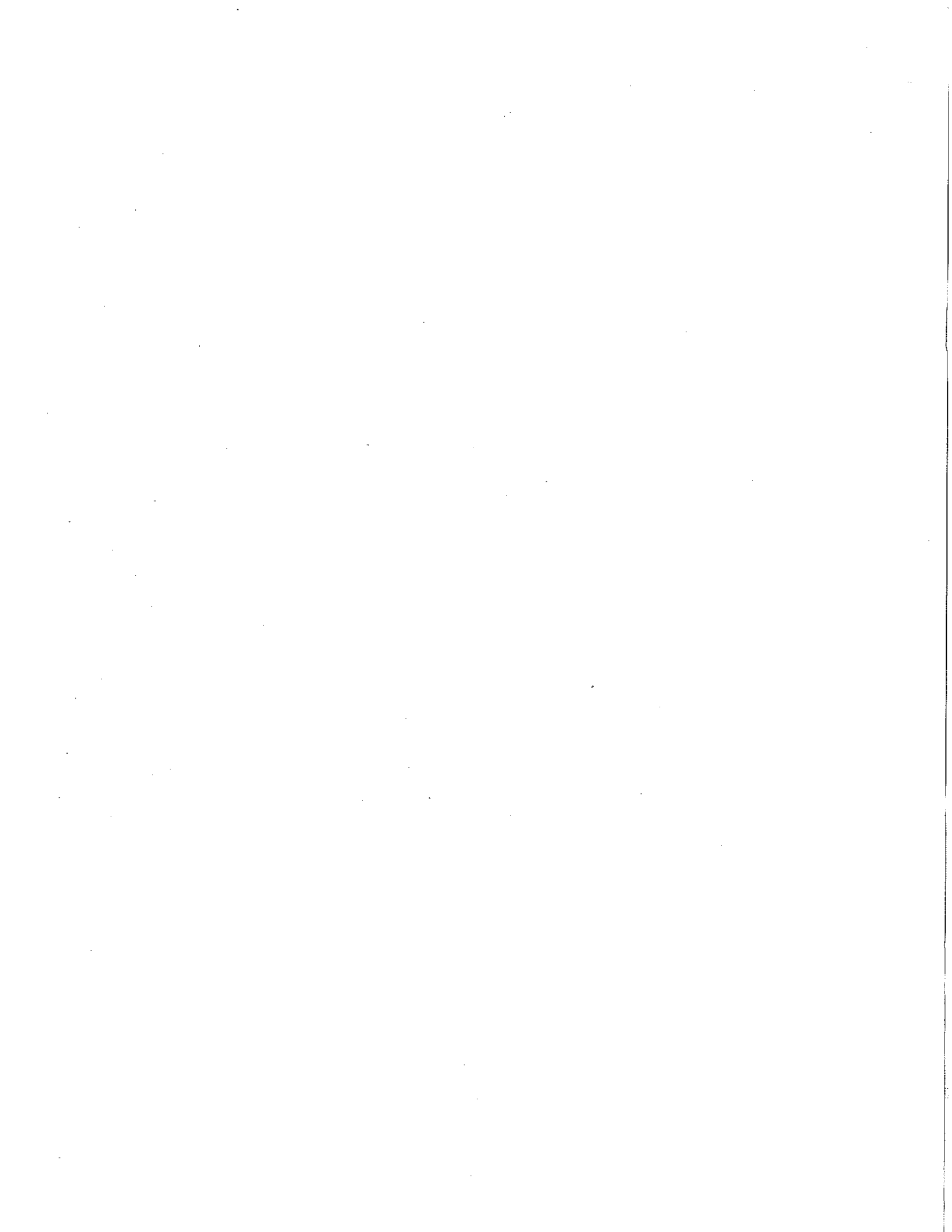


PAC 6498 Filed under Canoe
Islets ER

BC PARKS

A MANAGEMENT PLAN FOR ✓CANOE AND ROSE ISLETS (Ecological Reserves No.'s 17 & 18)



T A B L E O F C O N T E N T S

CANOE AND ROSE ISLETS

		Page
1.0	PLAN HIGHLIGHTS	1
2.0	WHY THESE RESERVES WERE ESTABLISHED	2
3.0	LOCATION OF RESERVES	3
4.0	PHYSICAL DESCRIPTION	5
	a) Rose Islets	5
	b) Canoe Islets	6
5.0	CLIMATE AND BIOGEOCLIMATIC ZONE	6
6.0	TIDES AND CURRENTS	7
7.0	BIOLOGICAL CHARACTERISTICS	7
	a) Rose Islets	8
	b) Canoe Islets	8
8.0	THE CORMORANTS	8
	a) Characteristics of BC Cormorants	9
9.0	THE DOUBLE-CRESTED CORMORANT (Table I)	10
10.0	NESTING CORMORANTS (Table II)	13
11.0	ISSUES	13
	a) Background	13
	b) Historic Levels (Rose Islets)	14
	i) Interpretation of Data	16
12.0	MANAGEMENT STRATEGY	17
13.0	REFERENCES	20
	APPENDIX A Cormorant Calendar - Conversation with R.W. Campbell	
	APPENDIX B Persons Consulted	
	APPENDIX C Conversation with R. Butler, C.W.S., Wildlife Biologist	
	APPENDIX D Foods of the Double-crested Cormorant	
	APPENDIX E Design of suggest marine bird colony sign	
	APPENDIX F List of outstanding permits	
	APPENDIX G List of lapsed permits	
	APPENDIX H More than Cormorants...other wildlife	
	APPENDIX I Suggested logo on Coastal Marine Parks of BC brochure	

1.0 PURPOSE OF PLAN

1. To review existing data with respect to the establishment of Rose and Canoe Islets as ecological reserves;
2. To determine why the Double-crested Cormorant has abandoned its traditional nesting sites on these reserves;
3. To recommend a management strategy for these reserves.

