TERRESTRIAL ECOSYSTEM MAPPING OF INTERNATIONAL FOREST PRODUCT'S TREE FARM LICENSE 45

Submitted by

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to

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1. INTRODUCTION

This ecosystem mapping project is a component of the main growth and yield project aimed at developing reliable estimates of average site index for the major tree species on the forested landbase of TFL 45 (B.A. Blackwell and Associates and J.S. Thrower and Associates, 1998). The primary goal of the ecosystem mapping component is to provide an ecological framework for computing polygon-specific average site index values for the TFL. These will be applied to spatial modeling of timber supply analysis for Management Plan No. 4.

The ecological framework includes all necessary data to develop site index estimates. This includes biogeoclimatic unit, site series, and relevant site modifiers for the forested portion of the landbase. All included information meets the *Standard for Terrestrial Ecosystem Mapping in British Columbia* (TEM Standard) (RIC 1998). In addition to the growth and yield application, the ecosystem mapping data is intended to serve a range of land-use decision-making applications. These include biodiversity planning, silviculture planning, second-growth management, and forest protection.

2. PROJECT TEAM

The project was conducted for Gerry Sommers, International Forest Products Ltd., Forestry & Land Use Group, Vancouver. The ecosystem mapping team consisted of Bob Green, Bruce Blackwell, Jeff McWilliams, Kevin Haberl, Trevor Cox, Mike Coulthard, and Rob Madden (B.A. Blackwell and Associates Ltd.). Other project team members included Jim Thrower, Guillaume Therien, and Hamish Robertson (J.S. Thrower and Associates Ltd., Vancouver-Kamloops, B.C.: site index estimation), Jane Bowyer-Smyth (International Mapping Technologies Ltd., Vancouver, B.C.: digitizing), Allan Ladouceur (Interfor GIS Dept., Vancouver: GIS processing), and Karel Klinka (University of British Columbia: quality assurance). Funding for the project was provided by Forest Renewal B.C.

3. STUDY AREA

The study area is located in the northern portion of the south coastal mainland around Knight Inlet and Phillips and Frederick Arms. It encompasses the southern Klinaklini River, Sim River, and Franklin River drainages at the northern end of Knight Inlet; the Kwalate Creek, Sallie Creek, Millerd Creek, and Glacier Bay areas along Knight Inlet; and the Phillips Arm, Frederick Arm, and the east end of West Thurlow Island areas south of Knight Inlet. The study area focuses on the continuously forested portion of the TFL that represents 68,000 ha of the total TFL area of 243,000 ha. The majority of the excluded portion encompasses non-forested rock, ice, and subalpine and alpine sites.

The mountainous terrain featuring Pleistocene glaciated valleys is characteristic of the Pacific Ranges physiographic region (Holland 1964) that comprises all but the West Thurlow Island block of the TFL. Here, the low rolling topography is characteristic of the Georgia Lowland physiographic region. Extensive icefields remain in the northern portion

of the TFL, the most notable being the Klinaklini and Franklin glaciers that extend to the valley bottoms. Remnant lobes of the Silverthrone, Whitemantle, and Waddington icefields extend into the upper reaches of numerous drainages in the northern portion of the TFL. These glaciers have been receding over the past century, leaving large areas of recently declaciated moraines and outwash deposits.

Throughout the mapped portion of the TFL, the dominant surficial material on gentle and moderate slopes is glacial till, with glaciofluvial deposits occurring commonly on major valley bottoms. This includes extensive recent outwash plains below the Klinaklini and Franklin Glaciers. Post-glacial deposits consist mainly of colluvial materials on steep slopes and fluvial materials in the valley bottoms, the latter dominated by the extensive floodplain of the lower Klinaklini River.

Bedrock geology of the TFL comprises mainly quartzdiorite granitic rocks of the Coast Plutonic Complex and granitoid gneiss of the Central Gneiss Complex . (Roddick 1985). The latter complex encompasses the majority of the area on the east side of the Klinaklini River, and includes the west side in the vicinity of Hoodoo and Dorothy Creeks. Localized areas of basalt flows occur around Hoodoo Creek. The West Thurlow Island area is underlain by granitic rocks of the Island Intrusives (Muller 1977).

4. METHODS

4.1 General Approach

This is a site index adjustment project with an ecosystem mapping component aimed at producing a framework suitable for deriving site index estimates. As such, the approach taken for ecosystem mapping departs from the TEM Standard in several ways in order to meet the project objectives in a cost and time efficient manner. The most significant departure is that mapping was restricted to the continuously forest portion of the TFL. Major exclusions included the Alpine Tundra and Mountain Hemlock Parkland biogeoclimatic units, glaciers, extensive avalanche tracks in the upper reaches of valleys, sparsely vegetated outwash plains and deglaciated moraines, and extensive areas of sparsely forested rock bluffs. This yielded a net study area comprising 28% of the total 243,000 ha TFL In addition, terrain attributes were not included in the attribute database, although terrain features were reflected in the polygon delineations. Finally, structural stage and warm/cool aspect site modifiers were not included in the database as they weren't required for the site index adjustment project.

All other aspects of the mapping approach are consistent with the TEM Standard. Polygon delineation follows the bioterrain approach with a similar overall polygon density to other TEM projects. The included core attributes are to TEM standard. These include data source, ecosection, biogeoclimatic unit, site series, and relevant site modifiers. Sampling was undertaken to a level 3 survey intensity in order to produce a map with > 70% reliability. Finally, the GIS database is to TEM Standards for the included attributes.

This approach can be considered a "TEM alternative" to full standards that meets the business needs of the user in relation to data requirements, cost, timing, reliability, and flexibility (Biggs et. al. 1997). Its components meet the current standards, and can be augmented incrementally to full standards according to client priorities and available resources.

4.2 Photo Typing

Photo typing followed the general approach outlined in *Standard for Terrestrial Ecosystem Mapping in British Columbia* (TEM Standard) (RIC 1998). Photo typing was done on alternate boxed air photos which had been renumbered with an internal reference system to facilitate handling. Stratification of 1:15,000 colour air photos (1996 flight) involved delineation of "bioterrain" features using recognizable terrain and landscape properties, ecological properties, and inferences related to changes in the landscape. Typing extended to areas where continuous forest cover gave way to discontinuous forest cover, as described in section 4.1. These areas generally coincided with non-productive and non-forested land as defined by the Ministry of Forest's non-productive descriptors in the Forest Inventory Planning (FIP) database. Non-forested areas occurring within the overall study area boundary defined above were mapped. The polygon boundaries for these areas were copied from the forest cover polygon boundaries that had been recently typed and digitized from copies of the same air photos. The intent was to minimize "intepreter discrepency" between obvious, shared polygons boundaries, and to increase digitizing efficiency. A total of 207 boxed photos were typed, with an average of 25 ecosystem polygons delineated per photo.

Preliminary attributes were noted on the photos, and included site units and their approximate polygon proportions, as well as site modifiers. The objective of recording these attributes during photo typing was to capture the initial thought process regarding polygon features, which would assist in subsequent final attributing. Table 1 shows the working legend used for assigning preliminary photo attributes.

TABLE 1. Working legend used in preliminary attribute database.

Site Units										
Label	**Name**	**MH mm1/2**	**CWH vm1**	**CWH vm2**	**CWH xm**	**CWH dm**	**CWH ds**	**CWH mm1**	**CWH ms**	**CWH ws2**
1	zonal	01	01	01	01	01	01	01	01	01
2	zonal-salal	n.a.	01s	01s	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
3	very dry lichen/kinnikinnick	n.a.	02	02	02	02	02	02	02	02
4	dry salal/falsebox/feathermoss/ heather	02	03	03	03	03	03	03	03	03
5	forested bluffs	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
6	dry/rich swordfern	n.a.	04	04	04	04	04	04	n.a.	n.a.
7	fresh/rich foamflower	03	05	05	05	05	05	05	04	04
8	moist/rich salmonberry/devil's club	05	07/08	07/08	07	07	07	07	06	06

Site Units										
Label	**Name**	**MH mm1/2**	**CWH vm1**	**CWH vm2**	**CWH xm**	**CWH dm**	**CWH ds**	**CWH mm1**	**CWH ms**	**CWH ws2**
9	moist deer fern/queens cup	n.a.	06	06	06	06	06	06	05	05
10	moist/poor salal	n.a.	06s	06s	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
11	very moist/poor goldthread	n.a.	12	09	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
12	wet skunk cabbage	n.a.	14	11	12	12	12	12	11	11
13	wet Pl bog	n.a.	13	10	11	11	11	11	10	10
14	alluvial/high bench	n.a.	09	n.a.	08	08	08	08	07	07
15	alluvial/medium + low bench	n.a.	**10,11**	n.a.	**09,10**	**09,10**	**09,10**	**09,10**	**08,09**	**08,09**
16	fluctuating WT - salmon + twinberry	n.a.	n.a.	n.a.	**13,14**	**13,14**	n.a.	n.a.	n.a.	n.a.
17	fluctuating WT - slough sedge	n.a.	n.a.	n.a.	15	15	n.a.	n.a.	n.a.	n.a.
18	Cw-Swamp forest	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
22	zonal/open forest	01.1								
24	very moist	06, 07								
25	wet open forest	08,09								

Site modifiers		
Label	**Name**	**Description**
ta	blocky colluvium	sites on rubbly (blocky) colluvial deposits
gu	gullied	sites with frequent gullies
hu	hummocky	sites on hummocky terrain
lo	local climate	sites strongly influenced by local climate (e.g. MH bowls)
ls	limestone	sites with clear limestone influence
po	poor productivity	sites with poorer than normal productivity for site unit
rv	ravine	sites with steep slopes bordering streams
sh	shallow	sites with predominantly shallow (<1m) soils
sl	slope	sites with slopes 35-70%
ss	steep slope	sites with slopes 70-100%
hs	hypersteep slope	sites with slopes >100%

Symbols for sparsely vegetated, non-vegetated, and anthropogenic units	
Symbol	**Description**
AV	snow avalanche tracks
BU	buildings and parking, etc.
ES	exposed soil from recent disturbance including mudslides, debris torrents, etc.
GL	glaciers
GP	gravel pit
LA	lake
LL	landings (logging related)
MO	recent glacial moraines
MU	mudflat sediments
OW	shallow open water
PK	MHp parkland sites
PD	pond
RI	river
RO	bedrock
RP	road

Symbols for sparsely vegetated, non-vegetated, and anthropogenic units	
Symbol	**Description**
RS	river sediments
TA	talus
UR	urban
WL	wetlands
BT	brushy talus

4.3 Field Sampling

4.3.1 Sampling strategy

The goal of the field sampling phase was to check as much ground as possible within the budget and time available. The focus was on characterizing site series composition of mapped polygons, checking polygon boundaries, particularly between biogeoclimatic units, and on characterizing site series features. Sampling was aimed at a level 3 survey intensity, with a target inspection density of 50 hectares per inspection (approximately 1400 inspections for the forested portion of the TFL). The sampling program was carried out using a combination of helicopter and truck access with 3 person crews. Helicopter access dominated the sampling because of the limited road network.

A sampling plan was prepared prior to each session of field work. This involved viewing each typed air photo with a stereoscope and marking locations where checking should be aimed. This generally focussed on sites which were representative of the area, or which appeared difficult to interpret from the photos. These pre-marked photos served as a guide to direct sampling in the field. The intent was to sample as many of these sites as possible, while allowing flexibility in checking additional sites as the need was determined by the field crews. The sampling program was facilitated by a set of 1:50,000 orientation maps which were generated from the Interfor GIS database. These displayed features of broad age class, roads, water, and topography (100 m contours). Box lines from the typed air photos were also transferred to the maps to assist in photo handling and field orientation. These maps were also used to track sampling progress with all inspection locations marked on the maps on a daily basis as sampling advanced.

4.3.2 Field inspection types

Field inspections consisted of two types: ground inspections and visual checks. Ground inspections were used to gather key ecological properties at specific points on the ground, including information on site series composition in the polygon (smaller polygons) or area around the sample point (larger polygons). Figure 1 shows the data collected on the ground inspection form. This form was developed by B.A. Blackwell and Associates Ltd. for other ecosystem mapping projects and is similar in content to the Ground Inspection Form (GIF) described in the TEM Standard.

Visual air checks (air calls) were conducted from a low flying helicopter for areas that were inaccessible to ground crews. They were used for characterizing site series composition of polygons and for biogeoclimatic boundary confirmation. In most cases,

sufficient features of dominant understory vegetation, tree species, physiography, and tree vigour are visible from hovering just above the canopy that site series composition can be reliably estimated. Information recorded for air calls included biogeoclimatic unit, site series composition, relevant site modifiers, terrain, structural stage, tree species composition, and comments relating to features that will aid in photo interpretation. Sampling was conducted in one pass during July, August, and September, 1998.

ECO-MAP CHECK FORM (1996b) **Project**_____ **Date:**_____

Photo # _____ **Poly #** _____ **Stop #** _____ **Method**: G A V

Elevation _____ **Aspect** _____ **Slope** _____ **Surveyor**_____

Slope position: Ri Up Mi Lo Fl De **Physio.**: Ro Ev Gu Br Hu

Terrain class: _____ *[where Ab or Ab/Cd: and where*
A.C = surficial. mat.: C M F FG W L R O; Ab/Cd = layer 1/2
b,d = surface exp.: v (ven. < 1m), b (blan. > 1m), t (terr.), p (plain), f (fan)]

Geology: Li.__ Gra.__ Vol.__ Sed.__ **For. floor depth**: _____cm

Soil texture _____ **Coarse fragments**: _____%

Depth to (if present): watertable____ gleying _____ pan _____ rock _____

Humus form: Mor__ Moder __ Mull __ **A horizon** depth: Ae ___ Ah ___

Stand composition: _____ [e.g.HwCw(Yc)] **Understory** ⇓

BGC Unit:_____ **Site series** _____ **SMR/SNR** _____ **Str.Stg.**_____

Comments:_____

_____

POLYGON SUMMARY: (component site series, SMR/SNR, %, and distribution),

	Component 1	Component 2	Component3
Site series			
%			
Site modif.			

Poly ____
Stop____

Terrain: Comp. 1 _____ % ____ Comp. 2 _____ % _____

Comments:_____

_____

_____

FIGURE 1. Data form used to collect ground inspection data.

4.3.3 Data processing

All data collected from ground inspections and air calls was entered into an Excel database (see Appendix 4). This was sorted by air photo number so that data could be easily referenced while attributing air photos.

4.3.4 Inspection locations

All field inspections were located on colour photocopies of the typed air photos, and labeled with their inspection numbers. These locations and labels were transferred to check plots of the ecosystem map, then digitized as a plot layer within the GIS database.

4.4 Digitizing

Integrated Mapping Technologies (IMT) undertook digitizing of polygon linework using mono-restitution techniques. A first draft of 1:20,000 check plots was produced for review. These were checked for errors in linework transfer then returned to IMT for revisions. A revised second draft of check plots used for the final attributing phase. Once the digitizing stage was complete, all subsequent GIS processing was conducted by Interfor's GIS department.

4.5 Final Attributes

4.5.1 Setup

The following items were assembled prior to commencing with the final ecosystem attributing phase:

- basic polygon map. This contained just the polygon linework and numbers and was used for tracking attributing progress and noting revisions.
- contour/inspection/old BGC map. This was plotted on translucent paper and contained polygon linework and numbers, inspection locations and numbers, 100 m contour intervals, and old (Regional) biogeoclimatic units. Inspection locations were colour coded manually according to the observed biogeoclimatic unit.
- key tree species theme. This was derived from the existing forest cover database and displayed ecosystem polygon linework and numbers, and key tree species using colour theming to display classes of percent stand composition.
- field inspection database sorted by air photo and inspection number

4.5.2 Building the attribute database

Attributing progressed on a photo-by-photo basis across each map sheet. The first step was to add the biogeoclimatic (BGC) unit boundaries to the polygon map. The following information was integrated to locate the BGC boundaries: observed BGC units from field inspections, 100 m contours, key tree species composition, and interpretation of air photo features. Based on this information, BGC lines were located on the map following existing polygon lines as much as possible. Where required, new lines were added, subdividing

existing polygons to ensure correct location of BGC boundaries. In these cases, new reference numbers were added for the new polygons.

The next step was to create final attributes for polygons on each photo. The following information was reviewed prior to deciding on the appropriate attributes: relevant field inspection and supplemental data around each polygon, polygon features from air photo interpretation, final attributes of adjacent polygons, and preliminary attributes for the polygon. Once decided, the attributes were recorded on an attribute data form, which was subsequently entered into an Excel database.

Once the attributing was completed, the polygon map containing all the new revisions was passed on to Interfor's GIS department so the spatial database could be updated accordingly.

