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attn. Alison Gill

ECOLOGICAL RESERVES COLLECTION
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Dear Alison,

Here is a draft of my paper 'Use of a Marine Mammal Reserve by Researchers and Photographers'. Although indicated in the table of contents, the abstract is not included at this time. To also be included in the final paper will be acknowledgments and a dedication.

To reiterate two points made during our last meeting, this paper is not a thesis but the credit equivalent of two graduate courses and therefore does not have the detail of a thesis. In addition, I will be in Telegraph Cove until approximately September 15. My address is given above. I would appreciate your comments by that date or earlier if possible. After September 15, mail will reach me at 2758 West 2nd Ave Vancouver, V6K 1K3.

Thanks very much for all the time you have taken.

Yours sincerely,

Robin

Robin Taylor

cc. Juri Peepre
Lousie Goulet
Phil Dearden

DRAFT

THE USE OF A MARINE MAMMAL RESERVE BY RESEARCHERS AND
PHOTOGRAPHERS

by

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RESEARCH PROJECT TO BE SUBMITTED IN PARTIAL FULFILLMENT
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THE USE OF A MARINE MAMMAL RESERVE BY RESEARCHERS AND PHOTOGRAPHERS

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CHAPTER 1

INTRODUCTION

The use of marine mammal reserves for research and photography has grown with increased public concern for wildlife and wild lands. While some attention has been focussed on the management of recreational whale-watching activities (Barstow, 1986; Jones and Swartz, 1984; Tilt, 1985; Dearden and Duffus, 1986), little has been written on managing researchers and professional photographers. Although they are fewer in number than the recreationists, their efforts are usually more intensive and long-term, and often involve closer approaches to the whales than those of recreational whale-watchers. This paper reviews the management of several marine mammal reserves for photographers and researchers. This will set the stage for a more detailed examination of the situation at Robson Bight Ecological Reserve, a killer whale sanctuary located on the northeast coast of Vancouver Island, British Columbia (Fig. 1).

1.1 RATIONALE AND PURPOSE

1.1.1 Rationale

The recreational whale-watching industry has grown steadily over the past fifteen years, not only in Canada, but in the United States and Mexico (Barstow, 1986; Kaza, 1981; Tilt, 1985), coupled with an heightened awareness for their conservation. Along with increasing interest in whales, there has been more competition with researchers and photographers for "whale time". Killer whales make startling and impressive photographic images; consequently they are in demand as subjects. However, as suggested in Darling's (1986) summary, increased visitation does appear to have impacts on whale populations.

Natural areas can benefit from use by researchers and professional photographers. Their activities can be vital tools in raising public awareness about the conservation of ecosystems. The value of an ecosystem to the research community may actually increase the longer it is left undisturbed (Likens, 1983). At a seminar on the value of wilderness in western Canada, Peterson (1987) stated that research may actually enhance the value of a protected area, especially where increased understanding leads to better management of the area. Films and documentaries, as well as still photography can reach millions of viewers and are powerful motivators in conservation.

Robson Bight and the adjacent Johnstone Strait are unique in the world as an area to consistently view killer whales. The British Columbia coast has the largest, most accessible concentration of killer whales in the world (Bigg, 1982).

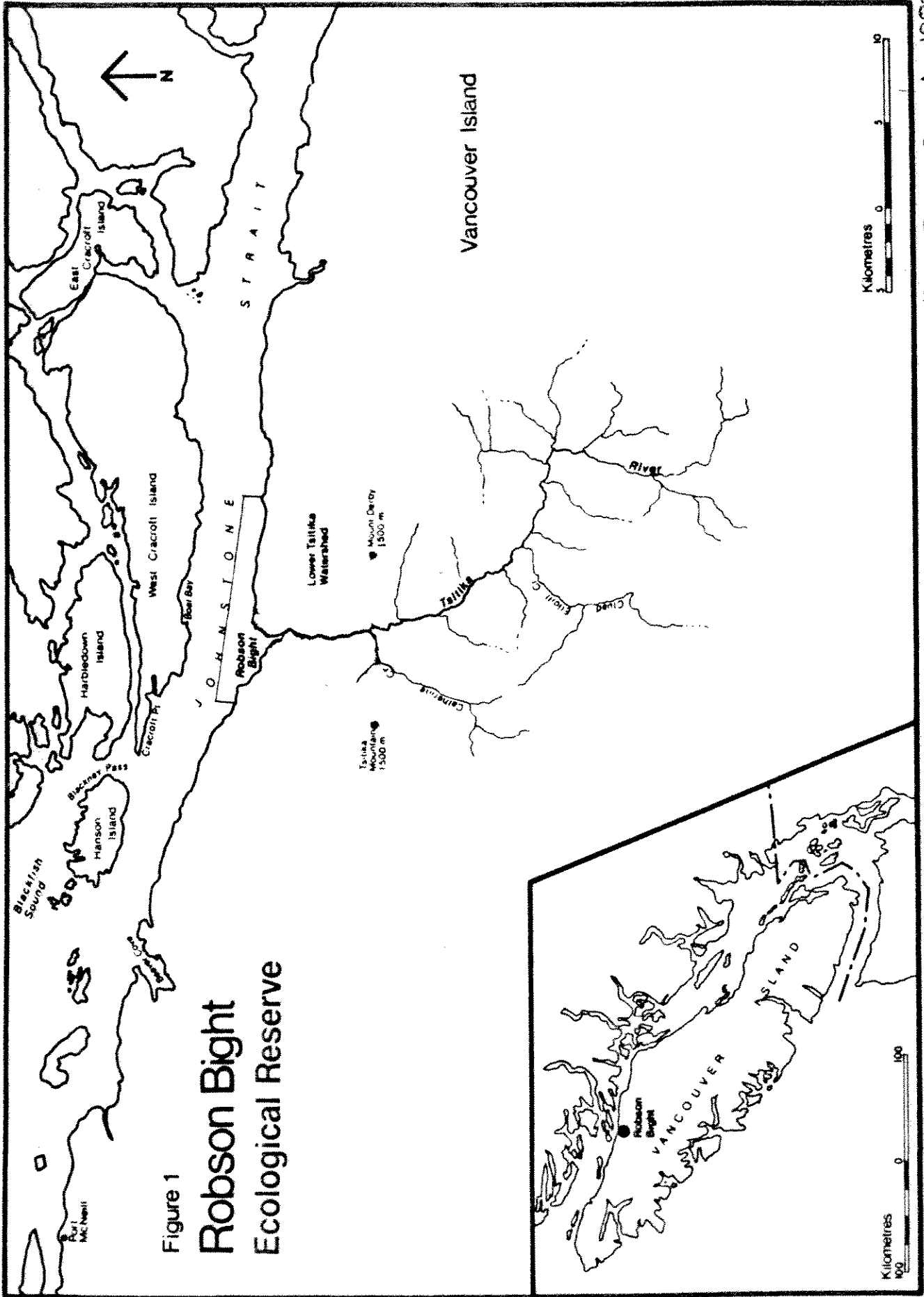


Figure 1
Robson Bight
Ecological Reserve

(from Partes Canada, 1982)

Johnstone Strait and particularly, Robson Bight, are significant core habitat frequently used for resting, socializing, feeding and rubbing. Thus, the area is very important as a site for research on killer whales in their natural habitat.

The number of researchers has grown since 1974. Johnstone Strait is an accessible area where the same killer whales are seen year after year, both factors essential in long-term behavioral and population studies. Although their numbers may be small, researchers' interactions with the whales are generally more extensive than those of recreationists. Researchers and others are concerned that too much interference in this significant core habitat may affect the whales' behavior or cause whales to leave the area altogether, possibly endangering their reproductive potential and survival.

1.1.2 Purpose

The purpose of the study is to examine present management of researchers and photographers at Robson Bight. The five specific goals of the study are:

1. to gain a better understanding of human-ecological interactions, especially within protected areas;
2. to examine the management of researchers and photographers in other protected areas and relevance for Robson Bight;
3. to determine whether present policy concerning researchers and photographers is effective in controlling their behavior in the reserve (in the Strait);
4. to examine the relationships among recreationists, researchers and photographers and what implications these might have for the management of the reserve;
5. and to suggest guidelines for the management of researchers and photographers within the reserve.

To determine whether new management guidelines are necessary for Robson Bight were necessary, the following questions need to be answered.

1. Are the present guidelines effective in managing research and photographic activities at Robson Bight?
2. What can be learned from management experience in other places where marine mammals occur?
3. What role, if any, do researchers or photographers play at Robson Bight to prevent potential disturbance of the

whales.

It is hypothesized that present policy concerning researchers and photographers has not been as effective in controlling their behavior as several other factors have been. In examining the management of other marine mammal reserves, there are probably several policies which would be useful at Robson Bight. The 24-hr presence and whale-oriented activity of researchers probably has prevented many situations which would have otherwise disturbed the whales.

1.2 BACKGROUND

The reputation of the killer whale (*Orcinus orca*) is a formidable one. As the top predator in the ocean, killer whale pods have been seen attacking many species of whales, as well as dolphins, seals, and salmon (Hoyt, 1984). Striking black and white markings and a towering dorsal fin add to the fearsome image of this cetacean. In recent years, since the first captivity of a killer whale at the Vancouver Aquarium in 1964, the public image of this cetacean has changed to that of an ocean-going panda.

The killer whale or orca is the largest member of the dolphin family. It is found in all oceans but is more common in temperate and polar waters within 800 km of shore. The world population is estimated between 10,000 and 100,000 (Rennie, 1982). Although the greatest numbers of these toothed whales occur in Antarctica, they are found in greatest concentration off the British Columbia coast (Bigg, MacAskie and Ellis, 1976). The two metre tall dorsal fin of the male makes it possible to differentiate between adult males and others in the pod.

In British Columbia, killer whales are grouped into three distinct communities: northern resident, southern resident and transient which total about 260 animals (Bigg, 1982). While resident whales are primarily salmon eaters and live in groups of five or more individuals, transients are marine mammal hunters living in groups of five or less. Through a photo identification program, Bigg (pers. comm.) and his colleagues have determined that 170 whales (12 family groups or pods) belong to the northern community, whose range extends from northern Georgia Strait to about 185 km. south of the British Columbia - Alaska border. The northern community does not mix with whales from the southern community or with transients (Bigg, 1982). Membership of these pods has been determined by photographically matching distinctive markings on individual whales and then linking associations. The pods have been given alphabetical letters as names, and each individual is identified by its pod letter and a number. Some of the larger pods have been split into subgroups, named after the most distinctive whale in the pod.

Both the northern and southern communities have "core areas",

areas where they can be seen more frequently than anywhere else. Transients have no "core areas" or distinct ranges and have been sighted along the entire coastline of Vancouver Island, as well as in Puget Sound. For the southern community, the core habitat is Haro Strait in the San Juan Islands (Bigg, 1982). For the northern community, this core habitat is northern Johnstone Strait, centering around Robson Bight, at the mouth of the Tsitika River (Fig. 1). Robson Bight has become well-known for its steep, pebble beaches which are used by the northern pods for rubbing themselves.

1.3 THE STUDY AREA

1.3.1 Physical Description

Johnstone Strait and the Strait of Georgia are part of a 3700 km downfold in the earth's crust, which stretches from the Gulf of California to Alaska (Waldichuk, 1957). Johnstone Strait is a narrow valley between the Coast Range of B.C. to the east and the Vancouver Island Range to the west. The Tsitika River valley is underlain by volcanic basalt lava and a major fault is present along the valley (Howes, 1981 in Rennie, 1982). During the most recent glacial period, the Fraser Glaciation, ice moved seaward from the Fraser River Delta and then northwestward to Johnstone Strait. Ice also moved down the Tsitika valley (Waldichuk, 1957). More recently, Johnstone Strait has been affected by tidal, wave and current erosion as well as deposition by the river at Robson Bight. The upper reaches of the Tsitika and its tributaries are characterized by exposed bedrock and rubbly colluvium. Substrate in the lower reaches ranges from gravelly to sandy textured river-worked materials.

Beyond the Tsitika delta, the Bight deepens quickly to 220 m. Johnstone Strait in the vicinity of the Bight is about 440 m deep. The shoreline substrate of the Bight is varied, being 40% rock, 25% cobble-boulder, and 35% mud, sand or gravel (Robson Bight Preservation Committee, 1981). Gravel beaches and shelves east of the Bight constitute an important area for the killer whales to rub and socialize. The narrow channel of Johnstone Strait differs in oceanographic characteristics from the surrounding region. The channel is only 3.5 to 4.5 km wide and possesses some of the deepest basins of inshore waters. These create strong tidal streams through its narrow passages and over shallow sills. The speed of these streams can reach 4.5 knots. The Bight differs little from the Strait, where the water mixes constantly and surface temperatures rarely exceed 10 degrees C. The cold water temperatures induce summer fogs (Thompson, 1981).