*Photo of group of
cormorants on
Rose Islet*

2.0 WHY THESE RESERVES WERE ESTABLISHED

1. Both reserves were established in 1971 to protect nesting sea bird habitats, chiefly the Double-crested Cormorant (*Phalacrocorax auritus*). Original surveys (Campbell, R., 1975) indicated that 180 pairs of Double-crested Cormorants nested on the Rose Islets and that 30 pairs nested on Canoe Islets. It is interesting to note that prior to the 1960s, the Canoe Islets were not utilized as cormorant nesting sites (Ecological Reserve Data Sheet 2-17A). By the early 1970's, it was also observed that 50% of the Canoe Islets were being utilized by the Glaucous-winged Gull (*Larus glaucescens*) for nesting.

a) Regional Context

All of British Columbia's known Double-crested Cormorant nesting colonies are in the South Coast Region.

b) Provincial Context

Ecological reserves are established to preserve significant examples of British Columbia's biological diversity; seabird colonies are an important component of this objective, since they are sensitive to pollution and human disturbance.

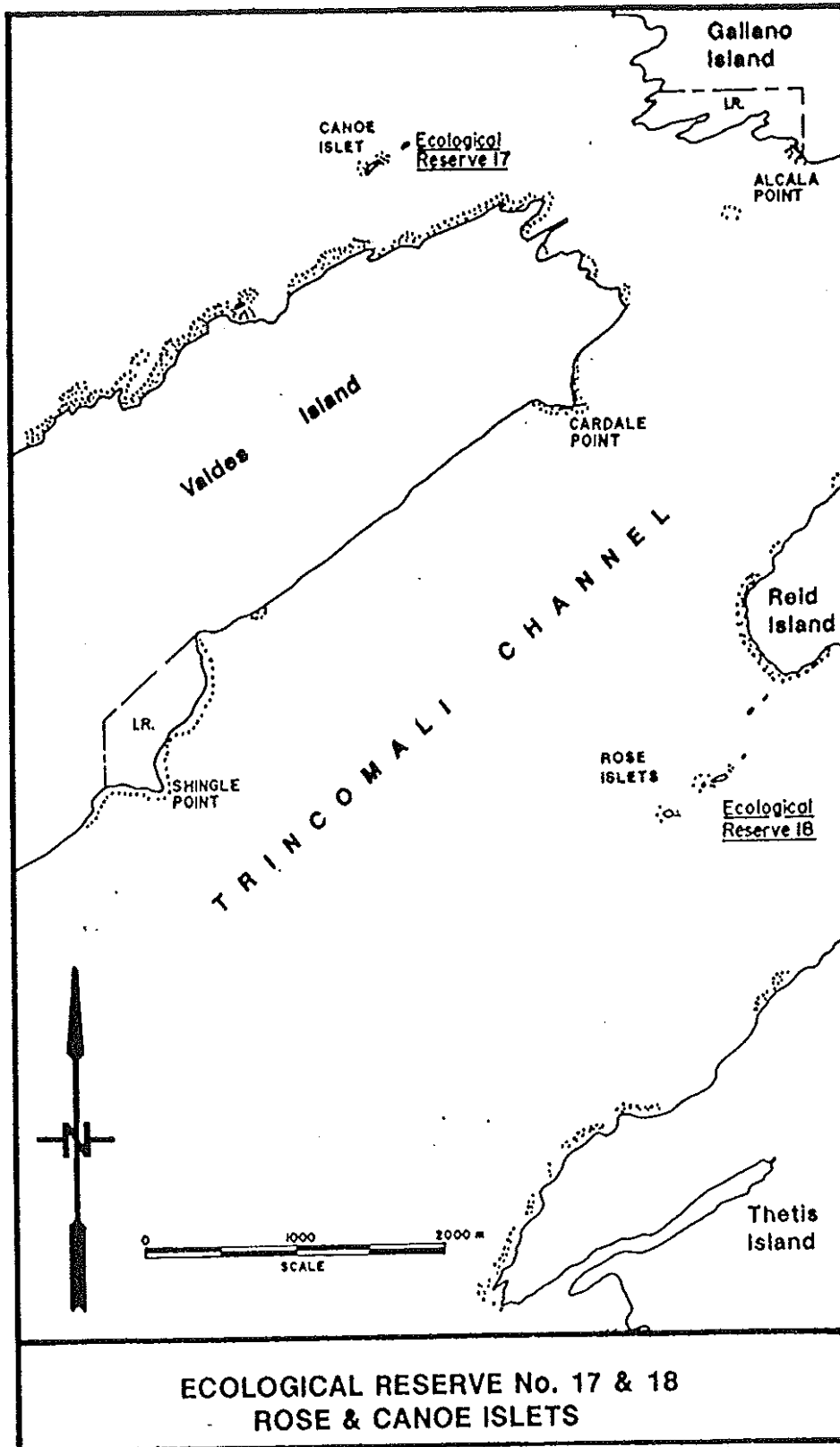
3.0 LOCATION OF RESERVES

Rose Islets (Ecological Reserve No. 19) off north tip of Reid Island, Trincomali Channel, 17 km NE of Chemainus.

