Mapping of Rare Ecosystem Probability Classes for the Central Coast LRMP

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1.0 Introduction and Background

1.1 Red and Blue-listed Plant Associations

British Columbia's Conservation Data Centre (1996) has developed a preliminary inventory, assessment and ranking of over 200 endangered and vulnerable plant associations in British Columbia. Oikos (1998) produced an element occurrence summary for these plant associations that describe vegetation, soil, and site properties, as well as rarity and management issues. The plant associations listed by the CDC include native grasslands, wetlands, alpine ecosystems, and a range of forested ecosystems. Most forested ecosystems listed by the CDC include plant associations identifying Old Forest communities that historically have been heavily exploited. Old Forest stands within these plant associations that have not been harvested are listed as endangered or vulnerable. In this project, the rare ecosystems targeted for mapping represent Old Forest structural stages of overexploited forest ecosystems that are either blue- or red-listed by the CDC.

The objective in identifying and conserving rare plant associations is part of a coarse filter approach to conservation of regional biodiversity. The objective of a coarse filter approach is to ensure that all natural ecosystems, as represented by their plant associations, are conserved across the climatic region (biogeoclimatic subzone) where they naturally occur. By ensuring the persistence of all natural ecosystem types across a region it is assumed that the myriad of plants, and especially animal species that live in that ecosystem will also be conserved.

CDC criteria for classifying rarity is summarized in Table 1, and the application of these criteria to rare plant associations is outlined in Table 2. Due to lack of rare ecosystem inventory and mapping at an appropriate scale for the entire province, the criteria outlined in Table 1 are difficult to apply to rare plant associations at this time. Instead, the CDC uses a "ranking by inspection" system, which is based on available occurrence information, and on the expert opinion of local ecologists, MOF and MOELP ecologists, as well as experienced naturalists (1992. CDC Newsletter. p.6).

Table 1: Conservation Data Centre ranks and definitions for element rarity.

critically imperilled	extremely rare (5 or fewer extant occurrences or very few remaining individuals) or some factor(s) make it especially vulnerable to extirpation or extinction
imperilled	rare (typically 6 – 20 occurrences or few remaining individuals) or some factor(s) make it vulnerable to extirpation or extinction
rare or uncommon	typically 21-100 occurrences; may be susceptible to large-scale disturbances, such as loss of extensive peripheral populations
frequent to common	greater than 100 occurrences; apparently secure but may have a restricted distribution or future threats may be perceived
common to very common	demonstrably secure and essentially ineradicable under present conditions

Table 2: Conservation Data Centre criteria for red- and blue listed plant associations.

Status	*Significance*	*CDC Rank*
red-listed	***endangered or threatened***	*plant associations with ranks of 1, 2, 1-2, 1-3*
blue-listed	***vulnerable and at risk***	*plant associations with ranks of 2-3, 3, or 3-4*

1.2 Mapping Rare Ecosystems

Biogeoclimatic Ecosystem Classification (BEC) provides a hierarchical framework for organizing ecosystems both regionally, at the subzone level, and locally, at the site series level. Site series are groups of sites within subzones that have the same ecological potential, and are identified by having the same plant association in the Old Forest structural stage. Some of these Old Forests are blue- or red-listed by the CDC, and these are summarized in Table 3.

Because Old Forests within a subzone are tied to site series, they can be mapped from aerial photography by interpreting factors such as slope position, elevation, aspect and surficial materials. For operational use this ecosystem mapping is usually carried out following the methods of Terrestrial Ecosystem Mapping (TEM) at a scale of either

Table 3: List of CDC blue- and red-listed plant associations in the CCLRMP area.

