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DRAFT  
PRELIMINARY REPORT ON PLANT SUCCESSION STUDY AT ER #122  
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I. SUMMARY

The study seeks to track change within the wetland plant communities on the Reserve by tracking spatial distribution of species. It is hoped that long term re-inventory of species succession in this undisturbed location, will be useful in understanding climate change (see Hebda, 1994). A transect was established which crossed several communities in a generally lower to higher and wetter to dryer gradient. Plant samples were taken from a series of 12 plots along the transect, with estimates of coverage and distribution. Also the location of occurrence of 5 species was recorded along the transect. Perforated pipes were set in the ground adjacent to 4 of the plots, to record water table level on a continuing basis. It is hoped that the transect will be re-sampled at approximately ten year intervals.

## II. GENERAL DESCRIPTION

The Tsitika Mountain Ecological Reserve #122 is situated on the west side of the lower Tsitika River Valley on northeastern Vancouver Island - see Map #1. The Reserve comprises within its 554 ha. a small plateau with lake and fens, and the mountain slopes above: on the east a low forested ridge and on the west a higher subalpine ridge - see Map #2. It was created in 1989 to protect representative montane and subalpine forest and bog communities. The Reserve has been incorporated within the new Robson Bight Provincial Park, which extends to the north and east. To the west, the reserve is bounded by Tree Farm 2, TimberWest Ltd., within the Kokish River drainage. To the south it is bounded by Tree Farm 39, MacMillan Bloedel Ltd.

The Reserve provides representative montane forested and subalpine areas, but lacks southerly aspects and low elevations. The fen area on slopes north and west of the lake is representative and has special interest because of terracing at two scales. There are many small terraced pools with 'dams' on the down hill side consisting of organic soil. Some of these are a meter tall. In a few of the pools with more water flow, the bottom of the pool is at the underlying till surface. Most pools exhibit little drainage. As a larger feature, there are bands of treed, hummocky, bouldery, slightly steeper terrain alternating with fen areas, parallel with the lake shore. The origin of both of these features is unclear.

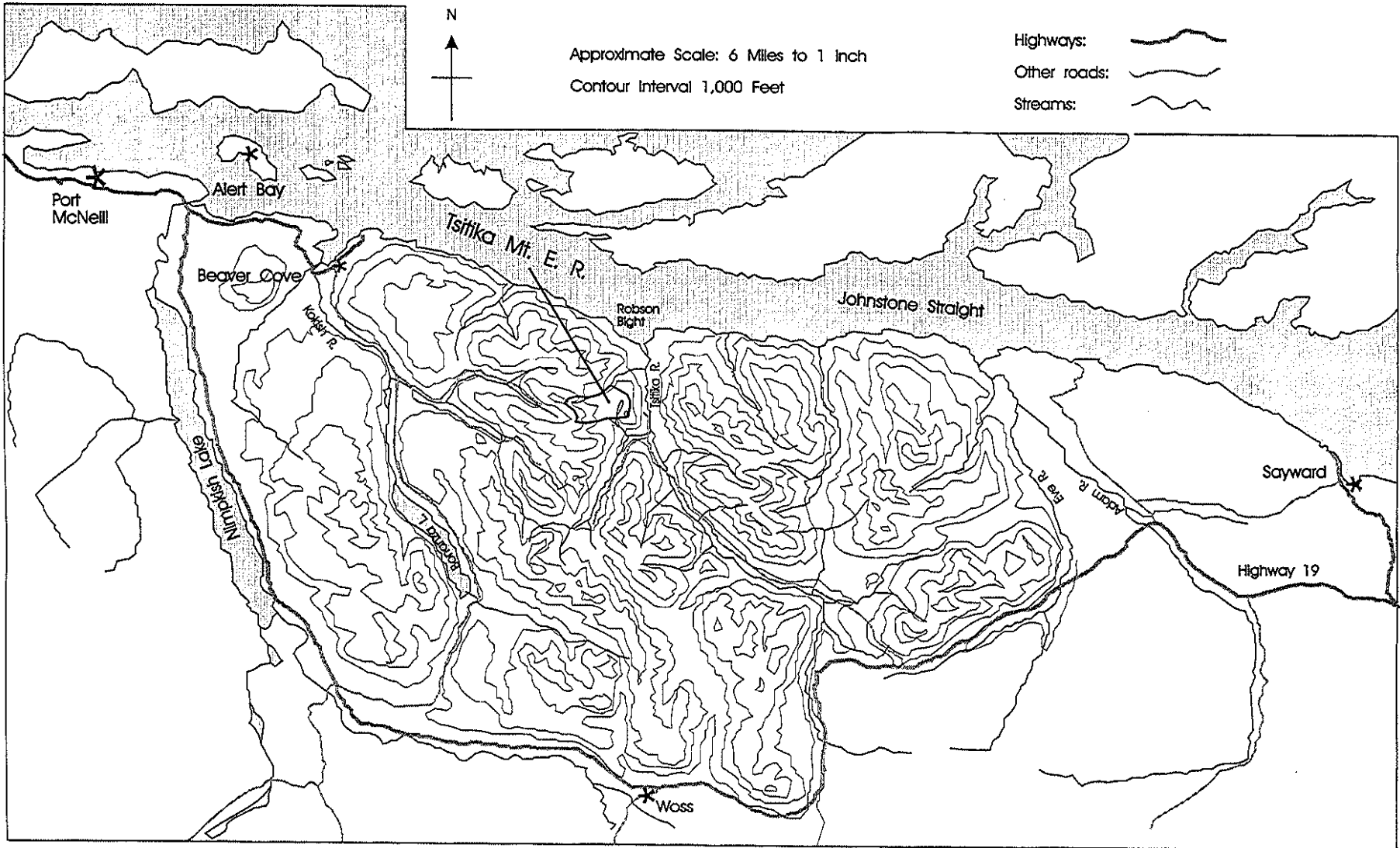
The vegetation on the reserve is typical for the biogeoclimatic subzones involved: The Reserve lies within the Northern Island Mountains Ecoregion of the Western Vancouver Island Ecoregion within the Coast and Mountains Ecoprovince. The low areas around Mudge Lake fall within the Montane Variant of the Very Wet Maritime Coastal Western Hemlock biogeoclimatic subzone (CWHvm2). The top of the east ridge and the lower slopes of the west ridge fall within the Windward Variant of the Moist Maritime Mountain Hemlock subzone (MHmm1). The highest levels on the west ridge fall within the Windward Variant of the Moist Maritime Parkland Mountain Hemlock subzone (MHmmp1).

