

FINAL REPORT

**Ecosystem Mapping of the Indian Arm
and
Mount Seymour Provincial Parks**

for:
BC Parks
North Vancouver, BC

by:
Robert Fuller and
Forest Information Systems

March, 2000

**ECOSYSTEM MAPPING OF INDIAN ARM and
MOUNT SEYMOUR PROVINCIAL PARKS**

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Terrestrial ecosystem mapping of Mount Seymour and Indian Arm Provincial Parks is the result of the efforts of several people. Deepa Spaeth Filatow and Bythe Kilam of J.M. Ryder and Associates, Terrain Analysis Inc (JMRA) completed bioterrain air photograph typing. Tyler Innes collected ecology field data, while Deepa Spaeth Filatow and Clair Tweedale of JMRA collected bioterrain and soils data. Ecosystem units were mapped by Tyler Innes with review provided by Robert Fuller. Mike Blazecka of Forest Information Systems Ltd. (FORMIS) acted as project manager and completed air photo orthorectification and GIS work. Ted Lea, Robert Maxwell and Carmin Cadrin of the Wildlife Inventory Section, Ministry of Environment, Lands and Parks provided project correlation. Funding of the project was provided through the BC Parks, Lower Mainland Region, Ministry of Environment, Lands and Parks. Tom Eng provided project management for BC Parks.

EXECUTIVE SUMMARY

The purpose of this project was to complete terrestrial ecosystem mapping of Indian Arm and Mount Seymour Provincial Parks at 1:20,000 scale. The study area consists of approximately 10,300 ha and covers portions of three TRIM maps sheets located adjacent to Indian Arm (off Burrard Inlet). Mapping was completed according to *Standards for Terrestrial Ecosystem Mapping in British Columbia* (RIC, 1998).

The ecosystem mapping is based on the three level ecosystem classification framework, which includes ecoregion units, biogeoclimatic units and ecosystem units. The study area occurs within two ecosections: the Southern Pacific Ranges and Georgia Lowland. Five biogeoclimatic units occur within the map area. These are: Dry Maritime Coastal Western Hemlock Subzone (CWHdm), Submontane Very Wet Maritime Coastal Western Hemlock Variant (CWHvm1); Montane Very Wet Maritime Coastal Western Hemlock Variant (CWHvm2); Windward Moist Maritime Mountain Hemlock Variant (MHmm1); Windward Moist Maritime Parkland Mountain Hemlock Variant (MHmmp1). Ecosystem unit labels consist of three components: site series, site modifier(s), and a structural stage. Site series are defined within the existing Ministry of Forests biogeoclimatic ecological classification system (Green and Klinka, 1994) forty site series and ten non-vegetated and/or anthropogenic units were mapped in the project area.

A description of the ecosystems mapped in each of the biogeoclimatic units is provided on separate tables. For each site series, these tables provide a summary of the environmental and physical site characteristics (site page); and a summary of the dominant and associate plant species for each potential structural stage (vegetation page).

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**ECOSYSTEM MAPPING OF INDIAN ARM AND
MOUNT SEYMOUR PROVINCIAL PARKS
for
BC Parks
North Vancouver, BC**

1.0 INTRODUCTION

1.1 BACKGROUND

Indian Arm and Mount Seymour Provincial Parks are located in the Coast Mountains in southwestern British Columbia. Mount Seymour Park is situated east of the Seymour River watershed and west of Indian Arm and north of Burrard Inlet. Indian Arm Park is located adjacent to the northwest and east sides of Indian Arm and west of the Coquitlam River watershed.

1.2 OBJECTIVES

The purpose of the project was to complete ecosystem mapping of Mount Seymour and Indian Arm Provincial Parks at 1:20,000 scale. Terrestrial ecosystem mapping was requested by BC Parks in order to assist in park management planning.

1.3 STUDY AREA

Indian Arm and Mount Seymour Provincial Parks are located on portions of the TRIM map sheets 092G.036, 092G.46 and 092G.56. The study area is shown in Figure 1.

The three TRIM map sheets were combined to form a seamless map base for the project area.

INSERT FIGURE 1

1.4 PHYSIOGRAPHY, GEOLOGY AND SOILS

1.4.1 Physiography

Indian Arm and Mount Seymour Parks are located within the Coast Mountain Ranges. The study area surrounds the fjord of Indian Arm, a glacially-carved U-shaped valley now occupied by the sea. On the west side of the inlet, Mt. Seymour rises to 1455 m, and on the east side, a steep ridge rises to approximately 1200 m. The peaks and ridges are rounded and rocky, and the steep valley sides are rocky with some colluvium, and numerous gullies. There are colluvial fans and cones at the base of major gullies. The gentler valley floors and gently sloping uplands on the flanks on Mount Seymour are covered with till.

1.4.2 Bedrock Geology

Bedrock in the area consists mainly of coarse crystalline intrusive rocks of the Coast Plutonic Complex: granite, granodiorite, quartz diorite and migmatite (Roddick, 1965). There are also minor amounts of the Twin Island Group, a metamorphic complex consisting of hornblende-granulite, amphibolite, gneiss, schist, conglomerate, quartzite, meta-arkose, lime-silicate rock and migmatite, and the Gambier Group, which consists of tuff, breccia, agglomerate, andesite, argillite, greywacke, quartzite and conglomerate. The intrusive rocks generally have great intact strength, with joints and other planes of weakness widely spaced, which allows for the formation and preservation of steep, glacially carved buttresses and gully walls. Till derived from all of these rock types is typically sandy, and colluvium includes many large blocks, commonly with interstitial sand.

1.4.3 Landscape Evolution and Deposition of Surficial Materials

The following section is modified from a chapter by J.M. Ryder contained in a report on GVRD watersheds by Acres International Ltd, 1997.

Pre-Glaciation

Tectonic uplift of the Coast Mountains has been occurring for tens of millions of years in response to convergence of the Pacific and Juan de Fuca/American Plates along the west coast of North America. The broad features of the present landscape date from the development of an erosion surface of low relief during a pause in uplift that occurred late in the Tertiary Era. This was followed by renewed uplift and related stream degradation, resulting in dissection of the erosion surface and creation of the deep valleys that were later modified by glaciers. Remnants of the erosion surface can be seen in areas of relatively gentle topography on some ridge crests and summits, such as the Mount Seymour ridge.

Glaciation

During the Pleistocene Period, the southern Coast Mountains were affected by many glaciations and intervening non-glacial intervals. Although evidence of three major glaciations has been

found in the Lower Mainland, the mountain landscape is dominated by the effects of the last of these, which is known locally as Fraser Glaciation. The history of Fraser Glaciation in parts of the watersheds and adjacent Fraser Lowland is described in publications by Lian and Hickin (1993), Hicock and Lian (1995) and references therein. The following account is based on this work.

At the beginning of Fraser Glaciation, approximately 30 000 years ago, small cirque glaciers began to expand. Ice advance during the next several millennia eventually resulted in the formation of large glaciers, which filled the major valleys of the study area. By the glacial maximum, about 14 500 yr B.P. (before present), glaciers had coalesced to form the vast Cordillera ice sheet, which covered most of western Canada. At this time, ice about 1500 m thick filled Indian Arm and buried adjacent peaks. The generally southward-flowing ice scoured valley floors and mountainsides, and rounded-off those peaks and ridges that were ice-covered. After 14 500 yr B.P., the ice gradually thinned and receded, revealing a landscape where moderate to gentle slopes were covered by till (rocky debris melted out from underneath or on top of the ice) and steep and exposed slopes were dominated by glacially-smoothed rock. By 13 500 yr B.P., the ice sheet had receded from the site of Vancouver and most of Indian Arm was probably ice-free. During deglaciation, relative sea level was as much as 200 m higher than at present due to isostatic depression of the landmass under the weight of the glaciers; glaciomarine sediments, predominantly sandy mud, and gravelly glaciofluvial deltas, accumulated in the inundated area. Sea level fell rapidly however, declining to its present level before about 10 000 years B.P., by which time it is likely that ice had melted from even the highest elevations.

Postglaciation

After the ice had receded but before the landscape was colonized by vegetation, erosion and landslides were likely much more common on the steep valley sides than at present. Till and other glacial deposits were eroded as a result of debris slides, debris flows, and streams, and sediments were redeposited on lower slopes and valley floors as colluvium and fluvial materials. It is also likely that rockfalls and rockslides occurred more frequently than now. Formation of colluvial (debris flow) fans, talus slopes, alluvial fans and floodplains, and erosion and enlargement of gullies and canyons has continued throughout postglacial time.

1.4.4 Surficial Materials and Associated Landforms

Till (M)

Till is material deposited directly by glacial ice. It typically consists of a fine-grained matrix (particles < 2 mm) surrounding and supporting clasts (particles > 2mm) of various sizes, shapes, and lithologies. The characteristics of till vary greatly according to the processes by which it was deposited. Basal till (M) resulted from melting at the base of the glacier, where sub-glacial accumulation of ice-transported debris resulted in a non-sorted, massive (unstratified), relatively compact basal till. Material that was exposed by the melting of the ice surface (downwasting) and accumulated on top of the ice, formed coarser-textured, less compact, ablation till.

In the study area, till consists of a predominantly sandy matrix, and 20-40% (by volume) clasts, chiefly granitic. At site MS-63 the till is silty (sdzMbw), but in most places silt makes up less than 20% of the matrix (e.g., site MS-04: zdsMw). Till was found on gentler slopes throughout the study area, on valley floors, and in depressions on the undulating ridge tops.

Colluvium (C)

Colluvium is the rocky debris that accumulated as a result of gravitational slope processes, such as rockfall, debris flows and slides, snow avalanches and rock creep. In this area, colluvium is dominantly rubbly to blocky in texture (textures are r, a, and x), with sandy interstitial material or sand matrix. Landforms vary, depending on the process that deposited the colluvium. Veneers and blankets of colluvium derived locally from weathered bedrock are common on hillsides; while fans, cones and talus slopes are found where rockfall, debris flow and debris slide deposits have accumulated at the toe of steep slopes (e.g., site MS-06, aCk-Rb). Debris flow fans are common along the shore of Indian Arm (e.g., site MS-60, sdCf-Rd).

Rock (R)

Throughout the study area, bedrock is commonly exposed in cliff bands, bluffs, and rocky outcrops on steep slopes (e.g., site MS-38, ⁶Rsk ⁴zscv –R”b).

Fluvial Materials (F, FA)

Fluvial deposits have been transported and deposited by flowing water. They form floodplains (FAp, Fp), river (fluvial) terraces (Ft) and alluvial (fluvial) fans (Ff). Fluvial materials consist of loosely packed, non-cohesive gravels, sands, and minor silt. Sands and gravels are porous and highly permeable. Typically, they provide sites that are dry and well-drained unless the water table lies close to the ground surface, as in the case of floodplains and the lower parts of fans. Site 99-02605 on the Indian River delta is an example of fine overbank sediments over gravelly floodplain materials (szFAb over gFAp).

Glaciomarine Materials (WG)

Glaciomarine sediments were deposited by settling from suspension in sea water in contact with glacial ice. Textures range from massive gravelly sandy mud to stratified, well-sorted sand, silt and/or clay. Lenses of other material, such as till, may be present, and marine shells, shell casts and the remains of other marine organisms may be present. No glaciomarine materials were observed or mapped in the study area, but it is likely that WG sediments may be present in depressions below 200 m elevation.

Glaciofluvial Materials (FG)

Glaciofluvial sediments have been deposited by glacial meltwater streams in front of or in contact with glacial ice. Glaciofluvial materials may be massive or well-stratified, with a range

of particle sizes from fine sands to large boulders. No glaciofluvial sediments were mapped or observed in the study area, but FG may be found in some areas where till has been mapped.

Organics (O)

Organic material accumulates at poorly drained sites and consists mainly of the accumulated, partly decomposed remains of mosses, sedges, and other hydrophytic vegetation. Organics were observed in the field at site MS-09, at the edge of a lake, and at site MS-26, on a valley floor.

1.4.5 Soils

Podzols

Podzols are the most common soils in the study area. They have B horizons dominated by accumulation of Al, Fe and humified organic matter. They typically develop in coarse to medium-textured, acidic parent materials, under coniferous forest vegetation in cool humid climates. Thus podzols are widespread on till and colluvium throughout the study area. Humo-ferric podzols (HFP) are most common; they have more Fe and Al than organics in the B horizon. Less common Ferro-humic podzols (FHP) have a higher organic content, as well as some Fe and Al. Site 99-02602 is an example of ferro-humic podzol.

Gleysols

Gleysols are found in wetter areas, and are characterized by grey colours and/or mottling due to prolonged saturation. In the Mount Seymour study area, gleysols were found on floodplains and other low-lying wet sites. Site 99-02605 on the Indian River estuary is an example of a gleysol.

Organic Soils

Organic soils contain more than 30% organic matter. They include peat and bog soils, and are usually associated with wetlands. Organic soil was observed at site MS-09.

1.4.6 Geomorphological Processes

Debris Slides and Debris Flows (-R, -R’)

Debris slides are a variety of landslides. They occur when a mass of glacial drift, colluvium, or weathered bedrock becomes detached from a hillside and moves rapidly downslope by sliding along a shear plane. On the terrain map, symbols such as Cv-R'd are used to indicate source areas for debris slides and flows, while symbols such as Cvb-Rs are used for downslope areas affected by slides and flows from upslope, where debris runout is a potential hazard. For an example of a debris slide, see photo 82057-14, symbol ⁵Cvx ³Mk ²Rk – VR's. (poly 1066). If the sliding debris is saturated, or if debris falls into a stream and becomes saturated, it is transformed into a debris flow. A debris flow is the rapid flow of a mass of viscous material consisting of mud, sand, stones, and vegetation debris. There are many debris flow gullies in the study area,

e.g., site MS-05, symbol ${}^8R_s {}^2C_{vx} - R''dbV$. Debris slides and debris flows also occur on many of the steep slopes throughout the area.

Rockfall

This process involves the release of relatively small masses of rock (e.g., a single block or a few cubic meters) and its movement downslope by free fall, rolling and bouncing. On the terrain map, symbols such as $R_s-R''b$ are used to indicate source areas for rock fall. Symbols such as $aCk-Rb$ are used for downslope areas affected by rockfall from above, where rockfall is a potential hazard (e.g., MS-06). Rockfall is common on steep rocky slopes throughout the study area.

Gully Erosion (-V)

Gullies are ravines with V-shaped cross section formed in drift and bedrock. The symbol is usually applied to polygons where more than one gully is present. Gullies are formed by the erosive effects of debris flows, small streams, snow avalanches, and rockfall. Gullies are common on the steep valley sides, including many debris flow gullies. (e.g., site 99-02601, symbol ${}^7R_s {}^3sxC_{vx} - R''dbV$).

Snow Avalanches (-A)

Snow avalanching is the rapid downslope movement of snow and ice by flowing or sliding. Avalanche tracks are abundant and widely distributed on steep slopes throughout the map area, indicating that avalanches are common during winter and early spring. Tracks are clearly distinguished by the absence of mature forest.

Avalanche tracks have been subdivided according to their extent in a terrain polygon. "Major" avalanche tracks, indicated by -Af, (e.g., site MS-24, symbol ${}^7C_{vb}$ over $Mbv {}^3Rk - RVAf$) are broader than the height of adjacent mature forest and occupy more than about 20% of the polygon area. "Minor" avalanche tracks, indicated by -Am, (e.g., site MS-21, symbol ${}^8R_s {}^2C_{vx} - R''dbVAm$) are narrower and occupy less than about 20% of a polygon. Polygons mapped as -Aw contain both major and minor avalanche tracks (e.g., the polygon containing site MS-42, symbol ${}^5C_{vb} {}^4Rsk {}^1Mv - R''dsAw$).

2.0 ECOSYSTEM UNIT CLASSIFICATION AND SYMBOLS

2.1 CLASSIFICATION SYSTEM

Three levels of classification are used in mapping habitats. These include Ecosections, Biogeoclimatic Units (zone, subzones, variants and phases) and Ecosystem Units.

Ecoregion classification system is used to stratify British Columbia's terrestrial and marine ecosystems into discrete geographical units at five different levels. The two highest levels, Ecodomains and Ecodivisions, are broad and place BC globally. The three lowest levels, Ecoprovinces, Ecoregions and Ecosections are progressively more detailed and narrow in scope, and relate segments of the province to one another. They describe areas of similar climate, physiography, oceanography, hydrology, vegetation and wildlife potential (Demarchi, 1993). Ecosection boundaries are delineated on 1:20,000 and 1:50,000 terrestrial ecosystem maps.

Biogeoclimatic Subzones are areas over which a distinct climatic climax community or zonal ecosystem occurs. A subzone consists of unique sequences of geographically related ecosystems.

Biogeoclimatic Variants are a subdivision of a subzone and represent a further reduction in the climatic and geographic variability with a subzone. These climatic differences result in corresponding differences in vegetation, soil and ecosystem productivity.

Ecosystem Units incorporate the site series of biogeoclimatic classification in addition to physical attributes and structural stages. Generally site series are relatively homogenous with regard to soils, surficial materials, topographic position, topoclimate and trends of secondary succession. Ecosystem units are composed of three components: site series, site modifiers, and structural stage. Ecosystem units have also been developed for non-forested ecosystems presently not included in the site series classification.

Site Series have been developed to describe variation at the site level within the biogeoclimatic unit. Site series codes (two letters) are unique within the biogeoclimatic subzone or variant [Resources Inventory Committee (RIC), 1998].

Site Modifiers are used to refine site series into more specific ecosystem units based on distinguishing site, soil and terrain characteristics. Typical environmental conditions have been defined for each site series defined within the Ministry of Forests biogeoclimatic classification system (RIC, 1998). Modifiers are used for sites that differ from the typical situation.

Structural Stages describe the dominant stand appearance for the ecosystem unit (RIC, 1995, 1998).

The ecosections, biogeoclimatic units, and ecosystem units present in the study area are described in the following sections.

2.2 ECOREGIONS AND BIOGEOCLIMATIC UNIT DESCRIPTION

2.2.1 Ecoregions

The study area occurs within two Ecoregions comprising two Ecoregions. The majority areas of both parks are located in the Pacific and Cascade Ranges Ecoregion, Southern Pacific Ranges Ecoregion. A small portion of the southern part of Mount Seymour Park is located in the Lower Mainland Ecoregion, Fraser Lowland (Georgia Lowland) Ecoregion (Demarchi, 1993, 1996). A description of these two ecoregions can be found in Demarchi et al. (1990) and is summarized below.

2.2.1.1 *Southern Pacific Ranges*

The Southern Pacific Ranges (SPR) is one of four Ecoregions located in the mountainous Pacific Ranges Ecoregion. The Pacific Ranges Ecoregion is a component of the Coast and Mountains Ecoprovince which extends from coastal Alaska to coastal Oregon; within British Columbia it includes the windward side of the Coast Mountains and Vancouver Island, all of the Queen Charlotte Islands and the Continental Shelf. The Pacific Ranges Ecoregion is the southern most of the nine Ecoregions in the Ecoprovince; the SPR Ecoregion is an area of steep, rugged mountains that receive high rainfall situated at the southern end and windward side of the Pacific Ranges Ecoregion.

The Submontane Very Wet Maritime Coastal Western Hemlock Variant (CWHvm1), Montane Very Wet Maritime Coastal Western Hemlock Variant (CWHvm2), Windward Moist Maritime Mountain Hemlock Variant (MHmm1) and the Windward Moist Maritime Parkland Mountain Hemlock Variant (MHmm1p) are found in the SPR Ecoregion within the project area.

2.2.2 Biogeoclimatic Units

Five biogeoclimatic units occur within the study area. These are:

CWHdm	Dry Maritime Coastal Western Hemlock Subzone
CWHvm1	Very Wet Maritime Coastal Western Hemlock, Submontane Variant
CWHvm2	Very Wet Maritime Coastal Western Hemlock, Montane Variant
MHmm1	Moist Maritime Mountain Hemlock, Windward Variant
MHmmp1	Moist Maritime Parkland Mountain Hemlock, Windward Variant

2.2.2.1 *CWHdm*

The CWHdm subzone is found along the mainland coast and adjacent islands from Hardwicke Island in the north to the Chilliwack River area in the southeast. (Green and Klinka, 1994). The CWHdm occurs above the Very Dry Maritime Coastal Western Hemlock Subzone (CWHxm) from about 150 m up to 650 m in elevation along the Sunshine Coast and lower Fraser Valley. In

the project area, the CWHdm is limited to the lower, south slopes of Mount Seymour to an elevation of 640 m.