Zone	Subzone & Variant	BEU[1]	Site Series	Rare Plant Association
CWH	dm	CD	03	FdHw - Salal
CWH	dm	CW	01	Hw - Flat moss
CWH	dm	CW	04	Fd- Sword fern
CWH	dm	CW	05	Cw - Sword fern
CWH	dm	CW	06	HwCw - Deer fern
CWH	dm	CW	07	Cw - Foamflower
CWH	dm	SR	08	Ss - Salmonberry
CWH	dm	SR	09	Act - Red-osier dogwood
CWH	dm	SR	10	Act - Willow
CWH	ds2	CD	04	Fd - Fairybells
CWH	ds2	CW	01	HwFd - Cat's-tail moss
CWH	ds2	CW	03	FdHw - Falsebox
CWH	ds2	CW	06	Hw - Queen's cup
CWH	ds2	HB	05	Cw - Solomon's seal
CWH	ds2	SR	08	Ss - Salmonberry
CWH	ds2	SR	09	Act - Red-osier dogwood
CWH	ds2	SR	10	Act - Willow
CWH	mm1	FR	01	HwBa - Pipecleaner moss
CWH	mm1	FR	04	CwHw - Sword fern
CWH	mm1	FR	05	BaCw - Foamflower
CWH	mm1	FR	07	BaCw - Salmonberry
CWH	ms2	FR	01	HwBa - Step moss
CWH	ms2	FR	03	FdHw - Falsebox
CWH	ms2	FR	04	BaCw - Oak fern
CWH	ms2	FR	06	BaCw - Devil's club
CWH	ms2	SR	07	Ss - Salmonberry
CWH	ms2	SR	08	Act - Red-osier dogwood
CWH	ms2	SR	09	Act - Willow
CWH	vh2	FR	07	CwSs - Devil's club
CWH	vh2	HL	02	PlYc - Rhacomitrium
CWH	vh2	SR	08	Ss - Lily-of-the-valley
CWH	vh2	SR	09	Ss - Trisetum
CWH	vh2	SR	10	Dr - Lily-of-the-valley
CWH	vm	FR	04	CwHw - Sword fern
CWH	vm	FR	07	BaCw - Salmonberry
CWH	vm	FR	08	BaSs - Devil's club
CWH	vm1	CH	03	HwCw - Salal
CWH	vm1	FR	04	CwHw - Sword fern
CWH	vm1	FR	07	BaCw - Salmonberry
CWH	vm1	FR	08	BaSs - Devil's club
CWH	vm1	SR	09	Ss - Salmonberry
CWH	vm1	SR	10	Act - Red-osier dogwood
CWH	vm1	YB	12	CwYc - Goldthread
CWH	vm2	CH	03	HwCw - Salal
CWH	vm2	FR	04	CwHw - Sword fern
CWH	vm2	FR	07	BaCw - Salmonberry
CWH	vm2	FR	08	BaSs - Devil's club

[1] for a list of BEU names see Appendix 2

Table 3 (cont.): List of CDC blue- and red-listed plant associations in the CCLRMP area.

Zone	Subzone & Variant	BEU	Site Series	Rare Plant Association
CWH	vm3	CH	03	HwCw - Salal
CWH	vm3	FR	04	CwHw - Sword fern
CWH	vm3	FR	07	BaCw - Salmonberry
CWH	vm3	FR	08	BaSs - Devil's club
CWH	ws2	FR	04	BaCw - Oak fern
CWH	ws2	FR	06	BaCw - Devil's club
CWH	ws2	HL	02	Pl - Kinnikinnick
CWH	ws2	SR	07	Ss - Salmonberry
CWH	ws2	SR	08	Act - Red-osier dogwood
CWH	xm2	CW	01	HwFd - Kindbergia
CWH	xm2	CW	04	Fd - Sword fern
CWH	xm2	CW	05	Cw - Sword fern
CWH	xm2	CW	06	HwCw - Deer fern
CWH	xm2	CW	07	Cw - Foamflower
ESSF	mc	EF	02	BlPl - Juniper - Cladonia
ESSF	mc	EF	03	Bl - Huckleberry - Crowberry
ESSF	mw	EF	02	BlPl - Juniper - Rhacomitrium
IDF	ww	RD	04	Fd - Douglas maple - Fairybells
IDF	ww	RD	05	CwFd - Vine maple
IDF	ww2	RD	04	Fd - Douglas maple - Fairybells
IDF	ww2	RD	05	CwFd - Vine maple
MH	wh1	YM	03	SsHm - Reedgrass

[1] for a list of BEU names see Appendix 2

1;20,000 or 1;50,000. Where 1:20,000 or 1:50,000 TEM projects have been completed for an area, identification and mapping of rare plant associations is easily done through theming in GIS.

