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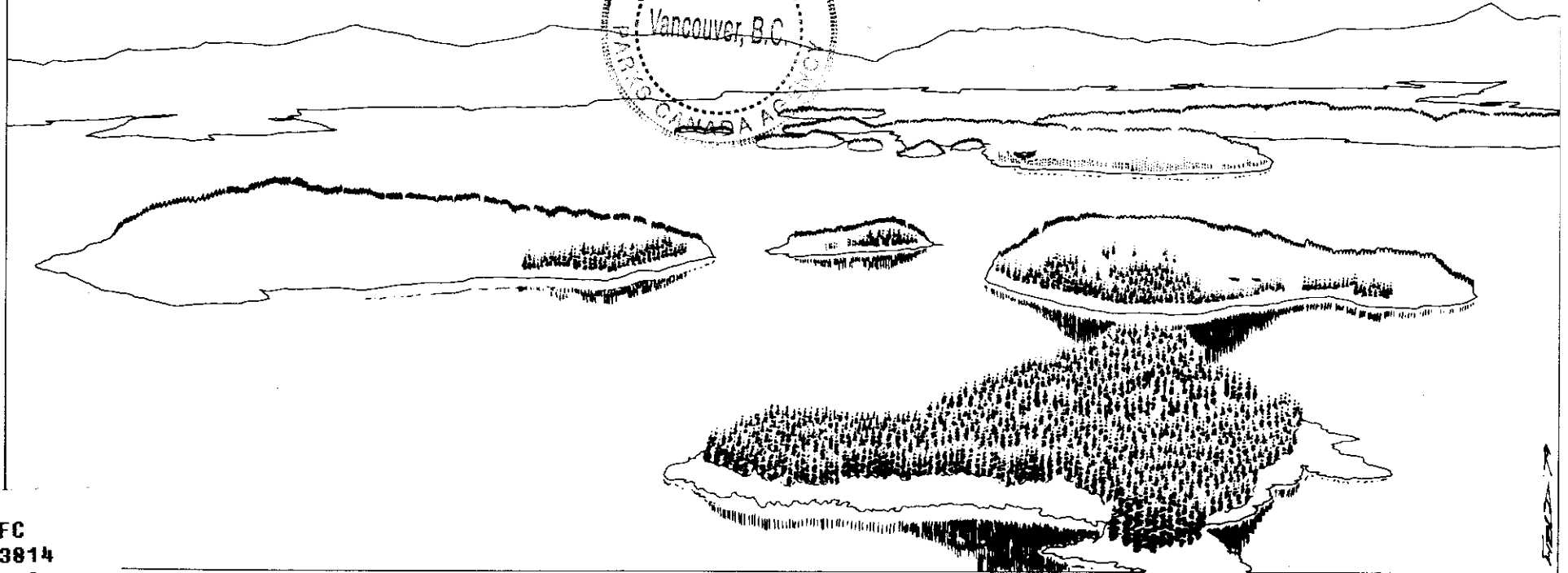
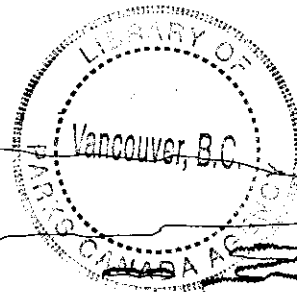
PACIFIC RIM NATIONAL PARK

Broken Group Islands

MANAGEMENT PLAN

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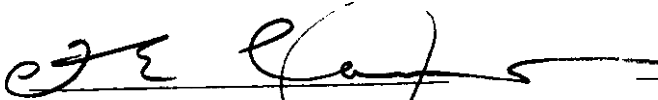
PACIFIC RIM NATIONAL PARK

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BROKEN GROUP ISLANDS

UNIT MANAGEMENT PLAN

APPROVED :


Park Superintendent 28-3-80
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Assistant Director
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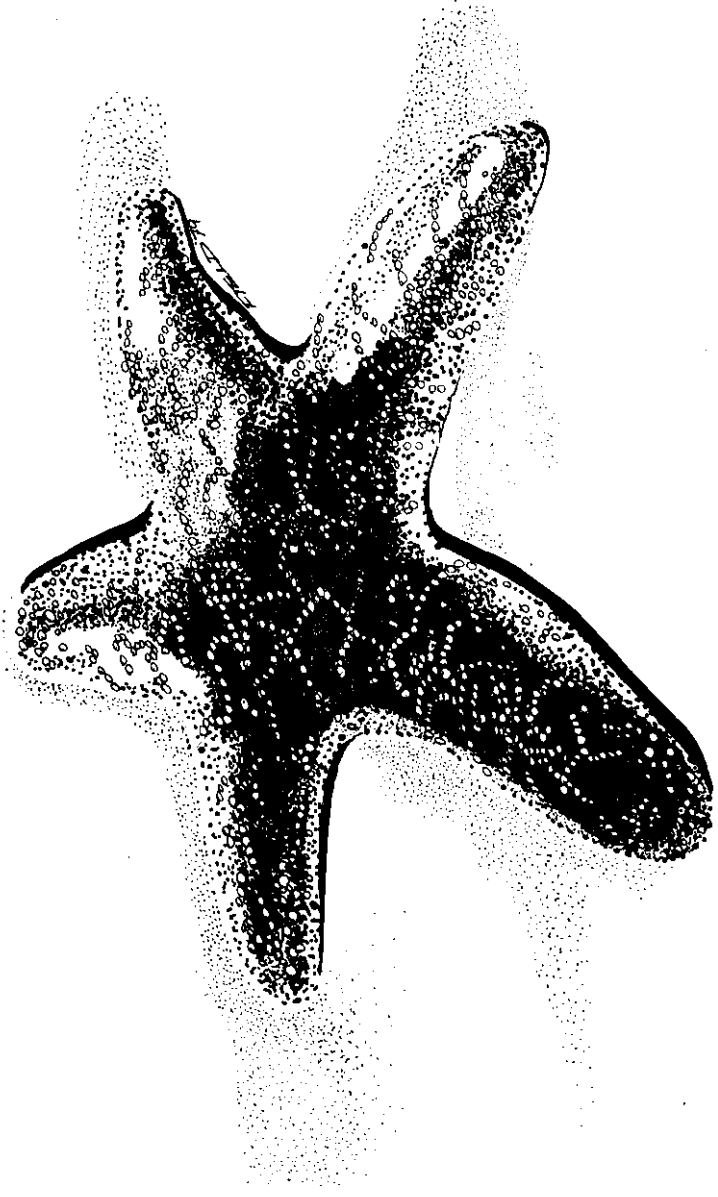

Director, Western Region 20/8/80
Date

TABLE OF CONTENTS

	Page		Page		
I.	Introduction	7	III.	Management Objectives	27
II.	Inventory and Analysis	11		Zoning	28
A.	Natural Resources	11	IV.	Proposals	33
1.	Geology	12	1.	Access and Circulation	33
2.	Soils	12	2.	Accommodation and services	34
3.	Vegetation	13	3.	Recreation Activities and Facilities	37
4.	Mammals	13	4.	Interpretation and Information	39
5.	Birds	14	5.	Surrounding Land Uses	41
6.	Marine Resources	14	A.	Park Boundaries	41
7.	History and Archaeology	15	B.	Regional Planning	42
8.	Summary	16	C.	Indian Reserves	42
B.	Visitor Facilities and Activities	16	6.	Park Administration	43
1.	Existing Facilities	16	V.	Summary	47
2.	Visitor Numbers	17		References	48
3.	Visitor Activities	17			
4.	Visitor Perceptions/Attitudes	19			
5.	External Influences	20			
C.	Summary	21			
1.	Natural Resources	21			
2.	Visitors	22			

	Page
Appendix 1 Soil Suitability for Recreation	53
Appendix 2 Resource Management Objectives	61
Figures :	
1. Pacific Rim National Park	78
2. Broken Group Islands Base Map	79
3. Marine Features	80
4. Archaeological Sites.....	81
5. Existing Facilities.....	82
5. Access Points and Points of Interest Outside the Park.....	83
7. Zoning.....	84
8. Proposed Development.....	85

Introduction



I INTRODUCTION

The Broken Group Islands consist of a compact group of approximately 90 small islands and rocks at the entrance to Barkley Sound on the west coast of Vancouver Island. The islands form one of three main units that make up Pacific Rim National Park (Figures 1 and 2).

The unit is approximately 10,725 hectares in area, of which 1,538 hectares are land and the remainder water. The largest island is Effingham, which is 239 hectares. The large amount of open water is significant because it provides an important marine component to the park.

Access to the islands is by boat across open and potentially treacherous water. The nearest departure points are the communities of Ucluelet and Bamfield, each approximately eight miles away on opposite sides of the entrance to Barkley Sound.

The islands face the open Pacific Ocean and are subjected to offshore winds and storms.

This element, plus the abundance of reefs around and throughout the islands create hazards to shipping enroute to Port Alberni and to the entrance to the Straits of Juan de Fuca. Many shipwrecks have been recorded over the years, the most recent being the Vanlene, which foundered on Austin Island in 1972.

The area has a mild and wet climate. Average precipitation at Ucluelet is 254 cm and the annual moisture surplus is 202 cm. This produces a coastal rain forest vegetation. Summer fogs are common, creating yet another hazard to boating.

Shorelines are for the most part rocky, interspersed with occasional small pocket-sized beaches which are covered at high tide. Soil cover is thin and quickly eroded if the vegetation cover is disturbed.

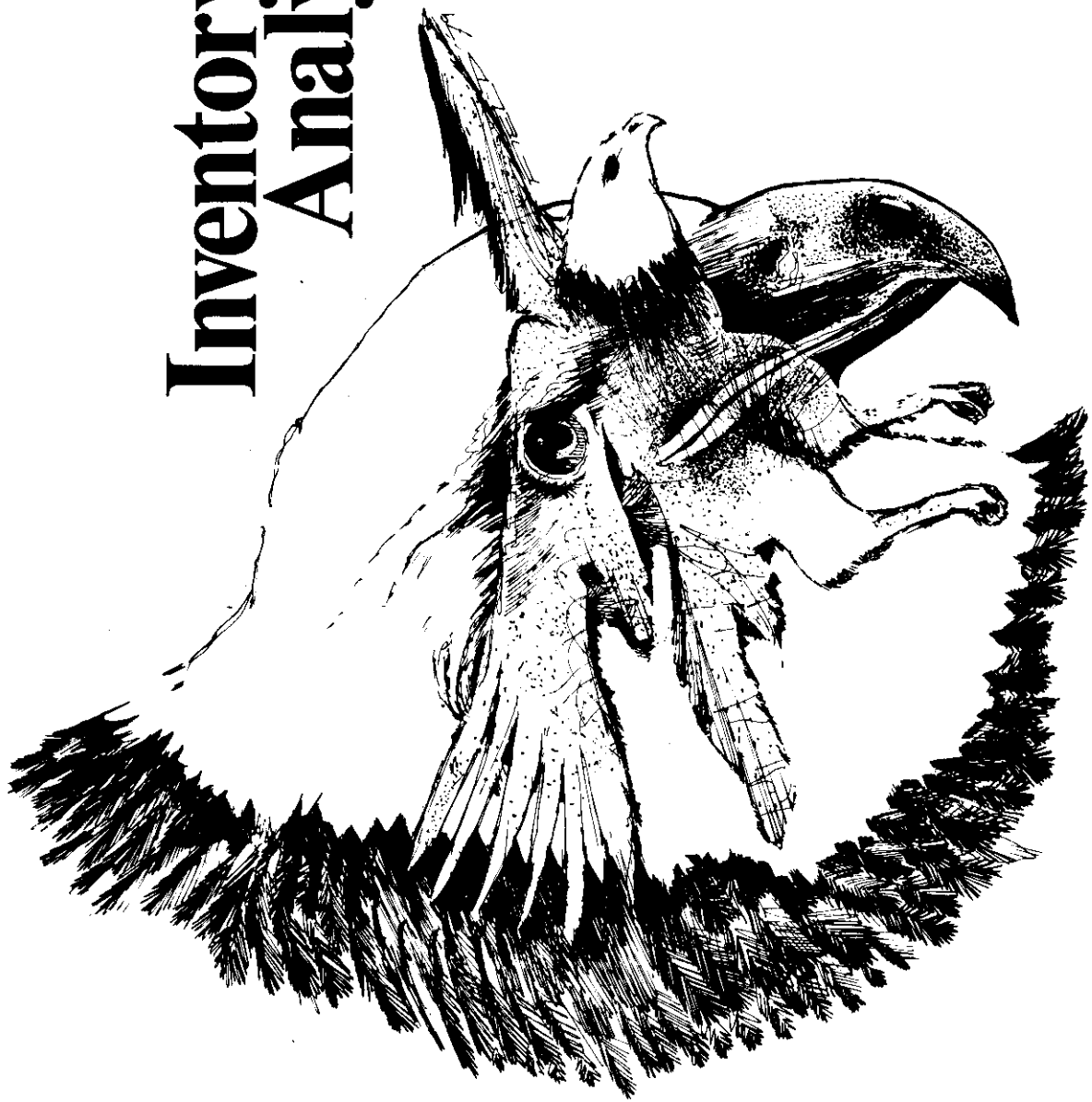
The combination of isolation, tricky boating conditions, moist and windy weather and limited recreation opportunities restricts the amount of visitor use the unit can or should sustain.

The area is scenically attractive and possesses a rich variety of marine habitats in an undisturbed state. ~~Once~~ the open water crossing has been made, the sheltered waters in the narrow channels and in the lee of the larger islands, permit leisurely and comparatively safe enjoyment of the surroundings.

Isolation and comparatively difficult access are the appeal of the Broken Group Islands. They represent an escape for those who want to retreat temporarily into an undisturbed scenic area where natural forces dominate. ~~The~~ wilderness environment of the islands is even more of a challenge than remote areas on land, for man, being a terrestrial animal, is very much at the mercy of natural elements, cushioned only by a flimsy technology.

"Wilderness" best describes both the islands and the experience being sought by visitors and is the major factor in developing a management plan for the area.

Inventory & Analysis



BALD EAGLE

II INVENTORY AND ANALYSIS

In recent years, Parks Canada has sponsored numerous surveys of the natural resources of the Broken Group Islands. Some work has also been undertaken by the Bamfield Marine Research Station, generally as part of more extensive marine studies.

Information is available about geology, soils, vegetation, mammals, birds, marine life and human history. The only significant mission is archaeology.

In addition, statistics have been collected for several years on visitor numbers and their activities. From these it is possible to draw general conclusions about current use patterns and also to venture predictions for the next few years.