In the fen area, the dominants are various sedges, such as Sitka, beaked and cottongrass, and mosses, such as various Sphagnum species. Some of the drier areas have extensive cover of crowberry. Many other species of wetland plants occur, such as western Bog-laurel, Labrador Tea, White Bog Orchid and Great Burnet. The forested parts of the reserve have yellowcedar, mountain and western hemlock, amabilis fir and western white pine. Shrubs include several huckleberries, false azalea and salal. Among the herbs are twin flower, Calypso, deer fern, spotted and striped coralroot, foam flower, heart-leaved twayblade and Canada dogwood. In the subalpine area at the top of the west ridge are pink and white mountain-heather, elephant head, penstemon and partridgefoot. See Appendix A for a more complete list.

The known vertebrates for the Reserve are what would be expected in this area and include: black-tailed deer, black bear, cougar and wolf, red squirrel, gray jay, crow, bald eagle, rufous hummingbird, tree frog. Of particular note are three bird species nesting at the lake: mew gulls, red-throated loons and common goldeneye.


The soil drainage on the Reserve varies from rapid on the high slopes, to moderate on the middle slopes and very poor within the fens. The latter seems to be caused by a pan which has formed near the top of the till material (author's observation). From the fens south of the North end of Mudge Lake, the drainage is into the lake. The fens further north drain into Keener Creek.

