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THE FRAZER RIVER ECOLOGICAL RESERVE:
Beaver Ecology and a Biosurvey.

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by

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ABSTRACT:

A biosurvey of an Ecological Reserve of Frazer River Islands was undertaken to investigate a suspected beaver problem and to update previously collected information. The report describes four permanent plots, set up to facilitate future studies on vegetation and erosion. Some trapping of small mammals was undertaken and met with limited success. An expanded plant species list expands earlier information on some conifer species. The beaver situation is discussed in some detail. It is concluded that the population of beaver are not presently threatening the stability of the islands. Erosion caused by the river, particularly during summer flood levels poses the most serious threat to the islands.

INTRODUCTION:

This report discusses an area that became an Ecological Reserve in 1977, "to conserve the last uncommitted river islands in the Frazer River for possible future studies" (Appl. for Ecol. Res., Rep.No. 186). The area, hereafter referred to as "Cottonwood Islands", totals approximately 75 hectares of alluvial flood plain islands in the Frazer River between Chilliwack Mountain and Skumalasph Indian Reserve Number 16 (Rep. No., 186).

Previously unreported information on the Cottonwood Islands beaver population is presented. Original data, collected in 1974 by G. Blom, of Scott Paper Ltd. New Westminster and V.J. Krájina of the UBC Department of Botany, did not specifically refer to any beaver on the islands (Rep. No., 186). In addition to information on the beaver population and updating and expanding the 1974 data on vegetation and wildlife, the present paper discusses the establishment of four permanent plots, on the islands, to facilitate future study.

The data presented in this paper was collected on two separate occasions in late winter; one day trip on February 5, 1983 and a two day trip on March 5-6, 1983. Data, particularly herb species, will be incomplete as a result of seasonal restrictions.

COTTONWOOD ISLANDS BEAVER ECOLOGY:

Presumably, beaver were not present on the islands in 1974 (Rep. No., 186). Since 1974, however, a population has become established and the abundance of sign has led to some concern that a population of beaver will threaten the stab-

ility of the islands. Dan Rempel, the reserves Volunteer Warden, initiated the concern for the islands. However, during two visits to the islands, we concluded that the beaver population is and will likely remain small and their impact on the islands is not significant. A number of factors led to this conclusion.

Lack of Suitable Habitat:

The beaver on Cottonwood Islands build their homes in the banks along the water's edge. The most suitable site for houses in the bank is governed by a number of parameters. The best sites will have a steep bank of fine sand next to a deep pool of calm water. Observations on the islands indicate that calm water is not as important as proximity to the waters edge. One beaver house, found on the southern shore (see Figure 2, House #3), is exposed to very heavy current while another house (#3) is abandoned because low water levels have exposed the entire house. Entrances to house #3 were approximately 10 metres from the water on March 6, 1983. Normally the entrances will be under water for security reasons. During high water this house may be reoccupied. Of the three houses on the islands, the only one where beaver were observed is house # 1 located, we feel, at the most suitable site. This site is on one of the interior channels and, as such, has little current. The pool is deep and the bank, about four feet from the pool, is approximately eight feet high and quite steep. No other area on the islands has this calibre of site. Territoriality will exclude other other beaver from establishing in this area.

The only other active house (although no beaver were sight-

64 65 66 05' 67 68 69 70 71 72 122°00'