Although not subject to the long swells of the open Pacific, prevailing northwest winds and the long, narrow valley of Johnstone Strait are conducive to steep, short chop during peak tides. In Robson Bight, there is shelter from the westerly winds and wave height rarely exceeds 1 m. during the summer (MacMillan

Bloedel Ltd., 1980). Waters of the Bight and Strait are murky during the summer months due to high productivity of plankton. Visibility is excellent during winter.

1.3.2 Biota

Until recently, the Tsitika was the last unlogged watershed on the east coast of Vancouver Island. The lower valley lies within the Coastal Western Hemlock - Pacific Silver Fir Biophysical Forest Zone (Terrestrial Studies Branch, B.C. Ministry of Environment, 1980). The dominant species in occurrence and commercial value are western hemlock and Pacific silver fir, mostly older than 300 years (Tsitika Planning Committee, 1978).

Robson Bight contains varied and productive marine communities and is the last major undisturbed estuary on Vancouver Island's east coast (B.C. Ecological Reserves Unit, 1978). There are several beds of bull kelp (*Nereocystis luetkeana*) and eelgrass (*Zostera marina*), as well as *Laminaria* sp., *Ulva* sp., *Cymathere* sp., and brown and coralline algae (Robson Bight Preservation Committee, 1980). Plankton blooms extensively in the summer, and the algal communities harbour many invertebrates and small fish. Among others, ling cod and salmon are attracted to this productivity.

Killer whales are found in the Strait in all months of the year, however the majority of sightings occur in July and August (Bigg, 1982). Jacobsen (1986) found that most of the sightings were of the A pods, which had 33 members in 1982.

1.3.3 Land Use and Jurisdiction

In the late 1970s, public concerns were raised about proposed logging in the Tsitika valley and a log dump to be located in Robson Bight. A government team appointed by the Ministry of Environment concluded in 1981 that logging and log handling were inappropriate near the rubbing beaches. They also proposed an Ecological Reserve be designated for the nearshore marine area used by the whales. Adjacent uplands were also recommended for inclusion but some of this land was in private holdings. The Wilderness Advisory Committee (1986) reported that MacMillan Bloedel, the principal upland owner, was willing to accept an upland extension to the reserve proposed by the government, for agreed-upon compensation. Logging commenced in the upper reaches of the valley in the early 1980s and by summer 1986, areas 11 km from the Bight had been logged (Darling, 1986).

Western Forest Products holds a Tree Farm Licence along the eastern edge of the reserve. They have expressed concern over the width of the proposed upland extension, and suggest instead a 250 m wide reserve with a ten year moratorium on harvesting for the remainder of the reserve extension.

The upland extension would provide some protection for whales when they are at the rubbing beaches. At present, without land access to the water's edge, the rubbing beaches remain secluded. However, this will change as Western Forest Products continues building a logging road from the next major watershed east of the Tsitika. In 1986, this road had extended to within approximately 4 km of the eastern edge of the reserve. The road will be completed in 1987 and will come within 300 m of the coast allowing easy access to hikers or kayakers (Darling, 1986: 15).

The national significance of Robson Bight was also considered for potential inclusion in the national marine park system. Rennie (1982: 62) recommended that all of the core habitat should be designated as a Natural Site of Canadian Significance. In addition, it was recommended that Robson Bight should be considered as a possible Canadian Landmark because it has stimulated international interest in killer whale research, and requires careful regulation. The area is quite accessible, and interpretive potential is good. Rennie also perceived that a comprehensive management plan would be needed in which several provincial and federal jurisdictions would be involved. Finally, a 15 km long terrestrial component was suggested to buffer the effects of any logging activities in the area in which killer whales are most likely to be disturbed.

Not in Ref.

Johnstone Strait and Robson Bight form part of an active shipping channel. In July and August 1984, Briggs (1985: 7) observed an average of 15 boats during scans made every half hour between 0600 and 2100h. Briggs found commercial fishing boats were the most numerous, especially during fishing openings and recreational boats were the second most numerous. Research boats constituted a regular presence during his study.

Dearden and Duffus surveyed the non-consumptive use and management of whales at Robson Bight in 1986. The preliminary findings were that the boundaries of the reserve are not effective in controlling use, partially due to the relatively inconspicuous boundary markers. Violation of the boundaries by recreational users seemed largely unintentional. His boat monitoring program showed that research use of the reserve was proportionately heavier than recreation and charter uses (Dearden and Duffus, 1986: 27).

All marine mammals in Canadian waters are within the jurisdiction of the federal Fisheries Act. According to the Act's regulations respecting the protection of cetaceans, "no person shall hunt cetaceans in Canadian fisheries waters unless that person is the holder of a licence issued..." by the Minister (ch.9, s. 4). "Hunt" is defined as "...chase, shoot at, take, kill, attempt to take or kill, or to harass cetaceans in any manner." These regulations have never been tested in court and "harass" has not been defined.

Killer whales are found in coastal waters, also within the jurisdiction of the federal government. However, the ecological

reserve designation is provincial and an officer of the province cannot enforce federal regulations. Moreover, the upland extension of the reserve, where the province would have legal jurisdiction, has not been approved yet.

1.4 METHODOLOGY

The study had three components. First, literature was reviewed on management practices at marine mammal reserves in the United States, Mexico and Canada. Second, past and present research and photographic activities in Johnstone Strait were examined. Third, field observations were conducted during the summer of 1986 in Johnstone Strait, including Robson Bight. Additional observations were made during the spring of 1987 in Baja California, but will not be referred to unless specifically stated.

For the first component, reports of management of researchers and photographers was examined at several locations in Mexico, the United States and Canada. Relevant legislation was also reviewed in the United States and Canada. Administrators were contacted in Florida, California and Quebec for additional information.

For the second component, researchers' and photographers' activities over the past 15 years were summarized from Ecological Reserve files and from conversations with the subjects. Criteria for classification were: whether it was a boat- or shore-based study; length of study; purpose of research; whether experimentation to intentionally modify whale behavior was used; type of contact with the whales; and whether the results have been published. Some researchers were affiliated with an accredited institution such as a university or Department of Fisheries and Oceans. Other researchers were funded independently by conservation organizations, or non-profit societies. Photographers' methods were reviewed when and where available. This has not been consistently documented prior to 1985.

In the third component, observational data on interactions between researchers, photographers and recreationists were collected during the field season, July 1 to September 15, 1986. These observations were primarily opportunistic, while assisting in a survey of recreational whale-watchers for Dave Duffus, of the University of Victoria. Observations were made from a small inflatable for at least six hours daily. VHF radio contact was maintained with a cliff-top observer, other researchers, and some photographers and recreationists. Interactions and incidents were also noted from shore at Boat Bay during available light throughout the field season. Boat Bay is situated directly across the strait from Robson Bight (Fig. 1). Information was also collected at a researchers' workshop held on Hansen Island, September 6 and 7 1986.

Photographers in Johnstone Strait are both shore-based and boat-based. Observations of shore-based photography were made while assisting two photographers at rubbing beaches with remote-controlled camera systems. Boat-based photographers were contacted as part of the recreational whale-watching study, while informing them of the reserve guidelines and status. In addition, several photographers were identified by the cliff-top observers and interactions tracked. Interactions were noted between researchers, between researchers and photographers, between researchers and recreationists, and between photographers and recreationists.

Observations in Baja California were made while assisting a professional film-maker at the breeding / nursery lagoons of Magdalena Bay and San Ignacio on the Pacific coast of the Baja peninsula. Three weeks were spent at San Ignacio and one week at Magdalena over the months of February and March. Observations were boat-based and took place for approximately three hours daily centred around mid-day.

CHAPTER 2

MANAGEMENT OF PROTECTED AREAS FOR MARINE MAMMALS

This chapter examines international management of protected areas, more detailed examples in Mexico and United States as well as Canadian experiences. It will next focus on federal management in British Columbia and then onto provincial management and the specific case of Robson Bight Ecological Reserve.

Marine protected areas are intended to conserve marine ecosystems and habitat. Growing pressure for development of natural resources has necessitated the establishment of sanctuaries for marine biota such as coral reefs, critical feeding areas for fish and marine mammals and unusually rich and diverse ecosystems.

There is limited published information on the management of marine mammals in protected areas, although some exists in the small body of literature on recreational whale-watching. More information is available on research use of protected areas. Literature is reviewed on international and Canadian experiences in management of protected areas, legislation in Canada and United States and non-consumptive uses of wildlife. This information is necessary for a better understanding of protected areas and to place Robson Bight in context. Administrators were also contacted at reserves in Florida, California and Quebec. In addition, personal experience at Robson Bight was useful.

Non-consumptive Utilization of Whales

Non-consumptive use of wildlife refers to a variety of activities, recreational and otherwise, in which animals are used but not consumed. In Barstow's (1986, p. 157) discussion of the non-consumptive use of whales, he mentions how this concept also extends to research. Benign research "does not depend on the human-caused death of wild animals nor involve significant stress or injury to them." Barstow cites a marked increase in benign cetacean research supported through non-government organizations (NGOs) and state and federal agencies. Benign research methods include aerial photography, radio tracking, visual camera scanning, recording whale sounds and satellite telemetry. Barstow (1986) emphasized the vital contributions of benign research in the phasing out and cessation of whaling. Contributions to the body of scientific knowledge made through whaling need augmentation through studies of living whales.

Wilkes (1977) feels that non-consumptive use does not exist. Even non-hunters and non-fishermen cause environmental degradation in parks. The nature of this degradation is spatial, visual and physical. Spatial consumption includes use of space

for facilities or for conflicting uses. Perceptions of crowding and wildlife stressed by human presence constitute visual degradation of the environment. Trampling of vegetation and altering of habitat are obvious physical impacts. Wilkes stresses that large organized groups often do the most damage.

2.1 INTERNATIONAL EXAMPLES

Since the early 1970s, whales have become the symbol of the international conservation movement. Research has further focussed that concern. An action plan has been formulated by the Food and Agriculture Organization (FAO) and the United Nations Environment Program (UNEP) for the conservation, management and utilization of marine mammals. The long-term objective of the plan is "to promote the effective implementation of a policy for marine mammals which is as widely acceptable as possible among the governments and people of the world." (Nielsen, 1986: 134).

Brown (1985) summarizes the difficulties of managing marine protected areas. They are larger, more complex and less understood than terrestrial ecosystems. They are generally populated with highly transient fish and marine mammals, which make it difficult to define physical limits to ecosystems. Ecological integrity is difficult to maintain because of the high mobility of the medium. Marine parks do not play the same role as terrestrial ecosystems where it is possible to preserve entire ecosystems. Rather, marine protected areas are intended to "afford protection to marine species at certain (often critical) stages of their life cycle, especially if the area is an important concentration area for that species." (Brown, 1985: 52).

Since the first international whale sanctuary was established in 1971, at least six others have been designated specifically for cetaceans (Table 1) and others have been planned (Barstow, 1986).

2.1.1 Mexico

2.1.1.1 Laguna San Ignacio

Gray whales migrate along the coast between Alaska and Baja California, and are the subject of a viable whale-watching tour business with revenues exceeding \$2 million per season in California (Tilt, 1985). This interest has spilled over into Mexico, where whale-watching charter operators are not regulated by the U.S. Marine Mammal Protection Act (MMPA)(1972). During the 1970s, the United States government became concerned that the amount of recreational whale watching constituted environmental disturbance and possibly "harassment" under the MMPA (Jones and Swartz, 1984). The government of Mexico needed scientific

Table 1: EXAMPLES OF INTERNATIONAL PROTECTED AREAS FOR MARINE MAMMALS

Location	Year Established	Species	Purpose	Source
Ano Nuevo State Reserve, California	1958	Elephant seal	protection of rookery	California, Dept. of Parks and Recreation
Ojo de Liebre, Baja California, Mexico	1971	Gray whale	protection for breeding and calving	Jones and Swartz 1984
Peninsula Valdes, Argentina	1974	Right whale	permanent sanctuary	Barstow 1986
North of 55 degrees S. Indian Ocean (International Whaling Commission or IWC)	1979	Sperm whale	fulfillment of IWC mandate to "designate whale sanctuaries"	Barstow 1986
Laguna San Ignacio, Baja California, Mexico	1979	Gray whale	sanctuary for breeding and calving	Jones and Swartz 1984
Glacier Bay, Alaska, U.S.A.	197	Humpback whale	protection of feeding areas from excessive boat traffic	Barstow 1986
Robson Bight Ecological Reserve, B.C., Canada	1982	Killer whale	protection of "core habitat" for science and education	B.C. Ministry of Lands Parks and Housing
Crystal River State Park, Crystal River, Florida	197	Manatee	protection of warm water refuge	O'Shea et. al. 1985

information about gray whale wintering areas in their waters to formulate management policy.