A Natural Resources

Available information indicates that the Broken Group Islands are characterized by resources which are typical of the outer

coast of the eastern Pacific Ocean in this latitude. As islands, they are representative of others along the open coast of B.C. Their preservation from resource extraction under the National Parks Act is important, because it provides assurance that the existing, largely natural appearance of the area will remain for future as well as present enjoyment. The foreknowledge of an undisturbed natural landscape which is associated with national parks will be a magnet to people seeking such an area. This inherent attraction of national park status, quite apart from the area's physical characteristics, should be recognized as important. This pristine condition will become increasingly important as more and more areas outside parks are committed to either resource extraction or residential development. Additionally, national park designation of an area implies unusually attractive landscapes (thanks to consistently high standards which have been maintained in selecting and designating parks). Consequently even those who have little knowledge of a particular park will be

attracted in anticipation of superior scenic qualities in an undisturbed state. Park designation is a form of guarantee to the public that the natural environment will be protected.

National park status can be regarded in its own right as a resource - in the sense of an important characteristic which attracts visitors and which can be exploited in various ways (e.g. wilderness preservation, promotion of tourism, ecological integrity, spiritual renewal, recreational opportunities).

1. Geology

The islands are composed for the most part of quartz diorite and granodiorite, except for some argillite on Cree and Dicebox Islands and the outer part of Howell Island.

Geological points of interest are agmatite exposures on Hand Island, quartzitic fault breccia on Combe Rock (at the western tip of Wouwer Island) and complexly folded and faulted metasediments and limestone on Cree

Island. None of these features are particularly fragile or of unusual interest to the average visitor. Defacement should be the only serious concern.

Several caves on Reeks Island contain stalactites. These are fragile features, easily damaged, as much by inadvertent cave exploration as by deliberate destruction. No unusual significance attaches to these features.

2. Soils

Soil cover consists mainly of till soils and bedrock, with some occurrences of marine deposits. No unusual or significant soil features have been noted. Drainage is the most important limiting factor and mass wasting is a danger where the vegetative cover has been removed. An analysis of the suitability of the soils for recreational development (Appendix 1) indicates the severe limitations which exist throughout the islands.

3. vegetation

Eighty percent of the vegetative cover of the Islards consists of cedar-hemlock communities. Spruce-hemlock communities are found behind a few shell middens and are important because they provide opportunities for campsites with minimal clearing. Two hundred thirty-one vascular plant species have been recorded, of which 66 are classified as extremely rare within the islands. However, they are common elsewhere within and outside the park (an example is *Aquilegia formosa*, the western columbine). The only unusual species is the gnome plant (*Hemitomes congestum*) found on Dodd Island, which is rare throughout B.C. The richest plant communities, with approximately 50 vascular species, are found on the steep south-facing cliffs on Clarke and Benson Islands. Twenty-eight shell middens have been identified. The generally level nature and short turf found on a number of them make ideal campsites. Examples are found on Gilbert and Turret Islands. Stinging nettle (*Urtica dioica*) is a common

plant in these communities. Much of the vegetation of the islands consists of impenetrable shrubbery dominated by salal (*Gaultheria shallon*) and recreational use is limited to aesthetic appreciation of its wind-sheared form.

4. Mammals

Islands typically have fewer terrestrial mammal species than adjoining mainland areas as a result of restricted habitats and inhibited access. The Broken Group Islands have fewer species than Vancouver Island, which itself has a less diverse mammalian fauna than mainland B.C. Additionally, the distribution of individual species within the islands is irregular (mice, for example, are absent from Mence and Brabant Islands). Mink and deer are the most frequently seen of the 10 recorded species. No unusual terrestrial faunal features have been noted.

Twelve species of marine mammals have been recorded. As they are highly mobile, only part of their range is within park

boundaries. Particularly important sites are the sea lion haul-out areas on Wouwer Island and adjacent rocks and a possible seal haul-out area on Gibraltar Island. Their disturbance by visitors is a concern.

5. Birds

Terrestrial bird species are essentially those which would be expected in similar habitats on the mainland. Forty-five species of sea bird have been recorded on transects between Ucluelet and Turtle Island but only pelagic cormorants are known to nest in the islands and these only in small numbers. Brandt's cormorants nested, until 1972, on Great Bear and Alley Rocks, just outside the Broken Group Islands boundaries. The only other known Canadian nesting colony is at **Sea Bird Rocks**, off Long Beach.

Barkley Sound contains a large concentration of bald eagles and many nest sites, active and inactive, have been recorded in the islands. What disturbance visitors have created is not known. Generally, incubation

of the eggs is completed in May and June, prior to heavy summer visitor use of the area.

6. Marine Resources

The coast of B.C. has one of the world's richest marine environments. Pacific Rim is the only park along this coast which has a significant marine component. Cape Scott and Naikoon Provincial Park boundaries extend only to the tide line. A considerable amount of information has been accumulated in recent years but it is not contained in a format which permits ready identification of unusual or significant features. Probably the most important marine characteristic of the Broken Group Islands is the variety of substrates and the resulting variety of benthic communities. The coastal areas of the Long Beach and West Coast Trail units of the park lack the sheltered, shallow areas found amongst the islands.

The Bamfield Marine Station has identified a number of sites which are of particular interest either because of some unusual

feature or as representative areas suitable for studies of comparative and dynamic marine conanunity characteristics. The sites are shown in Figure 3. Two notable sites are the great tide pool on Wouwer Island and the southwest coast of Cree Island. The most important challenge will be to preserve the diversity of marine life, which could be threatened by regular disturbance or exploitation of particular species, communities or locations. A thorough analysis of the data is required to identify potential problems and management options.

7. History and Archaeology

The islands were traditionally used and occupied, on a seasonal basis, by the Sheshaht and Opetchesaht bands of the Nootka Indians. Four Indian Reserves are still located in the islands. Evidence of Indian habitation consists of middens, fish traps and burial caves. Known locations of each are shown in Figure 4 (the burial caves are omitted for security reasons). The burial caves are particularly vulnerable as the

skeletal remains and associated artifacts can be easily removed by visitors. Lack of knowledge of their location has prevented serious loss so far, but as more visitors explore the area this protection will diminish. The significance of the archaeological resources has not been investigated.

Historic sites consist mainly of shipwrecks and former homesteads. A trading anchorage was located in Effingham Bay and associated artifacts may lie on the floor of the bay. This is probably the only feature of historic significance but a professional assessment is required to confirm this assumption.

8. Summary

The variety of marine habitats and communities distinguishes the Broken Group Islands from the other two units of the park and as such is the most significant feature of the area. It is this variety, coupled with the opportunity to enjoy it in relative safety and isolation which appeals to visitors.

The marine environment is also susceptible to external influences, particularly oil spills. Visitor impact, by contrast is far less pervasive. Even assuming that more boating and diving occur, the impact by visitors is likely to be restricted to a few species of consumptive or aesthetic interest (e.g. abalone and unusual molluscs).

Terrestrial features are of importance as a scenic backdrop to water and shore based activities rather than for their inherent characteristics. This contrasts with the pattern in the other two units, where the ocean acts more as a backdrop to land-based activities. In the Broken Group Islands it is particularly important to preserve the integrity of the shorelines as viewed from the water.

B Visitor Facilities and Activities

Information on visitor use of the islands is general and has not been collected in a consistent way. However, this may not be a serious problem as past trends are mt

necessariiy a guide to the future, particularly in a new park area that is only just becoming known. Examples from elsewhere show all too clearly the fallacy of straight line projections, particularly when the influencing factors are poorly understood, or change. Consequently this section concentrates more on what could happen in the future, rather than on what has happened in the past few years.

1. Existing Facilities

Limited facilities have been provided so that the wilderness atmosphere of the area may be preserved. Figure 5 show the location of facilities.

Seven primitive campsites are provided on Clarke, Benson, Gilbert, Turret, Willis, Gibraltar and Hand Islands. Each has a pit privy and freshwater is available at all sites except that on Gilbert Island. Some camping also occurs on Jaques Island, next to the cabin.

Emergency cabins are available on Clarke and Jaques Islands. The only other facilities are a few primitive trails, little used, on Clarke, Benson, Wouwer and Gibraltar Islands. The warden cabin is located on a float moored in Nettle Bay.

Sheltered anchorages are used by larger vessels whose occupants sleep on board rather than camp on shore. The most popular locations are Effingham Bay, Island Harbour, Turtle Harbour and Nettle Bay.

Illegal camping occasionally occurs at various locations, probably more through ignorance than deliberate contravention of regulations.

Access to the islands is from points outside the national park, as shown in Figure 6.

2. Visitor Numbers

Accurate visitor numbers are difficult to obtain because of unregulated access from several directions and the dispersed nature

of activities. Day visitors, in particular, are easily missed. Consequently the figures which are available are conservative estimates.

Boat Days¹

1973	70
1975	156
1977	381
1978	1450

Summer weather conditions are undoubtedly an important factor influencing visitor numbers. They affect both the number setting out for the islands and also the length of stay. Weatherwise, 1978 was an exceptionally fine year while the summer was cool and wet in 1975.

¹ Boat days: one boat visiting the park area for one day

3. Visitor Activities

Most recreation activities are, as might be expected, related to the Ocean and to the

shorelines. Vandall's 1955 survey listed beachcombing, exploring, relaxing and fishing as the most popular past-times. The impenetrable nature of much of the vegetation, coupled with perceptions of the islands as a water-oriented area, inhibit use of the interior of the islands. The overgrown trails are indicative of this lack of use.

Scuba diving is increasing in popularity. Only six parties listed this activity in 1975. In 1977, 140 dives were recorded and 433 occurred in 1978.

There **has** been a sharp increase in the use of canoes, kayaks and sailing dinghies, both absolutely and relatively:

	<u>Sail/Motor</u>		<u>Speed</u>		<u>Canoes/</u>	
	<u>Vessels</u>		<u>Boats</u>		<u>Kayaks</u>	
	#	%	#	%	#	%
1973	56	80.0	9	12.9	5	7.1
1975	83	53.2	37	23.7	36	23.1
1977	94	24.7	119	31.3	168	44.1
1978	457	31.5	308	21.2	586	47.3

A corollary of the increased use of canoes and kayaks is a trend to more tent camping :

	<u>using</u>		<u>Staying</u>		<u>Camping</u>	
	<u>Cabin</u>		<u>On Board</u>		<u>_____</u>	
	#	%	#	%	#	%
1973 (parties)	9	13.8	38	58.5	18	27.7
1975 (parties)	N/A	N/A	88	61.5	55	38.5
1977 (party days)	29	7.6	135	35.4	217	57.0
1978 (party days)	31	2.1	595	41.0	825	56.8

There are undoubtedly discrepancies in the data in both of the preceding tables but the trends are apparent.

The most popular campsites are on Clarke and Hard Islands. The attraction of the former is the white sand beaches. The position of Hard Island as the first and last campsite in the islands for canoes making the sheltered one day crossing from and back to Toquart Bay is significant. Increasing use of this route will affect the use of the campsite on Hard Island.

The most suitable campsites have already been developed. No other sites offer the combination of sheltered access, a beach, a suitable tenting area and a water supply. The larger, self-contained boats do not require the latter two characteristics but, by the same token, their impact on land areas is less.

Besides the inherent attractiveness of the islands as an undisturbed scenic area, there are a number of features of particular

interest to visitors. Most notable are the sea lion haul-out areas on Wouwer Island and adjacent rocks, rock pools and shallow lagoons (e.g. the Jaques-Jarvis lagoon), clam beaches and burial caves. The interest in the sea lion areas and the burial caves could be a concern of the future, as mentioned earlier.

Information on length of stay is lacking but there is an assumption that visitors with small, non-motorized boats tend to stay longer and use the islands as a destination. The larger boats capable of tackling the open ocean generally come by water from farther afield (e.g. Vancouver and Puget Sound).

Though the islands may also be a destination point, the cruise from and to their departure point is also an important part of the trip and the islands are consequently not the sole focal point.

4. Visitor Perceptions/Attitudes

The surveys of 1973 (Robinson) and 1975

(Vandal:) indicated that visitors are seeking an undisturbed area in a natural state. One of the great attractions of the islands is the absence of facilities for visitors and only a minimum number of people using the area. It is still possible (though increasingly difficult) to find a cove or a beach for oneself.

Subjectively, a number of characteristics contribute to the attractiveness of the islands:

- (a) the combination of land and water views.
- (b) the small scale of the scenery (coves, narrow channels, islets, pocket beaches) which heighten the "surprise" element by providing constantly changing Scenes.
- (c) the intricate shoreline restricts foreground and middleground views and provides much screening. Consequently the area can absorb a considerable number of visitors without appearing crowded. The sense of aloneness, of privacy is not difficult to maintain, even for camping, because visitors are

rarely in sight of each other.

- (d) the sheltered waters provide relatively safe boating at the edge of the open Ocean, even for non-motorized boats.
- (e) there are a great variety of marine habitats with a consequent variety of marine life.
- (f) all islands and shorelines are publicly accessible (c.f. the shores and islands of **the** Strait of Georgia).
- (g) the absence of information about the area sharpens the sense of discovery.
- (h) the islands are readily accessible to large population centres (c.f. northern Vancouver Island, the north coast of the mainland, Queen Charlotte Islands).
- (i) there is an absence of regulation, registration, limitation, signs, etc. - a freedom from the regimentation of everyday life. **The** lack of a strong park "presence" is a positive contribution to the carefree atmosphere.

5. External Influences

The use of a park is a function of demand and supply. Demand factors are generally beyond

management control, though some influence may be exerted through information programs.

Examples of uncontrollable demand factors are:

- health of local or regional economy
- highway accessibility
- size of regional population
- school year
- recreation technology
- distance from major population centres
- national and provincial tourist promotion
- unsolicited publicity (e.g. National Geographic)

In the case of the Broken Group Islands, park management also lacks control over access points, which compounds the problem of disseminating information and introducing control mechanisms. For example, it is possible for visitors to arrive in the islands without any clear idea of camping locations or pertinent park regulations or even that they are in a national park. This contrasts with parks with controlled access points where contact can be made with the visitor upon his arrival.

As a consequence, fewer direct alternatives have to be utilized; one visitor influence would be the limiting of facilities. A better approach might be to influence attitudes and perceptions before visitors reach the area through various information programs of a non-promotional nature, e.g. by tying park information to basic boating information (on marine charts) which is required, whether or not park authorities are contacted.

C Summary

1. Natural Resources

The Broken Group Islands are a microcosm of the landscape of the outer Pacific Coast. There are no unusually outstanding features. However, the combination of many representative features (both terrestrial and marine) in a small, relatively accessible area and under national park protection has a synergistic effect. It is the total of the features, rather than any individual component, which is significant.

consequently, management must be aimed at maintaining the integrity of the whole landscape. Man in large numbers is not a component of that landscape. As the most influential external factor, he is the most deserving of and most amenable to manipulation. The landscape can manage itself if left alone. Consequently resource management should attempt to avoid adverse impacts on the resources rather than attempt to correct them after the fact - prevention rather than cure.

