A Field Guide for Identification and Interpretation of the Coastal Western Hemlock Zone, Northern Drier Maritime Subzone (CWHf), in the Prince Rupert Forest Region

Land Management HANDBOOK NUMBER 14

ISSN 0229-1622

February 1987

BC
Ministry of Forests and Lands
A Field Guide for Identification and Interpretation of the Coastal Western Hemloc Zone, Northern Drier Maritime Subzone (CWHf), in the Prince Rupert Forest Region

by

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February 1987

BC
Ministry of Forests and Lands
Canadian Cataloguing in Publication Data

Main entry under title:
A Field guide for identification and interpretation of
the coastal western hemlock zone, northern drier
maritime subzone (CWH1), in the Prince Rupert
Forest Region

(Land management handbook, ISSN 0229-1622 ; no. 14)

Bibliography: p.

1. Bioclimatology – British Columbia. 2. Forest
ecology – British Columbia. 3. Forest management –
British Columbia. I. Standish, J.T. II. British

QK938.F6F48 1987  581.5'2642'0971132  C87-092044-8

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Published by the
Research Branch
Ministry of Forests and Lands
Parliament Buildings
Victoria, B.C.
V8W 3E7

Copies of this and other Ministry of Forests and Lands
titles are available at a cost-recovery price from the
Queen's Printer Publications, Parliament Buildings,
Victoria, B.C. V8V 4R6
ACKNOWLEDGEMENTS

Numerous individuals assisted in the various phases of this field guide and it would be impractical to mention everyone here. Thanks are due to all those who assisted in the collection and analysis of ecological data. We also thank the personnel of the Kalum and Kispiox Forest Districts and the Prince Rupert Regional staff for their assistance and support. R. Annas, P. Comeau, R. Coupé, S. Hardy, and R. Smith helped co-ordinate field operations in the first year of the project; they were greatly aided by the co-operation of Inventory Branch, Victoria. D.J. Wilford managed the program in its middle stage. I. Moss, A. Waters, G. Lloyd, and T. Nash contributed information and ideas incorporated in the silvicultural interpretations. Illustrations are by P. Nystedt and Verina Kwong. Maria Romeo, Marilyn Stewart, and Marie-Ann Lauder did the word processing.
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1 INTRODUCTION

This guide contains information, condensed for field use, on the identification and interpretation of biogeoclimatic and ecosystematic units in the Coastal Western Hemlock Zone, Northern Drier Maritime Subzone (CWMF). The area covered is shown in Figure 1 and includes most of the low and middle elevation forests of the central part of the Kalum Timber Supply Area and some of the middle elevations of the westernmost Kispiox Timber Supply Area.

It is assumed that the user of this guide has completed the training programs of the regional ecology staff so that the basic concepts and methods of site, soil, and vegetation evaluation have been mastered. Consequently the field guide does not include material on plant identification, hand texturing, or identification of soil subgroups and humus forms. To identify questionable or unknown plants, consult "A Guide to Some Common Plants of the Skeena Area, British Columbia" (Coupe et al. 1982). Refer to "A Guide to the Coastal Western Hemlock Zone, Northern Drier Maritime Subzone (CWMF), in the Prince Rupert Forest Region, British Columbia" (Haeussler et al. 1984) for further information on the principles, philosophy, and methods underpinning the classification, and on the physiography, geology, terrain, and climate of the CWMF; or for more detailed information on the classification and management interpretations of the ecosystems of the CWMF subzone. See Coates and Haeussler (1984) for a guide to mechanical site preparation and Klinka et al. (1981) for a classification of humus forms. Soil family particle size classes are used in the guide instead of texture classes. For a description of soil family particle size classes see Canada Soil Survey Committee (1978, pp. 115-118).

1The CWMF has recently been relegated to variant status, as part of the Snowy Central Submaritime Variant of the Wetter CWM Subzone (i.e., the CWMf9)
FIGURE 1. The Coastal Western Hemlock Zone, Northern Drier Maritime Subzone (CMHR), in the Prince Rupert Forest Region (approximate extent and boundaries).
2 USE OF THE GUIDE

The B.C. Ministry of Forests and Lands classification of ecosystems is arranged into a hierarchy that may be thought of as having two primary levels: biogeoclimatic and ecosystematic. Biogeoclimatic categories include the zone, subzone, variant, and phase; ecosystematic categories include the association, variation, and phase. A standard code is used to denote these categories, for example:

In addition, connotative common names are generally applied to the various categories; for example, the "Outwash Pine variation of the Dry Hemlock - Moss ecosystem association".

Using the guide involves two main steps: first, identifying the biogeoclimatic subzone or variant; and second, identifying the ecosystem association, variation, and phase where defined.

2.1 Identifying Subzones and Variants

A map of the CWIF and a table presenting diagnostic floristic elements of the CWIF and neighbouring biogeoclimatic units are presented in Section 2 as aids to identifying the subzone. Maps at a scale of 1:500,000 are included in Haeussler et al. (1984); 1:250,000 maps are on file in the Prince Rupert Forest Region Office in Smithers. For the Terrace - Kitimat area, Figures 2 and 3 will also be helpful for subzone identification.
To determine the variant, the user should refer to Figure 4 (p. 13) and Figure 9 (p. 46). Table 2 (p. 10) provides a summary of vegetation and environmental characteristics for biogeoclimatic units of the CWVF.

If identification of the variant is difficult, the user should identify the ecosystem units in the area and then decide which variant they best "fit".

2.2 Identifying Ecosystem Units

Sections 4 and 5 present information for the CWVF1 and CWVF2, respectively, of the Prince Rupert Forest Region. These sections include information needed to identify the various ecosystem associations, variations, and phases of the two CWVF variants. Information on recommended ecosystem-specific silvicultural practices for each of these units is also included.

The following steps are suggested to identify the ecosystem unit:

**Step 1**

Consult a biogeoclimatic map and Tables 1 (p. 7) and 2 (p. 10) to determine the variant in which the site occurs.

**Step 2**

Walk the area in question and note the site and soil factors needed to assess moisture and nutrient regimes. Watch for pronounced differences in topography, wetness, or vegetation that would indicate that more than one ecosystem unit may be present. For each relatively uniform area determine the moisture and nutrient regime so as to place the site on the ecolotopic grid. Consider the following factors: landscape position, slope, and aspect; soil texture and coarse fragments; humus form and thickness of organic matter; depth
FIGURE 2. Oblique view from the Kitimat River valley looking northward.
FIGURE 3. Change in abundance of selected plant species in zonal ecosystems at low elevations between Terrace and Kitimat.


<table>
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<th>** common</th>
<th>* occasional</th>
<th>rare</th>
<th>absent</th>
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<td>Coastal Western</td>
<td>Coastal Eastern</td>
<td>Interior Cedar - Hemlock</td>
<td>Subalpine Mountain</td>
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<td>Hemlock Zone, Northern Dry</td>
<td>Zone, Transitional Subzone</td>
<td>Zone, Northwestern</td>
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<td>(east of CMT)</td>
<td>(east of CMT)</td>
<td>(high elevations)</td>
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<td>***</td>
<td>***</td>
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<td>**</td>
</tr>
<tr>
<td>western redcedar</td>
<td>***</td>
<td>***</td>
<td>* (higher elevations)</td>
<td>**</td>
</tr>
<tr>
<td>amabilis fir</td>
<td>-</td>
<td>**</td>
<td>***</td>
<td>**</td>
</tr>
<tr>
<td>yellow-cedar</td>
<td>*</td>
<td>**</td>
<td>***</td>
<td>**</td>
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<tr>
<td>subalpine fir</td>
<td>*</td>
<td>* (frequently in hoar)</td>
<td>***</td>
<td>**</td>
</tr>
<tr>
<td>mountain hemlock</td>
<td>-</td>
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<th>pure Sitka spruce</th>
<th>S. glauca \times S. sitchensis</th>
<th>variable, dominantly</th>
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<tr>
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<td>Picea sitchensis</td>
<td>S. glauca \times S. sitchensis</td>
<td></td>
<td>S. glauca \times P. engelmannii</td>
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<tr>
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<td>P. engelmannii</td>
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<td>lodgepole pine</td>
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<td>-</td>
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<tr>
<td>trembling aspen</td>
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<td>-</td>
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<th>**</th>
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<td>shore pine (P. contorta var.</td>
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TABLE 1. (Continued)

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<td>Northern Drier</td>
<td>Central Wetter</td>
<td>Transitional Subzone</td>
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<td>Other tree species</td>
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<td>scopulorum)</td>
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<tr>
<td>***</td>
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<td>Viola pedata</td>
<td>=</td>
<td>=</td>
<td>=</td>
<td>=</td>
<td>=</td>
</tr>
<tr>
<td>Viola tricolor</td>
<td>=</td>
<td>=</td>
<td>=</td>
<td>=</td>
<td>=</td>
</tr>
<tr>
<td>Penstemon fruticosus</td>
<td>=</td>
<td>=</td>
<td>=</td>
<td>=</td>
<td>=</td>
</tr>
<tr>
<td>Hylotelephium uniflorum</td>
<td>=</td>
<td>=</td>
<td>=</td>
<td>=</td>
<td>=</td>
</tr>
<tr>
<td>Eriogonum triquetrum</td>
<td>=</td>
<td>=</td>
<td>=</td>
<td>=</td>
<td>=</td>
</tr>
<tr>
<td>Hymenoxys brachyclada</td>
<td>=</td>
<td>=</td>
<td>=</td>
<td>=</td>
<td>=</td>
</tr>
<tr>
<td>Eriogonum umbellatum</td>
<td>=</td>
<td>=</td>
<td>=</td>
<td>=</td>
<td>=</td>
</tr>
<tr>
<td>Characteristic</td>
<td>Carta: Low Elevation Variant</td>
<td>Carta: Dahl-Modern Phase</td>
<td>CWMZ: High Elevation Variant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------------------</td>
<td>-----------------------------------------------------------------</td>
<td>----------------------------------------------------------------</td>
<td>-------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Geographic distribution</strong></td>
<td>Skene River (Lister Creek to Esquimalt);</td>
<td>Dahl and medine creeks (west side of Kitimat valley)</td>
<td>above continuous CWMZ; above CHVZ in Skene valley</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mass River (Java beds to Greenville);</td>
<td>(east side of Kitimat valley)</td>
<td>(Kitagewuc-Lister Creek) and above</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kitasooxat, middle Kitimat, and</td>
<td></td>
<td>Massas, Cranberry, and Kitagewuc valleys east</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>lower Kitagewuc River valleys</td>
<td></td>
<td>of Tsaaxs R.; upper Kitagewuc, Clare, Kitamat,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Kitamux, and Kitagewuc; river valleys</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Physiographic subdivisions</strong></td>
<td>primarily E slopes of Kitagewuc ranges of Coast Mountains</td>
<td>E slopes of Kitagewuc ranges of Coast Mountains</td>
<td>primarily W slopes of Massas, Bulking, and</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>100-300</td>
<td>350-700</td>
<td>Kispiox ranges of Hazelton mountains</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Elevation range (m)</strong></td>
<td>Warmer, drier than contiguous Cl;</td>
<td>cooler with greater snowpacks than P, but more maritime climate than P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Climate</strong></td>
<td>greater fluctuations in temperature; snowpacks 0.5-1.5 m, moist to wet</td>
<td></td>
<td>1.5-4 m, moist and firm; late Oct.-mid Nov.; forest fires rare</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(late Nov.-Apr.); forest fires quite common</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Vegetation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>major tree species</td>
<td>Hw, Sa, Sx, Sx, Bt absent</td>
<td>Hw, Sa, (Sx, Sx, Bt), Cw absent</td>
<td>Hw, Sa, (Bt, Sx, Hel), Cw rare</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>other stands</em></td>
<td>extensive in major valleys; dominated by P, A, Ta, Ac, or common</td>
<td></td>
<td>rare due to scarcity of fire; P, A, Ta, Ac, or common</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Landforms</strong></td>
<td>Generally absent; valley bottoms; fluvial terraces and floodplains. Middle to upper elevations; glacial moraine, moraines, and colluvial deposits</td>
<td>generally absent; valley bottoms; fluvial terraces and floodplains. Middle to upper elevations; glacial moraine, moraines, and colluvial deposits</td>
<td>generally absent; valley bottoms; fluvial terraces and floodplains. Middle to upper elevations; glacial moraine, moraines, and colluvial deposits</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Zonal soils</strong></td>
<td>Sandy textured Orthic Humo-Ferric Podzols</td>
<td>Loamy textured Orthic Humo-Ferric and Orthic Ferric-Huvo Podzols</td>
<td>Loamy textured Orthic Humo-Ferric and Orthic Ferric-Huvo Podzols</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Humin depth (cm)</strong></td>
<td>7-16</td>
<td>5-33</td>
<td>5-11</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Tree species symbols as in Appendix 1.

