ICHg1/01(1) ZONAL HEMLOCK - MOSS ECOSYSTEM ASSOCIATION: VACCINIUM VARIATION

VEGETATION:
Trees: stands usually not dense.
   western hemlock (Tsuga heterophylla)
   [subalpine fir (Abies lasiocarpa)] -significant component of main canopy
   in most stands, esp. at higher elevations

Shrubs: usually a well-developed layer (50-80% cover).
   Alaskan blueberry (Vaccinium alaskaense)
   false azalea (Menziesia ferruginea)
   oval-leaved blueberry (Vaccinium ovalifolium)
   black huckleberry (Vaccinium membranaceum)

Herbs: sparse to moderately well-developed (trace - 20% cover).
   bunchberry (Cornus canadensis) -consistently
   five-leaved bramble (Rubus pedatus) ) present
   one-sided wintergreen (Orthilia secunda)
   [stiff club-moss (Lycopodium annotinum)]
   [pink wintergreen (Pyrola asarifolia)]
   [twinflower (Linnaea borealis)]
   [small twistedstalk (Streptopus streptopoides)] -especially at
   higher elevations

Moss layer: a well-developed, continuous carpet of feather mosses.
   Pleurozium schreberi
   Hylocomium splendens
   Ptilium crista-castrensis
   Brachythecium spp.
   Barbilophozia spp.

Remarks: The dominant visual feature of this ecosystem variation is the well-
developed layer of Vaccinium (and false azalea) shrubs. Aside from its
shrub layer, there is little that differentiates the Vaccinium variation
from the typical Hemlock - moss found on zonal sites throughout most of
the ICHg1. We do not fully understand why the variation is present in
some areas while in others it is not. The presence of the shrub layer may
reflect higher precipitation levels (especially snow) than are present in
most areas of the ICHg1. The Vaccinium variation seems especially common
at higher elevations and this supports the theory that the depth of
snowpack is somehow responsible. Stand structure also affects the
development of the shrub layer. Many of the stands belonging to the
Vaccinium variation have a more open canopy than typical Hemlock - moss
stands. In denser stands the shrubs may be excluded because of lack of
light. Stand density may reflect successional status but it is likely that
climate and site factors are also involved.
Until we have a better understanding of the differences between the typical Zonal hemlock - moss ecosystem association (ICHgl/Ol) and the Vaccinium variation and how they affect tree establishment and growth, we will treat these two ecosystem units together for management purposes.
ICHgl/01(1) ZONAL HEMLOCK - MOSS ECOSYSTEM ASSOCIATION: VACCINIUM VARIATION

SOILS: Most of the soils of this variation have developed on morainal veneers overlying bedrock in varied slope positions. Such shallow soils are well-drained, have undergone intense leaching, and show good profile development. A thick, light brownish-gray surface mineral horizon (Ae) between 3 and 15 cm thick is found above dark reddish-brown (Bhf) and/or yellowish brown (Bf) mineral horizons of loamy texture. Organic materials have accumulated to depths ranging from 5 to 11 cm with fungal (F) decomposition predominant.

Soil Classification: Orthic Humo-Ferric Podzols with minor occurrences of Gleyed Podzolic Gray Luvisols.

Humus Form Classification: Orthihemimors.

Schematic Profile: refer to profile description under Zonal hemlock - moss ecosystem association (ICHgl/01).
Average pH: mineral horizons - 4.3
organic horizons - 3.1

Key Characteristics:
- shallow soils with bedrock commonly within 60 cm of the mineral surface.
- dominantly well-drained, loamy soils.
- subsurface horizons have a relatively low coarse fragment content.
- thick, light brownish gray Ae horizons are present at the mineral surface.
- occasional accumulation of organic matter in surface mineral horizons (Bhf) may improve moisture and nutrient storage.
- mottles may be found in subsurface horizons of the deeper morainal deposits.
- effective rooting shallow (30 - 50 cm) or to bedrock.
Remarks: This ecosystem association has a very limited distribution in the ICHgl variant and is unimportant for forest management. It includes ecosystems on the very driest and nutrient-poorest rock outcrops, ridges, and outwash terraces where lodgepole pine is maintained by repeated fire. Most dry pine stands in the ICHgl do not belong to this seral ecosystem association, but merely represent seral stages of the Dry hemlock - moss e.a. (ICHgl/03).