Both reserves are located on Figure 1.

FIGURE I

LOCATION OF ROSE AND CANOE ISLETS
ECOLOGICAL RESERVES



ECOLOGICAL RESERVE No. 17 & 18
ROSE & CANOE ISLETS

Rose Islets Ecological Reserve includes a chain of five low rocky islets. The three largest islets have small areas of shallow solid sufficient to support vascular plants. Area: 0.8 ha (2 acres).

Canoe Islets (Ecological Reserve No. 17) is located off the northwest entrance to Porlier Pass, in the Strait of Georgia, Nanaimo District, lying easterly of and 25 chains offshore from Lot 3, Valdes Island, Nanaimo District, containing 1.5 acres more or less.

*Photo to show
Canoe Islets*

4.0 PHYSICAL DESCRIPTIONS

A. ROSE ISLETS

*photo to show
Rose Islets
(topography.)*

Rose Islets includes a chain of five low rocky islets oriented in a northwest-southeast direction. These are made up of glaciated and wave-worm sedimentary bedrock of the Nanaimo Group, and located between Thetis and Valdes Islands in northern Trincomali Channel. Elevation: 0 - 4 m.

B. CANOE ISLETS

*photo to
show topography
of islet*

Two small rounded bedrock islets, composed of glacially smoother sedimentary rocks of the Nanaimo Group. Subtidally, strongly sloping bedrock and substrates of irregular relief are interrupted by narrow sand-shell terraces. Elevation: 0-3 m.

5.0 CLIMATE AND BIOGEOCLIMATIC ZONE

(sb C Koppen-Trewartha)

Both reserves are described as having a climate featuring summer drought associated with the cool summer mediterranean climate.

Biogeoclimatic Zone (Krajina) is CDF ax? - drier subzone of the Coastal Douglas-fir zone.

6.0 TIDES AND CURRENTS

The channel between Canoe Islets and Valdes Island is about 20 metres deep. Currents are described as usually strong from the influence of Porlier Pass.

The waters of Trincomali Channel surrounding the Rose Islets are about 20 - 30 metres in depth. Currents are minor and wave action tempered by the sheltered location among the Gulf Islands.

7.0 BIOLOGICAL CHARACTERISTICS

*photo to show
vegetated islet*

The Rose and Canoe reserves are somewhat different in their biological character. Forty species of plants, including vascular species, mosses and lichens are present on the Rose Islets. The three largest islets of this reserve have areas of thin soil, sufficient to support vascular plants, consisting of grasses, herbs, a few shrubs; but no trees. The Canoe Islets have no soil to support vascular plants, but lichens are abundant.

A. ROSE ISLETS

Approximately 40 species of plants, including vascular species, bryophytes, and lichens, are present on the three largest islets. These are species typical of shallow soil and rocky crevice habitats subjected to summer drought associated with the cool-summer Mediterranean climate. Herbs, grasses, and a few shrubs are present, but no trees. Vegetation patterns appear to be greatly influenced by soil depth, exposure, and possibly by nesting cormorants.

About 180 pairs of Double-crested Cormorants nested here in 1968, but the number declined to 80 by 1975, 33 in 1981, and 12 in 1983. An estimated 20 pairs of Glaucous-winged Gulls nest on the islets. A few Pigeon Guillemots and Black Oystercatchers nest here. Several other species of seabirds utilize surrounding waters, especially winter and spring.

B. CANOE ISLETS

Glaucous-winged Gulls nest on the islets and the area is utilized by other seabirds. At least 30 pairs of Double-crested Cormorants nested here when the reserve was established, but they soon abandoned the site. Plants here include vascular species, bryophytes and lichens, but no vascular species are present on the three largest islets.

8.0 THE CORMORANTS

Three species of Cormorants are found in the waters of British Columbia, all of which breed in this province. The species of special concern on the Rose and Canoe Islets is the Double-crested Cormorant. All three species utilize the waters around the reserves, and the Pelagic Cormorant regularly roosts in both reserves.

CHARACTERISTICS OF BC CORMORANTS

TABLE I

SPECIES	SIZE	DISTRIBUTION	STATUS	COMMENTS
Pelagic Cormorant (<i>phalacrocorax Pelagicus</i>)	65 cm	Coastal	Abundant: • populations steady	Smallest of our cormorants. Nests on coastal cliffs.
Brandt's Cormorant (<i>P. pencicillatus</i>)	90 cm	Coastal	Common: Gulf Islands; • populations steady	Seen in large winter flocks, nest on rocky islets, few sites in B.C.
Double-crested Cormorant (<i>P. auritus</i>)	88 cm	Coastal and Fresh Water	Common, St. of Georgia: • numbers appear to be declining over N.A. range steady increasing in B.C.	Nests on rocky islets on bare rock or in trees.
<p>Cormorants are largely fish-eating birds, consuming species such as herring, hake, and rock fish.</p> <p style="text-align: center;">See Appendix</p>				

9.0 THE DOUBLE-CRESTED CORMORANT

This cormorant measures up to 36 inches (91.4 cm) in total length. In full plumage it is readily distinguished from the other two species by a bright-yellow throat patch; the double crest is seldom apparent. The others have blue and red throat patches respectively. The adult plumage is mainly shine, greenish-black; sexes are coloured alike and breeding adults, for a brief period, sometimes have two small tufts of white feathers on either side of the head. Young of the year are dark brown with light-coloured breasts and dark bellies. This, like other cormorants, has an up-right position when at roost; it flies with the head above the horizontal; and has a rapid distinctive wing beat.

