

Terrestrial Ecosystem Mapping of CDC-listed Ecosystems in the North Coast LRMP Area

Final Report

July 2002

Prepared by:
Irene Ronalds R.P.Bio.
Donald McLennan Ph.D., R.P.Bio.
Oikos Ecological Services Ltd.

for
The North Coast LRMP Table

Project Team

This project was led by Irene Ronalds, with assistance from Donald McLennan, both from Oikos Ecological Services Ltd., Smithers, B.C. Irene planned the project, developed the GIS queries, acquired all photos, and did most of the air photo typing. Irene also led the fieldwork and produced the first drafts of the final report. Donald McLennan managed the project, provided training and QA on the air photo interpretation, reviewed the final map, and contributed to the final report. Valerie Veenstra of Oikos Ecological Services Ltd. helped with GIS issues throughout the project, and assisted with the fieldwork. Adrian DeGroot (Droseros Ecological Consulting), also assisted with the fieldwork.

Acknowledgements

We are indebted to the following for assistance to complete the project. Alan Banner and Jim Pojar, Prince Rupert Forest Region provided expert advice on the locations of listed ecosystems. Jim Pojar reviewed and approved of our recommendations regarding changes to the CDC-listed ecosystems. Sarma Liepens and Mike Grainger (North Coast Forest District) also provided advice on rare ecosystem locations.

Table of Contents

1.0	Introduction	1
1.1	Approach and Objectives	2
1.2	Red and Blue-listed Ecosystems	2
2.0	Methods	4
2.1	Locating and Mapping Rare Ecosystems	4
2.2	Field Checking	5
2.3	Map Production	6
3.0	Results	6
3.1	Mapping Overview	6
3.2	Maps Produced	11
3.3	Representation of Red- and Blue-listed Ecosystems	11
4.0	Discussion and Recommendations	13
5.0	References	16

Tables

Table 1:	CDC Red- and Blue-listed Ecosystems in the North Coast LRMP Area .	3
Table 2:	North Coast Red and Blue-listed Ecosystem Mapping Summary	8
Table 3:	Summary of number of polygons mapped by site series and structural stage. This table shows only leading site series in the polygons (see text).	12
Table 4:	Suggested changes to the status of Red and Blue-listed ecosystems in the North Coast LRMP area.....	14

Appendices

Appendix A:	A summary of the status and ecology of the CDC-listed ecosystems, extracted from the Manual for Identification and Assessment of Red and Blue-listed Plant Communities (1999)	
Appendix B:	Red and Blue-listed Ecosystem Mapping Working Legend	
Appendix C:	List of Rare or Significant Ecosystems Not CDC-Listed	

1.0 Introduction

Old growth forests that make up the temperate rainforests of coastal British Columbia are characterized by a longevity that is unusual in North American and Asian forests at similar latitudes. Disturbance in these forests is infrequent and seldom stand-replacing, so that living elements of previous stands remain following fire, windstorms, flooding, and landsliding. As a result, present old growth stands contain very old (> 800 years) and, often very large (> 2m DBH) structural elements both living and dead. Biodiversity conservation in these forests is closely linked to stand structural elements, including large lateral branches for nesting, large trunks for denning, complex foodwebs associated with large downed wood, and stream ecosystems dependent on large wood for stream morphology and bank stability.

Forest harvesting clearly has an immediate and direct impact on old growth stand structural functions, structure-function relationships that have taken 500-1,000 years to develop. It should also be clear that re-establishment of these structure-functions is not achievable within any meaningful management timeframe, so conservation of existing structure and biodiversity is central to maintaining biodiversity values in these forests.

Old growth forests have a composition and structure that can be differentiated by the site series classification of the biogeoclimatic ecosystem classification (Banner *et al.* 1993). Each site series is typified by old growth stands that can be described as a single site association (a group of similar 'plant communities'). To ensure biodiversity conservation it is fundamental that old growth stands on all site series be maintained in numbers sufficient to maintain their coarse- and fine-filter biodiversity functions.

The Conservation Data Centre (CDC) of British Columbia uses site series to identify old growth ecosystems considered to be threatened (Red-listed) or vulnerable (Blue-listed) in the province. CDC rankings are based primarily on the expert opinion and field experience of staff of the Prince Rupert Forest Region, and not on detailed inventories of the listed ecosystems. The objective of this project was to identify and map Red- and Blue-listed ecosystems ("plant communities") across the North Coast LRMP area (MSRM, CDC, 2001). This project provides an inventory for the North Coast LRMP area of the most prevalent group of listed ecosystems – old growth floodplain forests, as well as associated fan ecosystems.

The results of the project are intended to provide an inventory of existing Red-listed ecosystems to assist the North Coast LRMP Table in determining regional conservation priorities, and in the development of LUPs.

1.1 Approach and Objectives

Given the level of funding for the project, it was decided to concentrate on Red-listed ecosystems, and to opportunistically map any adjacent Blue-listed ecosystems observed on the photos selected for the Red-listed ecosystems. This approach was feasible in the North Coast LRMP area because Red-listed ecosystems occur on floodplains, and the Blue-listed occur as valley floor ecosystems on fans adjacent to the Red-listed floodplains. The main objective then was to do a thorough job of mapping Red-listed ecosystems, and to map as many Blue-listed as possible, as we mapped the Red-listed. We also opportunistically mapped early structural stage ecosystems on site series that support Red- and Blue-listed ecosystems in the Old Forest structural stage.

1.2 Red and Blue-listed Ecosystems

The Conservation Data Centre (CDC) provides provincial coordination for international endangered species and plant community conservation efforts implemented by the Nature Conservancy. The CDC lists over 200 rare plant communities, many of which are mostly the Old Forest structural stages (see RIC 1998) of harvested forests, or grassland ecosystems located in the path of agricultural and urban development in British Columbia.

A Red-listed ecosystem is considered by the CDC as “imperiled provincially because of extreme rarity or because some factor(s) making it especially vulnerable to extinction” (1992). A Red-listed ecosystem is estimated to have less than 20 occurrences within the province. A Blue-listed ecosystem may have from 21 to 100 occurrences and is considered vulnerable to either large-scale disturbance, or continued human-caused disturbance. Both Red and Blue-listed ecosystems may be either naturally rare in occurrence or have become rare due to human activities. The thirteen Red and Blue-listed ecosystems of the North Coast planning area are listed in Table 1 below. A summary of the status and ecology of each CDC-listed ecosystem is contained in Appendix A, and is extracted from the Manual for Identification and Assessment of Red and Blue-listed Plant Communities (1999).

Table 1: CDC Red- and Blue-listed Ecosystems in the North Coast LRMP Area

Scientific name	Biogeoclimatic Ecosystem Classification Unit(s)	Provincial Rank	Provincial List	Typical Situation	Structural Stage
Group 1: Floodplain Forest and Alluvial Forest					
<i>Picea sitchensis</i> / <i>Rubus spectabilis</i> Very Wet Maritime	CWHvm1/09	S2	Red	high bench floodplain	7
<i>Picea sitchensis</i> / <i>Trisetum cernuum</i>	CWHvh2/09	S2	Red	middle bench floodplain	7
<i>Picea sitchensis</i> / <i>Maianthemum dilatatum</i> Wet Hypermaritime 1	CWHvh2/08	S2	Red	high bench floodplain	7
<i>Abies amabilis</i> - <i>Picea sitchensis</i> / <i>Oplopanax horridus</i>	CWHvm1/08 CWHvm2/08	S3	Blue	alluvial/colluvial forest	7
<i>Populus balsamifera</i> ssp. <i>trichocarpa</i> / <i>Cornus stolonifera</i>	CWHvm1/10 CWHwm/06* CWHws1/08* CWHws2/08*	S3	Blue	middle bench floodplain	6
<i>Thuja plicata</i> - <i>Picea sitchensis</i> / <i>Oplopanax horridus</i> Very Wet Hypermaritime 2	CWHvh2/07	S3	Blue	alluvial / colluvial forest	7
Group 2: Spray Zone Forest					
<i>Picea sitchensis</i> / <i>Calamagrostis nutkaensis</i>	CWHvh2/16	S3	Blue	spray zone	7
<i>Picea sitchensis</i> / <i>Carex obnupta</i>	CWHvh2/18	S3	Blue	spray zone	7
<i>Picea sitchensis</i> / <i>Kindbergia oregana</i>	CWHvh2/15	S3	Blue	spray zone	7
<i>Picea sitchensis</i> / <i>Malus fusca</i>	CWHvh2/19	S3	Blue	spray zone	7
<i>Picea sitchensis</i> / <i>Polystichum munitum</i>	CWHvh2/17	S3	Blue	spray zone	7
Group 3: Difficult to Airphoto-Interpret					
<i>Thuja plicata</i> - <i>Picea sitchensis</i> / <i>Polystichum munitum</i>	CWHvh2/05	S2S3	Blue	limestone and meta-morphics	7
<i>Thuja plicata</i> - <i>Tsuga heterophylla</i> / <i>Polystichum munitum</i>	CWHvm1/04	S3	Blue	steep well-drained	7