For a complete description and management interpretations of the Pine-lichen e.a. refer to the corresponding ecosystem unit in the g3 (Hazelton) variant (ICHg3/02).
ECOLOGICAL MOISTURE REGIME:
(subxeric) - submesic

ECOLOGICAL NUTRIENT REGIME:
submesotrophic

DISTRIBUTION: widespread throughout the ICHgl, especially at lower elevations.

PHYSIOGRAPHIC FEATURES:
Slope position: upper slopes and ridge crests, some terraces and benches; generally moisture-shedding positions.
Slope range: level to moderately steep (0 - 45%).
Surface shape: usually convex, occasionally straight or irregular.
Landforms: morainal (colluvial) veneers over bedrock; some morainal blankets; coarse textured glaciofluvial and fluvial deposits.
ICHg1/03 DRY HEMLOCK - MOSS ECOSYSTEM ASSOCIATION

VEGETATION:

Trees: usually a dense canopy formed by small, short trees.
western hemlock (Tsuga heterophylla) -dominant cover
lodgepole pine (Pinus contorta) -usually scattered,
subalpine fir (Abies lasiocarpa) -overmature dominants

small, scattered, below main canopy

Shrubs: a very poorly developed layer; advance regeneration of trees usually very poor.
black huckleberry (Vaccinium membranaceum) -scattered
oval-leaved blueberry (Vaccinium ovalifolium) individuals of
Alaskan blueberry (Vaccinium alaskaense) very low vigour
false azalea (Menziesia farruginea)
falsebox (Paxistima myrsinoides)

Herbs: very poorly developed layer (less than 1 to 4% cover).
prince's pine (Chimaphila umbellata) individuals or
rattlesnake plantain (Goodyera oblongifolia) small groups
bunchberry (Cornus canadensis) very low vigour
five-leaved bramble (Rubus pedatus) small groups
twinflower (Linnaea borealis)
pinesap (Hypopitys monotropa)

Moss layer: a well-developed solid carpet of feather mosses; low diversity.
Pleurozium schreberi -usually dominates sites on the driest
Hylocomium splendens -usually dominates on slightly moister sites

[Ptilium crista-castrensis]

Remarks: The Dry hemlock - moss ecosystem association is usually distinctly drier and poorer than the Zonal hemlock - moss e.g., but intermediate sites need to be carefully examined. Soils and moisture status of the site must be assessed before an ecosystem can be placed within this unit. The productivity of tree species is often noticeably lower than in the Zonal hemlock - moss e.g. Subalpine fir is restricted to subcanopy layers and amabilis fir in valleys such as the Kinskuch; also rarely reaches the main canopy. Spruce is extremely rare, and shows very poor growth rates when present. Pine often dominates young stands and attains the greatest height of all trees. In mature stands, the crowns of overmature pines extend above the main canopy of hemlock.
SOILS: Soil profiles have developed mainly in upper slope positions, where available moisture may be lacking. This is true especially in shallow soils having bedrock intrusions within 50 cm of the mineral surface. Loamy to loamy sand, strong brown, mineral horizons (Bf, Bm) dominate the upper 30 cm of the mineral soil. These modified horizons are often underlain by a yellowish-brown silt loam to clay loam horizon containing variable amounts of coarse fragments. Relatively thin organic horizons (4-10 cm) reflect the slightly drier conditions and reduced litter fall.

Soil Classification: Orthic Humo-Ferric Podzols and Eluviated Dystric Brunisols.

Humus Form Classification: Orthihemimors.