The CWHdm is characterized by warm, relatively dry summers and moist, mild winters. Relatively little of the precipitation falls as snowfall (Green and Klinka, 1994). The growing season in the CWHdm is long; water deficits are minor on zonal sites and are common on drier than zonal sites. Dominant species on zonal sites includes Douglas-fir, western redcedar, and western hemlock in the tree canopy and salal, red huckleberry, step moss, Oregon beaked moss, electrified cat's-tail moss and flat moss in the understory.

2.2.2.2 CWHvm1

The CWHvm1 is the most common biogeoclimatic unit in the Vancouver Forest Region (Green and Klinka, 1994). It occurs on the windward slopes of the Coast Mountains over the entire length of the Forest Region from the Fraser River area in the south to the northern administrative boundary. On the windward side of Vancouver Island it is found from the Holberg Inlet area in the north to Jordan River in the south; along the eastern side of Vancouver Island it occurs from the Port Hardy area south to Kelsey Bay. The CWHvm1 also occurs on the leeward side of some coastal islands and along the mainland coast as far north as Portland Canal to the north within the Prince Rupert Forest Region. It occurs from sea level to approximately 650 m in elevation, except when located above the CWHxm or CWHdm. It has been mapped to an elevation of 640 m within the project area. It occurs below the CWHvm2.

The CWHvm1 is characterized by a wet, humid climate with cool summers and mild winters (growing season is long). Mean annual precipitation is high (2682 mm), but varies greatly across the variant (ranges from 1555 to 4387 mm) (Green and Klinka, 1994). Relatively little of the precipitation falls as snow.

Dominant tree species on zonal sites are western hemlock and amabilis fir with lesser amounts of western redcedar. The shrub and moss layers are generally well-developed. Red huckleberry and Alaskan blueberry are dominant shrubs, while step moss and lanky moss are most common mosses. The herb layer is generally sparse on zonal sites and consists of low cover of deer fern, five-leaved bramble, bunchberry and queen's cup.

2.2.2.3 CWHvm2

The CWHvm2 is

The CWHvm2 is also common in the Vancouver Forest Region; it occurs above the CWHvm1 to elevations of about 650 to 1000 m in the south and 450 to 800 m in the north of its range (Green and Klinka, 1994). The CWHvm2 grades into the Mountain Hemlock (MH) zone. The CWHvm2 is mapped to an elevation of approximately 1000 m within the project area.

The CWHvm2 is characterized by a wet, humid climate with cool, short summers and cool winters. In general, the CWHvm2 has cooler temperatures, a shorter growing season, and heavier snowfall than the CWHvm1. Mean annual precipitation is high (2850 mm; based on two stations) (Green and Klinka, 1994).

Dominant tree species on zonal sites are western hemlock and amabilis fir. Western redcedar, yellow cedar and mountain hemlock are less common; yellow cedar and mountain hemlock become more abundant with increasing elevation (i.e. approaching the MH zone) and on wetter sites. Alaskan blueberry, five-leaved bramble, step moss, lanky moss and pipecleaner moss are common in the understorey.

2.2.2.4 *MHmm1*

MHmm1

The MHmm1 occurs above the CWH zone at high elevations on Vancouver Island and along the mainland coast. It occurs at elevations above 800 to 1000 m and below 1100 to 1350 m. The MHmm1 is mapped to an elevation of approximately 1240 m in the project area.

The MHmm1 has a climate that is characterized by long, wet, cold winters and short, cool, moist summers (Green and Klinka, 1994). The total amount of snowfall is high in the unit; snowpacks can persist in variant into July. Mean annual precipitation is 2565 mm (based on two stations); total mean annual snowfall is 816 cm (Green and Klinka, 1994).

Amabilis fir and mountain hemlock are dominant in the tree canopy of climax stands on zonal sites; yellow cedar is generally present. Blueberries and pipecleaner moss dominate the understorey.

2.2.2.5 *MHmmp1*

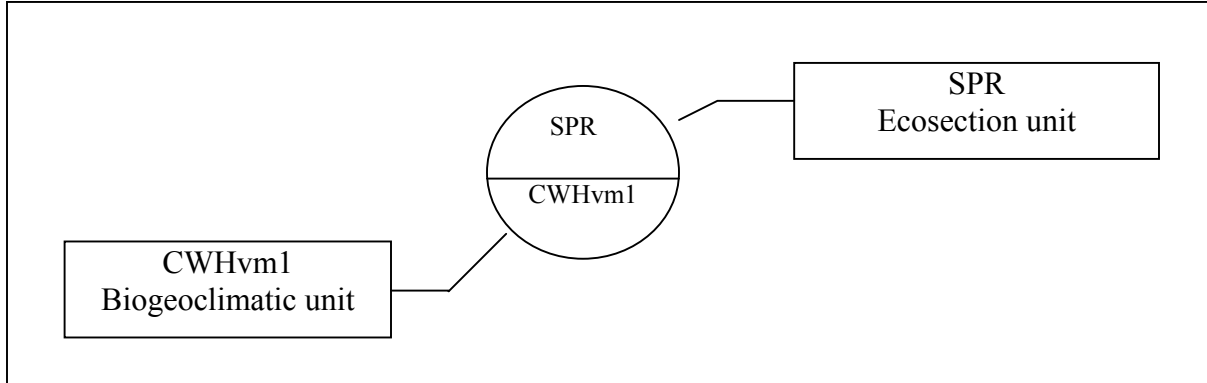
The MHmmp1 occurs above the MHmm1; it is characterized by discontinuous patches of parkland forest interspersed by non-forested units such as heathland, wetland, and rock. It is mapped at elevations above approximately 1240m in the project area. It is limited to the very tops of mountains found on the boundaries of the project area adjacent to the Seymour and Coquitlam River watersheds.

Although no data are available for this unit it is assumed that the climate is more extreme than the MHmm1 (i.e. longer, colder winters).

2.2.3 Ecoregion and Biogeoclimatic Map Labels

Figure 2 depicts the ecoregion and biogeoclimatic unit label as they appear on the ecosystem maps.

Figure 2: Symbols for Ecosection and Biogeoclimatic Units

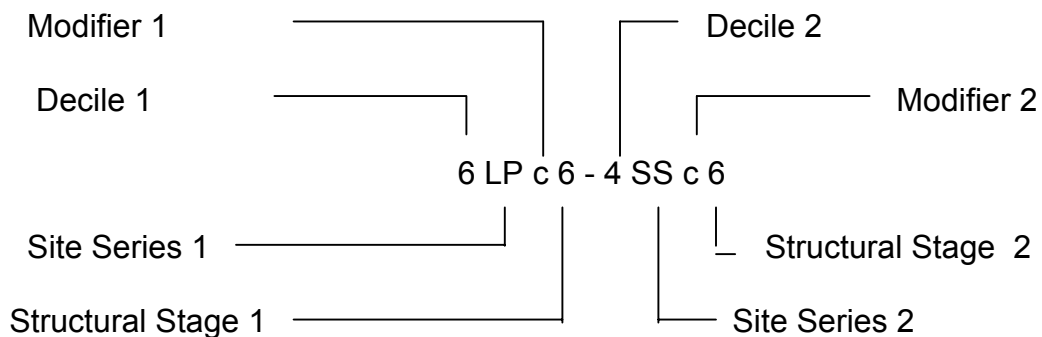


2.3 ECOSYSTEM UNIT METHODOLOGY

Mapping was completed according to the methodology outlined in *Standards for Terrestrial Ecosystem Mapping in British Columbia* (RIC, 1998).

The ecosystem mapping is based on the three level ecosystem classification framework, which includes ecoregion units, biogeoclimatic units and ecosystem units. Ecosystem unit labels consist of three components: site series, site modifier(s) and a structural stage. Site series are defined within the existing Ministry of Forests biogeoclimatic ecological classification system (Green and Klinka, 1994). Non-forested ecosystem units (i.e. avalanche units, parkland forest, heathland, and wetlands) were also encountered that are presently not included in the MOF site series classification. Definitions and codes for these units were selected from the Ministry of Environment Provincial Site Series Code list. A two-letter code has been assigned to each of the Ministry of Forest site series and non-forested ecosystems. The two-letter code is followed by site modifiers (if any are used) and then by the structural stage. Up to two site modifiers may be used in defining ecosystem units. The structural stage component of the label consists of a numeric character and in certain cases a structural stage modifier (a lower case alpha character). An example of an ecosystem unit map label is provided in Figure 3.

Figure 3: Ecosystem Unit Label



2.3.1 Site Series

Site series are the first component of an ecosystem unit. Site series have been developed to describe variation at the site level within the biogeoclimatic units (RIC, 1995, 1998). The site series describe all land areas capable of supporting a specific climax plant association and reflecting a specified range of soil moisture and nutrient regimes within a subzone or variant (RIC, 1995, 1998). A two-letter symbol has been assigned to each site series; the codes are unique to each biogeoclimatic subzone and variant.

2.3.2 Site Modifiers

Typical environmental conditions, such as site, soil (depth, texture) and terrain features have been described for each sites series within the Ministry of Forests biogeoclimatic classification system. Site modifiers, if required, are used to further denote conditions that differ from the typical for the site series.

The following site modifiers have been used:

Symbol	Criteria
a	active floodplain
c	coarse-textured soils (includes sand and loamy sand; and sandy loam, loam and sandy clay loam with over 70% coarse fragment volume)
f	fine-textured soils (includes silt and silt loam with less than 20% coarse fragment volume; heavy clay, silty clay, silty clay loam, clay loam, clay and sandy clay with less than 35% coarse fragment volume)
g	gulying occurring
h	hummocky terrain
j	gentle to moderate slope (less than 35% slope)
k	cool, northerly or easterly aspect (285-135 degrees, slopes 35-100%)
m	medium-textured soils (includes sandy loam, loam, and sandy clay loam with less than 70% coarse fragment volume; silt loam and silt with greater than 20 % coarse fragment volume; and clay, silty clay, silty clay loam, clay loam, sandy clay and heavy clay with greater than 35% coarse fragment volume)
n	fan or cone
p	peaty material on surface
r	ridge top
s	shallow soils (20-100 cm to bedrock)
t	terrace
v	very shallow soil (less than 20 cm to bedrock)
w	warm, southerly or westerly aspect (135-285 degrees, slopes 35-100%)
z	very steep warm aspect (slope greater than 100% on warm aspects, 135-285 degrees)

2.3.3 Structural Stage

Structural stage describes the existing dominant stand appearance or physiognomy of the ecosystem unit. One of seven structural stage categories describing the current development stage is assigned to each ecosystem unit.

Symbol	Structural Stage	Age Criteria and Description
1	Sparse/bryoid	Initial stages of primary and secondary succession; total shrub and herb cover less than 20%.
1a	Sparse	Less than 10% vegetation cover. (Less than 20 years.)
1b	Bryoid	Bryophyte and lichen-dominated communities; >1/2 total vegetation cover (less than 20 years).
2	Herb	Early successional stages, and disclimax or climax sites, dominated by herbaceous vegetation (tree cover < 10%, shrub cover <= 20%, herb cover >20% or >= 33% of total cover) (less than 20 years for normal forest succession).
2a	Forb-dominated	Herbaceous communities dominated (>1/2 of total herb cover) by non-graminoid herbs, including ferns.
2b	Graminoid-dominated	Herbaceous communities dominated [>1/2 of total herb cover by graminoids (grasses, sedges, reeds, and rushes)].
3	Shrub/Herb	Early successional stages, and communities dominated by shrub vegetation < 10 m in height (tree cover < 10%, shrub cover > 20% or >= 33% of total cover). Used for communities that will be forested at climax (less than 20 years for normal forest succession).
3a	Low Shrub	Disclimax or climax communities dominated by shrub cover < 2 m in height.
3b	Tall Shrub	Disclimax or climax communities dominated by shrub cover 2-10 m in height.
4	Pole/Sapling	Trees > 10 m tall that have topped the shrub and herb layers. Stands are typically dense (generally < 20-40 years).
5	Young Forest	Self-thinning is usually evident and the forest canopy has begun differentiation into distinct layers (40-80 years).
6	Mature Forest	Trees established after the last disturbance have matured and a second cycle of shade tolerant trees may have established. (80-250 years for the CWHdm, CWHvm1, CWHvm2, MHmm1 and MHmm1p).
7	Old Forest	Old structurally complex stands. (>250 years for the CWHdm, CWHvm1, CWHvm2, MHmm1, and MHmmp1).

2.3.4 Stand Composition Modifiers

Stand composition modifiers are used to provide further definition to the structural stage. These modifiers differentiate between coniferous, broadleaf and mixed stands (RIC, 1998).

Modifier	Description
C	Coniferous – greater than $\frac{3}{4}$ of total tree layer cover is coniferous
B	Broadleaf – greater than $\frac{3}{4}$ of total tree layer cover is broadleaf
M	Mixed – neither coniferous or broadleaf account for $> \frac{3}{4}$ of total tree layer cover

2.4 ECOSYSTEM UNITS

A summary of ecosystem units mapped in the project area is provided in Table 1. Map code, site series number, assumed site modifiers, typical situation, typical soil moisture regime and mapped site modifiers is provided for each ecosystem unit. Detailed descriptions of each ecosystem unit (summarized by biogeoclimatic unit) are provided in sections 4.2 through 4.6.

3.0 ECOSYSTEM MAPPING METHODOLOGY

3.1 BACKGROUND

Mapping was completed according to the methodology outlined in Standard for Terrestrial Ecosystem Mapping in British Columbia (RIC, 1998).

3.2 BIOTERRAIN

Bioterrain units were pre-typed onto 1: 20,000 scale, black and white aerial photographs taken in 1982 prior to the field work. This pre-typing was completed under a previous contract completed in 1996. Bioterrain mapping is the first step in the ecosystem mapping process. It involves primary subdivision of the landscape according to the physical conditions, such as slope position and soil moisture that influence ecosystems. The criteria used for this landscape classification are the same as those applied to standard terrain mapping, namely surficial materials and their texture, surface expression (landforms and material thickness), and geomorphic processes. Surficial materials are the primary control of soil drainage and the soil's ability to retain moisture for plants. Landforms and material thickness also influence soil moisture, as well as other factors relevant to plant growth such as depth to water table, soil thickness, and exposure to sun and wind. Geomorphic processes such as gulying, landslides, avalanching and the shifting of streams also influence ecosystems. These processes contribute to the diversification of vegetation communities and of structural stages (herb, shrub or young forest) in the landscape.

Bioterrain mapping was carried out following the Terrain Classification System for British Columbia (Howes and Kenk, 1997), the Guidelines and Standards to Terrain Geology Mapping in British Columbia (RIC, 1996) and ecosystem mapping standards (RIC, 1998). Bioterrain mapping differs slightly from standard terrain mapping. On the air photographs, the area was examined closely and terrain polygons were delineated, based primarily on the surficial material, topography and geomorphological patterns, such as gulying. Polygon boundaries were also drawn to take account of soil drainage, aspect, and exposure and, where possible, vegetation patterns. Terrain symbols, geomorphic processes and soil drainage class symbols were assigned to each polygon.

Bioterrain mapping occurred over several stages. Norecol, Dames & Moore, Inc and J.M. Ryder and Associates completed the preliminary terrain typing of the project area under an earlier contract with BC Parks in 1996. Mapping on the air photographs was checked by staff from J.M. Ryder and Associates during the field work completed in October 2000 (see Section 3.3). Following completion of the field work, the bioterrain polygon lines, terrain symbols and soil drainage classes were revised to take field data into account.

3.3 FIELD WORK

A sampling plan was submitted to MELP prior to the initiation of field work. These plans identified the biogeoclimatic units and potential ecosystem units expected in the area. Air photographs and topography maps were examined to identify access routes and potential sampling sites. These sampling sites were selected to provide a cross section of environmental and physical conditions in the project area.

BC Parks provided a map that identified key areas for sampling; these areas are of interest from a management perspective. A significant amount of the field inspections were completed within these areas.

Field work was completed in October 2000 at survey intensity level 5. The field crew consisted of a plant ecologist and terrain/soil specialist. The scientists who participated in the field sampling program were as follows: vegetation data were collected by Tyler Innes; terrain and soils data were collected by Deepa Spaeth Filatow and Claire Tweedale.

Five full plots and 68 ground and visual inspections were completed in the project area. The locations of the plot and ground inspection sites were selectively chosen. An effort was made to ensure that the sample sites were homogeneous with respect to site, soil and vegetation characteristics. The Ecosystem Field Plot form (1998 version FS 882) was completed for full plots, while the Terrestrial Ecosystem Mapping Ground Inspection Form was used for ground inspections and visuals. The Field Manual for Describing Terrestrial Ecosystems (Ministry of Forests and BC Environment, 1998) provided a detailed methodology for data collection at plot and ground inspections locations. Colour photographs were taken of the general plot area at the full plots and some ground inspections.

Access was largely achieved by the use of helicopter, boat and road. The location of full plots, ground inspections and visual inspections were marked on the air photographs, and topographic mapsheets.

3.4 DATA REVIEW

Upon completion of the field studies, the project specialists reviewed the field forms. Data from the inspections (i.e. full plots, grounds and visuals) were recorded in VTEM. Project data was provided to the ecology correlator for review.

The BGC lines were placed onto the 1:20,000 scale maps and adjusted to fit the elevations as provided in the MOF field guide. An attempt was made to edge matched biogeoclimatic (BGC) lines with 1996 ecosystem mapping conducted for Seymour and Coquitlam River areas for GVRD. However, the BGC linework for the GVRD project was obtained late in the project mapping schedule and not all lines are matched exactly. Biogeoclimatic lines were reviewed by the Ministry of Forests.

3.5 ECOSYSTEM MAPPING

Following completion of the field program, review of the field data and revision of bioterrain polygons and symbols the bioterrain polygons were digitized into a digital file. The polygons were then plotted on a base map that included topographic lines and hydrology features. Digital TRIM (1:20,000) files supplied by MELP were used to create the 1:20,000 base maps. Biogeoclimatic unit boundaries were drafted onto the bases for digitizing.

Ecosystem unit labels were created by project ecologists. Ecosystem unit labels include a site series, modifier(s) (where conditions differ from the typical situation described for a site series) and a structural stage. Map polygons were compared to forest cover maps to assist in determining structural stage for labels. Project ecologists examined the aerial photographs to determine the labels for each polygon. Ecosystem labels may consist of simple units (one ecosystem unit) or be complex and consist of up to three ecosystem units. Bioterrain polygons were frequently subdivided due to the placement of biogeoclimatic lines, where ecological variability within a bioterrain polygon warranted creation of separate polygons, and to account for logging history. When the bioterrain polygons were split into additional polygons by the ecosystem mappers, lines were placed on the base map. This map was provided to the MELP Ecology Correlator for review and comment. Comments were incorporated into the final mapping.

The revisions provided on the base maps were incorporated into the digital polygon file (spatial coverage). Ecosystem unit and bioterrain labels were entered into the ecosystem polygon database provided by the Ministry of Environment, Resource Inventory Branch (Excel format). Mapping standards provide a list of the core polygon attribute data that are required. Some of the core data found in the ecosystem database for each polygon include ecosection, biogeoclimatic zone, subzone, variant and phase, ecosystem labels [decile, site series, modifier(s) and structural stage, recorded up to three times per polygon] and stand composition. Terrain attributes were also entered in the database. A description of the ecosystem polygon data attribute fields is contained in RIC, 1998a.

Ecosystem maps were created in ARC/Info format by combining the base map coverage, polygon digital files and the ecosystem databases. A map legend was created and incorporated into the maps to assist any map user. In addition to other information (see maps), the map legend lists all of the ecosystems mapped in the project area. The biogeoclimatic unit, ecosystem name, typical situation, assumed modifiers and mapped modifiers are provided for each ecosystem unit. Copies of the maps were provided to the MELP correlators for review and comment.

Descriptions of the ecosystem units are found in Section 4.0.

3.6 NON-FORESTED UNITS

Several non-forested ecosystem units are found in the project area. These include avalanche tracks, wetlands, parkland forest and heathland. One ecosystem unit (SA) was used to map all

avalanche tracks in the project area; avalanche tracks were mapped in the CWHvm1, CWHvm2, MHmm1 and MHmm1p.