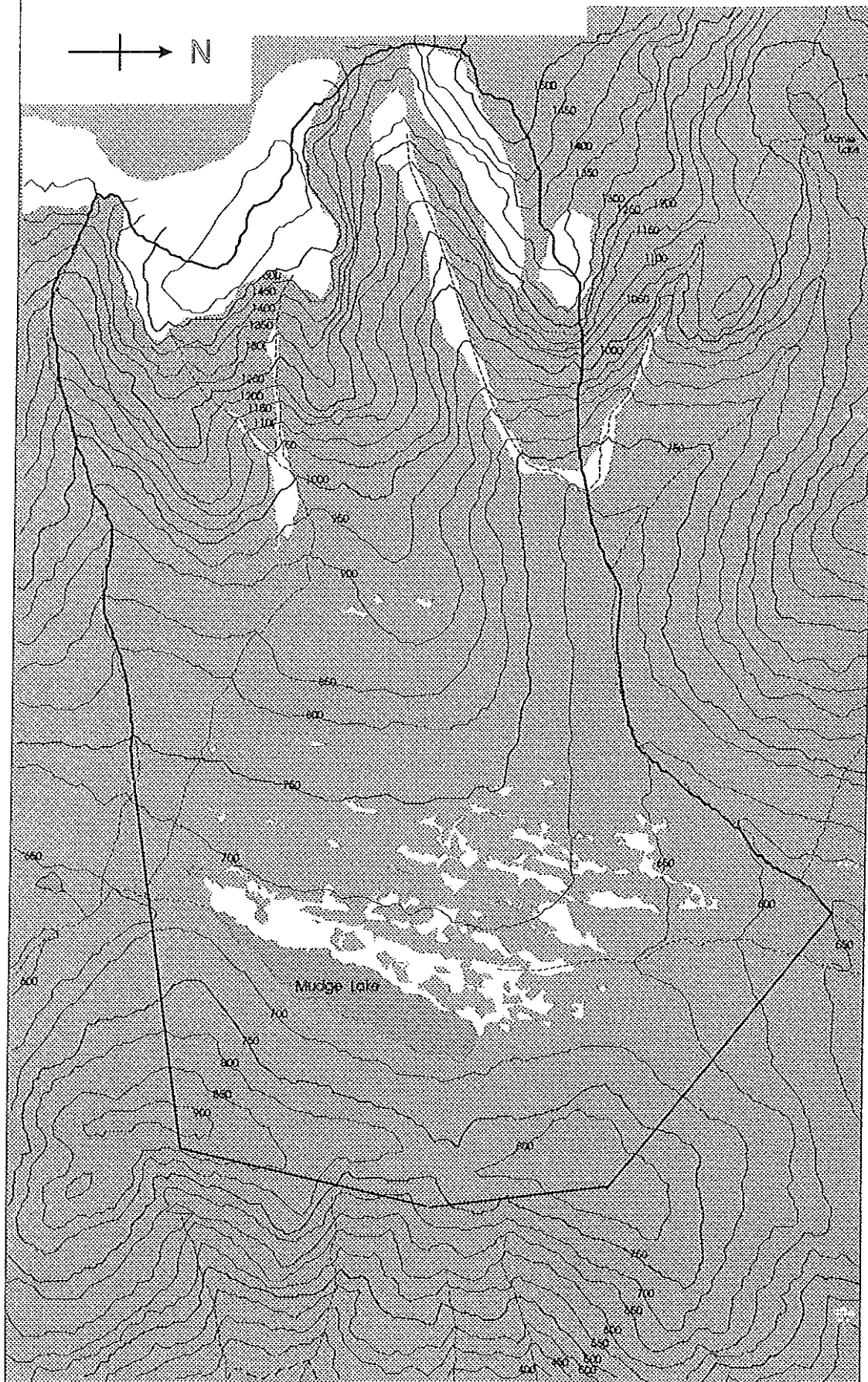
Map #1: Tsifika River and Surroundings



# Map #2 Tsitika Mt. Ecological Reserve

Scale approx.: 1 cm = 200 m

 = Forest



### III. METHODOLOGY

The three phases of the study all use a transect laid out from the lake shore, and traversing a portion of the bog/fen to the west of the north end of the lake. Along the transect, 12 plots were located to show different plant communities, and transitional locations between these communities. At four of the plots perforated pipes were sunk in the ground, to allow for measurement of the water table. Also along the transect, the first and last location of occurrence of 5 species of plants was recorded.

#### Description of transect:

The transect runs approximately 280 degrees true, from a stake at the west end of the straight portion of north end of Mudge Lake. See Airphoto #1