2.0 Methods

2.1 Rare Ecosystem Probability Classes

Large-scale TEM inventories are not available for the CCLRMP area, so we developed a method using existing 1:250,000 Broad Ecosystem Unit (BEU) mapping (MOELP 1999) to provide probabilities of identifying different groups of rare plant associations in the CCLRMP planning area. BEU mapping delineates BEUs that are composed of a predictable assemblage of BEC site series. Rare ecosystem probability classes were developed by dividing the total number of site series in a BEU by the total number of blue- or red-listed site series, i.e., site series where the circumscribing Old Forest plant association is blue- or red-listed, and expressing this as a percentage. Using this approach we identified 4 probability classes as outlined in Table 4. A list of all BEUs in

Table 4: Rare ecosystem probability classes.

Probability Class	Probability
Very High	the Old Forest plant associations of all site series in the BEU are blue- or red-listed
High	the Old Forest plant associations of 50-99% site series in the BEU are blue- or red-listed
Moderate	the Old Forest plant associations of 1-49% of all site series in the BEU are blue- or red-listed
Low	no Old Forest plant associations of site series in the BEU are blue- or red-listed

the CCLRMP area, and their Rare Ecosystem Probability Class, are summarized in Appendix 1. The classes associated with each BEU in Appendix 1 were assigned to the BEUs in the GIS data base to produce thematic maps of the BEU classes.

2.2 Rare Ecosystem Probability Class Mapping

Presenting the rare ecosystem probability class information in communicative maps format is complicated because;

- there are often 2 BEU components in a polygon, and these component BEUs may have different rare ecosystem probability classes;
- there may be a range of structural stages in each polygon, and they are not associated with a particular site series

To provide useful maps we developed 2 approaches to provide a comprehensive visual overview of rare ecosystem probabilities for the CCLRMP. For both approaches we assumed that if there was only 1 BEU then the polygon was well represented, and if there were two BEUs but the probability class was the same then the polygon was also well represented. Where there were 2 BEUs in a polygon with different probabilities, then we used 2 approaches.

1. We selected the BEU with the highest rare ecosystem probability class. This ensured that we did not miss any rare BEUs. The downside of this method is that a polygon may be given a very high probability but may represent as little as 10% of the area of the polygon, as this tends to visually overstate the occurrence of rare ecosystems.
2. We selected the BEU with the highest coverage in the polygon. This tends to represent the area of the polygon more accurately, although some information may be lost.

To account for structural stage, and to identify the Old Forest component, we overlaid the Base Thematic Mapper (BTM) layer over the rare ecosystem probability class layer. the BTM identifies areas that have been disturbed by a variety of impacts including harvesting, fire, settlement and other industrial development, and landslide-snowslide areas. By overlaying the BTM, we are assuming that the area remaining represents Old Forest within the rare ecosystem polygons.

3.0 Results

3.1 Overview of the Rare Ecosystem Probability Maps

3.1.1 Very High Probability Class

Very High probability class polygons identify areas where all site series are blue- or red-listed. These polygons occur in midslope, lower slope, and valley bottom locations, including forest ecosystems featuring very large trees on enriched ecosystems such as floodplains, alluvial fans, and on seepage and toe slopes. The CW and SR BEUs comprise most of the area of this class (Tables 5 and 6; see Table 3 for site series within BEUs), and 48% and 24% of the original area of Old Forest remain for these BEUs, respectively. Historically, these stands have been heavily harvested due to the large trees, high economic value, and excellent access in midslope and valley bottom locations. In the CWHdm and CWHxm2 only 1% of the BEU is presently in Old Forest, and much of this disturbance can be attributed to harvesting in the southern area of the central coast. By contrast, in the more northerly CWHds2, 81% of the CW Old Forest remains. The SR BEU includes floodplain ecosystems and 24% is still dominated by Old Forests. These are primarily floodplain forests that were the target of very early harvesting on the central coast. In addition to forest harvesting, some of the disturbance in this BEU can be related to both community development and natural disturbance on floodplains. The CD BEU has also been heavily impacted by harvesting, with only 15% of the Old Forest remaining. The CD represent submesic ecosystems that are of limited areal extent, and have been harvested along with more productive forest ecosystems. The HB and HL BEU also occupy small areas, and are completely Old Forest at this time.

Table 5: Summary of remaining Old Forest by BEU and variant.