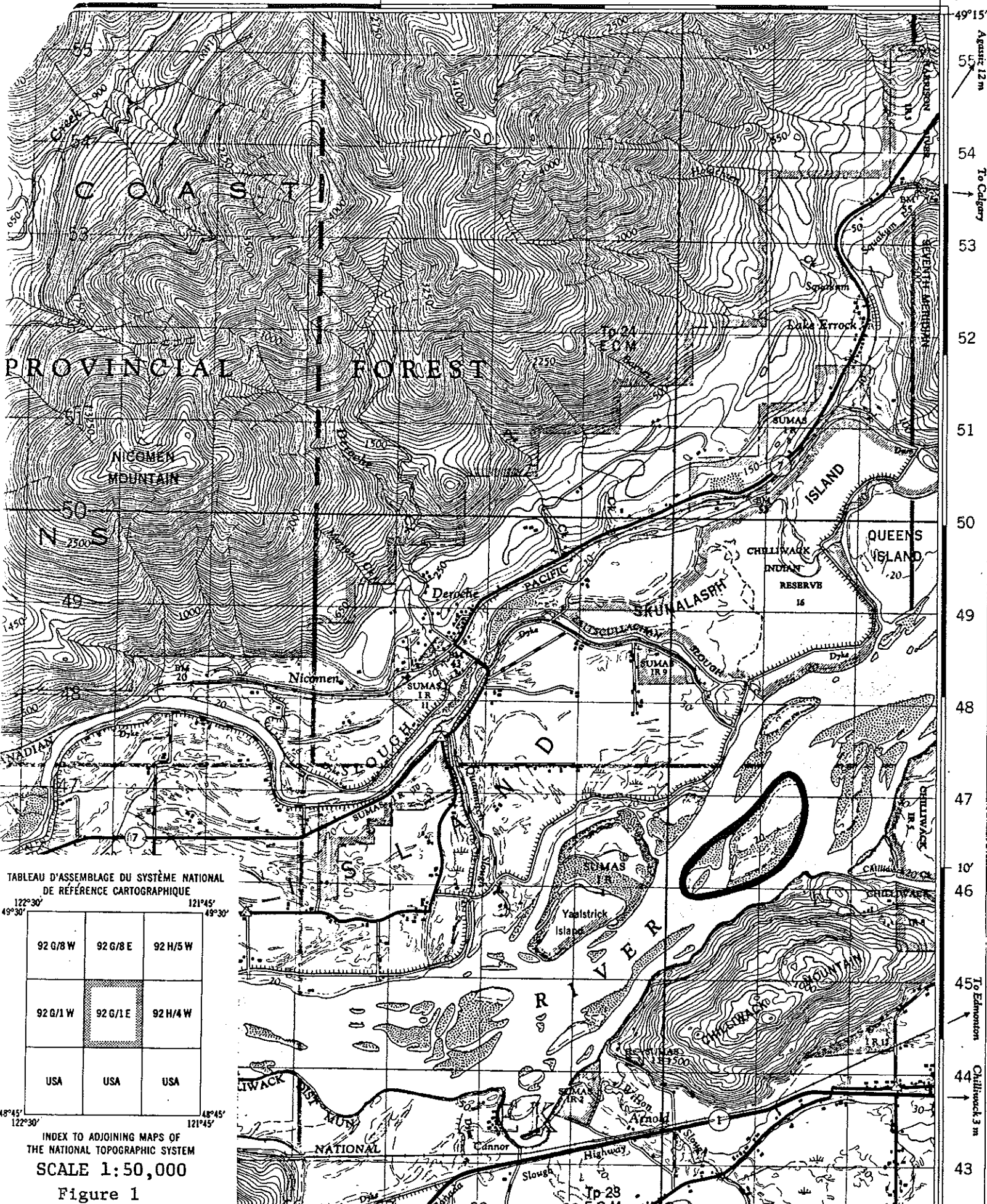
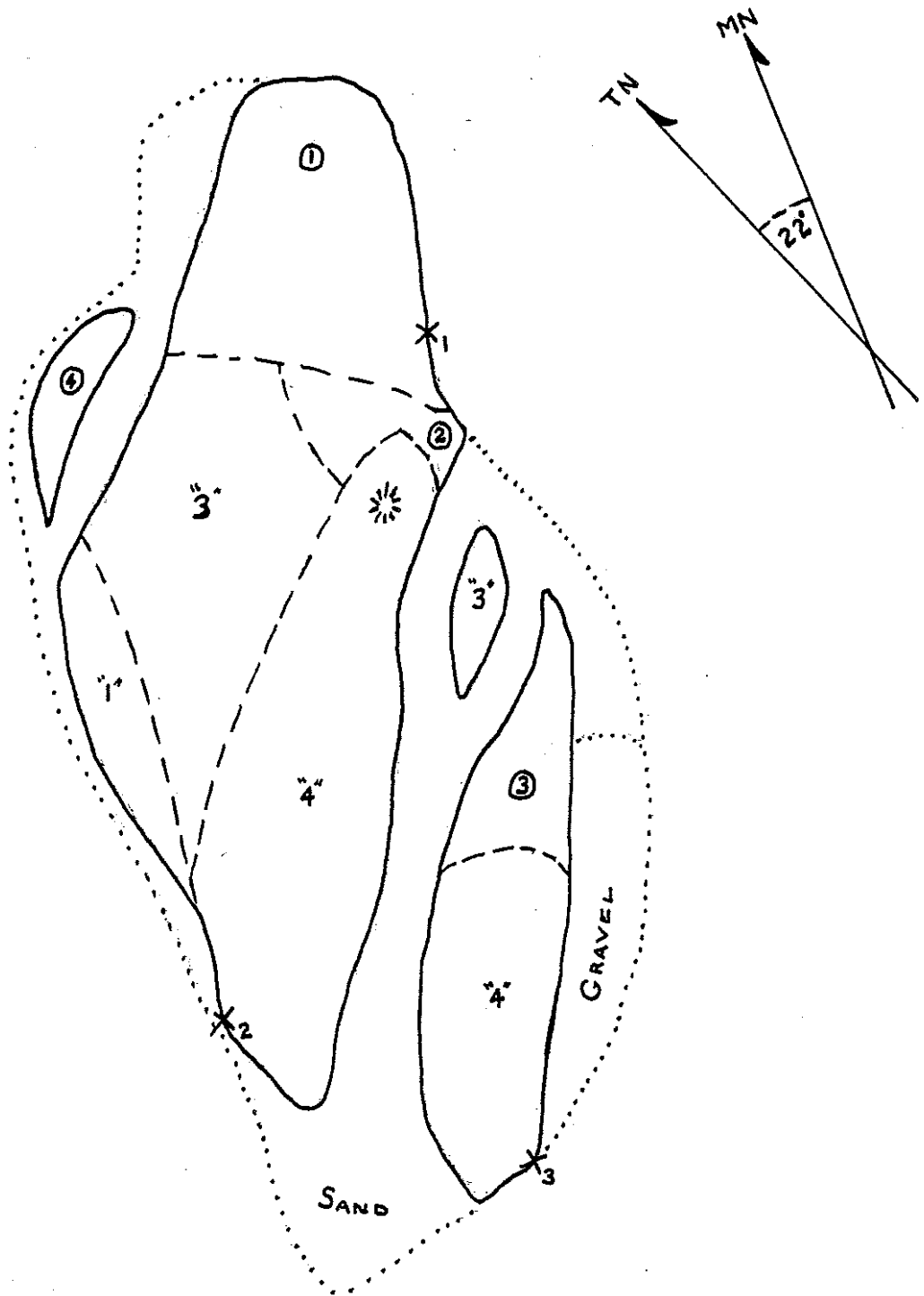