Consequently, one of the best studied areas for protection of marine mammals are the gray whale breeding lagoons on the Pacific coast of the Baja peninsula. Gray whales congregate in these lagoons from January to April each year to breed and calve. Due to their concentration in these lagoons, the whales were easily hunted and became greatly reduced in numbers during the latter part of the 19th century (Scammon, 1874). The gray whale became a protected species in 1946 under the auspices of the International Whaling Commission (Tilt, 1985). In 1972, the breeding lagoons at Ojo de Liebre were given protection by the Mexican government (Gard, 1974). Laguna San Ignacio became protected in 1979 (Jones and Swartz, 1984). The lagoon at San Ignacio is divided into upper, middle and lower sections, and all commercial whale-watching vessels are confined to the lower lagoon. A permit is necessary for anyone to enter the lagoon.

Jones and Swartz (1984) monitored whale-vessel interactions in Laguna San Ignacio during the years 1978 - 1982. They found that the patterns of whale use have remained the same in the presence or absence of charter boats and despite increased levels of whale-watching activity. The number of cow-calf pairs within the lagoon increased by 10% per year above the total population growth rate for the years 1978-82. There was no evidence of increases in calf mortality. The authors attribute this population recovery primarily to the establishment of a refuge which not only regulates the number of vessels but also provides a sanctuary completely free of all vessel traffic. This may indicate that cows and calves are not disturbed by the current restricted level and nature of use.

Jones and Swartz (1984) attributed continued use of the lower lagoon by whales, where vessels are allowed, to several factors. First, whale-watching skiffs were operated only eight hours per day and only during restricted seasons. Second, skiff handlers were experienced and had genuine respect for the whales. Third, whale-watching was best accomplished when the engine was in neutral or operated at slow speeds. Fourth, continued exposure to boat noise and whale-watching activity in the lower lagoon may have habituated the whales to association with humans. However, the authors cautioned that five years was a relatively short period in which to monitor changes, and that the cumulative effects of stress through noise activity will only be known over time.

Permitting procedures for researchers and photographers in the lagoons are similar to that for commercial operators. Regulations restrict the number of days a vessel may stay within the lagoon as well as the number of people to be associated with the research or photography project. The permitting procedure must be completed in Mexico City, and requires considerable time to process.

From observations made during February and March 1987, the author found that commercial whale-watching charters outnumber researchers in San Ignacio Lagoon and Magdalena Bay. There were 30 scheduled charters in San Ignacio for the 1987 season. Each boat is limited to visits of two days and allowed to operate a maximum of three skiffs. During that same time period, Mexican researchers conducted weekly aerial surveys lasting less than an hour each at San Ignacio. In addition, a team from Orange County College, California came for a brief period each winter for a photo identification program. At Magdalena, counts of single whales and cows with calves were made from a boat once a week.

There was no daily enforcement presence at San Ignacio during February and March 1987. Fisheries officers apparently checked permits on one occasion, and escorted some non-permitted individuals back to the nearest town. A delegado, a local fisherman, lives at the lagoon, but did not check permits. He took some non-permitted photographers out in his boat for several days. Regulations at San Ignacio are relatively easy to enforce because land access is difficult and land-based groups must bring in all their own supplies. The lagoon is not a shipping channel, and due to shifting sand bars is hazardous to navigation. Anyone in a boat on the lagoon must either have a permit or be a local fisherman.

At Magdalena Bay, the local boat (ponga) operators cautioned other individuals with boats to be careful around the whales. Since the ponga operators were gaining part of their livelihood from whale-watching, it was in their best interest to ensure the whales were not harassed.

2.1.2 United States

2.1.2.1 Legislation

In the United States, the Marine Mammal Protection Act (MMPA) of 1972 controls the permitting of scientists. The MMPA primarily deals with research involving the taking of marine mammals under scientific permits. Any other scientific uses of marine mammals in waters under the jurisdiction of the United States must be reviewed by the Marine Mammal Commission and the Committee of Scientific Advisors.

2.1.2.2 Ano Nuevo, California

Ano Nuevo State Reserve is located on the California coast just north of Santa Cruz. It was established in 1958 to provide undisturbed breeding habitat for elephant seals and two species of sea lions. It consists of a 5.3 ha island and 283 ha of adjacent mainland. In order to tour the area, reservations must be made ahead of time.

Ano Nuevo has written policies concerning both photographers

and researchers. The policy for photographers also concerns other media persons and requires proof of a current media agreement of the employer prior to the employee's visit (App. 1). The policy's aim is to restrict the number and distributions of media visits, while recognizing the important contribution of heightened public awareness. Media tours are conducted with general public tours. Media time slots are more restrictive than those for the general public.

Agreements concerning researchers and photographers give a very detailed list of expected behavior within the reserve. An agreement is negotiated and updated annually. An example is the agreement made with the University of California at Santa Cruz. This agreement explains the purpose of the reserve and details conditions which researchers must abide by. These conditions are:

1. that researchers' work takes place "under the critical public eye" and researchers must act accordingly;
2. that only authorized, identifiable researchers are allowed without prior clearance;
3. that researchers must wear identity jackets or vests in a specified closure area;
4. that researchers will avoid contact with seals in view of public tour groups whenever possible;
5. and that special efforts are made to facilitate communications between researchers, rangers and tour guides, including daily meetings between researchers and rangers.

2.1.2.3 Crystal River State Park, Florida

Crystal River State Park is one of two reserves in Florida for protection of West Indian manatees. These manatees are slow-moving marine mammals belonging to the order Sirenia and found in the waters of the Caribbean, Mexico and Brazil. In addition, the entire coast of Florida has been declared as a sanctuary (White, 1984). Crystal River is located on the east coast of Florida peninsula and is important winter habitat for these mammals (O'Shea et. al., 1985). Administrators did not seem to have special regulations or restrictions on photographers or researchers. However, boat speed and traffic within the park is strictly monitored and regulated. The boundary of two no-entry areas at Crystal River is marked with orange buoys (Hall, 1984).

2.2 Canada

2.2.1 Legislation and Policy Guidelines

The Fisheries Act has jurisdiction for marine mammals occurring in Canadian waters. In Canada, licences are required for the taking of marine mammals under Federal Fisheries Regulations, s. 71 (A)(6b) for scientific or educational purposes. However, the act has little to say about non-intrusive or non-consumptive research.

In 1983, whale watching guidelines were published by the Canadian Department of Fisheries and Oceans (DFO). The guidelines requested that boaters should not split up groups of whales or disturb them while they are resting. In addition, when within 300 metres of whales, boaters should slow down and proceed forward slowly. At 100 metres, engines should be cut and lifted from the water. There should be no sudden changes in direction or speed.

In 1985, research scientists Mike Bigg and John Ford posted an information bulletin regarding persons involved in killer whale research or photography, primarily in the Johnstone Strait area. Researchers or photographers are requested to adhere to the general whale watching guidelines wherever possible. They introduced a system of numbered yellow pennants as identification while on the water. Researchers and photographers with a need to approach whales closely would be issued a pennant. Those researchers requiring to enter Robson Bight Ecological Reserve and to approach whales closely would be issued a pennant with a black tip. This was intended to prevent confusion among recreationists who might otherwise copy the behavior of an unidentified boat.

2.2.2. Saguenay Fjord, Quebec

Saguenay Fjord is one of a number of critical cetacean habitats identified by Department of Fisheries and Oceans (Breton, 1986) (Fig. 2). A proposed federal Saguenay Fjord Marine Park would encompass part of the St. Lawrence estuary and all of the Saguenay River in Quebec (Pippard, 1985) to protect critical habitat for beluga whales. A provincial park, Parc Saguenay, has been established on the shores of the Saguenay River mouth to protect nearshore habitat. The extremely cold waters of the Saguenay pour into the deep trough of the St. Lawrence to create a nutrient-rich upwelling and the base of a highly productive marine ecosystem. A population of beluga, once numbering 5,000 (Pippard, 1985: 187), has been reduced to 350 through degradation and loss of habitat and are now considered endangered in this part of their range.

Research permits are administered through DFO at Saguenay Fjord (Pippard, pers. comm.; Breton, pers. comm.). A project proposal outlining methods, boat type, number of persons and qualifications is required to screen for qualified researchers.

No research may be conducted from whale watching charter boats. Research activity must be in another area when whale watching charters are present or conducted outside whale watching hours (Breton, pers. comm.). The situation is primarily self-regulating with occasional surveillance by fisheries officers (Pippard, pers. comm.). Professional photographers are considered as part of the general public and are not allowed to approach any closer than 100 metres.

2.3 ECOLOGICAL RESERVES IN BRITISH COLUMBIA

2.3.1 The Program

The purpose of ecological reserves in British Columbia is to reserve Crown land for ecological objectives, including scientific research and educational studies in biological productivity and the natural environment and preservation of "unique and rare examples of botanical, zoological or geological phenomena." (Ecological Reserves Act, 1971, c. 16, s. 2). British Columbia was the first province to give permanent status to ecological reserves. Scientists value ecological reserves because their permanence and scientific purpose are more clearly established than in parks (Ecological Reserves Program, 1986). Ecological reserves are also part of the International Biological Program (IBP), and as such, may attract scientists from afar. Since their initiation in 1971, the number of reserves has grown to 117 (Goulet, pers. comm.). Robson Bight, Ecological Reserve #111, was created in 1982 and contains 1,248 ha.

2.3.2 The Permitting System - Past and Present

Prior to 1985, permits to enter ecological reserves and closely approach whales for research or photography were not issued systematically. (Non-whale-oriented research and photography does not require a permit.) Few records were kept of permit issuance and permits were not standardized. Permission was sometimes given in the form of a letter, at other times at least part of the procedure was carried out over the telephone. There were no formal criteria for granting a permit, and each application was appraised on its individual merit.

When responsibility for permits was transferred to Land Dispositions and Reserves, within the Ministry of Lands, Parks and Housing in 1984, a standard form and procedure were instituted (App. 2). At the present time, a proposal is required which describes details of a project. This proposal is reviewed and its acceptance is dependent upon whether the following questions are answered satisfactorily:

1. Will the proposed work be detrimental to the reserve?
2. Will it be detrimental to other researchers?

3. Will a legitimate research report be produced?
4. How effectively will it raise awareness of the Ecological Reserves program?

Once approved, there are two steps to the issuance of the permit. Two copies of the permit are sent to the applicant. If the applicant agrees to the terms of the permit, then both copies are signed and returned to Ecological Reserves. Then one of the signed copies is returned to the applicant. Copies of approved permits are also sent to volunteer wardens, who are local residents who informally monitor activity in the reserves as well as hosting and providing information to visitors. In addition to the written permit, a flag system, instituted by DFO, is used to identify researchers and photographers while on the water.

2.3.3 Robson Bight Ecological Reserve Guidelines

In 1986, Ecological Reserves published a brochure on Robson Bight. It describes the purpose and location of the reserve, some basic killer whale biology and guidelines for public use of the reserve. The following guidelines were also used to direct behavior of researchers and photographers in the vicinity of Robson Bight: *Backus should...*

- "1. Should you stray into the reserve, keep at least 300 metres away from the whales. Only researchers are issued permits by the Park Programs Branch to observe whales at closer range in the reserve.

Whales may be approached to within 100 m outside the reserve without a permit.

2. Always approach whales from the side; not from the front or the rear. Always approach and depart slowly.
3. When travelling beside whales, maintain a speed of 2 to 4 knots; do not alter your speed abruptly.
4. Keep noise levels down -- no horns, whistles, shouting or racing of motors.
5. Be conscious of the effect of your actions on the whales. Do not engage in any activity which disturbs or molests them. It is illegal under Federal Fisheries Regulations, Section 71 (A) (2) to disturb or molest killer whales."

B.C. Ministry of Lands, Parks and Housing (1986)

Five conditions listed on the Ecological Reserve permits, to which researchers and photographers are subject:

- "1. That no plants, animals or other materials shall be damaged, destroyed or removed from the Reserve.

2. That no motorized vehicles or equipment shall be used on the Reserve.
3. That no foreign objects, animals or other materials shall be introduced to or deposited on the Reserve.
4. That in conducting research and studies within the Reserve the procedures and methods used shall be minimally disruptive to the natural environment of the area.
5. That the person or persons hereby authorized shall accept full and complete responsibility for ensuring adherence to the conditions of the permit."

B.C. Ministry of Lands, Parks and Housing (1983)

In addition to these conditions, special provisions are sometimes required. Generally, an informed observer was appointed by the Ecological Reserves Unit. It rested on the opinion of this person whether a permittee's activities unduly disturbed the whales and whether their work should cease within the reserve.

2.3.4 The Management Plan

The need for a management plan for Robson Bight was recognized by the Ecological Reserves Unit in 1985. A study was completed by Jim Darling, a Canadian expert on cetacean ecology and management in 1986. The purpose was to "assess current and future impacts of human activities on the killer whale population and provide management guidelines for the area." (Darling, 1986: ii). Several recommendations were made regarding researchers and professional photographers.