BEC	BEU	Total Area (ha)	Old Forest Area (ha)	% Old Forest
CWHdm	**CD**	2,933	0	0
	CW	17,140	192	1
	SR	309	0	0
CWHds2	**CD**	671	538	80
	CW	61,317	49,779	81
	HB	292	292	100
	SR	8,596	834	10
CWHmm1	**FR**	8,080	0	0
CWHms2	**CW**	211	211	100
	FR	114,722	90,178	79
	SR	6,445	4,451	69
CWHvh1	**CB**	173,649	166,471	96
	CH	86,757	82,454	95
	YB	1,210	1,210	100
CWHvh2	**CB**	159,727	159,592	100
	CH	367,143	363,104	99
	FR	399	399	100
	HL	977	977	100
	SR	147	147	100
CWHvm	**FR**	22,323	20,403	91
CWHvm1	**CB**	1,905	1,785	94
	CH	376	225	60
	FR	686,125	471,431	69
	SR	20,471	3,149	15
	YB	2,699	2,699	100
CWHvm2	**CH**	365	365	100
	FR	436,106	395,938	91
	SR	39	39	100
CWHvm3	**FR**	73,603	71,846	98
	SR	135	135	100
CWHws2	**FR**	153,078	139,388	91
	HL	52	52	100
	SR	1,102	140	13
CWHxm2	**CW**	26,591	208	1
ESSFmc	**EF**	67,689	40,529	60
	EW	1167	1,167	100
ESSFmk	**EF**	851	851	100
ESSFmw	**EF**	16	16	100
	EW	80,069	79,775	100
ESSFxv	**EF**	2,725	2,725	100
IDFun	**DL**	580	580	100
	RD	479	479	100
	RR	392	0	0
IDFww	**DL**	7,352	5,467	74
	RD	11,837	10,174	86
	RR	3,543	0	0
IDFww2	**DL**	214	214	100
	RD	1,058	1,058	100
	RR	114	0	0

Table 5 (cont.): Summary of remaining Old Forest by BEU and variant.

BEC	BEU	Total Area (ha)	Old Forest Area (ha)	% Old Forest
MHmm1	**MF**	365,093	360,611	99
MHmm2	**MF**	259,946	257,778	99
MHwh1	**YB**	227	227	100
	YM	23,645	23,645	100
MMmm1	**MF**	336	336	100
MSun	**LP**	767	767	100
	SL	7,502	6,533	87
SBPSmc	**LP**	6493	39	1
	SL	40,107	26	0
SBSmc2	**EF**	860	430	50
	LP	24	0	0
	SF	77,770	36,457	47
	WR	60	0	0

Table 6: Summary of remaining Old Forest by BEU.

BEU	Probability Class	Total Area (ha)	Old Forest Area (ha)	Old Forest (%)
CD	1	3,603	538	15
HB	1	292	292	100
HL	1	1,029	1,029	100
RR	1	4,049	0	0
CW	1,2	105,259	50,389	48
SR	1,2	37,242	8,895	24
FR	2,3	1,494,436	1,189,582	80
EF	2,3,4	72,142	44,552	62
RD	2,3,4	13,374	11,711	88
YM	3	23,645	23,645	100
LP	4	7,284	806	11
MF	4	625,375	618,724	99
EW	4	81,236	80,942	100
SF	4	77,770	36,457	47
SL	4	47,609	6,558	14
WR	4	60	0	0
DL	4	8,146	6,261	77
CH	4	454,641	446,149	98
YB	4	4,136	4,136	100
CB	4	335,281	327,849	98
Grand Total		3,425,720	2,886,898	84

Table 7: Summary of remaining Old Forest by subzone/variant.

BEC	Total Area (ha)	Old Forest Area (ha)	Old Forest (%)
CWHdm	20,382	192	1
CWHds2	70,876	51,443	73
CWHmm1	8,080	0	0
CWHms2	121,377	94,839	78
CWHvh1	261,617	250,136	96
CWHvh2	528,392	524,218	99
CWHvm	22,323	20,403	91
CWHvm1	711,575	479,290	67
CWHvm2	436,510	396,342	91
CWHvm3	73,738	71,980	98
CWHws2	154,232	139,580	91
CWHxm2	26,591	208	1
ESSFmc	68,856	41,697	61
ESSFmk	851	851	100
ESSFmw	105,844	104,822	99
ESSFxv	2,891	2,891	100
IDFun	1,451	1,059	73
IDFww	22,731	15,641	69
IDFww2	1,387	1,272	92
MHmm1	366,729	362,247	99
MHmm2	261,496	259,328	99
MHwh1	23,873	23,873	100
MMmm1	336	336	100
MSun	8,269	7,300	88
SBPSmc	46,600	65	0
SBSmc2	78,713	36,887	47
Grand Total	**3,425,720**	**2,886,898**	**84**

