule* (highbush-cranberry)
- *Cornus stolonifera* (red-osier dogwood)
- hybrid white spruce

Herb Layer: 80% cover
- *Cornus canadensis* (bunchberry)
- *Petasites frigidus* var. *palmatus* (palmate coltsfoot)
- *Linnaea borealis* (twinflower)
- *Miteila nudicaulis* (common mitrewort)
- *Galium triflorum* (sweet-scented bedstraw)
- *Equisetum arvense* (common horsetail)
- *Equisetum palustre* (marsh horsetail)
- *Equisetum sylvaticum* (wood horsetail)
- *Rubus pubeascens* (trailing raspberry)
- *Gymnocarpium dryopteris* (oak fern)
- *Heracleum lanatum* (cow-parsnip)
- *Streptopus amplexifolius* (clasping twistedstalk)
- *Osmorhiza chilensis* (mountain sweet-cicely)

Moss Layer: 85% cover
- *Pleurozium schreberi* (red-stemmed feathermoss)
- *Hylocomium splendens* (step moss)
- *Philio crista-castrensis* (knight’s plume)
- *Rhytidioderphilus triquestrus* (electrified cat’s-tail moss)
- *[Mnium spp.* (leafy mosses)]

SOIL AND SITE

- Moisture Regime: 6 (hg)
- Nutrient Regime: C - E (m- vr)
- *Slope Gradient (%): 0-8*
- *Slope Position: toe - level*
- *Parent Material: fluvial*
- Soil Texture: variable, usually fine
- *Coarse Fragments (%): 0-5*
- *Seepage Water: present*

DISTRIBUTION: common; associated with watercourses
Sxw - Horsetail (SBSdw2/10)

INTERPRETATIONS

Site limitations:  
- very difficult sites to manage; serious consideration should be given to managing these sites as wildlife corridors.
- sites within this unit with saturated soils are poorly aerated, which slows root development; plant seedlings on naturally or artificially raised microsites.

Site preparation:  
- see Section 5.1
- see Section 5.2
- creating an excessive number of mounds (eg., >300/ha) should be avoided, especially on sites within this unit with a watertable < 30 cm from the surface.

Silviculture system:  
- see Section 5.1
- see Section 5.2
- creating an excessive number of mounds (eg., >300/ha) should be avoided, especially on sites within this unit with a watertable < 30 cm from the surface.

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

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

Reforestation:  
- advance regeneration should be preserved.
- supplement advance regeneration by planting sturdy stock in groups, using available raised microsites.
- young Bl regeneration (< 3 m tall) may be susceptible to heavy browsing by moose.

Concerns:  
- site conditions may lead to frost damage of Sx and Bl regeneration, especially in any naturally occurring or artificially created depression; leaving a partial canopy and/or choosing a frost-resistant species (eg., Pl) is advised.
- sites within this unit with fine-textured soils are vulnerable to compaction under wet conditions; restrict traffic to winter operations or dry soil conditions.
- sites within this unit with high water tables, combined with thick organic horizons (> 10 cm), increase the windthrow hazard; block layouts must have windfirm boundaries, or a wide buffer of standing timber must be left around such sites.
- these units may represent important wildlife habitat; discuss prescription with wildlife personnel.
- water table will likely rise above the ground surface in the spring, causing seedling mortality.
- this association is critical to the control of runoff streamflow.
- Warren's root collar weevil can cause mortality in young stands, especially where duff layers are thick.
**Vegetation**

**Tree Layer:** 5% cover
- Black spruce, hybrid white spruce

**Shrub Layer:** 25% cover
- *Ledum groenlandicum* (Labrador tea)
- *Lonicera involucrata* (black twinberry)
- *Rosa acicularis* (prickly rose)
- *Salix spp.* (willows)
- *Ribes hudsonianum* (northern black currant)
- *Ribes lacustre* (black gooseberry)
- *Ribes triste* (red swamp currant)

**Herb Layer:** 90% cover
- *Carex leptalea* (bristle-stalked sedge)
- *Carex disperma* (soft-leaved sedge)
- *Equisetum arvense* (common horsetail)
- *Equisetum scirpoides* (dwarf scouring-rush)
- *Cornus canadensis* (bunchberry)
- *Mitella nuda* (common mitrewort)
- *Linnaea borealis* (twinflower)
- *Ribes hudsonianum* var. *palmatum* (palmate coltsfoot)
- *Epilobium angustifolium* (fireweed)
- *Geocaulon lividum* (bastard toad-flax)

**Moss Layer:** 95% cover
- *Hylocomium splendens* (step moss)
- *Ptilium crista-castrensis* (knight’s plume)
- *Sphagnum spp.* (sphagnums)
- *Pleurozium schreberi* (red-stemmed feathermoss)
- *Rhytidiadelphus triquetrus* (electrified cat’s-tail moss)
- *Mnium spp.* (leafy mosses)
- *Aulacomnium palustre* (glow moss)

**Soil and Site**

- **Moisture Regime:** 6-7 (hg-shd)
- **Nutrient Regime:** B-C (p-m)
- **Slope Gradient (%):** 0-1
- **Slope Position:** toe, level, or depression
- **Parent Material:** fluvial or organic
- **Soil Texture:** medium or organic
- **Coarse Fragments (%):** 0-34
- **Seepage Water:** present, near the surface

**Distribution:** common, in wet, cold air accumulation sites