Only one wetland type has been mapped within each of the biogeoclimatic units. Non-forested fens/marshes in the CWHvm1 and CWHvm2 are mapped as a sedge fen (FS). Wetlands in the MHmm1 have been mapped as Tufted clubrush – Asphodel (CA).

Non-forested units in the MHmmp1 have been mapped as follows. Sparsely forested units with a heath understorey have been mapped as Mountain hemlock – Parkland (MP). Heathland has been mapped as Mountain hemlock – Heath (MH), while shrubby units dominated by low conifers have been mapped as Mountain hemlock – krummholz (MK).

A description of the non-forest ecosystems is provided in Section 4.0.

3.7 APPLICATION OF MODIFIERS

Terrain and soils data collected in the field indicate that coarse-textured soils are common throughout the area. These coarse-textured soils are generally found on morainal and colluvial parent materials. Fluvial and organic parent materials are also present. Soil texture modifiers were added to the ecosystem unit where field data and/or the terrain textures indicated non-typic textures for the site series. The definition used for soils textures is based on modifier definitions given in the mapping standards (RIC, 1998).

The coarse-textured modifier was assigned to those ecosystem units in polygons where the terrain texture is mapped as being coarse-textured or in areas where colluvial or morainal materials are mapped and no texture data is available. Medium-textured soils are mapped where texture data is available.

Soil depth modifiers were applied to situations where soil depth for a particular ecosystem did not meet the typical conditions. For example, in cases where deep soils are typical, the shallow soil modifier was used where the veneer surface expression was applied to a parent material (i.e. Mv or Cv) in the terrain label. The very shallow modifier was used where the surface expression “very thin veneer” (x) was applied to a parent material in the terrain label (i.e. Cx), where bedrock was a significant component of the terrain label or where field data supported its use.

Other modifiers (such as h, j, k, n, p, and w) were used in situations that did not meet the typical situation. The gullying modifier was applied when the bioterrain label included the gullying geomorphological process (V) and the gullying was equal to or greater than 20% of the polygon.

3.8 DISTURBANCE HISTORY

Logging occurred within the present Indian Arm Provincial Park area prior to establishment of the park. Past logging activity was extensive in the Grand Creek watershed, and has occurred elsewhere around Indian Arm (i.e. Bishop Creek, Clementine Creek areas). As a result of this logging, a moderate amount of structural stage three and five has been mapped in certain biogeoclimatic units.

Structural stages in the logged areas were determined based on the forest cover labels (age class), field data, and air photo interpretation. Based on a comparison of the forest cover maps and air photographs, it appears that the logging within the project area occurred previous to 1982 when the air photographs were taken.

3.9 LIMITATIONS

The project photographs were 1:20,000 scale flown in 1982 and were, therefore, several (17) years out of date at the time of the field work. This does not appear to have had a significant impact on mapping since disturbance (that would effect ecosystem type or age) within the park appears to be largely limited to logging. Forest cover maps were utilized in determining structural stage within the polygons impacted by logging.

This mapping is based on reconnaissance level sampling (i.e. Survey Intensity Level 5).

4.0 DESCRIPTION OF ECOSYSTEM UNITS

4.1 BACKGROUND

A description of the ecosystems mapped in each of the biogeoclimatic units is provided on separate tables. Each ecosystem unit is described on both a site and vegetation page. On the site page, the biogeoclimatic unit and site series number, two-letter ecosystem map symbol, ecosystem name and list of all modifiers used with the individual ecosystem symbol are listed in the boxes at the top of the page. A summary of the environmental and physical site characteristics, as determined from the plots, ground inspections and MOF regional field guide (when minimal field inspection data for a particular ecosystem unit are available) is provided in the site description box. Site data include elevation, slope, aspect, soil moisture regime, soil nutrient regime and drainage class. Terrain and soil characteristics provided are the surficial material, soil development, coarse fragment content, humus depth and form, and soil texture encountered for that ecosystem unit at the inspection sites. Some boxes in the site description box remain blank where no field data is available.

The vegetation page provides a summary of the dominant and associate plant species for each potential structural stage of the ecosystem unit. Plant species were treated as dominants and associates based on the following criteria.

Dominant trees:	Closed canopy $\geq 65\%$; open canopy $\leq 65\%$.
Dominant shrubs:	Occur in over 50% of the plots/ground inspections with a cover $\geq 10\%$.
Associate shrubs:	Occur in 50 % of the plots/ground inspections with a cover between 1 and 9%.
Dominant herbs:	Occur in over 50 % of the plots/ground inspections with a cover $\geq 10\%$.
Associate herbs:	Occur in over 50 % of the plots/ground inspections with a cover between 1 and 9%.
Dominant mosses/lichens:	Occur in over 50% of the plots/ground inspections with a cover $\geq 10\%$.
Associate mosses/lichens:	Occurs in over 50 % of the plots/ground inspections with a cover between 1 and 9%.

Five potential structural stages are listed for the forested ecosystem units. These include shrub, pole sapling, young forest, mature forest and old forest. For edaphic ecosystem units, only the herb and/or shrub structural stages are described. Notes that may provide further descriptions of the ecosystem unit are provided at the bottom of the vegetation table. The plot and ground inspection number(s) completed within each structural stage of the ecosystem unit are listed in the vegetation page of the tables. When no inspection numbers are provided for a particular structural stage, the dominant and associate species have been extrapolated from inspections completed in other structural stages, and from data contained in the MOF regional field guide.

Five full plots were complete in the project area; these are numbered 99-02601 through 99-02605. Ground and visual inspections completed are shown as MS followed by a number. For example, MS01 represents inspection number one. Sixty-eight ground and visual inspections were completed.

The following tables provide a description of the ecosystem units for each biogeoclimatic table. The biogeoclimatic units are ordered alphabetically. Within a biogeoclimatic unit, the tables are ordered alphabetically, with forested sites series listed first, followed by shrubland units, and then wetland units.

4.2 CWHdm – DRY MARITIME COASTAL WESTERN HEMLOCK SUBZONE

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
CWHdm	DS	03	FdHw – Salal
Typic DS occurs on steep, warm aspects on deep soils on middle to upper slope positions.			

SITE DESCRIPTION

	Range	Mean
Elevation (m)		
Slope (%)		
Aspect (degrees)		
Moisture Regime	Nutrient Regime	
xeric-subxeric	very poor - medium	
Drainage	well - rapid	
Surficial Material		
mapped on: morainal thin veneer and mantle of variable thickness		
Soil Development		
	Range	Mean
Humus Depth (cm)		
Coarse Fragments (%)		
Soil Texture	Humus Form	

Photo: no photograph

MAP

Symbol/Site Series

DS 03

Name

FdHw - Salal

Map Symbol	DS3	DS4	DS5	DS6	DS7
Plant Species	Shrub	Pole Sapling	Young Forest	Mature Forest	Old Forest
Dominants	Douglas-fir western redcedar salal bracken	closed canopy of: Douglas-fir western redcedar salal	closed canopy of: Douglas-fir western redcedar salal	open canopy of: Douglas-fir western redcedar salal Oregon beaked moss step moss	open canopy of: Douglas-fir western redcedar salal Oregon beaked moss step moss
Associates	red huckleberry trailing blackberry	red huckleberry trailing blackberry bracken Oregon beaked moss step moss	western hemlock red huckleberry trailing blackberry bracken Oregon beaked moss step moss flat moss lanky moss	western hemlock red huckleberry bracken flat moss lanky moss	western hemlock red huckleberry bracken flat moss lanky moss
Plots					

Comments: This description is based on Klinka and Green (1994). A low cover of dull Oregon-grape may be found in these ecosystems.

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
CWHdm	HM	01	Hw – Flat moss
	HMj		Hw –Flat moss; gently sloping
	HMsw		Hw –Flat moss; shallow soils, warm aspect
	HMw		Hw –Flat moss; warm aspect
<p>Typic HM occurs on steep slopes on deep soils on middle slope positions. HM also occurs on gently sloping sites (HMj), and warm aspects on shallow (HMsw) and deep (HMw) soils.</p>			

SITE DESCRIPTION

	Range	Mean
Elevation (m)	340-450	405
Slope (%)	25	-
Aspect (degrees)	158	
Moisture Regime	Nutrient Regime	
mesic	medium	
Drainage	well (moderately well)	
Surficial Material		
morainal blanket and mantle of variable thickness morainal veneer		
Soil Development		
-		
	Range	Mean
Humus Depth (cm)	0-40	-
Coarse Fragments (%)	35-70	
Soil Texture	Humus Form	
loamy	Mor	

Photo: no photograph

MAP

Symbol/Site Series

Name

HM 01

Hw – Flat moss

Map Symbol	HM3, HMj3, HMsw3, HMw3	HM4, HMj4, HMsw4, HMw4	HM5, HMj5, HMsw5, HMw5	HM6, HMj6, HMsw6, HMw6	HM7, HMj7, HMsw7, HMw7
Plant Species	Shrub	Pole Sapling	Young Forest	Mature Forest	Old Forest
Dominants	red alder vine maple thimbleberry salal bracken	closed canopy of: Douglas-fir red alder salal red huckleberry	closed canopy of: Douglas-fir red alder western redcedar western hemlock salal red huckleberry	open canopy of: Douglas-fir western redcedar western hemlock salal red huckleberry	closed canopy of: Douglas-fir western redcedar western hemlock salal red huckleberry step moss Oregon beaked moss
Associates	Douglas –fir sword fern spiny wood fern red huckleberry fireweed	western redcedar western hemlock vine maple sword fern spiny wood fern bracken flat moss	vine maple thimbleberry dull Oregon-grape bracken sword fern spiny wood fern flat moss Oregon beaked moss step moss	vine maple ¹ dull Oregon-grape ¹ bracken ¹ sword fern spiny wood fern flat moss Oregon beaked moss lanky moss step moss ¹	vine maple dull Oregon-grape bracken sword fern spiny wood fern flat moss lanky moss
Plots				MS66	

Comments: 1 notes species that are listed as indicators in the MOF Regional Field Guide that do not meet criteria based on data from project inspections.

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
CWHdm	RF	07	Cw - Foamflower
Typic RF occurs on gentle slopes on medium-textured soils; RF typically occurs on rich sites on lower slope positions that receive moisture.			

SITE DESCRIPTION

	Range	Mean
Elevation (m)	250	250
Slope (%)	5	
Aspect (degrees)	240	
Moisture Regime	Nutrient Regime	
subhygric	rich	
Drainage	moderately well - imperfect	
Surficial Material		
morainal blanket		
Soil Development		
	Range	Mean
Humus Depth (cm)	0-40	
Coarse Fragments (%)	35-70	
Soil Texture	Humus Form	
loamy	Mor	

Photo: no photograph

MAP

Symbol/Site Series

Name

RF 07

Cw - Foamflower

Map Symbol	RF3	RF4	RF5	RF6	RF7
Plant Species	Shrub	Pole Sapling	Young Forest	Mature Forest	Old Forest
Dominants	red alder salmonberry vine maple sword fern	closed canopy of: red alder salmonberry three-leaved foamflower sword fern	closed canopy of: western hemlock western redcedar salmonberry three-leaved foamflower sword fern Oregon beaked moss coastal leafy moss	open canopy of: western hemlock western redcedar bigleaf maple Douglas-fir ¹ salmonberry three-leaved foamflower spiny wood fern Oregon beaked moss coastal leafy moss	open canopy of: western hemlock western redcedar Douglas-fir salmonberry three-leaved foamflower spiny wood fern Oregon beaked moss coastal leafy moss
Associates	bigleaf maple red huckleberry red elderberry thimbleberry spiny wood fern deer fern lady fern three-leaved foamflower	Douglas-fir western redcedar bigleaf maple thimbleberry red huckleberry deer fern spiny wood fern lady fern Oregon beaked moss leafy mosses	bigleaf maple red alder Douglas-fir vine maple thimbleberry red huckleberry red elderberry deer fern spiny wood fern lady fern large leafy moss	red alder ¹ vine maple red huckleberry deer fern sword fern lady fern large leafy moss	bigleaf maple vine maple red huckleberry deer fern sword fern lady fern large leafy moss
Plots				MS67	

Comments: Spiny wood fern is a dominant species in MS67 while sword fern is typically a dominant in the herb layer. ¹ notes species that are listed as indicators in the MOF Regional Field Guide that do not meet criteria based on data from project inspections.

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
CWHdm	RS	05	Cw –Sword fern
	RSj		Cw – Sword fern, gently sloping
	RSsw		Cw – Sword fern, shallow soils, warm aspect
<p>Typic RS occurs on significant slopes on deep, medium-textured soils; RS commonly occurs on middle slope positions on nutrient rich sites. RS also occurs on gently sloping sites and shallow soils on warm aspects.</p>			

SITE DESCRIPTION

	Range	Mean
Elevation (m)	260	260
Slope (%)	35	
Aspect (degrees)	117	
Moisture Regime	Nutrient Regime	
mesic	rich	
Drainage	well – moderately well	
Surficial Material		
sandy, mixed fragments, silty moraine blanket, mantle of variable thickness		
Soil Development		
	Range	Mean
Humus Depth (cm)	0-40	
Coarse Fragments (%)	35-70	
Soil Texture	Humus Form	
silty	Mor	

Photo: no photograph

MAP

Symbol/Site Series

Name

RS 05

Cw – Sword fern

Map Symbol	RS3, RSj3, RSsw3	RS4, RSj4, RSsw4	RS5, RSj5, RSsw5	RS6, RSj6, RSsw6	RS7, RSj7, RSsw7
Plant Species	Shrub	Pole Sapling	Young Forest	Mature Forest	Old Forest
Dominants	Douglas-fir western redcedar vine maple sword fern	closed canopy of: Douglas-fir western redcedar sword fern	open canopy of: Douglas-fir western redcedar vine maple sword fern	open canopy of: Douglas-fir western hemlock vine maple ¹ salal sword fern spiny wood fern lanky moss step moss ¹	open canopy of: Douglas-fir western hemlock western redcedar vine maple sword fern spiny wood fern step moss Oregon beaked moss
Associates	salal thimbleberry salmonberry trailing blackberry spiny wood fern bracken dull Oregon-grape	western hemlock vine maple salal dull Oregon-grape step moss Oregon beaked moss	western hemlock red alder bigleaf maple red huckleberry salmonberry trailing blackberry salal dull Oregon-grape step moss Oregon beaked moss	western redcedar red alder ¹ bigleaf maple ¹ red huckleberry salmonberry dull Oregon-grape ¹ bracken Oregon beaked moss	red huckleberry dull Oregon-grape spiny wood fern flat moss lanky moss
Plots				MS63	

Comments: ¹ notes species that are listed as indicators in the MOF Regional Field Guide that do not meet criteria based on data from project inspections.

4.3 CWHvm1 – VERY WET MARITIME COASTAL WESTERN HEMLOCK, SUBMONTANE VARIANT

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
CWHvm1	AB	01	HwBa - Blueberry
	ABc		HwBa – Blueberry; coarse-textured soil
	ABch		HwBa – Blueberry; coarse-textured soil, hummocky terrain
	ABck		HwBa – Blueberry; coarse-textured soil, cool aspect
	ABcs		HwBa – Blueberry; coarse-textured, shallow soil
	ABcw		HwBa – Blueberry; coarse-textured soil, warm aspect
	ABks		HwBa – Blueberry; cool aspect, shallow soils
	ABsw		HwBa – Blueberry; shallow soils, warm aspect
Typic AB occurs on gentle slopes on deep medium-textured soils; it is typically found on mid-slope positions. In the study area it is found on coarse-textures soils (c), hummocky terrain (h), shallow soils (s) and steeply sloping, warm (w) and cool (k) aspects.			

SITE DESCRIPTION

	Range	Mean
Elevation (m)	180	180
Slope (%)	15	
Aspect (degrees)	230	
Moisture Regime	Nutrient Regime	
submesic	medium	
Drainage	well – moderately well	
Surficial Material		
silty, mixed fragments, sandy moraine mantle of variable thickness		
Soil Development		
	Range	Mean
Humus Depth (cm)	0-40	
Coarse Fragments (%)	20-35	
Soil Texture	Humus Form	
sandy	Mor	

Photo: no photograph

MAP

Symbol/Site Series

AB 01

Name

HwBa - Blueberry

Map Symbol	AB3, ABc3, ABch3, ABck3, ABcs3, ABcw3, ABks3, ABsw3	AB4, ABc4, ABch4, ABck4, ABcs4, ABcw4, ABks4, ABsw4	AB5, ABc5, ABch5, ABck5, ABcs5, ABcw5, ABks5, ABsw5	AB6, ABc6, ABch6, ABck6, ABcs6, ABcw6, ABks6, ABsw6	AB7, ABc7, ABch7, ABck7, ABcs7, ABcw7, ABks7, ABsw7
Plant Species	Shrub	Pole Sapling	Young Forest	Mature Forest	Old Forest
Dominants	western hemlock amabilis fir Alaskan blueberry oval-leaved blueberry	western hemlock	closed canopy of: western hemlock Amabilis fir Alaskan blueberry lanky moss	closed canopy of: western hemlock amabilis fir Alaskan blueberry step moss lanky moss	closed canopy of: western hemlock amabilis fir Alaskan blueberry step moss lanky moss
Associates	salmonberry salal deer fern bunchberry fireweed	Alaskan blueberry oval-leaved blueberry salal deer fern bunchberry step moss lanky moss	oval-leaved blueberry false azalea salal deer fern bunchberry five-leaved bramble step moss	western redcedar red huckleberry false azalea salal oval-leaved blueberry deer fern bunchberry queen's cup five-leaved bramble flat moss	western redcedar red huckleberry false azalea salal oval-leaved blueberry deer fern bunchberry queen's cup five-leaved bramble flat moss
Plots			MS04		

Comments: red alder may be a seral species on disturbed (logged) sites, especially when mineral soil is left exposed.

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
CWHvm1	AF	05	BaCw – Foamflower
	AFcj		BaCw – Foamflower; coarse-textured soil, gently sloping
	AFck		BaCw – Foamflower; coarse-textured soil, cool aspect
	AFcn		BaCw – Foamflower; coarse-textured soil, colluvial fan or cone
	AFcw		BaCw – Foamflower; coarse-textured soil, warm aspect
	AFgk		BaCw – Foamflower; gullied, cool aspect
	AFgw		BaCw – Foamflower; gullied, warm aspect
	AFsw		BaCw – Foamflower; shallow soil, warm aspect
<p>Typic AF occurs on steep slopes on deep, medium-textured soils; it is typically found on middle slope positions on nutrient rich sites. In the project area it is commonly found on coarse textured soils (c), gently sloping sites (j), on fluvial and colluvial fans and cones (n) and in gullied (g) terrain. It also occurs on steeply sloping, warm (w) and cool (k) aspects and shallow soils (s).</p>			

SITE DESCRIPTION

	Range	Mean
Elevation (m)	5-60	
Slope (%)	0-50	25
Aspect (degrees)	999, 280	
Moisture Regime	Nutrient Regime	
sub-mesic - mesic	rich	
Drainage	well (moderately well)	
Surficial Material		
sandy gravelly fluvial fan fluvial fan		
Soil Development		
	Range	Mean
Humus Depth (cm)		
Coarse Fragments (%)		
Soil Texture	Humus Form	
sandy	Moder	

Photo: no photograph

MAP

Symbol/Site Series
AF 05

Name
BaCw - Foamflower

Map Symbol	AFcj3, AFck3, AFcn3, AFcw3, AFgk3, AFgw3, AFsw3	AFcj4, AFck4, AFcn4, AFcw4, AFgk4, AFgw4, AFsw4	AFcj5, AFck5, AFcn5, AFcw5, AFgk5, AFgw5, AFsw5	AFcj6, AFck6, AFcn6, AFcw6, AFgk6, AFgw6, AFsw6	AFcj7, AFck7, AFcn7, AFcw7, AFgk7, AFgw7, AFsw7
Plant Species	Shrub	Pole Sapling	Young Forest	Mature Forest	Old Forest
Dominants	red alder western redcedar salmonberry sword fern spiny wood fern	closed canopy of: red alder western redcedar sword fern spiny wood fern	closed canopy of: western hemlock western redcedar red alder Alaskan blueberry sword fern spiny wood fern deer fern lanky moss step moss	open canopy of: western hemlock western redcedar Alaskan blueberry sword fern spiny wood fern deer fern lanky moss step moss	open canopy of: western hemlock western redcedar Alaskan blueberry sword fern spiny wood fern deer fern lanky moss step moss
Associates	western hemlock Douglas-fir Alaskan blueberry oval-leaved blueberry red elderberry thimbleberry fireweed pearly everlasting	western hemlock Douglas-fir salmonberry Alaskan blueberry oval-leaved blueberry deer fern three-leaved foamflower lanky moss step moss large leafy moss	Douglas-fir amabilis fir Sitka spruce salmonberry thimbleberry oval-leaved blueberry red huckleberry red elderberry three-leaved foamflower large leafy moss	amabilis fir Sitka spruce red alder Douglas-fir salmonberry oval-leaved blueberry red huckleberry three-leaved foamflower Oregon beaked moss large leafy moss	amabilis fir Sitka spruce red alder Douglas-fir salmonberry oval-leaved blueberry red huckleberry three-leaved foamflower Oregon beaked moss large leafy moss
Plots				MS 07	

Comments: the description is based on data from visual inspections and the MOF field guide. A low cover (typically <1%) of false azalea, devil's club, bunchberry, oak fern, five-leaved bramble, false lily-of-the-valley and lady fern may be present in these units. Pearly everlasting, fireweed, thimbleberry, salmonberry and red alder may be dominant on early successional stages on disturbed sites (exposed mineral soil).