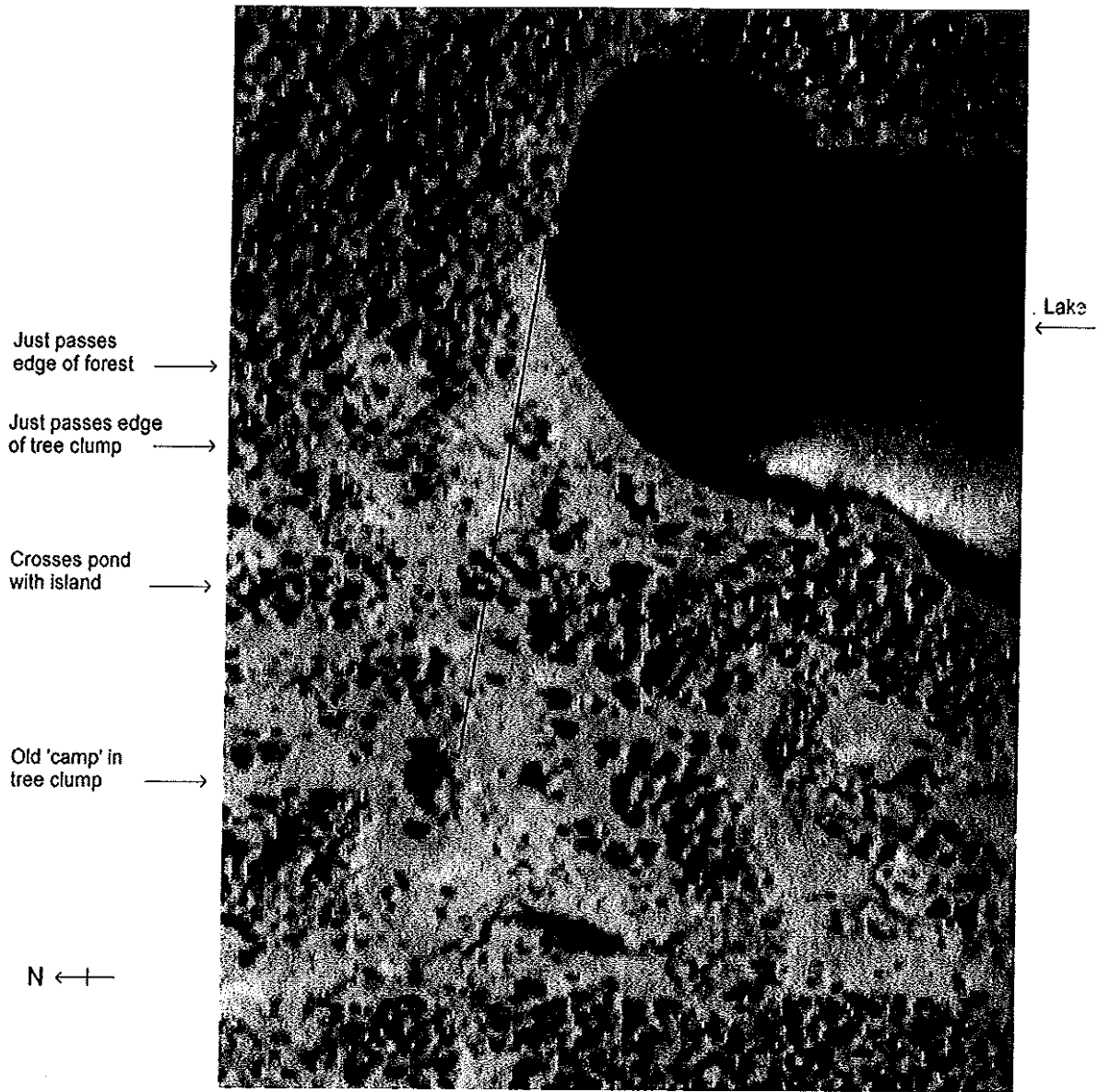
The transect starts where the trees come to the edge of the lake near the NW corner. It passes a couple of small trees between plots B3 and B4, skirts trees (which are to the N.) at B5. The transect then changes from sidehill (up to N.) to uphill at B6; levels at B8, where it skirts a tree clump (which is to the S.). After B9, it dips slightly past minor pool (which is to the S.), then it goes uphill slightly to cross through a more or less circular pool complex, with small clump of very small trees in the centre. Almost immediately the transect steps up and across a narrow (along the line) pool. Again it almost immediately crosses the left side of a more or less oval pool, with small round island in centre (to the N.). It then climbs slightly to B10, where it levels out, and passes among a small group of spaced trees to B11. Then past a small sunken pool (to the S.), through a couple of trees (one fairly large and old), past another small pool (to the S.) and a couple of small trees, (with large old trees a few meters to N) to B12. The end stake is a short distance beyond, just at the edge of the trees at "camp island" (a larger group of trees with old lean-to camp structures in the middle).

#### Plots:

The plots were laid out with a frame 1m. x 2m., length along the transect. Measurements are to the first corner, (then second 2m. further) from Initial Point of transect. The tape was used as it draped on ground and vegetation. For each plot, the slope was estimated in degrees; aspect was taken by compass; soil depth was probed with a rod at the centre of plot, to hardpan or stone. All soils were considered hygric unless water was evident on the surface, in which case it was recorded as hydric.

The plant species data was recorded with an ID which is somewhat uncertain, with collection of a sample for those that seemed necessary - guesses noted with ?. Names used were taken from Pojar & Mackinnon, 1994. The distribution codes are from Luttmerding et. Al., 1990, with the added code 10 meaning continuous in approximately half of plot, absent in the other half (see Distribution Codes, below). We searched carefully, but not exhaustively, for various species in the first several plots. In later plots, we spent less time, and did not record everything. All the plots were considered to be in the open, even though a couple might have transient tree shadows for part of the day.