Cw absent in upper Kitimat River valley.

Present on some south aspects, Kitimat River valley.
to water table or gleying/mottling; soil depth, presence of impermeable layers, and rooting depth. Note the ecosystem indicated for this part of the edatopic grid (see Figures 5 [p. 15] and 10 [p. 48]); then refer to Tables 3 (p. 24) and 6 (p. 53) and consult Figures 6 (p. 18), 7 (p. 19), and 11 (p. 50). (Steps 3 through 6 apply to each relatively homogeneous area identified in Steps 1 and 2.)

**Step 3**

List the plant species and note their abundance.

**Step 4**

Use the information of Steps 1, 2, and 3 to work through the ecosystem key for the variant. Proceed to the description of the indicated ecosystem association. If this association encompasses the moisture and nutrient regimes indicated by Step 2, proceed to Step 5; if not, recheck your observations and try to get agreement. Reference to Figures 8 (p. 22) or 12 (p. 52), which depict the relative prominence of species in the various ecosystems, may be helpful at this point.

**Step 5**

Compare the site, soil, and vegetation with that summarized for the indicated ecosystem association (variation and/or phase if defined). If there is reasonable fit, proceed to Step 6; if not, record all pertinent data and discuss the information with regional ecology staff.

**Step 6**

Consider the management interpretations suggested for the ecosystem unit. These are located on the pages following the ecosystem descriptions. Modify them as necessary to suit site-specific and stand-specific conditions.
3 BIODGEOCLIMATIC UNITS

The CWHf occurs in inland valleys and on eastern slopes of the Coast Mountains, Kitimat Ranges, and on adjacent slopes of the Hazelton Mountains. Major valley systems include the Skeena River between Exstew River and Legate Creek, the Nass River between Greenville and Kwinatahl River, and the Zymoetz, Kitsumkalum, Kitsault, and upper Kitimat valleys. Above the main valley floors, a mid-elevation band of CWHf extends as far east as the Cranberry and Kitsequela river drainages and high elevation stands are found in the upper Clore River and Telkwa Pass areas.

To the west, the CWHf is bounded by the Central Wetter Maritime Subzone (CWHi), and to the east it borders on the Interior Cedar - Hemlock Zone, Northwestern Transitional Subzone (IDHi). At subalpine elevations above the CWHf lie transitional subzones of the Mountain Hemlock (MH) and Engelmann Spruce - Subalpine Fir (ESSF) zones.

The location and approximate extent and boundaries of the CWHf are shown in Figure 1. Table 1 compares vegetation characteristics of the CWHf with other adjacent biogeoclimatic units and Figure 2 depicts elevational relationships of zones, subzones, and variants looking northward from the Kitimat River valley.

Two biogeoclimatic variants occur: the Low Elevation CWHf1 (Figure 4) and the High Elevation CWHf2 (Figure 9). These variants are compared in Table 2. The CWHf1a, a biogeoclimatic phase of the CWHf1, has also been included for comparison. This particular phase is not widespread or extensive throughout the CWHf, but is worth noting because of some special characteristics (such as absence of western redcedar). Other unique phases may exist in the upper Kitimat River, upper Kitsumkalum, and possibly other valleys, but these have not been formally described.
FIGURE 4. Low Elevation Variant of the Coastal Western Hemlock Zone, Northern Drier Maritime Subzone (CWHf1).
Classification of Ecosystem Units of the CWHF1: Low Elevation Variant

CWHF1/01 Zonal Hemlock - Vaccinium - Moss ecosystem association
   /01(1) Moss variation
   /01(a) Glaciofluvial Gravels phase
   /01(b) Imperfectly Drained phase

CWHF1/02 Dry Hemlock - Moss ecosystem association
   /02(1) Outwash Pine variation

CWHF1/03 Devil's Club - Oak Fern ecosystem association

CWHF1/04 Devil's Club - Lady Fern - Oak Fern ecosystem association

CWHF1/05 Fluvial Spruce - Devil's Club - Fern ecosystem association
   /05(1) Floodplain Cottonwood variation

CWHF1/06 Skunk Cabbage ecosystem association

CWHF1/07 Bog ecosystems
FIGURE 5. Ecotopic grid of ecological moisture and nutrient regimes - CWHF1.
4.1 Key to Ecosystem Units of the CWHF1

A. Ecosystems with poor tree growth, either dry or very wet ............. B

AA. Mesic to wet ecosystems with moderate to good tree growth ........ E

B. Main canopy dominated by Pl; outwash terraces, eskers, and kames (occasionally ridges or rock knobs)

DRY HEMLOCK - MOSS: OUTWASH PINE VARIATION [CWHF1/02(1)]

BB. Main canopy dominated by Hw and/or Sxs ......................... C

C. Lysichiton americanum dominates the herb layer

SKUNK CABBAGE (CWHF1/06)

CC. Lysichiton americanum rare or lacking in the herb layer .... D

D. Sphagnum spp. dominate the moss layer

BOGS (CWHF1/07)

DD. Sphagnum spp. rare or lacking in the moss layer

DRY HEMLOCK - MOSS (CWHF1/02)

E. Act dominates main canopy; floodplain islands and river bottomlands

FLUVIAL SPRUCE - DEVIL'S CLUB - FERN: FLOODPLAIN COTTONWOOD VARIATION [CWHF1/05(1)]

EE. Act rare or lacking in main canopy ......................... F

F. Oplopanax horridus abundant in shrub layers ............... G

FF. Oplopanax horridus rare or lacking in shrub layers ......... I

G. Main canopy dominated by Sxs; recent fluvial landforms

FLUVIAL SPRUCE - DEVIL'S CLUB - FERN (CWHF1/05)

GG. Main canopy usually dominated by species other than Sxs; morainal, colluvial, and occasionally inactive fluvial landforms .......... H
H. Athyrium and Dryopteris spp. rare or lacking in herb layer; moderately well-developed feathermoss carpet
   DEVIL'S CLUB - OAK FERN (CWHF1/03)

Hh. Herb layer dominated by ferns
   (Gymnocarpium, Dryopteris, and Athyrium), feathermosses confined to hummocks and decaying wood
   DEVIL'S CLUB - LADY FERN - OAK FERN (CWHF1/04)

I. Lysichiton americanum dominates the herb layer
   SKUNK CABBAGE (CWHF1/06)

II. Lysichiton americanum rare or lacking in the herb layer ............................................ J

J. Shrub layers moderately to well developed,
   dominated by Vaccinium spp.
   ZONAL HEMLOCK - VACCINIUM - MOSS (CWHF1/01)

JJ. Shrub layers very poorly developed

ZONAL HEMLOCK - VACCINIUM - MOSS: MOSS VARIATION [CWHF1/01(1)]
FIGURE 6. Topographic sequence of some CWHFL ecosystem associations on a slope.
FIGURE 7. Topographic sequence of some CMHFL ecosystem associations on a valley floor.

- Glaciofluvial outwash
- Moist, coarse-loamy fluvial deposits
4.2 Prominence of the Major Species of the CWHFL

Figure 8 depicts the relative prominence of several species that typify the CWHFL. Prominence is a measure derived from both presence and plant cover. For example, if a species is present on four of five plots (i.e., presence of 80%) and has a mean cover on the five plots of 7%, its prominence would be equal to:

\[(\text{square root of } 80) \times 7 = 63 \text{ (rounded off to nearest whole number)}\]

Figure 8 only includes species having a prominence value of 50 or more in one or more ecosystems. To get a firm idea of this cut-off value, note that a species that always occurs would have to have a cover of 5% or more. Clearly, this would not easily be overlooked in the field.

Figure 8 presents circles whose diameters are proportional to the prominence value. The diameter equivalent to a prominence value of 50 is about 1.4 mm.

4.3 Description and Interpretation of CWHFL Ecosystems

Table 3 presents selected physical and edaphic features associated with the ecosystem units; Table 4 (p. 25) summarizes silvicultural interpretations for these units and Table 5 (p. 45) shows equivalent ecosystems of the CWHFL, CWHFLa, and CWHFLb. Pages 26 through 45 describe and interpret the various ecosystem units. The small figure that appears in the upper right of the descriptive pages is an edaphic grid with an outlined area indicating the usual moisture and nutrient conditions for the ecosystem.
<table>
<thead>
<tr>
<th>SPECIES</th>
<th>ECOSYSTEM ASSOCIATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>TREES</td>
<td>02</td>
</tr>
<tr>
<td>Tsuga heterophylla</td>
<td>●</td>
</tr>
<tr>
<td>Tsuga plicata</td>
<td>●</td>
</tr>
<tr>
<td>Abies amabilis</td>
<td>●</td>
</tr>
<tr>
<td>Pinus contorta</td>
<td>●</td>
</tr>
<tr>
<td>Picea spp.</td>
<td>●</td>
</tr>
<tr>
<td>Tsuga mertensiana</td>
<td>●</td>
</tr>
<tr>
<td>Populus balsamifera</td>
<td>●</td>
</tr>
<tr>
<td>ssp. trichocarpa</td>
<td>●</td>
</tr>
<tr>
<td>SHRUBS</td>
<td></td>
</tr>
<tr>
<td>Vaccinium glaskoviae</td>
<td>●</td>
</tr>
<tr>
<td>Manzania ferruginea</td>
<td>●</td>
</tr>
<tr>
<td>Vaccinium ovalifolium</td>
<td>●</td>
</tr>
<tr>
<td>Cornus sericea</td>
<td>●</td>
</tr>
<tr>
<td>Daphneospora horrida</td>
<td>●</td>
</tr>
<tr>
<td>Rubus speciebis</td>
<td>●</td>
</tr>
<tr>
<td>HERBS &amp; DWARF SHRUBS</td>
<td></td>
</tr>
<tr>
<td>Cornus canadensis</td>
<td>●</td>
</tr>
<tr>
<td>Gymnocarpium dryopteris</td>
<td>●</td>
</tr>
<tr>
<td>Dryopteris asplenifolia</td>
<td>●</td>
</tr>
</tbody>
</table>