Fortunately the visitor use patterns in the islands produce physical impacts which are highly localized. Additionally, the climate is a favourable influence (from the management perspective) in that it produces a resilient vegetation and can also greatly affect use on a random basis, thereby giving popular sites a respite. In fact, there is a suspicion that the area could physically handle more visitors than would be in harmony with its wilderness character. Attempts to influence use characteristics would be justified more on the basis of preserving the

wilderness experience than protecting the resources.

2. Visitors

The number of visitors is comparatively small at present but growing steadily. 1978 may prove to have been unusual in the short term as a result of the exceptionally good weather but in the long term is likely to manifest itself as an aberrant peak in a general upward trend. The assumption of more and more visitor use is based on several considerations :

- (a) The "market area" of the park as a whole is gradually expanding as a result of increasing publicity and improved roads and tourist facilities. The park is a major west coast attraction and has the potential to become internationally renowned. Inevitably there will be greater awareness of the islands. Already the islands are attracting visitors from farther afield e.g. Vancouver B.C., Seattle,

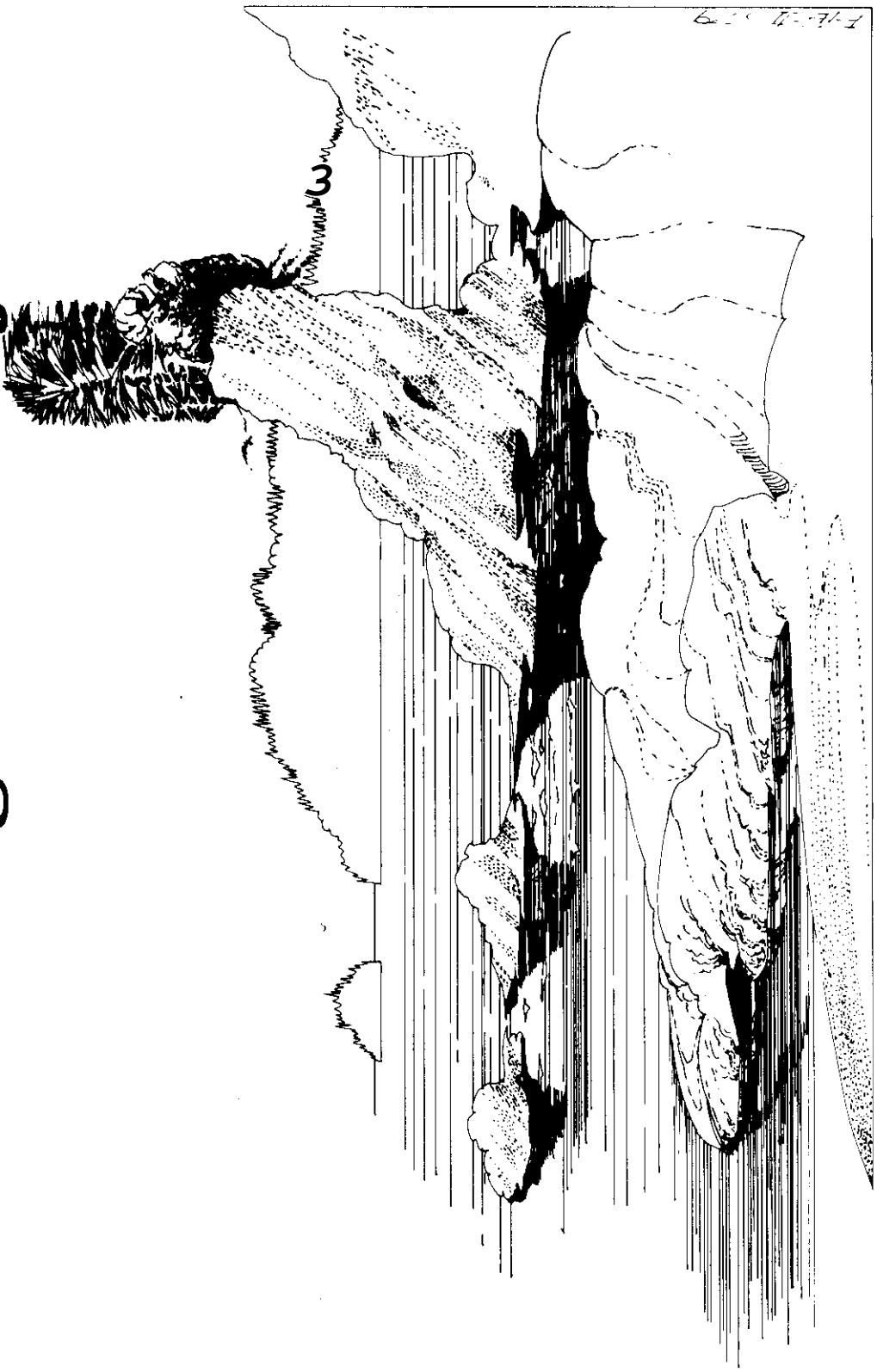
- (b) Wilderness appreciation and enjoyment ~~shows~~ no signs of slackening,
- (c) Boating in general ~~and~~ canoeing in particular have been increasing rapidly in popularity. In the western region, participation in canoeing has jumped from 39 per 1000 population in 1967 to 121 per 1000 in 1976 (SERD 77-15),
- (d) ~~As~~ the Gulf Islands, San Juan Islands and Puget Sound areas become increasingly congested, boaters will seek other sheltered locations along the coast. Barkley Sound is a natural choice, being comparatively close to and accessible from the major population centres,
- (e) Scuba diving is becoming more popular and more organized because the waters are sheltered and shallow and are in an area representative of the outer coast.

Park designation should not be underrated as an attraction ~~it~~ itself. It connotes attractive scenery, natural landscape, public land ownership, at least minimal facilities and management aimed at maintaining those characteristics.

The islands are viewed as a wilderness refuge where it is possible to escape from the daily routine for a short period. Visitors ~~tend to come~~ in small groups using private boats, which is in harmony with the wilderness environment. In fact, the trend to a larger proportion of non-motorized boats permits more visitors to enjoy the area, without worsening the sense of crowding. Because of their slow speeds and quiet nature, many can be scattered throughout the islands without impinging on each other.

In the absence of direct visitor control, the dissemination of appropriate information will be one means of influencing activity patterns in the islands. However, any information which is supplied should not diminish the joy of exploration and discovery which characterizes the current situation. And, given the anticipated growth in visitor numbers regardless of management objectives, any information should be non-promotional and aimed only at those who would come anyway.

Management Objectives



III MANAGEMENT OBJECTIVES

National **parks** are governed by Section 4 of **the** National Parks Act, which states the general purposes for which parks are established. Each park, however, **has** its own intrinsic set of characteristics distinguishing it from other parks in the national parks system. The system is based on identified natural regions.

Pacific Rim National Park falls within the Pacific Coast Mountains terrestrial natural region and provides representation of the Estevan Coastal Plain unit of this region. The park also provides national park representation of the Pacific West Coast marine natural region.

Individual parks are zoned in order to provide the appropriate balance of resource protection and visitor **use** opportunities.

The division of Pacific Rim National Park into three main units, each geographically and physiographically distinctive, partly accomplishes this task. **The** Long Beach unit

provides opportunities for intensive **use** of a spectacular shoreline area. The West Coast Trail unit is managed for comparatively low-intensity land-based activities. The Broken Group unit has been managed for low-intensity, water-oriented activities. "The major consideration is the opportunity to preserve in an undisturbed state the flora, fauna and sea life associated with a small group of offshore islands" (Long Beach Provisional Master Plan, 1973).

The review of information **suggests** that this management approach is appropriate to the islands and is welcomed by visitors. Consequently, this approach will be continued, based on the following objective:

"To preserve the Broken Group Islands unit in an undisturbed natural state for enjoyment and appreciation by visitors as an example of Pacific coastal wilderness".

The specific objectives for achieving this broader objective are:

facilitates the identification and management of different zones. Consequently, the Broken Group Islands can be treated as a single wilderness entity. In fact, given the small size of the unit, it has to be treated as a single entity in order to ensure protection of its integrity.

In the zoning system (September 1978), wilderness areas are designated Class 2, which prohibits motorized transportation and permits "only the essential minimum primitive-type visitor facilities required for a wilderness park experience". Motorized transportation is accommodated in Class 4 zones.

In the case of the Broken Group Islands, it is obviously impractical to prohibit motorized transportation on the waters, despite the designation of the area as wilderness. In fact, given the nature of the area and the use patterns and visitor perceptions, there is no conflict. It is, however, realistic to designate the land areas as Class 2 and to restrict the scale of

development in such a way that visitors are required to be entirely self-sufficient, consistent with a wilderness area.

Consequently, all land areas are designated Class 2 and all salt water areas are zoned Class 4, as shown in Figure 7. The Class 4 designation is strictly to accommodate motorized transportation and not to permit any form of visitor facility (e.g. floating accommodation facilities).

No Class 1 areas are designated. The consideration in this case is the impracticality of enforcing restricted or prohibited access, even if it were considered desirable. There is also the danger of focussing attention on such features as burial caves whose only protection at present is limited public knowledge of their existence.

- A. to preserve in an undisturbed state the marine and terrestrial natural and cultural resources by:
- i. locating necessary visitor facilities only where environmentally acceptable.
 - ii. monitoring the impact of visitor use on the resources.
 - iii. conducting research in instances where more information is required for management purposes.
 - iv. undertaking resource manipulation only where and when essential to avoid irreversible adverse influences.
 - v. preparing contingency plans for dealing with adverse impacts from external sources.
 - vi. applying all relevant regulations.
- B. to assist enjoyment and appreciation of the Broken Group Islands as an example of coastal wilderness by:
- i. providing only those simple facilities that are required in

order to minimize resource impairment.

- ii. avoiding, as far as possible, direct controls on visitors.
- iii. encouraging visitor enjoyment by means of small groups, private boats and unorganized activities.
- iv. providing appropriate information and interpretation.
- v. maintaining the emphasis on informal, personal contacts of park staff with visitors.

Zoning

The zoning system applied to national parks is based on the park objectives, visitor needs and desires, the significance of the resources and their potential for and sensitivity to visitor use. Each part of a park is allocated to one of five classes, ranging from strict preservation to intensive visitor use.

The physical separation of Pacific Rim National Park into three discrete units

Proposals



IV PROPOSALS

As the objective is to perpetuate the wilderness character of the islands, the primary intent is to avoid developing facilities. Consequently, the proposals are, for the most part, a list of policies aimed at limiting development. The proposed distribution of facilities is shown in Figure 8.

1. Access and Circulation

Current use of the islands is by private boat, travelling singly or in small groups. This results in comparatively small parties of visitors dispersed throughout the islands.

To date there has been no interest by commercial enterprises in providing package tours (c.f. the horse and hiker camps in the mountain parks). It is suggested that any such development be discouraged as they could produce larger groups and dominate the limited camping areas.

Access to the islands via the M.V. Lady Rose for canoes and kayaks poses no problems and should be allowed to continue.

Other than the Lady Rose, no commercial tour boats presently operate in the islands. Should the market grow in Ucluelet, with increasing popularity of the Long Beach area, there might be some interest in offering tours from this location. However, variable weather and dangerous wave conditions would inhibit a regular schedule. Consequently, the regular intrusion of tour boats into the islands is considered to be a remote possibility at present. If any applications should be received, however, they should be assessed on the basis of the anticipated impact on the wilderness character of the islands.

There have been occasional instances of float planes landing in the area (e.g. in Nettle Bay and on Effingham Lake). Cruise flights from Tofino are available from a private operator and as with tour boats, there is the possibility of sufficient demand building to

induce operators to offer a more regular service. This form of access to and within a national park is not acceptable except in strictly controlled circumstances (Parks Canada Policy, 1979, Section 4.3.9.3 on p. 44). In the case of the islands, low flying aircraft are intrusive in the wilderness atmosphere and disruptive of bird life and the sea lion colony. Once the park is legally proclaimed, all aircraft landings should be prohibited (except for emergency purposes) and minimum altitudes for over-flying should be determined in consultation with the Department of Transport.

Access to the islands is available from several locations, **all** of which are outside the national park. Toquart Bay is growing in popularity as a departure point for non-motorized boats. The present arrangement is satisfactory and no changes are proposed.

1.1 The suitability of the Broken Group Islands for wilderness enjoyment by means of small groups using private boats will **be** emphasized.

- 1.2 Any developments which threaten the wilderness character of the area (e.g. regular boat **tours**, large guided groups) will be carefully monitored and appropriate management responses will be assessed.
- 1.3 The MV. Lady Rose will be permitted continued docking privileges at the Gibraltar Island float.
- 1.4 Aircraft landings will be prohibited, except for emergency purposes. Minimum overflight heights will be determined with the Dept. of Transport.
- 1.5 Existing access points for travel to the Islands are adequate. No changes will be undertaken.

2. Accommodation and Services

In keeping with the wilderness character of the area, facilities should be kept to a minimum, should **be** small and primitive and should provide only those services which are required to minimize resource impairment.

The most obvious campsites have already been developed and so far have proven adequate, even during the busy summer of 1978.

Additional sites are not warranted on the basis of current use levels, nor would a further proliferation of sites be consonant with the atmosphere of the islands. On a more practical level, there are no additional sites possessing all the desirable qualities of level terrain, resistant soils, water supply, beach and sheltered access.

Consequently it is recommended that no additional campsites be developed, nor enlargement of the existing sites be undertaken. Illegal camping should be consistently discouraged, so that impact is restricted to those sites best capable of absorbing it. This task should become less onerous as information dissemination is improved.

At all campsites, development should be restricted to the pit privies already provided. No site clearing or water supply improvements should be undertaken nor should tables or fireplaces be provided.

Visitors should be encouraged to use only driftwood for fires and a pack-in pack-out policy on litter should be enforced.

Periodic clean-up of sites should be done discreetly, to avoid giving the impression of regular garbage collection.

The use of the two remaining cabins does not now appear to be causing problems. Emphasis should continue to be on their emergency function, to avoid any problems of ill-prepared visitors relying solely on the cabins for shelter. The eventual objective should be their complete removal, so that the islands revert to a situation which requires visitors to be entirely self-sufficient.

Maintenance should be kept to a minimum so that capital investment does not become a barrier to eventual removal. The cabins should not be replaced and no others constructed.

Commercial accommodation facilities and facilities for group camping would be contrary to the proposal for small primitive

facilities only and should be prohibited in the islands.

Two floats are provided, at Clarke and Gibraltar Islands. Though they do not conform with the emphasis on visitor self-sufficiency, they do provide benefits with minimal environmental impacts. The float at Gibraltar Island is used by the M.V. Lady Rose for transporting visitors with canoes and kayaks to and from the islands. The Clarke Island float provides moorage at a popular beach and camping area with a poor anchorage. It is recommended that both floats be retained but no others built. Good anchorages are available elsewhere and in conjunction with the dinghies carried on board the deeper draught boats, allow visitors to go ashore at all popular locations.

2.1 Existing primitive campsites will be maintained on Clarke, Benson, Gilbert, Turret, Willis, Gibraltar, Hand and Jaques Islands. No additional campsites will be provided and no enlargements of

existing sites will be undertaken. All camping will be restricted to these sites.