# Airphoto #1: Tsitika Mt. Ecological Reserve



"B" Transect., I.P. at lake shore

Plot Locations, Descriptions:

- B1: at IP, to north of transect; slope 0-10; aspect S.; soil hygric?; soil depth 0.9m; at forest-fen boundary at lake shore.
- B2: at 5m., to north of transect; slope 0-10; aspect S; soil hygric; soil depth 0.6m; transitional from drier to wetter at surface; perforated pipe at 2nd corner for measuring water table.
- B3: at 13m., to north of transect; slope 0-10; aspect S; soil hydric; soil depth 0.85m; standing water, non-transitional; pipe at 2nd corner for measuring water table.
- B4: at 30m., to north of transect; slope 10-20; aspect S; soil hygric; soil depth 0.9m; somewhat transitional from wetter to drier; very near forest edge.
- B5: at 33m., to north of transect; slope 10-20; aspect S; soil hygric; soil depth 0.5m; at forest edge, drier.
- B6: at 49m., to south of transect; slope 0-10; aspect S; soil hygric; soil depth 0.8m; transitional dry to wet, leaving forest edge and entering sedgy slope.
- B7: at 60m., to north of transect; slope 10-20; aspect E; soil hydric; soil depth 1.05m; non-transitional on sedgy slope, tree clump to south; pipe at 2nd corner for measuring water table.
- B8: at 66.5m., to north of transect; slope 10-20; aspect SE; soil hygric; soil depth 1.05m; transitional to drier tree clump edge.
- B9: at 80m., to north of transect; slope 10; aspect S; soil hydric; soil depth > 1.5m; non-transitional, sedgy (cotton grass), near top of local relief.
- B10: at 133.5m., to south of transect; slope 0-10; aspect E; soil hygric; soil depth > 1.5m; transition sedgy to crowberry.
- B11: at 158m., to north of transect; level (humpy); soil hygric; soil depth 0.8m; non-transitional drier crowberry area, scattered small trees around; pipe at 2nd corner for measuring water table.
- B12: at 185m., to north of transect; level; soil hygric; soil depth 1.2m; crowberry-swamp laurel (*Kalmia*) area, scattered trees; and 'camp' tree clump approx. 7m. further along transect.

End of line at 190.2m.

Pools: along line of transect (distances are the approximate perpendicular projection onto transect)

92 - 97m: narrow pool with sparse buckbean and sedge

106 - 115m: buckbean and yellow pondlily

117 - 122m: buckbean with scattered sedge & one pondlily

125 - 131m: buckbean with scattered sedge

163 - 166m: no emergent vegetation, none at all obvious

173 - 176m: no vegetation; drying out with mud showing

#### Distribution Codes

- 1 Rare individual, a single occurrence
- 2 A few sporadically occurring individuals
- 3 A single patch or clump
- 4 Several sporadically occurring individuals
- 5 A few patches or clumps of a species
- 6 Several well-spaced patches or clumps
- 7 Continuous uniform occurrence of well-spaced individuals
- 8 Continuous occurrence of a species with a few gaps in the distribution
- 9 Continuous dense occurrence of a species
- 10 Continuous occurrence (7, 8 or 9) restricted to approximately half of plot



## IV. DATA

## B1 Data

?	Genus	species	% cover	distrib
?	Aulacomnium	palustre	70	9
?	Carex	sitchensis	8	8
	Chamaecyparis	nootkatensis	8	1
	Cornus	canadensis	1	2
	Empetrum	nigrum	25	7
?	Gaultheria	shallon	3	4
	Kalmia	microphylla	8	7
	Ledum	groenlandicum	27	8
	Sanguisorba	officinalis	10	7
?	Vaccinium	caespitosum	20	4
?	Vaccinium	uliginosum	20	4
?	Vaccinium	vitis-idaea	<1	2

## B2 Data

4				
	Andromeda	polyfolia		1
?	Aulacomnium	palustre	10	5
?	Carex	livida	5	8
?	Carex	pauciflora	<1	2
?	Carex	sitchensis	<1	1
?	Carex?	(unknown, no flower)	5	7
	Chamaecyparis	nootkatensis	absent	
	Coptis	trifolia	<1	2
	Cornus	canadensis	<1	2
	Drosera	rotundifolia	<1	2
	Empetrum	nigrum	35	8
?	Erigeron	peregrinus	1	5
?	Gaultheria	shallon	absent	
	Gentiana	douglasiana	<1	2
	Kalmia	microphylla	7	2 & 5
	Ledum	groenlandicum	15	5
	Oxycoccus	oxycoccus	3	7
	Sanguisorba	officinalis	25	7
?	Sphagnum	sp?(red)	6	3
?	Sphagnum	sp?(yellow)	6	3
?	Trichophorum	cespitosum	10	5
?	Vaccinium	caespitosum	absent	
?	Vaccinium	uliginosum	20	5
?	Vaccinium	vitis-idaea	absent	