1. Robson Bight should be closed to all boat traffic when whales are in the area.
2. Land-based photography or research should be limited to two permits (one of each) for any one time period. Only remote underwater cameras, and quiet, hidden land observation should be allowed. There should be no moored or beached boats in the vicinity. Only experienced professionals or students connected with an academic institution should be granted permits, and if conditions are not complied with, permits should be immediately withdrawn.
3. Recommended studies include a long-term, rigorous project on the impacts of vessel traffic on whales, and a winter range investigation.

CHAPTER 3

RESEARCH AND PHOTOGRAPHIC ACTIVITIES IN JOHNSTONE STRAIT, 1970-1985

This review does not present the results of the various studies which are on-going or completed in Johnstone Strait, but briefly describes the purpose and methods of their studies. This is intended to illustrate the scale of research and photographic activity. Researchers were classified as either affiliated with an accredited educational institution or government agency or as independent entities. Funding mechanisms were different for the two types of researchers. Affiliated researchers were either paid by the government institution or received grants through the institution to complete their research. Their research contributed towards an academic degree or article in a refereed journal. Independent researchers are funded through sales of photography or contributions from conservation organizations and/or visitors to their research site. The number of researchers present in Johnstone Strait has grown quickly, especially since 1980 (Fig. 4).

Affiliated researchers originated from British Columbia (3), California (6), and France (1) over the period 1972-1986 (Table 2). Independent researchers have come from British Columbia (2), Washington state (1) and Nevada (1) (Table 3). The number of affiliated researchers has increased from one group in 1972 to six in 1986. Independent researchers have increased from one in 1970 to four in 1986. Studies are generally long-term; 40% included six or more years of fieldwork (Fig. 5). Photographers have come from the United States, Japan, England in the past to work at Robson Bight.

The international spectrum of research and photography crews reflects the importance of the area on the world scene. This is one of the few places in the world where photography of killer whales can be accomplished with any reliability, and certainly one of the few reserves in the world where research takes such a high priority. The presence of researchers tend to attract more researchers, especially from the same institution but also from increasing wider circles.

Many of the researchers have originated from University of California at Santa Cruz through the combined support of their Dean of Science, Kenneth Norris and Dave Bain. Their success in obtaining funding is evident since more than half of the researchers are from this university. They have had a relatively low impact on the whales since many of the studies were carried out from cliff observation points. This approach has been encouraged by Dave Bain, who has successfully minimized the number of UCSC boats to one.

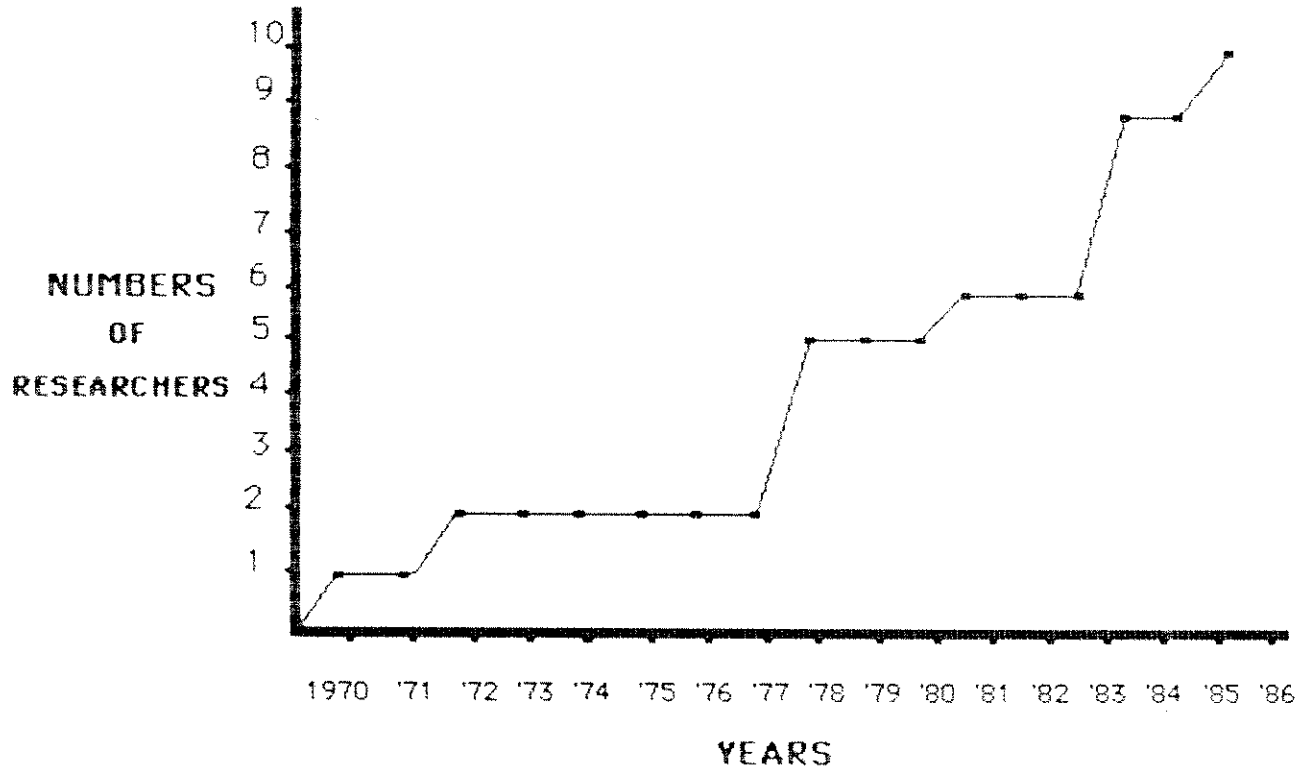


FIGURE 4: NUMBER OF MARINE MAMMAL RESEARCHERS IN JOHNSTONE STRAIT , 1970-1986

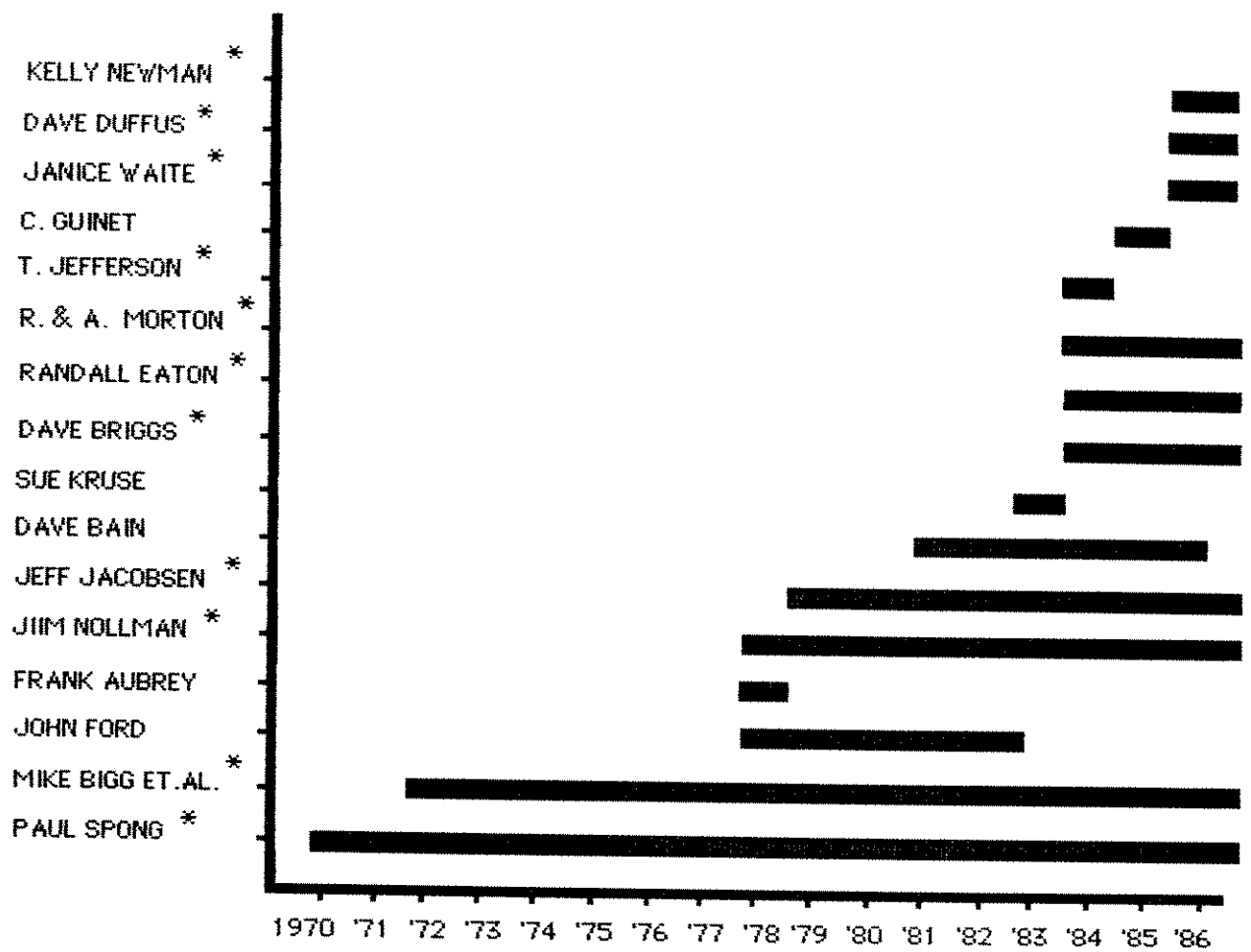


FIGURE 5: YEARS OF FIELD STUDY FOR 16 RESEARCHERS IN JOHNSTONE STRAIT, B.C.

* INDICATES PROBABLE RETURN TO JOHNSTONE STRAIT IN 1987

TABLE 2: PRESENCE OF AFFILIATED RESEARCHERS IN JOHNSTONE STRAIT, BRITISH COLUMBIA, 1970-1985

Researcher	Study Subject	Boat or shore based	Years Present	Permit?*	Affiliation
David Bain	Killer whales: behavioral and morphological evolution	boat and shore	1981-85	Yes	U. of California, and Santa Cruz (UCSC), CA
David Briggs	Killer whales: boat activity and whales	shore	1984-85	No	UCSC
Graeme Ellis Mike Bigg (Ian MacAskie)	Killer whales: population biology and photo id.	boat	1972-85	Yes	Department of Fisheries and Oceans Nanaimo, B.C.
John Ford	Killer whales: pod dialects	boat	1978-82	No	U. of British Columbia, Vancouver
Christoff Guinet	Killer whales:	boat and shore	1985-85	No	Ecole Internationale d'Engineurs des Travaux Agricoles de Dijon, France
Jeff Jacobsen	Killer whales: social structure and behavior	boat	1979-85	Yes	Humboldt State University, CA.
Thomas Jefferson	Dall's porpoise: behavior and ecology	shore	1984	No	UCSC
Sue Kruse	Killer whale: behavior in presence of boat activity	shore	1983	No	UCSC
Frank Awbrey	Dall porpoise	boat	1978	n/a	Hubbs/Sea World Research Inst., CA.

* Have obtained a permit each year since the permitting process was initiated in 1983.-

TABLE 3. PRESENCE OF INDEPENDENT RESEARCHERS IN JOHNSTONE STRAIT, BRITISH COLUMBIA, 1970-1985

Researcher	Study Subject	Boat or shore based	Years Present	Permit?*
Randall Eaton	Killer whales: social behavior	shore and boat	1984-85	No
Alexandra and Robin Morton	Killer whales: year-round behavior	boat and shore	1984-85	Yes
Jim Nollman	Killer whales: inter-species communication	shore	1978-85	No
Paul Spong and associates	Killer whales: movements of groups at all times of year through acoustic means	primarily shore	1970-85	No

Spong and associates
1970-85
check

3.1 AFFILIATED RESEARCHERS' ACTIVITIES, 1972-1885

Researchers affiliated with accredited educational and government institutions are listed in Table 5. The first research by an institution began in 1972 and has continued in some form since that time.

Mike Bigg and his colleagues at the Pacific Biological Station in Nanaimo, B.C. began a population study of killer whales in 1971 and first began work in Johnstone Strait in 1972. Their work forms the basis of knowledge about such vital characteristics as longevity, individual identification and pod and community structure. In no other studies of large wild mammals is there such a complete record of births, deaths and community structure.

In 1978, John Ford, then a doctoral candidate at University of British Columbia, introduced a theory of dialects which are distinctive to family groups or pods of killer whales. Subsequently, he did find that some calls were distinctive, that the pods of a community have many calls in common, and that the frequency of the use of those calls is distinctive. John Ford's work was primarily done from a boat, as he needed to identify the individuals who were calling. Presently, Dr. Ford has enlisted the enthusiastic support of residents and lighthouse keepers along eastern Vancouver Island to maintain a system of hydrophones and tape recorders to monitor the movements of killer whales.