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
CWHvm1	AS	07	BaCw – Salmonberry
	ASc		BaCw – Salmonberry; coarse-textured soil
	AScg		BaCw – Salmonberry; coarse-textured soil, gullied
	ASck		BaCw – Salmonberry; coarse-textured soil, cool aspect
	AScn		BaCw – Salmonberry; coarse-textured soil, cone of fan
	AScw		BaCw – Salmonberry; coarse-textured soil, warm aspect
	ASgk		BaCw – Salmonberry; gullied, cool aspect
	ASgw		BaCw – Salmonberry; gullied, warm aspect
	ASks		BaCw – Salmonberry; cool aspect, shallow soil
ASsw		BaCw – Salmonberry; shallow soil, warm aspect	
Typic AS occurs on gentle, lower slope receiving sites on deep, medium-textured soils. It commonly occurs on coarse-textured soils (c), fans and cones (n), and in gullies on steep slopes within the project area. It also occurs on steep slopes on cool (k) and warm aspects (w) and on shallow (s) soils.			

SITE DESCRIPTION

	Range	Mean
Elevation (m)	25-245	135
Slope (%)	20-45	33
Aspect (degrees)	35-245	
Moisture Regime	Nutrient Regime	
subhygric	rich	
Drainage	well (- imperfect)	
Surficial Material		
sandy, angular fragments colluvial veneer and thin veneer sandy, mixed fragments colluvial fan		
Soil Development		
	Range	Mean
Humus Depth (cm)		
Coarse Fragments (%)	35-70, >70	
Soil Texture	Humus Form	
sandy	Mor	

Photo: MS 60 (forested area)

MAP

Symbol/Site Series

AS 07

Name

BaCw– Salmonberry

Map Symbol	AS3, ASc3, AScg3, ASck3, AScn3, AScw3, ASgk3, ASgw3, ASks3, ASsw3	AS4, ASc4, AScg4, ASck4, AScn4, AScw4, ASgk4, ASgw4, ASks4, ASsw4	AS5, ASc5, AScg5, ASck5, AScn5, AScw5, ASgk5, ASgw5, ASks5, ASsw5	AS6, ASc6, AScg6, ASck6, AScn6, AScw6, ASgk6, ASgw6, ASks6, ASsw6	AS7, ASc7, AScg7, ASck7, AScn7, AScw7, ASgk7, ASgw7, ASks7, ASsw7
Plant Species	Shrub	Pole Sapling	Young Forest	Mature Forest	Old Forest
Dominants	red alder western hemlock salmonberry	closed canopy of: red alder western hemlock salmonberry	closed canopy of: red alder western hemlock salmonberry lanky moss	closed canopy of: western hemlock western redcedar amabilis fir red huckleberry Alaskan blueberry deer fern sword fern lanky moss	closed canopy of: western hemlock western redcedar amabilis fir red huckleberry Alaskan blueberry deer fern sword fern lanky moss
Associates	red elderberry Alaskan blueberry red elderberry sword fern spiny wood fern fireweed juniper haircap moss	red elderberry Alaskan blueberry sword fern deer fern spiny wood fern juniper haircap moss lanky moss	western redcedar red elderberry red huckleberry sword fern spiny wood fern Oregon beaked moss juniper haircap moss flat moss large leafy moss	red alder salal salmonberry spiny wood fern three-leaved foamflower lady fern step moss Oregon beaked moss flat moss	red alder salal salmonberry spiny wood fern three-leaved foamflower lady fern step moss Oregon beaked moss flat moss
Plots			MS60	MS05 in gully (low sp. cover)	

Comments: A low cover (<1%) of false azalea, oval-leaved blueberry, devil’s club, bunchberry, five-leaved bramble, and false lily-of-the-valley may be present. MS05 is located in a steep, rock controlled gully and has low species diversity and cover. Small areas of BaSs – Devil’s club (site series 08) may be found in this unit (MS 31).

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
CWHvm1	CD	10	Act – Red-osier dogwood
	CDc		Act – Red-osier dogwood; coarse-textured soils
Typic CD occurs on medium-textured soils on middle-bench floodplains. CD is mapped on coarse-textured soils (c) on fluvial sites in the project area.			

SITE DESCRIPTION

	Range	Mean
Elevation (m)		
Slope (%)		
Aspect (degrees)		
Moisture Regime	Nutrient Regime	
Drainage	well - moderately well (imperfect)	
Surficial Material		
mapped on: sandy, active fluvial veneer over gravelly fluvial plain		
Soil Development		
Regosols		
	Range	Mean
Humus Depth (cm)		
Coarse Fragments (%)		
Soil Texture	Humus Form	

Photo: no photograph

MAP

Symbol/Site Series

Name

CD 10

Act – Red-osier dogwood

Map Symbol	CDe3	CDe4	CDe5	CDe6	CDe7
Plant Species	Shrub	Pole Sapling	Young Forest	Mature Forest	Old Forest
Dominants	red alder black cottonwood salmonberry stink currant	closed canopy of: red alder black cottonwood salmonberry	closed canopy of: red alder black cottonwood salmonberry stink currant	closed canopy of: black cottonwood Sitka spruce salmonberry stink currant lady fern false lily-of-the-valley	closed canopy of: black cottonwood Sitka spruce salmonberry stink currant lady fern false lily-of-the-valley
Associates	red elderberry lady fern	stink currant lady fern deer fern oak fern	Sitka spruce red elderberry lady fern deer fern oak fern rosy twistedstalk false lily-of-the-valley	red alder red elderberry deer fern oak fern rosy twistedstalk	red alder red elderberry deer fern oak fern rosy twistedstalk
Plots					

Comments: This description is based on Green and Klinka, 1994.

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
CWHvm1	CW	11	Act – Willow
Typic CW occurs on coarse-textured soils on active, low-bench floodplains.			

SITE DESCRIPTION

	Range	Mean
Elevation (m)		
Slope (%)		
Aspect (degrees)		
Moisture Regime	Nutrient Regime	
Drainage	moderately well - imperfect	
Surficial Material		
mapped on: sandy, active fluvial veneer over gravelly fluvial plain		
Soil Development		
	Range	Mean
Humus Depth (cm)		
Coarse Fragments (%)		
Soil Texture	Humus Form	

Photo: no photograph

MAP

Symbol/Site Series

CW 11

Name

Act – Willow

Map Symbol	CW3	CW4	CW5	CW6	CW7
Plant Species	Shrub	Pole Sapling	Young Forest	Mature Forest	Old Forest
Dominants	red alder salmonberry willows	closed canopy of: red alder salmonberry willows common horsetail	closed canopy of: red alder salmonberry willows common horsetail	closed canopy of: red alder salmonberry willows common horsetail	closed canopy of: red alder salmonberry willows common horsetail
Associates	common horsetail	false lily-of-the-valley	stink currant false lily-of-the-valley large leafy moss	stink currant false lily-of-the-valley large leafy moss slender beaked moss	stink currant false lily-of-the-valley large leafy moss slender beaked moss
Plots					

Comments: This description is based on Green and Klinka, 1994.

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
CWHvm1	HD	06	HwBa – Deer fern
	HDcj		HwBa – Deer fern; coarse-textured soils, gentle slope
<p>Typic HD occurs on steep slopes on deep, medium-textured soils; this unit is typically found on lower slope positions that receive seepage. It is mapped on coarse-textured soils (c) and gentle slopes (j) in the project area.</p>			

SITE DESCRIPTION

	Range	Mean
Elevation (m)		
Slope (%)		
Aspect (degrees)		
Moisture Regime	Nutrient Regime	
subhygric - hygric	very poor - medium	
Drainage	moderately well - imperfect	
Surficial Material		
mapped on: mixed fragments, silty, sandy morainal blanket partial colluvial veneer over morainal blanket		
Soil Development		
	Range	Mean
Humus Depth (cm)		
Coarse Fragments (%)		
Soil Texture	Humus Form	

Photo: no photograph

MAP

Symbol/Site Series

HD 06

Name

HwBa – Deer fern

Map Symbol	HDcj3	HDcj4	HDcj5	HDcj6	HDcj7
Plant Species	Shrub	Pole Sapling	Young Forest	Mature Forest	Old Forest
Dominants	western hemlock salal salmonberry Alaskan blueberry deer fern	closed canopy of: western hemlock western redcedar salal deer fern	closed canopy of: western hemlock western redcedar Alaskan blueberry salal deer fern lanky moss step moss	closed canopy of: western hemlock western redcedar red huckleberry Alaskan blueberry salal deer fern lanky moss step moss	closed canopy of: western hemlock western redcedar red huckleberry Alaskan blueberry salal deer fern lanky moss step moss
Associates	bunchberry fireweed	red huckleberry Alaskan blueberry bunchberry lanky moss step moss	red huckleberry false azalea bunchberry Oregon beaked moss common green sphagnum large leafy moss	false azalea bunchberry Oregon beaked moss common green sphagnum large leafy moss	false azalea bunchberry Oregon beaked moss common green sphagnum large leafy moss
Plots					

Comments: This description is based on Green and Klinka, 1994. Amabilis fir may be present in upper elevations of the subzone as it approaches the CWWHvm2. A low cover (<1%) of sword fern, salmonberry, five-leaved bramble, false lily-of-the valley and fern-leaved goldthread may be present.

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
CWHvm1	HS	03	HwCw - Salal
	HSk		HwCw – Salal; cool aspect
	HSkv		HwCw – Salal; cool aspect, very shallow soils
	HSv		HwCw – Salal; very shallow soils
	HSvw		HwCw – Salal; very shallow soils, warm aspect
	HSw		HwCw – Salal; warm aspect
<p>Typic HS occurs on gentle slopes on shallow soils on upper slope positions. It is commonly found on steep slopes on cool (k) and warm (w) aspects in the project area. It also occurs on very shallow soils (v).</p>			

SITE DESCRIPTION

	Range	Mean
Elevation (m)	140	140
Slope (%)	100	
Aspect (degrees)	260	
Moisture Regime	Nutrient Regime	
subxeric	poor	
Drainage	well - rapid	
Surficial Material		
sandy, angular fragments colluvium		
Soil Development		
Folisol		
	Range	Mean
Humus Depth (cm)	40	
Coarse Fragments (%)		
Soil Texture	Humus Form	
organic	Mormoder	

Photo: no photograph

MAP

Symbol/Site Series

HS 03

Name

HwCw - Salal

Map Symbol	HS3, HSk3, HSkv3, HSv3, HSvw3, HSw3	HS4, HSk4, HSkv4, HSv4, HSvw4, HSw4	HS5, HSk5, HSkv5, HSv5, HSvw5, HSw5	HS6, HSk6, HSkv6, HSv6, HSvw6, HSw6	HS7, HSk7, HSkv7, HSv7, HSvw7, HSw7
Plant Species	Shrub	Pole Sapling	Young Forest	Mature Forest	Old Forest
Dominants	western redcedar Douglas-fir salal	closed canopy of: western redcedar Douglas-fir salal	closed canopy of: western redcedar western hemlock Douglas-fir salal	open canopy of: western redcedar western hemlock Douglas-fir salal	open canopy of: western redcedar western hemlock Douglas-fir salal step moss lanky moss
Associates	western hemlock Alaskan blueberry bunchberry bracken pearly everlasting	western hemlock red huckleberry Alaskan blueberry step moss lanky moss	Alaskan blueberry false azalea red huckleberry step moss flat moss lanky moss Oregon beaked moss	Alaskan blueberry ¹ false azalea ¹ red huckleberry bunchberry ¹ step moss flat moss lanky moss Oregon beaked moss ¹	Alaskan blueberry false azalea red huckleberry bunchberry flat moss Oregon beaked moss
Plots				99-02601	

Comments: The plot was located on a non-typic location i.e. steep site with shallow soils. A low cover of bunchberry was present within the plot. ¹ indicates species that are listed as indicators in the MOF field guide that did not meet abundance requirements for inclusion in the table.

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
CWHvm1	LC	02	HwPl - Cladina
Typic LC occurs on gently sloping, crest positions on shallow soils.			

SITE DESCRIPTION

	Range	Mean
Elevation (m)	150	
Slope (%)	70	
Aspect (degrees)	240	
Moisture Regime	Nutrient Regime	
very xeric	very poor - poor	
Drainage	very rapid (rapid)	
Surficial Material		
rock, moderately steep slope and steep slope also mapped on: colluvial veneer and thin veneer morainal veneer over rock undulating rock undulating sandy, angular fragments colluvial veneer and thin veneer moraine, mantle of variable thickness over rock undulating, moderate slope		
Soil Development		
	Range	Mean
Humus Depth (cm)	0-40	
Coarse Fragments (%)	35-70	
Soil Texture	Humus Form	
sandy		

Photo: no photograph

MAP

Symbol/Site Series

Name

LC 02

HwPI - Cladina

Map Symbol	LC3	LC4	LC5	LC6	LC7
Plant Species	Shrub	Pole Sapling	Young Forest	Mature Forest	Old Forest
Dominants	lodgepole pine Douglas-fir salal kinnikinnick	closed canopy of: lodgepole pine Douglas-fir salal	open canopy of: lodgepole pine Douglas-fir salal red-stemmed feathermoss	open canopy of: lodgepole pine western redcedar Douglas-fir salal red-stemmed feathermoss step moss Cladina lichens hoary rock moss	open canopy of: lodgepole pine western redcedar Douglas-fir salal red-stemmed feathermoss step moss Cladina lichens hoary rock moss
Associates	red huckleberry	kinnikinnick red huckleberry red-stemmed feathermoss step moss	western hemlock western redcedar red huckleberry Alaskan blueberry step moss Cladina lichens hoary rock moss	western hemlock red huckleberry Alaskan blueberry	western hemlock red huckleberry Alaskan blueberry
Plots	MS08				

Comments: Pearly everlasting and fireweed may occur in early successional stages.

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
CWHvm1	RS	04	CwHw – Sword fern
	RSk		CwHw – Sword fern; cool aspect
	RSks		CwHw – Sword fern; cool aspect, shallow soils
	RSsw		CwHw – Sword fern; shallow soils, warm aspect
	RSw		CwHw – Sword fern; warm aspect
Typic RS occurs on steep, upper slope positions on deep soils derived from colluvial material.			

SITE DESCRIPTION

	Range	Mean
Elevation (m)	20-100	60
Slope (%)	50-75	65
Aspect (degrees)	255-280	
Moisture Regime	Nutrient Regime	
subxeric	rich	
Drainage	well (rapid)	
Surficial Material		
angular fragments, colluvial veneer blocky colluvium moderately steep slope		
Soil Development		
Eluviated Dystric Brunisol		
	Range	Mean
Humus Depth (cm)	0-40	
Coarse Fragments (%)	35-70, >70	
Soil Texture	Humus Form	
sandy	Mor; Moder	

Photo: no photograph

MAP

Symbol/Site Series

RS 04

Name

CwHw – Sword fern

Map Symbol	RS3	RS4	RS5	RS6	RS7
Plant Species	Shrub	Pole Sapling	Young Forest	Mature Forest	Old Forest
Dominants	red alder thimbleberry sword fern	closed canopy of: western hemlock western redcedar red alder	open canopy of: western hemlock western redcedar red huckleberry sword fern oak fern ¹	open canopy of: western hemlock western redcedar sword fern oak fern Oregon beaked moss lanky moss	open canopy of: western hemlock western redcedar sword fern oak fern Oregon beaked moss lanky moss
Associates	western hemlock Douglas-fir salmonberry fireweed	Douglas-fir red huckleberry sword fern oak fern lanky moss Oregon beaked moss step moss	Douglas-fir red alder salal spiny wood fern ¹ lanky moss Oregon beaked moss step moss	Douglas-fir red alder red huckleberry spiny wood fern queen's cup step moss	Douglas-fir red alder red huckleberry spiny wood fern queen's cup step moss
Plots			MS03		

Comments: thimbleberry and salmonberry may persist into young forests but were not present in MS03. ¹ indicates species that are listed as indicators in the MOF field guide that did not meet abundance requirements for inclusion in the table.

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
CWHvm1	SS	09	Ss – Salmonberry
Typic SS occurs on medium-textured soils on high-bench floodplains.			

SITE DESCRIPTION

	Range	Mean
Elevation (m)		
Slope (%)		
Aspect (degrees)		
Moisture Regime	Nutrient Regime	
subhygric - hygric	rich – very rich	
Drainage	moderately well	
Surficial Material		
mapped on: colluvial fan		
Soil Development		
	Range	Mean
Humus Depth (cm)		
Coarse Fragments (%)		
Soil Texture	Humus Form	

Photo: no photograph

MAP

Symbol/Site Series
SS 09

Name
Ss – Salmonberry

Map Symbol	SS3	SS4	SS5	SS6	SS7
Plant Species	Shrub	Pole Sapling	Young Forest	Mature Forest	Old Forest
Dominants	red alder salmonberry lady fern sword fern	closed canopy of: western hemlock salmonberry lady fern sword fern	closed canopy of: Sitka spruce western hemlock salmonberry Alaskan blueberry lady fern three-leaved foamflower sword fern coastal leafy moss lanky moss	closed canopy of: Sitka spruce western hemlock salmonberry Alaskan blueberry lady fern three-leaved foamflower sword fern coastal leafy moss lanky moss	closed canopy of: Sitka spruce western hemlock salmonberry Alaskan blueberry lady fern three-leaved foamflower sword fern coastal leafy moss lanky moss
Associates	western hemlock Sitka spruce Alaskan blueberry stink currant red elderberry three-leaved foamflower	Sitka spruce western redcedar red alder Alaskan blueberry oak fern three-leaved foamflower lanky moss coastal leafy moss	western redcedar amabilis fir red alder oval-leaved blueberry stink currant devil's club red elderberry stream violet oak fern rosy twistedstalk one-leaved foamflower step moss large leafy moss	western redcedar amabilis fir red alder oval-leaved blueberry stink currant devil's club red elderberry stream violet oak fern rosy twistedstalk one-leaved foamflower step moss large leafy moss	western redcedar amabilis fir oval-leaved blueberry stink currant devil's club red elderberry stream violet oak fern rosy twistedstalk one-leaved foamflower step moss large leafy moss
Plots					

Comments: This description is based on Green and Klinka, 1994. These units typically have robust and species rich shrub and herb layers.