3.1.2 High Probability Class

The High probability class includes polygons where more than half of the site series are red- or blue-listed by the CDC. High probability class ecosystems are mostly midslope and lower slope ecosystems in the CWHws2 and CWHvm2 variants. These ecosystems have been the focus of harvesting over the last 10-20 years and disturbance is primarily forest harvesting. The FR is the most common BEU in the High class, and accounts for more than half of the area of all BEUs in the CCLRMP. Based on the 1:250,000 mapping, 80% of the FR remains in Old Forest. The EF and RD BEUs are also common in the High class, and include site series in the ESSF and IDF zones respectively.

3.1.3 Moderate Probability Class

The Moderate probability class includes polygons where less than half of the site series are red- or blue-listed by the CDC. Lower and midslope site series in the CWHvm1, CWHmm1, and CWHms2 make up the majority of these polygons. The FR is the most common BEU, with some EF, RD, and YM.

3.1.4 Low Probability Class

The Low probability class includes BEUs where none of the site series that comprise the BEU are listed as rare. Almost all of the CWHvh falls into this category because of the low levels of forest harvesting that have happened to date in that subzone. Subalpine (MH and ESSF) BEUs sites are also mostly in the Low probability class for the same reason. The Low class also includes those small areas of interior SBS, SBPS, and MS variants that occur in the CCLRMP area.

3.2 Assessment of Rare Ecosystems in the CCLRMP

The summary of the 1:250,000 BEU inventory shows that overall, 84% of the CCLRMP forested area (not including alpine and glacier areas) remains as Old Forests (Tables 5, 6 and 7). However, forest harvesting has been concentrated in valley bottoms in the largest and most accessible stands, and many of these low elevation, Old Forest ecosystems are listed as threatened or vulnerable by the CDC. From this analysis, most of the SR BEU, and portions of the FR, CD, and CW BEUs are the most threatened (Table 8). The vulnerability of these ecosystems should be assessed further, and should be considered in the forest harvesting plans for the CCLRMP area.

Table 8: Most threatened Old Forest ecosystems in the CCLRMP area.

BEU	Names	Details
SR	Sitka Spruce – Black Cottonwood Riparian	• floodplain ecosystems in the CWHdm (0%), CWHds2 (10%), CWHvm1 (15%), and CWHws2 (13%)
FR	Amabilis Fir – Western Hemlock	• lower slope ecosystems in the CWHmm1 (0%)
CD	Coastal Douglas-fir	• submesic ecosystems in the CWHdm (0%)
CW	Coastal Western Hemlock – Douglas-fir	• lower slope ecosystems in the CWHdm (1%), CWHxm2 (1%)

3.3 Other Issues

The BEU mapping information used in this report presents a broad overview of ecosystem in the CCLRMP area. The information is thus, by nature, quite coarse, and many small inclusions will have been lost as mapping impurities, because of the inability to identify these ecosystems using remote sensing and the other tools for constructing the BEU mapbase. To this end it is important to emphasize the probability approach that is used in the mapping, i.e., the categories represent the probability of finding rare ecosystems within the delineated polygons.

Some CDC-listed rare ecosystems are not included in the mapping because of their small extent in relation to the scale of the mapping. Examples of this exclusion are shoreline site series in the CWHvh subzone (CWHvh1,2/ 14, 15, 16 ,17, 18, 19). To date these ecosystems are relatively unthreatened by forest development.

There are another group of ecosystems, both forested and non-forested, which are considered unique, but are not included on the CDC list, and are not mapped in this report. These are summarized in Table 9, and are based on an interview with J. Pojar, MOF, Smithers. These ecosystems need to be identified if local development occurs, and, if appropriate, management plans should be developed that ensure the continued health of these ecosystems.