Jeff Jacobsen, currently completing his Master's of Science degree at Humboldt State University in California, has spent summers in Johnstone Strait since 1979. Although his primary topic of research is social structure and behavior of the northern community of killer whales, he has also researched respiratory patterns, dorsal fin morphology and play behavior of these whales. From a small Zodiac, he usually follows parallel to the focal pod. Occasionally, he approaches closely to ascertain identifications or to record respiratory patterns, especially while pods are resting.

David Bain, of the Long Marine Lab at the University of California at Santa Cruz (UCSC), began his studies of morphological and behavioral evolution of killer whales in 1981. Besides a photo identification program and computer matching of similar characteristics in dorsal fin shapes to test relatedness, he employed a tetrahedral hydrophone array to pinpoint vocalizations to individual whales. His research required the co-ordination of boat and shore crews to record whale locations with a theodolite. From a 17-ft rigid-hulled "C-Dory", Bain first closely approached a pod to make positive identification and photograph dorsal fins, and then fell back to a position from which they could minimize disturbance but still track individual whales. He will compare these calls to those of captive ex-pod members.

In 1983, Sue Kruse of the Long Marine Lab, monitored movements of killer whales undisturbed and in relation to boat traffic. Her shore station was equipped with a theodolite. She also monitored boat speed, size and engine type.

David Briggs, also of UCSC, began tracking boat traffic in Johnstone Strait in 1984. From shore or cliff observation points on West Cracroft and Hanson Islands, Briggs has recorded numbers of different types of boats every half hour.

Thomas Jefferson of UCSC monitored behavior of Dall's porpoise in Johnstone Strait from a clifftop station on West Cracroft Island during the summer of 1984. Dall's porpoise are the second most abundant marine mammal in Johnstone Strait.

Christophe Guinet is a student at Ecole Nationale d'Engenieurs des Travaux Agricoles de Dijon (ENITA) in France. Beginning in fall 1985, he monitored the movements of whales past Hanson Island from a shore station there.

3.2 INDEPENDENT RESEARCHERS' ACTIVITIES, 1970-1985

The independent researchers were Alexandra and Robin Morton, Helena Symonds and Paul Spong, Randall Eaton, and Jim Nollman (Table 3). The first independently funded research began in 1970. This group of researchers is generally less well documented than the affiliated researchers, since other than Alexandra Morton, none have successfully applied for a permit. Only permitted researchers are required to submit a year-end report.

Alexandra Morton began investigating the sounds of killer whales in captivity in 1978. She and late husband Robin Morton, initiated studies of wild killer whale vocalizations and behavior. Since their monitoring program has continued year-round, their work is a valuable addition to most other research which occurs only from June to October.

Paul Spong and Helena Symonds monitor pod movements with a network of directional hydrophones through Johnstone Strait, and Blackfish Sound. They are able to identify most pods by their vocalizations and have built up several years' records of movements throughout the year.

Randall Eaton from Sierra Nevada College in Lake Tahoe, Nevada began coming to the strait in 1984. With a group of "volunteers", he made observations of behavior from a shore camp as well as from an inflatable boat. It was commonly held that Dr. Eaton was using the tolerant jurisdictional situation in Canada to offer whale watching tours under the guise of research.

Jim Nollman of Interspecies Communication has returned every summer since 1978 to experiment with killer whales' reactions to music played through underwater speakers. He originates from

Washington state and is usually accompanied by a number of guests.

3.3 PROFESSIONAL PHOTOGRAPHERS' ACTIVITIES, 1978-1985

It is difficult to document the activities of photographers since many of them do not apply for permits nor publish articles. Much of this information is based upon the recollections of other researchers and photographers and is spotty at best. Some photographers are listed in Table 4.

Professional photographers in Johnstone Strait only in the years 1978 to 1985 were Flip Nicklin, Francois Gohier, Al Giddings and Koji Nakamura. Flip Nicklin specializes in underwater photography of marine mammals. He has visited Johnstone Strait in 1981, 1982 and 1984, and enlisted the help of West Coast Whale Research, a professional organization formed by Drs. Jim Darling, John Ford and others. Francois Gohier is a French photographer now based in California. His photos have been featured in a National Geographic article on San Ignacio. He was last in Johnstone Strait in 1982. Al Giddings of Oceanquest in California has specialized in filming of marine environments, often with the use of a tethered and manned balloon. In 1984, his filming concentrated on the research of John Ford and Graeme Ellis. Koji Nakamura is the energy behind a Japanese video show featuring underwater nature around the world. He worked in Johnstone Strait in 1984, when he was assisted by West Coast Whale Research.

3.4 USE OF PERMITS AND PENNANTS

Permits issued by the Ecological Reserves Program for conducting research or photographic work in Robson Bight were first issued in 1983. Three permits were issued in 1983, three in 1984, and eight in 1985 (Table 5). These permits were for closely approaching the whales within the ecological reserve. Approaching whales in the rest of Johnstone Strait does not require a permit, however approaches closer than 300 m for research or photographic purposes require obtaining a yellow pennant from the Department of Fisheries and Oceans in Nanaimo. A large proportion of researchers did not have permits because they observed whales from shore and did not closely approach their study subjects (Tables 2 and 5).

3.5 PUBLICATIONS

Publications are one of the most effective and cost-efficient methods to raise awareness of ecological reserves. At this time, there are no requirements for photographers to submit any results of their work. Researchers in the last two years have been asked

TABLE 4: SOME PROFESSIONAL PHOTOGRAPHERS IN JOHNSTONE STRAIT, BRITISH COLUMBIA, 1970-1985

Photographer	Primary Wildlife Subject	Boat or shore based	Years Present	Permit?
Peter Thomas	Killer whales	Boat	1978-85	No *
Flip Nicklin	Killer whales	Boat	1981, '82 and '84	No *
Francois Gohier	Killer whales	Boat	1982	No *
Al Siddings	Killer whales and their research	Boat and tethered balloon	1984	Yes
Koji Nakamura	Killer whales	Shore?	1984	Yes
Jeff Foott	Killer whales	Boat (and shore at rubbing beach)	1984-85	Yes
Hiroya Minakuchi	Killer whales	Boat (and shore at rubbing beach)	1985-85	Yes
Bob Talbot	Killer whales	Boat	1985	No

* Source: John Ford, Pers. comm., June 8, 1987.

Table 5: PERMITS REQUESTED FOR ROBSON BIGHT ECOLOGICAL RESERVE, 1983-85

Name of Applicant	Institution	Date of Application	Dates Requested by Applicant	Date Permit Processed
Dave Bain	Center for Coastal Marine Studies, University of California at Santa Cruz (UCSC)	May 28/83	no record	no record
Jeff Jacobsen	Dep't. of Biological Sciences, Humboldt State University (HSU), Arcata, CA.	June 7/83	Jul 1-Aug 15/83	Jun 23/83
Walter Miale	SPEC	Aug 15/83	Aug 15-Oct 31/83	Aug 18/83
Al Giddings	OceanQuest, Berkeley, CA.	May 31/84	Aug 17-26/84 (Jun 19/84)	Jun 11/84
Jeff Jacobsen	Dep't of Biological Sciences, HSU	May 31/84	Jul 1-Sept 30	Jun 12/84
Alexandra Morton	Lore Quest, Simoom Sound, Echo Bay, B.C.	no date (no request on file)	Nov 1/84-Mar 13/85	Oct 24/84
Christoph Guinet	Ecole International d'Ingenieurs des Travaux Agricoles de Dijon (ENITA), France	Feb 13/85	Jul-Aug/85 and Jul-Aug/86	no permit (Mar 12/85)
Allan Reese		April 22/85		May 21/85 (no permit)
Jeff Jacobsen	Dep't of Biological Sciences, HSU	April 19/85	Jun 15-Sept 30	May 21/85 (Jun 17/85)
Dave Bain	UCSC	May 14/85	Jun 15-Sept 15	Jun 19/85
Jeff Foott	Survival Anglia, London, England	May 9/85	Jul 15-Sept 15	May 24/85 (Jun 25/85)

TABLE 5 (cont'd): PERMITS REQUESTED FOR ROBSON BIGHT ECOLOGICAL RESERVE, 1983-85

Name of Applicant	Institution	Date of Application	Dates Requested by Applicant	Date Permit Processed
Mike Bigg Graeme Ellis	Pacific Biological Station, Dep't of Fisheries and Oceans (DFO)	Jun 4/85	year-round for 5 years	Jun 21/85 (Jul 3/85)
Alexandra Morton	Lore Quest, Simoom Sound, B.C. (independent)	Jun 23/85	year-round for 1 year	Jul 12/85 (Aug 7/85)
Douglas Allen		Jul 29/85	Aug 15-Sept 15/85	Initially refused Aug 2/85 Accepted Aug 8/85
Peter Thomas	independent	Jul 25/85	no dates	permit refused (given yellow pennant before permit reviewed)
Paul Spong for Hiroya Minakuchi and Jin Tatsumara	Anima Magazine Japan	Jul 30/85	Aug 22-27/85	Aug 15/85 (Sept 11/85)
Paul Spong for Krov Menuhin		Sept 15/85	Sept/85-Jun/86	Sept 26/85 (Oct 16/85)
Jeff Foott	Survival Anglia England	Dec 4/85	Jul 15-Sept 15/86	Mar 11/86
Jeff Jacobsen	Dep't of Biological Sciences, HSU	Dec 29/85	Jun 15-Oct 1/86	Jan 20/86 (Feb 4/86)
Ed Morlan	independent	Dec 23/85	n/a	no permit Feb 2/86

to report each year on their findings. According to the records at the Ecological Reserves office, there have been three refereed journal articles, 15 magazine articles, 30 reports, two theses and five chapters in books and presentations at symposia on the Tsitika and Robson Bight. There are at least four other symposia presentations and a book not listed by Ecological Reserves. At least two more theses (one Masters level and one Ph.D level) should be complete in 1987. The articles and books have a fairly wide distribution, whereas the reports have a more specific audience and are not as widely available. Only one of the published theses was directly related to killer whales.

There has been a collective total of 73 years of research on killer whales at Robson Bight (Fig. 5). Affiliated researchers have worked 50 of these years. Forty percent of all the studies have been at least six years in length. Research from Robson Bight that has been published in refereed journals and books amounts to 11 scientific publications over 15 years by 10 affiliated researchers. The proportion of refereed articles and theses to years of field study by affiliated researchers has been less than 1:10. This low ratio is partially due to the complexity of behavior and longevity of the study subject, and partially to the relatively short time that Robson Bight has attracted international research attention.

Photographs are an even more immediate way of raising public awareness, especially if the journal, magazine or book has international distribution. Robson Bight has been featured in a National Geographic article and several other natural history magazines. In addition, much of the high quality photography of killer whales required for posters has been taken here. A recent television documentary featured Robson Bight in some detail and was slated for release in 35 countries (Foott, pers. comm.).

CHAPTER 4

FIELD OBSERVATIONS IN JOHNSTONE STRAIT, 1986

In this chapter, the following will be discussed: the research and photographic activities in 1986, the use of permits and pennants, the interactions between researchers, photographers and recreationists, and photographic activity at the rubbing beaches.

4.1 RESEARCH AND PHOTOGRAPHIC ACTIVITIES IN 1986

4.1.1 Affiliated Researchers

Researchers from accredited institutions working in Johnstone Strait in 1986 were: David Bain, David Briggs, David Duffus, Graeme Ellis and Mike Bigg, Christoff Guinet, Jeff Jacobsen, Kelly Newman and Janice Waite (Table 6). As the others have already been described in chapter 3, the following will only describe new work and researchers new to the area.

David Briggs began a study of killer whale turnarounds in Johnstone Strait, from a cliff observation point on Hansen Island (Fig. 2). Turnarounds are synchronized behaviors that may involve more than one pod. He was investigating where they turn and possible reasons for the behavior. He was more loosely associated with UCSC in 1986 than in previous years because he had not received any funding. However, he was still working on the boat traffic data from 1984 and 1985 to complete his undergraduate thesis. No summary report or published paper has been submitted on the turnaround data to date.