- 2.2 Pit privies will be the only facilities provided at campsites. No site clearing or water supply improvements will be undertaken.
- 2.3 Visitors will be encouraged to use only driftwood for fires. A pack-in pack-out litter policy will be enforced. Periodic discreet site clean-up will be undertaken.
- 2.4 Only minimal maintenance of the cabins on Clarke and Jaques Islands will be undertaken. They will not be replaced nor should new cabins be constructed. The emphasis should continue to be on the emergency function of the cabins.
- 2.5 Commercial accommodation facilities and facilities for group camping will be prohibited.
- 2.6 The existing floats will be retained at Clarke Island and Gibraltar Island, the latter primarily for the use of the M.V. Lady Rose transporting small boats to

and from the Islands. No other floats will be provided.

3. Recreation Activities and Facilities

The dominant activity in the Broken Group Islands area is boating, with visitors constantly moving from island to island to explore the shorelines.

Boating of this nature does not require specialized facilities such as launching ramps or floats. In fact, they would be contrary to the atmosphere of solitude and discovery being sought by the visitors, since developments tend to create their own market and attract visitors who might not otherwise be interested in the area. It would be self-defeating to introduce facilities that would destroy the wilderness character of the islands. Consequently no boating facilities, other than the floats at Gibraltar and Clarke Islands, are proposed.

The navigation aids installed by the Department of Transport would, of course, remain.

The lack of a fuel supply may be restrictive to power boaters but outlets are available only 8 miles away (though admittedly across open water) in Ucluelet and Bamfield. The emphasis for all visitors must be on self-sufficiency.

Primitive trails exist on a few islands but are little used. However, they do give boaters the opportunity to stretch their legs and to explore the interior vegetation communities. Those on Benson and Wouwer Islands also enable visitors to explore the outer exposed coastlines which are not easily accessible by water. For the small amount of work involved, it would be worthwhile to occasionally brush out the trails and to continue marking them on maps and brochures. No new trails are proposed.

Scuba diving is becoming an increasingly popular sport and the few figures available indicate that more dives are being made in the islands. Barkley Sound is noted for the variety and colour of its underwater flora and fauna. The diversity of habitats in the

islands combined with relatively sheltered waters provide favourable conditions for diving. It should be expected that the islands will continue to attract more and more divers. As long as diving activities are non-consumptive, no problems should arise. However, the impact of collecting, particularly of abalone, is a concern. Continued liaison with the Department of Fisheries will be required to set appropriate catch limits.

Clam digging and salmon fishing are popular activities. Both are regulated through Department of Fisheries regulations. Problems do not exist now but periodic monitoring, particularly of mollusc populations, should be undertaken. The situation may well be self-regulating - as populations diminish, it becomes less worthwhile to dig clams and interest may drop until populations build up again. The peak visitor use season also coincides with the period when "red tide" is most prevalent and this undoubtedly discourages many visitors. A simple warning in publications could be an

effective method of avoiding over-harvest problems.

The collecting of shells and driftwood undoubtedly occurs but is very difficult to assess and generally impossible to control. There is constant replenishment of deposits by the tides, so that the impact of current use levels is likely negligible and highly localized at campsite beaches. A plea for restraint in publications would probably be the most practical and effective method of management.

- 3.1 Boating facilities will be limited to the floats at Clarke and Gibraltar Islands and the navigation aids operated by the Department of Transport.
- 3.2 The emphasis for all visitors will be on self-sufficiency in equipment and supplies, including fuel.
- 3.3 Existing primitive trails will receive occasional minor maintenance. They will be marked on maps and brochures.
- 3.4 Scuba diving is accepted as an appropriate activity in the islands.

Abalone populations will be regularly monitored and catch limits set through liaison with the Department of Fisheries. Non-consumptive enjoyment of submarine features will be emphasized.

3.5 Mollusc populations will be periodically monitored, particularly at popular clam beaches and catch limits adjusted as necessary. Publications will discourage excessive collecting and will carry a warning about "red tide".

3.6 Park publications will request restraint in the collecting of shells and driftwood and will explain their role in natural ecosystems.

4. Interpretation and Information

No interpretation is currently being undertaken in the Broken Group Islands. This absence contributes to the sense of discovery for visitors who enjoy exploring their surroundings but it also means visitors may overlook some items of interest. The outstanding feature of the islands is undoubtedly the underwater environment which

does not lend itself readily to on-site interpretation. Additionally, on-site exhibits, whether on land or underwater would not be in harmony with the wilderness setting of the area. It would be preferable to use an alternative approach such as publications made available outside the unit. Any such approaches should be general in nature e.g. they might discuss typical submarine features associated with a rocky substrate or the typical pattern of Indian use of the area. They should not, however, draw attention to individual sites. The publications should trigger an interest in the surroundings without destroying the sense of discovery and without concentrating use in certain locations.

Before any of these suggestions are implemented, an Interpretive Management Unit plan should be completed, to ensure a logical and systematic approach.

If commercial boat tours of the islands do develop, the possibilities for interpretation should be considered (e.g. a naturalist on

the board, with a request for an assessment of its significance.

The location of the park boundaries ~~has~~ also excluded access points for visitors travelling to the Islands. However, as mentioned previously, the present arrangement is working satisfactorily and there is no reason to seek change. No attempt should be made to acquire boat access points.

B. Regional Planning

Visitors travel from several directions to the Broken Group Islands, frequently using other sites en route e.g. upper Alberni Canal, Julia Passage, Pinkerton and Deer Groups. The Broken Group Islands are, and should continue to be, just one element in a regional recreation hating system, providing an unaltered wilderness environment. Other areas would be available for commercial resorts, cottages, unhindered recreational use, provincial marine parks, ecological reserves, etc. Parks Canada should co-operate in any regional planning

undertaken for Barkley Sound but should not attempt to acquire any more areas unless there are outstanding features that warrant inclusion in the national park system (see the previous references).

C. Indian Reserves

Four Indian Reserves are located in the Broken Group Islands, on Effingham and Nettle Islands (2) and the whole of Keith Island.

Little use is presently made of these areas by Indian bands but they are occasionally used by park visitors.

The archaeological resources and the undisturbed natural landscapes of the reserve lands complement and contribute to the wilderness setting and objectives of the Broken Group Islands park unit.

Potential exists for a co-operative management approach by maintaining liaison with the band councils with the aim of achieving mutually acceptable goals.

- 5.1 The need to protect the cormorant nesting sites on Starlight Reef, Great Bear Rocks and Alley Rocks will be discussed with the B.C. Fish and Wildlife Branch and the B.C. Ecological Reserves Unit.
- 5.2 The National Historic Sites and Monuments Board will be asked to assess the significance of the Sechart Whaling Station.
- 5.3 No attempt will be made to acquire an access point on Vancouver Island for boaters visiting the Broken Group Islands.
- 5.4 Parks Canada will co-operate in any regional recreation planning undertaken in the Barkley Sound area but will not attempt to acquire more areas unless outstanding features exist which warrant inclusion in the national park system.
- 5.5 Liaison will be maintained with the band councils whose reserves are located in the Broken Group Islands; the aim should be to achieve mutually acceptable goals.

6. Park Administration

The Broken Group Islands are patrolled regularly during the summer by a seasonal warden whose headquarters are a cabin on a float in Nettle Bay. Occasional patrols are made from Ucluelet during other times of the year. The arrangement appears to be satisfactory. The frequent patrols effectively establish a "Parks Canada presence" and visitors quickly learn to recognize the combination of grey Zodiac, orange jacket and full throttle Mercury 200 as "the warden". The personal, informal approach seems to be welcomed by visitors, certainly in preference to a proliferation of park signs and other tangible evidence of "authority".

The patrol cabin is well located in the sheltered waters of Nettle Bay. Because of the small size of the unit, all areas can be quickly reached from this location. No superior site exists and consequently it is recommended that the cabin remain in Nettle Bay.

resource management objectives for all

islands were approved in 1974. The objectives are still valid and no amendments are required at present. The resource management objectives should be regarded as an integral part of this overall management plan.

Reference has been made to the other park operational sections in previous sections of this plan.

The main objective in managing the islands should be to perpetuate their wilderness character. This implies not only minimal visitor facilities but also minimal tangible evidence of park management.

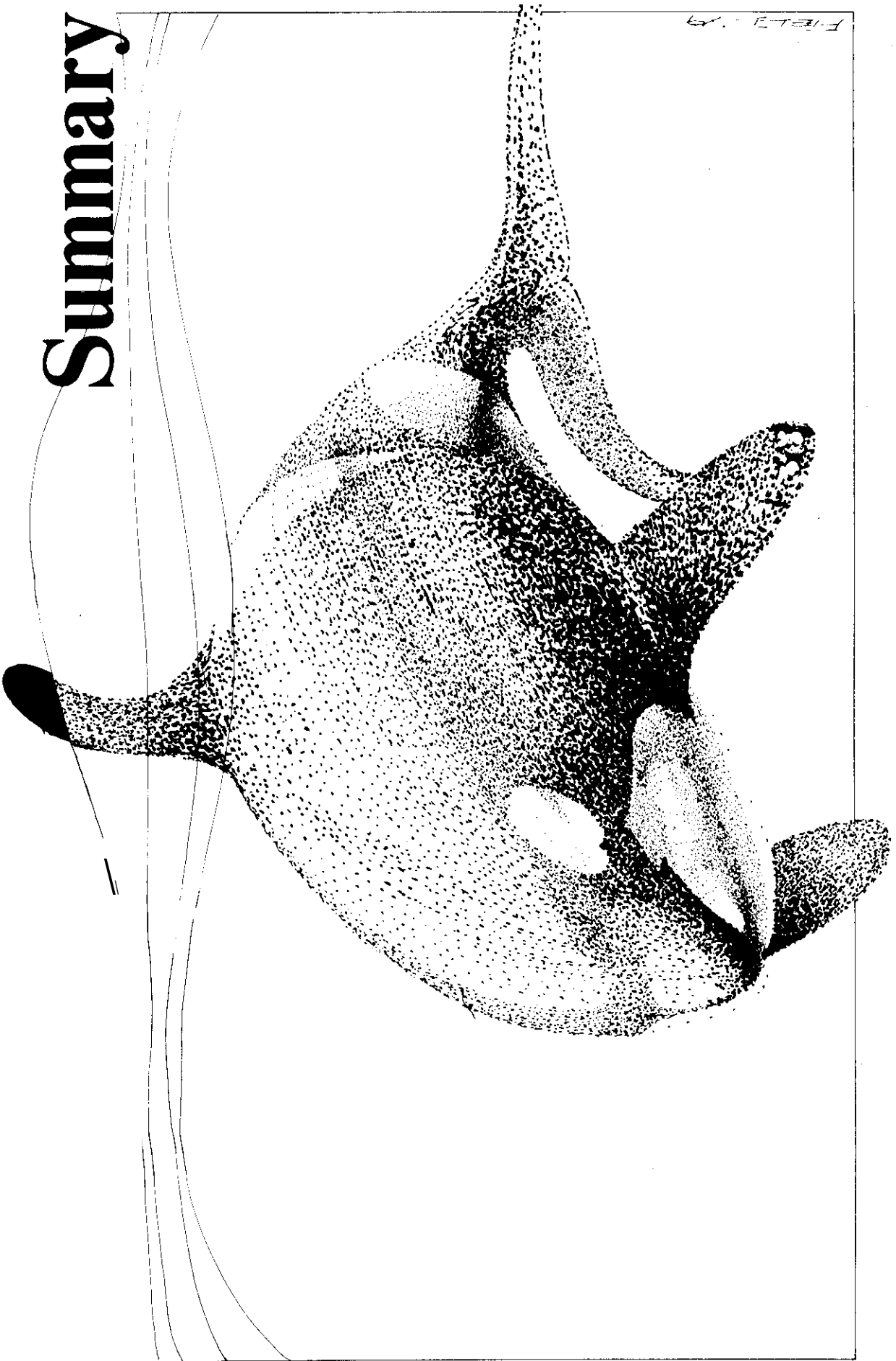
- 6.1 Frequent warden patrols of the islands will be undertaken during the summer months and occasional patrols at other times. The emphasis will be on personal contacts with visitors rather than the use of signs.
- 6.2 The warden cabin will remain at its present location in Nettle Bay.
- 6.3 The resource management objectives

are

part of this overall management plan.

- 6.4 The main objective in managing the islands will be to perpetuate their wilderness character through minimizing both visitor facilities and tangible evidence of park management.

Summary



V SUMMARY

The Broken Group Islands are only just becoming known to visitors. Because of the isolation, they have largely escaped exploitation and development in the past. Paradoxically, the legal protection granted them by national park status attracts attention and creates the problem of maintaining their peacefulness. However, this plan recognizes that the wilderness qualities of the area are paramount and management must be aimed at perpetuating such an atmosphere. Consequently, a series of policies are proposed to achieve this objective.

The other important influence is the regional setting of the islands. They form one of three units in Pacific Rim National Park and parts of the other units, Long Beach in particular, are better suited to and managed for intensive recreation. It is also important to remember that there are numerous other areas in Barkley Sound which are of interest to boaters. Through co-operative

regional planning it should be possible to channel intensive recreational development into other areas, leaving the Broken Group Islands as an example of Pacific coastal wilderness.

- Muller, J.E.
The Geology of Pacific Rim National Park. Geological Survey of Canada for Parks Canada, Calgary, 1974.
- Paish, Howard and Associates, Ltd.
The Canadian Marine Environment as a National Park Theme for Parks Canada, Ottawa, 1970.
- Parks Canada
Longitudinal Data on the Participation of Canadians in Outdoor Recreation Activities, 1967-1976.
Report #SERD 71-15, Ottawa, 1977.
- Parks Canada
Pacific Rim National Park, Long Beach Unit, Provisional Master Plan
Calgary 1973.
- Parks Canada
Parks Canada Policy
Ottawa, 1979
- Parks Canada
Zoning in National Parks
Ottawa 1978.
- Pierce, T.W.
A Survey of Soils and Landforms, Phase I and II, Pacific Rim National Park for parks Canada, Calgary, 1973.
- Retfalvi, Laszlo
Surveys of Bald Eagles in Barkley Sound, B.C., 1970-73.
Canadian Wildlife Service, 1977.
- Robilliard, G.A.
Preliminary Survey of the Intertidal and Subtidal Marine Fauna and Flora of Pacific Rim National Park for Parks Canada, Calgary, 1971.
- Robinson, Neil (Park Warden)
A Report on the Visitor Use Survey in the Broken Island Group - Phase 11. 1973.
- Salvat, Bernard
Guidelines for the Planning and Management of Marine Parks and Reserves In "Proceedings of an International Conference on Marine Parks and Reserves" I.U.C.N., Morges, Switzerland, 1976.
- Smith, Ian
Vancouver Island: Unknown Wilderness
Seattle, 1973.
- Vandal, J.P.
Recreational Capability and Use of the Broken Group Islands Thesis, University of Alberta, 1975.
- White, Brian P.
Human History Study, Pacific Rim National Park for Parks Canada, Calgary, 1974.