Schematic Profile:

<table>
<thead>
<tr>
<th>Horizon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>S,L</td>
<td>moss layer and loose, undecomposed, discontinuous litter.</td>
</tr>
<tr>
<td>F</td>
<td>slightly to moderately decomposed; brown; contains common fungal mycelia; plentiful fine roots.</td>
</tr>
<tr>
<td>Bf</td>
<td>yellowish-brown to strong brown; loamy sand to loam; plentiful medium, coarse roots; variable coarse fragment content.</td>
</tr>
<tr>
<td>BC</td>
<td>yellowish-brown; sand to clay loam; few to plentiful fine roots; subangular blocky structure.</td>
</tr>
</tbody>
</table>

Orthic Humo-Ferric Podzol

Average pH: mineral horizons - 4.6
organic horizons - 3.3

Key Characteristics:
- soils generally occur on crest and upper slope positions.
- generally shallow, well-drained soils.
- subsurface mineral horizons of clayey texture may become hard when dry.
- organic materials are relatively weakly decomposed (freely drained), acidic, and thin.
- effective rooting generally deep (greater than 60 cm) or to lithic contact.
ECOLOGICAL MOISTURE REGIME:
(mesic+) - subhygic

ECOLOGICAL NUTRIENT REGIME:
mesotrophic - permesotrophic

DISTRIBUTION: widely distributed throughout the ICHg1, but less extensive, more localized than the Zonal hemlock - moss e.a.

PHYSIOGRAPHIC FEATURES:
Slope position: middle to lower slopes (rarely upper slopes); valley floors.
Slope range: gentle to moderately sloping; occasionally flat.
Surface shape: smooth and straight - irregular concave; rarely convex. Landforms: fluvial (glaciofluvial) deposits; morainal and colluvial blankets, often washed.
ICHg1/04 DEVIL'S CLUB - OAK FERN - FEATHER MOSS ECOSYSTEM ASSOCIATION

VEGETATION:

Trees: relatively open stands; irregular canopy.
- western hemlock (Tsuga heterophylla) - usually dominates cover
- subalpine fir (Abies lasiocarpa) - dominant cover in many stands
- hybrid spruce (Picea glauca x sitchensis ? x engelmannii) - consistently present; tallest tree

Shrubs: a moderately well-developed layer.
- devil's club (Opiopanax horridus) - consistently present but rarely dominates shrub layer
- black gooseberry (Ribes lacustre) - consistently present but inconspicuous

- oval-leaved blueberry (Vaccinium ovalifolium)
- black huckleberry (Vaccinium membranaceum)
- false azalea (Menziesia ferruginea)
- [thimbleberry (Rubus parviflorus)]
- [highbush-cranberry (Viburnum edule)] - good indicators

Herbs: moderately to well-developed layer; fairly diverse.
- oak fern (Gymnocarpium dryopteris) - characteristic dominant
- foamflowers (Tiarella trifoliata, T. unifoliata) - good indicator species
- bunchberry (Cornus canadensis) - very common, good vigour, but not
- five-leaved bramble (Rubus pedatus)
- one-sided wintergreen (Orthilia secunda)
- queen's cup (Clintonia uniflora)
- [heart-leaved twayblade (Listera cordata)]
- [twistedstalks (Streptopus amplexifolius, S. roseus)]

Moss layer: a moderately well-developed feather moss carpet, but poorly developed in depressions.
- Hylocomium splendens
- Ptilium cristat-castrensis
- Pleurozium schreberi
- [Rhytidiodelphus triquetrus]
- [Mnium spp.] - in wetter depressional microsites
Remarks: Both subalpine fir and spruce are significantly more important in this ecosystem association than in the Zonal hemlock-moss e.a. Their productivity is greater than that of hemlock, although there is high natural mortality of subalpine fir in many stands. Note that even though devil's club and oak fern are the important indicator plant species of this ecosystem association, they rarely totally dominate the understory vegetation. A carpet of feather mosses is still a noticeable feature. Lady fern and spiny wood fern are rarely present and then only as small individuals in wet pockets.