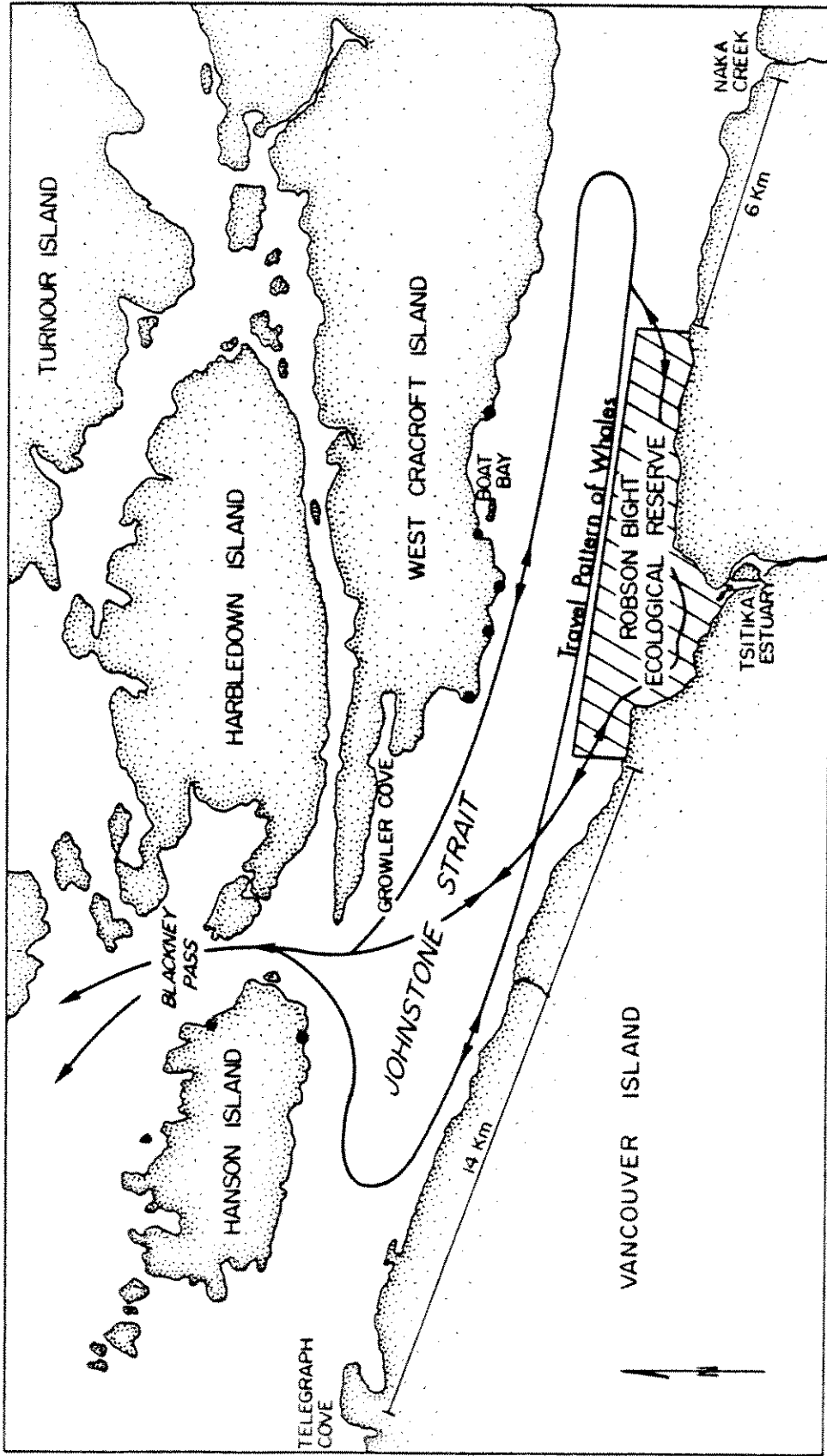
Dave Duffus is completing his doctoral thesis at the University of Victoria in the Department of Geography. He is obtaining a profile of whale watching in British Columbia, examining both the Johnstone Strait area as well as the Tofino-Ucluelet area for gray whale watching. This profile will contain information on socio-economic, environmental and geographic aspects of whale watchers. Boats who changed behavior in relation to the swimming direction of whale pods were monitored from a cliff observation point and contacted by a boat crew. Respondents were informed of the survey and asked to complete a mail-in questionnaire. They were made aware of the reserve and appropriate behavior around whales. A permit was not requested for this research because it was boat-oriented rather than whale-oriented. A preliminary report was submitted to Ecological Reserves in December.

Kelly Newman came to Johnstone Strait as part of Dave Bain's support crew. She monitored hydrophones placed below the cliff observation point for noises made by killer whales while feeding. These noises, called 'bangs', are hypothesized to stun fish so that they may be taken easily. Previously, the stunning of fish

Figure 2

Robson Bight Ecological Reserve

LOCATIONS OF RESEARCH CAMPS 1986



● Research camp

(adapted from Darling 1986)

TABLE 6: PRESENCE OF RESEARCHERS IN JOHNSTONE STRAIT, BRITISH COLUMBIA IN 1986. *

Researcher	Association	Boat or shore based	Time Present	Permitted?
Dave Bain Janice Waite	University of California at Santa Cruz (UCSC)	Boat and shore	Jun 15-Oct 30 Jun 15-Sept 14	Yes (2) working jointly
Mike Bigg Graeme Ellis	Department of Fisheries and Oceans, B.C.	Boat	Jun-Oct	Yes
Dave Briggs	UCSC	Shore	*Jul 1-Aug 30	No
Dave Duffus	University of Victoria, B.C.	Boat	Jul 1-Aug 29	No
Randall Eaton	Sierra Nevada College, Nevada	Shore	Jul 15-Aug 25	No
Cristoff Guinet	Ecole Nationale d'Ingenieurs des Travaux Agricoles Dijon, France	Shore	Jan 01-Jul 26	No
Jeff Jacobsen	Humboldt State University, CA	Boat	Jul 2-Sept 13	Yes
Robin Morton Alexandra Morton	Lore Quest Society, B.C.	Boat and shore	all year	No
Kelly Newman	UCSC	Shore	Jun 15-Sept 21	No
Jim Nollman	Interspecies Communication, Washington	Shore	Jul 20-Aug 20	No
Paul Spong Helena Symonds	OrcaLab, British Columbia	Shore	all year	No

* In addition to author, working in co-operation with Dave Duffus.

had been seen but not heard or vice versa. The clifftop is an ideal location from which to observe and record both.

Janice Waite, also from the Long Marine Lab, is conducting a study of the energetics of reciprocal altruism ('babysitting') in killer whales. This work requires theodolite tracking from shore as well as boat observations of respirations by focal animals.

4.1.2 Independent Researchers

In 1986, independent researchers kept a low profile in Johnstone Strait. Alexandra and Robin Morton stayed north and east of the strait most of the summer. Jim Nollman, Randall Eaton and their 'volunteers' were based on shore at West Cracroft Island and only made occasional forays into the strait. Paul Spong and Helena Symonds were land-bound as they did not have a working boat.

Alexandra and the late Robin Morton are funded through the LoreQuest Society, through which their cards, notepaper and photography are marketed. In 1986, they stayed north of Johnstone Strait most of the time. Although they monitored the movements of all species of whales in the area, they concentrated their efforts on transient killer whales. Robin Morton was killed in a diving accident in September 1986.

Paul Spong and Helena Symonds continued acoustical monitoring of pod movements in 1986. Their research seemed to be partially funded by visitors again in 1986.

Randall Eaton from Sierra Nevada College arrived in Johnstone Strait in mid July 1986 with approximately 15 volunteers. The group primarily conducted shore observations from their camp on West Cracroft Island, although they also did some diving and kayaking within ~2 km of their camp. In August, they began to participate in the radio network, alerting researchers at Dave Bain's camp to movements of whales.

Jim Nollman of Interspecies Communication returned to Johnstone Strait in August with a group of guests. He has continued his playing of music to the whales and recording their acoustical reactions.

4.1.3 Professional Photographers

In 1986, photographers from Canada, United States, England, Japan, Germany, and France were present in Johnstone Strait (Table 7). Photographers from Canada included Peter Thomas, contractors, and Norm de Leenheer. In 1986, Peter Thomas returned for approximately two weeks in July to photograph whales. Contractor photographers for Tourism B.C. arrived one evening in Robson Bight with the local fisheries guardian to photograph

TABLE 7: PRESENCE OF PROFESSIONAL PHOTOGRAPHERS IN JOHNSTONE STRAIT, BRITISH COLUMBIA IN 1986. *

Photographer	Association	Boat or shore based	Time Present	Permitted?
Jeff Foott	Survival Anglia	Boat and shore	Aug 17-Sept 14	Yes
Neil Shapiro	Cousteau Society, France	Boat	Sept 8-13	No
[Contract photographers]	Ministry of Tourism, British Columbia	Boat	Jul ? ** Boat Data **	No
Norman de Leenheer	British Columbia	Boat	** Boat Data **	No
Robin Morton Alexandra Morton	Lore Quest Society, British Columbia	Boat	all year	No
Hiroya Minakuchi	Anima Magazine, Japan	Shore	Aug 25-Sept 13	Yes
Doug Smith	California	Shore	Jul 26-Sept 30	No
Hermann Sulberg	Reportagen Germany	Boat	Jul 20-Aug 15	No
Bob Talbot	Marineworld, California and Cousteau Society, France	Boat	Aug 19-Sept 13	No
Peter Thomas	British Columbia	Boat	Jul 16-Jul 30	No

*Not all photographers are accounted for because of their resemblance to recreationists and failure to identify themselves otherwise.

whales at close range. Norman De Leenheer is a local schoolteacher in Port McNeill who does freelance photography in the summer. Over approximately a three week period, he photographed whales in Robson Bight and Johnstone Strait. He markets his photography locally in Port McNeill.

The U.S. contingent included film-makers Bob Talbot and Doug Smith, both from California. Doug Smith is a freelance film-maker from California who was attempting to use specialized diving equipment outside the reserve to obtain underwater footage of killer whales. He was in the area during August and September. Bob Talbot was completing his film for Marineworld in 1986 as well as guiding a French expedition described below.

Photographers with more potential for promoting international awareness of Robson Bight were Jeff Foott, Hiroya Minakuchi, Herman Sulberg and the Cousteau Society expedition. Jeff Foott, operating for a British film company, was one of two photographers permitted to work at the rubbing beaches. He was in the area from mid August to mid September. His cine gear included remote underwater cameras and video monitor since diving at the rubbing beaches is not allowed by Ecological Reserves. The film was contracted by a large wildlife film company and the documentary distributed worldwide. Hiroya Minakuchi was the other photographer working at the rubbing beach. As a Japanese still photographer and editor of a wildlife magazine in Japan, his work is distributed to a large audience. Herman Sulberg is a German freelance photographer working with Geo magazine in Europe. Although pictures of whales were to be used in his article, the purpose was primarily to show the whale watching and research activities. The Cousteau Society boat arrived in September en route to the Queen Charlotte Islands. Their one week of work did not require entry of the reserve. Footage was to be included in a special of their 'Voyage of Rediscovery' series.

4.2 THE USE OF PERMITS AND PENNANTS

4.2.1 Permits

A total of 33 ecological reserve permits were issued in 1986. Of these, eight were issued for Robson Bight. DFO was granted a five year permit in 1985, which was also in effect. Of the nine permits issued to international groups, five were for Robson Bight (Table 8). Two photographers were permitted in 1986 to conduct remotely controlled underwater photography at the rubbing beaches. By early August 1986, three photographers and two researchers had entered the reserve and closely approached whales without a permit.

The permits appear to work well in managing the researchers and photographers who have obtained them. They define a certain code of behavior expected while in close contact with whales. However, a number of individuals operate in the area without permits. Permits are not necessary for research done from shore

TABLE 8: PERMITS REQUESTED FOR ROBSON BIGHT ECOLOGICAL RESERVE, 1986

Name of Applicant	Institution	Date of Application	Dates Requested by Applicant	Date Permit Processed
Don Knapp		no application	n/a	no permit (May 23/86)
Dave Bain	UCSC	May 7/86	Jun 20-Oct 31/86	Jun 3/86 (Jun 20/86)
Janice Waite	UCSC	May 7/86	Jun 25-Sept 15/87	Jun 3/86 (Jun 20/86)
Paul Spong for Hiroya Minakuchi	Anima Magazine Japan	May 7/86 (rec'd Jun 10/86)	Sept 1-15/86	Jun 24/86 (Aug 28/86)
Alexandra Morton	Lore Quest Society, B.C.	Jul 4/86	Jul 4-Dec 31/86	Jul 14/86 (Jul 25/86)
Robin Baird	University of Victoria	Oct 19/86		Nov 4/86
Dave Briggs	UCSC	Feb 20/87		Apr 23/87

stations on West Cracroft and Hanson Islands, but for other projects, requests for permits were rejected or were never written. These people have fallen through the administrative 'cracks', that is, they do not have to report to Ecological Reserves at the end of the field season and are not responsible to them for their behavior. In other words, the permitting system primarily deals with people who will be compliant to the guidelines anyway. Those whose activities may be less justifiable in terms of impact 'costs' to the whales and the environment, are operating without regard to the guidelines. These people may not feel the guidelines are credible since commercial fishermen are not required to stay out of the reserve and that fishermen are allowed to set nets even on the rubbing beaches, considered the most sensitive habitat for the whales. Others may operate in the belief that there are no effective penalties for not complying with the guidelines or that they are not disturbing the whales.