FIGURE 8. Prominence values for the major species of the DHFL.
<table>
<thead>
<tr>
<th>SPECIES</th>
<th>ECOSYSTEM ASSOCIATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>HERBS &amp; DWARF SHRUBS (cont')</td>
<td></td>
</tr>
<tr>
<td>Alnus tibia-femina</td>
<td></td>
</tr>
<tr>
<td>Lycichiton americanum</td>
<td></td>
</tr>
<tr>
<td>Liriolum trifoliatum</td>
<td></td>
</tr>
<tr>
<td>Cirquea alpina</td>
<td></td>
</tr>
<tr>
<td>Lycopodium inundata</td>
<td></td>
</tr>
<tr>
<td>Drasery ssp.</td>
<td></td>
</tr>
<tr>
<td>Morehenia trifoliatum</td>
<td></td>
</tr>
<tr>
<td>LICHENS, MOSSES, &amp; LIVERWORTS</td>
<td></td>
</tr>
<tr>
<td>Hypococum splendidis</td>
<td></td>
</tr>
<tr>
<td>Rhizodium loricus</td>
<td></td>
</tr>
<tr>
<td>Rhizodium repens</td>
<td></td>
</tr>
<tr>
<td>Pleuranium schreberi</td>
<td></td>
</tr>
<tr>
<td>Rhizodium triquetra</td>
<td></td>
</tr>
<tr>
<td>Pogopodium asplenioides</td>
<td></td>
</tr>
<tr>
<td>Molium ssp.</td>
<td></td>
</tr>
<tr>
<td>Sphagnum ssp.</td>
<td></td>
</tr>
</tbody>
</table>

FIGURE 8. (Continued)
<table>
<thead>
<tr>
<th>Habitual Features</th>
<th>CMNF/01</th>
<th>CMNF/02/03</th>
<th>CMNF/03</th>
<th>CMNF/04</th>
<th>CMNF/05</th>
<th>CMNF/06</th>
<th>CMNF/07</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slope positions</td>
<td>Middle</td>
<td>Valley floor, lower to slope base</td>
<td>Valley floor, upper middle</td>
<td>Valley floor, upper middle</td>
<td>Tidal, lower slope, upper middle</td>
<td>Valley floor, upper middle</td>
<td>Valley floor, lower middle</td>
</tr>
<tr>
<td>Level</td>
<td>0-7°/4</td>
<td>Level</td>
<td>Level</td>
<td>Level</td>
<td>Level</td>
<td>Level</td>
<td>Level</td>
</tr>
<tr>
<td>Soil parent materials</td>
<td>NB, CG, MV, FG</td>
<td>Gravel or F or M</td>
<td>NB, CG, MV, FG</td>
<td>NB, CG, MV, FG</td>
<td>NB, CG, MV, FG</td>
<td>NB, CG, MV, FG</td>
<td>NB, CG, MV, FG</td>
</tr>
<tr>
<td>Drainage class</td>
<td>VG-MG</td>
<td>MG-I</td>
<td>BFG</td>
<td>MG-I</td>
<td>MG-I</td>
<td>MG-I</td>
<td>MG-I</td>
</tr>
<tr>
<td>Moisture regime</td>
<td>Submuscaton</td>
<td>Submesic</td>
<td>Submesic</td>
<td>Submesic</td>
<td>Hyptic</td>
<td>Hyptic</td>
<td>Hyptic</td>
</tr>
<tr>
<td>Nutrient regime</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>Soil classification</td>
<td>HPP</td>
<td>HPP</td>
<td>HPP</td>
<td>HPP</td>
<td>HPP</td>
<td>HPP</td>
<td>HPP</td>
</tr>
<tr>
<td>Human food classification</td>
<td>HHH</td>
<td>HHH</td>
<td>HHH</td>
<td>HHH</td>
<td>HHH</td>
<td>HHH</td>
<td>HHH</td>
</tr>
<tr>
<td>Rooting depth (cm)</td>
<td>65</td>
<td>20-35</td>
<td>50</td>
<td>20-50</td>
<td>25-60</td>
<td>25-60</td>
<td>25-60</td>
</tr>
<tr>
<td>Thickness, Human layer (cm)</td>
<td>20</td>
<td>15-20</td>
<td>10</td>
<td>5-15</td>
<td>5-15</td>
<td>5-15</td>
<td>5-15</td>
</tr>
<tr>
<td>Mineral soil pH (mean in CaCl₂)</td>
<td>4.7</td>
<td>4.8</td>
<td>4.8</td>
<td>4.7</td>
<td>4.7</td>
<td>4.7</td>
<td>4.7</td>
</tr>
<tr>
<td>Humus pH (mean in CaCl₂)</td>
<td>2.7</td>
<td>2.7</td>
<td>2.7</td>
<td>2.7</td>
<td>2.7</td>
<td>2.7</td>
<td>2.7</td>
</tr>
</tbody>
</table>

**Notes:**
- **CMNF:** Coastal Western Hemlock.
- **CMNF/01** through **CMNF/07** represent different years or data sets.
- **Slope positions** indicate the position on the slope for each study year.
- ** Soil parent materials** refer to the type of soil parent material present.
- **Particle size classes** indicate the size distribution of particles in the soil.
- **Drainage class** refers to the amount of water that drains through the soil.
- **Moisture regime** describes the moisture conditions of the soil.
- **Nutrient regime** indicates the availability of nutrients in the soil.
- **Soil classification** is based on the soil's characteristics.
- **Human food classification** indicates the suitability of the area for human food production.
- **Rooting depth** and **thickness** are measured in centimeters.
- **Mineral soil pH** and **humus pH** are measured in CaCl₂.

**References:**
- CG = colluvial, FG = fluvo-eutric, MV = morainal, O = organic, V = veneer (less than 1 m thick), B = blanket (greater than in thickness). Or = colluvial veneer.
- Drainage classes from Holmey et al. (1980): MG = very rapid, M = rapid, G = good, MG = moderately good, I = imperfect, F = poor, V = very poor. Exotic regime: most common regime(s), from Hauckner et al. (1984), M = mesotrophic, SN = submesotrophic, P = permesotrophic, E = eutrophic, S = oligotrophic.

**Note:** For abbreviations of ecosystem units, see previous lists accompanying edaphic grids.
### TABLE 4. Summary of silvicultural prescriptions and guidelines for the CHW complex

<table>
<thead>
<tr>
<th>Ecosystem unit</th>
<th>Species choice</th>
<th>Primary method of establishment</th>
<th>Site preparation</th>
<th>Brush potential</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Preferred</td>
<td>Acceptable</td>
<td>Mech. Burning</td>
<td></td>
</tr>
<tr>
<td>/01</td>
<td>Hw, Ba</td>
<td>Sxs&lt;sup&gt;a&lt;/sup&gt;, Pl</td>
<td>AVOID</td>
<td>low</td>
</tr>
<tr>
<td>/01(a)</td>
<td></td>
<td></td>
<td>AVOID</td>
<td></td>
</tr>
<tr>
<td>/01(b)</td>
<td></td>
<td></td>
<td>AVOID</td>
<td>low</td>
</tr>
<tr>
<td>/02 (except fluvial terraces)</td>
<td></td>
<td></td>
<td>AVOID</td>
<td>none</td>
</tr>
<tr>
<td>/02 (fluvial terraces)</td>
<td></td>
<td></td>
<td>AVOID</td>
<td>none</td>
</tr>
<tr>
<td>/02(1)</td>
<td></td>
<td></td>
<td>AVOID</td>
<td>none</td>
</tr>
<tr>
<td>/03 (in complex)</td>
<td>Sxs</td>
<td>Hw, Ba, Cw, Pl</td>
<td>OK</td>
<td>AVOID</td>
</tr>
<tr>
<td>/03 (extensive area)</td>
<td></td>
<td></td>
<td>AVOID</td>
<td>OK</td>
</tr>
<tr>
<td>/04</td>
<td>Sxs</td>
<td>Hw, Ba, Cw</td>
<td>AVOID</td>
<td>YES</td>
</tr>
<tr>
<td>/05 (1)</td>
<td>Sxs</td>
<td>Act, Cw</td>
<td>OK</td>
<td>OK</td>
</tr>
<tr>
<td>/06</td>
<td>Sxs, Cw</td>
<td>natural &amp; planting</td>
<td>AVOID</td>
<td>AVOID</td>
</tr>
</tbody>
</table>

<sup>a</sup>See discussion on page 27.
ZONAL HEMLOCK - VACCINIUM - MOSS (CWHF1/01)

SLOPE POSITIONS: Middle to upper; less commonly on valley floors and terraces.

SLOPE RANGE: Gentle to very steep (0 - 70+%), occasionally flat.

---

**VEGETATION LAYERS**

**SOILS**

**TREE:**
- Hw
- Ba
- (Cw)
- (Sxs)

**SHRUB:** cover variable but usually moderately to well developed; advanced regeneration often abundant.
- Vaccinium alaskaense
- V. ovalifolium
- V. parvifolium
- Menziesia ferruginea

**HERB:** poorly to moderately well developed.
- Corrals canadensis
- Rubus pedatus
- Clintonia uniflora
- Orthilia secunda

**MOSS:** usually well developed.
- Rhytidiodaehus lorens
- Hylocomium splendens
- Rhytidipsis robusta
- (Pleurozium schreberi)
- (Plagiochila areoloides)

**PARTICLE SIZE CLASS:**
- Sandy, coarse-loamy, sandy-skeletal.

**DRAINAGE:**
- Good to moderately good.

**EFFECTIVE ROOTING:**
- Usually greater than 65 cm.

**COARSE FRAGMENT CONTENT:**
- Sometimes greater than 35%.

**TERRAIN/PARENT MATERIALS:**
- Morainal and colluvial blankets and venners; glaciofluvial terraces; sometimes fluvial deposits.