Table 9: Summary of unique ecosystems not included in the CDC listing, and not mapped in this project. (Information is from J. Pojar, pers. comm., BCMOF, Smithers)

Group	Details
unusual forest types	outpost populations of Douglas-fir in the transition areas between coastal and interior climates
edaphically unique forests	forests occurring on soils developed on limestone scattered throughout the area, and on pumice adjacent to Pleistocene volcanoes are unique compared to adjacent forested wetlands on the plutonic granite bedrock that dominates the area
unique wetlands	rich minerotrophic fens and swamps are scattered throughout the CWHvh subzone; these contrast with the *Sphagnum*-dominated wetlands that dominate the subzone
unique microsites	small, scattered unique ecosystems occur in narrow ravines, cliff faces with seepage and caves
marine environments	coastal estuaries occur at the mouths of the major rivers; sand beaches occur sporadically along the coast and support unique sand and sand dune ecosystems

4.0 References Cited

B.C. Conservation Data Centre. 1996. Identified Wildlife Management Strategy: Plant Communities. Unpublished review draft. B.C. Ministry of Environment, Land and Parks, Resource Inventory Branch. Victoria, B.C.

Oikos. 1998. Methods and Standards for Rare Ecosystem Inventory and Mapping. Draft Field Guide. Contract report to Conservation Data Centre, MOELP, Victoria, B.C.

Appendix 1

List of BEUs and Rare Ecosystem Probability Classes for CCLRMP

List of BEUs and rare ecosystem probability classes for CCLRMP

BGC Zone	Subzone Variant	BEU	P Class
AT		AH	0
AT		AM	0
AT		AT	0
AT		AU	0
AT		GL	0
AT		LS	0
AT		RO	0
AT		TA	0
CWH	dm	CD	1
CWH	dm	CW	1
CWH	dm	ES	0
CWH	dm	GB	0
CWH	dm	LL	0
CWH	dm	LS	0
CWH	dm	SR	1
CWH	dm	ST	0
CWH	ds2	AV	0
CWH	ds2	CD	1
CWH	ds2	CW	1
CWH	ds2	FS	0
CWH	ds2	GB	0
CWH	ds2	HB	1
CWH	ds2	LS	0
CWH	ds2	RO	0
CWH	ds2	SR	1
CWH	ds2	TA	0
CWH	ds2	UR	0
CWH	ds2	WL	0
CWH	mm1	FR	2
CWH	ms2	AV	0
CWH	ms2	CW	2 *
CWH	ms2	ES	0
CWH	ms2	FR	2
CWH	ms2	GB	0
CWH	ms2	LL	0
CWH	ms2	LS	0
CWH	ms2	RO	0
CWH	ms2	SR	1
CWH	ms2	ST	0
CWH	ms2	WL	0
CWH	vh1	AV	0
CWH	vh1	CB	4
CWH	vh1	CH	4
CWH	vh1	LL	0
CWH	vh1	LS	0
CWH	vh1	RO	0
CWH	vh1	ST	0
CWH	vh1	YB	4

P Class = probability of occurrence of rare ecosystem

1 all site series in BEUs are listed as rare by CDC
2 > 49% of site series in BEUs are listed as rare by CDC
3 < 50% of site series in BEUs are listed as rare by CDC
4 no site series in BEUs are listed as rare by CDC
0 non-vegetated, sparsely vegetated, and anthropogenic units

*Not in Appendix list from *Standards for Broad Terrestrial Ecosystem Classification and Mapping for British Columbia (RIC 1998)*; interpreted from occurrence in related subzones.

un* Undifferentiated subzones were assumed to have no rare plant associations.

BGC Zone	Subzone Variant	BEU	P Class	
CWH	vh2	BG	0	
CWH	vh2	CB	4	
CWH	vh2	CH	4	
CWH	vh2	FR	2	
CWH	vh2	HL	1	
CWH	vh2	LL	0	
CWH	vh2	LS	0	
CWH	vh2	RO	0	
CWH	vh2	SR	1	
CWH	vh2	ST	0	
CWH	vh2	UR	0	
CWH	vh2	WL	0	
CWH	vh2	YB	4	
CWH	vm	FR	3	
CWH	vm	LL	0	
CWH	vm	ST	0	
CWH	vm1	AV	0	
CWH	vm1	CB	4	
CWH	vm1	CH	1	
CWH	vm1	ES	0	
CWH	vm1	FR	3	
CWH	vm1	FS	0	
CWH	vm1	GB	0	
CWH	vm1	LL	0	
CWH	vm1	LS	0	
CWH	vm1	RO	0	
CWH	vm1	SR	2	
CWH	vm1	ST	0	
CWH	vm1	WL	0	
CWH	vm1	YB	1	
CWH	vm2	AV	0	
CWH	vm2	CH	1	
CWH	vm2	FR	2	
CWH	vm2	LL	0	
CWH	vm2	LS	0	
CWH	vm2	RO	0	
CWH	vm2	SR	1	*
CWH	vm2	ST	0	
CWH	vm3	AV	0	
CWH	vm3	FR	2	
CWH	vm3	RO	0	
CWH	vm3	SR	1	*
CWH	vm3	WL	0	
CWH	ws2	AV	0	
CWH	ws2	FR	2	
CWH	ws2	FS	0	
CWH	ws2	GB	0	
CWH	ws2	GL	0	
CWH	ws2	HL	2	
CWH	ws2	LS	0	