4.5.3 Editing

Two main editing phases were conducted; a) editing the final attribute database prior to linking it with the spatial polygon data, and b) editing the linked spatial and attribute data. In the first phase, the Excel database of final attributes was thoroughly reviewed using a series of filters and sorts. The following issues were checked and corrected where required:

- duplicate polygon numbers
- inconsistencies and errors in the field codes
- polygon components not summing to 100%

Once the database was correct, all extra fields used for internal editing (e.g. air photo number) were stripped from the file, and the resulting data was exported as a dBase file for linking to the spatial data in ARC/INFO.

Editing of the linked GIS data was done using ArcView GIS. Shape files for the ecosystem data were obtained from Interfor's GIS department. A series of themes were created from the data which included BGC unit, Ecosection, and site series. These were used to conduct the first edit of the GIS data. The BGC and Ecosection themes were initially checked for obvious anomalies, then carefully compared against the original check plots containing the BGC unit boundaries. Any attribute errors were edited directly in ArcView. Errors which required additional lines were indicated on printed inset maps and passed on to Interfor's GIS department for correction. Polygons with missing attributes were also highlighted on the BGC unit theme and were corrected directly in ArcView. Several duplicate polygon numbers were also identified and corrected at this stage.

Several site unit themes were produced to check clearly visible (non-forested) polygons against the original typed air photos. These included themes for wetland polygons, water polygons, non-vegetated (gravel pits, etc.) polygons, avalanche polygons, and rock/talus polygons. Any discrepancies between the polygons and the air photo features were clearly visible and corrected as required. A theme of forested site series was

also produced to check consistency in expected distribution and against visible features on the air photos (e.g. rocky dry sites, parkland sites, etc.).

The results of the above editing were fully incorporated into the GIS database by Interfor's GIS department who then conducted a final quality check to identify any outstanding issues. These were corrected to produce the final clean GIS database.

4.5.4 Data conversion

The attribute database from the clean GIS data was exported as a dBase file for conversion to TEM Standard field codes. Two separate databases were required. The first was the Interfor version, which was designed for maximum utility by Interfor staff. This file utilized conventional numeric codes for site series, two-letter alphabetic codes for the site modifiers shown in Table 1, and a field for combined biogeoclimatic zone, subzone, and variant. The second database was the TEM version, which utilized fields and codes specified in the TEM Standard. The conversion process was done in Access, with the resulting two databases exported back as dBase files which were subsequently relinked to the spatial data.

4.6 Presentation Maps

Presentation plots of the site unit data were produced for displaying the principal ecological features of the TFL in hard copy format. The intent was to display information in a way which readily conveyed the general ecological features, while providing polygon-specific attributes for more detailed review. The approach taken was based on the system developed by Dr. K. Klinka for displaying ecosystems of the U.B.C. Research Forest (Klinka and Skoda 1976). The key feature is the use of a relatively simple colour scheme to clearly convey ecological properties.

Rather than assigning a unique colour to individual site units, we amalgamated site units into more generalized "site groups". Each group contained site units which shared similarities in their key properties. Table 2 shows the site groups used and their component site units.

TABLE 2. Site groups used in the presentation maps.

Name	**BGC unit**	**Site unit code** (see Table 9 for definitions)
Zonal units	CWHxm	01
	CWHmm1	01
	CWHdm	01
	CWHvm1	01
	CWHvm2	01
	CWHms2	01
	CWHws2	01
	MHmm1	01
	MHmm2	01
Zonal-salal units	CWHvm1	01s
	CWHvm2	01s

Name	BGC unit	Site unit code (see Table 9 for definitions)
Dry units	CWHxm	02, 03
	CWHmm1	03
	CWHdm	02, 03, 04, 20
	CWHvm1	02, 03, 04, 20
	CWHvm2	02, 03, 20
	CWHms2	02, 03, 20
	CWHws2	02, 03, 20
	MHmm1	02, 21
	MHmm2	02, 21
Moisture and/or nutrient enhanced - poorly productive units	CWHxm	12
	CWHmm1	11, 12
	CWHdm	12
	CWHvm1	13, 14
	CWHvm2	09, 10, 11
	CWHms2	10, 11, 12
	CWHws2	10, 11
	MHmm1	06, 07, 08, 09
	MHmm2	06, 07, 08, 09
Moisture and/or nutrient enhanced - productive units	CWHxm	05, 06, 07
	CWHmm1	05, 06, 07
	CWHdm	05, 06, 07
	CWHvm1	05, 06, 07
	CWHvm2	05, 06, 07
	CWHms2	04, 05, 06
	CWHws2	04, 05, 06
	MHmm1	03, 04, 05
	MHmm2	03, 04, 05
Wetland units	All BGC units	31, 32
Floodplain units	CWHvm1	09, 10, 11
	CWHms2	07, 08, 09
	CWHws2	07, 08, 09
Subalpine parkland, transition parkland units	MHmmp	22, 23, 24
	MHmm1	27
	MHmm2	27
Snow avalanche units	All BGC units	51, 51.1, BT
Rock and talus units	All BGC units	RO, TA
Exposed soil units	All BGC units	ES, LL, GP, BU, MO, MU, RS
Water features	All BGC units	LA, PD, RI

A colour scheme was applied to each of these groups that was designed to convey some properties of the group where possible. For example, blue shade for moist, productive sites; yellow for dry sites, dark green for zonal sites, etc.). These colours were applied to the ecosystem polygons on the map according to the dominant (component 1) site series. The colours are also shown in the site series legend so that a particular site series' membership in a site group is clearly displayed. Biogeoclimatic unit boundaries and labels are displayed on the map so that knowledge of an area's site group colour and BGC unit identifies the specific site series.

In addition to the site group information, specific ecosystem attributes for each polygon on the map sheet are displayed in a polygon list in the map surround. These attributes were taken from the Interfor database and use the conventional numeric site series codes and enhanced site modifiers. Additional information displayed in the map surround includes the site series, site group, and BGC unit legends, the mapping approach, and the mapping credits and data sources.

5. RESULTS

5.1 Polygon Density

A total of 5,041 polygons were mapped in the TFL, with an average and median area of 13.6 ha and 8.3 ha, respectively. Figure 2 shows the frequency distribution of polygon size.

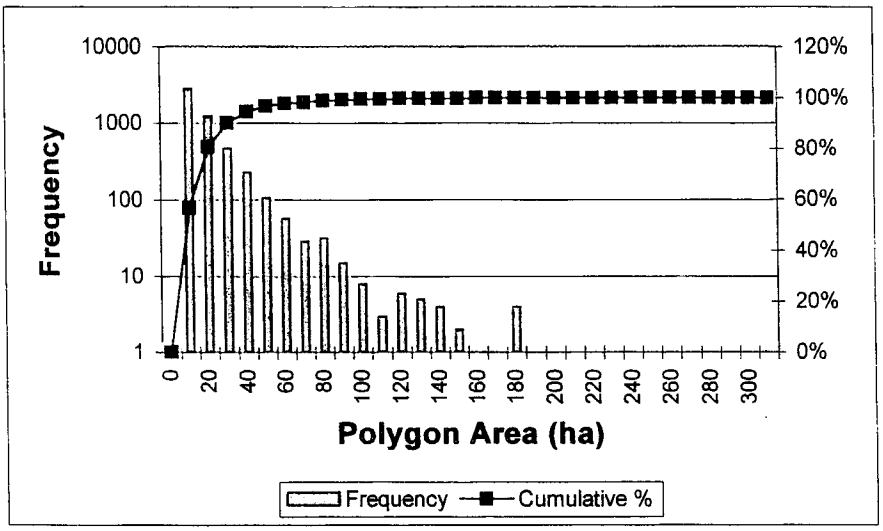

FIGURE 2. Frequency distribution of polygon size (note logarithmic scale of the Y axis; the number displayed for polygon area is the upper class boundary).

The majority of polygons (>90%) are less than 30 ha in size. Figure 3 shows the frequency distribution focussing on the less than 30 ha polygons. More than half the polygons are below 10 ha in size. These results are comparable to ecosystem mapping of TFL 47 completed by B.A. Blackwell & Associates (Table 3). They represent a lower polygon density compared to ecosystem mapping of TFL 37 which featured detailed polygon delineation associated with terrain stability mapping.

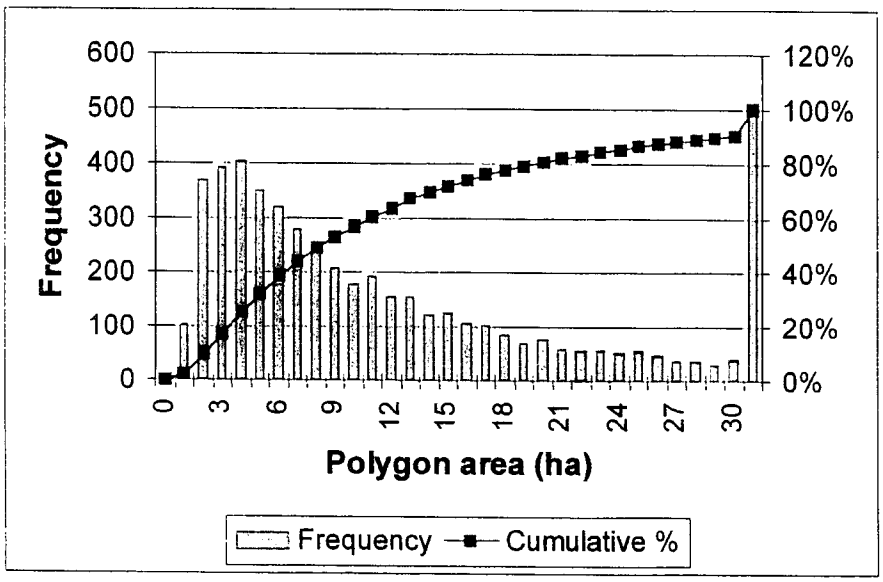

FIGURE 3. Frequency distribution of polygon size focussing on less than 20 ha polygons (the number displayed for polygon area is the upper class boundary)

TABLE 3. Comparison of polygon area statistics between TFL 45, and other coastal mapping projects (TFL 47, Beaver Cove and Johnstone Straits; TFL 37, Nimpkish).

Statistic	TFL 45 Knight Inlet	TFL 37 Nimpkish	TFL 47 Beaver Cove/John. St.
Mean polygon area	13.6 ha	8.6 ha	11.9 ha
Median polygon area	8.3 ha	4.7 ha	6.5 ha
Standard deviation	17.3 ha	27.5 ha	20.4 ha
Mapped area	68,028 ha	190,730 ha	142,046 ha
Polygon density	73 polys/1000 ha	117 polys/1000 ha	84 polys/1000 ha

5.2 Sampling

A total of 1389 inspections were completed for this project, comprised of 44% ground inspections and 56% air calls. Table 4 summarizes the distribution of inspections by type.

TABLE 4. Distribution of inspections by type.

Inspection Type	Number Completed	Proportion of total (%)
Ground inspections	606	43.6
Air calls	783	56.4
Total inspections	1389	100.0
Mapped area	68,028 ha	
Inspection density	49 ha per inspection	

The achieved inspection density of 49 ha/inspections met the target density for a level 3 survey intensity. The inspection distribution was relatively consistent throughout the CWH zone. The slightly higher inspection densities in the CWHxm, CWHdm, and CWHmm1 reflected their small areas (Table 5). The forested MH zone was sampled at a substantially lower intensity as this zone features limited management activity, and a low and narrow range in productivity. The small amount of MHmmp that was mapped was not sampled as it was considered outside the focus of the study.

TABLE 5. Distribution of inspections by BGC unit.

BGC Unit	Area (ha)	Total Inspections	Proportion of Total (%)	Inspection Density (ha/inspection)
CWHdm	1,481	57	4.1	26
CWHxm	657	22	1.6	30
CWHmm1	1,364	39	2.8	35
CWHvm1	14,722	369	26.6	40
CWHvm2	6,691	137	9.9	49
CWHms2	16,198	359	25.8	45
CWHws2	13,432	323	23.3	42
MHmm1	2,492	20	1.4	125
MHmm2	10,806	63	4.5	172
MHmmp	185	0	0	0
Total	68,028	1389	100	

Another measure of survey intensity is the proportion of polygons inspected. Table 6 summarizes polygon inspection frequency by information source.

TABLE 6. Frequency of inspected polygons by information source.

Source	Number of polygons
Air call	659
Ground observations	449
Total	1108

The total number of inspected polygons is less than the total number of inspections because of multiple observations within some larger polygons. The inspected polygons represent 27% of the total eligible polygons in the mapped area. This figure excludes polygons which are clearly interpreted because of their distinct features (e.g. lakes, rivers, gravel pits, rock, avalanche tracks, etc.). This inspection frequency meets a level 3 survey intensity according to the TEM Standard, which is consistent with the survey intensity met based on sampling density.

5.3 Biogeoclimatic Units

A number of changes from the distribution of biogeoclimatic units as shown on the 1:250,000 Vancouver Region map resulted from mapping ecosystems in the TFL. Table 7 summarizes the BGC unit area and proportion of the TFL study area for the old and new mapping. The most significant changes took place in the northern portion of the TFL where areas originally mapped as CWHvm1 and CWHdm in the Klinaklini and Franklin/Stanton drainages were changed to CWHms2. A strong submaritime influence was recognized down to the head of the inlet, reflecting cold winter temperatures from outflow winds off the glaciers and the Interior plateau. In addition, the CWHds2 originally mapped in the north end of the TFL by Dorothy Creek was better represented by the CWHms2 based on the scattered but consistent presence of *Abies amabilis* that was observed. The high proportion of dry rocky sites gives this area a drier appearance.

The back end of the Sim River was mapped as submaritime rather than maritime, given the common *Abies lasiocarpa* on the steep, rocky slopes. This reflects cold air influence off the glaciers to the north. Although the rest of the Sim drainage was mapped with maritime units, there was clearly a submaritime influence as indicated by occasional occurance of submaritime plant species. The Glacier Bay, Kwalate Ck., Sallie Ck., and Millerd Ck. areas were very similar to the original mapping.

TABLE 7. Area and proportion of old BGC units compared to new BGC units.

BGC Unit	Old BGC Units[1]		New BGC Units	
	Area (ha)	% of mapped area	Area (ha)	% of mapped area
CWHdm	3867	5.7%	1481	2.2%
CWHds2	1781	2.6%	0	0.0%
CWHmm1	664	1.0%	1364	2.0%
CWHms2	0	0.0%	16198	23.8%
CWHvm1	25031	36.8%	14722	21.6%
CWHvm2	8541	12.6%	6691	9.8%
CWHws2	17442	25.6%	13432	19.7%
CWHxm2	1402	2.1%	657	1.0%
MHmm1	2621	3.9%	2492	3.7%
MHmm2	6679	9.8%	10806	15.9%
MHmmp	0	0.0%	185	0.3%
Total	68028	100.0%	68028	100.0%

[1] old units from Ministry of Forests Vancouver Region map; new units as mapped in this project

In the southern portion, the original area of the CWHdm was reduced in the area northwest of Phillips Arm, and along the north side of Frederick Arm. The CWHvm2 was also enlarged in an extensive cool bowl in the upper Gray Ck. area. Finally, the CWHxm was replaced with the CWHmm1 over the higher elevation portion of West Thurlow Island.

These types of discrepancies between 1:250,000 subzone maps and 1:15,000 ecosystem maps are not uncommon. It reflects differences in precision and intensity of field verification between the two levels of ecological "inventories". Figures 4 to 7 show sections of the northern and southern portions, respectively, that characterize the main differences between the old and new mapping. The more irregular boundaries of the new mapping reflect the ecosystem polygon boundaries that the BGC units have to follow.