This species has a wide range in North America. It occurs from southwestern Alaska, coastal British Columbia, central Alberta and Manitoba, James Bay, the Gulf of St. Lawrence, and Newfoundland, south to the Revilla Gigedo Islands, Baja California, Guerrero, Cuba, Florida, and the Bahama Islands; in winter to British Honduras.

Over this range it occurs as three subspecies or geographic races that are very similar in appearance. The race occurring in British Columbia has been known to nest on Mandarte Island, the Ballingall Islets, Christie Islets, the Channel Islets, Admiral Island, and the Red Islets (Drent and Guiguet, 1961). Elsewhere it breeds southward along the Pacific Coast of the United States and Baja California and in the interior of Oregon, California, Nevada, and Arizona.

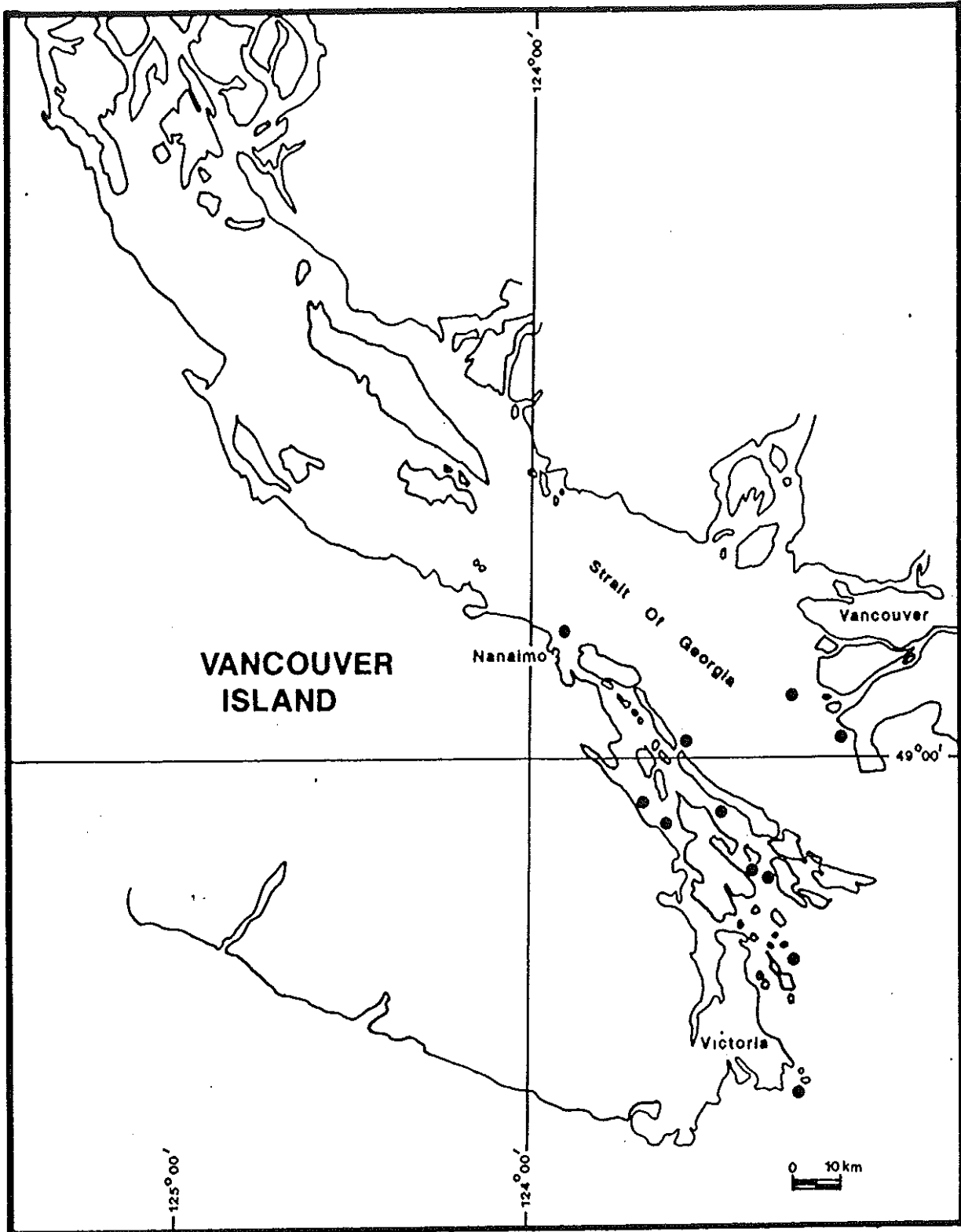
In British Columbia the nests of this species are located in trees or on the ground. They are large, some almost two feet (60.9 cm) in diameter. They are constructed of sticks, roots, and branches and lined with grasses, seaweeds, and such shore-side materials. clutch size varies from three to five chalky blue eggs, most of which are laid from mid-April to late May. Incubation is shared by both parents and is of 28 day duration. Sometimes two broods are raised a season in the southern part of the range; the second egg laying taking place in early August.

Young born blind and naked, grow quickly, and the early hatches are gone from the breeding islands in late September, having been fed by regurgitation until six or seven weeks old. At that age they are capable of fishing on their own.