The three Red-listed plant communities for the North Coast mapping area all occur on active floodplains (CWHvm1/09; CWHvh2/08; CWHvh2/09). In many cases they adjoin blue-listed ecosystems, either on the floodplain (CWHvm1/10) or adjacent alluvial/colluvial fans and toe slopes (CWHvm1,2/08; CWHvh2/07; CWHwm/06; CWHws1,2/08). This first group of ecosystems is the focus of the mapping project, as this group encompasses all of the Red-listed ecosystems. The floodplain and alluvial/colluvial ecosystems also happen to be the most reliable to identify by air-photo. All rivers with a significant component of Red-listed floodplain forest will be mapped for both Red and Blue-listed ecosystems in this first group.

A second major group of blue-listed ecosystems occur in salt-spray zones along windward shores in the CWHvh2 (CWHvh2.15,16,17,18,19). Thematic mapping would not help to narrow the field of search on these, as occurrences are often

much smaller than a forest cover polygon. All air-photos covering the outer coast were reviewed for productive forest exposed to a southwest ketch from the Pacific. Air-photos were selected and organized by map sheet, but no typing or attributing was undertaken – as time and resources did not permit.

Two other Blue-listed ecosystems were considered in a separate category from the rest, because photo interpretation is more difficult, and because there is no easy way to pick them out of the map inventories available, as was the case for listed floodplain and fan ecosystems. These are the CWHvm1/04 which occurs on steep slopes with good drainage; and the CWHvh2/05 which occurs on fresh soils which have developed over base-rich bedrock (metamorphics and limestone). It was not possible to address these ecosystems within the scope of this project.

2.0 Methods

2.1 Locating and Mapping Rare Ecosystems

Standards and approaches for rare (Red and Blue-listed) ecosystem mapping (REM) are outlined by the CDC (RIC 2000), and are followed in this project as much as possible. In the absence of a specific database standard for REM, the Terrestrial Ecosystem Mapping (RIC 1998) standard has been adapted for this project. A TEM (1998) working legend for the mapping products is found in Appendix B.

CDC-listed ecosystems were located by a combination of expert information and thematic mapping. Broad ecosystem unit (BEU) mapping is available at 1:250,000 scale for the planning area. The BEU, Sitka Spruce – Black Cottonwood Riparian (SR), provided a first cut of watersheds to check for CDC-listed floodplain units. Two other thematic maps based on forest cover data also provided information on the planning area:

- ✓ leading in black cottonwood or Sitka spruce and age class 8 or 9; and,
- ✓ height class 6 or greater.

By reviewing our thematic maps with local experts we are quite confident that all watersheds with a significant component of the Red-listed floodplain ecosystems were identified. Our local experts were: Jim Pojar and Allen Banner, of Ministry of Forests, Regional Office, Research Section; and, Mike Grainger and Sarma Liepins, of Prince Rupert Forest District.

For each of the identified watersheds, Red and Blue-listed ecosystems were delineated on 1:15,000 forest cover air photos using a Sokia stereoscope with 3x magnification. This step took considerable time because air-photos had to be

removed from the Ministry of Forests Regional warehouse, checked by stereoscope for CDC-listed ecosystems, and laser-copied prior to typing and attributing.

One important issue with the mapping stems from the old air photos used for much of the typing. Almost all photos were flown in the 1970s, and that is what appears on the maps. This could mean that our mapping overestimates the area of Red and Blue-listed ecosystems, if many of them have been logged since the 1970s. However, during the course of fieldwork we flew over almost all areas in a helicopter and observed that very few of the areas mapped have been logged since that time. To fine-tune the mapping it would be worth looking at updated forest cover to note any logged Red or Blue-listed ecosystems. We don't feel this will significantly alter the results presented in this report.

2.2 Field Checking

The CDC-listed ecosystems mapped are associated with unique biogeoclimatic site series, and occur in predictable landscape positions, i.e., fans and floodplains. These ecosystems tend to have readily identifiable air photo signatures. Initially no field verification was budgeted for this mapping project. However, in view of the proposed changes to CDC listings (recommended in Section 4.0), it was considered prudent to carry out field checking.

The field checking target for CDC-listed ecosystems is 100% of polygons (RIC, 1999). The standard for a similar scale Level IV TEM map is 20% of polygons checked; roughly one third of these should be ground-checked (RIC, 1998). The costs in meeting the RIC standard for ground-visited polygons, is simply prohibitive in this type of terrain, where access is largely by helicopter or boat.

Ecosystem attributing was checked in the field using a helicopter for a two day period in May 2002. In order to cover as much of the mapping area as possible in this limited timeframe aircalls predominated - no full ecosystem plots, and only 6 full ground inspection plots and 7 visual ground inspection plots were carried out (RIC 1998). The ground work was used to calibrate the 109 polygons confirmed from the helicopter (air calls). Total polygons confirmed was thus 122 of 346 CDC-listed polygons or 35%.

As a result of the field checking we deleted numerous polygons north of the Skeena that were originally typed as *Abies amabilis* - *Picea sitchensis* / *Oplodanax horridus*, as they were drier than expected; and, corrected some of the floodplain typing where ecosystems typed as middle bench should have been high bench on the steeper gradient rivers. Field checking also allowed us a closer look at the subtle gradient between middle and high bench ecosystem progression on the Ecstall and Quall Rivers, and refine the typing there. We are confident that the focus on aircalls for field checking was appropriate for covering

the LRMP planning area and that the field checking has significantly improved map reliability.

2.3 Map Production

Polygons delineated on the 1:15,000 photography were digitized and orthorectified using a monorestitution process by Triathlon Mapping Inc., Saanichton, B.C., using RIC (1999) GIS standards. Ecological attributes for each polygon were recorded into an Excel database using a TEM standard. The database is included with final products for the project. The line work was linked to the database in an Arcview™ environment. The maps feature a map legend drawn to TEM (1998) standard.

3.0 Results

3.1 Mapping Overview

Table 2 lists the 26 watersheds we examined in detail to locate Red-listed ecosystems. The table lists the map sheet numbers, BEC unit, notes on Red and Blue-listed ecosystems found, and general notes on the watershed. Of the 26 watersheds checked, 12 had enough area in Red-listed ecosystems to justify mapping. The 'Comments' section in Table 2 notes small areas of Red-listed ecosystems that were too small or dispersed to map for the project. Watersheds which originally supported Red-listed ecosystems, but which have been logged, such as the Kitsault, are also noted.

Based on the expert information obtained, and, using thematic mapping as a reference, we feel reasonably comfortable that all watersheds with a significant component of Red-listed floodplain ecosystems have been mapped. This mapping also includes any Blue-listed floodplain or alluvial forest ecosystems in proximity to the Red-listed units. That is, for any of the rivers having a significant Red-listed floodplain forest component, all of the Blue-listed floodplain and alluvial units have been mapped as well.

All BEU map polygons themed as Sitka Spruce – Black Cottonwood Riparian (SR) were air-photo interpreted to determine presence/absence of Red or Blue-listed ecosystems. This BEU was helpful in identifying some of the more extensive floodplain forest units, whether in an old growth state or logged. It missed entirely several floodplain forest units leading in western hemlock, such as the Khutzhmateen and Sparkling River (Ecstall River drainage). Many of the less extensive occurrences, such as Captain's Cove, and the unnamed creeks west of Stair Creek were also missed. The Johnson and Burton watersheds were incorrectly mapped as having relatively extensive floodplain forest.