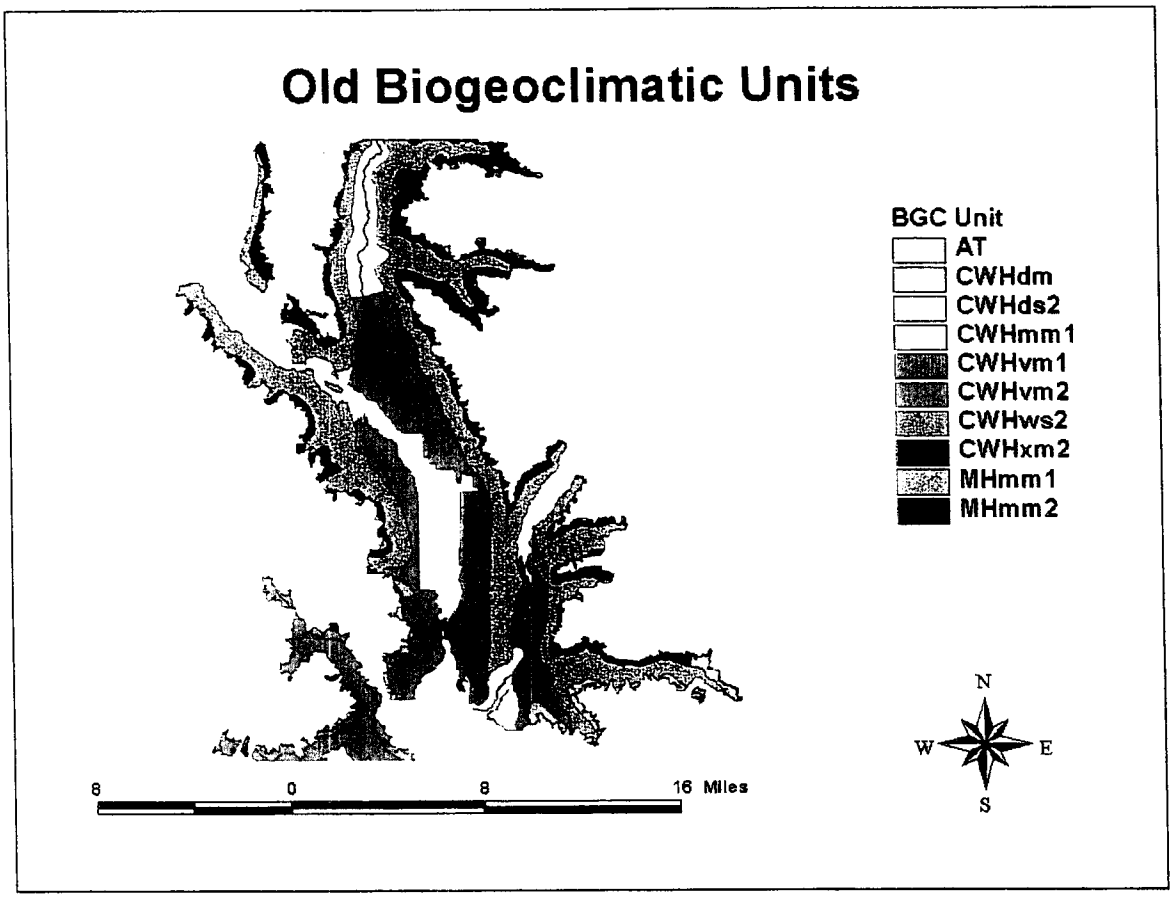

FIGURE 4. Old biogeoclimatic units in the northern portion of the TFL.

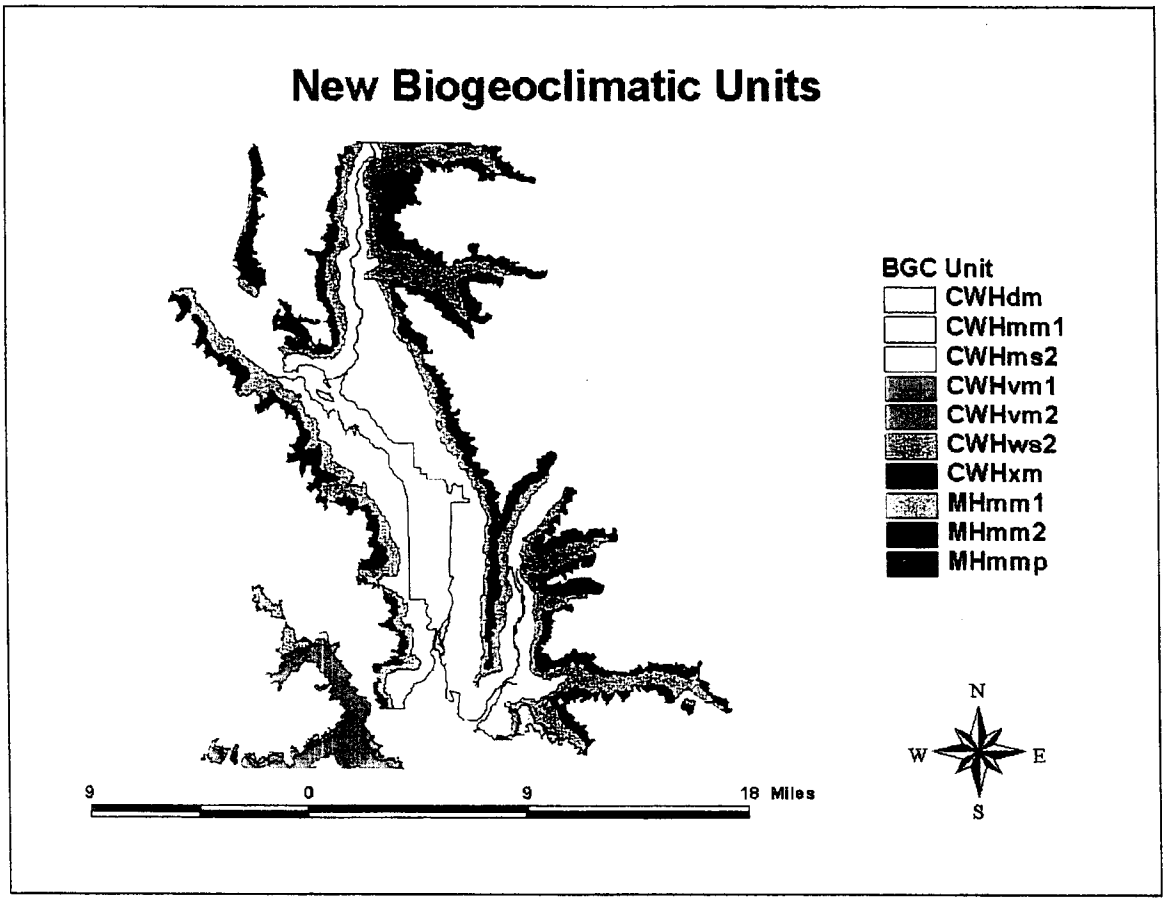

FIGURE 5. New biogeoclimatic units in the northern portion of the TFL.

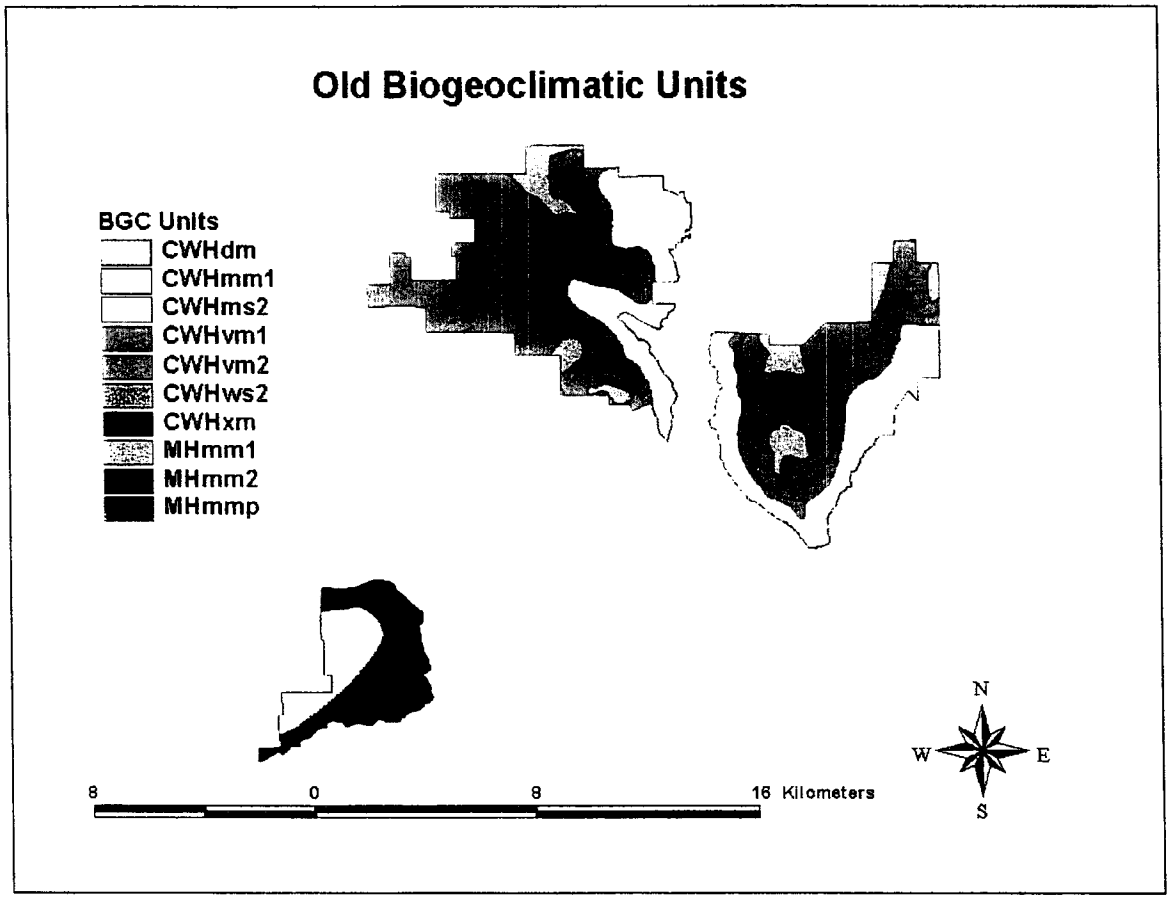

FIGURE 6. Old biogeoclimatic units in the southern portion of the TFL.

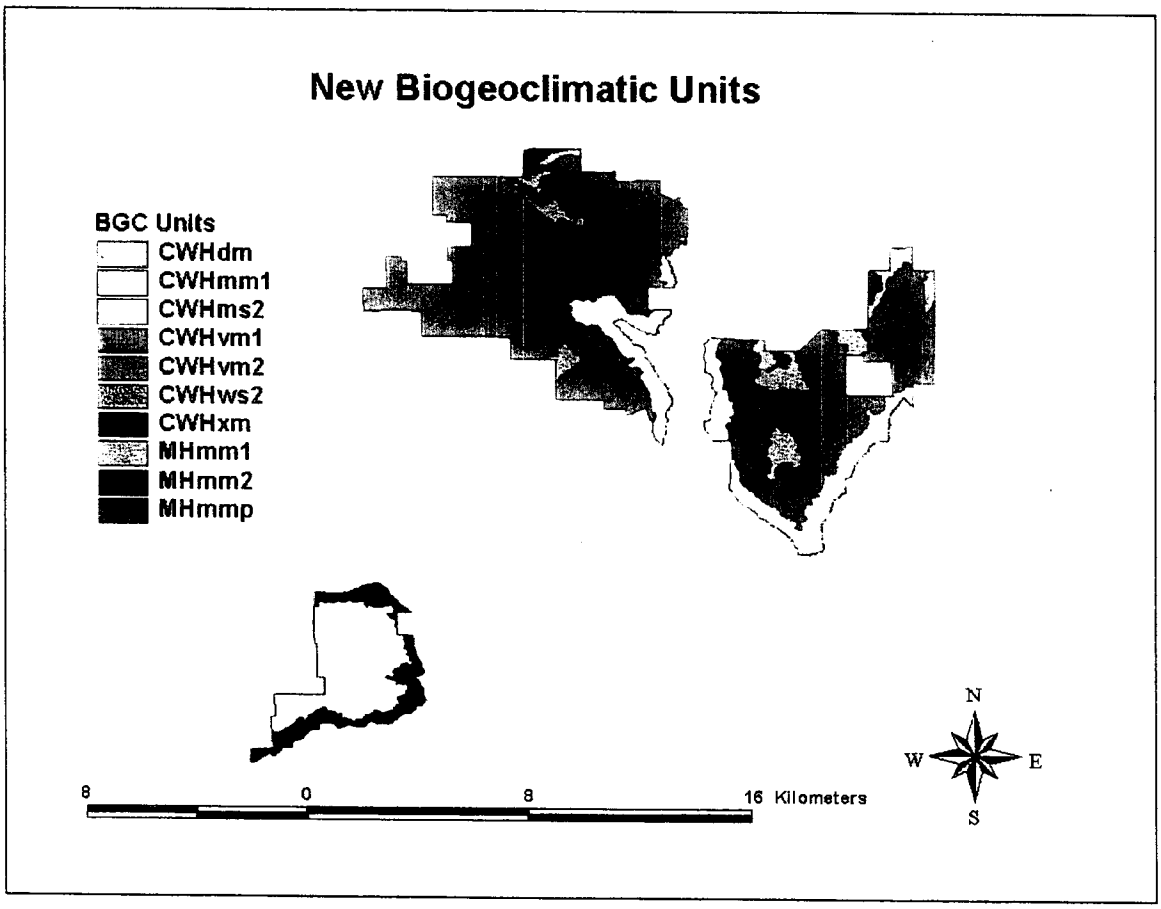

FIGURE 7. New biogeoclimatic units in the southern portion of the TFL.

5.4 Site Units

5.4.1 New and atypical site units

In the TFL 45 project, a number of site units not recognized in the provincial site series classification were encountered. This reflects the focus of the original BEC program which was predominantly forested ecosystems. The new units recognized in the TFL were reviewed and approved by the project quality assurance specialist, and are summarized in Table 8. The descriptions of these units is based on data and observations collected during field sampling in other coastal mapping projects conducted by B.A. Blackwell and Associates, as well as information contained in Klinka et al. (1997).

TABLE 8. New site units currently not recognized in the provincial site series classification.

BGC unit	Name	Description
All	Beaked sedge – Sphagnum bog (T)	Bogs and transition bogs featuring *Sphagnum* spp., *Carex* spp., *Ledum groenlandicum* and other ericaceous shrubs; in MH it includes *Fauria crista-galli*, *Phyllodoce empetriformis* and other subalpine spp.; typically a complex pattern of plant communities of the *Carex - Sphagnum* order (Klinka *et al.* 1997).
All	Carex fen (T)	Non-forested fen/march dominated by Carex species; typically a complex pattern of plant communities of the *Carex - Sphagnum* order (Klinka *et al.* 1997)
CWH	Cw –Fern bluffs (N)	Precipitous bluffs and cliffs; extreme microsite variation due to crevices, ledges and other irregularities, combined with intermittent surface seepage; irregularly stocked stands rooted in crevices, and very thin organic and colluvial parent material; typically includes *Adiantum aleuticum*, *Polystichum munitum*, and/or *Polypodium glycyrrhiza*.
MH	Yc – Rhacomitrium bluffs (N)	Precipitous bluffs, cliffs, and extremely steep (>100%) rocky slopes featuring scrubby conifers rooted in crevices and very thin organic and colluvial parent material.
MH	HmYc – Blueberry – Mountain-heather (N)	Fresh/poor late snow-lie sites with open canopies; on subdued topography with slopes <20%; late snow melt associated with this topography results in open canopy stands; generally hummocky microtopography with common moist to wet depressions; often complexed with 07 and 09
All	Sitka alder – Salmonberry avalanche tracks (T)	Frequently disturbed avalanche tracks dominated by *Alnus sinuata*; may include patches of Hm and Yc; typically a complex pattern of plant communities of the *Alnus sinuata* order. (Klinka *et al.* 1997).
All	Ba - Copperbush avalanche tracks (N)	Infrequently disturbed avalanche tracks dominated by young conifer regeneration; typically a complex pattern of plant communities.
MHmmp	Hm – Mountain heather parkland (T)	A mosaic of islands of conifers separated by heath communities; tree islands include Yc, Hm, *Phyllodoce empetriformis*, *Empetrum nigrum*, *Vaccinium deliciosum*; heath communities dominated by *Cassiope mertensiana* and *Phyllodoce empetriformis*; includes wet

BGC unit	Name	Description
		depressions of *Carex - Sphagnum* communities in subdued topography; highly complex due to impacts of varying snow patterns; consists of communities of the *Cassiope - Phyllodoce* order, and *Phyllodoce - Abies* association, with inclusions of the *Carex - Sphagnum* and *Carex nigricans* orders (Klinka *et al.* 1997).
MHmmp	Sedge – Swamp moss parkland meadow (N)	A mosaic of meadow, stream-edge, spring-line, wetland communities, and snow basins; conifers, where present, in isolated clumps; highly complex due to impacts of varying snow patterns and seepage; consists of communities of the *Philonotis fontana, Carex nigricans*, and *Marsupella brevissima* orders, and inclusions of the *Cassiope - Phyllodoce* and *Carex - Sphagnum* orders (Klinka *et al.* 1997).
MHmmp	Lichen – Hm parkland (N)	A mosaic of exposed bedrock outcrops, rocky ridges, fragmental talus, and cliffs, with moist depressions interspersed among the rock; irregular clumps of conifers generally on elevated sites where snow melts earliest; highly complex due to impacts of varying snow patterns and irregular terrain; may include patches of Hm – Mountain heather parkland; consists of communities of the *Rhizocarpon geographicum* order, with inclusions of the *Cassiope - Phyllodoce* and *Carex - Sphagnum* orders (Klinka *et al.* 1997).