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
CWHvm1	SA	00	Sitka alder avalanche track
	SAg		Sitka alder avalanche track; gullied
	SAgw		Sitka alder avalanche track; gullied, warm aspect
	SAk		Sitka alder avalanche track; cool aspect
Typic SA occurs on (gently sloping colluvial blankets and cones)			

SITE DESCRIPTION

	Range	Mean
Elevation (m)		
Slope (%)		
Aspect (degrees)		
Moisture Regime	Nutrient Regime	
Drainage	well – moderately well	
Surficial Material		
mapped on: angular fragments colluvial fan, moderately steep slope colluvial veneer and blanket colluvial veneer and thin veneer morainal blanket, moderately steep slope rock, steep slope and moderately steep slope colluvial veneer colluvial blanket, moderately steep slope, moderate slope		
Soil Development		
	Range	Mean
Humus Depth (cm)		
Coarse Fragments (%)		
Soil Texture	Humus Form	

Photo: no photograph

MAP

Symbol/Site Series

Name

SA 00

Sitka alder avalanche track

Map Symbol	SA3a, SAg3a, SAgw3a, SAK3a	SA3b, SAg3b, SAgw3b, SAK3b
Plant Species	Low Shrub Climax	Tall Shrub Climax
Dominants	Sitka alder salmonberry false azalea Alaskan blueberry red elderberry lady fern spiny wood fern oak fern deer fern	Sitka alder salmonberry false azalea Alaskan blueberry red elderberry lady fern spiny wood fern oak fern deer fern
Associates	Indian hellebore rosy twistedstalk violet false lily-of-the-valley queen's cup	Indian hellebore rosy twistedstalk violet false lily-of-the-valley queen's cup
Plots		

Comments: this description is based on inspection MS32 in the CWHvm2. Devil's club may also be an associate.

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
CWHvm1	AP	00	Estuarine wetland
Typic AP occurs on estuaries.			

SITE DESCRIPTION

	Range	Mean
Elevation (m)	2	2
Slope (%)	0	
Aspect (degrees)	999	
Moisture Regime	Nutrient Regime	
subhydric	rich – very rich	
Drainage	poor	
Surficial Material		
sandy silty fluvial blanket		
Soil Development		
Orthic Humic Gleysol		
	Range	Mean
Humus Depth (cm)	5	
Coarse Fragments (%)	0	
Soil Texture	Humus Form	
silt loam	Hydromor	

Photo: 99-02605

MAP

Symbol/Site Series

Name

AP 00

Estuarine wetland

Map Symbol	AP2a
Plant Species	Herb Climax
Dominants	Alaska alkali grass Douglas' aster silverweed yarrow field mint
Associates	Pacific crab apple black hawthorn cattail spike bentgrass Arctic rush sea-watch sea milk-wort tufted hairgrass sea plantain groundsel
Plots	99-02605

Comments: This unit is located only on the Indian River estuary.

4.4 CWHvm2 – VERY WET MARITIME COASTAL WESTERN HEMLOCK, MONTANE VARIANT

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
CWHvm2	AB	01	HwBa - Blueberry
	ABc		HwBa – Blueberry; coarse-textured soil
	ABck		HwBa – Blueberry; coarse-textured soil, cool aspect
	ABcs		HwBa – Blueberry; coarse-textured soil, shallow soil
	ABcw		HwBa – Blueberry; coarse-textured soil, warm aspect
	ABks		HwBa – Blueberry; cool aspect, shallow soil
	ABsw		HwBa – Blueberry; shallow soil, warm aspect
<p>Typic AB occurs on gentle slopes on deep, medium-textured soils on middle slope positions. It is commonly found on coarse-textured soils (c); steeply sloping, cool (k) and warm aspects (w) on coarse-textured and shallow soils; and coarse-textured, shallow soils (s) in the project area.</p>			

SITE DESCRIPTION

	Range	Mean
Elevation (m)	700 - 790	745
Slope (%)	15 - 50	27
Aspect (degrees)	145 - 220	
Moisture Regime	Nutrient Regime	
submesic - mesic	medium	
Drainage	moderately well - well	
Surficial Material		
blocky partial colluvial veneer over morainal blanket silty sandy bouldery morainal blanket		
Soil Development		
	Range	Mean
Humus Depth (cm)	0-40	
Coarse Fragments (%)	>70	
Soil Texture	Humus Form	
sandy	Mor	

Photo: MS 25

MAP

Symbol/Site Series

Name

AB 01

HwBa - Blueberry

Map Symbol	ABc3, ABck3, ABcs3, ABcw3, ABks3, ABsw3	ABc4, ABck4, ABcs4, ABcw4, ABks4, ABsw4	ABc5, ABck5, ABcs5, ABcw5, ABks5, ABsw5	ABc6, ABck6, ABcs6, ABcw6, ABks6, ABsw6	ABc7, ABck7, ABcs7, ABcw7, ABks7, ABsw7
Plant Species	Shrub	Pole Sapling	Young Forest	Mature Forest	Old Forest
Dominants	mountain hemlock western hemlock Alaskan blueberry fireweed	closed canopy of: mountain hemlock western hemlock five-leaved bramble	closed canopy of: mountain hemlock western hemlock amabilis fir five-leaved bramble lanky moss step moss pipecleaner moss	open canopy of: mountain hemlock western hemlock amabilis fir Alaskan blueberry five-leaved bramble lanky moss step moss pipecleaner moss	open canopy of: mountain hemlock amabilis fir Alaskan blueberry five-leaved bramble queen's cup lanky moss
Associates	western redcedar oval-leaved blueberry deer fern bunchberry five-leaved bramble	yellow cedar western redcedar amabilis fir Alaskan blueberry red huckleberry oval-leaved blueberry deer fern bunchberry lanky moss step moss pipecleaner moss	yellow cedar western redcedar Alaskan blueberry black huckleberry red huckleberry oval-leaved blueberry deer fern bunchberry	yellow cedar western redcedar black huckleberry red huckleberry oval-leaved blueberry deer fern bunchberry	western hemlock yellow cedar western redcedar ¹ black huckleberry red huckleberry ¹ oval-leaved blueberry ¹ false azalea deer fern rosy twistedstalk bunchberry ¹ pipecleaner moss step moss ¹ large leafy moss
Plots					MS25, MS29

Comments: Mountain hemlock, yellow cedar and black huckleberry become more common with increasing elevation in the subzone. ¹ indicates species that are listed as indicators in the MOF field guide that did not meet abundance requirements for inclusion in the table. A low cover (<1%) of large leafy moss is typical.

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
CWHvm2	AF	05	BaCw – Foamflower
	AFcj		BaCw – Foamflower; coarse-textured soil , gentle slope
	AFck		BaCw – Foamflower; coarse-textured soil , cool aspect
	AFcn		BaCw – Foamflower; coarse-textured soil , fan or cone
	AFcw		BaCw – Foamflower; coarse-textured soil , warm aspect
	AFgk		BaCw – Foamflower; gullied, cool aspect
	AFgw		BaCw – Foamflower; gullied, warm aspect
	AFjs		BaCw – Foamflower; gentle slope, shallow soil
	AFsw		BaCw – Foamflower; shallow soil, warm aspect
Typic AF occurs on steep slopes on deep, medium-textured soils; it is typically found on nutrient rich sites. It is commonly found on coarse-texture soils (c), and gentle slopes in the project area. It occurs on warm (w) and cool aspects (k), fans and cones (n), gullies (g) and occasionally on shallow soils (s).			

SITE DESCRIPTION

	Range	Mean
Elevation (m)		
Slope (%)		
Aspect (degrees)		
Moisture Regime	Nutrient Regime	
submesic - mesic	rich – very rich	
Drainage	well (moderately well)	
Surficial Material		
mapped on: gravelly fluvial fan; colluvial fan and cone; fluvial fan colluvial veneer and blanket partial blocky colluvial blanket over silty, bouldery, sandy morainal blanket morainal blanket and veneer colluvial veneer and thin veneer rock, steep slope and moderately steep slope		
Soil Development		
	Range	Mean
Humus Depth (cm)		
Coarse Fragments (%)		
Soil Texture	Humus Form	

Photo: no photograph

MAP

Symbol/Site Series

AF 05

Name

BaCw - Foamflower

Map Symbol	AFcj3, AFck3, AFcn3, AFcw3, AFgk3, AFgw3, AFjs3, AFsw3	AFcj4, AFck4, AFcn4, AFcw4, AFgk4, AFgw4, AFjs4, AFsw4	AFcj5, AFck5, AFcn5, AFcw5, AFgk5, AFgw5, AFjs5, AFsw5	AFcj6, AFck6, AFcn6, AFcw6, AFgk6, AFgw6, AFjs6, AFsw6	AFcj7, AFck7, AFcn7, AFcw7, AFgk7, AFgw7, AFjs7, AFsw7
Plant Species	Shrub	Pole Sapling	Young Forest	Mature Forest	Old Forest
Dominants	western hemlock western redcedar red alder thimbleberry salmonberry sword fern	closed canopy of: western hemlock western redcedar five-leaved bramble	closed canopy of: western hemlock amabilis fir western redcedar five-leaved bramble lanky moss	open canopy of: western hemlock amabilis fir western redcedar Alaskan blueberry five-leaved bramble spiny wood fern lanky moss	open canopy of: western hemlock amabilis fir western redcedar Alaskan blueberry five-leaved bramble spiny wood fern lanky moss
Associates	red elderberry Alaskan blueberry bunchberry fireweed	amabilis fir Alaskan blueberry red huckleberry spiny wood fern bunchberry sword fern lanky moss	Alaskan blueberry red huckleberry bunchberry spiny wood fern sword fern pipecleaner moss flat moss large leafy moss	red huckleberry bunchberry sword fern pipecleaner moss flat moss large leafy moss	red huckleberry bunchberry sword fern pipecleaner moss flat moss large leafy moss
Plots					

Comments: This description is based on Green and Klinka, 1994. A low cover (<1%) of salmonberry, salal, deer fern, and three-leaved foamflower is common in these ecosystems. Douglas-fir may be present on warm aspects in the lower elevations of the variant. Red alder may be a dominant in early successional stages on disturbed sites with exposed mineral soils.

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
CWHvm2	AS	07	BaCw – Salmonberry
	ASc		BaCw – Salmonberry; coarse-textured soil
	AScg		BaCw – Salmonberry; coarse-textured soil, gullied
	ASck		BaCw – Salmonberry; coarse-textured soil, cool aspect
	AScn		BaCw – Salmonberry; coarse-textured soil, fan or cone
	AScw		BaCw – Salmonberry; coarse-textured soil, warm aspect
	ASgk		BaCw – Salmonberry; gullied, cool aspect
	ASgw		BaCw – Salmonberry; gullied, warm aspect
	ASks		BaCw – Salmonberry; cool aspect, shallow soil
	ASsw		BaCw – Salmonberry; shallow soil, warm aspect
<p>Typic AS occurs on gentle, lower slopes that receive moisture on deep, medium-textured soil. It is commonly found on coarse-textured soils (c), cool aspects (k) and warm aspects (w) and gullies (g) in the project area. It is infrequently found on fans or cones (n) and on shallow soils (s) on warm and cool aspects. It is frequently associated with creeks or small streams.</p>			

SITE DESCRIPTION

	Range	Mean
Elevation (m)	680 - 770	725
Slope (%)	20	20
Aspect (degrees)	120 - 150	
Moisture Regime	Nutrient Regime	
subhygric	rich – very rich	
Drainage	moderately well - imperfect	
Surficial Material		
bouldery, gravelly fluvial active, gentle slope bouldery fluvial active plain		
Soil Development		
	Range	Mean
Humus Depth (cm)		
Coarse Fragments (%)	>70	
Soil Texture	Humus Form	
sandy		

Photo: no photograph

MAP

Symbol/Site Series
AS 07

Name
BaCw– Salmonberry

Map Symbol	ASc3, AScg3, ASck3, AScn3, AScw3, ASgk3, ASgw3, ASks3, ASaw3	ASc4, AScg4, ASck4, AScn4, AScw4, ASgk4, ASgw4, ASks4, ASaw4	ASc5, AScg5, ASck5, AScn5, AScw5, ASgk5, ASgw5, ASks5, ASaw5	ASc6, AScg6, ASck6, AScn6, AScw6, ASgk6, ASgw6, ASks6, ASaw6	ASc7, AScg7, ASck7, AScn7, AScw7, ASgk7, ASgw7, ASks7, ASaw7
Plant Species	Shrub	Pole Sapling	Young Forest	Mature Forest	Old Forest
Dominants	western hemlock amabilis fir red alder salmonberry red elderberry lady fern goat's beard narrow beech fern fireweed	closed canopy of: western hemlock amabilis fir Alaskan blueberry deer fern	closed canopy of: western hemlock mountain hemlock amabilis fir salmonberry Sitka alder Alaskan blueberry deer fern five-leaved bramble lanky moss	open canopy of: western hemlock mountain hemlock amabilis fir salmonberry Sitka alder Alaskan blueberry deer fern five-leaved bramble lanky moss	open canopy of: western hemlock mountain hemlock amabilis fir salmonberry false azalea Sitka alder oval-leaved blueberry Alaskan blueberry ¹ bunchberry five-leaved bramble ¹ lanky moss ¹
Associates	Alaskan blueberry sword fern deer fern bunchberry	western redcedar mountain hemlock salmonberry red huckleberry five-leaved bramble bunchberry lanky moss juniper haircap moss	yellow cedar western redcedar mountain hemlock red huckleberry oval-leaved blueberry false azalea sword fern bunchberry three-leaved foamflower juniper haircap moss step moss flat moss large leafy moss	yellow cedar western redcedar mountain hemlock red huckleberry oval-leaved blueberry false azalea sword fern bunchberry three-leaved foamflower juniper haircap moss step moss flat moss large leafy moss	yellow cedar western redcedar ¹ red huckleberry ¹ sword fern ¹ deer fern three-leaved foamflower juniper haircap moss step moss ¹ flat moss ¹ large leafy moss ¹
Plots	MS45				MS30

Comments: Sitka alder and salmonberry appear to be dominants along stream and creek beds and/or in gullies. ¹ indicates species that are listed as indicators in the MOF field guide that did not meet abundance requirements for inclusion in the table.

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
CWHvm2	HD	06	HwBa – Deer fern
	HDcj		HwBa – Deer fern; coarse-textured soil, gentle slope
	HDks		HwBa – Deer fern; cool aspect, shallow soils
	HDsw		HwBa – Deer fern; shallow soils, warm aspect
<p>Typic HD occurs on steep slopes on deep, medium-textured soils; this unit is typically found on lower slope positions that receive seepage. It commonly occurs on coarse-textured soil (c) on gently sloping sites in the project area. It infrequently is mapped on shallow soils (s) on warm and cool aspects.</p>			

SITE DESCRIPTION

	Range	Mean
Elevation (m)	745	745
Slope (%)	10	
Aspect (degrees)	170	
Moisture Regime	Nutrient Regime	
subhygric	poor	
Drainage	moderately well - imperfect	
Surficial Material		
partial mesic organic veneer over morainal blanket		
Soil Development		
	Range	Mean
Humus Depth (cm)	>40	
Coarse Fragments (%)	<20	
Soil Texture	Humus Form	

Photo: MS 27

MAP

Symbol/Site Series
HD 06

Name
HwBa – Deer fern

Map Symbol	HDcj3, HDks3, HDsw3	HDcj4, HDks4, HDsw4	HDcj5, HDks5, HDsw5	HDcj6, HDks6, HDsw6	HDcj7, HDks7, HDsw7
Plant Species	Shrub	Pole Sapling	Young Forest	Mature Forest	Old Forest
Dominants	yellow cedar western redcedar western hemlock Alaskan blueberry bunchberry five-leaved bramble deer fern	closed canopy of: yellow cedar western redcedar western hemlock Alaskan blueberry bunchberry five-leaved bramble deer fern fern-leaved goldthread	closed canopy of: yellow cedar western redcedar western hemlock amabilis fir Alaskan blueberry bunchberry five-leaved bramble deer fern fern-leaved goldthread step moss lanky moss large leafy moss	open canopy of: yellow cedar western redcedar western hemlock amabilis fir Alaskan blueberry bunchberry five-leaved bramble deer fern fern-leaved goldthread step moss lanky moss large leafy moss	open canopy of: mountain hemlock yellow cedar western redcedar ¹ western hemlock ¹ amabilis fir ¹ Alaskan blueberry copperbush bunchberry five-leaved bramble deer fern fern-leaved goldthread ¹ step moss ¹ lanky moss ¹ large leafy moss ¹
Associates	amabilis fir salmonberry Indian hellebore	amabilis fir mountain hemlock false azalea step moss lanky moss large leafy moss	mountain hemlock false azalea Indian hellebore pipecleaner moss flat moss common green sphagnum scapania	mountain hemlock false azalea Indian hellebore pipecleaner moss flat moss common green sphagnum scapania	red huckleberry ¹ false azalea Indian hellebore red mountain-heather pipecleaner moss ¹ flat moss ¹ common green sphagnum ¹ scapania ¹
Plots					MS27

Comments: A low cover (<1%) of copperbush, salal and oval-leaved blueberry is typical for this unit. The abundance of mountain hemlock, and copperbush in MS27 may be due to the gently sloping terrain and local cold air ponding. ¹ indicates species that are listed as indicators in the MOF field guide that did not meet abundance requirements for inclusion in the table.

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
CWHvm2	HS	03	HwCw - Salal
	HSh		HwCw – Salal; hummocky terrain
	HSk		HwCw – Salal; cool aspect
	HSkv		HwCw – Salal; cool aspect, very shallow soils
	HSr		HwCw – Salal; ridge
	HSrv		HwCw – Salal; ridge, very shallow soils
	HSvw		HwCw – Salal; very shallow soils, warm aspect
	HSw		HwCw – Salal; warm aspect
Typic HS occurs on gently sloping, upper slope positions on shallow soil. It is very common on steep slopes on warm (w) and cool (k) aspects. It is also found on very shallow soils (v), on hummocky terrain (h) and on ridges (r).			

SITE DESCRIPTION

	Range	Mean
Elevation (m)	820	
Slope (%)		
Aspect (degrees)		
Moisture Regime	Nutrient Regime	
xeric - subxeric	very poor – medium	
Drainage	well - rapid	
Surficial Material		
mapped on: rock, steep slope and moderately steep slope; colluvial thin veneer and veneer; moraine, undulating topography; morainal veneer over rock, undulating topography; rock, moderate slope and undulating topography; moraine, mantle of variable thickness over rock, steep slope and moderately steep slope; angular fragments, colluvial veneer and thin veneer; morainal veneer; moraine, mantle of variable thickness over rock, undulating topography; moraine, mantle of variable thickness; rock, hummocks, undulating topography		
Soil Development		
	Range	Mean
Humus Depth (cm)		
Coarse Fragments (%)		
Soil Texture	Humus Form	

Photo: no photograph

MAP

Symbol/Site Series

HS 03

Name

HwCw - Salal

Map Symbol	HS3, HSh3, HSk3, HSkv3, HSr3, HSrv3, HSvw3, HSw3	HS4, HSh4, HSk4, HSkv4, HSr4, HSrv4, HSvw4, HSw4	HS5, HSh5, HSk5, HSkv5, HSr5, HSrv5, HSvw5, HSw5	HS6, HSh6, HSk6, HSkv6, HSr6, HSrv6, HSvw6, HSw6	HS7, HSh7, HSk7, HSkv7, HSr7, HSrv7, HSvw7, HSw7
Plant Species	Shrub	Pole Sapling	Young Forest	Mature Forest	Old Forest
Dominants	western hemlock western redcedar Douglas-fir Alaskan blueberry salal	closed canopy of: western hemlock western redcedar Douglas-fir Alaskan blueberry salal	open canopy of: western hemlock western redcedar Douglas-fir Alaskan blueberry red huckleberry salal step moss lanky moss	open canopy of: western hemlock western redcedar Douglas-fir Alaskan blueberry red huckleberry salal step moss lanky moss	open canopy of: western hemlock western redcedar Douglas-fir Alaskan blueberry red huckleberry salal step moss lanky moss
Associates	red huckleberry oval-leaved blueberry fireweed pearly everlasting	red huckleberry oval-leaved blueberry false azalea step moss lanky moss	yellow cedar oval-leaved blueberry false azalea pipecleaner moss red-stemmed feathermoss flat moss	yellow cedar oval-leaved blueberry false azalea pipecleaner moss red-stemmed feathermoss flat moss	yellow cedar oval-leaved blueberry false azalea pipecleaner moss red-stemmed feathermoss flat moss
Plots					

Comments: This description is based on Green and Klinka, 1994.

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
CWHvm2	LC	02	HwPl - Cladina
	LCk		HwPl - Cladina; cool aspect
	LCkv		HwPl - Cladina; cool aspect, very shallow soil
	LCv		HwPl - Cladina; very shallow soil
	LCvw		HwPl - Cladina; very shallow soil, warm aspect
	LCw		HwPl - Cladina; warm aspect
	LCz		HwPl - Cladina; very steep warm aspect
Typic LC occurs on gently sloping, crest positions on shallow soils. Within the project area LC frequently occurs on warm aspects (w) and very shallow soils (v); it is less frequent on very steep warm aspects (z) and on cool aspect (k).			