Forest cover thematic mapping of black cottonwood and Sitka spruce age class 8 and 9 helped further refined the field of search for CDC-listed floodplain ecosystems. In particular, this mapping helped determine where along the major river tributaries, identified by expert information, to extend the search. This helped minimize the quantity of air-photos that needed to be pulled and checked by stereoscope.

Table 2: North Coast Red and Blue-listed Ecosystem Mapping Summary

Area	Map Sheets	BEC	Red	Blue	Comments
Altanhash River	103H.048, 038	CWHvm1		08, 10 middle bench	some limited middle bench floodplain forest, but most is south of planning area boundary
Baker Inlet	103H.071	CWHwm		06 middle bench	too steep for floodplain forest
Belle Bay	103P.021	CWHws		08 middle bench	some large spruce, but no floodplain to speak of
Captain's Cove	103G.080	CWHvh2	08, 09	07	limited floodplain
Chambers Creek	103J.080, 090, 103I, 081	CWHvm1		middle, and alluvial/colluvial fans	good representation of fluvial/colluvial fan forest; two large wetlands near drainage divide with Johnson Creek
Ecstall / Sparkling River	103H.082, 083, 084, 072, 073	CWHvm1,2	high-bench	middle, and alluvial/colluvial fans	good representation of middle bench; very little high bench; lots of fluvial/colluvial fan forest; extensive wetlands (unlisted); other tribs: Hayward, Muddy Lakes, Big Falls have productive fan forest; nice high-bench floodplain at mouth of Big Falls Creek
Freda Lake	103H.062	CWHvh2	09 middle bench	07, 09 middle bench	limited 09 middle bench floodplain forest less than 1/2 ha in size at north end of lake; some productive 07 forest on colluvial slopes east of lake
Illiance	103P.043	CWHvws		08 middle bench	high-bench floodplain (unlisted) at river mouth is second growth; channel gradient increases up river - no middle-bench floodplain forest
Johnson	103I.091	CWHvm	09 high bench	08, 10 middle bench, 04	no floodplain to speak of

Table 2 (con't): North Coast Red and Blue-listed Ecosystem Mapping Summary

Area	Map Sheets	BEC	Red	Blue	Comments
Khutzehmateen	103I.061	CWHvm1, 2	09 high bench	08, 10 middle bench, 04	good representation of middle and high bench floodplain forest; existing TEM mapping available (Clement, 1990).
Khyex River	103I.021, 022, 031, 032, 041, 042	CWHvm1, 2	09 high bench	08, 10 middle bench, 04	logging near mouth; good representation of middle and some high-bench floodplain forest farther up river
Kitkiata River	103H.064	CWHvm1, 2	09 high bench	08, 10, 04	no floodplain to speak of; alluvial (08) forest is all logged)
Kitsault	103P.043, 053	CWHws1,2		08 middle bench	large river subject to "flashy" flow regime - no middle-bench floodplain forest; quite extensive second-growth high-bench and fluvial fan forest
Kshwan River	103P.061, 062	CWHwm		06 middle bench	large river subject to "flashy" flow regime - no middle-bench floodplain forest
Kwinamass	103J.080	CWHvm	09 high bench	08, 10 middle bench, 04	most of floodplain at mouth of river is logged; some floodplain forest and extensive alluvial forest up river
McNeil River	103J.021	CWHvh2	08 high bench, 09 middle bench	07	bog forest at river mouth; some productive stands of (07) alluvial forest along colluvial slopes up river
Nass Islands	103P.003	CWHvm	09 high bench	08, 10 middle bench, 04	good representation of middle-bench floodplain forest, but, logged

Table 2 (con't): North Coast Red and Blue-listed Ecosystem Mapping Summary

Area	Map Sheets	BEC	Red	Blue	Comments
Pa-Aat River	103J.080	CWHvh2	08 high bench, 09 middle bench	05, 07	limited floodplain
Quall River	103H.064, 074	CWHvm1,2	09 high bench	08, 10 middle bench, 04	good middle-bench, some high-bench up river; near estuary is bog forest
Scotia River	103I.012, 023	CWHvm1	09 high bench	08, 10 middle bench, 04	bog forest at river mouth, limited alluvial 08 fan forest up river
Skeena Islands	103I.011, 012, 013, 021, 022, 023, 024, 034	CWHvm1	09 high bench	08, 10 middle bench, 04	extensive middle bench floodplain, but logged
Stagoo River	103P.022, 032	CWHwm		06 middle bench	some floodplain in first few km; extensive fens and bogs; fluvial/colluvial fan forest (unlisted in this subzone) up river
Stair Creek	103H.074, 075	CWHvm1	09 high bench	08, 10 middle bench, 04	some floodplain forest and fluvial/colluvial fan forest
Toon River	103I.051	CWHvm1, 2	09 high bench	08, 10 middle bench, 04	floodplain at mouth is logged; up river good representation of fluvial/colluvial fan forest; trib to north appears to have some 08, and limited 09
Triumph River	103H.037, 047	CWHvm1		08, 10 middle bench	Triumph Bay 07 sites on colluvial materials logged; no floodplain to speak of along Triumph R
Welda	103I.091	CWHvm1, 2	09 high bench	08, 10 middle bench, 04	no floodplain to speak of, too steep

3.2 Maps Produced

Two final maps were produced for the project. Map 1 lists just Red and Blue-listed ecosystems, i.e. no younger structural stages that have been harvested or feature natural succession have been mapped. Map 2 shows all mapping, including the adjacent younger structural stages of the same site series. Map legends describe all units and other details of the mapping.

The most extensive areas of Red and Blue-listed floodplain and alluvial forest occur along the Ecstall River and its tributaries, particularly the Sparkling River. Another exceptional area is the Khutzehmateen, where ecosystems have already been well mapped (Clement, 1993) and thus are not included in the mapping for this project. On the Skeena River Islands, and the Nass River Islands to a much lesser extent, large areas of middle-bench floodplain occurs, most of which has been logged. The Khyex River also has some excellent examples of Red-listed floodplain forest. Other rivers of note include the Quall, Kwinamass, Chambers, Toon, and two unnamed creeks west of Stair Creek.

3.3 Representation of Red- and Blue-listed Ecosystems

Table 3 summarizes the numbers of polygons of Red or Blue-listed ecosystems targeted for mapping in this project. It is evident in Table 3 that almost all ecosystems mapped were either the Blue-listed fan ecosystem, BaSs-Devil's club, or the Red-listed Ss-Salmonberry, found on the high bench of floodplains. Together, these two ecosystems accounted for 91% of all ecosystems mapped.

The Ss-Salmonberry is Red-listed by the CDC, and this implies that the ecosystem has less than 20 occurrences in the province. Clearly, this is not the case as evidenced by this mapping, and further emphasized by the point that there are additional known occurrences of this ecosystem in the Kalum and Central Coast FDs. This result calls into question the Red-listing for the Ss-Salmonberry ecosystem.

The 186 mapped stands of the BaSs-Devil's club ecosystem also call into question the Blue listing for this ecosystem. A CDC Blue-listed ecosystem is to be represented by between 21 and 100 occurrences. Considering that we did not attempt to map all occurrences of the BaSs-Devil's club in the North Coast FD, and that the ecosystem also occurs in adjacent forest districts, it is clear there are many more than 100 occurrences of this ecosystem in the province.

Table 3: Summary of number of polygons mapped by site series and structural stage. This table shows only leading site series in the polygons (see text).

Site Series	CDC Status	Map Code	RIC (1998) Structural Stage*				
			SH	PS	YF`	MF	OF
CWHvm1/08 – BaSs-Devil’s club	Blue	AD	24	9	2	5	186
CWHvm1/09 – Ss-Salmonberry	Red	SS	17	3	5	1	126
CWHvm1/10 – Act-Red osier dogwood	Blue	CD	10	41	45	17**	22
CWHws1,2/10– Act-Red osier dogwood	Blue	CD					
CWHwm/10– Act-Red osier dogwood	Blue	CD					
CWHvh2/08 – Ss-Lily of the valley	Red	SL	0	0	0	0	2
CWHvh2/07 – CwSs-Devil’s club	Blue	SD	0	0	0	0	6
CWHvh2/09 – Ss-Trisetum	Red	ST	0	0	0	0	0

* SH = Shrub-herb; PS = Pole-sapling; YF = Young Forest; MF = Mature Forest; OF = Old Forest; see RIC (1998)

** Note that while these stands met the RIC definition of mature forest, where trees established since last disturbance have matured and the second cycle of shade tolerant trees have become established, these stands are still quite young – between 30 and 40 years of age, and thus do not meet the CDC definition for Blue-listing.