BGC Zone	Subzone Variant	BEU	P Class
CWH	ws2	RO	0
CWH	ws2	SR	2
CWH	ws2	TA	0
CWH	ws2	WL	0
CWH	xm2	CW	1
CWH	xm2	LL	0
CWH	xm2	LS	0
CWH	xm2	ST	0
ESSF	mc	AV	4
ESSF	mc	EF	3
ESSF	mc	EW	4 *
ESSF	mc	LL	0
ESSF	mc	LL	0
ESSF	mc	LS	0
ESSF	mc	RO	0
ESSF	mc	SM	0
ESSF	mc	WL	0
ESSF	mk	AV	4
ESSF	mk	EF	4
ESSF	mk	LL	0
ESSF	mw	AV	0
ESSF	mw	EF	2
ESSF	mw	EW	4
ESSF	mw	FP	0
ESSF	mw	GL	0
ESSF	mw	LL	0
ESSF	mw	LS	0
ESSF	mw	RO	0
ESSF	mw	SM	0
ESSF	mw	TA	0
ESSF	mw	WL	0
ESSF	mw	WP	0
ESSF	xv	EF	4
ESSF	xv	FP	0
ESSF	xv	SM	0
IDF	mw	LL	0
IDF	un*	AV	0
IDF	un*	DL	4
IDF	un*	RD	4
IDF	un*	RO	0
IDF	un*	RR	4
IDF	ww	AV	0
IDF	ww	DL	4
IDF	ww	GB	0
IDF	ww	LL	0
IDF	ww	LS	0
IDF	ww	RD	2
IDF	ww	RO	0

BGC Zone	Subzone Variant	BEU	P Class	
IDF	ww	RR	1	*
IDF	ww	TA	0	
IDF	ww	WL	0	
IDF	ww2	AV	0	
IDF	ww2	DL	4	
IDF	ww2	RD	2	
IDF	ww2	RO	0	
IDF	ww2	RR	1	*
MH	mm1	AV	0	
MH	mm1	GL	0	
MH	mm1	HP	0	
MH	mm1	LS	0	
MH	mm1	MF	4	
MH	mm1	RO	0	
MH	mm1	SM	0	
MH	mm2	AV	0	
MH	mm2	GL	0	
MH	mm2	HP	0	
MH	mm2	LL	0	
MH	mm2	LS	0	
MH	mm2	MF	4	
MH	mm2	MF	0	
MH	mm2	RO	0	
MH	mm2	SM	0	
MH	mm2	WL	0	
MH	wh1	RO	0	
MH	wh1	YB	4	
MH	wh1	YM	3	
MS	un*	AV	0	
MS	un*	LL	0	
MS	un*	LP	4	
MS	un*	RO	0	
MS	un*	SL	4	
MS	un*	WL	0	
SBPS	mc	LL	0	
SBPS	mc	LP	4	
SBPS	mc	LS	0	
SBPS	mc	SL	4	
SBPS	mc	WL	0	
SBS	mc2	LL	0	
SBS	mc2	LP	4	
SBS	mc2	LS	0	
SBS	mc2	SF	4	
SBS	mc2	WL	4	
SBS	mc2	WR	4	

Appendix 2

List of full names for BEUs

List of BEUs

4.0 COASTAL FOREST ECOSYSTEMS

CD Coastal Douglas-fir
CG Coastal Western Redcedar - Grand Fir
CH Coastal Western Hemlock - Western Redcedar
CP Coastal Douglas-fir - Shore Pine
CS Coastal Western Hemlock - Subalpine Fir
CW Coastal Western Hemlock - Douglas-fir
DA Douglas-fir - Arbutus
FR Amabilis Fir - Western Hemlock
GO Garry Oak
HB Coastal Western Hemlock - Paper Birch
HL Coastal Western Hemlock - Lodgepole Pine
HS Western Hemlock - Sitka Spruce
MF Mountain Hemlock - Amabilis Fir
OA Garry Oak – Arbutus
YM Yellow-cedar - Mountain Hemlock Forest