REFERENCES

- Bell, Marcus AM.
Annotated Bibliography of the National Park, Ucluelet, B.C. for Parks Canada, Calgary, 1971.
- Bell, Marcus AM. and A. Harcombe
Flora and Vegetation of Pacific Rim National Park, Phase 2, Broken Group Islands
for Parks Canada, Calgary, 1973.
- Bodsworth, Fred
The Pacific Coast in Illustrated Natural History of Canada series.
- Congdon, Brian
Broken Group Islands, Visitor Use Statistics, July 1, 1977 - Sept. 3, 1977.
- Congdon, Brian
Broken Group Islands, Visitor Use Statistics, 21 May 1978 - 3 Sept. 1978.
- Congdon, Brian
Broken Group Islands, End of Summer Report September 1978.
- Dougan, H. and G. McLean (Park wardens)
Recommendations for primitive Campsites in Unit 11, Pacific Rim National Park, 1975.
- Hatler, D.J., R.W. Campbell and A. Dorst
Birds of Pacific Rim National Park for Parks Canada, Calgary, 1973.
- Hatler, D.J.
The Mammals of Pacific Rim National Park for Parks Canada, Calgary, 1972.
- Hubbard, WF.
Annotated Bibliography of Pacific Rim National Park, Part II (1971-77) for Parks Canada, Calgary, 1977.
- Lee, J. Charlene and N. Bourne
Marine Resources Inventory of Pacific Rim National Park. Fisheries Research Board Report #1389
Nanaimo, B.C., 1976
- Lee, J. Charlene and N. Bourne
Marine Resources Inventory of Pacific Rim National Park, 1976. Fisheries and Marine Service Manuscript Report #1436
Nanaimo, B.C. 1977
- Lee, J. Charlene and N. Bourne
Marine Resources Inventory of Pacific Rim National Park, 1977. Fisheries and Marine Service Manuscript Report #1467
Nanaimo, B.C. 1978.
- Lee, R.K.S. and A.L. Sutherland
Benthic Marine Algal Survey of Pacific Rim National Park
for Parks Canada, Calgary, 1972.
- MacArthur, Robert H. and Edward O. Wilson
The Theory of Island Biogeography
Princeton, 1967.

Appendices & Figures



Appendix 1 SOIL SUITABILITY FOR RECREATION

The following analysis is based on data provided in T.W. Pierce's "Survey of Soils and Landforms, Phases I and II, Pacific Rim National Park" (1973).

Pierce provides Recreation Value Assessments for soil units in Phase I but they are not based on inherent soil characteristics. The assessments are based on interpretive potentials e.g. a good viewpoint rates highly, whether on rock or poor soil.

The following analysis for Phase II is based on inherent soil characteristics alone, using data provided by Pierce.

Four factors were considered in rating the recreational suitability of individual soil units.

1. Soil Type

The predominant soil type in the Islands is

till which is generally fine textured and shallow. Ablation Till (Ta) was the only till soil considered to have any recreation suitability because of its greater depth and then only in combination with good drainage and low erodibility.

Three other soil types were considered to have some suitability:

Sc - Schooner Cover marine soils, which are generally fairly level and moderately well drained.

Rg - Rogosols

M - Middens, which are not further classified by Pierce.

All other soil units were excluded from further consideration.

2. Drainage

This is an important consideration in an area with high rainfall. Pierce lists six drainage classes:

1. Rapid
2. Well
3. Moderately well
4. Imperfect
5. Poor
6. Very poor

Only those units falling into the first three classes were considered to have any suitability for recreation.

3. Slope

slope is important because of its influence on drainage and erodibility and on the usability of sites. Camping is the main terrestrial activity in the Islands and requires fairly level terrain.

Pierce lists five **slop** classes of which only the first two are applicable:

1. 0% - 15% slope
2. 16% - 30% slope

4. Erodiability

Erodiability is based on susceptibility when the vegetative cover is removed. This factor is important because of the heavy rainfall, soil textures and **slope** characteristics. Four classes are defined by Pierce:

1. Extreme
2. High
3. Moderate
4. Low

Other factors identified by Pierce (e.g. soil texture, gravel and stone content) were considered to be of less significance in this analysis.

The factors were grouped as follows:

<u>High</u>	soil type	: Sc, Rg
	drainage	: 1 - 3
	slope	
	erodibility	: 3 - 4

Moderate soil type : Sc, Rg, M
 drainage : 1 - 3
 slope : 1
 erodibility : 2

LOW soil type : Sc, Rg
 drainage : 1 - 3
 slope : 2
 erodibility : 3 - 4

OR

 soil type : Ta
 drainage : 1 - 3
 slop : 1
 erodibility : 2 - 4

By applying **the** grouping of factors to **the** soil units identified by Pierce, **it** was possible to determine soil suitability for recreation as listed **below**. Other factors such as vegetation cover, accessibility for boats **and** water supply would also have to be considered in developing an overall recreation rating.

Soil Unit Number	Soil Type	Drainage Class	Slope	Erodibility Class	Recreation Suitability
2	Rg	1	1	2	Mod. ■
4	Rg	I	1	2	Mod.
6	Rg	1	1	2	Mod.
a	Sc	3	1	2,3	Mod.
14	sc	3	1	2	Mod.
24	Sc	1	1	2	Mod.
25	M	1	1	-	Mod.
32	Ta	3	1	2	LOW
41	Ta	3	1,2	2,3	LOW
63	Sc	3	1	2	Mod. ■
67	Ta	3	1	3,2	LOW
76	M	-	-	-	Mod.
81	Sc	3	1	2	Mod.
85	Ta	3	1,4	2	LOW
101	Ta	3	1	2	LOW
109	Ta	3	1,2	2	LOW
114	M	-	-	-	Mod.
119	Sc	3	1	2,1	Mod.
122	sc	2	1	2	Mod.
126	Sc	3	1	2,3	Mod.
139	Ta	3	1	2	Low
142	M	-	-	-	Mod.
144	M	-	-	-	Mod.

Soil Unit Number	Soil Type	Drainage Class	Slope	Erodibility Class	Recreation Suitability
145	Ta	3	1	2,3	LOW
157	Ta	3	1	2,3	LOW
173	Ta	3	1,2	2	LOW
175	Ta	3	1	2	LOW
187	Ta	3	1,4	2	LOW
191	Rg	1	1	2	Mod.
210	Rg	2		2	Mod.
212	M	-	-	-	Mod.
213	Rg	1	1	2	Mod.
214	Rg	1	1	2	Mod.
219	Sc	1	1	2	Mod.
224	Rg, Sc	1	1	2	Mod.
234	SC	2	1	2	Mod.
239	Ta	3	1,2	2	LOW
245	M	-	-	-	Mod.
241	Sc	1	1	2	Mod.
251	SC	1	1	2	Mod.
255	Sc	1	1	2	Mod.
258	Rg	1	1	3	High
259	Ta	3	1,2	2,1	LOW
263	Rg	1	1	2	Mod.
265	Rg	1	1	2	Mod.
266	Sc	1	1	2	Mod.

Soil Unit Number	Soil Type	Drainage Class	Slope	Erodibility Class	Recreation Suitability
268	SC	2	1	2	Mod.
270	M	-	-	-	Mod.
272	sc	1	1	2	Mod.
211	sc	1	1	2	Mod.
285	sc	3	1	2	Mod.
287	Ta	3	1	2	LOW
298	sc	2	1	2	Mod.
301	Rg	1	1	2	Mod.
302	Rg	1	1	2	Mod.
304	Sc	2	1	2	Mod.
313	Ta	3	1,2	2	LOW
324	Sc	2	1	2	Mod.
327	M	-	-	-	Mod.
335	Sc	3	1	2,3	Mod.
336	M	-	-	-	Mod.
338	Sc	3	1	2,1	Mod.
339	Ta	3	1	2	Mod.
341	Rg	1	1	2	Mod.
342	Rg	1	1	2	Mod.
344	Ta	3	1,2	2,3	LOW
348	Ta	3	1,2	2	LOW
349	M	-	-	-	Mod.
351	Sc	3	1	2	Mod.

Soil Unit Number	Soil Type	Drainage Class	Slope	Erodibility Class	Recreation Suitability
352	Sc	3	1	2	Mod.
357	Rg, Sc	2	1	2	Mod.
358	Ta	3	1,2	2	LOW
359	M	-	-	-	Mod.
365	M	-	-	-	Mod.
366	M	-	-	-	Mod.
367	Ta	3	1,2	2	LOW
372	Ta	3	1	2	Low
383	Ta	3	1	2	LOW
385	Ta	3	1,3	2,1	LOW
386	Ta	3	1	2	LOW
387	M	-	-	-	Mod.
389	M	-	-	-	Mod.
392	Sc, Rg	1	1	2	Mod.
394	Rg	2	1	2	Mod.
396	Rg	3	1	2	Mod.
399	Ta	3	1	2,3	LOW
401	Ta	3	1	2,3	LOW
402	M	-	-	-	Mod.
412	M	-	-	-	Mod.
416	M	-	-	-	Mod.
422	Ta	3	1,2	2	Low
425	M	-	-	-	Mod.

Soil Unit Number	Soil Type	Drainage Class	Slope	Erodibility Class	Recreation Suitability
437	M	-	1	-	Mod.
439	Rg	2	1	2	Mod.
444	Ta	3	1,	2	Low
445	Rg	2	1	Z, B	Mod.
446	Rg	2	1	2	Mod.
447	Ta	3	1,	2	Low
449	Rg	2	1	2	Mod.
451	Ta	3	1	Z, B	Low
454	Ta	3	1	Z, B	Low
464	Sc	2	1	2	Mod.

Appendix 2 RESOURCE MANAGEMENT OBJECTIVES

In the context of the National Park Act and Policy, the following general objectives will serve as guidelines to the planning and management of the Broken Group Islands Unit (hereafter referred to as the "unit"):

1. To preserve in an undisturbed state, the natural features and processes occurring in the unit.
2. To manage the natural features and processes only where such management is necessary to compensate for man-induced effect.
3. To provide a high quality wilderness experience to all users by limiting development to primitive facilities on a few islands.

Resource management sub-objectives were assigned following an analysis of the resource inventory. Sub-objectives are stated in terms of the protection, monitoring, research and manipulation requirements of the following five resource components:

- A. Physiographic Resources
- B. Soils
- C. Floral Resources
- D. Faunal Resources
- E. Historical and Archaeological Resources

The resource management sub-objectives outlined below provide more detailed direction to aid park resource managers.

A Physiographic Resources

The geological features of the unit are included within the West Coast Complex which includes gneissic diorite, quartz diorite, gabbro and amphibolite.

1. Agmatite Exposure - Hand Island

There are numerous agmatite deposits throughout the unit. A highly representative exposure occurs on Hand Island. Photos and discussion are given in Muller 1974.

Protection requirements

1. This exposure is relatively indestructable and requires no special

protection other than enforcement to ensure that defacing or unnatural destruction does not occur.

Monitoring requirements

Thorough checks are to be made just prior to, during and shortly after the visitor season.

2. Fault Zone-Combe Rock

Combe Rock is situated off the west tip of Wouwer island and contains an uncommon exposure of quartzitic fault breccia (Muller 1974)

Protection requirements

This exposure is relatively indestructable and requires no special protection, other than enforcement to ensure that defacing or unnatural destruction does not occur.

Monitoring requirements

Thorough checks are to be made just prior

to, during and shortly after the visitor season.

3. Silicified Sediments - Cree Island

Cree Island is located in the southwest section of the unit and contains unusual thinbedded, tightly folded silicified sediments (Muller 1974).

protection requirements

This formation is relatively indestructable to natural erosional influences. However, protection is required to ensure that no removal, defacing or degradation of this resource occurs through unnatural causes.

Monitoring requirements

Thorough checks are to be made just prior to, during and shortly after the visitor season.

4. Stalactites, Stalagmites - Reeks Island

On Reeks Island there is a cave containing stalactites and stalagmites. No other formations of this type have been found to date.

Protection requirements

These features will be protected from unnatural destruction. Their location will be kept confidential at present.

Monitoring requirements

Thorough checks are to be made just prior to, during and shortly after the visitor season.

Research requirements

- i An attempt will be made to locate any other stalactites and stalagmites within unit and if ~~so, some~~ caves containing these features could be made accessible to the public.

- ii The techniques for future measurements of growth in these features will be determined and evaluated.

5. Meares Bluff

Meares Bluff is an impressive headland located on the east side of Effingham Island. It also marks the location of an unsubstantiated fortress site.

Research requirements

An investigation will be carried out to determine if a fortress was ever located at Meares Bluff.

B Soils

Landforms are **less** varied in the Broken Group Islands than in the Long Beach unit. The major terrain system is Till soils and one vegetation community, Thuja plicata - Tsuga heterophylla, (~~Western Red Cedar~~ - Western Hemlock) covers almost 80% of the area

(Pierce, 1973). Marine deposits similar to Grice Bay soils occur on many islands. Soils associated with tidal flats, organic bogs, middens and rocky headlands also occur.

Soil types within the unit have been classified according to slope, soil drainage, soil texture, soil compaction, gravel and stone content, landform type, and soil depth. Soil erodability, foundation and productivity values have also been assigned.

The most important factor affecting soil development and characteristics is drainage. Due to the high rainfall and gentle slopes over most of the unit, few soils are better than moderately well drained.

Protection requirements

- i To analyse the soils before any development occurs on a specific site in order that their suitability for development can be determined.
- ii To avoid development on soils having extreme or high erodability (Class

1,2), soils having no, extremely low, or low foundation (Class 1,2), and soils having a severe productivity restriction or low productivity (class 3,4) (Classification system from Pierce, 1973).

- iii Rills which are developed should, if possible, avoid steep ablation till slopes. These sites are subject to erosion and heavy use may cause mass wastage.

Monitoring requirements

Thorough checks of the soils/vegetation complex at each facility development are to be made just prior to, during and shortly after the visitor season.

Manipulation requirements

It may be necessary to manipulate the soils/vegetation complex associated with visitor facilities in order to avoid degradation through use and/or to upgrade site conditions to the desired standard (i.e. application of fertilizer).

Research requirements

Research is required to determine which manipulation treatments are most appropriate for managing visitor facilities.

C Floral Resources

Six major plant communities are described for the unit primarily on the basis of dominant species and gross physical landforms. Within these communities, 19 vegetation types are further delineated.

Three additional communities are defined on the basis on land use history, namely shell midden, logged/regenerative, and homestead communities.

Two hundred and thirty-one vascular plant species comprising 168 genera and 61 families occur in the unit. Only 26 species are abundant and widespread, 139 rare to sparsely distributed and 66 extremely rare.