**SOIL NAME:**
- Orthic Humo-Ferric Podzols.

**HUMUS FORM:**
- Hemimors; (Humimors, Hemihumimors).

**COMMENTS:** This is the zonal association for the CWHF1 and is the most widely distributed association in the variant. The Moss variation of this association, CWHF1/01(1), is similar, but the shrub layer is poorly developed or consists of a dense cover of conifer regeneration (mainly Hw and Ba); Goodyera oblongifolia may be present in the herb layer; and Rhytidipsis robusta is sometimes the dominant moss.
**ZONAL HEMLOCK - VACCINIUM - MOSS:**
GLACIOFLUVIAL GRAVELS PHASE [CWHF1/01(a)]
IMPERFECTLY DRAINED PHASE [CWHF1/01(b)]

**SLOPE POSITIONS:** Valley floor, slope bases, and terraces.

**SLOPE RANGE:** Level.

<table>
<thead>
<tr>
<th>VEGETATION LAYERS</th>
<th>Glaciofluvial gravels phase</th>
<th>Imperfectly drained phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>See CWHF1/01 and COMMENTS below.</td>
<td>PARTİCLE SIZE CLASS: Coarse loamy-skeletal.</td>
<td>Loamy, loamy-skeletal.</td>
</tr>
<tr>
<td></td>
<td>EFFECTIVE ROOTING: Sometimes greater than 30 cm.</td>
<td>20 - 40 cm (variable).</td>
</tr>
<tr>
<td></td>
<td>COARSE FRAGMENT CONTENT: 35 to 85%.</td>
<td>Usually 0.</td>
</tr>
<tr>
<td></td>
<td>TERRAIN/PARENT MATERIALS: Glaciofluvial deposits.</td>
<td>Organic veneers overlying morainal or fluvial deposits.</td>
</tr>
<tr>
<td></td>
<td>HUMUS FORM: Hemicorrs.</td>
<td>Huminers; Heminors.</td>
</tr>
</tbody>
</table>

**COMMENTS:** The CWHF1/01(a) is common in the Onion Lake area between Terrace and Kitimat. Many soil and site characteristics seem akin to the Dry Hemlock - Moss association. The CWHF1/01(b) occurs in the Kitimat River valley and may occur elsewhere; it is characterized by accumulations (10 - 30+ cm) of decaying wood and humus overlying imperfectly drained mineral soils. Scattered individuals of Lysichiton americanus, Athyrium filix-femina, Streptopus roseus, or other atypical species may be present. This phase is small in extent and may be found in complexes with the Skunk Cabbage association.
<table>
<thead>
<tr>
<th>ACTIVITY OR CONCERN</th>
<th>DHMF/01</th>
<th>DHMF/01(a)</th>
<th>DHMF/01(b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Species choice:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preferred</td>
<td>Hw, Ba.</td>
<td>Hw, Ba.</td>
<td></td>
</tr>
<tr>
<td>Acceptable</td>
<td>Sxs, Pl.</td>
<td>Sxs, Cw.</td>
<td></td>
</tr>
<tr>
<td>Logging:</td>
<td>Winter or summer.</td>
<td>snowpack logging preferred.</td>
<td>windfall potential.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- avoid cut-block boundaries through or adjacent to stands of this phase.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- protect acceptable advanced regeneration by minimizing disturbance.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- 3-ma knockdown enforced to minimize mistletoe.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- steeper areas should be high-grade logged.</td>
<td></td>
</tr>
<tr>
<td>Site preparation:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical</td>
<td>AVOID.</td>
<td>AVOID.</td>
<td></td>
</tr>
<tr>
<td>Prescribed fire</td>
<td>AVOID.</td>
<td>AVOID.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>planting required if burned; delay planting three (3) growing seasons to improve survival.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brush hazard:</td>
<td>low.</td>
<td>low, unless disturbed.</td>
<td></td>
</tr>
<tr>
<td>Reforestation:</td>
<td>use acceptable advanced Hw and Ba.</td>
<td>fill-plant if required with Sxs or Hw.</td>
<td>low availability of planting spots if disturbed.</td>
</tr>
<tr>
<td>Other comments:</td>
<td>Bg preferred only on moister and richer sites.</td>
<td>increase component of Sxs and Cw in the more oceanic parts of the variant.</td>
<td>mixed opinions exist on the use of Sitka spruce on circum-mesic sites in the DHMF. Many ecologists maintain that it is suited only to subhygric to</td>
</tr>
</tbody>
</table>
hygroic soil moisture regimes and subeutrophic to eutrophic nutrient regimes. Others point out that spruce does occur, and individual trees seem to grow well in natural stands on drier, less rich sites. Spruce might be out-competed in natural stands, partly because of the build-up of very strongly acid and sometimes thick Moor humus.

- Exposed mineral soil provides a suitable seedbed, favouring spruce germination. Also, the exposure probably results in a more favourable soil thermal regime. Nutrient availability might also be more favourable. These changes could improve survival and growth of spruce.

- Planted Sitka spruce seems to be performing well on circum-mesic sites in the general area of Onion Lake, south of Terrace. Its performance is likely related to improved soil thermal and nutrient regimes following logging and broadcast burning. Whether or not this is a relatively short-term effect is currently a matter of debate. The plantations are in an area that is not generally representative of the CWHF1; the climate is transitional to the more maritime CWHF1. Parent materials are also somewhat unusual; gravelly glaciofluvial materials predominate. Also, cemented subsoil horizons (e.g., argillite layers) may be common.

- In general, it would be best to restrict the use of Sitka spruce to relatively moist and rich sites in the CWHF1, at least until more conclusive information is available. It still could be planted on some circum-mesic sites when a reasonable case for its use can be made based on a site-specific evaluation.
RY HEMLOCK - MOSS (CRHF1/02)

LOPE POSITIONS: Upper to middle slopes, ridges, valley floors, and terraces; moisture-shedding positions.

LOPE RANGE: Level to very steep.

<table>
<thead>
<tr>
<th>SOILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRAY: usually dense stands of small average diameter.</td>
</tr>
<tr>
<td>HW</td>
</tr>
<tr>
<td>VACCINIUM App.</td>
</tr>
</tbody>
</table>

| HUMUS FORM: | HEMNOU. |

<table>
<thead>
<tr>
<th>SOILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>PARTICLE SIZE CLASS:</td>
</tr>
<tr>
<td>DRAINAGE:</td>
</tr>
<tr>
<td>EFFECTIVE ROOTING:</td>
</tr>
<tr>
<td>COARSE FRAGMENT CONTENT:</td>
</tr>
<tr>
<td>TERRAIN/PARENT MATERIALS:</td>
</tr>
<tr>
<td>SOIL NAME:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>VEGETATION LAYERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>HD1:</td>
</tr>
<tr>
<td>RUB:</td>
</tr>
<tr>
<td>GUS:</td>
</tr>
<tr>
<td>M1:</td>
</tr>
</tbody>
</table>

| HUMUS FORM: | HEMNOU. |

NOTES: Do not confuse this association with the Moss variation of the CRHF1/01. The Dry Hemlock - Moss association is widespread on valley floors and slopes throughout the CRHF and is especially common in areas with coarse-textured or shallow soil parent materials. It is characterized by dense, small-diameter stands (mainly HW, often with scattered PI) and a thick carpet of mosses. Shrubs and herbs are absent or occur as scattered individuals or patches.
DRY HEALOCK - MOSS: OUTWASH PINE VARIATION [CWHF/02(1)]

SLOPE POSITIONS: Valley floors, terraces, plains (sometimes ridges or rock knobs).

SLOPE RANGE: Level (0 - 3%).

VEGETATION LAYERS

TREE:
  P1 (dominant cover)
  Hw
  (Hm)

SHRUB: sparse.
  Menziesia ferruginea
  Vaccinium membranaceum
  V. parvifolium
  (Alnus glutinosa)
  (Amelanchier alnifolia)

HERB: sparse.
  Linnaea borealis
  Chamaedaphne calyculata
  Vaccinium cespitosum
  Cornus canadensis
  Pyrola asarifolia
  (Melampyrum linare)
  (Arctostaphylos uva-ursi)

MOSS: well developed.
  Pleurozium schreberi
  Poeltigera spp.
  Hlycomonium splendens
  Rhytidiadelphus triquetrus
  (Polytrichum juniperinum)
  (Dicranum polysetum)
  (Cololejeunea spp.)
  (Cladina spp.)
  (Sticta spp.)

SOILS

PARTICLE SIZE CLASS:
  Coarse loamy-skeletal,
  sandy-skeletal.

DRAINAGE:
  Very rapid to good.

EFFECTIVE ROOTING:
  May be greater than 40 cm.

COARSE FRAGMENT CONTENT:
  Commonly greater than 35%.

TERRAIN/PARENT MATERIALS:
  Coarse glaciofluvial materials;
  also shallow morainal or colluvial
  materials over bedrock.

SOIL NAME:
  Orthic Humo-Ferric Podzols.

HUMUS FORM:
  Humimors.

COMMENTS: Common on outwash terraces at low elevations in major valleys such as the
  Kitsumkalum, upper Kitsmat, and Skeena. Extremely Dry Pine - Lichen
  ecosystems on ridges or rock outcrops may also be included within this
  variation. Tree height growth is poor and some botanical curiosities,
  such as Hemitomes congestum, may be found.
<table>
<thead>
<tr>
<th>Activity or Concern</th>
<th>CWHP1/02 (except fluvial terraces)</th>
<th>CWHP1/02 (fluvial terraces)</th>
</tr>
</thead>
</table>

### Species Choice:

**Preferred**
- Pl; use only local provenances.

**Acceptable**
- minor Hw.
- minor Cw; some pole potential.

### Gging:
- AVOID EXCESSIVE GROUND DISTURBANCE.
- Light disturbance beneficial.
- 3-w knockdown to eliminate shade-tolerant remnants of the understory.

### Site Preparation:

**Mechanical**
- AVOID, particularly on steep slopes or shallow soils.
- OK but do not scalp.
- A possibility, only if winter logged.

**Prescribed fire**
- AVOID, unless organic horizons are thick (greater than 15 cm).
- burning is acceptable if only the L horizon is consumed (spring).
- if advanced regeneration is unacceptable, consider a light burn.

### Brush Hazard:
- no problem, however, eliminate true firs and hemlock if required.

### Forestation:
- plant Pl.
- plant Pl if natural seeding-in is inadequate.

### Other Comments:
- Ba, Hw, Sks, generally unacceptable (Hw may be acceptable as a minor species on thick organic horizons).
- organic horizons are very beneficial for moisture retention.
- a minor component of aspen may be acceptable for site improvement of these dry, nutrient-impoverished ecosystems.
EVIL'S CLUB - OAK FERN (CWHF1/03)

LOPE POSITIONS: Lower (sometimes to middle).

LOPE RANGE: Level to very steep but usually gently sloping.

---

EGETATION LAYERS

AEE:
Hw
Gw
Ba
(Sxs)

MRLB: moderately to well developed.
 Diplachnus horridus
 Rhamnus lacustris
 Vaccinium ovalifolium
 Menziesia ferruginea
 (Viburnum edule)
 (Sambucus racemosa)

ERB: moderately to well developed.
 Gymnocarpium dryopteris
 Tiarella trifoliata
 T. unifoliata
 Streptopus roseus
 S. amplexifolius
 Rubus pedatus
 Clintonia uniflora
 Orthilia secunda
 Cornus canadensis
 Actaea rubra
 Dryopteris assimilis

ISS: well developed but often laden by shrubs and herbs.
 Hylocomium splendens
 Rhizidiadelphus triquetrus
 M. loquus
 (Plagiochila borellioides)
 (Minum sap.)

---

SOILS

PARTICLE SIZE CLASS:
Loamy, coarse-loamy, sandy,
(Including skeletal groups).

DRAINAGE:
Moderately good to imperfect.

EFFECTIVE ROOTING:
Variable (20 - 90 cm).

COARSE FRAGMENT CONTENT:
Sometimes greater than 35%.

TERRAIN/PARENT MATERIALS:
Fluvial, glacifluvial,
or morainal materials.

SOIL NAME:
Orthic Humo-Ferric Podzols;
Eluviated Dystric Brunisols.

HUMUS FORM:
Nonmoder; Huminors.