TABLEAU D'ASSEMBLAGE DU SYSTÈME NATIONAL
DE RÉFÉRENCE CARTOGRAPHIQUE

122°30'		121°45'	
49°30'	92 G/8 W	92 G/8 E	92 H/5 W
49°30'	92 G/1 W	92 G/1 E	92 H/4 W
49°30'	USA	USA	USA
48°45'		48°45'	
122°30'		121°45'	

INDEX TO ADJOINING MAPS OF
THE NATIONAL TOPOGRAPHIC SYSTEM
SCALE 1:50,000
Figure 1

49°15'
August 12 m
55
54
53
52
51
50
49
48
47
10'
46
45
To Edmonton
Chilliwack 3 m
44
43



LEGEND:

- Intermittent River Area
- Island Edge
- - - Stand Border
- ⊙ Established Plot

- * Representative Stand of an Established Plot
- X Beaver Lodge
- * Hawk Nest

Figure 2. Cottonwood Island Ecological Reserve

ed) is on the south shore, exposed to the current. The current is a liability here and much of the beaver's time is occupied in fortifying the bank up and down stream from the house. About eight metres of bank is covered in stick work at this site. We feel that this is probably an extreme environment for the beaver and there move here is probably a result of lower water levels exposing house #2 on the west shore.

Other possible sites on Cottonwood Islands are either too far from water, have gradually sloping banks or have very coarse gravel banks exposed to heavy currents.

One beaver house may contain two adults along with yearlings and kits for a total of 4-6 animals (Bradt, 1938). Using these figures Cottonwood Islands will contain 8-12 animals. These figures are probably high. Population constraints may be imposed by fluctuating water levels and fast water. Only two beaver were observed on the islands, however, based on the amount of activity, we would estimate that there are six beaver on the islands at this time.

Fluctuating Water Levels:

As stated above, low water during winter may require beaver to abandon their houses. Even the best site on the islands may be cut off from the river and dry up during particularly low water levels. Conversely, during summer months, high water levels on the Frazer River may flood the houses. After such a flood beaver would have to re-establish. This will act as a control on the islands' beaver population.