SITE DESCRIPTION

	Range	Mean
Elevation (m)		
Slope (%)		
Aspect (degrees)		
Moisture Regime	Nutrient Regime	
very xeric	very poor - medium	
Drainage	rapid (very rapid)	
Surficial Material		
mapped on: rock, steep slope and moderately steep slope colluvial thin veneer and veneer rock, undulating topography rock, hummocks and undulating topography rock, undulating topography and moderate slope		
Soil Development		
	Range	Mean
Humus Depth (cm)		
Coarse Fragments (%)		
Soil Texture	Humus Form	

Photo: no photograph

MAP

Symbol/Site Series
LC 02

Name
HwPI - Cladina

Map Symbol	LC3, LCK3, LCKv3, LCv3, LCvw3, LCw3, LCz3	LC4, LCK4, LCKv4, LCv4, LCvw4, LCw4, LCz4	LC5, LCK5, LCKv5, LCv5, LCvw5, LCv5, LCz5	LC6, LCK6, LCKv6, LCv6, LCvw6, LCw6, LCz6	LC7, LCK7, LCKv7, LCv7, LCvw7, LCw7, LCz7
Plant Species	Shrub	Pole Sapling	Young Forest	Mature Forest	Old Forest
Dominants	lodgepole pine salal white mountain-heather	closed canopy of: mountain hemlock lodgepole pine salal	open canopy of: mountain hemlock lodgepole pine salal white mountain-heather <i>Cladina</i> spp.	open canopy of: mountain hemlock lodgepole pine salal white mountain-heather <i>Cladina</i> spp.	open canopy of: mountain hemlock lodgepole pine salal white mountain-heather <i>Cladina</i> spp.
Associates	mountain hemlock yellow cedar Alaskan blueberry copperbush dwarf blueberry crowberry	yellow cedar Alaskan blueberry copperbush dwarf blueberry white mountain-heather crowberry red-stemmed feathermoss <i>Cladina</i> spp.	yellow cedar Alaskan blueberry copperbush dwarf blueberry crowberry red-stemmed feathermoss	yellow cedar Alaskan blueberry copperbush dwarf blueberry crowberry red-stemmed feathermoss	yellow cedar Alaskan blueberry copperbush dwarf blueberry crowberry red-stemmed feathermoss
Plots					

Comments: This description is based on Green and Klinka, 1994. Douglas-fir may be present in this ecosystem at the lower elevations of this biogeoclimatic unit. A very low cover (<1%) of western hemlock, red huckleberry, false azalea, step moss, lanky moss, and pipecleaner moss may be present in these ecosystems.

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
CWHvm2	RS	04	CwHw – Sword fern
	RScj		CwHw – Sword fern; coarse-textured soil, gentle slope
	RSck		CwHw – Sword fern; coarse-textured soil, cool aspect
	RScw		CwHw – Sword fern; coarse-textured soil, warm aspect
	RSsw		CwHw – Sword fern; shallow soil, warm aspect
<p>Typic RS occurs on steep, upper slope positions on deep medium-textured soil; it occurs on rich nutrient regimes. RS is not very common in the CWHvm2 within the project area; it is found on coarse-textured soil. It is most frequently mapped on steep, cool aspects (ck) and on shallow soils on warm aspects (sw). It is infrequently mapped on coarse-textured soil on gentle slopes (cj) and on coarse-textured soil on steep, warm aspects (cw).</p>			

SITE DESCRIPTION

	Range	Mean
Elevation (m)		
Slope (%)		
Aspect (degrees)		
Moisture Regime	Nutrient Regime	
xeric - subxeric	rich – very rich	
Drainage	well (rapid)	
Surficial Material		
mapped on: colluvial veneer and thin veneer angular fragments colluvial veneer, moderately steep slope		
Soil Development		
	Range	Mean
Humus Depth (cm)		
Coarse Fragments (%)		
Soil Texture	Humus Form	

Photo: no photograph

MAP

Symbol/Site Series

RS 04

Name

CwHw – Sword fern

Map Symbol	RScj3, RSck3, RScw3, RSsw3	RScj4, RSck4, RScw4, RSsw4	RScj5, RSck5, RScw5, RSsw5	RScj6, RSck6, RScw6, RSsw6	RScj7, RSck6, RScw6, RSsw6
Plant Species	Shrub	Pole Sapling	Young Forest	Mature Forest	Old Forest
Dominants	western redcedar fireweed trailing blackberry	closed canopy of: western hemlock western redcedar red huckleberry	closed canopy of: western hemlock western redcedar yellow cedar red huckleberry step moss pipecleaner moss	closed canopy of: western hemlock western redcedar yellow cedar red huckleberry step moss pipecleaner moss	closed canopy of: western hemlock western redcedar yellow cedar red huckleberry step moss pipecleaner moss
Associates	oval-leaved blueberry red huckleberry dull Oregon-grape vanilla leaf	western hemlock yellow cedar oval-leaved blueberry dull Oregon-grape vanilla leaf step moss pipecleaner moss lanky moss	amabilis fir oval-leaved blueberry dull Oregon-grape vanilla leaf lanky moss	amabilis fir oval-leaved blueberry dull Oregon-grape vanilla leaf lanky moss	amabilis fir oval-leaved blueberry dull Oregon-grape vanilla leaf lanky moss
Plots					

Comments: This description is based on Green and Klinka (1994). Douglas-fir may be found at lower elevations, especially on warm aspects ecosystems. A low cover (<1%) of Alaskan blueberry, sword fern, five-leaved bramble and three-leaved foamflower is commonly found in these ecosystems.

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
CWHvm2	SA	00	Sitka alder avalanche track
	SAgw		Sitka alder avalanche track; gullied, warm aspect
	SAk		Sitka alder avalanche track; cool aspect
	SAw		Sitka alder avalanche track; warm aspect
<p>Typic SA occurs on gently sloping colluvial blankets and cones. It is commonly found on steep cool (k) and warm (w) aspects in the project area. It is mapped infrequently on gullies on warm aspects (gw).</p>			

SITE DESCRIPTION

	Range	Mean
Elevation (m)	695 - 800	748
Slope (%)	65	
Aspect (degrees)	70	
Moisture Regime	Nutrient Regime	
subhygric	rich	
Drainage	well (moderately well)	
Surficial Material		
angular colluvium, moderately steep slope		
Soil Development		
	Range	Mean
Humus Depth (cm)	0 - 40	
Coarse Fragments (%)	>70	
Soil Texture	Humus Form	
sandy		

Photo: MS 32

MAP

Symbol/Site Series

SA 00

Name

Sitka alder avalanche track

Map Symbol	SA3a, SAgw3a, SAK3a, SAw3a	SA3b, SAgw3b, SAK3b, SAw3b
Plant Species	Low Shrub Climax	Tall Shrub Climax
Dominants	Sitka alder salmonberry false azalea Alaskan blueberry red elderberry lady fern spiny wood fern oak fern deer fern	Sitka alder salmonberry false azalea Alaskan blueberry red elderberry lady fern spiny wood fern oak fern deer fern
Associates	western hemlock Indian hellebore rosy twistedstalk <i>Viola</i> sp. false lily-of-the-valley queens' cup	western hemlock Indian hellebore rosy twistedstalk <i>Viola</i> sp. false lily-of-the-valley queens' cup
Plots		MS32

Comments: Devil's club may also be an associate.

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
CWHvm2	YG	09	CwYc – Goldthread
Typic YG occurs on lower slope positions on organic soils (bog forest).			

SITE DESCRIPTION

	Range	Mean
Elevation (m)		
Slope (%)		
Aspect (degrees)		
Moisture Regime	Nutrient Regime	
hygric	very poor - medium	
Drainage	imperfect - poor	
Surficial Material		
mapped on: mesic organic plain organic plain		
Soil Development		
	Range	Mean
Humus Depth (cm)		
Coarse Fragments (%)		
Soil Texture	Humus Form	

Photo: no photograph

MAP

Symbol/Site Series

Name

YG 09

CwYc - Goldthread

Map Symbol	YG3	YG4	YG5	YG6	YG7
Plant Species	Shrub	Pole Sapling	Young Forest	Mature Forest	Old Forest
Dominants	western hemlock mountain hemlock Alaskan blueberry salal	closed canopy of: western hemlock mountain hemlock Alaskan blueberry salal	closed canopy of: western hemlock yellow cedar mountain hemlock Alaskan blueberry salal step moss lanky moss common green sphagnum	open canopy of: western hemlock yellow cedar mountain hemlock Alaskan blueberry salal step moss lanky moss common green sphagnum	open canopy of: western hemlock yellow cedar mountain hemlock Alaskan blueberry salal step moss lanky moss common green sphagnum
Associates	yellow cedar western redcedar bunchberry deer fern five-leaved bramble fern-leaved goldthread	yellow cedar western redcedar bunchberry deer fern five-leaved bramble fern-leaved goldthread step moss lanky moss common green sphagnum large leafy moss	western redcedar oval-leaved blueberry false azalea bunchberry deer fern five-leaved bramble fern-leaved goldthread large leafy moss	western redcedar oval-leaved blueberry false azalea bunchberry deer fern five-leaved bramble fern-leaved goldthread large leafy moss	western redcedar oval-leaved blueberry false azalea bunchberry deer fern five-leaved bramble fern-leaved goldthread large leafy moss
Plots					

Comments: This description is based on Green and Klinka (1994). A very low cover (<1%) of amabilis fir, red huckleberry, skunk cabbage and scapania may be present in these ecosystems.

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
CWHvm2	FS	32	Non-forested fen
Typic FS occurs on organic soil.			

SITE DESCRIPTION

	Range	Mean
Elevation (m)	680 - 760	728
Slope (%)	0 - 5	2
Aspect (degrees)	none, 140 - 210	
Moisture Regime	Nutrient Regime	
subhydric (- hydric)	poor – rich	
Drainage	poorly – very poorly	
Surficial Material		
mesic organic plain mesic organic plain, undulating organic veneer		
Soil Development		
Organic		
	Range	Mean
Humus Depth (cm)	>40	
Coarse Fragments (%)	0	
Soil Texture	Humus Form	
mesic		

Photo: MS 26

MAP**Symbol/Site Series**

FS 32

Name**Non-forested fen**

Map Symbol	FS2b
Plant Species	Herb Climax
Dominants	western bog-laurel sedges (few-flowered sedge, Sitka sedge) narrow-leaved cotton-grass creeping spike-rush sphagnum mosses
Associates	mountain hemlock yellow cedar hardhack bunchberry northern starflower skunk cabbage sticky false asphodel subalpine daisy alpine white marsh-marigold
Plots	MS26, MS28

Comments: Stunted mountain hemlock and yellow cedar are scattered throughout or found along the fringe of this wetland towards the forested units.

MAP

Symbol/Site Series

AB 04

Name

HmBa - Bramble

Map Symbol	ABc3, ABks3, ABsw3	ABc4, ABks4, ABsw4	ABc5, ABks5, ABsw5	ABc6, ABks6, ABsw6	ABc7, ABks7, ABsw7
Plant Species	Shrub	Pole Sapling	Young Forest	Mature Forest	Old Forest
Dominants	mountain hemlock oval-leaved blueberry Alaskan blueberry black huckleberry	closed canopy of: mountain hemlock five-leaved bramble pipecleaner moss lanky moss	closed canopy of: mountain hemlock amabilis fir oval-leaved blueberry Alaskan blueberry black huckleberry five-leaved bramble pipecleaner moss lanky moss	closed canopy of: mountain hemlock amabilis fir oval-leaved blueberry Alaskan blueberry black huckleberry five-leaved bramble pipecleaner moss lanky moss	closed canopy of: mountain hemlock amabilis fir oval-leaved blueberry Alaskan blueberry black huckleberry five-leaved bramble pipecleaner moss lanky moss
Associates	amabilis fir western hemlock false azalea rosy twistedstalk five-leaved bramble fireweed	amabilis fir western hemlock oval-leaved blueberry Alaskan blueberry black huckleberry false azalea rosy twistedstalk curly heron's-bill moss	yellow cedar western hemlock false azalea copperbush rosy twistedstalk curly heron's-bill moss	yellow cedar western hemlock false azalea copperbush rosy twistedstalk curly heron's-bill moss	yellow cedar western hemlock false azalea copperbush rosy twistedstalk curly heron's-bill moss
Plots					

Comments: This description is based on Green and Klinka (1994).

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
MHmm1	MB	01	HmBa - Blueberry
	MBcj		HmBa – Blueberry; coarse-textured soil, gentle slope
	MBck		HmBa – Blueberry; coarse-textured soil, cool aspect
	MBcw		HmBa – Blueberry; coarse-textured soil, warm aspect
	MBjs		HmBa – Blueberry; gentle slope, shallow soil
	MBks		HmBa – Blueberry; cool aspect, shallow soil
	MBkv		HmBa – Blueberry; cool aspect, very shallow soil
	MBqs		HmBa – Blueberry; very steep cool aspect, shallow soil
	MBsw		HmBa – Blueberry; shallow soil, warm aspect
	MBvw		HmBa – Blueberry; very shallow soil, warm aspect
<p>Typic MB occurs on steep slopes on deep, medium-textured soils. Within the project area, MB is commonly found on coarse-textured soils on gentle slopes (cj), cool aspects on shallow soils (ks) and shallow soils on warm aspects (sw). It is also found on coarse-textured soils on cool (ck) and warm (cw) aspects; it is infrequently found on cool aspects on very shallow soils (kv); very shallow soils on warm aspects (vw) and very steep cool aspects on shallow soil (qs).</p>			

SITE DESCRIPTION

	Range	Mean
Elevation (m)	1060 – 1180	1124
Slope (%)	25 - 90	63
Aspect (degrees)	120 - 350	
Moisture Regime	Nutrient Regime	
submesic - mesic	poor - medium	
Drainage	well (– moderately well)	
Surficial Material		
blocky colluvial veneer over mixed fragments, silty, sandy moraine mantle of variable thickness silty, sandy, angular colluvial veneer silty, mixed fragments, sandy morainal mantle of variable thickness moraine, mantle of variable thickness		
Soil Development		
	Range	Mean
Humus Depth (cm)	0 – 40	
Coarse Fragments (%)	35 - 70	
Soil Texture	Humus Form	
sandy, loamy	Mor	

Photo: MS 14

MAP

Symbol/Site Series

MB 01

Name

HmBa - Blueberry

Map Symbol	MBcj3, MBck3, MBcw3, MBjs3, MBks3, MBkv3, MBqs3, MBsw3, MBvw3	MBcj4, MBck4, MBcw4, MBjs4, MBks4, MBkv4, MBqs4, MBsw4, MBvw4	MBcj5, MBck5, MBcw5, MBjs5, MBks5, MBkv5, MBqs5, MBsw5, MBvw5	MBcj6, MBck6, MBcw6, MBjs6, MBks6, MBkv6, MBqs6, MBsw6, MBvw6	MBcj7, MBck7, MBcw7, MBjs7, MBks7, MBkv7, MBqs7, MBsw7, MBvw7
Plant Species	Shrub	Pole Sapling	Young Forest	Mature Forest	Old Forest
Dominants	mountain hemlock Alaskan blueberry oval-leaved blueberry black huckleberry	closed canopy of: mountain hemlock five-leaved bramble pipecleaner moss	closed canopy of: mountain hemlock amabilis fir Alaskan blueberry oval-leaved blueberry five-leaved bramble pipecleaner moss	open canopy of: mountain hemlock amabilis fir Alaskan blueberry oval-leaved blueberry five-leaved bramble pipecleaner moss	open canopy of: mountain hemlock amabilis fir Alaskan blueberry copperbush oval-leaved blueberry deer fern five-leaved bramble pipecleaner moss ¹
Associates	false azalea fireweed five-leaved bramble pipecleaner moss	amabilis fir western hemlock Alaskan blueberry oval-leaved blueberry black huckleberry false azalea pink mountain-heather lanky moss curly heron's-bill moss	yellow cedar western hemlock black huckleberry copperbush false azalea pink mountain-heather queen's cup lanky moss curly heron's-bill moss	yellow cedar western hemlock black huckleberry copperbush false azalea pink mountain-heather queen's cup lanky moss curly heron's-bill moss	yellow cedar western hemlock ¹ black huckleberry false azalea pink mountain-heather rosy twistedstalk queen's cup lanky moss ¹ curly heron's-bill moss ¹
Plots					MS19, MS38

Comments: ¹ indicates species that are listed as indicators in the MOF field guide that did not meet abundance requirements for inclusion in the table (mosses where not recorded for these two observations). Copperbush and deer fern are not typical dominants in MB ecosystems. Pink mountain-heather becomes more common in open canopy forests as elevation approaches parkland; western hemlock becomes less common with elevation.

MAP

Symbol/Site Series

MD 06

Name

HmYc- Deer cabbage

Map Symbol	MDc3, MDcw3	MDc4, MDcw4	MDc5, MDcw5	MDc6, MDcw6	MDc7, MDcw7
Plant Species	Shrub	Pole Sapling	Young Forest	Mature Forest	Old Forest
Dominants	mountain hemlock oval-leaved blueberry Alaskan blueberry copperbush five-leaved bramble rosy twistedstalk deer-cabbage	closed canopy: mountain hemlock five-leaved bramble rosy twistedstalk deer-cabbage lanky moss	open canopy of: mountain hemlock amabilis fir yellow cedar oval-leaved blueberry Alaskan blueberry false azalea copperbush five-leaved bramble rosy twistedstalk deer-cabbage lanky moss	open canopy of: mountain hemlock amabilis fir yellow cedar oval-leaved blueberry Alaskan blueberry false azalea copperbush five-leaved bramble rosy twistedstalk deer-cabbage lanky moss	open canopy of: mountain hemlock amabilis fir yellow cedar oval-leaved blueberry Alaskan blueberry false azalea copperbush five-leaved bramble rosy twistedstalk deer-cabbage lanky moss
Associates	amabilis fir yellow cedar false azalea deer fern fireweed	amabilis fir yellow cedar oval-leaved blueberry Alaskan blueberry black huckleberry false azalea copperbush deer fern	black huckleberry deer fern pipecleaner moss mountain leafy liverwort	black huckleberry deer fern pipecleaner moss mountain leafy liverwort	black huckleberry deer fern pipecleaner moss mountain leafy liverwort
Plots					

Comments: This description is based on Green and Klinka (1994).

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
MHmm1	MM	02	HmBa – Mountain-heather
	MMk		HmBa – Mountain-heather; cool aspect
	MMkv		HmBa – Mountain-heather; cool aspect, very shallow soil
	MMqv		HmBa – Mountain-heather; very steep cool aspect, very shallow soil
	MMv		HmBa – Mountain-heather; very shallow soil
	MMvw		HmBa – Mountain-heather; very shallow soil, warm aspect
	MMw		HmBa – Mountain-heather; warm aspect
Typic MM occurs on gently sloping, crest positions on shallow soils. MM is very common within the project area; it is also found on very shallow soils (v), cool aspects (k), cool aspects with very shallow soil (kv), very steep cool aspects on very shallow soils (qv), warm aspects (w) and warm aspects on very shallow soils (vw).			

