Remarks: This subassociation is considerably more productive than the Zonal hemlock-moss e.a., especially for cedar and spruce. Lodgepole pine is generally absent from the stand and subalpine fir is only a minor species.

Note that devil's club does not totally dominate the shrub layer in this ecosystem association although it is always present. The herb layer is lush compared with Zonal hemlock-moss ecosystems, but a carpet of mosses is still very visible. Lady fern (Athyrium filix-femina) and spiny wood fern (Dryopteris assimilis) are generally absent.
SOILS: A variety of soils exists within this subassociation; most lie in lower slope or receiving positions. Seepage is commonly found within 70 cm of the mineral surface; this indicates only short-term water saturation, since mottling rarely occurs. Dark yellowish brown (Bm) and yellowish to strong brown (Bf), loamy surface horizons are overlain by light brownish gray mineral horizons (Ae). Subsurface mineral horizons generally contain a high volume of coarse fragments, which aid in drainage. Organic materials are thin (4-6 cm) on fluvial or glaciofluvial landforms and thicker (7-20 cm) on morainal blankets.

Soil Classification: dominantly Orthic Humo-Ferric Podzols with minor Eutric Brunisols and Regosols.

Humus Form Classification: Orthimormoder; Orthivelomor (on active fluvial landforms).

Schematic Profile:

<table>
<thead>
<tr>
<th>Horizon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>variable depth; moderately decomposed, brownish organic horizons; contain fungal mycelia and/or insects; abundant fine, very fine roots.</td>
</tr>
<tr>
<td>H</td>
<td>variable depth; well-decomposed organic horizon; dark brown to black; plentiful medium and coarse roots.</td>
</tr>
<tr>
<td>Ae</td>
<td>light brownish gray; silt loam; few coarse roots; acidic.</td>
</tr>
<tr>
<td>Bf</td>
<td>yellowish brown to strong brown; loamy; plentiful medium, fine roots.</td>
</tr>
<tr>
<td>Bm</td>
<td>olive brown; loam to silt loam; plentiful medium and fine roots.</td>
</tr>
<tr>
<td>BC</td>
<td>olive brown to yellowish brown; sandy to silt loam; seepage common below 60 cm; compacted to massive below 70 cm.</td>
</tr>
</tbody>
</table>

Orthic Humo-Ferric Podzol

Average pH: mineral horizons - 5.0
organic horizons - 3.9

Key Characteristics:
- high coarse fragment content, particularly in subsurface horizons of all landform types.
- found on lower slope or receiving positions where seepage waters commonly occur.
- common occurrence of compacted tills below 70 cm.
- silty upper horizons common; may cause frost heaving problems.
ICHg3: HAZELTON VARIANT

/04.2 DEVIL'S CLUB - OAK FERN - FEATHER MOSS ECOSYSTEM ASSOCIATION, SPRUCE SUBASSOCIATION (233)

ECOLOGICAL MOISTURE REGIME:
subhygric - (hygric)

ECOLOGICAL NUTRIENT REGIME:
permesomeiotic

DISTRIBUTION: found mainly at the northern and eastern extremities of the subzone where continental (sub-boreal) climatic influences are strong. Common in the Kispiox, Kitseguecla, and upper Kitwanga river valleys. Sites may be subject to cold air ponding.

PHYSIOGRAPHIC FEATURES:
Slope position: lower slope to valley floor; sites receiving seepage.
Slope range: level to gently sloping (0 – 15%).
Surface shape: flat – concave.
Landforms: fluvial, morainal, recent fluvial (alluvial) over glaciofluvial deposits.
ICHg3/04.2 DEVIL'S CLUB - OAK FERN - FEATHER MOSS ECOSYSTEM ASSOCIATION, SPRUCE SUBASSOCIATION

VEGETATION:

Trees: moderately large, good vigour; note general lack of western hemlock.
  hybrid spruce (Picea glauca x sitchensis
  ? x engelmannii)
  subalpine fir (Abies lasiocarpa)
  [paper birch (Betula papyrifera)] -seral remnant

Shrubs: generally a well-developed layer.
  devil's club (Oplopanax horridus)
  highbush-cranberry (Viburnum edule)
  red-osier dogwood (Cornus sericea)
  thimbleberry (Rubus parviflorus)
  black twinberry (Lonicera involucrata)

Herbs: generally a well-developed layer; diverse species composition.
  oak fern (Gymnocarpium dryopteris)
  bunchberry (Cornus canadensis)
  queen's cup (Clintonia uniflora)
  sweet-scented bedstraw (Galium triflorum)
  foamflowers (Tiarella trifoliata, T. unifoliata)
  red baneberry (Actaea rubra)
  trailing raspberry (Rubus pubescens)
  false Solomon's-seal (Smilacina racemosa)
  mountain sweet-cicely (Osmorhiza chilensis)
  false sarsaparilla (Aralia nudicaulis)
  star-flowered false
  Solomon's-seal (Smilacina stellata)

Moss layer: poorly to moderately developed.
  [Ptilium crista-castrensis]
  [Hylocomium splendens]
  [Rhytidiothallus triquetrus]
  [Mnium spp.]