---

MILENENTS: Spruce (when present) is usually the largest trees; Ba and Gw are often important stand components. This association is common through the CWHF1 but usually covers smaller areas.
<table>
<thead>
<tr>
<th>ACTIVITY OR CONCERN</th>
<th>In complex with CWMF1/01</th>
<th>Extensive area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Species choice:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preferred</td>
<td>- Sxs.</td>
<td>- Sxs.</td>
</tr>
<tr>
<td>Acceptable</td>
<td>- Hw, Ba, Cw, Pl.</td>
<td>- Hw, Ba, Cw.</td>
</tr>
<tr>
<td>Logging:</td>
<td>- minimize disturbance.</td>
<td>- 3-m knockdown.</td>
</tr>
<tr>
<td></td>
<td>- minimize slash</td>
<td>- winter logging preferred.</td>
</tr>
<tr>
<td></td>
<td>accumulation.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- AVOID LOGGING DURING WET SEASON.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- 3-m knockdown.</td>
<td></td>
</tr>
<tr>
<td>Site preparation:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical</td>
<td>- avoid because disturbance aggravates brush problem.</td>
<td></td>
</tr>
<tr>
<td>Prescribed fire</td>
<td>- AVOID, especially on shallow soil.</td>
<td>- OK.</td>
</tr>
<tr>
<td>Brush hazard:</td>
<td>- moderate.</td>
<td>- severe.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Brushing and weeding probably required.</td>
</tr>
<tr>
<td>Reforestation:</td>
<td>- use acceptable Hw and Ba, and if understocked PLANT IMMEDIATELY WITH Sxs.</td>
<td>- usually understocked and requires IMMEDIATE PLANTING.</td>
</tr>
<tr>
<td>Other comments:</td>
<td>- assess need for brush control at time of first survival assessment.</td>
<td>- this unit often exists in complex with /01 as hollows that collect slash.</td>
</tr>
</tbody>
</table>
EVIL'S CLUB - LADY FERN - OAK FERN (CM#1/04)

LOPE POSITIONS: Valley floor, toe, lower slope, and bench.

LOPE RANGE: Level to gently sloping (0 - 20%).

DETENTION LAYERS

REE: Large, widely spaced trees.
- Hw
- Sxs
- Dw
- Ba
- Act
- Dr

RUB: Usually dense.
- Gaulanum horridus
- Rubus spectabilis
- Vaccinium ovillosum
- Ribes spp.
- Cornus sericea
- Viburnum edule
- Lonicera involucrata
- Sambucus racemosa

RB: Very well developed.
- Athyrium filix-femina
- Gymnocarpium dryopteris
- Dryopteris assimilis
- Paeonia trifoliata
- L. unifoliata
- Sicaea alpina
- Viola labella
- Streptopus roseus
- L. amplexifolius
- Salmo triflorum

JS: Sparse, mainly on hummocks.
- Tnnium spp.
- Trachycheilium spp.
- Trichothecia pellioidea
- Hydridiadelphus loreus

SOILS

PARTICLE SIZE CLASS:
- Loamy, loamy-skeletal.

DRAINAGE:
- Moderately good to imperfect.

EFFECTIVE ROOTING:
- Sometimes greater than 30 cm.

COARSE FRAGMENT CONTENT:
- Sometimes may be greater than 30%.

TERRAIN/PARENT MATERIALS:
- Morainal, colluvial, and fluvial.

SOIL NAME:
- Orthic Gleysols;
- Orthic Humic Gleysols.

HUMUS FORM:
- Hemituminors; Mirmographs.

NOTES: This association has a high capacity for timber production. It can be distinguished from the CM#1/03 by the abundance of salmonberry, the dominance of large ferns (lady fern and spiny wood fern), and a poorly developed moss layer dominated by leafy Tnnum mosses.
Species choice:
- Preferred
  - 5xs.
- Acceptable
  - Ba preferable in valleys experiencing cold air drainage.
  - Hw acceptable on humus mounds.
  - Cw; this is its best site, but its growth remains slower than that of the others.

Logging:
- try to lay out these units as separate areas to facilitate speed and control of subsequent treatments.
- avoid using these ecosystems for road building and skid-trails.
- winter logging preferred, or log during dry season.
- minimize slash accumulation and disturbance (duration and degree).

Site preparation:
- Mechanical
  - AVOID because of fine soil texture, wetness of site, and brush hazard.
- Prescribed fire
  - recommended, except on fragmental or skeletal soils
  - often difficult to get a good burn because of wetness and brush; recommend burning in very dry times of year.
- Brush hazard:
  - SEVERE; plan everything to minimize this problem.
  - assess need and urgency of control at time of planting.
- Reforestation:
  - PLANT IMMEDIATELY with healthy, sturdy stock.
- Other comments:
  - these units must be planned in detail and closely controlled to avoid brush problems and site degradation. TIMING IS CRITICAL. Winter logging followed by a spring burn will save a season. Frequent monitoring of plantation progress is necessary, followed by swift treatment of brush control if required.
LUVIAL SPRUCE - DEVIL'S CLUB - FERN (CDHF1/05)

SLOPE POSITIONS: Valley floor.
SLOPE RANGE: Level (0 - 2%).

VEGETATION LAYERS

TREE: very large, widely spaced trees.
- Ss or Sxs
- Hw
- Ba
- Cw

HUB: well developed.
- Oligoneur axillaris
  (Vaccinium alaskaense)
  (Ribes spp.)
  (Sambucus racemosa)
  (Rubus spectabilis)

ENB: moderately well developed.
- Gymnocarpium dryopteris
- Athyrium filix-femina
- Dryopteris assimilis
- Tiarella trifoliata
- T. unifoliata
- Streptopus amplexifolius
- S. roseus
  (Circina alpigena)
  (Galium triflorum)

OSS: poorly developed.
- (Mnium spp.)
- (Brachythecium spp.)
- (Plagiochila pseudolides)
- (Rhytidolepia boreus)
- (Hylocomium splendens)

SOILS

PARTICLE SIZE CLASS:
- Variable: loamy, sandy, coarse-loamy, and sandy-skeletal.

DRAINAGE:
- Good to imperfect.

EFFECTIVE ROOTING:
- 25 - 60 cm.

COARSE FRAGMENT CONTENT:
- Sometimes greater than 35%.

TERRAIN/PARENT MATERIALS:
- Fluvial deposits.

SOIL NAME:
- Orthic and Cumulic Regosols;
- Orthic Dystric and Eutric Brunisols; Orthic Humo-Ferric Podzols.

HUMUS FORM:
- Velamoder; Leptamoder;
on older floodplains.

NOTES: This association has the greatest capability for tree growth in the CDHF. Few undisturbed stands remain and most ecosystems in this association belong to the seral variation.
FLUVIAL SPRUCE - DEVIL'S CLUB - FERN:  
FLOODPLAIN COTTONWOOD VARIATION [(CWHF1/05(1)]

SLOPE POSITIONS: Valley floor.

SLOPE RANGE: Level (0 - 2%).

VEGETATION LAYERS

TREE: very large, widely spaced trees.
   Act
   Ss
   Dw
   Dr

SHRUB: tall and usually dense.
   Cornus sericea
   Rubus spectabilis
   Sambucus racemosa
   Symphoricarpos albus
   Lonicer INVOLVURATA
   Rosa triloba
   Ribes spp.
   Viburnum edule

HERB: variable development.
   Athyrium filix-femina
   Equisetum arvense
   E. pratense
   E. hyemale
   Disporum hookeri
   Galium triflorum
   Uvularia Chilensis
   Malanthemum dilatatum
   Aralia nudicaulis
   Asarum caudatum
   Aruncus dioicus
   Viola canadensis
   Pyrola geariifolia
   Smilacina spp.

MOSS: generally absent.

SOILS

PARTICLE SIZE CLASS: Variable: loamy, sandy, coarse-loamy, and sandy-skeletal.

DRAINAGE: Good to imperfect.

EFFECTIVE ROOTING: 25 - 60 cm.

COARSE FRAGMENT CONTENT: Sometimes greater than 35%.

TERRAIN/PARENT MATERIALS: Fluvial deposits.

SOIL NAME: Orthic and Cumulic Regosols;
Orthic Dystric and Eutric Brunisols;
Orthic Humo-Ferric Podzols.

COMMENTS: This is considered a seral variation of the CWHF1/05; black cottonwood would eventually give way to a spruce - (cedar) climax in the absence of periodic, severe flooding. However, recurrent flooding and erosion seem to maintain the seral stage.
Regeneration plans must be submitted and approved prior to road building and harvesting activity. Assess risk for next rotation in conjunction with erosion potential.

Species choice:

Preferred
- Sxs; component of Act for partial shading.
- Cw and Bz may be preferred in areas where intensive brush control is not feasible or where spruce weevil hazard is severe.
- Act may be preferred on some sites; establish by natural regeneration and manage as pure stands.

Acceptable
- Act, Cw, Hw, (Bz in cold air drainages).

Logging:
- Log quickly and cleanly.
- Moving slash may damage plantation during floods.
- Consider cutting deciduous seed trees around opening.

Site preparation:

Mechanical
- OK, if planting follows immediately; use jumbo stock.
- Aggravates brush problems.
- Cost/benefit assessment important.

Prescribed fire
- OK, but burning improbable using conventional means.

Brush hazard:
- Severe; burning may control brush for 1 or 2 years.
- Search for appropriate herbicide.

Reforestation:
- Secure supply of planting stock prior to harvesting.
- Plant immediately with the healthiest, strongest, tallest spruce stock available.

Other comments:
- Check fisheries implications if burning attempted.
- Assess annually during high risk years (brush, flooding).
SKUNK CABBAGE (DHF1/06)

SLOPE POSITIONS: Valley floor, base of slope, depressions in benches or terraces.

SLOPE RANGE: Level (0 - 2%).

VEGETATION LAYERS

TREES: trees widely spaced, mainly on hummocks.
Sxs (usually dominant)
Hw
Cw
Dr

SHRUB: well developed.
Cornus sericea
Rubus spectabilis
Viburnum edule
(Dipteris horridus)
(Menziesia farruginea)
(Vaccinium ang.)
(Sphagnet douglasii)
(Malus fusca)

HERBS: usually well developed.
Lyssineton americana
Athyrium filix-femina
Dryopteris asplinica
Equisetum arvense
Gymnocarpium dryopteris
(Cornus canadensis)

MOSS: poorly developed except on hummocks.
H nitric spp.
Sphagnum spp.
Rhytiadiaphus loreus

SOILS

PARTICLE SIZE CLASS:
Loamy, fine-loamy (for mineral soils).

DRAINAGE:
Imperfect to very poor.

EFFECTIVE ROOTING:
Often 20 - 30 cm.

COARSE FRAGMENT CONTENT:
Usually 0.

TERRAIN/PREREANT MATERIALS:
Organic overlying lacustrine, morainal or fluviatile deposits.

SOIL NAME:
Terric Mesisols; Terric Humisols;
(Orthic Humic Gleysols).

HUMUS FORM:
Histamoders.

COMMENTS: Forest capability in these ecosystems depends on ecological nutrient status and successional stage. Best stands are dominated by Sxs or Cw; nutrient-poor swamps occur in complex with Hw - Vaccinium - Moss ecosystems elevated above the water table (see DHF1/01b).
ACTIVITY OR CONCERN

Species choice:
- Preferred
  - Sxs, Cw.
- Acceptable
  - Ba, richer examples of this unit.
  - Hw, only on hummocks.