We mapped 22 occurrences of the Act - Red osier dogwood (Table 3), an ecosystem that occurs on middle bench floodplain benches where rooting zone flooding is prolonged during the growing season. Another 96 stands on middle bench sites were mapped that were in a younger structural stage. Although we can't confirm what exact proportion of these ecosystems have been harvested, we do know that most of the YF and MF stands are recovering following harvesting on islands in the Skeena River and Nass River. The low number of Old Forest occurrences of this ecosystem suggest the rank should be changed from Blue to Red to ensure no further harvesting occurs.

CWHvh2 floodplain ecosystems are very rare in the North Coast LRMP area (Table 3). Only 8 occurrences were mapped - 6 CwSs-Devil's club, 2 Ss-Lily of the valley and no Ss-Trisetum. The rarity of these ecosystems reflects the rarity of active floodplains in the low relief landscapes of the CWHvh2 in the North Coast LRMP area. These ecosystem are more common the CWHvh2 on Haida Gwaii. These results point out that floodplain ecosystems in the CWHvh2 should be a very high conservation priority in all forest districts where they occur.

4.0 Discussion and Recommendations

The results of the sampling suggest the CDC-listing of some old growth ecosystems needs to be reconsidered. Table 4 presents recommendations for Red and Blue-listing based on the mapping conducted in this project.

1. Given the high number of occurrences mapped it is difficult to justify a listed status for the BaSs-Devil's club ecosystems. We recommend recognition of these fan and toe old growth ecosystems as special management areas. The large trees stabilize fan landforms and protect stream stability and habitats often important for anadromous fish. Old growth toe and fan ecosystems are also very important wildlife nesting, denning and foraging areas and any cutting should maintain these functions as well. To maintain these functions variable retention approaches are recommended on all sites. Also, a number of these ecosystems should be left unharvested in each watershed developed for harvesting. Wilford (2001) has developed specific recommendations for forest practices on fan ecosystems.
2. Given the mapping we have completed and the 'less than 20 occurrences ' CDC rule for Red-listing, we recommend that Ss-Salmonberry ecosystems be changed from Red to Blue. The mapping revealed greater than 100 occurrences of these ecosystems, recognizing that not all are necessarily high quality, type A occurrences (as defined by CDC), especially the smaller patches. We also recommend that no harvesting occur in these important ecosystems for the following reasons:

- Most Ss-Salmonberry ecosystems occur along S1 or S2 streams with 50m and 30m riparian reserve zones, respectively. Given the prevalence of S3 and S4 streams in back channel areas, as well as the common occurrence of fisheries sensitive zones, it is very difficult to find harvestable areas in high bench floodplains.
- The brush hazard on floodplain ecosystems is extremely high, and regeneration of even small groups of conifers is extremely difficult, and historically has been completely unsuccessful.
- Wildlife habitat values are very high for a wide range of species, and particularly important for grizzly bears.
- Riparian functions of the old growth forests are also very important. Principle functions are the provision of large woody debris and maintenance of floodplain bank stability.

Table 4: Suggested changes to the status of Red and Blue-listed ecosystems in the North Coast LRMP area.

Site Series	No. of Occurrences	Present CDC Status	Suggested CDC Status
CWHvm1/08 – BaSs-Devil’s club	186	Blue	de-list
CWHvm1/09 – Ss-Salmonberry	126	Red	Blue
CWHvm1/10 – Act-Red osier dogwood	22	Blue	Red
CWHws1,2/10– Act-Red osier dogwood		Blue	
CWHwm/10– Act-Red osier dogwood		Blue	
CWHvh2/08 – Ss-Lily of the valley	2	Red	Red
CWHvh2/07 – CwSs-Devil’s club	6	Blue	Red
CWHvh2/09 – Ss-Trisetum	0	Red	Red

3. Also using the 'less than 20 occurrences' criterion we recommend that the status of Act-Red osier dogwood be upgraded from Blue to Red. These ecosystems should not be harvested for the same reasons listed above for the Ss-Salmonberry.
4. All floodplain ecosystems are extremely rare in the CWHvh2 within the North Coast LRMP and should be Red-listed. This means an upgrading of the CwSs-Devil's club from Blue to Red-listed. As for other floodplain ecosystems discussed above, no harvesting should be permitted on floodplains in the CWHvh2. These same Red-listed ecosystems occur in the CWHvh2 and CWHwh1 in the Queen Charlotte Islands FD where harvesting is ongoing. Given their extreme level of rarity in the North Coast LRMP area, this prohibition on harvesting these ecosystems should be extended to the

same rare ecosystem units in the Queen Charlotte Islands FD, and to the Central Coast FD.

As discussed above, the mapping in this project concentrates on a subset of the Red and Blue-listed ecosystems in the North Coast LRMP area. In particular the Spray Zone Forest group of ecosystems has not been mapped, nor has 2 Blue-listed upland ecosystems - the CwSs-Swordfern and the CwHw-Sword fern. There are other important ecosystems that require special consideration in the LRMP process and these are described in a separate report by Pojar (2002).

The project achieved its objective of providing a reliable inventory of floodplain Red-listed ecosystems in the North Coast LRMP area. The information will assist in decision-making for the LRMP area - especially in helping to identify those watersheds reserved for protection. The mapping also shows that, in drainages developed for forest harvesting, there has historically been a pattern of targeting fan and floodplain ecosystems because of the large timber and accessible valley-bottom position. This pattern repeats what has happened in south-coastal British Columbia, where fan and floodplain ecosystems have been eliminated from the forest landscape. The CDC Red and Blue-lists of threatened and vulnerable ecosystems are not intended as targets for land management. For example, it would not be sound land management to harvest BaSs-Devil's club ecosystems until there are 100 occurrences left, blue-list them, and then stop harvesting them. These ecosystems serve important ecological functions in each of the valleys in which they occur, and the recommendations in this report are put forward to reflect these functions.

5.0 References

- Banner, A., W. Mackenzie, S. Haeussler, S. Thomson, J. Pojar, and R. Trowbridge. 1993. A Field Guide to Site Identification and Interpretation for the Prince Rupert Forest Region. Land Management Handbook Number 26. Ministry of Forests, Research Branch. Victoria, B.C.
- Clement, Chris. 1990. Ecosystem Units of the Khutzeymateen and Kateen Drainages. Report prepared for Forest Sciences Section, Ministry of Forests, Smithers, by Shearwater Mapping Ltd., Victoria. 91pp
- Oikos Ecological Services Ltd. 1999. Manual for Identification, Description, and Assessment of Red and Blue-listed Plant Communities. Contract report for the Conservation Data Centre, Ministry of Environment, Lands and Parks.
- Pojar, J, unpublished. 2002. Rare ecosystems of the CWHvh2 in the North Coast Forest District.
- Ministry of Sustainable Resource Management. (MSRM). 2001. Conservation Data Centre. Provincial Natural Plant Community Tracking List for North Coast Forest District.
srmwww.gov.bc.ca/cdc/trackinglists/plantcommunities/ctrack28.doc
- Resources Inventory Committee (RIC). 1998. Standard for Terrestrial Ecosystem Mapping in British Columbia. The Province of British Columbia, Victoria, B.C
- Resources Inventory Committee (RIC). 1999. Methods and Standards for Rare Ecosystem Mapping in British Columbia. The Province of British Columbia, Victoria, B.C.
- Wilford, D., Sakals, M., Innes, J. 2001. Forest Management and Restoration on Fans. Watershed Restoration Tech. Bul. Streamline Vol. 6 No.3. p.1-8.

Appendix A

A summary of the status and ecology of the CDC-listed ecosystems, extracted from the Manual for Identification and Assessment of Red and Blue-listed Plant Communities (1999)

Abies amabilis/Picea sitchensis – *Oplopanax horridus*
Amabilis fir/Sitka spruce – Devil’s club

Status	S3 [suggest change to S2] ; Blue-listed
Occurrences (# estimated)	6-20
Trend	declining
Threats	forest harvesting
Protection	Kitlope Prov. Park, Gitnadoix Prov Park, Golden Ears Prov. Park (unverified)
Fragility	moderate

Ecology

This is a very productive ecosystem found on lower to mid colluvial seepage slopes. Soils are typically gleyed Ferro-Humic Podzols, Dystric Brunisols and Regosols developed on colluvial or fluvial parent materials. The soil moisture regime is subhygric to hygric and nutrient regime is rich to very rich.