Limits of Beaver Activity:

Although there is abundant sign of beaver activity on Cottonwood Islands, this activity is limited to the north-east and southwest ends of the largest island. These areas of activity are dominated by smaller diameter cottonwood (2-15 cm DBH), red-osier dogwood and willow. The beaver favour these areas because the trees are easily removed and are not far from the safety of the river. No felling of large diameter trees, by beaver, was observed anywhere on the islands. We feel that the abundance and accessibility of small diameter trees and the relative inaccessibility of the larger trees, reduces the threat, by the beaver, to the islands' stability. The regenerative capacity of the cut cottonwood stems produces an two to three metre shoot in one year. As a result of this regeneration, the supply of food and building material is constantly replenished.

For the reasons stated above, the lack of suitable habitat, fluctuating water levels and the abundance of small diameter trees, we feel that beaver do not represent a threat to the stability of Cottonwood Islands.

COTTONWOOD ISLANDS BIOSURVEY:

The biosurvey of the islands was undertaken to update the information presented in 1974. Four permanent plots were established on the islands to facilitate future studies. Trapping of small mammals was undertaken to establish their presence on the islands. To complete this survey, a general list of plant and animal species was compiled. Again, time and seasonal restrictions limited the completeness of the survey.

Each of the permanent plots was established in a representative wooded area of the islands. We feel that there are four major areas based on tree diameter and stand structure. The plots were located with plot centres being a measured distance from an adjacent bank edge. By repeating this measure along a given bearing (see Table #1), at some future date, the amount of erosion taking place on the islands can be calculated. Since most of the erosion will take place on the outer part of the islands, two of the plots were placed near where the islands are exposed to the mainstream currents (Figure #2 plots 3 & 4).

The plots used for this survey were circular with a diameter of 11 metres. Each plot, therefore, has an area of approximately one-tenth acre or $1/25^{\text{th}}$ hectare. All stem diameters 2.6cm DBH or larger are recorded by species and tabulated per plot (Tables 2 and 3). Stem diameters smaller than 2.6cm, and herb species are listed by plot (Table 1). Table 1 also describes each plot by location and distance and bearing from the bank. The minor species are listed, more or less, in a descending order of abundance.

TABLE #1: LOCATION AND MINOR SPECIES COMPOSITION BY PLOT

<u>PLOT #</u>	<u>LOCATION</u>	<u>DISTANCE/ BEARING</u>	<u>MINOR SPECIES</u>
1	NE end of large island	60m by S12°W from bank edge	Equisetum arvense Salix spp. Cornus stolonifera Anaphalis margaritacea Various mosses Various grasses
2	NE end of large island S of #1 house	30m by S79W from bank edge	E. arvense C. stolonifera C. occidentalis Populus trichocarpa Salix spp. Orthilia secunda Various mosses Various grasses
3	SE shore opposite Chilliwack Mtn.	100m by N75W from bank edge	E. arvense C. stolonifera Symphoricarpos albus A. margaritacea Crataegus douglasii Some mosses Various grasses
4	NW shore of small isl. opp. I.R.-	13m in from reserve sign by S88E	S. albus E. arvense C. stolonifera C. occidentalis Rubus spectabilis Alnus rubra Rhamnus purshiana Mosses only on decay wood

TABLE #2. STAND TABLE FOR COTTONWOOD

Dia. Class (cm)	Stems / 0.04 ha. plot				Total/ class
	Plot 1	Plot 2	Plot 3	Plot 4	
2.6-5.0		109		1	110
5.1-7.5	2	18			20
7.6-10.0		3	2		5
10.1-12.5	2		4		6
12.6-15.0	2		5	3	10
15.1-17.5			4	8	12
17.6-20.0	1		2	2	5
20.1-22.5	1		4	4	9
22.6-25.0			6	5	11
25.1-27.5	1		1	5	7
27.6-30.0			5	4	9
30.0-32.5			1	4	5
32.6-35.0					
35.1-37.5					
37.6-40.0				2	2
40.1-42.5				1	1
42.6-45.0					
45.1-47.5					
47.6-50.0				2	2
50.1-52.5				1	1
Total/ Plot	9	130	34	42	

TABLE #3. STAND TABLE FOR RED ALDER & (R.O. DOGWOOD)