5.0 SOUTHERN INTERIOR FOREST ECOSYSTEMS

AC Trembling Aspen Copse
DF Interior Douglas-fir Forest
DL Douglas-fir - Lodgepole Pine
DP Douglas-fir - Ponderosa Pine
EF Engelmann Spruce - Sub-alpine Fir Dry Forested
IG Interior Western Redcedar
IH Interior Western Hemlock - Douglas-fir
IS Interior Western Hemlock - White Spruce
PP Ponderosa Pine
RB Western Redcedar - Paper Birch
RD Western Redcedar - Douglas-fir
SD Spruce - Douglas-fir

6.0 CENTRAL AND NORTHERN FOREST ECOSYSTEMS

BA Boreal White Spruce - Trembling Aspen
BL Black Spruce - Lodgepole Pine
BP Boreal White Spruce - Lodgepole Pine
EW Subalpine Fir - Mountain Hemlock Wet Forested
FB Subalpine Fir - Scrub Birch Forested
LP Lodgepole Pine
SA Subboreal White Spruce - Trembling Aspen
SB White Spruce - Paper Birch
SF White Spruce - Subalpine Fir
SL Subboreal White Spruce - Lodgepole Pine
TB Trembling Aspen - Balsam Poplar

7.0 FORESTED WETLAND AND RIPARIAN ECOSYSTEMS

BB Black Spruce Bog
CB Cedars - Shore Pine Bog
CR Black Cottonwood Riparian Habitat Class
ER Engelmann Spruce Riparian
PB Lodgepole/Shore Pine Bog
PR White Spruce - Balsam Poplar Riparian
RR Western Redcedar - Black Cottonwood Riparian
RS Western Redcedar Swamp
SK Spruce – Swamp
SR Sitka Spruce - Black Cottonwood Riparian
TF Tamarack Wetland
WG Hybrid White Spruce Bog Forest
WR Hybrid White Spruce - Black Cottonwood Riparian
YB Yellow Cedar Bog Forest
YS Yellow-cedar Skunk Cabbage Swamp Forest

8.0 SUBALPINE PARKLAND AND KRUMMNOLZ ECOSYSTEMS

BK Subalpine Fir - Scrub Birch Krummholz
FP Engelmann Spruce - Subalpine Fir Parkland
HP Mountain Hemlock Parkland
WB Whitebark Pine Subalpine
WP Subalpine fir - Mountain Hemlock Wet Parkland

9.0 SHRUB AND HERB DOMINATED ECOSYSTEMS

AB Antelope-brush Shrub/Grassland
AD Sitka Alder - Devil's Club Shrub
AV Avalanche Track
BS Bunchgrass Grassland
MS Montane Shrub/Grassland
SS Big Sagebrush Shrub/Grassland

10.0 NON-FORESTED AQUATIC AND WETLAND ECOSYSTEMS

BG Sphagnum Bog
ES Estuary
FE Sedge Fen
FS Fast Perennial Stream
IM Intertidal Marine
IN Intermittent Stream
LL Large Lake
LS Small Lake
ME Meadow
MR Marsh
OW Shallow Open Water
RE Reservoir
SC Shrub-Carr
SH Shrub Fen
SP Slow Perennial Stream
ST Subtidal Marine
SW Shrub Swamp
WL Wetland

11.0 NON-FORESTED SUBALPINE AND ALPINE ECOSYSTEMS

AG Alpine Grassland
AH Alpine Heath
AM Alpine Meadow
AN Alpine Sparsely Vegetated
AS Alpine Shrubland
AT Alpine Tundra
AU Alpine Unvegetated
SG Subalpine Grassland
SM Subalpine Meadow
SU Subalpine Shrub/Grassland

12.0 SPARSELY VEGETATED UNITS

CL Cliff
GB Gravel Bar
GL Glacier
PO Lodgepole Pine Outcrop
RO Rock
TA Talus
UV Unvegetated

13.0 URBAN AND AGRICULTURAL UNITS

CF Cultivated Field
MI Mine
OV Orchard/Vineyard
RM Reclaimed Mine
TC Transportation Corridor
TR Transmission Corridor
UR Urban