The tree layer is dominated by large *Tsuga heterophylla* (western hemlock), *Abies amabilis* (amabilis fir) and *Picea sitchensis* (Sitka spruce). The shrub layer is dominated by *Oplopanax horridus* (devil’s club) and *Rubus spectabilis* (salmonberry). Rich site indicators such as *Gymnocarpium dryopteris* (oak fern), *Athyrium filix-femina* (ladyfern) and *Tiarella spp.* are prominent in the herb layer. *Mnium spp.* (leaf mosses) are common in the moss layer.

Distribution

This forested plant community is uncommon in distribution within a moderately widespread range. The range of this community extends on the windward side of Vancouver Island from Jordan River in the south, on both sides of Vancouver Island through the central island and north, to Port Hardy. On the mainland the range includes the windward slopes of the Coast Mountains, from the Fraser River north to the Skeena River. The range also extends at low to mid elevation in; the Skeena River drainage and its tributaries from the Exstew to Ecstall rivers, most of Douglas Channel and Gardner Canal, the lower Kitlope River and the east side Princess Royal Island.

Ecosystem Processes

- seepage

Management Approaches

- maintain natural hydrological regime

Environment Table

Ecosystem Units	CWHvm1/08	CWHvm2/08
RSMR	5-6	5-6
RSNR	D-E	D-E
Aspect	-	-
Slope Gradient (%)	0-110	20-84
Mesoslope Position	lower-mid	lower-mid
Soil classification	FHP, DYB, R; (gleyed)	FHP, HFP, (FO); (gleyed)
Soil Texture Class	S, CL	L(s), S
Parent Materials	C, F	C, (F)
Humus Form	Mor, Moder	Mor, Moder

Selected References

Banner A., W. Mackenzie, S. Haeussler, S. Thomson, J. Pojar and R. Trowbridge. 1993. A field guide to site identification and interpretation for the Prince Rupert Forest Region. B.C. Min. For., Land Manage. Hand. No 26, Victoria B.C.
 Pojar, J. 1998. Per. Com., Min. For. Prince Rupert Region

Picea Sitchensis* – *Calamagrostis nutkaensis
Sitka spruce - Reedgrass

Status	S3; Blue-listed
Occurrences (# estimated)	101-200
Trend	stable
Threats	A-frame logging
Protection	cell#23(ER#9,10,44,45), cell#84(ER#10), S. Moresby Nat. Park, Naikoon Prov. Park
Fragility	moderate

Ecology

This is a shoreline forest community characterized by high winds and waves, salt spray, brackish waters and marine landforms. These forests are best developed on the Queen Charlotte Islands and are found on windy headlands and old sand dunes and are typified by large windswept *Picea sitchensis* (Sitka spruce). The shrub layer is vigorous and dominated by *Gaultheria shallon* (salal) and *Vaccinium parvifolium* (red huckleberry) and the herb layer is characterized by *Calamagrostis nutkaensis* (reedgrass).

Distribution

The range of this plant community is very small, found primarily on the Queen Charlotte Islands on the outer coast and a small portion of the mid coast at sea level on rocky headlands of coastal islands. This community is naturally limited in extent.

Ecosystem Processes

- strong maritime influences; high winds, salt spray, marine parent materials

Environment Table

Ecosystem Units	CWHvh1/16, CWHvh2/16, CWHwh1/15
RSMR	0-3
RSNR	B-D
Aspect	-
Slope Gradient (%)	0-30
Mesoslope Position	crests-mid
Soil classification	FHP, HO, FO
Soil Texture Class	S(skeletal, fragmental)
Parent Materials	Ov/R, W
Humus Form	Mor

Selected References

Banner A., W. Mackenzie, S. Haeussler, S. Thomson, J. Pojar and R. Trowbridge. 1993. A field guide to site identification and interpretation for the Prince Rupert Forest Region. B.C. Min. For., Land Manage. Hand. No 26, Victoria B.C.
 Pojar, J. 1998. Per. Com., Min. For. Prince Rupert Region

Picea sitchensis* – *Carex obnupta
Sitka spruce – Slough sedge

Status	S3; Blue-listed
Occurrences (# estimated)	6-20
Trend	stable
Threats	no direct threats
Protection	S. Morseby Nat. Park, Naikoon Prov. Park, ER cell#34
Fragility	moderate

Ecology

This is a shoreline community influenced by brackish waters and marine landforms. It is found on estuaries and tidal sloughs that have strongly fluctuating brackish water levels. The tree layer is characterized by poorly growing *Picea sitchensis* (Sitka spruce) and the shrub layer is dominated by *Malus fusca* (Pacific crab apple), *Gaultheria shallon* (salal) and *Rubus spectabilis* (salmonberry). The herb layer is characterized by abundant *Carex obnupta* (slough sedge).

Distribution

This plant community is naturally limited in extent and has a very small range, found primarily on the Queen Charlotte Islands on the outer coast and a small portion of the mid coast at sea level in brackish sloughs.

Ecosystem Processes

- fluctuating brackish waters and marine parent materials

Environment Table

Biogeoclimatic Units	CWHvh1/18, CWHvh2/18, CWHwh1/17
RSMR	6
RSNR	C-E
Aspect	-
Slope Gradient (%)	0
Mesoslope Position	level
Soil classification	R
Soil Texture Class	S
Parent Materials	W, F
Humus Form	Mor

Selected References

- Banner A., W. Mackenzie, S. Haeussler, S. Thomson, J. Pojar and R. Trowbridge. 1993. A field guide to site identification and interpretation for the Prince Rupert Forest Region. B.C. Min. For., Land Manage. Hand. No 26, Victoria B.C.
- Pojar, J. 1998. Per. Com., Min. For. Prince Rupert Region

Picea sitchensis* – *Kinbergia oregana
Sitka spruce - Kinbergia

Status	S2; Blue-listed
Occurrences (# estimated)	6-20
Trend	declining
Threats	forest harvesting
Protection	Morseby Nat. Park, Naikoon Prov. Park
Fragility	low

Ecology

This is a shoreline forest community found on sandy beach plain deposits where salt spray and strong winds have a major effect on micro-climate. The tree layer is productive and dominated by *Picea sitchensis* (Sitka spruce) and *Tsuga heterophylla* (western hemlock). The understory shrub layer is dominated by *Gaultheria shallon* (salal), *Picea sitchensis* (Sitka spruce) and *Tsuga heterophylla* (western hemlock). The herb layer is sparse and the moss layer typically contains *Kinbergia oregana* (Oregon beaked moss) and *Rhytidiadelphus loreus* (lanky moss).

Distribution

This ecosystem is found at sea level on sandy beach plains of the Queen Charlotte Islands and less abundantly on other coastal islands in the north and mid coast. This community is naturally limited in distribution within a narrow range.

Ecosystem Processes

- strong maritime influences; high winds, salt spray, marine parent materials

Environment Table

Ecosystem Units	CWHvh1/15	CWHvh2/15	CWHwh1/14
RSMR	0-3	0-3	0-3
RSNR	B-D	B-D	A-C
Aspect	-	-	-
Slope Gradient (%)	0-30	0-30	0-30
Mesoslope Position	all	all	all
Soil classification	R, (HFP, DYB)	R, (HFP, DYB)	R, (HFP, DYB)
Soil Texture Class	S(skeletal)	S(skeletal)	S(skeletal)
Parent Materials	W	W	W
Humus Form	Mor	Mor	Mor

Selected References

- Banner A., W. Mackenzie, S. Haeussler, S. Thomson, J. Pojar and R. Trowbridge. 1993. A field guide to site identification and interpretation for the Prince Rupert Forest Region. B.C. Min. For., Land Manage. Hand. No 26, Victoria B.C.
- Pojar, J. 1998. Per. Com., Min. For. Prince Rupert Region

***Picea sitchensis* – *Mianthemum dilatatum*, wet hypermaritime 1**
Sitka spruce – Lily-of-the-valley, wet hypermaritime 1

Status	S2; Red-listed
Occurrences (# estimated)	6-20
Trend	declining
Threats	forest harvesting, changes to flooding regime
Protection	there are no verified occurrences of this community with Protection, however inventory work may locate some within Parks of the Queen Charlotte Islands (South Moresby Nat. Park and Naikoon Prov. Park)
Fragility	low

Ecology

This is a high bench-floodplain site that experiences irregular overbank flooding but is strongly influenced by sub-irrigation. These are very productive sites as result of the nutrient rich ground waters. The tree layer is dominated by large and well spaced *Tsuga heterophylla* (western hemlock) and *Picea sitchensis* (Sitka spruce) and has a minor component of *Thuja plicata* (western redcedar). The shrub and herb layers are moderately developed and diverse and include rich indicators such as *Gymnocarpium dryopteris* (oak fern), *Dryopteris expansa* (spiny wood fern) and *Tiarella spp.*(foamflowers). The moss layer is typified by dense mats of *Hylocomium splendens* (step moss) and *Rhytidiadelphus loreus* (lanky moss).