[1] T = recognized in *Provincial Site Series Mapping Codes and Typical Environmental Conditions* (1999); N = new units.

5.4.2 Synopsis of mapped site units

Table 9 provides a synopsis of all site units mapped in TFL 45, including the codes used for the Interfor and TEM databases. Two-letter codes for the TEM database were derived from the *Provincial Site Series Mapping Codes and Typical Environmental Conditions* (1999) database except for unrecognized units. In these cases unique codes were assigned following conventions used in the provincial mapping codes list. Non-vegetated sites use the two-letter codes from the TEM Standard. Numeric codes for recognized site series following the existing BEC coding format (Green and Klinka 1994). Newly recognized site units are not formally classified site series, and are noted with numeric codes of 20 or higher. These codes were based on recognized numeric codes from the provincial mapping code list, as well as codes developed for ecosystem mapping projects completed for TimberWest Forest Ltd[1] and Canadian Forest Products Ltd. Non-vegetated sites use the two-letter codes from the TEM standard.

[1] numeric coding convention developed with input from D. Meidinger, Ministry of Forests, Research Branch.

TABLE 9. Synopsis of all site units mapped in TFL 45

Interfor Site series code	TEM site series code	Name	Comments
CWHxm			
01	HK	HwFd - Kindbergia	slightly dry/poor to medium sites (zonal)
02	DC	FdPl - Cladina	very dry/poor sites on bedrock or very thin soils
03	DS	FdHw - Salal	moderately dry/poor to medium sites on shallow and/or very coarse soils
05	RS	Cw - Sword fern	slightly dry to fresh/rich sites
06	HD	HwCw - Deer fern	moist to very moist/poor to medium sites
07	RF	Cw - Foamflower	moist to very moist/rich sites
12	RC	CwSs - Skunk cabbage	wet/medium to rich sites on poorly drained soils
CWHdm			
01	HM	Hw - Flat moss	slightly dry/poor to medium sites (zonal)
02	DC	FdPl - Cladina	very dry/poor sites on bedrock or very thin soils
03	DS	FdHw - Salal	moderately dry/poor to medium sites on shallow and/or very coarse soils
04	DF	Fd - Sword fern	moderately dry/rich sites on colluvial soils
05	RS	Cw- Sword fern	slightly dry to fresh/rich sites
06	HD	HwCw - Deer fern	moist to very moist/poor to medium sites
07	RF	Cw - Foamflower	moist to very moist/rich sites
12	RC	CwSs - Skunk cabbage	wet/medium to rich sites on poorly drained soils
20	RM	Cw – Fern bluffs	dry to moist/poor to medium sites on forested bluffs and cliffs (extreme microsite variation)
CWHmm1			
01	AP	HwBa - Pipecleaner moss	fresh/poor to medium sites (zonal)
03	HS	HwCw - Salal	slightly dry/poor to medium sites on shallow and/or very coarse soils
05	AF	BaCw - Foamflower	fresh/rich sites
06	HD	HwBa - Deer fern	moist to very moist/poor to medium sites
07	AS	BaCw - Salmonberry	moist to very moist/rich sites
11	LS	Pl - Sphagnum	wet/poor sparsely forested bog
12	RC	CwSs - Skunk cabbage	wet/medium to rich sites on poorly drained soils
CWHms2			
01	AM	HwBa – Step moss	slightly dry to fresh/poor to medium sites (zonal)
02	DK	FdPl - Kinnikinnick	very dry/poor sites on bedrock or very thin soils
03	DF	FdHw – Falsebox	moderately dry/poor to medium sites on shallow and/or very coarse soils
04	AO	BaCw – Oak fern	slightly dry to fresh/rich sites
05	HQ	HwBa – Queen's cup	moist to very moist/poor to medium sites

Interfor Site series code	TEM site series code	Name	Comments
06	AD	BaCw – Devil's club	moist to very moist/rich sites
07	SS	Ss - Salmonberry	high bench floodplain sites
08	CD	Act – Red-osier dogwood	medium bench floodplain sites
09	CW	Act - Willow	low bench floodplain sites
10	LS	Pl - Sphagnum	wet/poor sparsely forested bog
11	RC	CwSs – Skunk cabbage	wet/medium to rich sites on poorly drained soils
12	SC	Ss – Pacific crabapple	wet/rich sparsely forested brackish site adjacent to estuary
20	RM	Cw – Fern bluffs	dry to moist/poor to medium sites on forested bluffs and cliffs (extreme microsite variation)
CWHws2			
01	AB	HwBa - Bramble	slightly dry to fresh/poor to medium sites (zonal)
02	LK	Pl - Kinnikinnick	very dry/poor sites on bedrock or very thin soils
03	HM	HwPl - Feathermoss	moderately dry/poor to medium sites on shallow and/or very coarse soils
04	AO	BaCw – Oak fern	slightly dry to fresh/rich sites
05	HQ	HwBa – Queen's cup	moist to very moist/poor to medium sites
06	AD	BaCw – Devil's club	moist to very moist/rich sites
07	SS	Ss - Salmonberry	high bench floodplain sites
08	CD	Act – Red-osier dogwood	medium bench floodplain sites
09	CW	Act - Willow	low bench floodplain sites
10	LS	Pl - Sphagnum	wet/poor sparsely forested bog
11	RC	CwSs – Skunk cabbage	wet/medium to rich sites on poorly drained soils
20	RF	Cw – Fern bluffs	dry to moist/poor to medium sites on forested bluffs and cliffs (extreme microsite variation)
CWHvm1			
01	AB	HwBa - Blueberry	fresh/poor to medium sites (zonal)
01s	ABs	HwBa - Blueberry/salal phase	fresh/very poor to poor salal dominated sites
02	LC	HwPl - Cladina	moderately dry/poor sites on bedrock or very thin soils
03	HS	HwCw - Salal	slightly dry/poor to medium sites on shallow and/or very coarse soils
04	RS	CwHw - Sword fern	slightly dry/rich sites on colluvial soils
05	AF	BaCw - Foamflower	fresh/rich sites
06	HD	HwBa - Deer fern	moist to very moist/poor to medium sites
07	AS	BaCw - Salmonberry	moist to very moist/rich sites
09	SS	Ss - Salmonberry	high bench floodplain sites
10	CD	Act - Red-osier dogwood	medium bench floodplain sites
11	CW	Act - Willow	low bench floodplain sites
13	LS	Pl - Sphagnum	wet/poor sparsely forested bog
14	RC	CwSs - Skunk cabbage	wet/medium to rich sites on poorly drained

Interfor Site series code	TEM site series code	Name	Comments
			soils
20	RM	Cw – Fern bluffs	dry to moist/poor to medium sites on forested bluffs and cliffs (extreme microsite variation)
CWHvm2			
01	AB	HwBa - Blueberry	fresh/poor to medium sites (zonal)
01s	ABs	HwBa - Blueberry/salal phase	fresh/very poor to poor salal dominated sites
02	LC	HwPl - Cladina	moderately dry/poor sites on bedrock or very thin soils
03	HS	HwCw - Salal	slightly dry/poor to medium sites on shallow and/or very coarse soils
05	AF	BaCw - Foamflower	fresh/rich sites
06	HD	HwBa - Deer fern	moist to very moist/poor to medium sites
07	AS	BaCw - Salmonberry	moist to very moist/rich sites
09	YG	CwYc - Goldthread	very moist/poor sites on poorly drained soils
10	LS	Pl - Sphagnum	wet/poor sparsely forested bog
11	RC	CwYc - Skunk cabbage	wet/medium to rich sites on poorly drained soils
20	RM	Cw – Fern bluffs	forested bluff sites
MHmm1			
01	MB	HmBa - Blueberry	fresh/poor to medium sites (zonal)
27	YB	HmYc – Blueberry – Mountain heather	fresh/poor to medium, late snow-lie sites with open canopy forests
02	MM	HmBa - Mountain-heather	slightly dry/poor to medium sites on bedrock or very shallow soils
03	MO	BaHm – Oak fern	fresh/rich sites
04	AB	HmBa - Bramble	moist/poor to medium sites
05	MT	BaHm - Twisted stalk	moist/rich sites
06	MD	HmYc – Deer cabbage	very moist/poor to medium sites with open canopy forests
07	YH	YcHm - Hellebore	very moist/medium to rich sites with open canopy forests
08	YS	HmYc - Sphagnum	wet/poor bog forest
09	YC	YcHm - Skunk cabbage	wet/medium to rich sites on poorly drained soils with open canopy forests
21	YR	Yc – Rhacomitrium bluffs	precipitous bluffs and cliffs featuring scrubby forests
MHmm2			
01	MB	HmBa - Blueberry	fresh/poor to medium sites (zonal)
27	YB	HmYc – Blueberry – Mountain heather	fresh/poor to medium, late snow-lie sites with open canopy forests
02	MM	HmBa - Mountain-heather	slightly dry/poor to medium sites on bedrock or very shallow soils
03	MO	BaHm – Oak fern	fresh/rich sites
05	MT	BaHm - Twisted stalk	moist/rich sites
06	MD	HmYc – Deer cabbage	Very moist/poor rich sites with open canopy forests

Interfor Site series code	TEM site series code	Name	Comments
07	YH	YcHm - Hellebore	very moist/medium to rich sites with open canopy forests
08	YS	HmYc - Sphagnum	wet/poor sparsely forested bog
09	YC	YcHm - Skunk cabbage	wet/medium to rich sites on poorly drained soils with open canopy forests
21	YR	Yc – Rhacomitrium bluffs	scrubby bluff sites
MHmmp			
22	MH	Hm – Mountain heather parkland	mosaic of heather and tree islands
23	LM	Lichen - Hm parkland	mosaic of rocky sites with tree islands
24	SS	Sedge – Swamp moss parkland meadows	mosaic of meadow sites with tree islands

Non-Forested Units in all BGC Units			
31	BS	Beaked sedge – Sphagnum bog	non-forested Sphagnum-dominated bog
32	CF	Carex fen	non-forested Carex-dominated fen
51	SA	Sitka alder – Salmonberry	shrub dominated avalanche tracks
51.1	AC	Ba - Copperbush	young conifer dominated avalanche tracks
BT	BT	Brushy talus	talus slopes dominated by shrub species
BU	BU	Buildings, parking, etc.	
ES	ES	Exposed soil	from recent disturbance; usually slope failures
GP	GP	Gravel pit	
LA	LA	Lake	
LL	LL	Landings	
MO	MO	Recent glacial moraines	may have pioneer shrub communities
MU	MU	Mudflat sediments	
PD	PD	Pond	
RI	RI	River	
RO	RO	Bedrock	
RS	RS	River sediments	
TA	TA	Talus	

An area summary of all site units mapped in the TFL is provided in Table 10. These areas represent totals for all polygon components. The area comprising 01 site series represents 38 % of the total TFL area. This is consistent with other ecosystem mapping projects completed by B.A. Blackwell and Associates in coastal landbases (38% in TFL 47 Beaver Cove/Johnstone Straits; 41% in TFL 37 Nimpkish, 44% in the Capilano watershed).

TABLE 10. Area summary for all site units mapped in TFL 37.

Site Unit	Biogeoclimatic Unit										
	CWHdm	CWHmm 1	CWHms 2	CWHvm 1	CWHvm 2	CWHws2	CWHxm	MHmm1	MHmm2	MHmmp	Grand Total
	Area (ha)										
01	712.2	718.6	4028.4	4900.0	2656.9	5192.3	290.9	1270.3	6189.1		25958.8
01s				112.9	14.2						127.1
02	9.5		887.1	58.9	68.2	102.3	57.5	527.1	2002.9		3713.6
03	151.0	238.0	3972.7	2367.1	1951.2	2551.0	140.5	21.8	23.2		11416.4
04	9.8		1545.7	29.3		478.5		13.4			2076.8
05	394.2	32.8	3.3	1492.3	29.8	11.7	114.8	20.4	249.1		2348.4
06	26.2	282.6	2036.5	478.2	486.4	1785.5	17.4	22.9	0.8		5136.7
07	161.2	20.7	680.7	3028.9	244.8	7.1	26.2	61.0	257.7		4488.3
08			531.1			4.2		9.2	27.1		571.6
09			314.8	170.1	113.1	6.7		30.7	68.3		703.7
10			61.5	71.9	32.9	2.1					168.3
11		7.2	213.3	7.5	171.6	44.3					443.9
12	1.7	60.4	76.5				2.6				141.2
13				21.8							21.8
14				102.3							102.3
20	10.9		441.9	523.3	330.8	609.5					1916.4
21								43.8	124.0		167.8
22										101.9	101.9
23										60.1	60.1
24										22.6	22.6
27								203.4	418.6		622.0
31			6.5	16.3	4.1	12.2			13.9		53.1
32		0.7	208.6	44.3		2.1					255.6
51			221.3	714.6	280.1	1726.8		89.4	730.6		3762.8
51.1				16.5	53.7	18.9		113.6	207.3		409.9
BT			16.9	9.3		150.6			30.0		206.8
BU			6.2	1.4							7.5
ES			30.1	26.3	14.7	108.5		1.0	108.4		289.0
GP	3.3										3.3
LA		1.7	286.0		29.7						317.4
LL			2.7								2.7
MO						15.3			1.2		16.5
MU				4.9							4.9
PD		1.4	62.2	23.0	7.9	4.4					98.9
RI			19.8	109.2		32.7					161.6
RO	0.7		188.6	355.2	200.3	283.4	7.2	61.7	229.5		1326.5
RS			49.9	27.0		50.1					127.0
TA			306.2	9.8	0.4	231.9		2.6	124.4		675.3
Grand Total	1480.7	1364.2	16198.4	14722.2	6690.8	13432.0	656.9	2492.3	10806.1	184.7	68028.4

The proportions of site series area by selected site modifiers (Interfor version of site modifiers) are shown in Table 11. Note that the proportions relate to the occurrence of each site modifier, however site modifiers can overlap (e.g. shallow and steep slope). Approximately 30-40% of 01 sites in the CWH occur on shallow soils, except for the

CWHvm2 which was associated with a higher proportion of shallow morainal and colluvial veneers. The higher proportion of shallow 01 sites in the MHmm are characteristic of the upper slopes and ridges where the MH is distributed. Poor site modifiers are relatively minor, occurring mainly in the CWHvm and CWHws2 where they tend to be associated with nutrient poor and slightly drier, grantic-derived morianal deposits. Talus ("blocky talus" or "forested talus") modifiers occurr in less than 5% of 01 sites in the CWHvm. They are more common in the CWHms2 as talus deposits are relatively common in the Klinaklini where forested talus tends to occur lower on slopes in the CWHms2. These proportions slightly underestimate the actual distribution of forested talus sites as they are difficult to interpret on air photos without field verification. Finally, a high proportion of steep slope modifiers are associated with dry sites as they tend to occur on steep, shallow, upper slopes.

TABLE 11. Proportion of total site series area by key site modifiers.