4.2.2 Pennants

Pennants issued by DFO were not consistently flown by either researchers or photographers. One researcher did not display his pennant, as he believed this might attract recreationists while he was collecting field data. A photographer kept his pennant issued to him the previous year, although he had no authorization from Ecological Reserves to closely approach whales in the reserve. It is possible that he had mistaken the purpose of the pennant with that of the permit, for he did enter the reserve. If this is the case, then efforts should be made to clarify any misunderstandings. The pennants were also too small to be seen from a distance. Some photographers didn't have boats from which to fly their pennants.

Most recreationists on small boats did not know the significance of the yellow flags. The presence of these flags made little difference to recreationists' behavior, as researchers were still being interrupted in data sessions by recreationists in the two years of the pennant system. Recreationists still approached the rubbing beach despite a pennant conspicuously displayed on the photographer's boat.

Many of the researchers and photographers have been using Robson Bight since 1978 or earlier and prior to its establishment as a reserve. During those early times, few recreationists knew about the area and there were also fewer researchers. Many of the researchers and photographers are on excellent terms with the Department of Fisheries and Oceans (DFO), where the initial responsibilities for management rested. The increasing regulation of the reserve by Ecological Reserves has restricted the freedom of individuals. Prior relationships between DFO and researchers and photographers may have undermined the authority of Ecological Reserves. For example, Ecological Reserves received a permit request from a photographer for the 1985 season. The photographer had already obtained a yellow flag from DFO. These

flags are normally not given out until the permit is approved.

4.3 INTERACTIONS

In the following section, interactions between photographers, researchers and recreationists are documented. In particular, instances of co-operation, conflict and self-regulation of behavior towards the whales are briefly described and then discussed. The author's role during this period was primarily as a researcher, and secondarily as a photographer's assistant, not as an outside observer. This section is not quantitative, but describes the general situation or a typical instance that exemplifies the general situation.

4.3.1 Photographers and Researchers

Three instances are described, the first and last showing co-operation and the second showing conflict. One photographer considered the work of researchers essential to his successful photography of wildlife by helping him to achieve a better understanding of the animal's behavioral ecology. On August 8 1986, several researchers were angry when non-permitted photographers entered the reserve and closely approached whales. On August 23 1986, a photographer co-operated closely with a researcher to avoid interrupting data collection by researcher.

Some photographers worked quite closely with researchers to avoid jeopardizing data collection by the researchers. In one instance, a photographer was in close radio contact with a researcher when both were working near a group of resting whales. The photographer took numerous precautions to co-operate with the researcher to avoid disturbing the pod. Several researchers have housed photographers or other researchers, giving them a convenient base to work from.

Researchers were quite "protective" of their research subjects and were not indifferent when a photographer, or other person, abused the reserve guidelines. Photographers who followed whales too closely or worked within the reserve without a permit did not receive the full co-operation of researchers. Radio requests for information on whale locations might be deliberately vague. Occasionally, efforts were made by individuals other than the whale-watching survey crew to inform photographers of appropriate behavior but often researchers were busy or did not feel it was their responsibility. Persons could circumvent requests for information by tuning into the whale "hotline", the VHF radio channel used primarily by researchers and listening for clues to location.

4.3.2 Researchers and Recreationists

Recreationists come to the area in several forms of transportation and to participate in a variety of activities, as was determined by Dearden and Duffus (1986). Charter and pleasure craft, both sail and motor, were used as well as kayaks, canoes, and airplanes. Each group arrives with certain expectations of their trip and ways of interacting with their environment. The day charter from Telegraph Cove provided for a great deal of positive interaction between researchers and recreationists, providing education in an exciting manner and an opportunity for researchers and recreationists to mingle in a non-stressful environment. However, recreationists arriving on other charters or independently often had a different experience.

These 'snapshots' show primarily conflicts which developed between these two groups. First, on August 8 1986, researchers in their Zodiac had to discontinue their data session when a charter sailboat forced them too close to the whales. One researcher did not use DFO pennant specifically to avoid being identified by recreationists. Another researcher avoided Johnstone Strait during August because it was too crowded with recreationists. However, one researcher solicited whale sightings from recreationists and others by distributing self-addressed postcards on which sightings could be reported. Finally, on a number of occasions, researchers attempted to modify behavior of recreationists by approaching them and asking them to stay out of the reserve. However, on several occasions these approaches ended in heated discussions. Researchers also attempted to set an example by their behavior around the whales and hoped that recreationists would follow suit.

Recreationists were contacted consistently consistently for the first time in 1986 by researchers, in order to explain about the reserve and the studies being carried out. In the words of Jim Borrowman (pers. comm.), long-time resident and volunteer warden of the reserve since its establishment, "this year had been the best year for co-operation among the recreationists, and there had been less need for regulation." During the workshop at the end of the field season, many of the researchers felt that the information given out during the whale-watching survey had been responsible for this co-operation. Alexandra Morton relies on recreationists, fishermen and tugboat captains to report their whale sightings on cards which were distributed in the local area (App. 3). She also asks individuals to contact her on VHF radio, if possible.

Several researchers found recreationists to be a hindrance to their studies. One researcher would leave Johnstone Strait, and search for whales further north, when Johnstone Strait was relatively crowded, on clear, calm days. Another researcher recalled being "nudged" out of data sessions by recreationists coming between him and the whales, or forcing him so close to the pod, that he would have to change direction and discontinue the session. He also felt that the whales would habituate more

quickly to the presence of boats, if only he and another researcher were approaching the whales. It was his perception that the unpredictable behavior of recreationists' boats disturbed the process of habituation.

Researchers would occasionally contact recreationists. Unfortunately, the interactions were often negative. These interactions were often precipitated by recreationists approaching the researchers or a pod of whales too closely. The recreationists would often model the actions of the research boat, possibly mistaking the research boat for another recreationist. Researchers would then have to break off their data session, and would either explain the guidelines of the reserve to the tourists or simply motor away. At other times, a researcher would spot a boater not acting within reserve guidelines and contact the survey boat. These interactions were generally more positive, since the surveyors had more time to spend with the tourists and a greater interest in the welfare of the recreational whale watcher.

4.3.3 Photographers and Recreationists

There were less observed instances of interactions between these two groups because of superficial resemblance to each other. One photographer commented that he found recreationists a minor inconvenience since they sometimes interfered with background on shots or competed for "whale time". On September 11 1986, curious recreationists approached photographers at rubbing beach, talked briefly but were encouraged to leave.

Generally, recreationists were viewed as an inconvenience to photographers. They would get in the way of photographs of the whales and could potentially disturb the whales. This was of relatively minor concern in terms of impacts. Of more concern was when photographers were working at the rubbing beaches. When the permitted photographers were set up with all their equipment at one of the beaches, several curious fishermen rowed to the shore. The fishermen had no radio, and therefore could not be contacted until they had approached quite closely. Their interest was harmless enough, but the presence of the boat might have been disturbing had there been whales present. The photographers were also concerned that their underwater equipment might be inadvertently run over, and that the fishermen might come back for a closer look at the equipment when the photographers were absent. They were also concerned that the presence of this recreationist might attract others and requested that the recreationist leave quickly.

4.3.4 Researchers

This group displayed more co-operation than any other. Researchers required daily or even hourly contact with each other to find whales, confirm pod identities and to obtain supplies and

help. Researchers seemed sensitive to the opinions of other researchers in their behavior regarding the whales. Affiliated researchers co-operated with independent researchers if the perceived behavior of the independent researchers was in agreement with the guidelines set out by Ecological Reserves and DFO.

Researchers among themselves were both co-operative and generally self-regulating. The series of research camps on Johnstone Strait were look-outs linked by radio, and all the affiliated researchers contributed their whale sightings. Several of the independent researchers also reported their sightings. At the close of the field season, the researchers gathered for a workshop to present their findings and exchange ideas. Peer pressure generally kept most researchers within the reserve guidelines. On at least one occasion² during the summer, one researcher was questioned about his research design and excessive length of study by several other researchers.

4.3.5 Photographers

Photographers interacted little while working in Johnstone Strait. An exception to this was a photographer hired as a guide for the Cousteau Society and who made sure the boundaries of the reserve were respected by the employer. Another exception was when two permitted photographers had to work at the rubbing beaches at the same time (the dates on their permits coincided).

Professional photographers seemed to be competitive among themselves. Although the two photographers at the rubbing beach worked together, it was not a very satisfactory arrangement and both would have preferred to work alone. Both were worried that their equipment would be broken or interfered with by the other. However, the presence of another photographer may ensure that neither will disregard the guidelines of the reserve.

4.4 PHOTOGRAPHIC ACTIVITY AT THE RUBBING BEACHES

Researchers have primarily worked on the water in the reserve rather than at the rubbing beach. Photographers who have spent some time at the beach have had a unique opportunity to observe whale behaviors. Some of these have been documented on film, but much has not.

In 1986, two permitted photographers and the author were present at one of the rubbing beaches from September 5 to September 15. During that time, whales were observed approaching the beach about once a day. One of these rubbing sessions lasted approximately 80 minutes, another about 20 minutes and the remainder less than five minutes. One of the photographers had a boat which for logistical reasons was moored close to shore at the east end of the beach. Photographic equipment included an

underwater, remotely-operated movie camera and one to two other underwater cameras. These were embedded in the beach gravel below the tide line at various locations. The photographers wore drab clothing to minimize attention being drawn to themselves by whales or humans, in addition to remaining hidden when whales were in the vicinity. On two occasions, whales apparently exhibited very different reactions when humans were visible to them at the beach.

On the first occasion, the author was hidden in a rock crevice and "peeked" up to observe the location of some whales to quietly intercom this to the photographer who was completely hidden among logs and vegetation. At the sight of the author, the bull in the pod who was quite close to one edge of the beach, raised its head partially from the water, to look directly at the author. It immediately slapped its flukes on the water, turned around and the entire pod had vacated the area within 30 seconds.

During the second instance, the two photographers were in the midst of setting up their underwater apparatus, and were in about a metre of water. A bull killer whale rounded the promontory at the west end of the beach less than 20 feet from shore. Both photographers immediately sat down quietly in the water and remained so while the whale proceeded in towards the beach and rubbed for several minutes.

There seemed to be no noticeable avoidance of the boat moored at the east end of the beach. Whales would rub all along the beach, including underneath the boat.

One photographer noted that whales seemed to avoid his camera when it was located in the middle of the beach. He moved it back nearer the promontory where he had first placed it at the first opportunity.

4.5 PUBLICATIONS TO DATE

Publications are one of the most effective and cost-efficient methods to raise awareness of ecological reserves. At this time, there are no requirements for photographers to submit any results of their work. Researchers in the last two years have been asked to report each year on their findings. According to the records at the Ecological Reserves office, there have been three refereed journal articles, 15 magazine articles, 30 reports, two theses and five chapters in books and presentations at symposia on the Tsitika and Robson Bight. There are at least three other symposia presentations and a book not listed by Ecological Reserves. At least two more theses (one Masters level and one Ph.D level) are expected in 1987. The articles and books have a fairly wide distribution, whereas the reports have a more specific audience and are not as widely available. Only one of the published theses was directly related to killer whales.

*These 2 theses
LPC*

There has been a collective total of 73 years of research on killer whales at Robson Bight (Fig. 8). Affiliated researchers have collectively worked 50 years. Forty percent of all the studies have been at least six years in length. The proportion of refereed articles and theses to years of field study by affiliated researchers has been less than 1:10. This low ratio is partially due to the complexity of behavior and longevity of the study subject, and partially to the relatively short time that Robson Bight has attracted international research attention.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

5.1.2 Conclusions from Field Observations

Boaters with a great deal of experience, such as researchers and photographers, could possibly be a major source of disturbance. This is especially true where these people were in the area for an extended period of time. However, researchers are primarily self-regulating in their conduct while engaged in research in Johnstone Strait and Robson Bight, due to peer pressure and the need for co-operation and information from other researchers. Permitted researchers and photographers are generally compliant to the terms of their permit, having accepted the 'rules of the game'. However, non-permitted individuals may cause more problems in the future since they may not accept these 'rules'. At present there are no implemented penalties for those individuals who do not act within the guidelines of the reserve.

Ecological reserve and DFO guidelines are not particularly effective where economic gain is involved. Some professional photographers are among the worst transgressors of the guidelines, especially since these people are often repeat visitors to Robson Bight and have reason to be fully aware of expected behavior.

Interactions between researchers and recreationists, and photographers and recreationists are not generally positive when recreationists come to the area independent of a charter. These people who arrive in Johnstone Strait in their own boats require another source from which to obtain information about the killer whale sanctuary.

The pennant system does not effectively inform recreationists of researchers and photographers. The pennants were designed to alert recreationists that the bearers had special permission to approach whales closely. However, the pennants are too inconspicuous to be seen from any distance and their significance is lost on all but the informed. Permitted parties at the rubbing beaches require some method of informing interested persons of their activities other than the pennant system. Recreationists also need to be informed how not to interfere with ongoing research (by staying out of the reserve).