Distribution

This community has a naturally limited distribution within a narrow range, as it only occurs on the floodplains of major rivers. This community occurs at low elevations (sea level to 600 m) on the outer mid coast north of Namu to the mouth of Portland Inlet. It also occurs at low elevations (sea level to 500 m) over most of the Queen Charlotte Islands.

Ecosystem Processes

- annual, sporadic subsurface flooding below the rooting zone, with occasional overbank flooding

Management Approaches

- maintain natural hydrological regime and flooding frequency

Environment Table

Biogeoclimatic Units	CWHvh2/08, CWHwh1/07
RSMR	(3)-6
RSNR	D-E
Aspect	-
Slope Gradient (%)	0-5
Mesoslope Position	level
Soil classification	R, DYB, FHP, HP, MB; (gleyed)
Soil Texture Class	FL(skeletal), CL, S(skeletal)
Parent Materials	F
Humus Form	Mor, Moder, Mull

Selected References

Banner A., W. Mackenzie, S. Haeussler, S. Thomson, J. Pojar and R. Trowbridge. 1993. A field guide to site identification and interpretation for the Prince Rupert Forest Region. B.C. Min. For., Land Manage. Hand. No 26, Victoria B.C.

Flynn, S. 1997. [Draft plant community accounts prepared for "Species and plant community accounts for identified wildlife: Volume 2 (Forest Practices code of British Columbia)" (in prep.)]. Located at: B.C. Conservation Data Centre, Ministry of Environment, Lands and Parks, Victoria, B.C.

Green, R.N, K. Klinka. 1994. A field guide to site identification and interpretation for the Vancouver Forest Region. B.C. Min. For., Land Manage. Hand. No 28, Victoria B.C.

Pojar, J. 1998. Per. Com., Min. For. Prince Rupert Region

Picea sitchensis* – *Malus fusca
Sitka spruce – Pacific crab apple

Status	S2; Blue-listed
Occurrences (# estimated)	6-20
Trend	stable
Threats	no direct threats
Protection	there are no verified occurrences of this community with Protection, however inventory work may locate some within Parks of the Queen Charlotte Islands (South Moresby Nat. Park and Naikoon Prov. Park)
Fragility	low

Ecology

This is a shore line forest community strongly influenced by strong winds and brackish waters found on marine landforms. It occurs on estuaries often associated with, but on higher positions than the *Picea sitchensis* – *Carex obnupta* community. The tree layer is moderately productive and dominated by *Picea sitchensis* (Sitka spruce) and *Malus fusca* (pacific crab apple). Species composition is very similar to the *Picea sitchensis* – *Carex obnupta* community except there is much lower cover of *Carex obnupta* (slough grass).

Distribution

This plant community is found at sea level on the Queen Charlotte islands, other coastal islands and on the fringe of the mainland from the mouth of the Portland Canal southward to Namu on the mid coast. These sites have also been described in the Kitlope (CWHvm). The distribution of this community is naturally limited in extent within a narrow range.

Ecosystem Processes

- fluctuating brackish waters, marine parent materials and strong winds

Environment Table

Biogeoclimatic Units	CWHvh1/19, CWHvh2/19, CWHwh1/18
RSMR	6
RSNR	C-E
Aspect	-
Slope Gradient (%)	0
Mesoslope Position	level
Soil classification	G
Soil Texture Class	S
Parent Materials	W
Humus Form	Mor

Selected References

- Banner A., W. Mackenzie, S. Haeussler, S. Thomson, J. Pojar and R. Trowbridge. 1993. A field guide to site identification and interpretation for the Prince Rupert Forest Region. B.C. Min. For., Land Manage. Hand. No 26, Victoria B.C.
- Pojar, J. 1998. Per. Com., Min. For. Prince Rupert Region

Picea sitchensis* – *Polystichum munitum
Sitka spruce – Sword fern

Status	S3; Blue-listed
Occurrences (# estimated)	21-100
Trend	not yet determined [declining]
Threats	deer browse
Protection	S. Moresby Nat. Park
Fragility	moderate

Ecology

This is a shore line forest community influenced by rich marine deposits. It is found on old marine terraces and supports a lush community dominated by *Picea sitchensis* (Sitka spruce) and *Tsuga heterophylla* (western hemlock) in the tree layer. The shrub layer is dominated by *Gaultheria shallon* (salal) and *Rubus spectabilis* (salmonberry) and the herb layer is characterized by abundant *Polystichum munitum* (sword fern) and *Blechnum spicant*.

Distribution

This community has a restricted distribution within a very small range, as it has only been described on the west Coast of the Queen Charlotte islands.

Ecosystem Processes

- strong maritime influences; high winds, salt spray, marine parent materials

Management Approaches

- control of deer browsing

Environment Table

Biogeoclimatic Units	CWHvh1/17, CWHvh2/17
RSMR	4-5
RSNR	C-E
Aspect	-
Slope Gradient (%)	0-60
Mesoslope Position	lower-level
Soil classification	R, HFP, HP
Soil Texture Class	S, (FL)
Parent Materials	W
Humus Form	Mor

Selected References

- Banner A., W. Mackenzie, S. Haeussler, S. Thomson, J. Pojar and R. Trowbridge. 1993. A field guide to site identification and interpretation for the Prince Rupert Forest Region. B.C. Min. For., Land Manage. Hand. No 26, Victoria B.C.
- Pojar, J. 1998. Per. Com., Min. For. Prince Rupert Region

***Picea sitchensis* – *Rubus spectabilis*, very wet maritime**
Sitka spruce – Salmonberry, very wet maritime

Status	S2; Red-listed
Occurrences (# estimated)	21-100
Trend	declining
Threats	forest harvesting
Protection	Golden Ears Prov. Park, Kitlope Prov. Park, Gitnadoix Prov. Park
Fragility	low

Ecology

This is a high-bench floodplain community that experiences irregular overbank flooding but is strongly influenced by sub irrigation. The tree layer is dominated by *Picea sitchensis* (Sitka spruce), *Tsuga heterophylla* (western hemlock) and *Alnus rubra* (red alder). The shrub layer is characterized by an abundance of *Oplopanax horridus* (devil’s club) and *Rubus spectabilis* (salmon berry). A diverse community occupies the herb layer including rich indicators such as *Gymnocarpium dryopteris* (oak fern), *Dryopteris expansa* (spiny wood fern), *Polystichum munitum* (sword fern) and *Tiarella spp.* (foamflowers). The moss layer is dominated by *Plagiomnium insigne* (coastal leafy moss), with a moderate cover of *Rhytidiadelphus loreus* (lanky moss).

Distribution

This community occurs at low elevations (0-600 m) on floodplains of the windward slopes of Vancouver Island north of Jordan River, and on both sides of the Island between Kelsey Bay and just north of Port Hardy. On the mainland, it occurs on the windward slopes of the Coast Mountains from the Fraser River north to Portland Canal. It has a naturally limited distribution, within a narrow range.