Cormorants along the British Columbia coast feed entirely upon fish. Herring, sandlance, sculpins, and blennies are the most commonly eaten. There are captured in underwater pursuit and by probing under rocks on the ocean floor.

The Double-crested Cormorant occurring in British Columbia is largely resident, remaining in most of the breeding range the year round. See Figure II.

Figure II



● - Known Nesting Sites Of The Double-crested
Cormorant In The Strait Of Georgia (After Vermeer, 1987) Page 12

10.0 NESTING CORMORANTS

Soon after the establishment of reserves, it was observed that the cormorants abandoned them as nesting sites. It was speculated (Campbell, et al.) that human disturbance from boaters was the cardinal factor involved. It was also noted (Foster, 1983) that the birds from both Rose and Canoe Islets reserves had relocated to the Chain Islets Ecological Reserve.

The number of nests in Double-crested Cormorant colonies in the Strait of Georgia: 1959-1987 (from Vermeer, et al.)

Table II

COLONY LOCATION	1959-60	1974-75	1983	1987
Canoe Islets	-	12	-	-
Rose Islets	-	80	12	2
Ballingall Islets	28	14	20	25
Chain Islets	-	-	135	510

It is interesting to compare the decrease on the Canoe and Rose Islets reserves with the Ballingall Islets which have remained fairly steady and the Chain Islets Ecological Reserve has shown an increase of slightly greater than four times. The overall trend is for a dramatic increase as Table II shows.

11.0 ISSUES

A. BACKGROUND

Both reserves were established in 1971 to protect nesting sea bird habitat, chiefly the Double-crested Cormorant (*Phalacrocorax auritus*). Original surveys (Campbell, R., 1975) indicated that 180 pairs of Double-crested Cormorants nested on the Rose Islets and that 30 pairs nested on Canoe Islets. It is interesting to note that prior to the 1960's, the Canoe Islets were not utilized as cormorant nesting sites (Ecological

Reserve Data Sheet 2-17A). By the early 1970's, it was also observed that 50% of the Canoe Islets were being utilized by the Glaucous-winged Gull (*Larus glaucescens*) for nesting.

Both Ecological Reserve's are closed to the public by Orders-In-Council:

- Canoe Islets: Order-In-Council No. 1579
- Rose Islets: Order-In-Council No. 1580

Under Order-In-Council 1920, a permit is required to land on either of the reserves. Permits issued to date have only been for qualified persons to do inventory work on birds or plants. Studies done on the islands have not been a factor in nest site abandonment.

Both of the reserves are in areas of high boat traffic, particularly during the critical breeding season (May through August).

Campbell (pers. com.) states that of the three species of cormorants in British Columbia, the Double-crested is the most sensitive to disturbance. He is of the opinion that boaters visiting the islands are largely to blame.

B. HISTORIC LEVELS - ROSE ISLETS

YEAR	NESTS	EGGS	YOUNG	OBSERVERS(S)
July 17, 1968	182	181	281	Campbell
July 20, 1969	146	45	212	Campbell
July 04, 1972	?	?	?	?
July 13, 1974	80	117	124	Campbell
July 17, 1976	108	165	3	Campbell
July 17, 1977	117	131	0	Campbell
July 21, 1978	100	2	0	Campbell
August 4, 1979	87	29	3	Shepard and Gee
June 10, 1981	33	0	0	Campbell
July 15, 1981 *	33	43	?	Campbell

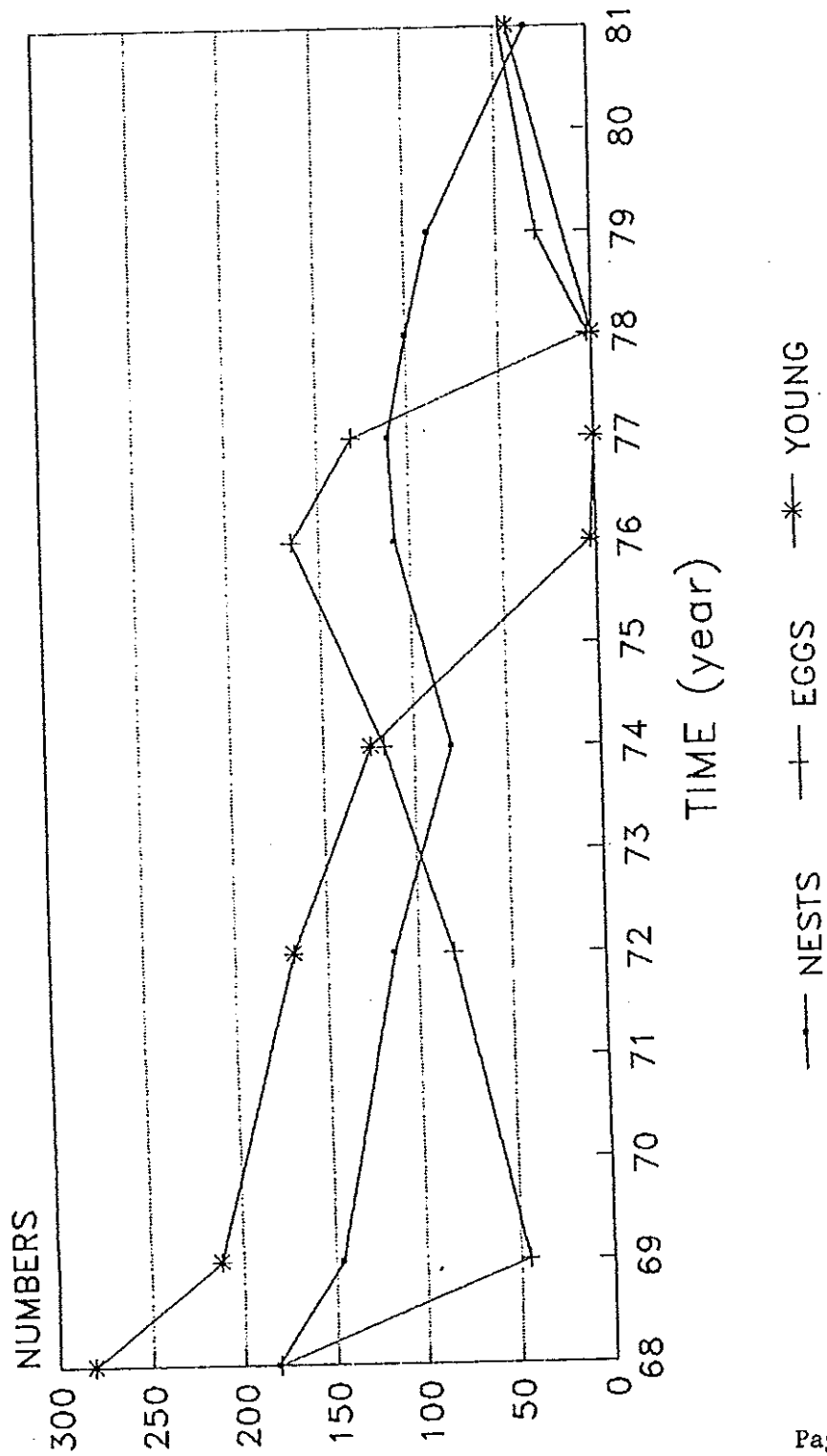
* Last year for data available. Insufficient data available for Canoe Islets.