## B3 Data

?	Genus	species	% cover	distrib
	Andromeda	polyfolia	<1	2
?	Aulacomnium	palustre	absent	
?	Carex	kelloggii	3	5
?	Carex	livida	2	8
?	Carex	pauciflora	3	5
?	Carex	sitchensis	absent	
?	Carex?	(unknown, no flower)	7	7 (as B2)
	Coptis	asplenifolia	<1	2
	Coptis	trifolia	<1	2
	Cornus	canadensis	<1	4
	Drosera	rotundifolia	10	6
	Empetrum	nigrum	absent	
?	Erigeron	peregrinus	10	8
	Eriophorum	angustifolium	10	8
	Fauria	cristi-galli	1	2
	Gentiana	douglasiana	<1	4
	Kalmia	microphylla	absent	
	Ledum	groenlandicum	<1	2
	Myrica	gale	50	8
	Oxycoccus	oxycoccus	1	8
	Platanthera	dilatata	<1	2
	Sanguisorba	officinalis	5	5
?	Sphagnum	sp?(green)	7	5
?	Sphagnum	sp?(yellow)	8	5 (as B2)
?	Trichophorum	cespitosum	absent	
?	Vaccinium	uliginosum	absent	
	water		2	

## B4 Data

3				
?	Carex	sp? sitchensis?	25	8 (no flower)
	Gentiana	douglasiana	1	
	Kalmia	microphylla	15	4
	Ledum	groenlandicum	25	8
	Myrica	gale	1	1
	Oxycoccus	oxycoccus	15	7
	Platanthera	dilatata	<1	
	Sanguisorba	officinalis	15	6
?	Sphagnum	sp? (red)		35
?	Sphagnum	sp? (yellow)	10	3
?	Trichophorum	cespitosum	15	5
?	Vaccinium	uliginosum	30	7
	Andromeda	polyfolia		1

## B5 Data

?	Genus	species	% cover	distrib
?	Carex	sp? (as B4)	15	7
	Chamaecyparis	nootkatensis	5	2
	Cornus	canadensis	<1	2
	Empetrum	nigrum	15	7
?	Hylocomium?		80	9
	Kalmia	microphylla	15	4
	Ledum	groenlandicum	80	7
	Sanguisorba	officinalis	7	4
?	Vaccinium	caespitosum	8	5
?	Vaccinium	uliginosum	15	7

## B6 Data

?	Carex	pauciflora	3	5
?	Carex	sitchensis	35	7
	Drosera	rotundifolia	2	2
	Empetrum	nigrum	25	10
?	Erigeron	peregrinus	5	10
	Eriophorum	angustifolium	<1	3
	Gentiana	douglasiana	<1	1
	Kalmia	microphylla	12	10
	Ledum	groenlandicum	15	10
	Oxycoccus	oxycoccus	2	8
	Platanthera	dilatata	<1	1
	Sanguisorba	officinalis	30	7
	Sphagnum	all sp.	80	8
?	Trichophorum	caespitosum	<1	3
?	Vaccinium	uliginosum	7	3

## B7 Data

?	Carex	pauciflora	3	5
?	Carex	sitchensis	10	7
	Drosera	rotundifolia	7	8
	Empetrum	nigrum	absent	
?	Erigeron	peregrinus	10	7
	Eriophorum	angustifolium	3	5
	Kalmia	microphylla	absent	
	Ledum	groenlandicum	absent	
	Myrica	gale	5	6
	Oxycoccus	oxycoccus	1	NR
	Platanthera	dilatata	1	4
	Sanguisorba	officinalis	10	7
?	Sedge	all sp.	50	9
?	Sphagnum	all sp.	80	7
?	Trichophorum	caespitosum	15	8

?	Genus	species	% cover	distrib
	Andomeda	polyfolia	<1	4
?	Aulacomnium	palustre	15	8
	Cornus	canadensis	<1	4
	Drosera	rotundifolia	1	3
	Empetrum	nigrum	35	8
	Kalmia	microphylla	3	4
	Ledum	groenlandicum	1	4
	lichen	all sp.	35	6
	Oxycoccus	oxycoccus	absent?	
?	sedge	all sp.	10	7
?	Sphagnum	all sp.	20	3
	Tsuga	mertensiana	2	1
	Vaccinium	caespitosum	<1	2
?	Vaccinium	uliginosum	15	8
?	Vaccinium?	(soft red leaved)	<1	3

#### B12 Data

?	Aulacomnium	palustre	80	9
	Empetrum	nigrum	70	9
	Kalmia	microphylla	40	7
	Ledum	groenlandicum	15	8
	lichen	all sp.	5	5
	Vaccinium	caespitosum	1	4
?	Vaccinium	uliginosum	10	8
?	Vaccinium?	(soft red leaved)	<1	2 (as in B11)