Site Unit	Total area of site unit (ha)	Sitemodifiers			
		po	sh	ss	ta
		Proportion of total site unit area			
CWHxm					
01	290.9	0.0%	36.2%	8.0%	1.2%
02	57.5	0.0%	0.0%	89.4%	0.0%
03	140.5	0.0%	0.0%	52.7%	0.0%
05	114.8	0.0%	7.6%	23.4%	7.6%
CWHmm1					
01	718.6	0.0%	39.9%	0.4%	0.0%
03	238.0	0.0%	0.0%	4.9%	0.0%
CWHvm1					
01	4900.0	2.4%	36.0%	11.1%	4.9%
01s	112.9	0.0%	34.5%	0.0%	0.0%
02	58.9	0.0%	0.0%	45.4%	0.0%
03	2367.1	0.0%	0.0%	47.1%	1.4%
04	29.3	0.0%	13.9%	13.9%	27.3%
05	1492.3	0.0%	8.5%	4.2%	11.8%
06	478.2	11.4%	21.7%	3.8%	2.6%
07	3028.9	0.0%	5.1%	4.3%	5.4%
CWHvm2					
01	2656.9	8.2%	55.9%	13.2%	0.2%
01s	14.2	0.0%	99.8%	0.0%	0.0%
02	68.2	0.0%	0.0%	58.9%	0.0%
03	1951.2	0.0%	0.0%	51.6%	0.0%
05	29.8	0.0%	33.3%	27.1%	21.6%
06	486.4	13.2%	36.9%	1.7%	0.0%
07	244.8	0.0%	29.2%	14.0%	1.2%
CWHms2					
01	4028.4	0.1%	38.9%	19.3%	10.9%
02	887.1	0.0%	0.0%	23.3%	0.0%
03	3972.7	0.0%	0.0%	35.1%	1.8%
04	1545.7	0.0%	3.8%	11.1%	19.8%

Site Unit	Total area of site unit (ha)	Sitemodifiers			
		po	sh	ss	ta
		Proportion of total site unit area			
06	2036.5	0.0%	8.1%	9.6%	5.4%
11	213.3	0.0%	1.1%	0.0%	0.0%
CWHws2					
01	5192.3	3.6%	34.1%	17.8%	0.0%
02	102.3	0.0%	0.0%	53.9%	0.0%
03	2551.0	0.0%	0.0%	58.8%	0.0%
04	478.5	0.0%	14.8%	22.6%	0.0%
05	11.7	0.0%	48.3%	0.0%	0.0%
06	1785.5	0.0%	9.7%	12.9%	0.0%
MHmm1					
01	1270.3	0.0%	67.4%	20.5%	0.0%
02	527.1	0.0%	0.0%	56.0%	0.0%
03	21.8	0.0%	78.9%	7.3%	0.0%
04	13.4	0.0%	59.0%	0.0%	0.0%
05	20.4	0.0%	34.6%	2.9%	0.0%
06	22.9	0.0%	100.0%	0.0%	0.0%
07	61.0	0.0%	7.6%	0.0%	0.0%
27	203.4	0.0%	81.9%	10.7%	0.0%
MHmm2					
01	6189.1	0.0%	44.1%	22.2%	1.2%
02	2002.9	0.0%	0.0%	51.5%	0.4%
03	23.2	0.0%	63.6%	63.6%	5.6%
05	249.1	0.0%	18.1%	24.0%	11.6%
06	0.8	0.0%	0.0%	0.0%	100.0%
07	257.7	0.0%	3.1%	1.9%	0.0%
09	68.3	0.0%	2.7%	0.0%	0.0%
27	418.6	0.0%	51.8%	0.0%	0.0%

6. Conclusion

The data generated from this study provide an inventory of biogeoclimatic site units for the forested portion of TFL 45 which will serve as a suitable framework for estimating site index for use in timber supply analysis. The included information meets the current TEM Standard, and can be readily augmented to full standards according to future priorities and available resources.

In addition to the growth and yield application, the ecological database from this project can also be applied to other planning needs. Because the data relates to the stable ecological components of the landbase, it should serve Interfor's planning requirements for some time into the future. Some examples include:

- biodiversity planning within the forested portion of the TFL. Key information includes site series, slope/aspect and structural stage (can be derived subsequently through GIS processing of forest cover and TRIM data), and accurate

biogeoclimatic unit boundaries. The revisions to biogeoclimatic units from this project have significant impacts on biodiversity planning. Information for the excluded portion (AT, MHmmp) can be derived from forest cover and TRIM data (using a "Predictive Ecosystem Mapping" approach), or can be added at a later date using a reconnaissance-level survey.

- analysis and identification of potential treatment opportunities for silvicultural practices such as fertilization, spacing, and pruning
- identification of hazard ratings for significant forest health agents which can be supplemented with observed incidence to produce hazard and risk assessments for the TFL.
- identification of stocking hazard ratings showing areas were site-related problems in meeting minimum stocking standards can be anticipated.
- identification of free-to-grow classes where regeneration growth rates can be estimated based on site series and tree species. This can be used to identify adjacency issues for development planning.

7. REFERENCES

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APPENDIX 1: Database Dictionary

DATA FIELDS

INTERFOR DATABASE

Code	Description
Sheet	Map sheet number
Polygon	Polygon number
Source	Data source
Ecosec	Ecosection
Zone	Biogeoclimatic zone
Subz/Var.	Biogeoclimatic subzone/variant
BGC_unit	Combined BGC zone/subzone/variant
Eco1_%dec	1st ecosystem component - % decile
Eco1_SS	1st ecosystem component - site series
Eco1_SM1	1st ecosystem component - 1st site modifier
Eco1_SM2	1st ecosystem component - 2nd site modifier
Eco1_SM3	1st ecosystem component - 3rd site modifier
Eco2_%dec	2nd ecosystem component - % decile
Eco2_SS	2nd ecosystem component - site series
Eco2_SM1	2nd ecosystem component - 1st site modifier
Eco2_SM2	2nd ecosystem component - 2nd site modifier
Eco2_SM3	2nd ecosystem component - 3rd site modifier
Eco3_%dec	3rd ecosystem component - % decile
Eco3_SS	3rd ecosystem component - site series
Eco3_SM1	3rd ecosystem component - 1st site modifier
Eco3_SM2	3rd ecosystem component - 2nd site modifier
Eco3_SM3	3rd ecosystem component - 3rd site modifier
PROD	Productivity class (for consistency check of derived SI data)

TEM DATABASE

TEM field	Description
Source	Data source
Eco_Sec	Ecosection
Bgc_Zone	Biogeoclimatic zone
Bgc_Subzon	Biogeoclimatic subzone
Bgc_Vrt	Biogeoclimatic variant
Sdec_1	1st ecosystem component - % decile
Site_S1	1st ecosystem component – site series
Site_M1a	1st ecosystem component – 1st site modifier
Site_M1b	1st ecosystem component – 2nd site modifier
Sdec_2	2nd ecosystem component - % decile
Site_S2	2nd ecosystem component – site series
Site_M2a	2nd ecosystem component – 1st site modifier
Site_M2b	2nd ecosystem component – 2nd site modifier
Sdec_3	3rd ecosystem component - %
Site_S3	3rd ecosystem component – site series
Site_M3a	3rd ecosystem component – 1st site modifier
Site_M3b	3rd ecosystem component – 2nd site modifier

Source

Code	Description
A	air call
G	Ground inspection plot
P	Photo interpretation

Ecosection

Code	Description
NPR	Northern Pacific Ranges
OUF	Outer Fiordland

Biogeoclimatic Unit (Zone/Subzone/Variant)

Code	Description
CWHxm	Very Dry Maritime CWH Subzone
CWHmm1	Submontane Moist Maritime CWH Variant
CWHdm	Dry Maritime CWH Subzone
CWHvm1	Submontane Very Wet Maritime CWH Variant
CWHvm2	Montane Very Wet Maritime CWH Variant
CWHms2	Central Moist Submaritime CWH Variant
CWHws2	Montane Wet Submaritime CWH Variant
MHmm1	Windward Moist Maritime MH Variant
MHmm2	Leeward Moist Maritime MH Variant
MHmmp	Parkland Moist Maritime MH Subzone

Site Series

Interfor Site series code	TEM site series code	Name	Comments
CWHxm			
01	HK	HwFd - Kindbergia	slightly dry/poor to medium sites (zonal)
02	DC	FdPl - Cladina	very dry/poor sites on bedrock or very thin soils
03	DS	FdHw - Salal	moderately dry/poor to medium sites on shallow and/or very coarse soils
05	RS	Cw - Sword fern	slightly dry to fresh/rich sites
06	HD	HwCw - Deer fern	moist to very moist/poor to medium sites
07	RF	Cw - Foamflower	moist to very moist/rich sites
12	RC	CwSs - Skunk cabbage	wet/medium to rich sites on poorly drained soils
CWHdm			
01	HM	Hw - Flat moss	slightly dry/poor to medium sites (zonal)
02	DC	FdPl - Cladina	very dry/poor sites on bedrock or very thin soils
03	DS	FdHw - Salal	moderately dry/poor to medium sites on shallow and/or very coarse soils

Interfor Site series code	TEM site series code	Name	Comments
04	DF	Fd - Sword fern	moderately dry/rich sites on colluvial soils
05	RS	Cw- Sword fern	slightly dry to fresh/rich sites
06	HD	HwCw - Deer fern	moist to very moist/poor to medium sites
07	RF	Cw - Foamflower	moist to very moist/rich sites
12	RC	CwSs - Skunk cabbage	wet/medium to rich sites on poorly drained soils
20	RM	Cw – Fern bluffs	dry to moist/poor to medium sites on forested bluffs and cliffs (extreme microsite variation)
CWHmm1			
01	AP	HwBa - Pipecleaner moss	fresh/poor to medium sites (zonal)
03	HS	HwCw - Salal	slightly dry/poor to medium sites on shallow and/or very coarse soils
05	AF	BaCw - Foamflower	fresh/rich sites
06	HD	HwBa - Deer fern	moist to very moist/poor to medium sites
07	AS	BaCw - Salmonberry	moist to very moist/rich sites
11	LS	Pl - Sphagnum	wet/poor sparsely forested bog
12	RC	CwSs - Skunk cabbage	wet/medium to rich sites on poorly drained soils
CWHms2			
01	AM	HwBa – Step moss	slightly dry to fresh/poor to medium sites (zonal)
02	DK	FdPl - Kinnikinnick	very dry/poor sites on bedrock or very thin soils
03	DF	FdHw – Falsebox	moderately dry/poor to medium sites on shallow and/or very coarse soils
04	AO	BaCw – Oak fern	slightly dry to fresh/rich sites
05	HQ	HwBa – Queen's cup	moist to very moist/poor to medium sites
06	AD	BaCw – Devil's club	moist to very moist/rich sites
07	SS	Ss - Salmonberry	high bench floodplain sites
08	CD	Act – Red-osier dogwood	medium bench floodplain sites
09	CW	Act - Willow	low bench floodplain sites
10	LS	Pl - Sphagnum	wet/poor sparsely forested bog
11	RC	CwSs – Skunk cabbage	wet/medium to rich sites on poorly drained soils
12	SC	Ss – Pacific crabapple	wet/rich sparsely forested brackish site adjacent to estuary
20	RM	Cw – Fern bluffs	dry to moist/poor to medium sites on forested bluffs and cliffs (extreme microsite variation)
CWHws2			
01	AB	HwBa - Bramble	slightly dry to fresh/poor to medium sites (zonal)
02	LK	Pl - Kinnikinnick	very dry/poor sites on bedrock or very thin soils
03	HM	HwPl - Feathermoss	moderately dry/poor to medium sites on shallow and/or very coarse soils
04	AO	BaCw – Oak fern	slightly dry to fresh/rich sites

Interfor Site series code	TEM site series code	Name	Comments
05	HQ	HwBa – Queen's cup	moist to very moist/poor to medium sites
06	AD	BaCw – Devil's club	moist to very moist/rich sites
07	SS	Ss - Salmonberry	high bench floodplain sites
08	CD	Act – Red-osier dogwood	medium bench floodplain sites
09	CW	Act - Willow	low bench floodplain sites
10	LS	Pl - Sphagnum	wet/poor sparsely forested bog
11	RC	CwSs – Skunk cabbage	wet/medium to rich sites on poorly drained soils
20	RF	Cw – Fern bluffs	dry to moist/poor to medium sites on forested bluffs and cliffs (extreme microsite variation)
CWHvm1			
01	AB	HwBa - Blueberry	fresh/poor to medium sites (zonal)
01s	ABs	HwBa - Blueberry/salal phase	fresh/very poor to poor salal dominated sites
02	LC	HwPl - Cladina	moderately dry/poor sites on bedrock or very thin soils
03	HS	HwCw - Salal	slightly dry/poor to medium sites on shallow and/or very coarse soils
04	RS	CwHw - Sword fern	slightly dry/rich sites on colluvial soils
05	AF	BaCw - Foamflower	fresh/rich sites
06	HD	HwBa - Deer fern	moist to very moist/poor to medium sites
07	AS	BaCw - Salmonberry	moist to very moist/rich sites
09	SS	Ss - Salmonberry	high bench floodplain sites
10	CD	Act - Red-osier dogwood	medium bench floodplain sites
11	CW	Act - Willow	low bench floodplain sites
13	LS	Pl - Sphagnum	wet/poor sparsely forested bog
14	RC	CwSs - Skunk cabbage	wet/medium to rich sites on poorly drained soils
20	RM	Cw – Fern bluffs	dry to moist/poor to medium sites on forested bluffs and cliffs (extreme microsite variation)
CWHvm2			
01	AB	HwBa - Blueberry	fresh/poor to medium sites (zonal)
01s	ABs	HwBa - Blueberry/salal phase	fresh/very poor to poor salal dominated sites
02	LC	HwPl - Cladina	moderately dry/poor sites on bedrock or very thin soils
03	HS	HwCw - Salal	slightly dry/poor to medium sites on shallow and/or very coarse soils
05	AF	BaCw - Foamflower	fresh/rich sites
06	HD	HwBa - Deer fern	moist to very moist/poor to medium sites
07	AS	BaCw - Salmonberry	moist to very moist/rich sites
09	YG	CwYc - Goldthread	very moist/poor sites on poorly drained soils
10	LS	Pl - Sphagnum	wet/poor sparsely forested bog
11	RC	CwYc - Skunk cabbage	wet/medium to rich sites on poorly drained soils
20	RM	Cw – Fern bluffs	forested bluff sites

Interfor Site series code	TEM site series code	Name	Comments
MHmm1			
01	MB	HmBa - Blueberry	fresh/poor to medium sites (zonal)
27	YB	HmYc – Blueberry – Mountain heather	fresh/poor to medium, late snow-lie sites with open canopy forests
02	MM	HmBa - Mountain-heather	slightly dry/poor to medium sites on bedrock or very shallow soils
03	MO	BaHm – Oak fern	fresh/rich sites
04	AB	HmBa - Bramble	moist/poor to medium sites
05	MT	BaHm - Twisted stalk	moist/rich sites
06	MD	HmYc – Deer cabbage	very moist/poor to medium sites with open canopy forests
07	YH	YcHm - Hellebore	very moist/medium to rich sites with open canopy forests
08	YS	HmYc - Sphagnum	wet/poor bog forest
09	YC	YcHm - Skunk cabbage	wet/medium to rich sites on poorly drained soils with open canopy forests
21	YR	Yc – Rhacomitrium bluffs	precipitous bluffs and cliffs featuring scrubby forests
MHmm2			
01	MB	HmBa - Blueberry	fresh/poor to medium sites (zonal)
27	YB	HmYc – Blueberry – Mountain heather	fresh/poor to medium, late snow-lie sites with open canopy forests
02	MM	HmBa - Mountain-heather	slightly dry/poor to medium sites on bedrock or very shallow soils
03	MO	BaHm – Oak fern	fresh/rich sites
05	MT	BaHm - Twisted stalk	moist/rich sites
06	MD	HmYc – Deer cabbage	Very moist/poor rich sites with open canopy forests
07	YH	YcHm - Hellebore	very moist/medium to rich sites with open canopy forests
08	YS	HmYc - Sphagnum	wet/poor sparsely forested bog
09	YC	YcHm - Skunk cabbage	wet/medium to rich sites on poorly drained soils with open canopy forests
21	YR	Yc – Rhacomitrium bluffs	scrubby bluff sites
MHmmp			
22	MH	Hm – Mountain heather parkland	mosaic of heather and tree islands
23	LM	Lichen - Hm parkland	mosaic of rocky sites with tree islands
24	SS	Sedge – Swamp moss parkland meadows	mosaic of meadow sites with tree islands