Graphically this data shows a dramatic failure in 1976. It would be important to know if this "crash" occurred elsewhere in B.C.

FIGURE III

ROSE AND CANOE ISLETS

NESTING SUCCESS
DOUBLE - CRESTED CORMORANT



Campbell (pers. com.) estimates the breeding population of the Double-crested Cormorants in British Columbia at 2000 pairs. The species is decreasing over most of its range in North America, but in British Columbia, it is holding its own, or even increasing. In this province its breeding colonies are all marine oriented - there is one fresh-water colony located on the Pitt River (Campbell, pers. com.).

The decline of the species in Ecological Reserve No. 17 and 18 is illustrated by the following graph for Rose Islets (No. 18).

The Canoe Islets are somewhat different:

Prior to 1960's	0 Pairs
Late 1960's	30 Pairs
Mid 1970's	12 Pairs
Early 1980's	0 Pairs
July 1981	50 Pairs
	No nests

Data should be interpreted with caution (Vermeer 1987):

- a) there is no proof that new colonies are a result of abandonment from old ones;
- b) surveys are not complete enough to supply sufficient data to state whether or not the numbers of Double-crested Cormorants in the Strait of Georgia is increasing or levelling off (but appear to be increasing).

Henny et al. comments that the cormorant population shifts in the neighbouring San Juan Islands may be related to human disturbance.

"Double-crested Cormorants are especially susceptible to human disturbance when gulls are present. The long hiatus from the nest after being disturbed, facilitates predation of their eggs and small young by gulls."

It is interesting to note that cormorants may choose sites occupied by gulls because the presence of these birds may indicate to the cormorants that the site is free of mammalian predators (Henny, et al.)

Henry (et al.) is of the opinion that in the San Juan Islands:

"the pattern of leaving the nesting islands where failure occurred in 1984, was in response to changes in human activity patterns....Human disturbance was the probable explanation for the redistribution of nesting activity during the last decade."

When the birds are disturbed (either by people, aircraft, and/or other birds such as the bald eagle) they panic, leaving their eggs vulnerable to predation by crows (Campbell, Butler, pers. com.).

It has been pointed out (Roemer, pers. com.) that there are times (for whatever reasons not well understood) that cormorants simply "pick-up and leave" and nest elsewhere. Butler (pers. comm.) says this has been observed in the Puget South of Washington State, where smaller colonies amalgamated into larger ones (possibly a defensive behaviour).

Low flying aircraft have been cited in several internal memoranda, as a possible cause, but there is no documentation. An aircraft could however, cause havoc at the critical nesting time.

While a permit is required to land on the reserves, the inter-tidal and sub-tidal lands are not included, and therefore boaters cannot be stopped from landing in these peripheral areas.

Campbell (pers. comm.) stated that boaters should keep at least 200 metres away to avoid disturbing the birds.

12.0 MANAGEMENT STRATEGY

1. An attempt should be made to have inter-tidal and sub-tidal lands included in the reserve. This would enable better enforcement of people wandering into the colony.
2. There is a mooring buoy for small craft at the Canoe Islets. This should be either removed or D.O.T. should be informed and a Notice to Mariners be issued to inform them that these:
 - a) are ecological reserves; and,
 - b) a permit is required to land on the reserve.