Remarks: Like the Subalpine fir - spruce subassociation of the Zonal hemlock - moss ecosystem association (ICHg3/01.2), the Spruce subassociation (ICHg3/04.2) seems to occur where a localized "sub-boreal" climate develops on the valley floor. Hemlock is generally absent from the stand and subalpine fir dominates the advance regeneration.

Many stands belonging to this subassociation are still in a successional stage and contain some paper birch, aspen, or black cottonwood. There is a much greater diversity of shrubs and herbs than in hemlock-dominated Devil's club - oak fern - feather moss ecosystems, and the carpet of feather moss is poorly developed or lacking.
SOILS: The profiles of this subassociation may represent slightly richer soils than those of the ICHg3/04.1. Seepage and mottling commonly occur within 60 cm of the soil surface, although well-drained coarse soils may also occur. Very dark brown to black surface mineral horizons (Ah) often reach depths of 4-14 cm and are underlain by yellowish brown to brown, loamy mineral horizons (Bm) that are well-drained. Subsurface mineral horizons may show signs of compaction and accumulation of clay (Bt), or they may contain well-drained sands.

Soil Classification: predominantly Orthic Eutric Brunisols and Gleyed Dark Gray Luvisols.

Humus Form Classification: Amphileptomoders; Amphimormoders.

Schematic Profile:

<table>
<thead>
<tr>
<th>Horizon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>brown; organic horizon with evidence of fungal and/or insect activity; abundant fine, medium roots.</td>
</tr>
<tr>
<td>H</td>
<td>well-decomposed; black organic horizon; abundant medium, coarse roots.</td>
</tr>
<tr>
<td>Ah</td>
<td>very dark brown; silt loam; granular; abundant fine, medium, coarse roots.</td>
</tr>
<tr>
<td>Bm</td>
<td>dark yellowish brown to brown; loamy; plentiful fine, medium roots; moist to wet.</td>
</tr>
<tr>
<td>AB</td>
<td>grayish brown; sandy to clay loam; seepage may occur; few fine roots.</td>
</tr>
<tr>
<td>(Btg)</td>
<td>grayish-brown; sandy to clay; mottles common; clay skins on ped faces; high coarse fragment content (in coarse soils only).</td>
</tr>
</tbody>
</table>

Orthic Eutric Brunisol
(Gleyed Dark Gray Luvisol)

Average pH: mineral horizons - 5.2
organic horizons - 4.0

Key Characteristics:
- moist to wet soils, often receiving seepage.
- soils are either moderately well to poorly drained on morainal blankets or imperfectly to well-drained on fluvial deposits.
- common dark brown surface mineral horizons (Ah) showing an accumulation of organic matter, which improves water and nutrient retention.
- organic horizons are generally between 5 and 10 cm thick and are relatively nutrient-rich, with increased insect activity.
ECOLOGICAL MOISTURE REGIME:
hygic (+)

ECOLOGICAL NUTRIENT REGIME:
permesotrophic - eutrophic

DISTRIBUTION: found in small pockets throughout most of the ICHg3; some larger stands on major valley floors.

PHYSIOGRAPHIC FEATURES:
Slope position: toe slopes and valley floors, gullies and drainage channels; sites receiving abundant seepage.
Slope range: level to gently sloping (0 - 10%).
Surface shape: irregularly flat or straight, occasionally concave.
Landforms: primarily fluvial deposits; also, washed morainal and (lacustrine) deposits.
ICHg3/05  DEVIL'S CLUB - FERN - LEAFY MOSS ECOSYSTEM ASSOCIATION

VEGETATION:

Trees: generally large, widely spaced.
- hybrid spruce (Picea glauca x sitchensis -largest tree
  \  ? x engelmannii)
- western redcedar (Thuja plicata)
- western hemlock (Tsuga heterophylla)  -generally a
  \  subcanopy tree

[black cottonwood (Populus balsamifera ssp.  
  trichocarpa)]

[subalpine fir (Abies lasiocarpa)] -mainly in eastern
  sections

Shrubs: a well-developed layer, especially in stand openings.
- devil's club (Oplopanax horridus) -characteristic
  \  dominant
- black gooseberry (Ribes lacustre)
- black twinberry (Lonicera involucrata)  -most abundant in
  \  ) stand openings
- highbush-cranberry (Viburnum edule)  )
- thimbleberry (Rubus parviflorus)
- red-osier dogwood (Cornus sericea)
- currants (Ribes spp.)