Forty-eight species found in the Island are not recorded from the Long Beach Unit; 155 species from Long Beach Unit are not found in the Islands. One hundred and eighty-three species are common to both units. The major environmental factors influencing vegetation appear to be parent material, exposure to wind and ocean spray and soil moisture regime.

Protection requirements

- i The natural processes of successional change will be **allowed** to operate unhindered by man-caused interferences. This implies that individual vegetation types will be permitted to disappear if nature dictates.
- ii Areas of high environmental fragility will be protected from any type of man-made interference. Environmental fragility includes an assessment of **both** the soil's fragility and soil's productivity. The degree to which vegetation types can withstand various types of human use determines vegetation fragility.

However, it should be noted that research on the relative fragility of vegetation types is in its infancy (Kuchar 1972; Knapik, Landals, and Scotter 1974; Nagy and Scotter 1974).

- iii Areas containing rare vegetation types and rare plant species (within the unit and region) will be protected from man-made interferences.
- iv Areas containing highly representative vegetation types (within the unit and region) will be protected from man-made interferences.
- v Where possible, facility developments within forested areas should coincide with the most readily penetrated forest. This would result in a minimum of disturbance by clearing and minimum visual obstruction for observing the forest ecosystem. Only driftwood is to be used as the source of fuel for open fires. The use of prima-type stoves is to be encouraged.
- vi The removal of excessive amounts of driftwood from the unit will be prevented as required.

Monitoring requirements

- i Thorough checks of the soils/vegetation complex at each facility development are to be made just prior to, during, and shortly after the visitor season.
- ii Accessible areas containing rare plant species, rare vegetation types and highly representative vegetation (within the unit and region) are to be thoroughly checked just prior to, during, and shortly after the visitor season.
- iii Accessible areas of high environmental fragility are to be monitored for disturbance just prior to, during, and shortly after the visitor season.
- iv Careful monitoring is required of any driftwood being removed from the unit. Firewood supplies will be monitored during regular patrols.

Manipulation requirements

It may be necessary to manipulate the soils/vegetation complex associated with

visitor facilities in order to avoid degradation through use and/or to upgrade site conditions to the desired standards (e.g. application of fertilizer).

Research requirements

A vegetation analysis is required to determine areas containing rare plant species, rare vegetation types, highly representative vegetation types, (within the unit and region) and areas of high environmental fragility. Such an analysis is imperative if an effective land use zoning system is to be applied to this unit of Pacific Rim National Park.

D Faunal Resources

1. Marine Resources

Preliminary surveys of the intertidal and subtidal marine flora and fauna have been completed. (Robilliard 1971, Austin 1970, Lee and Sutherland, 1972). Numerous

intertidal and subtidal habitats occur making the unit the most diverse, physically and biologically, of the three major sections of the Park (Robilliard 1971). Public utilization of marine resources has not been intensive yet and much of the marine community is in its natural state or very close to it. Extensive public utilization may very well upset the complex interactions within marine communities, especially with regard to the large populations of several edible species of molluscs.

Protection requirements

- i No person shall take any living marine organisms, with the exception of traditionally edible shellfish, fish, and specimens collected for scientific study by authorized individuals. The present policy prohibiting collection on non-edible intertidal and subtidal species is to be maintained and enforced.
- ii Traditionally edible shellfish ((i.e. urchins, Dungeness crabs, abalone, rock

scallops, littleneck clams, butter clams, horse clams, goe ducks, and California mussels) will be considered a recreational consumptive resource that will be harvested only to the level that can be sustained naturally. Federal Fisheries regulations will be enforced where applicable.

- iii Federal Fisheries regulations pertaining to fish in tidal waters will be enforced. The unrestricted taking of fish other than salmon and ling cod will be conditional upon the completion of the marine biophysical program and the subsequent determination of quota levels.
- iv Park visitors should be encouraged to turn all rocks the way they found them, fill in holes dug in the sand, and generally leave the environment the way they found it.
- v A contingency plan must be prepared to protect marine resources in the event of man-made environmental perturbation (e.g. oil spills) which may alter the structure, stability, or the very existence of one or more of the biological communities present.

Monitoring requirements

- i Following completion of the marine biophysical program, a series of carefully selected, permanently established stations and transects should be monitored continuously to determine temporal and spatial changes in distribution, abundance, and composition of intertidal and subtidal species. Traditionally edible shellfish populations will be monitored in this way.
- ii Consumption of traditionally edible shellfish will be monitored regularly.

Research requirements

The distribution, productivity, and standing crop levels for the various edible fish and shellfish populations must be determined. The data will be used to establish appropriate yearly harvest levels.

Research Collecting

The tremendous diversity of marine floral and

faunal communities within the unit offers an attractive area for research collecting. Collectors for biological supply houses have in the past made extensive collections of some of the more abundant species, such as starfish (Pisaster ochraceus) in the Park area. Although the intensive collection may not affect the ecology of the Park as a whole, it could conceivably upset the stability of the marine community in a local area and change the faunal and floral diversity and composition.

Protection requirements

Guidelines will be formulated for research collecting within the unit.

Monitoring requirements

The collection of specimens for scientific study will be monitored by qualified personnel as required.

Research requirements

Appropriate quotas for collecting will be determined as required.

2. Avifauna

Preliminary surveys of the Park's avifauna have been completed (Hatler, Campbell, Dorst 1973). A total of 238 species of birds are known or strongly suspected to occur in the west coast area represented by Pacific Rim National Park.

A total of 45 species of sea birds has been recorded along water transects from the mouth of Ucluelet Harbour to Turtle Island. It appears that avian variety decreases with increasing water depth and degree of exposure in marine habitats (Hatler, Campbell, Dorst 1973). There are now very few sea bird nesting or regular roosting areas within the park unit. This should be corrected. Great Bear Rocks and Starlight Reef support the only known sea bird colonies in Barkley Sound near the Park. It is strongly recommended

that these small, rocky islets be included within Pacific Rim National Park.

The fragile nature of sea bird colonies has been well documented. Avifauna species recorded on the Islands within the unit are essentially those which would be expected in similar habitats on the mainland.

Protection requirements

- i To the greatest extent possible, protection from human disturbance should be provided for the sea bird colonies on Great Bear Pocks and Starlight Reef.
- ii Strict protection will be provided for all nest sites on land-oriented avifauna.
- iii All newly discovered sea bird nesting and roosting sites will be protected from human disturbance during critical periods except in the case of authorized scientific study.
- iv In order to minimize disturbance during monitoring surveys of sea bird nesting sites, the guidelines outlined in Hatler, Campbell, Dorst 1973 will be followed.

Monitoring requirements

- i Park personnel will continue to record observations of the avifauna within the unit, paying particular attention to the gaps in knowledge for a number of species.
- ii The distribution and performance of nesting seabirds will be recorded annually including those using Great Bear Rocks and Starlight Reef. Annual monitoring of colonies will include abundance, distribution, and productivity (number of nests, eggs, young) data.
- iii The distribution and performance of active bald eagle (Haliaetus leucocephalus) nests will be recorded annually.

Research requirements

A study will be undertaken to locate and describe all pelagic cormorant nesting sites within the unit.

3. Mammals

Ten species of native land mammals occur within the unit including 1 insectivore, 3 rodents, 5 carnivores, and 1 artiodactyl (Hatler 1972). These data include the results of small mammal trapping and observations of larger mammals and their sign on all of the named and several of the un-named islands in the unit.

Five species of seals (Pinnipedia) and seven species of whales (Catacea) have been recorded in the vicinity of Pacific Rim National Park. These are two groups of mammals which, as fauna of western Canadian National Parks, occur only in Pacific Rim.

Protection requirements

- i Marine mammals must be protected from harassment by man. Excessive disturbance of sea lions and seals at haul-out areas will not be tolerated. Aircraft should not be permitted to descend lower than 1,000 feet over the unit.
- ii A public awareness program must be carried out to emphasize the importance

of preventing human disturbance at all sea lion and seal haul-out areas.

- iii Land mammals must be protected from undue harassment by man.

Monitoring requirements

- i Park personnel will continue to record observations of land and marine mammals within the unit. It is recommended that a permanent file for observations be kept.
- ii Weekly surveys of sea lion and seal haul-out areas will be conducted from May - September annually to determine abundance, distribution and if possible, species composition and age structure. The degree of disturbance by man will also be monitored.
- iii All whale strandings should be investigated as quickly as possible, and standard measurements should be obtained. The British Columbia Provincial Museum and the U.B.C. Vertebrate Museum should be alerted to the possibility of obtaining specimen material. The same

holds for California sea lions and elephant seals. All other pinnipeds should at least be examined for ear tags, flipper tags, etc. and a series of measurements should be taken.

- iv Other mammals found dead should also be considered for potential museum specimens. Both the marten and the weasel from Vancouver Island are poorly represented in museum collections.
- v Any bat which is found should be identified.
- vi The navigator shrew should be watched for.

Research requirements

A study will be undertaken to determine the feasibility of introducing sea otter (Enhydra lutris) into the unit. This will include an assessment of the distribution, life history, and ecology of the kelp communities and possible consequences of the influence of otters. "If the otters are successful in establishing a "large" resident

population, they could significantly reduce the density and alter the population structure of their prey, especially abalones and urchins, and also several species of bivalves and smaller gastropods. The reduction in numbers of these herbivores would reduce the overall grazing activity in the kelp bed to the point where many more kelp sporlings could survive to become adult plants instead of being rasped off the rocks soon after settling. The areal extent and density of kelp beds would increase and provide the otters with additional protection from predators and wave action. As the otter population continued to increase, the herbivore population would decrease further and the recruitment of algae would increase. Eventually a balance should be achieved with an increase in abundance of otters and algae and decrease in abundance of herbivores (especially those which are prey for the otters) over the extant levels. Whether the expansion of the kelp community and the attendant changes

in overall community structure as a result of the introduction of otters would be beneficial or not we are unable to say at present. Even to assume that this scenario is any more realistic than any of several that might have been described without a longer and more detailed study of the ecology of the kelp community may be presumptuous. However, it is precisely this lack of knowledge which should be rectified before an introduction of otters takes place." Robilliard 1971.

E Historical and Archaeological Resources

Discussion (taken from White 1974)

The edge of a continent usually presents a complex human situation evolved over thousands of years from the comings and goings of coastal peoples.

The human occupancy of Vancouver Island's west coast is further clouded by our present ignorance of the region's pre-contact

history, and by the varied and transitory quality of European resource perception and utilization over the past 180 years.

Archaeological research indicates that a sizable pre-contact population inhabited the Park area. Village sites were seasonally occupied, with annual migration patterns roughly following resource availability. When Indian reservations were surveyed in the region in 1774, only those sites occupied or often used were included within reservation boundaries. As a result many summer whaling sites, winter village sites, and local lineage-house sites remained unalienated. Some have subsequently become Euro-Canadian settlements (e.g. Tofino, Clayoquot, Bamfield) while others, especially in the Broken Group Islands Unit, are now under the Park's jurisdiction. There are few features remaining in the present relict landscape from the pre-contact era, other than village and collecting site middens. The Broken Group Islands Unit contains well-preserved complexes of rock fish traps. They were constructed well before the contact era.

Some sea-caves might contain pre-contact burials, although the latter point is very tenuous. Evidence has been found indicating sea-caves were used for temporary habitation in the Nootka Sound area. Archaeological excavation in the Park might support this hypothesis.

At contact (1780) the Sechart tribe of the Nootka confederacy occupied the Broken Group Islands. Major villages were located on Effingham and Nettle Islands. Fur trading was active in Barkley Sound from 1780-1800. From 1800-1850 Vancouver Island's west coast was known and visited occasionally but slipped back into obscurity relative to its political and commercial importance during the last two decades of the eighteenth century. Europeans and Americans did not contemplate permanent settlement of Vancouver Island's west coast because of the areas' isolation and unsavory reputation. Too many white men had left their heads on top of poles in Nootkan villages.

The growth of Victoria as a fur trading and

provisioning centre began to have a significant effect on the Nootkan population in the 1850's when many began to leave their villages to trade seal skins and dogfish oil at the Hudson Bay store. Soon, enterprising independent trading skippers recognized the advantages of establishing stores near the villages, to garner the increasingly lucrative Nootka trade at its source. By 1855 traders had become established at a few locations along the coast, including Effingham Bay, Gilbert Island and Hand Island.

The naval survey of the west coast's resources between 1859 and 1862 convinced Governor James Douglas that the area was ripe for settlement, and pioneers were encouraged to take up land in the new community of Alberni.

The "Gunboat Diplomacy" of the North Pacific Squadron in policing the Nootkans undoubtedly helped allay any fears settlers might have had about taking up land, since the shelling of villages had a massively demoralizing

effect on the social cohesiveness of Nootkan tribal society. The Nootkans were increasingly drawn into association with the white men, acquiring their weapons, trade goods, liquor, and diseases.

The 1860's were the beginning of the end of traditional Nootkan culture, and the beginning of permanent European settlement. The remains of European settlements of the period in the Park region are few and far between. The most significant source of artifacts relating directly to European activities on the west coast continues to be trading anchorages, such as Effingham Bay off Effingham Island.

Some exploratory mining operations were in progress in Barkley Sound in the 1860's.

European settlement other than trading establishments, lighthouses, and missions remained very spordic until the later 1880's. The earliest significant landscape change by Europeans occurred during the last part of the nineteenth century. Land-clearing

operations, prospecting, small-scale lumbering, the development of settlements, missions, and the altered nature of Nootkan villages all contributed to the changing character of the human environment.

The establishment of major resource processing plants (Sechart whaling station, canneries, sawmills), in conjunction with the Christie Indian School and governmental establishments such as the Bamfield Cable Station, had an accelerating effect on homesteading during the decade 1900-1910. Several pre-emptions were registered in the Broken Group Islands. On Hawkins (Benson) Island, John Webb Benson cleared a pasture, planted European ornamental trees, and opened a small hotel complete with bar, for fishermen, cannery, sawmill and whale station workers to spend their holidays. The grove of trees planted by John Benson (Chestnut, Sycamore, Poplar, Beech) which originally surrounded the hotel, remains on Benson Island today.

Existing historic sites along the West Coast,

of Vancouver Island can be designated as follow;:

1. Prehistoric Sites

- (a) Middens
- (b) Petroglyphs
- (c) Fish traps
- (d) Fortress sites
- (e) Burial Caves

2. Historic Sites

- (a) Lighthouses
- (b) Missions and churches
- (c) Homesteads and other buildings
- (d) Shipwrecks
- (e) Trading anchorages
- (f) Trails and roads
- (g) Telephone lines
- (h) Resource extraction plants
- (i) Forts and wintering quarters
- (j) Wartime fortifications

Many of the above sites are found within the Broken Group Islands. Reconstruction of sites is not recommended since the high visitation generated by historic and prehistoric site development would be

incompatible with the Parks's preservational goals.

protection requirements

- i Burial caves will be protected from human disturbance in agreement with the local Indian band. Every effort must be made to ensure absolute confidentiality of their location.
- ii Important middens are to be protected from any type of human disturbance.
- iii Rock fish traps complexes are to be protected from human disturbance.
- iv Homesteads sites on Clark, Willis, Turtle, and Hand Islands are to be protected from human disturbance.
- v There is to be no salvage of any historic shipwrecks within the unit except where such shipwrecks pose an environmental or navigational hazard. The collection of artifacts from any historic shipwreck will be prohibited unless authorized by the Superintendent. The Park reserves the right to remove any artifacts and wrecks from within the unit.