3. It is universally felt that the Islets are still very valuable, and given "half the chance", the cormorants might return. Aside from this, the islets are used by the cormorants in the winter as roosts and by other sea birds including Pigeon Guillemots, Oystercatchers. Sea-lions use the Canoe Islets as a winter haul-out.
4. The number of inspections by staff and volunteer wardens should be increased in order to monitor the islands better.
5. Qualified persons, should be encouraged to use the reserves for studies in order to give us badly needing data.
6. A public education program should be initiated through our Visitor Services Officers:
 - a) to inform boaters and pilots:
 - i) articles in newspapers, sportsman's and boater's magazines;
 - ii) issue notices to marinas;
 - iii) issue notices to airmen (through Federal Ministry of Transport).
 - b) signage: should be clear and visible from at least 150 metres (if it is too small, boaters will be curious and come in to see what it says).
7. An attempt should be made to work with the Knowledge Network to develop a 1/2 hour program on Marine Ecological Reserves, which could later be used as a video for public education, including schools.
8. A logo poster be developed to mark or designate marine ecological reserves:
 - a) a colour that is readily visible in most kinds of weather;
 - b) suitable size to be recognized at 200 feet.

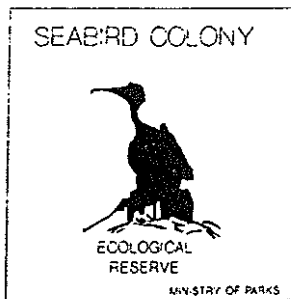
Smaller ecological reserve signs are not visible a great distances without binoculars, if people can not read a sign, they will move towards the sign to see what it says, simply out of curiosity.

- the logo should be made into an 8" x 10" mini-poster to be posted at marinas, etc., to inform boaters that marine ecological reserves are off-limits.

- the logo should be placed on our marine park brochure.

SIGN SHOULD BE ENAMILIZED METAL TO BE SEAWATER AND BIRD GUARD RESISTANT (SEE APPENDIX)

9. The Ecological Reserves: Seabird Colony logo should be placed on our Coastal Marine Parks brochure with a short message.



REFERENCES

- Campbell, R.W. 1976. Seabird Census, Rose Islets No. 1 & 2. File No. 3-9-4-3.
- Campbell, R.W. 1976. Seabirds Breeding on the Canadian West Coast. B.C. Provincial Museum, Victoria, B.C. Heritage Record No. 1, pp. 36-95.
- Campbell, R.W. 1978. Summary of Seabirds Breeding on Rose Islets: 1963 - 1978. File No. 3-9-4-3.
- Campbell, R.W. 1981. Results of Seabird Survey for Four Ecological Reserves in the Strait of Georgia and Juan de Fuca. File No. 3-9-4-3.
- Henny, C.J., L.J. Blus, S.P. Thompson, and Ulrich, Wilson. 1989. Environmental Contaminants, Human Disturbance, and Nesting of Double-crested Cormorants in Northwest Washington. Colonial Waterbirds 12(2): 198-206.
- Rodney, M.S., and R.W. Campbell. 1977. Natural History Theme Study of Marine Bird and Mammal Habitats in the Gulf Islands, B.C. Unpublished Report, Parks Canada, Ottawa, 107 pp.
- Vermeer, K., and L. Rankin. 1984. Population Trends in Nesting Double-crested and Pelagic Cormorants in Canada. Murrelet 65: 1-9.

APPENDIX A

CORMORANT CALENDAR

What is the most sensitive period? When can the damage to birds be done? To answer these questions requires a basic knowledge of the breeding cycle.

Drent (1964) reviewed nesting data and found the egg-laying period ranged from the 20th of April to the 2nd of September (N=3628). Campbell, et al. (1989) notes that "late dates reflect attempts at replacing egg losses to gulls and crows". Broods occur from the 14th of June to the 10th of September (N=1183) with a 68% 10th of July and 15th of August. Fledgling period is 35 - 42 days (Lewis 1929, Campbell 1989).

It should be kept in mind that there is a two week courtship period preceding egg-laying, which would advance the calendar to early April. As well, many cormorants use the islets as nesting and roosting sites during the non-breeding season. Disturbance to the sites does occur in the following ways:

1. frightening birds off their nests causing eggs to be smashed and young to be injured or even killed;
2. adults are kept away from the young causing nestling starvation;
3. the period away from the nests allows predators such as crows and gulls to eat eggs and small young;
4. dry vegetated sites such as the Rose Islets pose an extreme fire hazard in the summer. A fire on the islets would be disastrous, especially during nesting season;
5. Garbage left by fishermen and boaters such as tangled fishing lines, lures and plastic can kill birds.

It is therefore imperative that no one be allowed on these islets, at any time of the year and for any reason other than those with permits to do approved studies.

From a conversation with Mr. R. Wayne Campbell, Royal British Columbia Museum, Victoria, May 1990.

APPENDIX B

PERSONS CONSULTED

Mr. R.W. Campbell, Vertebrate Division, Royal BC Museum, Victoria: 387-2483.

Dr. Hans Roemer, Ecological Reserves, Victoria: 387-4599.

Mike Shephard, Volunteer Warden, Rose and Canoe Islets Ecological Reserves: 388-4227.

Mr. Rik Simmons, Wildlife Technician, B.C. Parks

Mr. Rob Butler, Canadian Wildlife Services, Delta: 666-0143.

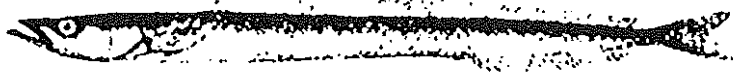
Dr. Louise Goulet, Victoria: 387-4596

APPENDIX C

April 10, conversation with Rob Butler, Biologist (Sea Birds), Canadian Wildlife Service, regarding the decline of the Double-crested Cormorant.