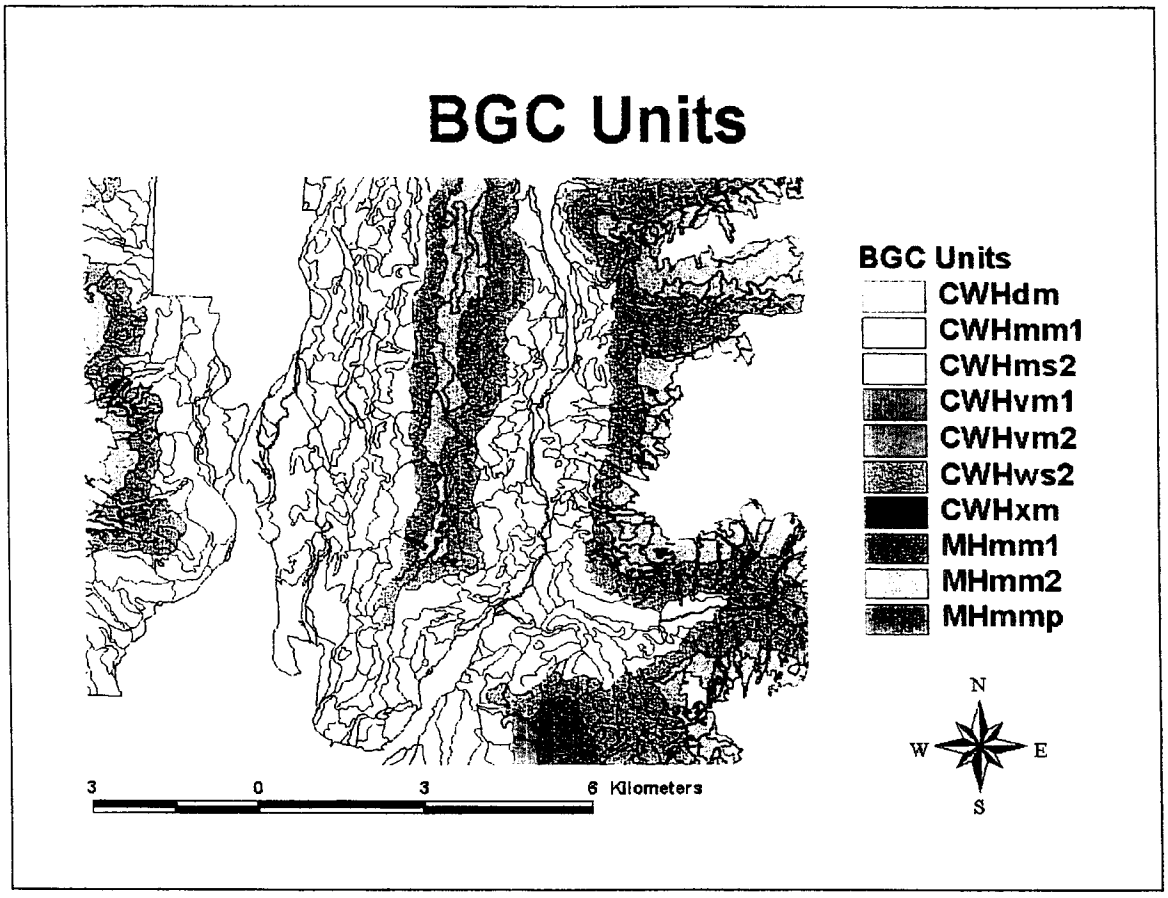
Non-Forested Units in all BGC Units			
31	BS	Beaked sedge – Sphagnum bog	non-forested Sphagnum-dominated bog
32	CF	Carex fen	non-forested Carex-dominated fen
51	SA	Sitka alder – Salmonberry	shrub dominated avalanche tracks

51.1	AC	Ba - Copperbush	young conifer dominated avalanche tracks
BT	BT	Brushy talus	talus slopes dominated by shrub species
BU	BU	Buildings, parking, etc.	
ES	ES	Exposed soil	from recent disturbance; usually slope failures
GP	GP	Gravel pit	
LA	LA	Lake	
LL	LL	Landings	
MO	MO	Recent glacial moraines	may have pioneer shrub communities
MU	MU	Mudflat sediments	
PD	PD	Pond	
RI	RI	River	
RO	RO	Bedrock	
RS	RS	River sediments	
TA	TA	Talus	

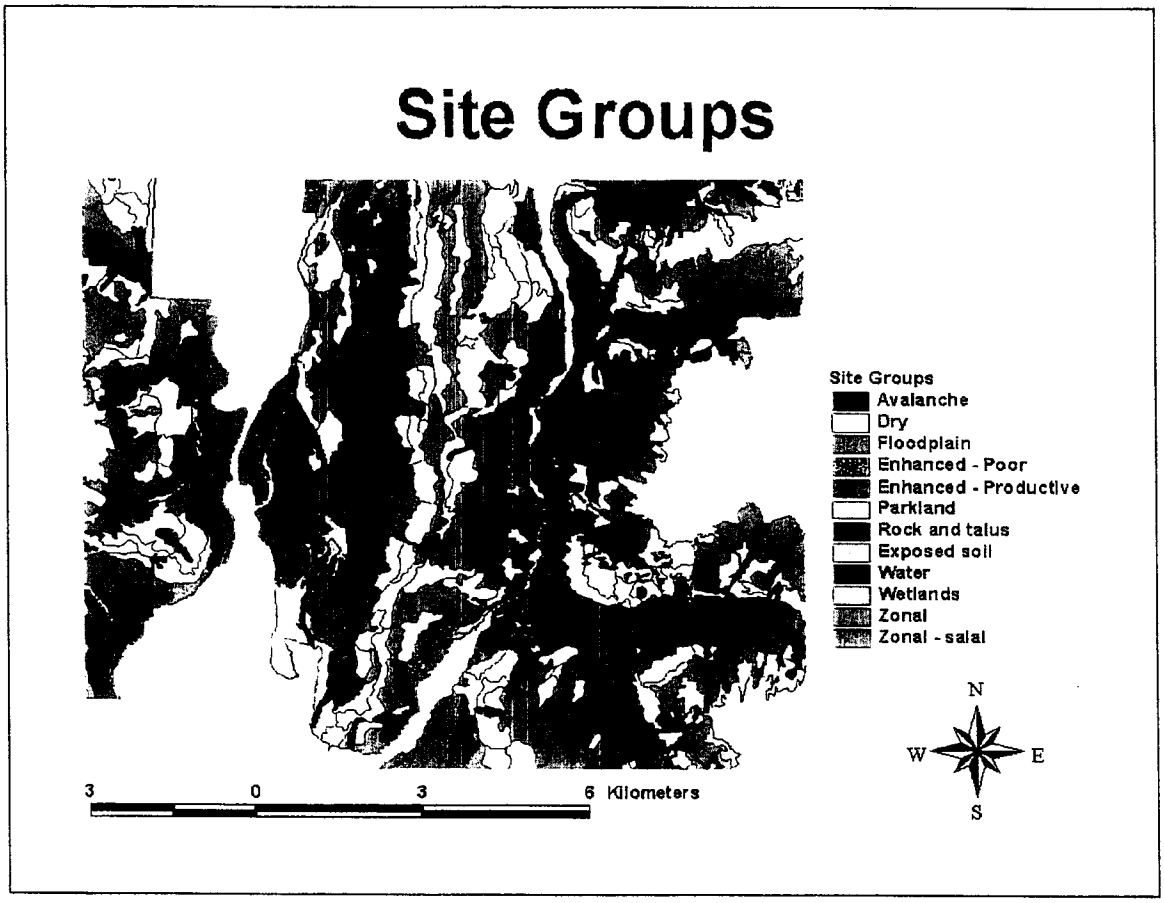
Site Modifiers

Interfor Code	TEM Code	Name	Comments
ta	--	blocky talus	sites on rubbly (blocky) colluvial deposits
gu	g	gullied	sites with frequent gullies
hu	h	hummocky	sites on hummocky terrain
lo	--	local climate	sites strongly influenced by local climate (e.g. MH bowls)
po	--	poor productivity	sites with poorer than normal productivity for site unit
rv	--	ravine	sites with steep slopes bordering streams
sh	s	shallow	sites with predominantly shallow (<1m) soils
sl	--	slope	sites with slopes 30-70%
ss	--	steep slope	sites with slopes 70-100%
hs	--	hypersteep slope	sites with slopes >100%
cf	--	cottonwood flats	major Act dominated floodplains of Klinaklini/Franklin Rivers

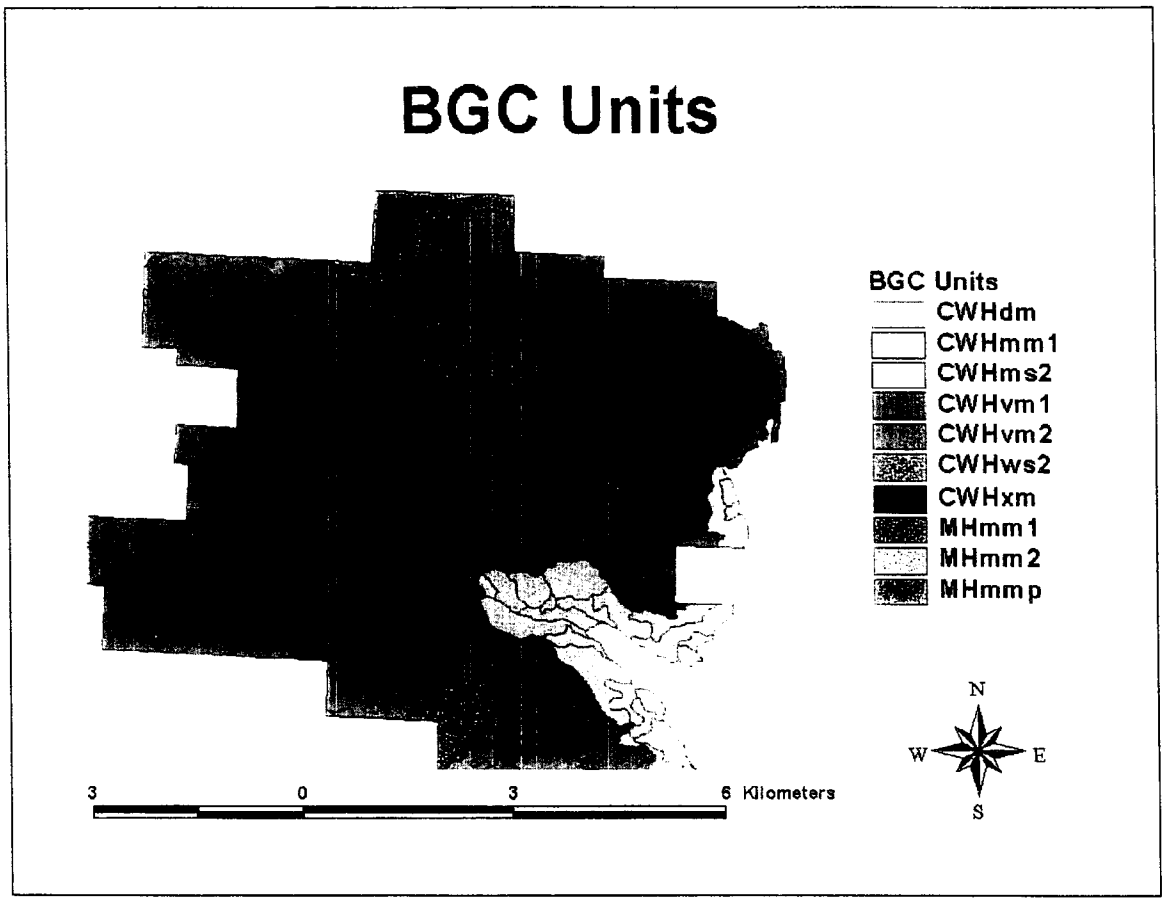
APPENDIX 2: Sample Map Themes



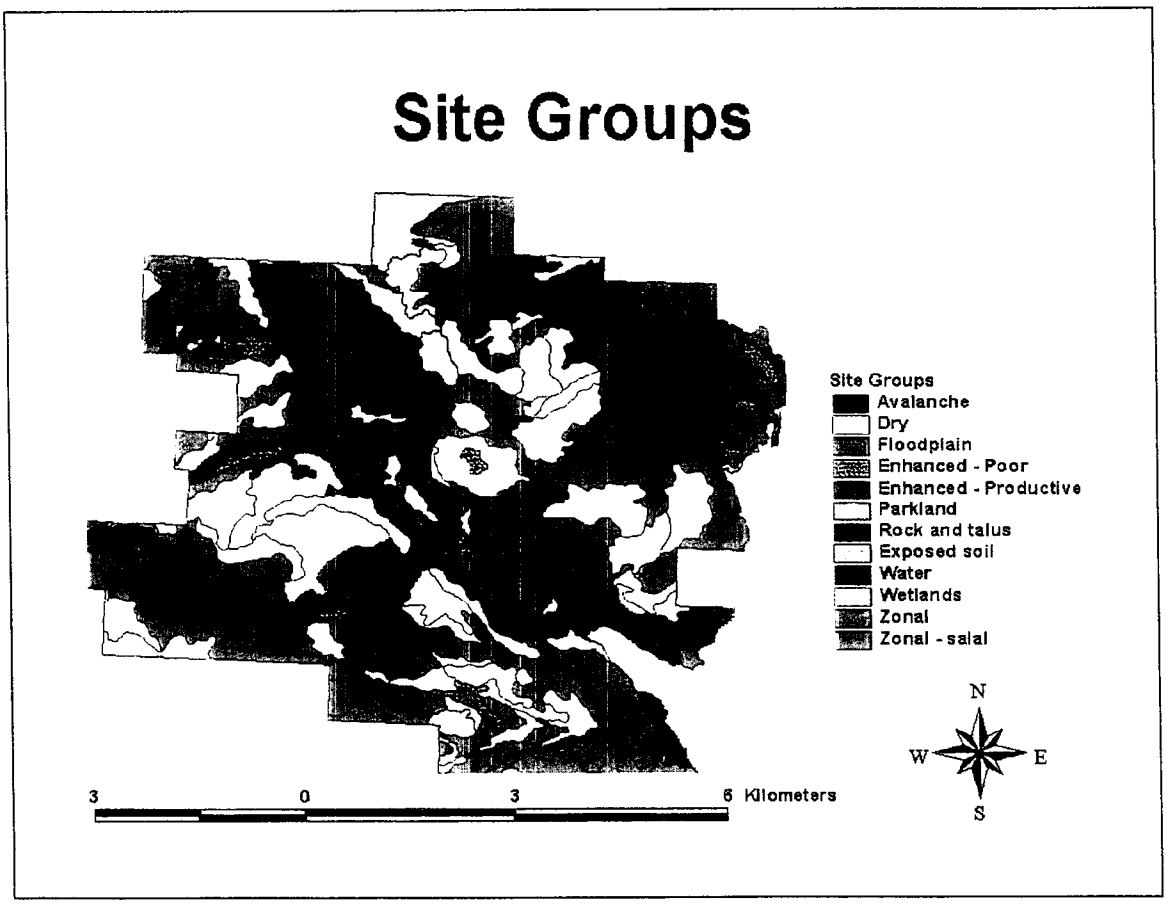
Example 1: Biogeoclimatic units; northern portion of the TFL (mouth of Klinaklini and Franklin Rivers).



Example 2: Site groups; northern portion of the TFL (mouth of Klinaklini and Franklin Rivers).



Example 3: Biogeoclimatic units; southern portion of the TFL (west side of Phillips Arm).



Example 4: Site groups; southern portion of the TFL (west side of Phillips Arm).