Monitoring requirements

Regular monitoring of historic sites is required to ensure these sites remain undisturbed. All shipwrecks within the unit are to be mapped for monitoring purposes.

Research requirements

- i A study is required to assess the importance of all middens within the unit.
- ii A survey will be conducted to locate any additional burial caves within the unit.

Manipulation requirements

All cabins within the unit will be removed except the cabin on Clarke **Island.**

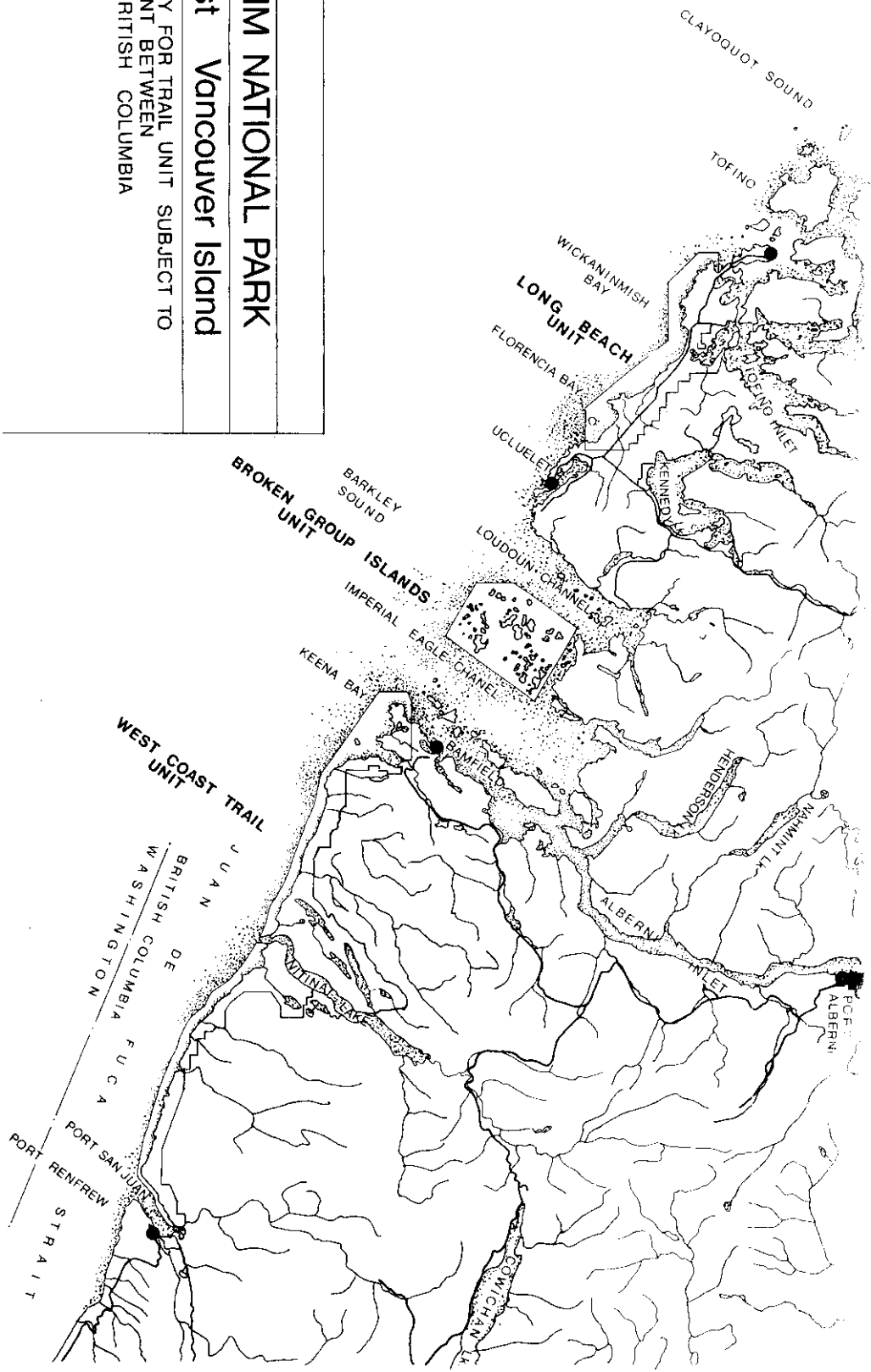
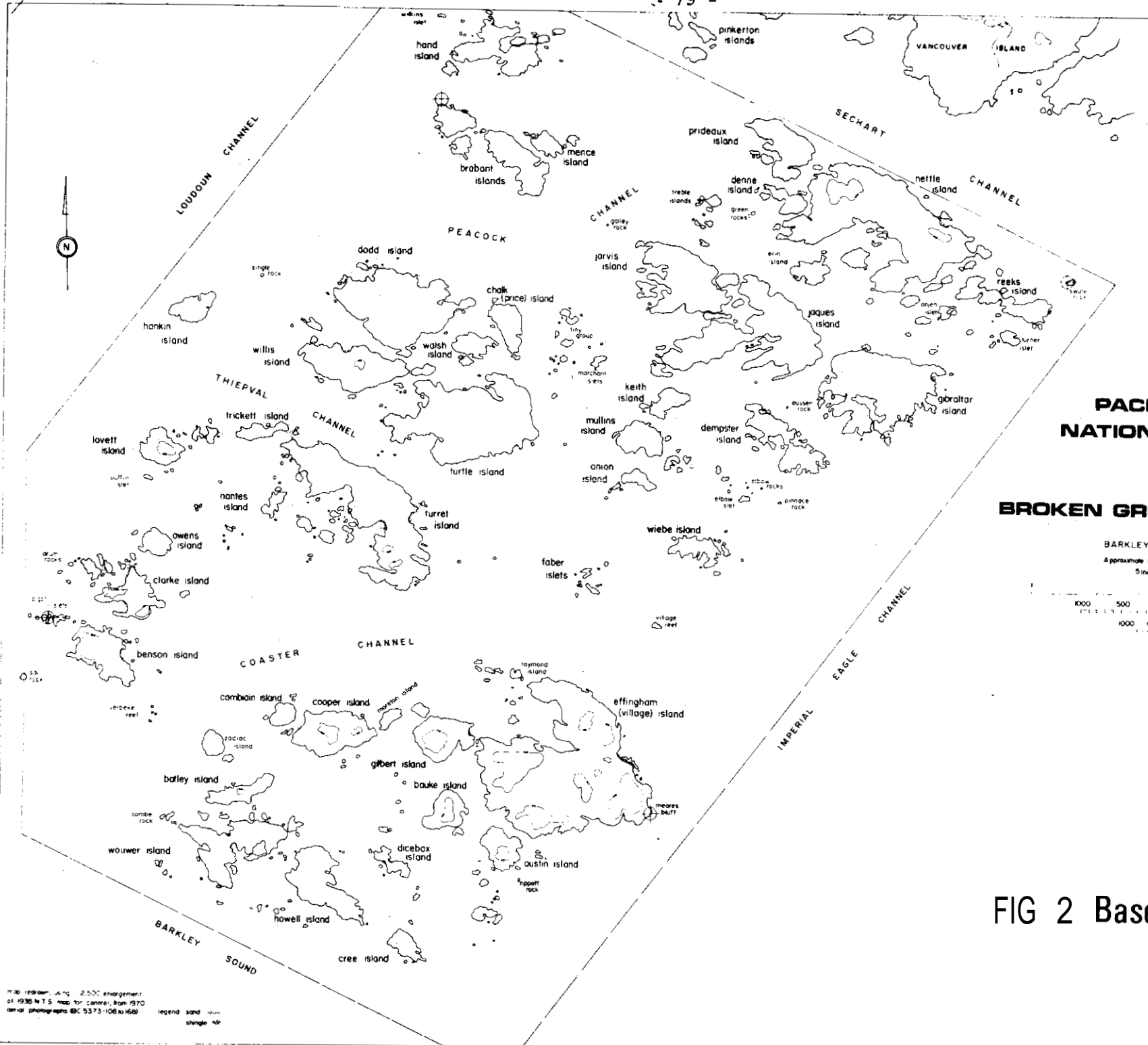


FIGURE 1

PACIFIC RIM NATIONAL PARK

West Coast Vancouver Island

PARK BOUNDARY FOR TRAIL UNIT SUBJECT TO FINAL AGREEMENT BETWEEN CANADA AND BRITISH COLUMBIA



PACIFIC RIM NATIONAL PARK

BROKEN GROUP ISLANDS

BARKLEY SOUND
 Approximate scale 1:12,500
 5 inches to 1 Mile

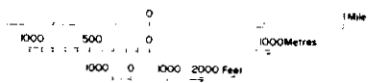
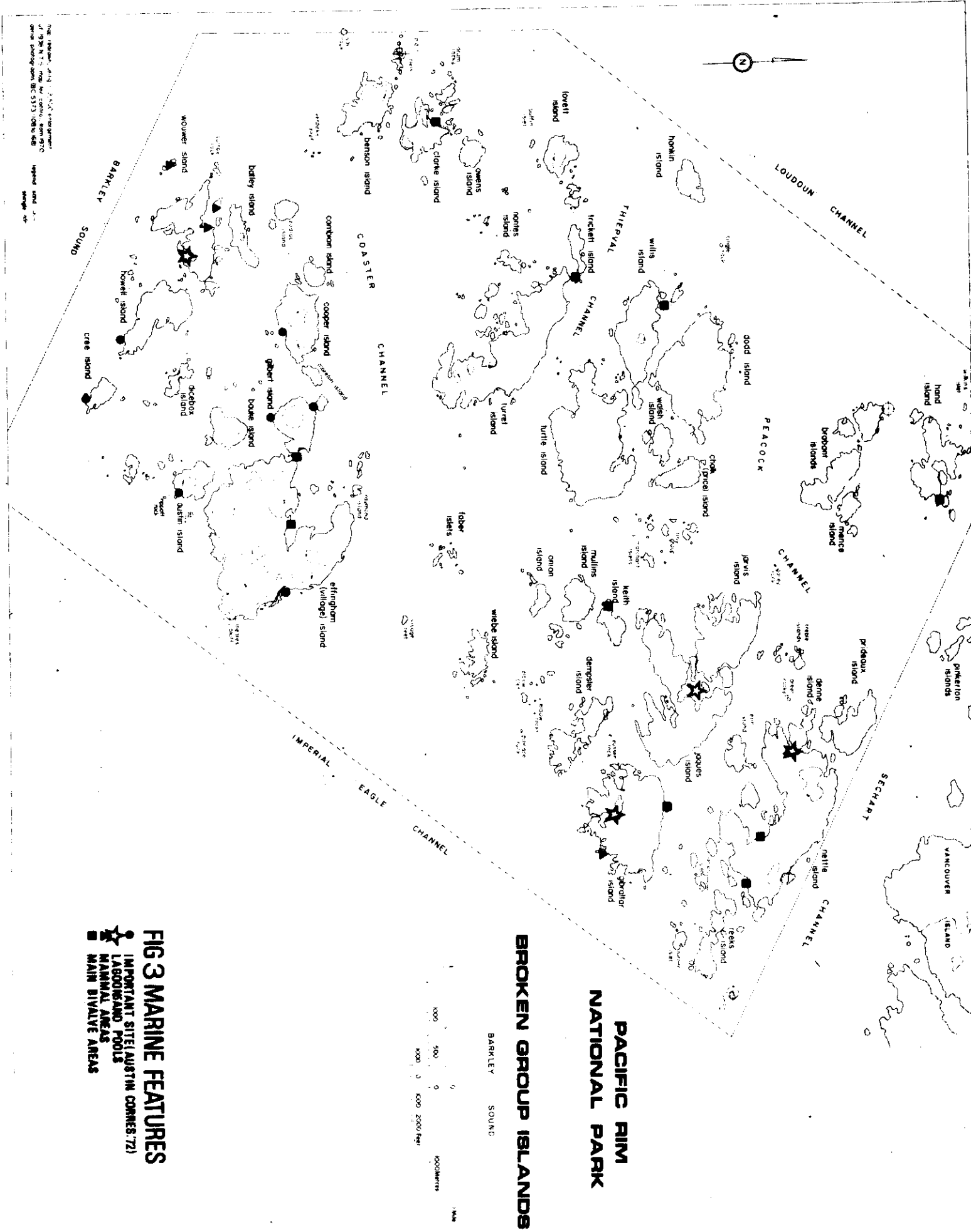


FIG 2 Base Map

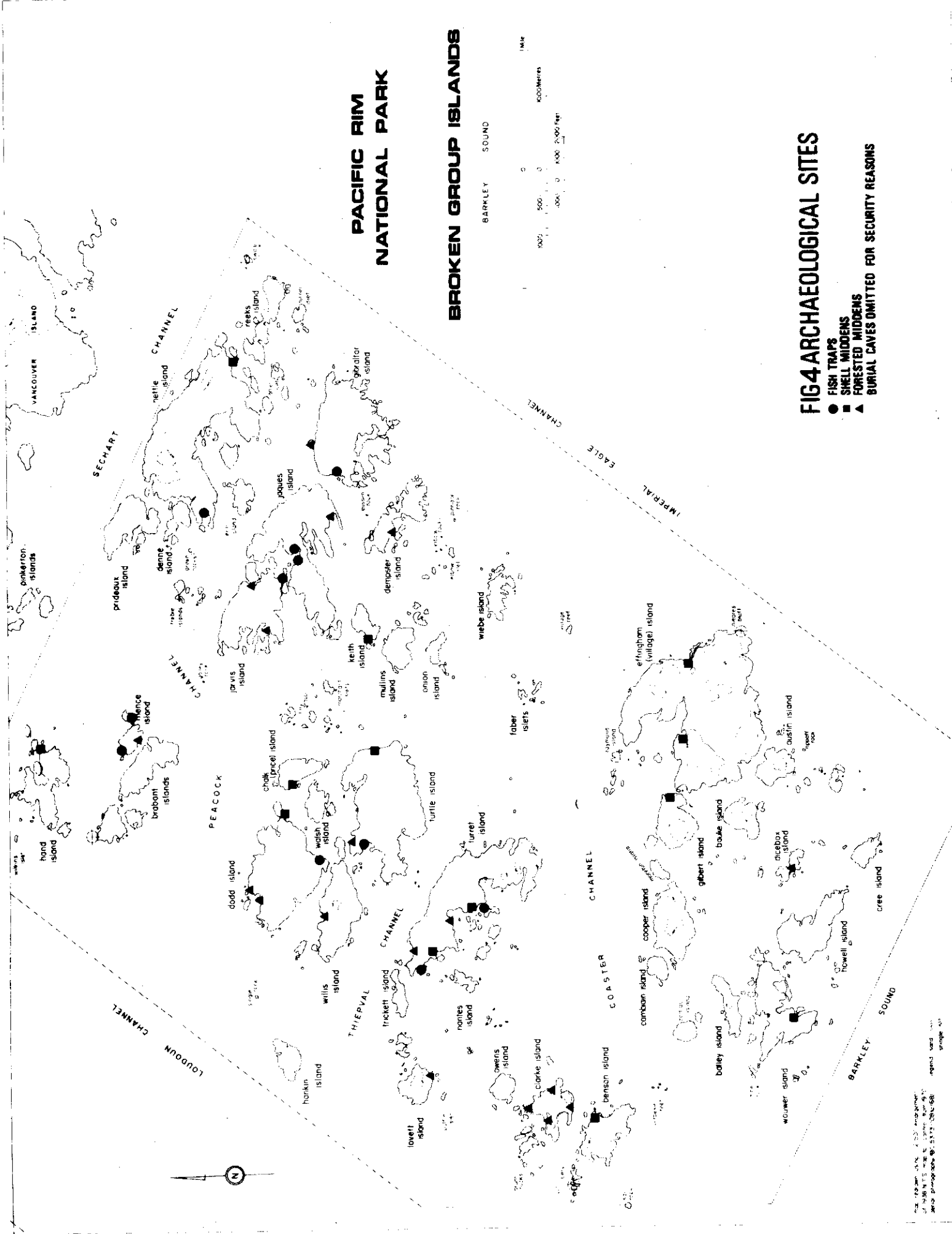
Map redrawn using 2,500' enlargement of 1936 N.T.S. map for control from 1970 aerial photographs (BC 5373-106 to 168) legend and shingle etc.