Logging:
- Winter logging preferred.
- Do not disturb soil.
- Avoid drainage interference (roads, skid trails).
- Avoid levelling mounds or hummocks.
- This unit will be very difficult to plant and survival will likely be low if not logged with some care.

Site preparation:
- Mechanical
  - Avoid unless used to improve drainage.
- Prescribed fire
  - Avoid, burning will reduce plantable spots, eliminate advanced regeneration and natural seeding, and reduce organic horizons and the productive area accordingly.

Brush hazard:
- Variable (assess during pre-logging assessment).

Reforestation:
- Promote natural and advanced regeneration of all conifers.
- If required, plant Sxs and Cw.

Other comments:
- Mechanical site preparation may be used to create plantable mounds or remove slash or to improve drainage (Harttiini plough).
SLOPE POSITIONS: Valley floor, slope bases, depressions in benches or terraces.

SLOPE RANGE: Usually level (0 - 10%).

VEGETATION LAYERS

FREE: scattered, shrub-size trees.

(CW)

(P1)

(Hm)

WHUEB: sparse to well developed.

Ledum groenlandicum
(Spiraea douglasii)
(Vaccinium uliginosum)

EBB: variable cover, includes many dwarf shrubs.

Kalmia microphylla
Antonowia polifolia
Vaccinium oxyccocoides
Carex spp.
Drosera anglica
S. rotundifolia

Coptis trifolia

Trientalis europaea ssp. arctica
Platanthera dilatata

Hymenocallis trifoliata
Potentilla palustris

Schoenocarya palustris
Lycopodium inundata

SOILS

COARSE FRAGMENT CONTENT:
N/A.

TERRAIN/PARENT MATERIALS:
Organic blankets.

SOIL NAME:
Typic Mesisols;
(Terric Mesisols).

HUMUS FORM:
Histoderms.

NOTES: Sparsely treed ecosystems with no commercial timber value.
4.4 Ecosystem Units of the CMHFLa (Dahl-Madeene) and Upper Kitimat River Phases

ACTIVITY OR CONCERN

MODIFICATIONS TO CMHFL PRESCRIPTIONS

Species choice:
- no Pl.
- less Cw.
- less Ss.
- more Ba.

Logging:
- road location and drainage structures take on greater importance.

Site preparation:
- Mechanical: AVOID.
- Prescribed fire: AVOID.

Brush hazard:
- see equivalent units of CMHFL.

Reforestation:
- heavier reliance on naturals.

Other comments:
- the climate is transitional both to more oceanic CMHFL and to the higher elevation CMHF2.

TABLE 5. Equivalent ecosystem units of the CMHFL, CMHFLa, and CMHF2

<table>
<thead>
<tr>
<th>Ecosystem Units of the CMHFL</th>
<th>Equivalent Ecosystem Units of the CMHFLa</th>
<th>Equivalent Ecosystem Units of the CMHF2</th>
</tr>
</thead>
<tbody>
<tr>
<td>/01</td>
<td>/01</td>
<td>/01</td>
</tr>
<tr>
<td>/01(l)</td>
<td></td>
<td>/01(l)</td>
</tr>
<tr>
<td>/02</td>
<td>/02</td>
<td>/02</td>
</tr>
<tr>
<td>/03</td>
<td>/03</td>
<td>/03</td>
</tr>
<tr>
<td>/04</td>
<td>/04</td>
<td>/04</td>
</tr>
<tr>
<td>/05</td>
<td>/05</td>
<td>/05(l)</td>
</tr>
<tr>
<td>/05(l)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
FIGURE 9. High Elevation Variant of the Coastal Western Hemlock Zone, Northern Drier Maritime Subzone (CWHf2).
Classification of Ecosystem Units of the CWHf2:
High Elevation Variant

CWHf2/01 Zonal Hemlock - (Amabilis Fir) - Vaccinium - Moss ecosystem
association

/01(1) Amabilis Fir - Rhytidium robusta variation

CWHf2/02 Dry Hemlock - Moss ecosystem association

CWHf2/03 Devil's Club - Oak Fern ecosystem association

CWHf2/04 Devil's Club - Lady Fern - Oak Fern ecosystem association
FIGURE 10. Ectopic grid of ecological moisture and nutrient regimes - OWMF2.
5.1 Key to Ecosystem Units of the CWfH2

A. Ecosystems with good tree growth; *Glopanax horridus* common in shrub layers; herb layer dominated by ferns . . . . . . . B

AA. Ecosystems with moderate to poor tree growth; *Glopanax horridus* rare or lacking in shrub layers; ferns rare or lacking in herb layer . . . . . . . . C

B. *Athyrium filix-femina* dominates the herb layer; feathermosses confined to hummocks and decaying wood

DEVL'S CLUB - LADY FERN - OAK FERN (CWfH2/04)

BB. *Athyrium filix-femina* rare or lacking in the herb layer; moderately well-developed feathermoss carpet

DEVL'S CLUB - OAK FERN (CWfH2/03)

C. Shrub layers moderately to well developed, dominated by *Vaccinium* spp.; dominantly mid-slope positions, extending to upper and lower slopes; mesic and mesotrophic moisture and nutrient conditions

ZONAL HEMLOCK - (AMARILIS FIR) - VACCINIUM - MOSS (CWfH2/01)

CC. Shrub layers very poorly developed . . . . . . . . . . D

D. Moss layer dominated by *Hylocomium splendens* and *Pleurozium schreberi*; upper slopes, ridges, bedrock outcrops, benches (river terraces); submesic and submesotrophic moisture and nutrient conditions

DRY HEMLOCK - MOSS (CWfH2/02)

DD. Moss layer dominated by *Rhytidogenia robusta*; dominantly mid-slope positions, extending to upper and lower slopes; mesic and mesotrophic moisture and nutrient conditions

ZONAL HEMLOCK - (AMARILIS FIR) - VACCINIUM - MOSS: AMARILIS FIR - RHYTIDIOPHIS ROBUSTA VARIATION ((CWfH2/01(1))}
FIGURE 11. Topographic sequence of CMHP2 ecosystem associations.
5.2 Prominence of the Major Species of the DWHF2

Figure 12 depicts the relative prominence of several species that typify the DWHF2. Prominence is a measure derived from both presence and plant cover. For example, if a species is present on four of five plots (i.e., presence of 80%) and has a mean cover on the five plots of 7%, its prominence would be equal to:

\[(\text{square root of } 80) \times (7) = 63\] (rounded off to nearest whole number)

Figure 12 only includes species having a prominence value of 30 or more in one or more ecosystems. To get a firm idea of this cut-off value, note that a species that always occurs would have to have a cover of 3% or more.

Figure 12 presents circles whose diameters are proportional to the prominence value. The diameter equivalent to a prominence value of 30 is about 1.1 mm.

5.3 Description and Interpretation of DWHF2 Ecosystems

Table 6 presents selected physical and edaphic features associated with the ecosystem units; Table 7 summarizes silvicultural interpretations for these units. The small figure that appears in the upper right of the descriptive page is an edaphic grid with an outlined area indicating the usual moisture and nutrient conditions for the ecosystem.
<table>
<thead>
<tr>
<th>SPECIES</th>
<th>ECOSYSTEM ASSOCIATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TREES</strong></td>
<td>02 01 01(1) 03 04</td>
</tr>
<tr>
<td>Picea spp.</td>
<td></td>
</tr>
<tr>
<td>Thuja heterophylla</td>
<td></td>
</tr>
<tr>
<td>Thuja plicata</td>
<td></td>
</tr>
<tr>
<td>Abies amabilis</td>
<td></td>
</tr>
<tr>
<td>Abies lasiocarpa</td>
<td></td>
</tr>
<tr>
<td>Taxus mertensiana</td>
<td></td>
</tr>
<tr>
<td><strong>SHRUBS</strong></td>
<td></td>
</tr>
<tr>
<td>Vaccinium alaskense</td>
<td></td>
</tr>
<tr>
<td>Vaccinium ovalifolium</td>
<td></td>
</tr>
<tr>
<td>Ophiogonum horridus</td>
<td></td>
</tr>
<tr>
<td>Rubus spectabilis</td>
<td></td>
</tr>
<tr>
<td><strong>HERBS &amp; DWARF SHRUBS</strong></td>
<td></td>
</tr>
<tr>
<td>Cornus canadensis</td>
<td></td>
</tr>
<tr>
<td>Gymnocarpium dryopteris</td>
<td></td>
</tr>
<tr>
<td>Rubus pedatus</td>
<td></td>
</tr>
<tr>
<td>Tiarella trifoliata</td>
<td></td>
</tr>
<tr>
<td>Athyrium filix-femina</td>
<td></td>
</tr>
<tr>
<td>Tiarella undulata</td>
<td></td>
</tr>
<tr>
<td><strong>LICHENS, MOSES, &amp; LIVERWORTS</strong></td>
<td>02 01 01(1) 03 04</td>
</tr>
<tr>
<td>Hypocenium splendens</td>
<td></td>
</tr>
<tr>
<td>Pleurocium schreberi</td>
<td></td>
</tr>
<tr>
<td>Phyllia picea-costrensis</td>
<td></td>
</tr>
<tr>
<td>Rhytidopsis robusta</td>
<td></td>
</tr>
<tr>
<td>Rhytidodendrophorus torreyan</td>
<td></td>
</tr>
<tr>
<td>Molinia spp.</td>
<td></td>
</tr>
</tbody>
</table>

FIGURE 12. Prominence values for the major species of the CWM2.
TABLE  6. Habitat features of ecosystem associations of the Coastal Western Hemlock, Northern Drier Maritime, High Elevation Variant (CMH2/2)