APPENDIX 3: Sample Attribute Database

Interfor Version of Ecosystem Database

SIBEC	SOURCE	ECOSEC	ZONE	SUBZ_VAR	BGC_UNIT	ECO1_DEC	ECO1_SS	ECO1_SM1	ECO1_SM2	ECO1_SM3	ECO2_DEC	ECO2_SS	ECO2_SM1	ECO2_SM2	ECO2_SM3	ECO3_DEC	ECO3_SS	ECO3_SM1	ECO3_SM2	ECO3_SM3	SITE_GRP
2	P	NPR	MH	mm2	MHmm2	7	01	po	sl	sh	3	27	sl	sh		0					ZO
3	P	NPR	MH	mm2	MHmm2	10	01	sl			0					0					ZO
4	G	NPR	CWH	ws2	CWHws2	8	01	sl	ta		2	06	sl	ta		0					ZO
5	G	NPR	CWH	ws2	CWHws2	8	01				2	03				0					ZO
6	P	NPR	CWH	ws2	CWHws2	7	01	sl	rv		3	RS	rv			0					ZO
7	P	NPR	CWH	ws2	CWHws2	7	01	sl	ta		3	03	sl	ta		0					ZO
8	P	NPR	CWH	ms2	CWHms2	10	03	sl			0					0					ZO
9	P	NPR	CWH	ms2	CWHms2	10	01				0					0					DR
10	P	NPR	CWH	ms2	CWHms2	6	03	ss			4	20				0					ZO
11	P	NPR	CWH	ms2	CWHms2	7	03	ss			3	20				0					DR
12	P	NPR	CWH	ws2	CWHws2	7	03	ss			3	RO	hs			0					DR
13	P	NPR	CWH	ms2	CWHms2	10	02	ss			0					0					DR
14	P	NPR	CWH	ws2	CWHws2	10	BT	sl			0					0					DR
15	P	NPR	CWH	ws2	CWHws2	10	03				0					0					AV
16	P	NPR	CWH	ws2	CWHws2	6	03				4	01	sh			0					DR
17	P	NPR	CWH	ws2	CWHws2	5	20				3	01	ss	sh		2	03	ss			DR
18	P	NPR	CWH	ws2	CWHws2	10	01	sl	ta		0					0					ZO
19	P	NPR	CWH	ws2	CWHws2	8	03	sl			2	01	sl	ta	sh	0					DR
20	P	NPR	MH	mm2	MHmm2	7	21				3	TA	sl			0					DR
21	P	NPR	MH	mm2	MHmm2	10	51	sl			0					0					AV
22	P	NPR	MH	mm2	MHmm2	7	02	ss			3	01	ss	sh		0					DR
23	P	NPR	CWH	ms2	CWHms2	10	01	sl	ta		0					0					ZO
24	P	NPR	MH	mm2	MHmm2	7	01	sl	gu		2	51	sl			1	05	sl			ZO
25	P	NPR	MH	mm2	MHmm2	6	21				4	RO	hs			0					DR
26	P	NPR	MH	mm2	MHmm2	7	01	po	sl	sh	3	27	sl	sh		0					ZO
27	P	NPR	CWH	ws2	CWHws2	7	03	ss			3	51	ss			0					DR
28	P	NPR	CWH	ws2	CWHws2	10	TA	sl			0					0					RO
29	P	NPR	MH	mm2	MHmm2	10	02	ss			0					0					DR
30	P	NPR	CWH	ws2	CWHws2	10	TA	sl			0					0					RO
31	P	NPR	CWH	ws2	CWHws2	10	03	ss			0					0					DR
32	P	NPR	CWH	ws2	CWHws2	7	03	ss			3	20				0					DR
33	P	NPR	MH	mm2	MHmm2	10	01	ss	sh		0					0					ZO
34	P	NPR	CWH	ws2	CWHws2	10	TA	sl			0					0					RO
35	P	NPR	CWH	ws2	CWHws2	8	01	sl			2	04	sl	ta		0					ZO
36	P	NPR	CWH	ws2	CWHws2	7	04	sl	ta		3	01	sl	ta		0					MR
37	P	NPR	MH	mm2	MHmm2	7	01	sl	gu	sh	2	05	sl	gu	sh	1	51	sl	sh		ZO
38	P	NPR	CWH	ws2	CWHws2	10	03	sl			0					0					DR
39	P	NPR	CWH	ws2	CWHws2	10	TA	sl			0					0					RO
40	P	NPR	MH	mm2	MHmm2	7	02	ss	gu		3	01	ss	sh	gu	0					DR
41	P	NPR	CWH	ws2	CWHws2	10	03	sl			0					0					DR
42	P	NPR	CWH	ms2	CWHms2	7	01				3	03				0					ZO
43	P	NPR	MH	mm2	MHmm2	10	RO	hs			0					0					RO
44	P	NPR	MH	mm2	MHmm2	10	01	ss			0					0					ZO
45	P	NPR	MH	mm2	MHmm2	10	51	ss			0					0					AV
46	P	NPR	MH	mm2	MHmm2	10	01	ss			0					0					ZO
47	P	NPR	CWH	ms2	CWHms2	7	01	sl	rv		3	RS	rv			0					ZO
48	P	NPR	MH	mm2	MHmm2	10	01	sl			0					0					ZO
49	P	NPR	MH	mm2	MHmm2	6	51	ss			4	01	ss			0					AV
50	P	NPR	CWH	ms2	CWHms2	8	01				2	03				0					ZO
51	P	NPR	CWH	ws2	CWHws2	8	01	sl	sh	gu	2	06	sl	sh	gu	0					ZO
52	P	NPR	MH	mm2	MHmm2	6	01	sh	po		4	21	gu			0					ZO
53	P	NPR	CWH	ws2	CWHws2	8	RO	hs	gu		2	TA	sl			0					RO
54	P	NPR	CWH	ms2	CWHms2	8	TA	sl			2	01	sl	ta		0					RO
55	P	NPR	CWH	ws2	CWHws2	10	01	ss			0					0					ZO
56	P	NPR	CWH	ws2	CWHws2	9	51	sl			1	RS				0					AV
57	P	NPR	CWH	ws2	CWHws2	10	51	ss			0					0					AV
58	P	NPR	CWH	ws2	CWHws2	8	03	ss			2	01	ss	sh		0					DR
59	P	NPR	CWH	ws2	CWHws2	10	03	ss			0					0					DR
60	P	NPR	CWH	ws2	CWHws2	4	TA	ss			3	BT	ss			3	03	ss	ta		RO
61	P	NPR	CWH	ms2	CWHms2	10	03	ss			0					0					DR

TEM Version of Ecosystem Database

SIBEC	Source	Eco Sec	Bgc Zone	Bgc Subzon	Bgc Vrt	Sdec 1	Site S1	Site M1a	Site M1b	Sdec 2	Site S2	Site M2a	Site M2b	Sdec 3	Site S3	Site M3a	Site M3b
2	P	NPR	MH	mm	2	7	MB	s		3	YB	s		0			
3	P	NPR	MH	mm	2	10	MB			0				0			
4	G	NPR	CWH	ws	2	8	AB			2	AD			0			
5	G	NPR	CWH	ws	2	8	AB			2	HM			0			
6	P	NPR	CWH	ws	2	7	AB			3	RS			0			
7	P	NPR	CWH	ws	2	7	AB			3	HM			0			
8	P	NPR	CWH	ms	2	10	DF			0				0			
9	P	NPR	CWH	ms	2	10	AM			0				0			
10	P	NPR	CWH	ms	2	6	DF			4	RM			0			
11	P	NPR	CWH	ms	2	7	DF			3	RM			0			
12	P	NPR	CWH	ws	2	7	HM			3	RO			0			
13	P	NPR	CWH	ms	2	10	DK			0				0			
14	P	NPR	CWH	ws	2	10	BT			0				0			
15	P	NPR	CWH	ws	2	10	HM			0				0			
16	P	NPR	CWH	ws	2	6	HM			4	AB	s		0			
17	P	NPR	CWH	ws	2	6	RF			3	AB	s		2	HM		
18	P	NPR	CWH	ws	2	10	AB			0				0			
19	P	NPR	CWH	ws	2	8	HM			2	AB	s		0			
20	P	NPR	MH	mm	2	7	YR			3	TA			0			
21	P	NPR	MH	mm	2	10	SA			0				0			
22	P	NPR	MH	mm	2	7	MM			3	MB	s		0			
23	P	NPR	CWH	ms	2	10	AM			0				0			
24	P	NPR	MH	mm	2	7	MB	g		2	SA			1	MT		
25	P	NPR	MH	mm	2	6	YR			4	RO			0			
26	P	NPR	MH	mm	2	7	MB	s		3	YB	s		0			
27	P	NPR	CWH	ws	2	7	HM			3	SA			0			
28	P	NPR	CWH	ws	2	10	TA			0				0			
29	P	NPR	MH	mm	2	10	MM			0				0			
30	P	NPR	CWH	ws	2	10	TA			0				0			
31	P	NPR	CWH	ws	2	10	HM			0				0			
32	P	NPR	CWH	ws	2	7	HM			3	RF			0			
33	P	NPR	MH	mm	2	10	MB	s		0				0			
34	P	NPR	CWH	ws	2	10	TA			0				0			
35	P	NPR	CWH	ws	2	8	AB			2	AO			0			
36	P	NPR	CWH	ws	2	7	AO			3	AB			0			
37	P	NPR	MH	mm	2	7	MB	g	s	2	MT	g	s	1	SA	s	
38	P	NPR	CWH	ws	2	10	HM			0				0			
39	P	NPR	CWH	ws	2	10	TA			0				0			
40	P	NPR	MH	mm	2	7	MM	g		3	MB	s	g	0			
41	P	NPR	CWH	ws	2	10	HM			0				0			
42	P	NPR	CWH	ms	2	7	AM			3	DF			0			
43	P	NPR	MH	mm	2	10	RO			0				0			
44	P	NPR	MH	mm	2	10	MB			0				0			
45	P	NPR	MH	mm	2	10	SA			0				0			
46	P	NPR	MH	mm	2	10	MB			0				0			
47	P	NPR	CWH	ms	2	7	AM			3	RS			0			
48	P	NPR	MH	mm	2	10	MB			0				0			
49	P	NPR	MH	mm	2	6	SA			4	MB			0			
50	P	NPR	CWH	ms	2	8	AM			2	DF			0			
51	P	NPR	CWH	ws	2	8	AB	s	g	2	AD	s	g	0			
52	P	NPR	MH	mm	2	6	MB	s		4	YR	g		0			
53	P	NPR	CWH	ws	2	8	RO	g		2	TA			0			
54	P	NPR	CWH	ms	2	8	TA			2	AM			0			
55	P	NPR	CWH	ws	2	10	AB			0				0			
56	P	NPR	CWH	ws	2	9	SA			1	RS			0			
57	P	NPR	CWH	ws	2	10	SA			0				0			
58	P	NPR	CWH	ws	2	8	HM			2	AB	s		0			
59	P	NPR	CWH	ws	2	10	HM			0				0			

APPENDIX 4: Sample Field Inspection Database

Sample Ground Inspection Data Summary - Variables

Photo Line	No.	Stop #	Date	Page	Elev.	Aspect	Slope %	Slope pos.	Terrain	Geol.	Forest Depth(cm)	Texture	Coarse frags(%)	Depth to	Humus form	Stand comp.	Stru. stage	BGC unit	Site serie	SMR/SNR	Poly summary Component 1 Site	%	Modif.	Component 2 Site	%	Modif.	Component 3 Site	%	Modif.
1	5	1C1	6/7/98	87	445	120	30	M	Cb	G	12	SL	50		mr	HwBaSx	OF	CWHws2	01	3/C	01	90	sl	03	10	sl			
1	5	1C2	6/7/98	87	480	30	55	M	Cb	G	12	SL	40		mr	HwBa(Sx)	OF	CWHws2	01	3/C	01	80	sl	03	20	sl	06	+	sl,sh
1	7	1B1	6/7/98	78	315	0	70	M	C	G	20	SL	45		mr	CwHwBa	OF	CWHms2	01	3/B	03	95	ss,sh	06	5	ss,sh			
1	11	1B1	2/7/98	2	695	164	35-40	M	C	G	5-10	SL	45		mr	HwBa(Ss)	OF	CWHws2	01/04	4/D-C	04	60	sl	01	40	sl			
1	11	1C1	2/7/98	11	690	330	50	M	Cf		6	SL	35		mr,md	HwBa	OF	CWHws2	01	4/C	01	70	sl	06	30	sl			
1	11	1C2	2/7/98	11	740	350	60	M	Cf	G	10	SL	40		mr	HwBa	OF	CWHws2	01	4/C	01	80	sl	06	20	sl			
1	11	1G1	2/7/98	7	690	180	60	M-L	Cb		4	L	50		md	HwCwBa	OF	CWHws2	04	4-5/D	04	60	sl	06	20	sl	01	20	sl
1	13	1B1	2/7/98	1	1000	80	60	M	Mb	G	5-7	SL	45-50		mr	HwBa	OF	CWHws2	01	4/C	01	100	sl						
1	13	1C1	2/7/98	10	990	230	35	M	Cf	G	8	SL	35		mr	HwBa(Hm)	OF	CWHws2	01	4/C	01	100	sl	06	+				
1	13	1C2	2/7/98	10	970	200	25	M	FG	G	8	SL	35		mr	HwBa(Hm)	OF	CWHws2	01	4/C	01	80	sl	06	20				
2	7	1B1	3/7/98	17	885	280	40	M	Mb	G	5-7	SL	30		mr	HwHmBa	OF	CWHws2	01	4/C	01	100	sl						
2	7	1B2	3/7/98	18	855	280	55	M	Mb	G	5-7	LS-SL	30		mr	HwHmBa	OF	CWHws2	01	3/C	01	100	sl,ss						
2	7	1C1	3/7/98	30	990	200	40	M	Cf	G	5	SL	50		md	BaHmHw	OF	CWHws2	04	4/D	04	50	sl,co	01	30	sl,co	06	20	sl,co
2	7	1C2	3/7/98	30	1020	205	40	M	Cf	G	12	SL	50		mr	HwHmBa	OF	CWHws2	01	4/C	01	80	sl,co	06	20	sl,co			
2	7	1G1	3/7/98	23	1165	300	60	U	Mb	G	5	SL	40		mr	HmBa	OF	MHmm2	01	4/C	01	100	sl						
2	7	1G2	3/7/98	24	1095	300	20	L	Mb	G	30	SiL		w70	mr	HmBa	OF	MHmm2	07	6/D	01	70		07	30				
3	8	1B1	2/7/98	5	580	70	10	M	Mb	G	20	LS-S	15		mr	HwBa(CwSsYc)	OF	CWHws2	01	4/C	01	80		11	15		06	5	
3	8	1B2	2/7/98	1	480	70	30-100	M	Mb/R	G	15	SL-S	15		mr	HmHwCwBa(Fd)	OF	CWHws2	01	3/B	01	100	sl						
3	8	1C1	2/7/98	9	510	75	55	M	Mb	G	12	LS	15		mr	HwCwBa(Fd)	OF	CWHws2	01	4/C	01	100	sl						
3	8	1C2	2/7/98	9	520	180	60	U	Ov/R	G	10	SL	15	r50	mr	HwBa(Cw)	OF	CWHws2	03	2/C	03	60	sh,sl	01	40	sl			
3	8	1G1	2/7/98	5	600	110	45	M	Mb	G	8	SL	15		mr	HwCwBa	OF	CWHws2	01	4/C	01	100	sl						
3	8	1G2	2/7/98	6	670	110	50	M	Cb-v	G	15	LS	30		mr	HwCw(Ba)	OF	CWHws2	06	5/C	06	80		01	20				
3	8	1G3	2/7/98	6	660	110	60	M	Cb	G	12	LS	70		mr	HwBaCw	OF	CWHws2	01	3/C	01	100							
3	8	1G4	2/7/98	7	565	F	0	D	Ob							CwHw	OF	CWHws2	11	7/C	11	100							
3	10	1B1	3/7/98	17	610	248	15	M	C	G	5	SL-LS	35-40		mr	HwBa(Cw)	OF	CWHws2	01	4/B-C	01	100							
3	10	1C1	3/7/98	29	935	208	40	M	Cb	G	15	SL	50		mr	HwBa(Hm)	OF	CWHws2	01	3-4/C	01	80	sl,co	03	10	sl,sh,co	06	10	co
3	10	1C2	3/7/98	29	985	275	30	M	Cb	G	11	SL	40		mr	BaHw(Hm)	OF	CWHws2	01	4/C	01	60	sl,co	06	40	sl,co			
4	7	1B1	3/7/98	16	830	82	40	M	Mb	G	15-20	S	25		mr	HwHmCwBaFd	OF	CWHms2	01	4/B-C	01	90	sl	06	10	sl			
4	7	1B2	3/7/98	16	830	97	25	M	Mb	G	10-15	S-LS	25		mr	HwHm(Ba)	OF	CWHws2	01	3-4/B-C	01	90		06	10				
4	7	1C1	3/7/98	28	810	80	25	M	Mb	G	15	S	10		mr	HwBa(Hm)	OF	CWHws2	01	4/B	01	70	sl	05	20		11	10	
4	9	1B1	3/7/98	15	530	187	35	M	Mb	G	20	LS-S	20		mr	CwFdHwBa	OF	CWHms2	06	5/D	01	60	sh	06	40	sh			
4	9	1B2	3/7/98	15	520		35	M	Mb	G	15	S	40-50		mr	HwCwFdBa	OF	CWHms2	01	3-4/B	01	100							
4	9	1C1	3/7/98	27	530	75	30	M	Cv/Mb	G	18	SL	20		mr	HwCw(Ba)	OF	CWHms2	05	6/C	05	50	sl	11	30		01	20	sl
4	9	1C2	3/7/98	27	530	75	50		Cv/Mb	G	11	SL	40		mr	HwBa(Fd)	OF	CWHms2	01	4/C	01	85	sl	06	10	sl	03	5	sl
4	9	1G1	3/7/98	22	565	90	30	M	Mv	G	12	LS	20	r60	mr	CwHwBa(Fd)	OF	CWHms2 x	01(po)	4/B	01	70		06	30				
4	9	1G2	3/7/98	22	650	90	45	U-M	Mv	G		SL		r60	mr	HwBa(Cw)	OF	CWHws2	03	2/B	03	80	sl	01	20	po,sh,sl			
4	9	1G3	4/7/98	37	435	210	70	M	Cbv	G	2	SL	50		mr	FdHw	SH	CWHms2	01	3/B	01	70	sl	03	30	sl			
4	9	1G4	6/7/98	76	225	80	10	M	Mvb	G	12	SL	45		mr	HwCwFd(SsBa)	OF	CWHms2	01	3/B	01	100							
4	9	1G5	6/7/98	77	235	30	60	M	Cb	G	25		75		mr	HwCw	OF	CWHms2	01po	2-3/B	01	70	sl,co	03	30	sl			
4	11	1C1	3/7/98	28	690	350	85	M	Cb	G	11	SL	40		mr	HwBa(Hm)	OF	CWHws2	01	4/C	01	100	ss						
4	11	1G1	3/7/98	23	890	360	80	M	Cvb	G	10	SL	30		mr	HwBa	OF	CWHws2	01	4/C	01	100	ss						
4	15	1B1	2/7/98	3	870	320	70	M	Mb	G	15-20	SiL-L	20		mr	HwBaSsCw	OF	CWHws2	06/01	4-5/C-D	06	70	ss	01	30	ss			
4	15	1B2	2/7/98	4	840	84	65	M	Mb	G	25	SL	25		mr	HwBa	OF	CWHws2	01/06	4-5/C-D	01	70	sl	06	30	sl			
4	15	1C1	2/7/98	13	885	180	30	M	Cf	G	4	S	40	p?	md	HwBa(CwSs)*	OF	CWHws2	06	5/D	06	100							
4	15	1G1	2/7/98	8	885	160	70	L	Mb	G	8	SiL	15	g30	md	BaHw	OF	CWHws2	06	5-6/C-D	01	60	sl	06	30	sl	04	10	
4	17	1B1	2/7/98	2	995	220	40	M	C	G		SL	20		mr	BaSsHw	OF	CWHws2	01/04	4/C-D	01	55	sl	04	40	sl	06	5	sl
4	17	1B2	2/7/98	3	1025	220	0-10	M	C/M?	G	5	L	15-20		mr	HwBaSs	OF	CWHws2	01/04	4/C-D	01	70		04	30				
4	17	1C1	2/7/98	12	1020	5	50	M	Mb	G	10	SL	30		mr	HwBa(Hm)*	OF	CWHws2	01	4/C	01	70	sl	06	30	sl			
4	17	1C2	2/7/98	12	1035	10	40	M	Cb	G	8	SL	40		mr	HwBa	OF	CWHws2	01	4/C	01	80	sl	06	20	sl			
5	4	1B1	3/7/98	18	580	86	5-15	M	Mb	G		SL	30		mr	HmHwBa	OF	CWHws2	01	3/B	01	100							
5	4	1B2	3/7/98	19	620	86	25-30	M	Mb	G		SL	25		mr	BaHwHm	MF	CWHws2	01	3/B	01	100							
5	4	1C1	3/7/98	31	580	55	60	M	Mb	G	13	SL	40		mr	BaHw(Hm)	OF	CWHws2	01		01	100	sl						
5	12	1B1	4/7/98	48	330	300	65	M	C	G	7-10	SL	50-60		mr	FdCw(Hw)	OF	CWHms2	01	3/C	01	90	sh,sl	06	10	sl,sh			
5	12	1B2	7/7/98	102	550	140	45	M	Mb	G	7	SL	40		mr	HwCwBa(FdHm)	OF	CWHws2	01	3-4/C	01	100	sl,sh						
5	12	1C1	7/7/98	97	575	80	35	M	Cv/R	G	12	SL	45		mr	HwBaCw	MF	CWHws2	01		01	60	sh,sl	03	30	sl	11	10	sl,sh
5	12	2H1	98/07/28	7	220	80	2	F	Ft	G	7	LS	30		mr,md	FdCw(Hw)	HB	CWHms2	(01)04	4/D(C)	04	80		01	20	ss	06	+	
5	12	2H2	98/07/28	7	230	38	9	L	CFc	G,V	4	SL	25		mr,md	FdCw(Hw)	HB	CWHms2	04	4/D	04	80		01	20		06	+	
5	12	2H3	98/07/28	8	280	94	74	M	Mv/Ov/Rh	V	8	LS	40	r40	mr	FdCwHw	HB	CWHms2	03/01	2-4/B-C	01	65-7	ss,sh	03	30	ss	06	<5	ss,sh
5	12	2T2	98/07/28	15	260	80	5	F	FGt	G	8	LS	15		mr,md	Hw4Cw3Fd2Ba1	HB	CWHms2	04	3/D	04	90		01	10				
5	14	1B1	4/7/98	48	355	212	15-20	M	C	G	5-7	SL	25		mr	FdCwHwSs	PS	CWHms2	06	5/D	06	70		01	30				
5	14	1B2	4/7/98	49	320	212	10-15	M	C	G	5	LS	30		md	HwBaCw(Ss)	SHb	CWHms2	06	5/D-E	06	100							
5	14	1B3	4/7/98	49													SHb	CWHms2	11	7/C-D	11	100							
5	14	1C1	4/7/98	42	415	230	60	M	Cv/R	G	4	LS	40		md	FdCwHw	SH	CWHms2	06	5/D	03	50	sl	06	30	sl	01	20	sl
5	14	1G1	4/7/98	38	260	F	0	L	Fv/Mb		12	fSL	5		md	FdHw(SsCw)	PS	CWHms2	04	4/D	04	60		06	40				