1. Eagles probably play a role here. C.W.S. studies show that eagles flying over the colony cause the cormorants to panic. The frightened birds leave their eggs exposed to predation by crows. Boaters do the same thing when they visit a colony during the breeding season.
2. Double-crested Cormorants in the Pacific Northwest are abandoning nest sites elsewhere. The shifting of nest sites from one place to another is not well understood. In some places the birds are abandoning smaller colonies to form larger ones.
3. The Ballingal Islets off Galiano Island have had the Double-crested Cormorant nesting. It would be important to see what is happening there.

The Rose and Canoe Islets should continue to receive full protection as Ecological Reserves because there is a good possibility that the cormorant will return.



Sandlance

Ammodytes hexapterus Pallas
Ammo/dytes=sand, diver.
hexa/pterus=six, fins.



Black Prickleback
Black Blenny

Epigeeichthys atropurpureus (Kittlitz)
Epige/ichthys=on land, fish.
atro/purpureus=dark purple.



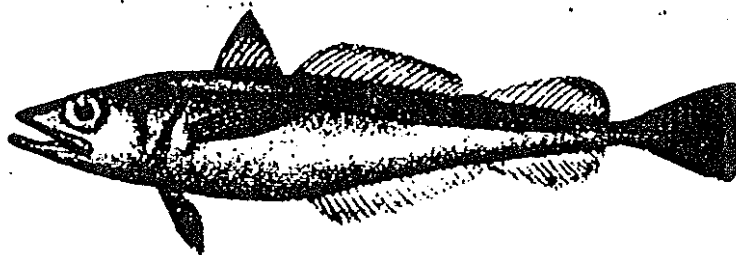
Staghorn Sculpin

Leptocottus armatus Girard
Lepto/cottus=slender cottid.
armatus=armed.



Herring

Clupea pallasii Valenciennes
Clupea=herring.
pallasii=after P. S. Pallas, naturalist
and explorer from St. Petersburg.



Hake

Merluccius productus (Ayres)
Mer/luccius=an ancient name mean-
ing sea pike.
productus=drawn out.

APPENDIX D

FOODS OF DOUBLE-CRESTED CORMORANTS

(From Carl, 1972)

APPENDIX E

SUGGESTED ECOLOGICAL RESERVE SIGN FOR MARINE BIRDS



APPENDIX F

LIST OF OUTSTANDING PERMITS

(As of April, 1990)

Mr. Robin Baird, P.O. Box 6244, Victoria, B.C. V8P 5L5.

- Permit to collect stranded Cetaceans. Valid from March 1, 1989 to February 28, 1994. File 3-9-4-3.

APPENDIX G

LAPSED PERMITS

Mr. R.W. Campbell, Royal British Columbia Museum, Victoria.

- Permit to Census Cormorants on the Chain Islets, Rose and Canoe Islets from July 15, 1983 to August 15, 1983. File 6-6-2-522-50.

Dr. Marcus Bell, University of Victoria.

- Permit to undertake vegetation studies, Rose and Canoe Islets.

APPENDIX H

MORE THAN CORMORANTS

While it is true that the original purpose for establishing the Rose and Canoe Islets as Ecological Reserves was to protect nesting habitat of the Double-crested Cormorants, it is also true that the reserves passes other important wildlife valves.

1. Other seabirds

- a) Pigeon Guillemot (*Cephus columba*). Up to 12 of these birds have been see around the islets. Nesting has been recorded on the Rose Islets (Campbell, et al.). This fish-eating species utilizes fissures in the rocks to nest. Puffins, Auklets and Murrelets also belong to this group.
- b) Black Oyster-catcher (*Haemotopus bachmani*) usually one or two pairs nest on the islets; important off breeding season feeding areas.
- c) Glaucous-winged Gull (*Larus glaucescens*). The population of this colonial breeder has increased by 3.5 times since the late 1930's (Campbell, 1989). Campbell (1989) states that in the period of 1960's to 1974, the population in the Strait of Georgia and Juan de Fuca nearly doubled. Populations on the Rose are as follows:

DATE	(N)	(E)	(YNG)
July 13, 1974	62	27	1
June 21, 1978	167	313	2
June 26, 1980	156	389	0
June 10, 1981	11	10	0

Data is not available as to the fledging rate. Nests and young counts is partly a function of the timing of visits.

OTHER SPECIES USING THE ISLETS

Harlequin Duck feed around the islets, using rocks for nesting, roosting and moulting. (In June 1977, Campbell observed a flock of 81)

CANOE ISLETS ETC

MOD: MISCELLANEOUS

SUB-MOD: MANAGEMENT PLANS

Black Oystercatcher nest on the islets (one to two pairs), important winter feeding sites

Black Turnstone flocks of these sech dwelling sandpipers occur here in winter, do not breed here

Marbled Murrelet feed offshore, do not breed here

Northwestern Crow forages on islets, can be a major predator on cormorant eggs and young (when cormorants are disturbed)

Bald Eagles visit the reserves to feed on gulls and cormorants and may sometimes be seen sitting on the higher rocks.

Seals and sealions are often observed around the islets, the latter using the rocks as haul-out sites.

Humans: recreational boaters visit the islets, sometimes because it is a safe haven from a storm. Coming within 200 metres or landing can cause panic amongst the birds, leaving them open to predation. Man can have a devastating effect on seabirds.