<table>
<thead>
<tr>
<th>Habitat features</th>
<th>CMH2/01</th>
<th>CMH2/02</th>
<th>CMH2/03</th>
<th>CMH2/04</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slope positions</td>
<td>Middle, (benches)</td>
<td>Upper, ridges, benches, terraces</td>
<td>Middle to lower, terraces</td>
<td>Valley floor, lower slope or toe</td>
</tr>
<tr>
<td>Slope range</td>
<td>0-70%</td>
<td>Level to extremely steep</td>
<td>Flat to very steep</td>
<td>0-25%</td>
</tr>
<tr>
<td>Soil parent materiala</td>
<td>C, N, FG, (F)</td>
<td>Mv, Cv, (F, F6)</td>
<td>FG, M, C</td>
<td>F, M, C</td>
</tr>
<tr>
<td>Particle size classesb</td>
<td>L, LS, CLS</td>
<td>L, LS</td>
<td>CLS</td>
<td>L</td>
</tr>
<tr>
<td>Drainage classc</td>
<td>G - MG</td>
<td>R - G</td>
<td>MG - I</td>
<td>MG - P</td>
</tr>
<tr>
<td>Moisture regime</td>
<td>mesic</td>
<td>submesic</td>
<td>subhygric</td>
<td>hygric</td>
</tr>
<tr>
<td>Nutrient regime</td>
<td>m</td>
<td>m</td>
<td>m</td>
<td>M</td>
</tr>
<tr>
<td>Soil classificationd</td>
<td>FHP, NFP</td>
<td>NFP</td>
<td>NFP, GL</td>
<td>EB, NS, FHP</td>
</tr>
<tr>
<td>Humus form classificationf</td>
<td>NHM, HNR</td>
<td>NHM</td>
<td>NHM, NHM</td>
<td>NHM, NHM</td>
</tr>
<tr>
<td>Rooting depth (cm)</td>
<td>20-60</td>
<td>&lt; 60</td>
<td>20-70</td>
<td>&lt; 60</td>
</tr>
<tr>
<td>Thickness, mineral soil (cm)</td>
<td>30-70</td>
<td>50</td>
<td>30-40</td>
<td>60 (2)</td>
</tr>
<tr>
<td>Thickness, humus layer (cm)</td>
<td>3-13</td>
<td>6-15</td>
<td>6-40</td>
<td>12-20</td>
</tr>
<tr>
<td>Mineral soil pH (mean in CaCl2)</td>
<td>4.7</td>
<td>4.4</td>
<td>5.0</td>
<td>5.9</td>
</tr>
<tr>
<td>Humus pH (mean in CaCl2)</td>
<td>3.2</td>
<td>3.0</td>
<td>4.3</td>
<td>5.7</td>
</tr>
</tbody>
</table>

a: C = colluvial, F = fluviol, FG = gleyo-fluvio, L = lacustrine, N = morainal, M = organic, v = veneer (less than 1 m thick), h = blanket (greater than 1 m thick); e.g., Cv = colluvial veneer.
b: Family particle size classes from CSSC (1978), S = sandy, L = loamy, CL = coarse loamy, F = fine-loamy, SS = sandy-skeletal, LS = loamy-skeletal, CLS = coarse loamy-skeletal.
c: Drainage class from Vahidkht and others (1980), VR = very rapid, R = rapid, G = good, MG = moderately good, I = imperfect, P = poor, VP = very poor.
d: Nutrient Regime: most common regimes (e.g. from Hanusser and others, 1984), m = mesotrophic, sm = submesotrophic, pm = perma-subtrophic, m = mesotrophic.
f: Representative Humus Form Group (Klinta and others, 1991). HNR = Humic-Norm, HNM = Humic-Mor, HNR = Humic-Mor, HNM = Humic-Mor, HNM = Humic-Mor.

Note: For abbreviations of ecosystem units, see previous lists accompanying edaphoclimatic grids.
TABLE 7. Summary of silvicultural prescriptions and guidelines for the CWHF2

<table>
<thead>
<tr>
<th>Ecosystem unit</th>
<th>Species choicea</th>
<th>Primary method of establishmentb</th>
<th>Site preparationc</th>
<th>Brush burning potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zonal Hw - (Ba)</td>
<td>Hw, Ba, Sxs</td>
<td>natural and planting</td>
<td>AVOID</td>
<td>AVOID</td>
</tr>
<tr>
<td>Vaccinium - Moss</td>
<td>(Cw, Hw BT, Pl)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dry Hw - Moss</td>
<td>Pl, Hw</td>
<td>natural and planting</td>
<td>AVOID</td>
<td>AVOID</td>
</tr>
<tr>
<td>Devil's Club - Oak Fern</td>
<td>Sxs</td>
<td>planting</td>
<td>AVOID</td>
<td>OK</td>
</tr>
<tr>
<td>Devil's Club - Lady Fern - Oak Fern</td>
<td>Ba, (Hw, Cw, B1)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

aGenerally speaking, Ba is more important and Cw is much less important in the CWHF2 compared to the fl. Provenance of Sx is also more critical in the high elevation variant.

bThere tends to be a heavier reliance on natural regeneration in the CWHF2 compared to the fl.

cSite preparation should be practised much less and with more care in the CWHF2 than in the fl; the climate is more severe and limiting, and organic soil horizons are much more important ecologically in the CWHF2.
ZONAL HEMLOCK - (AMARILIS FIR) - VACCINIUM - MOSS (CW1D2/01)

SLOPE POSITIONS: Valley floor, slope bases, and terraces.

SLOPE RANGE: Level.

<table>
<thead>
<tr>
<th>VEGETATION LAYERS</th>
<th>SOILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TREE:</td>
<td></td>
</tr>
<tr>
<td>Hw</td>
<td></td>
</tr>
<tr>
<td>Ba</td>
<td></td>
</tr>
<tr>
<td>SHRUB: usually moderately to well developed; advanced regeneration usually abundant.</td>
<td>PARTICLE SIZE CLASS:</td>
</tr>
<tr>
<td>Vaccinium glaskense</td>
<td>Loamy, loamy-skeletal,</td>
</tr>
<tr>
<td>Menziesia ferruginea</td>
<td>coarse loamy-skeletal.</td>
</tr>
<tr>
<td>Vaccinium ovalifolium</td>
<td></td>
</tr>
<tr>
<td>Vaccinium membranaceum</td>
<td></td>
</tr>
<tr>
<td>HERB: poorly to moderately well developed.</td>
<td>DRAINAGE:</td>
</tr>
<tr>
<td>Rubus pedatus</td>
<td>Good to moderately good.</td>
</tr>
<tr>
<td>Cornus canadensis</td>
<td></td>
</tr>
<tr>
<td>Orthilia secunda</td>
<td></td>
</tr>
<tr>
<td>MOSS: well developed.</td>
<td>EFFECTIVE ROOTING:</td>
</tr>
<tr>
<td>Mylocomium splendens</td>
<td>Generally 20 - 40 cm.</td>
</tr>
<tr>
<td>Rhytidiodopsis robusta</td>
<td></td>
</tr>
<tr>
<td>Rhytidiodiphycus lutes</td>
<td></td>
</tr>
<tr>
<td>Pleurozium schreberi</td>
<td></td>
</tr>
<tr>
<td>COMMENTS: The Amabilis fir - Rhytidiodopsis robusta variation CW1D2/01(1) occurs at elevations greater than 700 m where snowpack is heavy. Amabilis fir regeneration, Menziesia ferruginea, Streptopus streptopoides, and Rhytidiodopsis robusta are all more abundant than they are in typical CW1D2/01.</td>
<td>COARSE FRAGMENT CONTENT:</td>
</tr>
<tr>
<td></td>
<td>Generally greater than 25%.</td>
</tr>
<tr>
<td></td>
<td>TERRAIN/PARENT MATERIALS:</td>
</tr>
<tr>
<td></td>
<td>Colluvial, morainal, and sometimes glacifluvial (rarely fluvial).</td>
</tr>
<tr>
<td></td>
<td>SOIL NAME:</td>
</tr>
<tr>
<td></td>
<td>Orthic Humo-Ferric Podzols; (Ortstei Humo-Ferric Podzols; Ferro-Humic Podzols; Ferrugineous Podzols).</td>
</tr>
<tr>
<td></td>
<td>HUMUS FORM:</td>
</tr>
<tr>
<td></td>
<td>Hemihumors; Hemihumitors.</td>
</tr>
</tbody>
</table>
XY HEMLOCK - MOSS (CHM#2/02)

SLOPE POSITIONS: Upper (also ridges, benches, and river terraces).

SLOPE RANGE: Level to extremely steep.

<table>
<thead>
<tr>
<th>EROSION LAYERS</th>
<th>SOILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEE:</td>
<td>PARTICLE SIZE CLASS:</td>
</tr>
<tr>
<td></td>
<td>Coarse-loamy, coarse loamy-skeletal.</td>
</tr>
<tr>
<td>(B1)</td>
<td>DRAINAGE:</td>
</tr>
<tr>
<td></td>
<td>Rapid to good.</td>
</tr>
<tr>
<td>HRUB: very poorly developed.</td>
<td>EFFECTIVE ROOTING:</td>
</tr>
<tr>
<td>(Vaccinium alaskanense)</td>
<td>Often restricted by bedrock</td>
</tr>
<tr>
<td>(V. ovalifolium)</td>
<td>at less than 50 cm.</td>
</tr>
<tr>
<td>(Menziesia ferruginea)</td>
<td></td>
</tr>
<tr>
<td>EEB: very poorly developed.</td>
<td>COARSE FRAGMENT CONTENT:</td>
</tr>
<tr>
<td>(Orthilia secunda)</td>
<td>Usually less than 33%.</td>
</tr>
<tr>
<td>(Rubus pedatus)</td>
<td></td>
</tr>
<tr>
<td>(Cornus canadensis)</td>
<td></td>
</tr>
<tr>
<td>OSS: usually well developed.</td>
<td>TERRAIN/PARENT MATERIALS:</td>
</tr>
<tr>
<td>Hyllocomium splendens</td>
<td>Morainal (sometimes colluvial)</td>
</tr>
<tr>
<td>Pleurozium schreberi</td>
<td>veneers. Rarely fluvial or</td>
</tr>
<tr>
<td>Rhytidiadelphus robusta</td>
<td>glacioluvial materials.</td>
</tr>
</tbody>
</table>

NOTES: The association is limited in extent and distribution compared to the analogous association in the CHM#. Mineral soils are usually shallow (less than 50 cm) to bedrock; surface organic layers are often greater than 10 cm.
DEVIL'S CLUB - OAK FERN (CWRF2/03)

SLOPE POSITIONS: Middle to lower.

SLOPE RANGE: Flat to very steep (usually gentle).

<table>
<thead>
<tr>
<th>VEGETATION LAYERS</th>
<th>SOILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TREE:</td>
<td>STRAND SIZE CLASS:</td>
</tr>
<tr>
<td></td>
<td>Loamy, (coarse loamy-skeletal).</td>
</tr>
<tr>
<td>Hw</td>
<td>DRAINAGE:</td>
</tr>
<tr>
<td>Ba</td>
<td>Moderately good to imperfect.</td>
</tr>
<tr>
<td>(BI)</td>
<td>EFFECTIVE ROOTING:</td>
</tr>
<tr>
<td>(Sxs)</td>
<td>20 - 70 cm.</td>
</tr>
</tbody>
</table>

SHRUB: moderately to well developed.
- Ophiopanax horridus
- Vaccinium ovalifolium
- V. alaskense
- Menziesia ferruginea
- Ribes lacustre
- Rubus spectabilis

HERB: moderately to well developed.
- Gymnogynium dryopteris
- Tiarella unifoliata
- T. trifoliata
- Streptopus streptopoides
- S. roseus
- S. amplexifolius
- Rubus pedatus

MOSS: usually well developed.
- Rhytidium robustum
- Rhytidiadelphus loreus
- Hylocomium splendens
- Pleurozium schreberi
- Mnium app.

COMMENTS: A productive association for Hw, Ba, and Sxs. Ophiopanax horridus is always present but rarely dominates the shrub layer. Gymnogynium dryopteris is a characteristic dominant herb. Wetter microsites may contain indicator species from the CWRF2/04.
DEVIL'S CLUB - LADY FERN - OAK FERN (CWHP2/04)

SLOPE POSITIONS: Valley floor, lower slope, and toe.
SLOPE RANGE: Level to moderately sloping (0 - 25%).