SITE DESCRIPTION

	Range	Mean
Elevation (m)	1200 - 1225	1212
Slope (%)	5 - 60	32
Aspect (degrees)	none, 250	
Moisture Regime	Nutrient Regime	
xeric	poor	
Drainage	rapid (very rapid)	
Surficial Material		
silty, angular, sandy colluvial thin veneer mixed fragment, sandy moraine mantle of variable thickness and undulating rock		
Soil Development		
Ferro-Humic Podzol		
	Range	Mean
Humus Depth (cm)	3.5	
Coarse Fragments (%)	<20	
Soil Texture	Humus Form	
loamy sand	Humimor	

Photo: 99-02602

MAP

Symbol/Site Series

MM 02

Name

HmBa – Mountain-heather

Map Symbol	MM3, MMk3, MMkv3, MMqv3, MMv3, MMvw3, MMw3	MM4, MMk4, MMkv4, MMqv4, MMv4, MMvw4, MMw4	MM5, MMk5, MMkv5, MMqv5, MMv5, MMvw5, MMw5	MM6, MMk6, MMkv6, MMqv6, MMv6, MMvw6, MMw6	MM7, MMk7, MMkv7, MMqv7, MMv7, MMvw7, MMw7
Plant Species	Shrub	Pole Sapling	Young Forest	Mature Forest	Old Forest
Dominants	blue-leaved huckleberry black huckleberry copperbush Alaskan blueberry pink mountain-heather	open canopy of: mountain hemlock amabilis fir blue-leaved huckleberry black huckleberry copperbush Alaskan blueberry pink mountain-heather	open canopy of: mountain hemlock yellow cedar amabilis fir blue-leaved huckleberry black huckleberry copperbush Alaskan blueberry pink mountain-heather <i>Cladonia</i> spp. pipecleaner moss curly heron's-bill moss broom moss	open canopy of: mountain hemlock yellow cedar amabilis fir blue-leaved huckleberry black huckleberry copperbush Alaskan blueberry pink mountain-heather <i>Cladonia</i> spp. pipecleaner moss curly heron's-bill moss broom moss	open canopy of: mountain hemlock yellow cedar amabilis fir blue-leaved huckleberry black huckleberry copperbush Alaskan blueberry pink mountain-heather dwarf blueberry <i>Cladonia</i> spp. pipecleaner moss curly heron's-bill moss ¹ broom moss ¹
Associates	mountain hemlock yellow cedar amabilis fir oval-leaved blueberry white-flowered rhododendron white mountain-heather five-leaved bramble	yellow cedar oval-leaved blueberry white-flowered rhododendron white mountain-heather five-leaved bramble <i>Cladonia</i> spp. pipecleaner moss curly heron's-bill moss broom moss	false azalea oval-leaved blueberry white-flowered rhododendron western tea-berry white mountain-heather five-leaved bramble dwarf blueberry reindeer lichens mountain leafy liverwort lanky moss	false azalea oval-leaved blueberry white-flowered rhododendron western tea-berry white mountain-heather five-leaved bramble dwarf blueberry reindeer lichens mountain leafy liverwort lanky moss	false azalea oval-leaved blueberry ¹ white-flowered rhododendron ¹ Sitka mountain-ash western tea-berry white mountain-heather ¹ five-leaved bramble grey reindeer lichen mountain leafy liverwort ¹ lanky moss ¹
Plots					99-02602

Comments: Trees in the MM are often low in stature (stunted) and many may be found in the shrub layers.

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
MHmm1	MO	03	BaHm – Oak fern
	MOcj		BaHm – Oak fern; coarse-textured soil, gentle slope
	MOck		BaHm – Oak fern; coarse-textured soil, cool aspect
	MOcw		BaHm – Oak fern; coarse-textured soil, warm aspect
	MOgk		BaHm – Oak fern; gullied, cool aspect
	MOgw		BaHm – Oak fern; gullied, warm aspect
	MOjs		BaHm – Oak fern; gentle slope, shallow soil
	MOks		BaHm – Oak fern; cool aspect, shallow soil
<p>Typic MO occurs on steep slopes on deep, medium textured soils on nutrient rich sites. Within the project area, MO occurs on coarse-textured soil on gentle slopes (cj), coarse-textured soils on cool aspects (ck), coarse-textured soils on warm aspects (cw), and gentle slopes and shallow soils (js). It is occasionally found on gullies on cool (gk) and warm (gw) aspects, and cool aspects on shallow soils (ks).</p>			

SITE DESCRIPTION

	Range	Mean
Elevation (m)	1060	1060
Slope (%)	20	
Aspect (degrees)	180	
Moisture Regime	Nutrient Regime	
subxeric - mesic	rich – very rich	
Drainage	moderately well - well	
Surficial Material		
silty, mixed fragments, sandy moraine mantle of variable thickness		
Soil Development		
	Range	Mean
Humus Depth (cm)	0 - 40	
Coarse Fragments (%)	20 - 35	
Soil Texture	Humus Form	
sandy	Mor	

Photo: MS 10

MAP

Symbol/Site Series

MO 03

Name

BaHm – Oak fern

Map Symbol	MOcj3, MOck3, MOcw3, MOgk3, MOgw3, MOjs3, MOks3	MOcj4, MOck4, MOcw4, MOgk4, MOgw4, MOjs4, MOks4	MOcj5, MOck5, MOcw5, MOgk5, MOgw5, MOjs5, MOks5	MOcj6, MOck6, MOcw6, MOgk6, MOgw6, MOjs6, MOks6	MOcj7, MOck7, MOcw7, MOgk7, MOgw7, MOjs7, MOks7
Plant Species	Shrub	Pole Sapling	Young Forest	Mature Forest	Old Forest
Dominants	mountain hemlock Alaskan blueberry salmonberry five-leaved bramble oak fern	mountain hemlock five-leaved bramble lanky moss	closed canopy of: mountain hemlock amabilis fir Alaskan blueberry false azalea devil's club five-leaved bramble small twistedstalk oak fern lanky moss	open canopy of: mountain hemlock amabilis fir Alaskan blueberry false azalea devil's club five-leaved bramble small twistedstalk oak fern lanky moss	open canopy of: mountain hemlock yellow cedar Alaskan blueberry false azalea devil's club ¹ five-leaved bramble rosy twistedstalk oak fern ¹ three-leaved foamflower pipecleaner moss lanky moss ¹
Associates	western hemlock devil's club oval-leaved blueberry false azalea small twistedstalk lady fern lanky moss	yellow cedar western hemlock amabilis fir Alaskan blueberry false azalea devil's club small twistedstalk oak fern salmonberry oval-leaved blueberry lady fern	yellow cedar western hemlock salmonberry green alder oval-leaved blueberry lady fern pipecleaner moss curly heron's-bill moss leafy moss	yellow cedar western hemlock salmonberry green alder oval-leaved blueberry lady fern pipecleaner moss curly heron's-bill moss leafy moss	amabilis fir western hemlock ¹ salmonberry ¹ green alder ¹ oval-leaved blueberry ¹ lady fern ¹ clasping twistedstalk deer fern queen's cup curly heron's-bill moss leafy moss
Plots					MS10

Comments: MO ecosystems generally have a diverse herb layer, however many species are typically present in low abundance. A low cover (<1%) of deer fern, rosy twistedstalk, one-leaved foamflower and Indian hellebore may be present. MS10 is transitional to the MT ecosystem.

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
MHmm1	YH	07	YcHm - Hellebore
	YHc		YcHm – Hellebore; coarse-textured soil
	YHcg		YcHm – Hellebore; coarse-textured soil, gullied
	YHck		YcHm – Hellebore; coarse-textured soil, cool aspect
	YHcw		YcHm – Hellebore; coarse-textured soil, warm aspect
<p>Typic YH occurs on gentle, lower slopes on medium-textured soils. It typically occurs on wet, nutrient rich sites. YH is not common in the project area; it is found on coarse-textured soils (c), coarse-textured soil on gullies (cg), and coarse-textured soil on cool (ck) and warm aspects (cw).</p>			

SITE DESCRIPTION

	Range	Mean
Elevation (m)	1040 - 1050	1045
Slope (%)	50	50
Aspect (degrees)	290	
Moisture Regime	Nutrient Regime	
hygric	rich – very rich	
Drainage	moderately well - imperfect	
Surficial Material		
silty, mixed fragments, sandy moraine mantle of variable thickness		
Soil Development		
	Range	Mean
Humus Depth (cm)	0 – 40	
Coarse Fragments (%)	20 – 35	
Soil Texture	Humus Form	
sandy	Mor	

Photo: no photograph

MAP

Symbol/Site Series

Name

YH 07

YcHm - Hellebore

Map Symbol	YHc3, YHcg3, YHck3, YHcw3	YHc4, YHcg4, YHck4, YHcw4	YHc5, YHcg5, YHck5, YHcw5	YHc6, YHcg6, YHck6, YHcw6	YHc7, YHcg7, Yhck7, YHcw7
Plant Species	Shrub	Pole Sapling	Young Forest	Mature Forest	Old Forest
Dominants	mountain hemlock Alaskan blueberry lady fern Indian hellebore rosy twistedstalk white marsh-marigold fireweed	closed canopy of: mountain hemlock Alaskan blueberry lady fern Indian hellebore rosy twistedstalk white marsh-marigold	open canopy of: mountain hemlock amabilis fir Alaskan blueberry lady fern Indian hellebore rosy twistedstalk white marsh-marigold sphagnum moss	open canopy of: mountain hemlock amabilis fir Alaskan blueberry lady fern Indian hellebore rosy twistedstalk white marsh-marigold sphagnum moss	open canopy of: mountain hemlock amabilis fir Alaskan blueberry salmonberry lady fern three-leaved foamflower Indian hellebore rosy twistedstalk white marsh-marigold ¹ sphagnum moss ¹
Associates	oval-leaved blueberry salmonberry oak fern clasping twistedstalk skunk cabbage	amabilis fir oval-leaved blueberry salmonberry deer fern oak fern clasping twistedstalk skunk cabbage sphagnum moss	oval-leaved blueberry green alder salmonberry deer fern oak fern clasping twistedstalk one-leaved foamflower fern-leaved goldthread skunk cabbage	oval-leaved blueberry green alder salmonberry deer fern oak fern clasping twistedstalk one-leaved foamflower fern-leaved goldthread skunk cabbage	oval-leaved blueberry ¹ green alder ¹ deer fern spiny wood fern oak fern <i>Carex</i> spp. clasping twistedstalk five-leaved bramble one-leaved foamflower ¹ fern-leaved goldthread ¹ skunk cabbage ¹
Plots					MS15

Comments: ¹ indicates species that are listed as indicators in Green and Klinka (1994) that did not meet abundance requirements for inclusion in the table. YH typically has a rich and diverse herb layer. MS10 was located in an atypical setting (i.e. on a steep slope).

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
MHmm1	YS	08	HmYc - Sphagnum
Typic YS occurs on gentle, lower slopes on organic soils (treed bog). This ecosystem is very uncommon in the project area.			

SITE DESCRIPTION

	Range	Mean
Elevation (m)		
Slope (%)		
Aspect (degrees)		
Moisture Regime	Nutrient Regime	
subhydric	very poor - poor	
Drainage	poor	
Surficial Material		
mapped on: organic plain organic blanket over rock, undulating		
Soil Development		
	Range	Mean
Humus Depth (cm)		
Coarse Fragments (%)		
Soil Texture	Humus Form	

Photo: no photograph

MAP

Symbol/Site Series

Name

YS 08

HmYc - Sphagnum

Map Symbol	YS3	YS4	YS5	YS6	YS7
Plant Species	Shrub	Pole Sapling	Young Forest	Mature Forest	Old Forest
Dominants	mountain hemlock yellow cedar oval-leaved blueberry deer cabbage white marsh-marigold	mountain hemlock yellow cedar oval-leaved blueberry copperbush deer cabbage white marsh-marigold	open canopy of: mountain hemlock yellow cedar oval-leaved blueberry copperbush deer cabbage white marsh-marigold lanky moss sphagnum moss	open canopy of: mountain hemlock yellow cedar oval-leaved blueberry copperbush deer cabbage white marsh-marigold lanky moss sphagnum moss	open canopy of: mountain hemlock yellow cedar oval-leaved blueberry copperbush deer cabbage white marsh-marigold lanky moss sphagnum moss
Associates	copperbush five-leaved bramble white mountain-heather skunk cabbage sedge	false azalea five-leaved bramble white mountain-heather fern-leaved goldthread skunk cabbage sedge lanky moss sphagnum moss	false azalea five-leaved bramble white mountain-heather fern-leaved goldthread skunk cabbage sedge	false azalea five-leaved bramble white mountain-heather fern-leaved goldthread skunk cabbage sedge	western hemlock false azalea five-leaved bramble white mountain-heather fern-leaved goldthread skunk cabbage sedge
Plots					

Comments: This description is based on Green and Klinka (1994).

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
MHmm1	SA	00	Avalanche track
	SAgw		Avalanche track; gullied, warm aspect
	SAk		Avalanche track; cool aspect
	SAw		Avalanche track; warm aspect
Typic SA occurs on active colluvial blankets and cones. SA is common on cool aspects (k); it is also found on warm aspects (w) and in gullies on warm aspects (gw).			

SITE DESCRIPTION

	Range	Mean
Elevation (m)	1050	1050
Slope (%)	55	55
Aspect (degrees)	155	
Moisture Regime	Nutrient Regime	
subhygric	rich	
Drainage	well	
Surficial Material		
angular colluvial veneer		
Soil Development		
	Range	Mean
Humus Depth (cm)	0 – 40	
Coarse Fragments (%)	>70	
Soil Texture	Humus Form	
loamy	Mor	

Photo: MS 39

MAP

Symbol/Site Series

SA 00

Name

Avalanche track

Map Symbol	SAgw3a, SAK3a, SAw3a	SAgw3b, SAK3b, SAw3b
Plant Species	Low Shrub Climax	Tall Shrub Climax
Dominants	Sitka alder salmonberry Alaskan blueberry false azalea lady fern deer fern rosy twistedstalk queen's cup	Sitka alder salmonberry Alaskan blueberry false azalea lady fern deer fern rosy twistedstalk queen's cup
Associates	mountain hemlock amabilis fir black huckleberry one-leaved foamflower goatsbeard <i>Festuca</i> sp. <i>Viola</i> sp. Indian hellebore	mountain hemlock amabilis fir black huckleberry one-leaved foamflower goatsbeard <i>Festuca</i> sp. <i>Viola</i> sp. Indian hellebore
Plots		MS39

Comments: Stage 3a is dominated by shrubs less than 2 m in height; 3b is greater than 2m in height.

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
MHmm1	CA	00	Tufted clubrush - Asphodel wetland
Typic CA occurs on organic veneers and blankets. It is relatively uncommon in the project area. These wetlands are generally small in size.			

SITE DESCRIPTION

	Range	Mean
Elevation (m)	1000	1000
Slope (%)	0	
Aspect (degrees)	none	
Moisture Regime	Nutrient Regime	
subhydric	medium - rich	
Drainage	very poorly	
Surficial Material		
mesic organic plain		
Soil Development		
Organic		
	Range	Mean
Humus Depth (cm)	>40	
Coarse Fragments (%)	0	
Soil Texture	Humus Form	
mesic		

Photo: MS 09

MAP

Symbol/Site Series

CA 00

Name

Tufted clubrush – Asphodel wetland

Map Symbol	
Plant Species	Herb Climax
Dominants	narrow-leaved cotton-grass western bog-laurel sedges (smooth sedge, poor sedge) sphagnum mosses
Associates	northern starflower stream violet skunk cabbage yellow cedar
Plots	MS09

Comments: These wetlands are generally found in complex with very moist and wet forests.

4.6 MHmmp1 – MOIST MARITIME PARKLAND MOUNTAIN HEMLOCK, WINDWARD VARIANT

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
MHmmp1	MP	00	Mountain hemlock parkland
	MPh		Mountain hemlock parkland; hummocky terrain
	MPk		Mountain hemlock parkland; cool aspect
	MPw		Mountain hemlock parkland; warm aspect
<p>Typic MP occurs on gentle to moderate slopes on shallow soils. MP is common within the parkland biogeoclimatic unit. MPh is found on hummocky terrain; MP also occurs on cool (k) and warm (w) aspects.</p>			

SITE DESCRIPTION

	Range	Mean
Elevation (m)	1110 - 1165	1138
Slope (%)	0 - 15	10
Aspect (degrees)	none	
Moisture Regime	Nutrient Regime	
subxeric - submesic	medium	
Drainage	well	
Surficial Material		
mixed fragments, sandy moraine mantle of variable thickness mixed fragments, silty, sandy moraine veneer		
Soil Development		
Orthic Dystric Brunisol		
	Range	Mean
Humus Depth (cm)	0 - 40, 6	
Coarse Fragments (%)	20 - 35	
Soil Texture	Humus Form	
sandy, sandy loam	Mor, Humimor	

Photo: MS 11

MAP

Symbol/Site Series
MP 00

Name
Mountain hemlock parkland

Map Symbol	MP3, MPh3, MPk3, MPw3	MP4, MPh4, MPk4, MPw4	MP5, MPh5, MPk5, MPw5	MP6, MPh6, MPk6, MPw6	MP7, MPh7, MPk7, MPw7
Plant Species	Shrub	Pole Sapling	Young Forest	Mature Forest	Old Forest
Dominants	mountain hemlock oval-leaved blueberry Alaskan blueberry pink mountain-heather white mountain-heather five-leaved bramble	very open canopy of: mountain hemlock yellow cedar oval-leaved blueberry Alaskan blueberry pink mountain-heather white mountain-heather five-leaved bramble curly heron's-bill moss	very open canopy of: mountain hemlock yellow cedar oval-leaved blueberry Alaskan blueberry pink mountain-heather white mountain-heather five-leaved bramble curly heron's-bill moss	very open canopy of: mountain hemlock yellow cedar oval-leaved blueberry Alaskan blueberry pink mountain-heather white mountain-heather five-leaved bramble curly heron's-bill moss	very open canopy of: mountain hemlock yellow cedar oval-leaved blueberry Alaskan blueberry pink mountain-heather white mountain-heather five-leaved bramble curly heron's-bill moss
Associates	amabilis fir yellow cedar black huckleberry partridgefoot	amabilis fir subalpine fir black huckleberry false azalea partridgefoot snow-mat liverwort* pipecleaner moss* <i>Cladonia</i> spp.*	amabilis fir subalpine fir black huckleberry false azalea copperbush partridgefoot black alpine sedge snow-mat liverwort* pipecleaner moss* <i>Cladonia</i> spp.*	amabilis fir subalpine fir black huckleberry false azalea copperbush partridgefoot black alpine sedge snow-mat liverwort* pipecleaner moss* <i>Cladonia</i> spp.*	amabilis fir subalpine fir black huckleberry false azalea copperbush partridgefoot black alpine sedge snow-mat liverwort* pipecleaner moss* <i>Cladonia</i> spp.*
Plots					99-02604, MS11

Comments: It is likely that black huckleberry becomes more abundant with increasing elevation while Alaskan blueberry and oval-leaved blueberry become less abundant. * indicates possible moss layer species from Klinka et al. (1997). Black alpine sedge is found in moist depressions.

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
MHmmp1	MH	00	Mountain-heather meadows
	MHh		Mountain-heather meadows; hummocky terrain
	MHk		Mountain-heather meadows; cool aspect
	MHw		Mountain-heather meadows; warm aspect
Typic MH on shallow soils on ridgetops and down gentle to moderate slopes of all aspects. MH is common in the MHmmp1 within the project area; it is uncommon on hummocky terrain (h) and on cool (k) and warm (w) aspects.			

SITE DESCRIPTION

	Range	Mean
Elevation (m)		
Slope (%)		
Aspect (degrees)		
Moisture Regime	Nutrient Regime	
Drainage	well – moderately well	
Surficial Material		
mapped on: morainal veneer; morainal mantle of variable thickness and thin veneer; rock, moderately steep slope and moderate slope; rock, hummocks and undulating; mixed fragments, silty, sandy morainal mantle of variable thickness, veneer and thin veneer; morainal mantle of variable thickness over rock undulating and moderate slope; colluvial thin veneer and veneer		
Soil Development		
	Range	Mean
Humus Depth (cm)		
Coarse Fragments (%)		
Soil Texture	Humus Form	

Photo: no photograph

MAP

Symbol/Site Series

Name

MH 00

Mountain-hemlock meadows

Map Symbol	
Plant Species	Herb Climax
Dominants	white mountain-heather pink mountain-heather
Associates	mountain hemlock black huckleberry blue-leaved huckleberry partridgefoot snow-mat liverwort curly heron's-bill moss Sitka clubmoss
Plots	adapted from Klinka et al. , 1997

Comments: Other possible associates include Sitka mountain-ash, slender hawkweed, Piper's wood-rush, Arctic lupine, Sitka valerian, five-leaved bramble, alpine-wintergreen, mountain hairgrass, showy sedge, alpine pussytoes, icelandmoss, woolly coral and *Cladonia* lichens.

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
MHmmp1	MK	00	Montane krummholz
	MKk		Montane krummholz; cool aspect
	MKq		Montane krummholz; very steep cool aspect
	MKw		Montane krummholz; warm aspect
Typic MK occurs on well drained gentle slopes with thin soil development. It is common on cool aspects (k) and uncommon on very steep cool aspects; it is also found on warm aspects (w).			