Ecosystem Processes

- annual, sporadic subsurface flooding below the rooting zone, with occasional overbank flooding

Management Approaches

- maintain natural hydrological regime and flooding frequency

Environment Table

Biogeoclimatic Units	CWHvm1/09
RSMR	3-6
RSNR	D-E
Aspect	-
Slope Gradient (%)	0-5
Mesoslope Position	level
Soil classification	R, (DYB)
Soil Texture Class	CL(skeletal), S(skeletal), S
Parent Materials	F
Humus Form	Mor

Selected References

Banner A., W. Mackenzie, S. Haeussler, S. Thomson, J. Pojar and R. Trowbridge. 1993. A field guide to site identification and interpretation for the Prince Rupert Forest Region. B.C. Min. For., Land Manage. Hand. No 26, Victoria B.C.

Flynn, S. 1997. [Draft plant community accounts prepared for "Species and plant community accounts for identified wildlife: Volume 2 (Forest Practices code of British Columbia)" (in prep.)]. Located at: B.C. Conservation Data Centre, Ministry of Environment, Lands and Parks, Victoria, B.C.

Green, R.N, K. Klinka. 1994. A field guide to site identification and interpretation for the Vancouver Forest Region. B.C. Min. For., Land Manage. Hand. No 28, Victoria B.C.

Pojar, J. 1998. Per. Com., Min. For. Prince Rupert Region

Picea sitchensis* – *Trisetum cernuum
Sitka spruce – Nodding trisetum

Status	S1 [suggest move to S2]; Red-listed
Occurrences (# estimated)	21-50
Trend	declining
Threats	forest harvesting
Protection	Naikoon Prov Park, S. Moresby Nat. Park, Pacific Rim Nat. Park, Cape Scott Prov. Park, Brooks Peninsula, Tahsish
Fragility	low

Ecology

This is a middle bench floodplain community which experiences irregular overbank flooding (1-5 yrs.) and is influenced by rich sub-irrigation. Soils are fine loams and sands with some gleying. Trees, tend to be located on mounds and surrounded by wet depressions.

The tree layer is dominated by large widely spaced *Picea sitchensis* (Sitka spruce) and *Tsuga heterophylla* (western hemlock) with a minor component of *Thuja plicata* (western redcedar) and *Alnus rubra* (red alder). The shrub layer is sparse, the herb layer is dominated by *Blechnum spicant* (deer fern), *Trisetum cernuum* (nodding trisetum), with low cover of *Maianthemum dilatatum* (false lily-of-the-valley) and *Tiarella trifoliata* (foamflower). The moss layer is dense with abundant *Hylocomnium splendens* (step-moss), *Rhytidiadelphus loreus* (lanky moss), *Conocephalum conicum* (snake liverwort), with low cover of *Kindbergia oregana* (Oregon beaked-moss).

Distribution

This community is uncommon in distribution within a moderately widespread range. Typically it occurs at low elevations (0 to 500 m) on floodplains of major rivers in the Queen Charlotte Islands. It also occurs at low elevations (0 to 250 m.) along major rivers of the outer coast of Vancouver Island from near Port Renfrew to Quatsino Sound, and across the Island north of Quatsino Sound. It's range does not extend to the mainland coast.

Ecosystem Processes

- annual, prolonged subsurface flooding in the rooting zone, with irregular overbank flooding

Management Approaches

- maintain natural hydrological regime and flooding frequency

Environment Table

Biogeoclimatic Units	CWHvh1/09	CWHvh2/09	CWHwh1/08
RSMR	4-6	4-6	4-6
RSNR	C-E	D-E	C-E
Aspect	-	-	-
Slope Gradient (%)	0-5	0-5	0-5
Mesoslope Position	lower-level	lower-level	lower-level
Soil classification	DYB, R, HFP; (gleyed)	DYB, R, HFP; (gleyed)	DYB, R, HFP; (gleyed)
Soil Texture Class	FL, S; (skeletal)	FL, S; (skeletal)	FL, S; (skeletal)
Parent Materials	F	F	F
Humus Form	Mor, Moder	Mor, Moder	Mor, Moder

Selected References

Banner A., W. Mackenzie, S. Haeussler, S. Thomson, J. Pojar and R. Trowbridge. 1993. A field guide to site identification and interpretation for the Prince Rupert Forest Region. B.C. Min. For., Land Manage. Hand. No 26, Victoria B.C.

Flynn, S. 1997. [Draft plant community accounts prepared for "Species and plant community accounts for identified wildlife: Volume 2 (Forest Practices code of British Columbia)" (in prep.)]. Located at: B.C. Conservation Data Centre, Ministry of Environment, Lands and Parks, Victoria, B.C.

Pojar, J. 1998. Per. Com., Min. For. Prince Rupert Region

Populus balsamifera ssp trichocarpa – Cornus stolonifera
Black cottonwood - Red-osier dogwood

Status	S3; Blue-listed
Occurrences (# estimated)	21-100
Trend	declining rapidly
Threats	forest harvesting, changes in flooding regime
Protection	verified occurrences have not been identified, inventory work is required to locate
Fragility	low

Ecology

This community occurs on middle fluvial bench floodplains of major rivers. The flooding regime is characterized by 4-6 weeks of elevated water tables during the growing season. Conifer growth is limited to raised mounds that elevate roots above persistent subsurface flooding. The tree layer is dominated by *Populus balsamifera ssp. trichocarpa* (black cottonwood) with a minor component of *Picea sitchensis* (Sitka spruce). The understory shrub layer is dense with abundant *Rubus spectabilis* (salmonberry) and *Cornus stolonifera* (red-osier dogwood). The herb and moss layers are sparse.

Distribution

This community is uncommon in distribution within a moderately widespread range. The range includes the major rivers of coastal and transitional coastal – interior areas from the Nass valley in the north, inland to Whitesail Lake and to the south including the Lillooet River, Chilliwack River and Silverhope Creek.

Ecosystem Processes

- annual, prolonged subsurface flooding in the rooting zone, with irregular overbank flooding

Management Approaches

- maintain natural hydrological regime and flooding frequency

Environment Table

Biogeoclimatic Units	CWHdm/09, CWHds1/09, CWHds2/09, CWHmm1/09, CWHms1/08, CWHms2/08, CWHvm1/10, CWHwm/06, CWHws1/08, CWHws2/08, CWHxm1/09, CWHxm2/09
RSMR	(4)5-6
RSNR	(C)D-E
Aspect	-
Slope Gradient (%)	0
Mesoslope Position	level
Soil classification	R
Soil Texture Class	CL(skeletal), S
Parent Materials	F
Humus Form	Moder, Mull

Selected References

Banner A., W. Mackenzie, S. Haeussler, S. Thomson, J. Pojar and R. Trowbridge. 1993. A field guide to site identification and interpretation for the Prince Rupert Forest Region. B.C. Min. For., Land Manage. Hand. No 26, Victoria B.C.
 Green, R.N, K. Klinka. 1994. A field guide to site identification and interpretation for the Vancouver Forest Region. B.C. Min. For., Land Manage. Hand. No 28, Victoria B.C.

***Thuja plicata* / *Picea sitchensis* – *Oplopanax horridus*, very wet hypermaritime 2**
Western redcedar / Sitka spruce – Devil’s club, very wet hypermaritime 2

Status	S3; Blue-listed
Occurrences (# estimated)	21-100
Trend	declining
Threats	moderately threatened by forest harvesting, deer browsing
Protection	Naikoon Nat. Park, S.Moresby Prov. Park
Fragility	high

Ecology

This are very productive forested communities found on receiving positions typically at lower and toe slopes. These communities are limited in extent occupying only those sites where seepage is continuous through the growing season. There are two phases recognized, a mineral phase and a lithic phase.

The tree layer is productive and dominated by *Tsuga heterophylla* (western hemlock) and *Abies amabilis* (amabilis fir) with a smaller component of *Picea sitchensis* (Sitka spruce) and *Thuja plicata* (western redcedar). The shrub layer diverse and characterized by abundant *Oplopanax horridus* (devil’s club) and *Rubus spectabilis* (salmonberry). The herb layer is diverse with rich site indicators including *Gymnocarpium dryopteris* (oak fern), *Dryopteris expansa* (spiny wood fern), *Polystichum munitum* (sword fern), *Blechnum spicant* (deer fern) and *Tiarella spp.*(foamflowers). The moss layer is characterized by abundant *Rhizomnium glabrescens* (large leafy moss).

Deer browsing in the Queen Charlotte Islands is altering the species composition of these communities. Consequently those occurrences within parks are not good representations of the classic description of the ecosystem.