**PACIFIC RIM
NATIONAL PARK
BROKEN GROUP ISLANDS**

FIG 3 MARINE FEATURES
 IMPORTANT SITE(AUSTIN CORNER: 72)
 LAGOON AND POOLS
 MAMMAL AREAS
 MAIN BIVALVE AREAS

The Broken Group Islands are administered by the Department of Fisheries and Oceans, 1978 N.S. Road, Victoria, B.C. V8V 2X6. Date of publication: 1983. 1:50,000 scale.

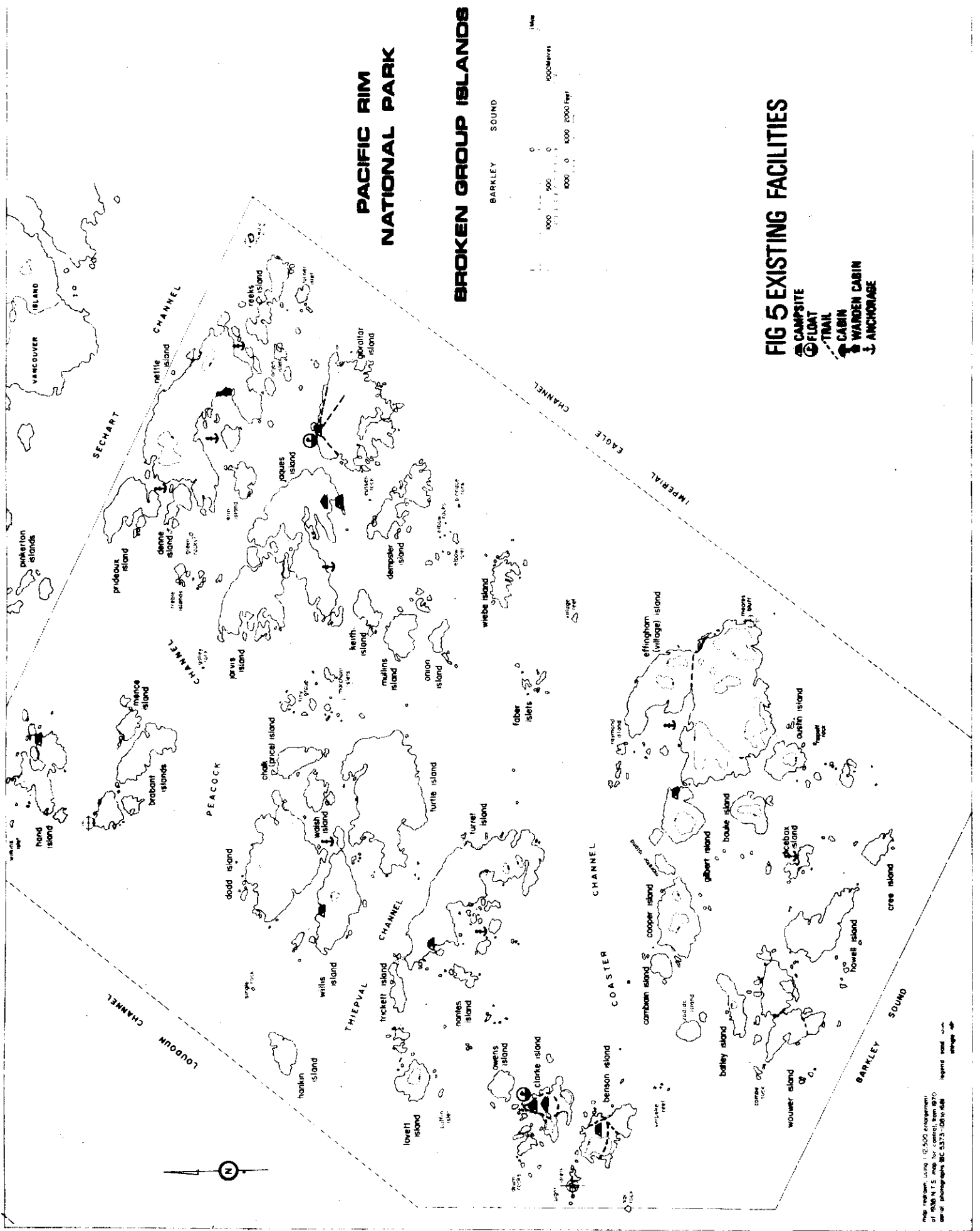


**PACIFIC RIM
NATIONAL PARK
BROKEN GROUP ISLANDS**

FIG 4 ARCHAEOLOGICAL SITES

- FISH TRAPS
- SHELL MIDDENS
- ▲ FORESTED MIDDENS
- ◆ BURIAL CAVES OMITTED FOR SECURITY REASONS

THE TOPOGRAPHY AND LOCATION OF THE ISLANDS AND CHANNELS SHOWN ON THIS MAP ARE BASED ON THE 1:50,000 SCALE MAP OF THE AREA, WHICH WAS PRODUCED BY THE CANADIAN GOVERNMENT IN 1968.



map prepared using U.S.G.S. photographs
of 1930 N.T.S. map for control from 1970
and photographs SIC 5373-100 to 658
legend and scale
sheet 48

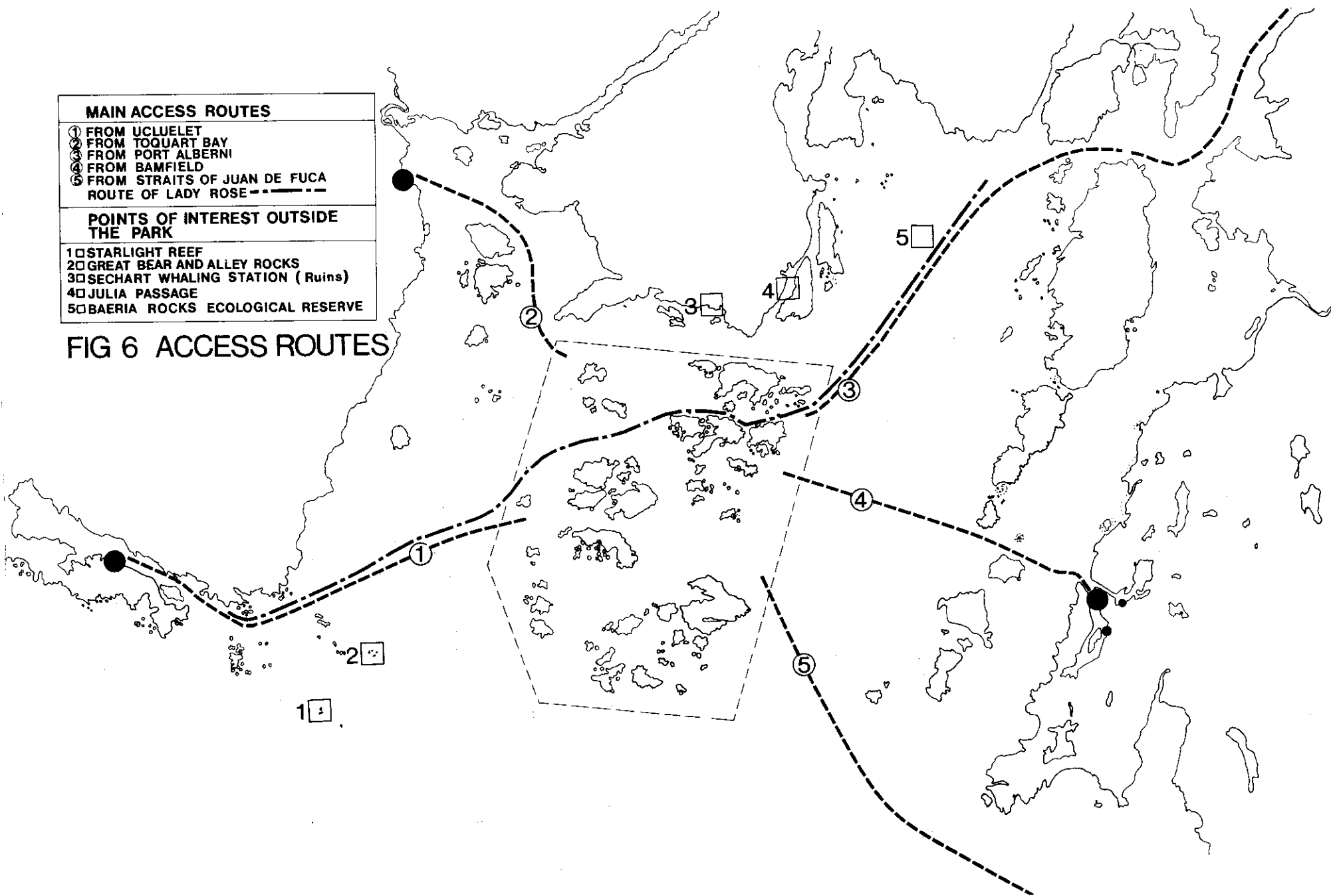


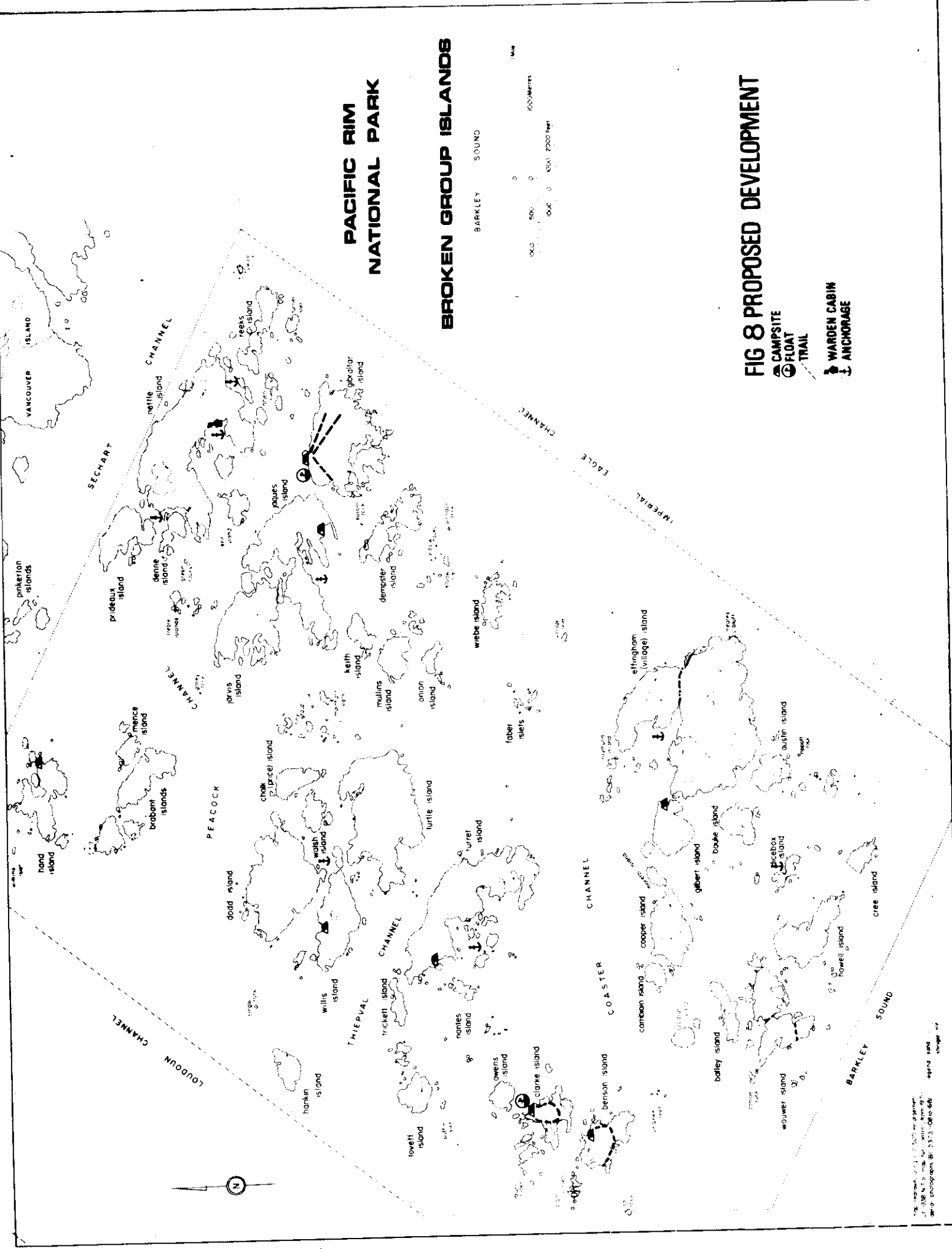
FIG 6 ACCESS ROUTES



map prepared using 1:250,000 enlargement of 1986 N.T.S. map for Canada, 50m 1970 aerial photographs, BC 533-10810 (88)

revised 1988

page 47



The map was prepared by the Pacific Rim National Park Authority, Victoria, B.C., Canada, from aerial photographs of 1973-75.