Dia. Class (cm)	Stems / 0.04 ha. Plot				Total/ class
	Plot 1	Plot2	Plot3	Plot4	
2.6-5.0	7 (16)	1		8	16 (16)
5.1-7.5	5			5	10
7.6-10.0				2	2
10.1-12.5				2	2
Total/ Plot	12 (16)	1		17	

TABLE #4: ANIMAL SPECIES LIST

note: this listing is based on sightings as well as
observation of animal signs

Red-tailed Hawk- nesting on island- observed bird in nest
see figure 2 for location

Beaver - 2 sighted - 2 "active" houses; one "inactive" house

Deer mice- 2 trapped

Downy Woodpecker

Bald Eagle- probably not resident

Deer- numerous signs

Coyote- numerous tracks and some scats - presumed to be coyote

Grouse- one sighting

Garter snake- one sighting (dead)

Live trapping for small mammals was carried out with a total of 67 live traps being set in and along the edge of dense bush. Two Deer mice (Peromyscus maniculatus Wagner) were caught, both in traps set in dense bush. One trap, set along the edge of the bush in tall grass and horsetail, showed signs of a visit but apparently the trigger did not work. A rainy night, inexperience in trapping and seasonal inactivity of the animals all contributed to the lack of success in the trapping survey.

Discussion of the Survey:

This survey represents an addition to the information collected in 1974. Whereas the earlier survey encompassed climate and soil as well as vegetation and wildlife, this survey concentrated on vegetation and wildlife (with an emphasis on beaver).

This paper reports the observation of vegetation previously unreported on the islands. Douglas-fir, Western Redcedar and Western Hemlock were not mentioned in the 1974 survey. Further to this, no *Picea sitchensis* was observed in three days of fairly extensive coverage of the islands. We can conclude with certainty that there is no Sitka Spruce on the islands at the present time.

This paper also mentions the Red-tailed Hawk as a resident and nesting inhabitant of the islands. The presence of this bird suggests that the small mammal population is larger than the trapping results indicate.

TABLE #5. PARTIAL SPECIES LIST: ISLAND VEGETATION

Douglas-fir	<i>Pseudotsuga menziesii</i>
Western Hemlock	<i>Tsuga heterophylla</i>
Western Redcedar	<i>Thuja plicata</i>
Cottonwood	<i>Populus trichocarpa</i>
Red Alder	<i>Alnus rubra</i>
Willow	<i>Salix</i> spp.
Vine maple	<i>Acer circinatum</i>
White Birch	<i>Betula papyrifera</i>
Red-osier Dogwood	<i>Cornus stolonifera</i>
Western Dogwood	<i>C. occidentalis</i>
Waxberry	<i>Symphoricarpos albus</i>
Salmonberry	<i>Rubus spectabilis</i>
Elderberry	<i>Sambucus racemosa</i>
Trailing Blackberry	<i>Rubus ursinus</i>
Cascara	<i>Rhamnus purshiana</i>
Pearly Everlasting	<i>Anaphalis margaritacea</i>
One-sided Wintergreen	<i>Orthilia secunda</i>
Western Sword Fern	<i>Polystichum munitum</i>
Licorice Fern	<i>Polypodium glycyrrhiza</i>
Horsetail	<i>Equisetum arvense</i>
Various mosses	<i>Isoetecium stoloniferum</i>
	<i>Leucolepsis menziesii</i>
	<i>Plagiomnium insigne</i>
	<i>Stokesiella oregana</i>
	<i>Rhytidiadelphus loreus</i>
	<i>Dicranum</i> spp.

CONCLUSION:

We concluded in the section on beaver ecology that the population of beaver do not presently represent a threat to the stability of the islands. In fact their presence on the south shore may help to prevent the erosion of the bank. The effect, however, will be minor as the river poses the only real threat to the islands' stability. High water periods will take large areas of the south shore and shifting river bars on the north and northwest shores will constantly redesign the islands. Shifting bars will also destabilize the beaver population as channels are rerouted.

Cottonwood is by far the most important food for the beaver but red-osier dogwood is used extensively as building material. At present there is enough of both for the existing population and no shortages are anticipated. However, the population may increase if the river makes more habitat available.

Both the beaver population and the effects of erosion should be monitored periodically by the volunteer warden or others. Since no trapping can be carried out on the reserve a count of active beaver houses can be used to imply a growth or decline of the population.

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