SITE DESCRIPTION

	Range	Mean
Elevation (m)		
Slope (%)		
Aspect (degrees)		
Moisture Regime	Nutrient Regime	
xeric - submesic	poor to medium	
Drainage	rapid - well	
Surficial Material		
mapped on: silty, sandy, angular colluvial veneer and thin veneer rock, steep slope and moderately steep slope colluvial veneer and thin veneer morainal mantle of variable thickness, thin veneer		
Soil Development		
	Range	Mean
Humus Depth (cm)		
Coarse Fragments (%)		
Soil Texture	Humus Form	

Photo: no photograph

MAP

Symbol/Site Series

Name

MK 00

Montane krummholz

Map Symbol	MK3a	MK3b
Plant Species	Low Shrub Climax	Tall Shrub Climax
Dominants	mountain hemlock whit mountain-heather pink mountain-heather	mountain hemlock whit mountain-heather pink mountain-heather
Associates	black huckleberry curly heron's-bill moss pipecleaner moss	black huckleberry curly heron's-bill moss pipecleaner moss
Plots		

Comments: MK appears as thick patches of dwarf /prostrate conifers in stage 3a; in stage 3b the conifers are more upright (trees are in the lower end of the 2-10 m range of stage 3b).

BIOGEOCLIMATIC UNIT	MAP		
	Symbol	Site Series	Name
MHmmp1	SA	00	Avalanche track
	SAk		Avalanche track; cool aspect
Typic SA occurs on active colluvial blankets and cones. It is uncommon in the MHmmp1; it is mapped on cool aspects (k).			

SITE DESCRIPTION

	Range	Mean
Elevation (m)		
Slope (%)		
Aspect (degrees)		
Moisture Regime	Nutrient Regime	
Drainage	well – moderately well	
Surficial Material		
mapped on: angular colluvial thin veneer and veneer rock, steep slope and moderately steep slope		
Soil Development		
	Range	Mean
Humus Depth (cm)		
Coarse Fragments (%)		
Soil Texture	Humus Form	

Photo: no photograph

MAP

Symbol/Site Series

SA 00

Name

Avalanche track

Map Symbol	SA3a	SA3b
Plant Species	Low Shrub Climax	Tall Shrub Climax
Dominants	Sitka alder salmonberry lady fern deer fern rosy twistedstalk queen's cup	Sitka alder salmonberry lady fern deer fern rosy twistedstalk queen's cup
Associates	mountain hemlock amabilis fir black huckleberry Alaskan blueberry false azalea one-leaved foamflower goatsbeard <i>Festuca</i> sp. <i>Viola</i> sp. Indian hellebore	mountain hemlock amabilis fir black huckleberry Alaskan blueberry false azalea one-leaved foamflower goatsbeard <i>Festuca</i> sp. <i>Viola</i> sp. Indian hellebore
Plots		

Comments: This description is based on MS39 (MHmm1).

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TABLES

Table 1: Ecosystem Units Mapped in the Indian Arm and Mount Seymour Provincial Parks Project Area

Subzone	Ecosystem Unit	Site Series	Site Series Name	Typical Situation	Typical Soil Moisture Regime	Assumed Site Modifiers	Mapped Site Modifiers
CWHdm	HM	01	Hw - Flat moss	significant slopes, middle slope position, deep soils	submesic – mesic	d	j,s,w
CWHdm	DS	03	FdHw – Salal	significant slopes, upper to middle slope position, warm, aspect, deep soils	xeric - subxeric	d,w	
CWHdm	RS	05	Cw – Sword fern	significant slope; middle slope position, deep medium-textured soils, richer nutrient regime (use aspect modifier)	submesic – mesic	d,m	j,s,w
CWHdm	RF	07	Cw – Foamflower	gentle slope, lower, receiving positions, deep - medium – textured soil; richer nutrient regime	subhygric – hygric	d,j,m	
CWHvm1	AB	01	HwBa – Blueberry	gentle slope, middle slope position; deep medium- textured soils	submesic – mesic	d,m,j	c,h,k,s,w
CWHvm1	LC	02	HwPI – Cladina	gentle slope; crest position, shallow soils	very xeric	j,r,s	k,v,w
CWHvm1	HS	03	HwCw – Salal	upper slope position; gentle slope on shallow soils	xeric – subxeric	j,s	k,v,w
CWHvm1	RS	04	CwHw – Sword fern	significant slope, upper slope position; deep soils of colluvial (use aspect modifiers)	xeric – subxeric	d	j,k,s,w
CWHvm1	AF	05	BaCw – Foamflower	significant slope, middle slope position; deep medium –textured soils; richer nutrient regime (use aspect modifiers)	submesic – mesic	d,m	c,g,j,k,n,s,w
CWHvm1	HD	06	HwBa – Deer fern	significant slope, lower slope position; deep medium textured soils seepage (use aspect modifiers)	subhygric	d,m	c,j
CWHvm1	AS	07	BaCw – Salmonberry	gentle lower receiving slope, deep, medium - textured soil	subhygric – hygric	d,j,m	a,c,g,k,n,s,w
CWHvm1	SS	09	Ss – Salmonberry	high bench – floodplain, medium –textured soil	subhygric – hygric	a,m	

CWHvm1	CD	10	Act - Red-osier dogwood	middle bench – floodplain, medium-textured soil	subhygric – hygric	a,m	C
CWHvm1	CW	11	Act – Willow	low bench – floodplain, coarse-textured soil	subhydric	a,c	
CWHvm1	AP	00	Estuarine marsh	estuarine march	hygric - subhydric	j	
CWHvm1	SA	00	Sitka alder – Salmonberry	avalanche track			g,k,w
CWHvm2	AB	01	HwBa – Blueberry	gentle slope, middle slope position; deep medium-textured soils	submesic – mesic	d,j,m	c,k,s,w
CWHvm2	LC	02	HwPI – Cladina	gentle slope, crest position; shallow soils	very xeric	j,r,s	k,v,w,z
CWHvm2	HS	03	HwCw – Salal	gentle slope, upper slope position; shallow soils	xeric – subxeric	j,s	h,k,r,v,w
CWHvm2	RS	04	CwHw – Sword fern	significant slope; upper slope position, deep medium-textured soil, richer nutrient regime (use aspect modifiers)	xeric – subxeric	d,m	c,j,k,s,w
CWHvm2	AF	05	BaCw – Foamflower	significant slope; deep medium-textured soils, richer nutrient regime (use aspect modifiers)	submesic – mesic	d,m	c,g,k,n,s,w
CWHvm2	HD	06	HwBa – Deer fern	significant slope; deep medium-textured soils, seepage (use aspect modifiers)	subhygric	d,m	c,j,k,s,w
CWHvm2	AS	07	BaCw – Salmonberry	gentle slope, lower slope receiving position, deep medium-textured soil (southern and central portion of variant)	subhygric – hygric	d,j,m	c,g,k,n,s,w
CWHvm2	YG	09	CwYc – Goldthread	lower slope; organic bog forest	subhygric – hygric	p	
CWHvm2	FS	00	Non-forested fen/march	Non-forested fen/march (Carex fen)			
CWHvm2	SA	00	Sitka alder – Salmonberry	avalanche track			g,k,w

MHmm1	MB	01	HmBa – Blueberry	significant slopes (use aspect modifiers); deep, medium-textured soils	mesic	d,m	c,j,k,q,s,w, v
MHmm1	MM	02	HmBa – Mountain-heather	gentle slopes, crest position, shallow soils	very xeric – xeric	j,r,s	k,q,v,w
MHmm1	MO	03	BaHm – Oak fern	significant slopes; deep medium-textured soils; richer nutrient regime (use aspect modifiers)	subxeric – xeric	d,m	c,g,j,k,s,w
MHmm1	AB	04	HmBa – Bramble	significant slopes; deep medium-textured soils; middle to lower slope position, seepage (use aspect modifiers)	subhygric	d,m	c,k,s,w
MHmm1	MD	06	HmYc – Deer cabbage	gentle slopes, receiving sites; deep medium-textured soils	hygric	d,j,m	c,w
MHmm1	YH	07	YcHm – Hellebore	lower slope position; gentle slopes; medium-textured soil, wet, richer nutrient regime	hygric	j,m	c,g,k,w
MHmm1	YS	08	HmYc – Sphagnum	lower slope; treed bog; organic	subhydric	p	
MHmm1	SA	00	Sitka alder – Salmonberry	limited to active avalanche tracks situated on colluvial blankets and cones	mesic – subhygric		
MHmm1	CA	00	Tufted clubrush – Asphodel wetland	organic veneers and blankets			
MHmmp1	MH	00	Mountain heather meadows	shallow rocky soils on ridgetops and down gentle to moderate slopes of all aspects	subxeric - mesic		h,k,w
MHmmp1	MK	00	Mountain heather krummholz	Mountain heather krummholz			k,q,w
MHmmp1	MP	00	Mountain heather parkland	Mountain heather parkland			h,k,w
MHmmp1	SA	00	Sitka alder – Salmonberry	avalanche track			k

Other sparsely or non-vegetated units

Ecosystem Unit	Site Series Name	Mapped Site Modifiers
EX	Exposed soil	
GB	Gravel bar	k
LA	Lake	
MU	Mudflat sediment	
OW	Shallow open water	
PD	Pond	
RI	River	
RO	Rock outcrop	
TA	Talus	
RR	Rural Residential	g,h,k,r,w,z
SW	Saltwater	
UR	Urban/Suburban	k,w

APPENDIX A

APPENDIX A. STANDARD TERRAIN LEGEND - LONG VERSION

(1) TERRAIN POLYGON SYMBOLS

Simple Terrain Units: e.g., texture ----> gFt - J <---- process
 surficial material ____/ ____ surface expression

Note: Two or three letters may be used to describe any characteristic other than surficial material, or letters may be omitted if information is lacking.

Composite Units: Two or three groups of letters are used to indicate that two or three kinds of terrain are present in a polygon. Deciles are used to indicate the relative proportions of each kind of terrain.

e.g., 8Mv 2Rs indicates that the polygon consists of 80% Mv and 20% Rs.

Stratigraphic Units: Groups of letters are arranged one above the other where one or more kinds of surficial material overlie a different material or bedrock:

e.g., $\frac{Mv}{Rr}$ indicates that Mv overlies Rr.

$\frac{/Mv}{Rr}$ indicates that Rr is partially buried by Mv

(2) MATERIALS

A	Anthropogenic materials	Artificial materials, and materials modified by human actions such that their original physical appearance and properties have been drastically altered.
C	Colluvium	Products of gravitational slope movements; materials derived from local bedrock and major deposits derived from drift; includes talus and landslide deposits.
D	Weathered bedrock	Bedrock modified <i>in situ</i> by mechanical and chemical weathering.
E	Eolian sediments	Sand and silt transported and deposited by wind; includes loess.
F	Fluvial materials	Sands and gravels transported and deposited by streams and rivers; floodplains, terraces and alluvial fans.
FA	"Active" materials fluvial	Active deposition zone on modern floodplains and fans; active channel zone.

(2) MATERIALS cont'd

FG	Glaciofluvial materials	Sands and gravels transported and deposited by meltwater streams; includes kames, eskers and outwash plains.
I	Ice	Permanent snow and ice; glaciers.
L	Lacustrine sediments	Fine sand, silt and clay deposited in lakes, and beach gravels and sand.
LG	Glaciolacustrine sediments	Fine sand, silt and clay deposited in ice-dammed lakes; beach gravels and sand.
M	Till	Material deposited by glaciers without modification by flowing water. Typically consists of a mixture of pebbles, cobbles and boulders in a matrix of sand, silt and clay.
M1	Ablation till	Material accumulated on top of a melting glacier; coarse textured and less consolidated than basal till.
M2	Little Ice Age till	Moraines and till deposited by alpine and valley glaciers during Little Ice Age advance and recession.
O	Organic materials	Material resulting from the accumulation of decaying vegetative matter; includes peat and organic soils.
R	Bedrock	Outcrops, and bedrock within a few centimetres of the surface.
U	Undifferentiated materials	Different surficial materials in such close proximity that they cannot be separated at the scale of the mapping.
V	Volcanic materials	Unconsolidated pyroclastic sediments.
W	Marine sediments	Sediments deposited by settling and gravity flows in brackish or marine waters, and beach sands and gravels.
WG	Glaciomarine sediments	Sediments laid down in marine waters in close proximity to glacier ice, and beach sands and gravels.

(3) TEXTURE

Specific Clastic Terms

c	clay	< 2 μ m	k	cobbles	64 - 256 mm
z	silt	62.5 - 2 μ m	b	boulders	> 256 mm
s	sand	2 mm - 62.5 μ m	a	blocks	angular boulders
p	pebbles	2 - 64 mm			

Common Clastic Terms

f	finer	any or all of c, z, and fine s
d	mixed fragments	mixed angular and rounded fragments
g	gravel	any or both of p and k; may include b
r	rubble	angular particles, 2 - 256 mm
x	angular fragments	mix of both r and a
m	mud	mix of both c and z
y	shells	shell or shell fragments

Organic Terms

e	fibric
---	--------

u	mesic
h	humic

(4) SURFACE EXPRESSION

a	moderate slope(s)	predominantly planar slopes; 15-26 ^o (27-49%).
b	blanket	material >1-2m thick with topography derived from underlying bedrock (which may not be mapped) or surficial material.
c	cone	a fan-shaped surface that is a sector of a cone; slopes 15 ^o (27%) and steeper.
d	depression	enclosed depressions.
f	fan	a fan-shaped surface that is a sector of a cone; slopes 3-15 ^o (5-27%).
h	hummocky	steep-sided hillocks and hollows; many slopes >15 ^o (27%).
j	gentle slope(s)	predominantly planar slopes; 3-15 ^o (5-27%).
k	moderately steep slope	predominantly planar slopes; 26-35 ^o (49-70%).
m	rolling topography	linear rises and depressions; <15 ^o (27%).
p	plain	0-3 ^o (0-5%).
r	ridges	linear rises and depressions with many slopes >15 ^o (27%).
s	steep slope(s)	slopes steeper than 35 ^o (70%).
t	terrace(s)	stepped topography and benchlands.
u	undulating topography	hillocks and hollows; slopes predominantly <15 ^o (27%).
v	veneer	material <1-2m thick with topography derived from underlying bedrock (may not be mapped) or surficial material; may include outcrops of underlying material.
w	mantle of variable thickness	material of variable thickness infilling depressions in an irregular substrate (rock or surficial material).
x	thin veneer	a thin veneer, where material is predominantly 10-25 centimeters thick.

(5) GEOLOGICAL PROCESSES AND MASS MOVEMENT SUB-CLASSES

A	Avalanches	Slopes modified by frequent snow avalanches.
Af	Avalanches: major tracks	In zones of coniferous forest: broad avalanche track(s) occupied by predominantly shrubby, deciduous vegetation.
Am	Avalanches: minor tracks	Similar to above, but generally narrower than the height of adjacent trees.
Aw	Avalanches: mixed	Includes both major and minor avalanche tracks.
Ao	Avalanches: old tracks	Clearly visible on air photos, but less well defined than active tracks because they are partly or completely occupied by young conifers.
B	Braiding channel	Channel zone with many diverging and rejoining channels; channels are laterally unstable.
C	Cryoturbation	Heaving and churning of soil/surficial materials due to frost action.
D	Deflation	Removal of sand and silt particles by wind action.
E	Glacial meltwater channels	Areas crossed by meltwater channels that are too small or too numerous to map individually.
F	Failing	Slope experiencing slow mass movement, such as sliding or slumping.
H	Kettled	Area includes numerous small depressions and/or lakes where buried blocks of ice melted.
I	Irregularly sinuous channel	Channel displays irregular turns and bends.
J	Anastomosing channel	Channels diverge and converge around semi-permanent islands.
K	Karst processes	Solution of carbonates (limestone, dolomite) resulting in development of collapse and subsidence features.
L	Surface seepage	Abundant seepage.
M	Meandering channel	Channel characterized by regular turns and bends.
N	Nivation	Surface modified by hollows developed around semi-permanent snowbanks.
P	Piping	Subsurface erosion of silty sediments by flowing water resulting in the formation of underground conduits.
R	Rapid mass movement	Slope affected by processes such as debris flows, debris slides, and rockfall.
S	Solifluction	Slope modified by slow downslope movement of seasonally frozen regolith.
U	Inundated	Areas submerged in standing water from a seasonally high watertable.
U1	Inundated due to beavers	Areas submerged by shallow standing water behind beaver dams.
V	Gullying	Slope affected by gully erosion.
W	Washing	Winnowing of fines by flowing water; development of lag deposits.
X	Permafrost processes	Processes related to the presence of permafrost and permafrost aggradation or degradation.
Z	Periglacial processes	Solifluction, nivation and cryoturbation occurring together in a single terrain polygon.

Mass Movement Sub-Classes

-F"	Slow m.m. (initiation zone)	-Fu, -Ru	Slump in surficial material: slow, rapid
-R"	Rapid m. m. (initiation zone)	-Fx, -Rx	Slump-earthflow: slow, rapid
-Fc	soil creep	-Rb	Rockfall
-Fe	Earthflow	-Rd	Debris flow
-Fg	Rock creep	-Rf	Debris fall
-Fj	Lateral spread in surficial materials	-Rr, -Fr	Rockslide: slow, rapid
-Fk	Tension cracks	-Rs, -Fs	Debris slide: slow, rapid
-Fm, -Rm	Slump in bedrock: slow, rapid	-Rt	Debris torrent
-Fp, -Rp	Lateral spread in bedrock: slow, rapid	-Fu, -Ru	Slump in surficial materials

(6) SOIL DRAINAGE CLASSES

x	very rapidly drained	Water is removed from the soil very rapidly in relation to supply.
r	rapidly drained	water is removed from the soil rapidly in relation to supply
w	well drained	water is removed from the soil readily but not rapidly
m	moderately well drained	water is removed from the soil somewhat slowly in relation to supply
i	imperfectly drained	water is removed from the soil sufficiently slowly in relation to supply to keep the soil wet for a significant part of the growing season
p	poorly drained	water is removed so slowly in relation to supply that the soil remains wet for a comparatively large part of the time the soil is not frozen
v	very poorly drained	water is removed from the soil so slowly that the water table remains at or on the surface for the greater part of the time the soil is not frozen

Where two drainage classes are shown:

if the symbols are separated by a comma, e.g., w,i then no intermediate classes are present;

if the symbols are separated by a dash, e.g., w-i then all intermediate classes are present.

Bedrock Classification Codes

Sedimentary Rocks

	EITHER		OR	
Clastic, calcareous	fine grained	kf	calcareous siltstone calcareous mudstone calcareous shale	kz kd kh
	medium grained	km	calcareous sandstone calcareous greywacke calcareous arkose	ks kg ka
	coarse grained	kc	calcareous conglomerate calcareous breccia	kn kb
Clastic non-calcareous	fine grained	uf	siltstone mudstone shale	zl md sh
	medium grained	um	sandstone greywacke arkose	ss gk ak
	coarse grained	uc	conglomerate breccia	cg bx
Precipitates	calcareous	pk	travertine limestone dolomite	tv ls do
	non-calcareous	pu	gypsum limonite barite	gy li ba
Organic	calcareous	ok	marl	ma
	carbonaceous	oc	lignite coal	lg co

Igneous Rocks

	EITHER		OR	
Intrusive	acid (felsic)	ia	syenite granite quartz monzonite granodiorite	sy gr qm gd
	intermediate	ii	quartz diorite diorite	qd di
	basic	ib	quartz gabbro gabbro pyroxenite peridotite dunite	qg gb py pd du
Extrusive	acid (felsic)	ea	trachyte rhyolite dacite	tr rh da
	intermediate	ei	andesite	an
	basic	eb	quartz basalt basalt	qb bs
	recent lava flow	la		
	pyroclastic	ep	tuff volcanic breccia agglomerate	tu vb ag

Metamorphic Rocks

	EITHER		OR	
Foliated	fine grained	ff	slate phyllite	sl ph
	medium to coarse grained	fm	schist gneiss granite gneiss diorite gneiss	sc gn gg dg
	coarse grained	fc	migmatite	mi
Non-foliated	fine grained	nf	argillite serpentinite	ar sp
	medium to coarse grained	nm	granulite quartzite hornfels	gl qt hf
	coarse grained	nc	amphibolite hornblendite	am hb
	calcareous	nk	marble dolomite marble serpentine marble	mb dm sm