Distribution

This plant community is uncommon in distribution within a narrow range which extends from Namu on the mid coast, along the outer mainland coast, to the mouth of the Portland Canal in the north. The range includes all major coastal islands, the windward side of the Queen Charlotte Island and almost the entire area of South Moresby. The elevation ranges form 0 to 500 metres in the south to 600 metres in the north.

Ecosystem Processes

- seepage

Management Approaches

- maintain natural hydrological regime
- deer exclusion

Environment Table

Biogeoclimatic Units	CWHvh2/07 (mineral phase)	CWHvh2/07 (lithic phase)
RSMR	(4)-6	(4)-6
RSNR	D-E	D-E
Aspect	-	-
Slope Gradient (%)	10-65	55-65
Mesoslope Position	lower-toe	lower
Soil classification	HFP, FHP, HP (gleyed)	FO
Soil Texture Class	L-CL(skeletal), S	CL
Parent Materials	C, F	Ov/R, Ov/C
Humus Form	Mor, Moder	Mor

Selected References

- Banner A., W. Mackenzie, S. Haeussler, S. Thomson, J. Pojar and R. Trowbridge. 1993. A field guide to site identification and interpretation for the Prince Rupert Forest Region. B.C. Min. For., Land Manage. Hand. No 26, Victoria B.C.
- Green, R.N, K. Klinka. 1994. A field guide to site identification and interpretation for the Vancouver Forest Region. B.C. Min. For., Land Manage. Hand. No 28, Victoria B.C.
- Pojar, J. 1998. Per. Com., Min. For. Prince Rupert Region

Thuja plicata/Picea sitchensis – Polystichum munitum
Western redcedar/Sitka spruce – Sword fern

Status	S2; Blue-listed
Occurrences (# estimated)	21-100
Trend	declining
Threats	forest harvesting
Protection	S. Moresby Nat. Park, Naikoon Prov. Park, Limestone Island
Fragility	high

Ecology

This is a moderately productive forested community that develops on freely draining soils on base-rich parent materials (limestone and metamorphic). The tree layer is characterized by *Tsuga heterophylla* (western hemlock) and *Picea sitchensis* (Sitka spruce). The herb layer is characterized by abundant *Polystichum munitum* (sword fern). The presence of abundant *Picea sitchensis* (Sitka spruce) and *Polystichum munitum* (sword fern) distinguishes this community from other adjacent communities.

Distribution

This plant community is uncommon in distribution within a moderately widespread range which extends from Port Renfrew in the south, and includes the hypermaritime and maritime coastal fringe of Vancouver island and the outer mainland coast, to the mouth of the Portland Canal in the north. The range includes all major coastal islands, the Queen Charlotte Island and almost the entire area of South Moresby. The elevation ranges from 0 to 500 metres in the south 0 to 600 metres in the north.

Ecosystem Processes

- base rich parent materials

Management Approaches

- exclusion of deer

Environment Table

Biogeoclimatic Units	CWHvh1/05, CWHvh2/05, CWHwh1/03
RSMR	2(3)
RSNR	D-E
Aspect	-
Slope Gradient (%)	5-95
Mesoslope Position	upper-lower
Soil classification	FHP, HFP, FO
Soil Texture Class	FL, FLS, CL
Parent Materials	M, C, Ov/R, Ov/C
Humus Form	Mor

Selected References

- Banner A., W. Mackenzie, S. Haeussler, S. Thomson, J. Pojar and R. Trowbridge. 1993. A field guide to site identification and interpretation for the Prince Rupert Forest Region. B.C. Min. For., Land Manage. Hand. No 26, Victoria B.C.
- Green, R.N, K. Klinka. 1994. A field guide to site identification and interpretation for the Vancouver Forest Region. B.C. Min. For., Land Manage. Hand. No 28, Victoria B.C.

***Thuja plicata* / *Tsuga heterophylla* – *Polystichum munitum*
Western redcedar / Western hemlock – Sword fern**

Status	S2; Blue-listed
Occurrences (# estimated)	21-100
Trend	declining
Threats	forest harvesting, agriculture conversion, urban
Protection	Golden Ears Park, Goldstream Prov. Park
Fragility	moderate

Ecology

This community is found on freely draining steep slopes that have base-rich parent materials. Tree growth is average and dominated by *Picea sitchensis* (Sitka spruce), *Tsuga heterophylla* (western hemlock) and *Thuja plicata* (western redcedar). The shrub layer is sparse, the herb layer is dominated and characterized by abundant *Dryopteris expansa* (spiny wood fern), *Polystichum munitum* (sword fern) and *Gymnocarpium dryopteris* (oak fern).

Distribution

This plant community is uncommon in distribution within a moderately widespread range which includes the windward side of Vancouver Island from Jordan River in the south, on both sides of Vancouver Island through the central island and north to Port Hardy. On the mainland the range extends along the windward slopes of the Coast Mountains, from the Fraser River north to the Skeena River. It occurs from sea level to elevation 1000 metres. The range also includes the leeward side of the Vancouver Island Ranges from elevation 450 metres to 1000 metres.

Ecosystem Processes

- base rich parent materials

Environment Table

Ecosystem Units	CWHvm1/04, CWHvm2/04, CWHmm1/04, CWHmm2/04
RSMR	1-2
RSNR	D-E
Aspect	-
Slope Gradient (%)	40-90
Mesoslope Position	upper-mid
Soil classification	FHP
Soil Texture Class	CL, S
Parent Materials	C, Cv/R, Mv/R
Humus Form	Mor, Moder

Selected References

- Banner A., W. Mackenzie, S. Haeussler, S. Thomson, J. Pojar and R. Trowbridge. 1993. A field guide to site identification and interpretation for the Prince Rupert Forest Region. B.C. Min. For., Land Manage. Hand. No 26, Victoria B.C.
- Green, R.N, K. Klinka. 1994. A field guide to site identification and interpretation for the Vancouver Forest Region. B.C. Min. For., Land Manage. Hand. No 28, Victoria B.C.

Appendix B: Red and Blue-listed Ecosystem Mapping Working Legend

BGC_Zone	BGC_Subzone	BGC_Variant	Site Series Number	Site Series ⁴ Code	Provincial Rank	Number of Occurrences	Site Series Name	Assumed Situation	Structural Stage	Typical Soil Moisture Regime
CWH	vh	2	07	SD	Blue ¹	6	CwSs - Devil's club	gentle slopes of lower, receiving sites; deep medium - textured soils; seepage	7	mesic - hygric
CWH	vh	2	08	SL	Red	2	Ss - Lily-of-the-valley	high bench - floodplain, deep medium - textured soils	7	subhygric - hygric
CWH	vh	2	09	ST	Red	0	Ss - Trisetum	middle bench - floodplain, deep medium - textured soils	7	subhygric - hygric
CWH	vm	1	08	AD	Blue ²	185	BaSs - Devil's club	gentle receiving slopes; deep, medium - textured soil; seepage	7	subhygric - hygric
CWH	vm	1	09	SS	Red ³	125	Ss - Salmonberry	active floodplain, high bench, deep medium - textured soil	7	subhygric - hygric
CWH	vm wm ws	1 1, 2	10	CD	Blue ¹	22	Act - Red-osier dogwood	active floodplain, middle bench, deep medium - textured soil	7	subhygric - hygric

¹ Recommend change to Red-listing

² Recommend de-listing

³ Recommend change to Blue-listing

⁴ For other Site Series please refer to A Field Guide to Site Identification and Interpretation in the Prince Rupert Region.

Appendix C: List of Rare or Significant Ecosystems Not CDC-Listed

In identifying areas to look for Red and Blue-listed ecosystems we spoke to Jim Pojar and Allan Banner of ministry of Forests, Research Branch; Sarma Liepins, Forest Ecosystem Specialist, and Mike Grainger, Sylviculturalist, of the Prince Rupert Forest District. The following list of rare or significant ecosystems was collected.

Portland Inlet – Crow Lagoon second caldera

Golden Cedar on Porcher Island

Estuaries and tidal marshes – see Don Remington’s report

Light stations

Seabird islands

Karst caves – Kumealon Inlet

Large fens and marshes – e.g. drainage divide between Chambers and Johnson Creeks

Kitson Island sandy beaches

Hotsprings

Any stands of productive yellow cedar (height class >6)

Caves