Sample Ground Inspection Data Summary - Comments

Photo Line	No.	Stop #	Comments
1	5	1C1	large boulders; a few large rock outcrops and talus for SS03 call; definite cold air from river.
1	5	1C2	SS06 over rock; SS03 large colluvium, almost BT.
1	7	1B1	older residuals with sub canopy Ba dominating the stand picture.
1	11	1B1	
1	11	1C1	numerous creek draws, dominated by oplo hor; mormoder; not the usual rich indicators for anything above SS01 but good humus; lower slope is all SS06 (15-20m up the hill).
1	11	1C2	not as good as 1C1 but still a moderate; some history of blowdown here.
1	11	1G1	Hw not the best for site; gappiest portions are solid SS06 in Devil swales; dense stuff is SS01 could boost SS01 right to the river.
1	13	1B1	Hw dominated stand with low vegetation cover;
1	13	1C1	very open stand - abundant Ba regen; localized MH because of river influence of cold air drainage.
1	13	1C2	nice open stand, similar to last stop; Hm here, very few because of river's local cold air; seepage tracts and slopes at river all SS06.
2	7	1B1	even sloping zonal above swamp.
2	7	1B2	represents polygon below swamp.
2	7	1C1	more Hm here but influenced by river I think; complex of rolling site series, SS06 in seepage tracts.
2	7	1C2	a lot of CF's; SS06 in seepage draws.
2	7	1G1	low end of productivity for MH; tending to the lower side.
2	7	1G2	seepage bench at bottom of steep slope from swamp; small SS07 swale within poly; stand more productive than 1G1 but still MH (lower range)
3	8	1B1	well drained coarse texture; till; mainly rolling SS01 with localized skunk and minor SS06.
3	8	1B2	knob on the edge of a cliff; productivity less than moderate but not low; note finer texture on the photo.
3	8	1C1	
3	8	1C2	for the polygon there is more SS01; dominant SS01 between rock outcrops with some minor SS06 associated with draws.
3	8	1G1	2 large Fd vets, one Pax. plant; scattered large Ss; very minor localized SS06 draws.
3	8	1G2	open stand of HwCw, seepage in loose Cb-v beside talus ; not really productive SS06.
3	8	1G3	block talus SS01; Productivity SS01; below shallow stuff; scattered Sx Hm (definitely montane), solid SS01 on rapidly drained Cb.
3	8	1G4	skunk, flat around swamp; Sphag bog in swamp; common HmYc.
3	10	1B1	
3	10	1C1	predominantly SS01 with SS03 on crest and SS06 in seepage channels on lower slope where it flattens out.
3	10	1C2	on a hummock; did not walk through polygon much.
4	7	1B1	soil has moisture present wetter indicators in the swales.
4	7	1B2	classic blueberry site; devil's club SS06 in swales and seepage draws.
4	7	1C1	snow plays a big role here, trees in clumps, evidence on ground of significant snow pack; overall SS01 is sloped, SS11 is just a "C" for nutrients, seepage from upper slopes, for SS05 and SS11.
4	9	1B1	seepage present, shallow soil less than 50cm; watertable is being held up; on average polygon M.
4	9	1B2	coarse texture soil; younger stand than rest of polygon.
4	9	1C1	almost an organic soil; productivity increases as you get onto hummocks; SS01 on convex hills, SS11 in depressions; very swampy from drop off to stop.
4	9	1C2	some blowdown throughout here; a minor amount of SS03 here but minimal; SS06 in draws, seepage.
4	9	1G1	lots of Ba in A3, scattered Fd; below is moist poor (hellebore) above swamp; open canopy; Hm in swamp; poor till; compact Mor; localized small SS06 depressions; shallow at plot but generally deeper in poly; tending to low productivity.
4	9	1G2	scattered Fd poor form; open stand; scattered larger Hw but short; common rock bluffs with folisols on top.
4	9	1G3	Gary McKell Ae Fd plantation close to SS03; lots of stem breakage in Fd, variable, some OK, many poor; dense, low light plantation.
4	9	1G4	Ba throughout in intermediate layer; SS01 on morainal bench above road.
4	9	1G5	SS01 blocky talus; stand quality poor; above stop is rocky SS03, steep.
4	11	1C1	quite a few Hm here;
4	11	1G1	steep bluffy slope below, localized SS06 seepage.
4	15	1B1	high cover of devil's club, nice Cw; western side of polygon is SS01 - failing till (fine texture).
4	15	1B2	SS06 in the swales; on the elevated portions grades to SS01;
4	15	1C1	*one found mid-slope - few by river; very coarse, expect to find compacted layer; gets coarser as you dig deeper; very rich.
4	15	1G1	Mormoder; seepage on old slump scarp.; Veg not well developed but plenty of seepage in pit; Unstable; minor SS04 on recent deposits; Ba from original stand look very nice; mixed ages from landslide damage.
4	17	1B1	Ba excellent; Ss showing good productivity.
4	17	1B2	Hw dominated with nice Ba scattered Ss; soil texture (some silts).
4	17	1C1	* two noted; SS06 along creek draws and depression tracks.
4	17	1C2	
5	4	1B1	trees typically small diameter rooting in forest floor thick matted mor.
5	4	1B2	stand is dominated by slow growing Ba with HwHm 105yrs (age); no veg cover.
5	4	1C1	transitional to MHmm2.
5	12	1B1	nice Fd/Cw stand; blocky talus site.
5	12	1B2	Cw/Hw showing slightly less than medium productivity; coarser shallower soil.
5	12	1C1	Fd in original stand - potentially burnt; cold air pocket, bowl; getting quite a few ms2 indicators here; SS11 on lower slope, edge of polygon by gully -- flattens out on benches; Hm regen found at SS11.
5	12	2H1	can't find a pan but it feels better than zonal; keys out to SS01 due to Ae; big boulders lying around; could be CFv/Ft?; I think scarp to creek is likely SS01.
5	12	2H2	recent clear-cut; fairly uniform; (SS01+)SS04 feel.
5	12	2H3	recent clear-cut; SS03 where shallow; productivity low on SS01, but productivity overall is medium; some moist rich swales.
5	12	2T2	big stumps (Fd,Cw) indicate good productivity,; coarse soil, well drained, lots of rich indicators; significant Ae but dark Bf horizon below; SS01 on mounds formed by colluvial activity from upper slope; stop in recent clear-cut.
5	14	1B1	where the coarser material has collected SS01;
5	14	1B2	brush pit very rich!!! Ss has been weeviled; the prunus has been treated.
5	14	1B3	Skunk dominated next to the lake.
5	14	1C1	seepage over rock; not usual rich indicators but very vigorous - weak SS06; productivity =medium on SS06 to low for SS03; SS06 predominantly in gullies, more SS03 a lot of rock.
5	14	1G1	rich fluvial fan veneer gappy areas or solid SS06; Fd has form problems from rapid growth; check proportion on photo; minor Ba present throughout area.
5	14	2T1	*planted Fd; plot on small bench; Ss off road into benchy ground; SS06 in seepage channels, benches.

BRITISH COLUMBIA

File: 13005-20/0001003

August 2, 2000

Gerald Sommers
International Forest Products Limited
PO Box 49114
1055 Dunsmuir Street
Vancouver, British Columbia
V7X 1H7

Dear Gerald Sommers:

Enclosed for your records is a Quality Certificate for 0001003/Terrestrial Ecosystem mapping.

Yours truly,

Dorothy Benneke
A/Finance and Administration Clerk
Regional Operations
Vancouver Forest Region

Enclosure: (1)

Ministry of Forests
Vancouver Regional Office
Location:
2100 Labieux Road, Nanaimo
Mailing Address:
2100 Labieux Road,
Nanaimo, BC V9T 6E9
Tel: (250) 751-7001
Fax: (250) 751-7190

BRITISH COLUMBIA

Ministry of Forests

Quality Certificate

For Inspection of Terrestrial Ecosystem Mapping work delivered under Standards Agreements

A) IDENTIFICATION

Standards Agreement	0001003	Activity	Terrestrial Ecosystem mapping
District	Port McNeill	Licensee/Proponent	International Forest Products Ltd.
Project No.	13005/20 - 0001003	Date	August 1, 2000

B) ITEMS INCLUDED IN QUALITY CERTIFICATION:

(MINISTRY STAFF LIST TYPE OR UNIT) CD with ArcInfo export file of TEM on TFL 45, CSV file of attributes & RTL presentation files

C) DELIVERABLE(S) INSPECTED:

TFL 45 Ecosystem maps and associated polygonal attributes.

1.	All deliverables received	☒Yes ☐No
2.	Overall quality of deliverable	100%
3.	Normal payment percent equivalent if different than #1 above	%
4.	Deliverable requires reworking	☐Yes ☒No
5.	Estimated cost of rework required (write in N/A if none required)	$
6.	Payment recommended, based on percentage of quality	100%
7.	Comments (use back of this sheet if necessary):	

Quality assurance done by Karel Klinka, Phd. Letter on file dated 20 June 2000 provides basis for this QA certificate.

CERTIFICATE COMPLETED BY: Derek Challenger, R.P.F. Derek Challenger 00/08/01

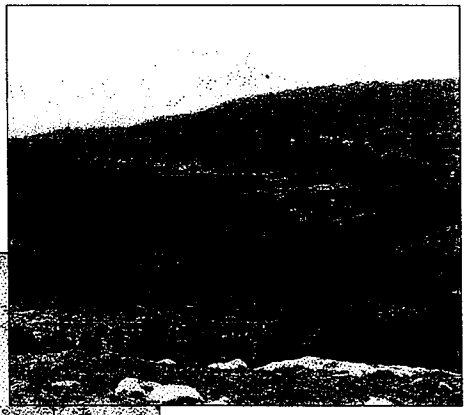
QA Auditor — Print Name — Signature and Date

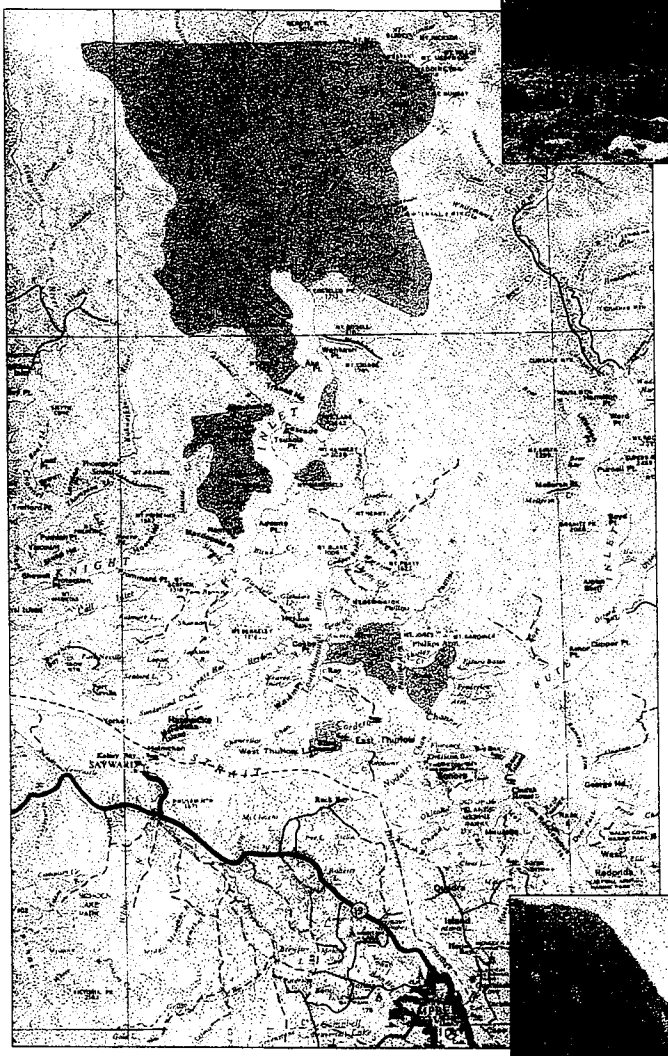
ACCEPTED BY: Mike Connor, R.P.F. Mike Connor 00/08/01

Ministry Representative — Print Name — Signature and Date

Recreation Features Inventory & Visual Landscape Inventory Updates

TFL 45 - Knight Inlet & Cordero Channel





International
Forest Products
Limited

Prepared by: RRL **Recreation Resources Ltd.**

January 2001