Herbs: a well-developed layer; diverse species composition.
- lady fern (Athyrium filix-femina) -dominant on the
  \  richest sites
- oak fern (Gymnocarpium dryopteris)
- spiny wood fern (Dryopteris asimilis)
- foamflowers (Tiarella trifoliata, T. unifoliata)
- clasping twistedstalk (Sectopus amplexifolius)
- enchanter's nightshade (Circaea alpina)
- sweet-scented bedstraw (Galium triflorum)
- red baneberry (Actaea rubra)
- common mitrewort (Mitella nudicaulis)
- trailing raspberry (Rubus pubescens)
- horsetails (Equisetum arvense, E. pratense, E. sylvaticum)

Moss layer: poorly to moderately well-developed; feather mosses restricted to
raised hummocks and decaying wood.
- Mnium spp.  -dominant
  \  [Rhytididiadelphus triqueterus]
  \  [Brachythecium spp.]

Remarks: This is a productive ecosystem association for most tree species.
Spruce and cedar grow very well, but hemlock seems to be confined to
raised hummocks or decaying wood and does not reach the size of the
other species. Many of these ecosystem associations have been partially logged or are in a seral stage. Paper birch and black cottonwood are major components of many younger stands and light-demanding shrub species dominate over devil's club.

Note the absence of *Vaccinium* spp. except on decaying wood and raised mounds.
SOILS: Soils in these receiving sites are characterized by high water tables and mottling close to the mineral surface. Deep, well to moderately well-decomposed organic layers may reach depths up to 40 cm. Dark brown to black surface mineral horizons (Ah) are common in those profiles sampled. These dark coloured horizons are underlain by brown to grayish mineral horizons that have abundant mottles, and range from sandy loam to clay loam texture. Seepage waters are commonly found in subsurface horizons.

*Soil Classification: Orthic Humic Gleysols and Gleyed subgroups of Luvisols and Brunisols.

Humus Form Classification: Amphihemihumimors; Amphimormoders.

Schematic Profile:

<table>
<thead>
<tr>
<th>Horizon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.L.</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>- slightly decomposed; light brown; well-aerated; abundant very fine, fine roots; common white fungal mycelia and/or insects.</td>
</tr>
<tr>
<td>H</td>
<td>- well-decomposed; moist to wet; dark brown to black; massive to blocky structure.</td>
</tr>
<tr>
<td>Ah</td>
<td>- very dark brown; silty clay loam; granular to massive; abundant medium, coarse roots; generally greater than 10 cm thick.</td>
</tr>
<tr>
<td>Bg</td>
<td>- grayish-brown; moist to wet; clay loam to sandy clay; common mottles; angular to massive; few to common clay skins; few to plentiful fine roots.</td>
</tr>
<tr>
<td>Cg</td>
<td>- dark gray; clay loam; many mottles; massive structure; few pores; few roots; few coarse fragments.</td>
</tr>
</tbody>
</table>

Orthic Humic Gleysol

*Average pH: mineral horizons - 5.7
organic horizons - 5.2

Key Characteristics:
- thick, well-decomposed organic layers on toe slopes; thinner organic horizons on steeper wet slopes.
- seepage and/or water tables close to mineral surface.
- prominent mottles close to mineral surface.
- fine textured, wet, subsurface mineral horizons (Bg, Cg) may be compact and root-restricting.
- dark brown surface mineral horizons (Ah) support abundant rooting.
- rooting depth shallow, generally less than 45 cm.

*NOTE: very limited sampling of this ecosystem association.
ICHg3: HAZELTON VARIANT

/06 HORSETAIL - (SKUNK CABBAGE) SWAMP ECOSYSTEM ASSOCIATION (235)

ECOLOGICAL MOISTURE REGIME:
(hygric+) - subhydryc

ECOLOGICAL NUTRIENT REGIME:
mesotrophic - eutrophic

DISTRIBUTION: found throughout the ICHg3, but neither common nor covering large areas; mainly at low elevations in major valleys.

PHYSIOGRAPHIC FEATURES:
Slope position: slope bases, valley floors, depressions in benches or terraces, positions collecting moisture.
Slope range: level to very gently sloping (0 - 2%).
Surface shape: flat to slightly concave; usually hummocky.
Landforms: organic veneers over fluvial, lacustrine, and washed morainal deposits.