## B8 Data

?	Genus	species	% cover	distrib
?	Carex	kelloggii	7	8
	Coptis	trifolia	3	10
	Cornus	canadensis	5	3
	Drosera	rotundifolia	3	8
	Empetrum	nigrum	7	10
?	Erigeron	peregrinus	3	10
	Eriophorum	angustifolium	1	4
	Fauria	cristi-galli	2	4
?	Gaultheria	shallon	2	4 (1/2 of plot)
	Gentiana	douglasiana	1	3 (at trans.)
	Kalmia	microphylla	1	4
	Ledum	groenlandicum	<1	2
	Myrica	gale	3	10
	Oxycoccus	oxycoccus	1	10
	Sanguisorba	officinalis	10	7
	sedge	all sp.	30	8
	Sphagnum	all sp.	80	9

## B9 Data

	Drosera	rotundifolia	1	4
	Empetrum	nigrum	absent	
?	Erigeron	peregrinus	30	9
	Eriophorum	angustifolium	40	9
	Gentiana	douglasiana	<1	1
	Kalmia	microphylla	absent	
	Ledum	groenlandicum	absent	
	Oxycoccus	oxycoccus	1	4
	Platanthera	dilatata	<1	2
	Sanguisorba	officinalis	5	7
?	sedge	all sp.	70	9
?	Sphagnum	all sp.	10	7
	Tofieldia	glutinosa	1	4
?	Vaccinium	uliginosum	2	4 (on 1/2 plot)

## B10 Data

7				
	Andromeda	polyfolia		2
	Drosera	rotundifolia	1	4
	Empetrum	nigrum	15	10
?	Erigeron	peregrinus	absent	
	Kalmia	microphylla	5	4
	Ledum	groenlandicum	5	5
	Oxycoccus	oxycoccus	1	7
?	sedge	all sp.	20	8
?	Sphagnum	all sp.	100	9 (most brown)
?	Vaccinium	uliginosum	20	8

## B11 Data

## Transect Occurrence

The occurrence of *Ledum groenlandicum*, *Empetrum nigrum*, *Gaultheria shallon*, *Erigeron peregrinus*, *Fauria cristigalli*, and *Myrica gale*, if "touching" the tape, was recorded in meters from IP. Gaps of less than approx. 1m were ignored. S = starts occurring, F = finishes.

Myrica	Erigeron	Fauria	Gaultheria	Empetrum	Ledum
S 9.5	S 5.5	S 69.1	S 67.2	S 0.0	S 0.0
F 18.6	F 13.2	F 69.1	F 72.4	F 7.0	F 5.5
S 19.9	S 14.9			S 17.9	S 17.3
F 23.5	F 15.0			F 28.1	F 28.0
S 28.0	S 50.8			S 31.2	S 29.5
F 30.9	F 65.2			F 50.5	F 51.0
S 55.1	S 72.6			S 67.2	S 67.0
F 57.0	F 89.7			F 72.8	F 72.6
S 59.8	S 93.7			S 104.5	S 104.3
F 67.2	F 101.2			F 104.5	F 104.3
				S 108.0	S 111.5
				F 111.6	F 111.5
				S 114.6	S 114.5
				F 115.9	F 115.0
				S 121.7	S 121.7
				F 122.6	F 124.7
				S 134.2	S 131.5
				F 189.8	F 134.4
				(End of transect)	S 140.7
					F 150.4
					S 153.0
					F 154.8
					S 156.6
					F 156.6
					S 160.2
					F 189.8
					(End of transect)

Water Table Data

Depths for each pipe record water surface, and ground surface from top of pipe, in cm.

Date	B 2	B 3	B 4	B 5
29 July 1997	16cm / 10cm	14 / 12	9.5 / 9.5	34 / 11
23 Sept 1997	17.6 / 10	17.2 / 12	9.0 / 9.0	31.7 / 11

## V. ACKNOWLEDGMENTS

We wish to thank several people for their assistance in designing and carrying out the study: Dr. Richard Hebda of the Royal British Columbia Museum discussed with us strategies for recording change in the bog/fen community, and identified the plant specimens we collected. Hans Roemer and Rik Simmons of BC Parks both gave us valuable advice. Our friend John Henry Whitehead swatted bugs and slogged across the bog with us collecting data. Kevin Smith of BC Parks and Roy Brooks helped carry the load up the mountain. The Eve River Division Engineers of Macmillan Bloedel Ltd. have been very helpful with maps, photos and information about the Reserve.