<table>
<thead>
<tr>
<th>VEGETATION LAYERS</th>
<th>SOILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TREE:</td>
<td></td>
</tr>
<tr>
<td>Hw</td>
<td></td>
</tr>
<tr>
<td>Ba</td>
<td></td>
</tr>
<tr>
<td>Bl</td>
<td></td>
</tr>
<tr>
<td>(Sxs)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PARTICLE SIZE CLASS:</td>
</tr>
<tr>
<td></td>
<td>Loamy.</td>
</tr>
<tr>
<td></td>
<td>DRAINAGE:</td>
</tr>
<tr>
<td></td>
<td>Moderately good to poor.</td>
</tr>
<tr>
<td></td>
<td>EFFECTIVE ROOTING:</td>
</tr>
<tr>
<td></td>
<td>Probably less than 60 cm.</td>
</tr>
<tr>
<td></td>
<td>COARSE FRAGMENT CONTENT:</td>
</tr>
<tr>
<td></td>
<td>Usually less than 35%.</td>
</tr>
<tr>
<td></td>
<td>TERRAIN/PARENT MATERIALS:</td>
</tr>
<tr>
<td></td>
<td>Fluvial or washed morainal and washed colluvial materials.</td>
</tr>
<tr>
<td></td>
<td>SOIL NAME:</td>
</tr>
<tr>
<td></td>
<td>Orthic Eutric Brunisols;</td>
</tr>
<tr>
<td></td>
<td>Orthic Histic Gleysols;</td>
</tr>
<tr>
<td></td>
<td>Gleyed Ferro-Histic Podzols.</td>
</tr>
<tr>
<td></td>
<td>HUMUS FORM:</td>
</tr>
<tr>
<td></td>
<td>Humimorphs, Hromoders.</td>
</tr>
</tbody>
</table>

SHRUB: well developed.
- Oligopanax horridus
- Rubus spectabilis
- Ribes lacustre
- Vaccinium spp.
- Rubus parviflorus
- Sambucus racemosa

HERB: well developed.
- Athyrium filix-femina
- Gymnocarpium dryopteris
- Tiarella trifoliata
- T. undulata
- Viola glabella
- Streptopus streptopoides
- S. roque
- S. amplexifolius
- (Equisetum arvense)
- (Calliium triflorum)
- (Dryopteris assimilis)
- (Veratrum viride)
- (Valeriana sitchensis)

GRASS: usually poorly developed.
- Menisci spp.
- (Brachytyneum spp.)
- (Rhytidiopsis robusta)

COMMENTS: Bl is more abundant in areas experiencing cold air drainage; Sxs is the largest tree (when present). Oligopanax horridus is a characteristic dominant shrub. Herb layer has diverse species composition but is visually dominated by Athyrium filix-femina. Veratrum viride and Valeriana sitchensis occur at upper elevations only.
6 LITERATURE CITED


### APPENDIX 1. Tree species symbols

<table>
<thead>
<tr>
<th>Latin name</th>
<th>Common name</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abies amabilis</td>
<td>amabilis fir</td>
<td>Ba</td>
</tr>
<tr>
<td>Abies lasiocarpa</td>
<td>subalpine fir</td>
<td>Bl</td>
</tr>
<tr>
<td>Alnus rubra</td>
<td>red alder</td>
<td>Dr</td>
</tr>
<tr>
<td>Betula papyrifera</td>
<td>paper birch</td>
<td>Ep</td>
</tr>
<tr>
<td>Picea (unknown origin)</td>
<td>hybrid spruce</td>
<td>Sx</td>
</tr>
<tr>
<td>Picea glauca x engelmannii</td>
<td>---</td>
<td>SxF</td>
</tr>
<tr>
<td>Picea glauca x sitchensis</td>
<td>Roche spruce</td>
<td>Sxs</td>
</tr>
<tr>
<td>Picea mariana</td>
<td>black spruce</td>
<td>Sb</td>
</tr>
<tr>
<td>Picea sitchensis</td>
<td>Sitka spruce</td>
<td>Ss</td>
</tr>
<tr>
<td>Pinus contorta var. latifolia</td>
<td>lodgepole pine</td>
<td>Pl</td>
</tr>
<tr>
<td>Populus balsamifera ssp. trichocarpa</td>
<td>black cottonwood</td>
<td>Act</td>
</tr>
<tr>
<td>Populus tremuloides</td>
<td>trembling aspen</td>
<td>At</td>
</tr>
<tr>
<td>Thuja plicata</td>
<td>western redcedar</td>
<td>Gw</td>
</tr>
<tr>
<td>Tsuga heterophylla</td>
<td>western hemlock</td>
<td>Hw</td>
</tr>
<tr>
<td>Tsuga heterophylla</td>
<td>mountain hemlock</td>
<td>Hm</td>
</tr>
</tbody>
</table>
APPENDIX 2. List of plant names used in the guide

TREES:

Abies amabilis
Abies lasiocarpa
Alnus rubra
Betula papyrifera
Chamaecyparis nootkatensis
Juniperus scopulorum
Picea engelmannii
Picea glauca
Picea mariana
Picea sitchensis
Picea sitchensis x glauca
Pinus contorta var. contorta
Pinus contorta var. latifolia
Populus balsamifera ssp. trichocarpa
Populus tremuloides
Tsuga brevifolia
Thuja plicata
Tsuga heterophylla
Tsuga mertensiana

SHRUBS:

Amelanchier alnifolia
Cornus sericea
Corylus cornuta
Gaultheria shallon
Kalama microphylla
Ledum groenlandicum
Lonicera involucrata
Malus sitchensis
Menyanthes ferruginea
Ophiopanax horridus
Paxistima myrsinites
Ribes spp.
Ribes bracteosum
Ribes lanustre
Rosa acicularis
Rosa nudicaulis
Ribes parviflorus
Rubus spectabilis
Sambucus racemosa
Shepherdia canadensis
Spiraea douglasii
Symphoricarpos albus
Vaccinium alaskaense
Vaccinium membranaceum
Vaccinium ovalifolium
Vaccinium parvifolium
Vaccinium uliginosum
Viburnum edule

amabilis fir
subalpine fir
red alder
paper birch
yellow-cedar
Rocky Mountain juniper
Engelmann spruce
white spruce
black spruce
Sitka spruce
Roche spruce
shore pine
lodgepole pine
black cottonwood
trembling aspen
western yew
western red cedar
western hemlock
mountain hemlock
Saskatoon
red-osier dogwood
hazelnut
salal
bog-laurel
Labrador tea
black twinberry
Pacific crab apple
false azalea
devil's club
falsebox
currants and gooseberries
stink currant
black gooseberry
prickly rose
Nootka rose
thimbleberry
salmonberry
red elderberry
sorrel
hardhack
common snowberry
Alaskan blueberry
black huckleberry
oval-leaved blueberry
red huckleberry
bog blueberry
highbush cranberry
HERBS AND DWARF SHRUBS:

**Actaea rubra**
**Adiantum pedatum**
**Andromeda polifolia**
**Aralia nudicaulis**
**Arctostaphylos uva-ursi**
**Aruncus dioicus**
**Astilbe candicans**
**Athyrium filix-femina**
**Blechnum spicant**
**Carex spp.**
**Cassiope mertensiana**
**Chimaphila umbellata**
**Circaea alpina**
**Clintonia uniflora**
**Coptis asplenifolia**
**Coptis trifolia**
**Corallorhiza maculata**
**Cornus canadensis**
**Disporum hookeri**
**Drosera anglica**
**Drosera rotundifolia**
**Erythronium americanum**
**Equisetum angustifolium**
**Equisetum arvense**
**Equisetum hyemale**
**Equisetum pratense**
**Galium triflorum**
**Goodyera oblongifolia**
**Gymnocarpium dryopteris**
**Hemionitis congestum**
**Lathyrus vernivulosis**
**Linnaea borealis**
**Listera cordata**
**Luehea perennis**
**Lycoptera inundata**
**Lythrum americanum**
**Maisanthemum dilatatum**
**Melampyrum lineare**
**Mertensia trifoliata**
**Mitella nuda**
**Moneses uniflora**
**Ornithogalum umbellatum**
**Oxytropis asperifolia**
**Oxytropis pungens**
**Osmorhiza delavayi**
**Phyllodoce empetriformis**
**Platanthera dilatata**
**Platanthera orbiculata**

baneberry
maidenhair fern
bog rosemary
wild sarsaparilla
winding-stick
goat's-beard
wild ginger
lady fern
deer fern
sedges
white mountain-heather
prince's pine
enchanter's nightshade
queen's cup
fern-leaved goldthread
three-leaved goldthread
spotted coralroot
bunchberry
Hooker's fairybells
long-leaved sundew
round-leaved sundew
spiny wood fern
fireweed
horse-tails
common horsetail
scouring-rush
meadow horsetail
sweet-scented bedstraw
rattlesnake-plantain
oak fern
gnome-plant
purple pea vine
twinflower
heart-leaved twayblade
partridgefoot
bog clubmoss
skunk cabbage
false lily-of-the-valley
cow-wheat
buckbean
common mitrewort
single delight
one-sided wintergreen
rough-leaved ricegrass
short-awned ricegrass
mountain sweet-cicely
pink mountain-heather
white bog-orchid
round-leaved rein-orchid
APPENDIX 2. (Continued)

Polystichum munitum  
Potentilla palustris  
Pyrola asarifolia  
Rupus pedatus  
Rupus pumilus  
Sanquiserta canadensis  
Scheuchzeria palustris  
Smilacina racemosa  
Streptopus amplexifolius  
Streptopus roseus  
Streptopus streptopoides  
Thelypteris phlegraoides  
Tineola trifoliata  
Tineola unifoliata  
Trollius europaeus spp. arctica  
Vaccinium caespitosum  
Vaccinium oxycoccos  
Valeriana stenchnsis  
Veratrum viride  
Viola spp.  
Viola canadensis  
Viola glabella  

sward fern  
marsh cinquefoil  
pink wintergreen  
five-leaved bramble  
trailing raspberry  
Sitka burnet  
scheuchzeria  
false Solomon’s-seal  
claspig twisted stalk  
rosy twisted stalk  
small twisted stalk  
beech fern  
three-leaved foamflower  
one-leaved foamflower  
northern starflower  
dwarf blueberry  
bog cranberry  
Sitka valerian  
Indian hellebore  
violets  
Canada violet  
stream violet

LICHENS, MOSSES, AND LIVERWORTS:

Aulacomium palustre  
Barbilophozia spp.  
Bazzania trifloba  
Brachythecium spp.  
Cladina spp.  
Cladonia spp.  
Didymodon spp.  
Dicranum polysetum  
Hylocomium splendens  
Isothecium spiculiferum  
Mnium spp.  
Peltigera spp.  
Plagiochila poreiloides  
Plagiothecium undulatum  
Pluorozium schreberi  
Polytrichum juniperinum  
Ptilium crista-castrensis  
Rhizocarpon lutescens  
Rhizocarpon robusta  
Scapania bolanderi  
Sphagnum spp.  
Sphagnum purpurascens  
Stereocaulon spp.  
Stokesiella oregana  
glow moss  
leaffy liverworts  
liverwort  
mosses  
reindeer lichens  
lichens  
mosses  
warved-leaved moss  
step moss  
variable moss  
leaffy moss  
lichenes  
liverwort  
flat moss  
red-stemmed feather moss  
juniper haircap moss  
knights plane  
little shaggy moss  
pipecleaner moss  
liverwort  
sphagnum  
common green sphagnum  
lichens  
Oregon beaked moss