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## APPENDIX: Plants observed on the Reserve

Trees

Amabilis fir	<i>Abies amabilis</i>
Alpine fir	<i>Abies lasiocarpa</i> (?)
Yellow cedar	<i>Chamaecyparis nootkatensis</i>
Western white pine	<i>Pinus monticola</i>
Western redcedar	<i>Thuja plicata</i>
Western hemlock	<i>Tsuga heterophylla</i>
Mountain hemlock	<i>Tsuga mertensiana</i>

Shrubs

Bog-rosemary	<i>Andromeda polifolia</i>
White mountain-heather	<i>Cassiope mertensiana</i> (var. Mert.?)
Canada dogwood	<i>Cornus canadensis</i>
Crowberry	<i>Empetrum nigrum</i>
Salal	<i>Gaultheria shallon</i>
Swamp-laurel	<i>Kalmia microphylla</i>
Labrador tea	<i>Ledum groenlandicum</i>
Twin-flower	<i>Linnaea borealis</i>
False azalea	<i>Menziesia ferruginea</i>
Sweet gale	<i>Myrica gale</i>
Devil's club	<i>Oplopanax horridum</i>
Bog cranberry	<i>Oxycoccus oxycoccus</i>
Red heather	<i>Phyllodoce empetriformis</i>
Salmonberry	<i>Rubus spectabilis</i>
Oval-leaved blueberry	<i>Vaccinium ovalifolium</i>
Bog blueberry	<i>Vaccinium uliginosum</i>
Dwarf blueberry	<i>Vaccinium caespitosum</i>
Lingonberry	<i>Vaccinium vitis-idaea</i> ?
Red huckleberry	<i>Vaccinium parvifolium</i>
Alaska blueberry	<i>Vaccinium alaskaense</i> (?)

Herbs

Calypso	<i>Calypso bulbosa</i>
Fern-leaved gold thread	<i>Coptis asplenifolia</i>
Three-leaved goldthread	<i>Coptis trifolia</i>
Western coralroot	<i>Corallorhiza maculata</i> ssp. <i>mertens.</i>
Striped coralroot	<i>Corallorhiza striata</i>
Great sundew	<i>Drosera anglica</i>
Round-leaved sundew	<i>Drosera rotundifolia</i>



Purple fleabane	Erigeron (?) Peregrinus
Deer cabbage	Fauria cristi-galli
Swamp gentian	Gentiana douglasiana
Rattlesnake-plantain	Goodyera oblongifolia
Bog rein orchid	Platanthera dilatata
Green Flowered bog orchid	Platanthera hyperborea
Ladies' tresses	Spiranthes romanzoffiana
Northwestern twayblade	Listera caurina (?)
Heart-leaved Twayblade	Listera cordata
Partridge foot	Luetkia pectinata
Skunk cabbage	Lysichitum americanum
Buckbean	Menyanthes trifoliata
Single delight	Moneses uniflora
Yellow pondlily	Nuphar polysepalum
Elephant's head	Pedicularis groenlandica (?)
Beardtongue	Penstemon davidsonii (?)
Butterwort	Pinguicula vulgaris
Cooley's buttercup	Ranunculus cooleyae
Great burnet	Sanguisorba officinalis
Rusty saxifrage	Saxifraga ferruginia v. ferruginea
Heart-leaved saxifrage	Saxifraga punctata v. cascadenis
Twistedstalk	Streptopus roseus
Foam flower	Tiarella trifoliata v. laciniata
False ashphodel	Tofieldia glutinosa
Baneberry	Actaea rubra (?)
False bugbane	Trautvetteria carolinensis (?)
Northern starflower	Trientalis artica
False hellebore	Veratrum viride
Marsh violet	Viola palustris
Marsh-marigold	Caltha sp. (?)
Monkey-flower	Mimulus sp. (?)

### Grasses

Hairgrass	Deschampsia sp. ?
Timber oat-grass	Danthonia intermedia (?)
Alaska bentgrass	Agrostis aequivalis (?)

### Sedges

Craw's sedge	Carex crawei (?)
Pale sedge	Carex livida (?)
Sedge	Carex pluriflora (?)
Inflated sedge	Carex vesicaria (?)
Sitka sedge	Carex sitchensis

Few-flowered sedge  
 Kellogg's sedge  
 Beaked sedge  
 Few-flowered spike-rush  
 Cotton grass  
 Tufted clubrush  
 White beak-rush

Carex pauciflora  
 Carex Kelloggii (?)  
 Carex rostrata (?)  
 Eleocharis pauciflora  
 Eriophorum angustifolium (?)  
 Trichophorum cespitosum  
 Rhynchospora alba (?)

### Ferns

Deer fern  
 Oak fern  
 Licorice fern

Blechnum spicant  
 Gymnocarpium dryopteris  
 Polypodium glycyrrhiza (?)

### Horsetails

Marsh horsetail

Equisetum palustre (?)

### Mosses & clubmosses

Moss  
 Fir clubmoss  
 Moss  
 Brown-stem bog moss  
 Peat moss  
 Peat moss  
 Peat moss

Aulacomnium palustre (?)  
 Lycopodium selago (?)  
 Pleurozium schreberi (?)  
 Sphagnum lindbergii  
 Sphagnum magellanicum (?)  
 Sphagnum palustre  
 Sphagnum subsecundum (?)