Only a small amount of the research at Robson Bight has resulted in publication. Research from Robson Bight that has been published in refereed journals and books amounts to 11 scientific publications over 15 years by 10 affiliated researchers. In addition, Robson Bight has been featured in a number of films, including a documentary completed in 1986.

5.1.2 Lessons from Other Protected Areas

Several lessons can be learned from other protected areas. For example, Laguna San Ignacio and Robson Bight have certain similarities. Entry of unauthorized persons into the reserves is restricted in both cases. Restrictions have been much more effective in San Ignacio due to the isolated nature of the lagoon and uncertainty of individuals about the consequences of Mexican law if caught in the lagoon without a permit. Robson Bight's location on an active shipping channel makes potential enforcement of any regulations difficult and demarcation of the boundaries of the reserve a problem. Adherence to guidelines at Robson Bight will require constant vigilance whereas San Ignacio only requires spot checks.

Ano Nuevo State Reserve in California is heavily used by researchers at the nearby University of Santa Cruz, as well as by the public. Several precautions are taken so that the general public does not mimic researchers' activities. To avoid being mistaken as members of the public, researchers are required to don partial uniforms (jackets or vests) while in the closure area. In addition, researchers are requested to avoid contact with seals while within sight of the public. Finally, tour guides are present at all times during a public visit to answer any questions and clarify research activities. While it would not be possible to accompany each visitor to Robson Bight, researchers and permitted photographers could be more clearly identified. It may be necessary to restrict researcher activity in the future to times when there are fewer members of the general public in the vicinity.

Being a popular reserve with both researchers and the public, staff at Ano Nuevo have found it essential to keep the lines of communication open. They have accomplished this in several ways. First, daily meetings are held between rangers, researchers and tour guides to discuss daily activities. Researchers are expected to report on any management problems they see, when rangers or tour guides are not present. Similarly, rangers and tour guides will report any unusual seal behaviors when researchers are not present. Formal agreements regarding communications and other management policy may be necessary for Robson Bight in the future as its visitation grows.

Research use at Saguenay Fjord and Robson Bight is monitored by an government agency. At Saguenay, Federal Fisheries is responsible for permitting researchers as well as being the enforcement agency. Visitor management can be much more effective in this situation (although it is not known whether it is). Presently at Robson Bight, management of researchers and photographers relies on a somewhat bewildering system necessitating co-operation and communication between a federal agency and a provincial one. In addition, enforcement personnel at Federal Fisheries do not have a directive to investigate

charges of marine mammal harassment (J. Lewis, pers. comm.).

5.2 RECOMMENDATIONS

The following recommendations are based in part on discussions with researchers and reserve managers, evidence from other areas and field observations at Robson Bight and Laguna San Ignacio in 1986 and 1987.

1. Information

a. Permitted researchers and photographers working at the rubbing beach should be required to identify their activities by conspicuously marking their boats or their persons. This identification could consist of minimum 8 inch (20 cm) letters placed on both port and starboard sides of the hull, above the water line. Another possibility would be to use fluorescent safety vests marked 'research' to be worn while working on the water. In addition, floats should be set off the rubbing beach with a large sign to the effect that they should not be disturbed and that they have some sort of official clearance (either Department of Fisheries and Oceans or the Ecological Reserves Unit).

b. Any information, such as in signage at Telegraph Cove, or interpretive talks, should include a section on researchers' and permitted photographers' activities, what to look for and a caution not to disturb them.

c. Researchers are largely self-regulating at present, reinforced by the need for co-operation in an isolated field situation and to facilitate the location of their study subjects. However, the presence of a representative of the Ecological Reserves Unit at all times during the field season and camped somewhere in the Strait would enhance their effectiveness in completing their research, as well as being able to assist Ecological Reserves in monitoring recreationists.

d. This person could also inform recreationists about the Reserve and could intervene when recreationists are interfering with the collection of research data. This person's term should extend from June to the end of September. At present, enforcement powers are not as necessary as informative capacity.

2. Publications

a. Permitted researchers should be required to submit results of their summer's research by December of the same year, to better assess the validity of issuing permits the following field season.

b. Permitted photographers should be required to submit copies of photographs, film or video resulting from their work for the

limited, internal or negotiated use by Ecological Reserves.

3. All researchers and photographers should seriously examine their methodologies to minimize their impacts and requirements for close contact with the whales (such as the use of a boat). This examination would include their requirement to enter the Reserve.

3. Enforcement

At the present time, there does not appear to be a serious harassment problem at Robson Bight. Regulations exist within the Canadian Fisheries Act to potentially control behavior of researchers and photographers if the need should arise but implementation is a problem at this time. DFO officers do not have a directive to enforce the cetacean regulations. This directive should be in place before the ecological and management problems at Robson Bight become irreversible.

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REGULATIONS RESPECTING THE PROTECTION OF CETACEANS

Short Title

1. These Regulations may be cited as the Cetacean Protection Regulations.

Interpretation

2. In these Regulations,

"hunt" means to chase, shoot at, harpoon, take, kill, attempt to take or kill, or to harass cetaceans in any manner; (chasser)

"Indian" has the same meaning as in the Indian Act; (Indien)

"Inuk" means a person who is a direct descendant of an Inuk, commonly referred to as an Eskimo, and possesses at least one-quarter of Inuk blood; (Inuit)

"local consumption" means the use of cetaceans or products thereof within the province adjacent to the place of hunting; (consommation locale)

"Minister" means the Minister of Fisheries and Oceans; (Ministre)

"right whale" means any whale known by the name of Atlantic right whale, Arctic right whale, Biscayan right whale, bowhead, great pilot whale, Greenland right whale, pigmy right whale, Southern pigmy right whale or Southern right whale; (baleine franche)

Application

3. These Regulations do not apply with respect to hunting cetaceans at sea.

Prohibition

4. Subject to section 5, no person shall hunt cetaceans in Canadian fisheries waters unless that person is the holder of a licence issued pursuant to section 6.

General

5. An Indian or Inuk may, without a licence, hunt cetaceans of any species, except right whales, on condition that the cetaceans are used for local consumption.

6. The Minister may, on request therefor, issue a licence to (a) an Indian or Inuk permitting him to hunt right whales for the purposes and under the conditions specified in the licence, or

(b) any person permitting him to hunt cetaceans, the species of which shall be specified in the licence, for the purposes of scientific research or education.

7. No person shall contravene any conditions specified in a licence issued to him pursuant to section 6.

RÈGLEMENT CONCERNANT LA PROTECTION DES CÉTACÉS

Titre abrégé

1. Le présent règlement peut être cité sous le titre Règlement sur la protection des cétacés.

Définitions

2. Dans le présent règlement,

« baleine franche » désigne toute baleine connue sous le nom de baleine franche de l'Atlantique, baleine franche boréale, baleine franche de Biscaye, baleine dite bowhead, baleine boréale, baleine franche du Groenland, baleine franche naine, baleine pygmée ou baleine australe; (right whale)

« chasser » signifie poursuivre, tirer, harponner, capturer, tenter de capturer ou de tuer, ou harceler de quelque façon des cétacés; (hunt)

« consommation locale » désigne l'utilisation d'un cétacé ou de ses produits dans la province adjacente à l'endroit où il est chassé; (local consumption)

« Indien » a le même sens que dans la Loi sur les Indiens; (Indian)

« Inuit » désigne un descendant direct d'un Inuit communément appelé un Esquimau, et ayant au moins un quart de sang inuit; (Inuk)

« Ministre » désigne le ministre des Pêches et des Océans; (Minister)

Application

3. Le présent règlement ne s'applique pas à la chasse aux cétacés en mer.

Interdiction

4. Sous réserve de l'article 5, il est interdit de chasser des cétacés dans les eaux des pêcheries canadiennes sans détenir un permis délivré en vertu de l'article 6.

Dispositions générales

5. Un Indien ou un Inuit peut chasser sans permis toutes les espèces de cétacés sauf la baleine franche, à la condition de les utiliser pour la consommation locale.

6. Le Ministre peut, sur demande, délivrer un permis

a) à un Indien ou à un Inuit, l'autorisant à chasser la baleine franche aux fins et aux conditions stipulées dans son permis, ou

b) à quiconque, l'autorisant à chasser des cétacés de l'espèce spécifiée dans son permis, à des fins scientifiques ou éducatives.

7. Il est interdit au titulaire d'un permis visé à l'article 6 de contrevenir aux conditions de son permis.



Government of Canada
Gouvernement du Canada

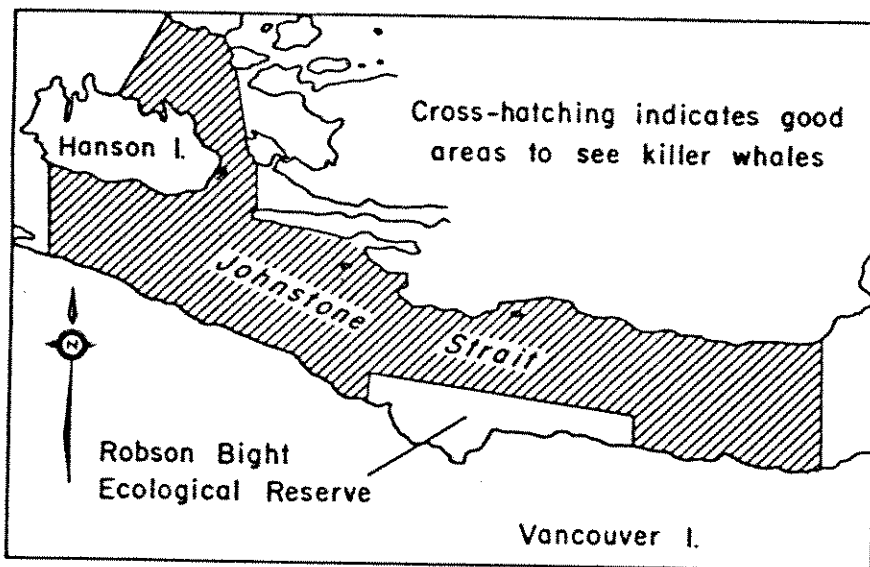
Fisheries and Oceans
Pêches et Océans

June 1985

Your file Votre référence

Our file Notre référence

ATTENTION WHALE WATCHERS



To ensure that killer whales are not disturbed, please stay at least 100 metres away in Johnstone Strait and at least 300 metres away in the Robson Bight Ecological Reserve. Research boats flying a numbered yellow pennant may approach closer when essential for study.

It is important to remember that harassing killer whales is an offence under the Federal Fisheries Act. Also, an Ecological Reserve was established in the Robson Bight area to allow these whales to feed and rest undisturbed. A permit is required from the British Columbia Parks and Recreation Division (1019 Wharf Street, Victoria, B.C. V8W 2Y9) to undertake research in the reserve.

The reverse side of this notice explains how to approach killer whales in your boat, and provides some biological facts about pods.

Marine Mammal Research
Pacific Biological Station
Nanaimo, B.C.
V9R 5K6

Station de biologie du pacifique
Nanaimo, (C.-B.)
V9R 5K6

App A

How to approach killer whales

The following guidelines will help you approach killer whales in your boat with a minimum of disturbance to the whales and to other whale watchers.

1. Approach whales from the side, not the front or rear.
2. Make your approach and departure slowly.
3. When travelling beside whales (100 m away in Johnstone Strait; 300 m in the Robson Bight Ecological Reserve) maintain a speed of 2-4 knots, and do not alter your speed abruptly. Whales surface for about 3 breaths, and dive for 3-4 minutes.
4. Be considerate of other whale watching boats, so that everyone has a chance for a good view, and where possible, lessen congestion by observing an unwatched pod.
5. Whales are particularly susceptible to disturbance when resting on the surface as a group.
6. On occasion, you may see a research boat approach the whales more rapidly or closely than is recommended for general observation. This research usually involves censusing, or documenting the behaviour of individual whales. Each whale is recognizable from unique natural markings. Research boats are identified by a numbered yellow pennant. Pennants with a black tip indicate a permit has been obtained to undertake research within the Robson Bight Ecological Reserve.

Some facts about pods of killer whales

Killer whales live in remarkably stable social groupings called pods that are only now beginning to be understood. A typical pod has 5-20 individuals, but can have up to 50. The average pod contains a mixture of males and females of various ages, and is organized into 2-3 subgroups. Each subgroup is composed of a cow with her offspring, and can number up to 5 animals. Cows within a pod are apparently closely related. A few other individuals are usually present in the pod, and these too are probably related to the cows. Whales within a pod appear to remain together throughout their lives. Males may live up to 50 years, and females up to 75 years. A new pod probably forms by the gradual splitting of an existing pod, along maternal lines. Each pod has its own unique dialect.

When travelling, a pod sometimes disperses over an area of several square km, while at other times it keeps in close formation. Different pods travel together for short periods, and this can result in a large group. Three communities of killer whales are known in British Columbia. One is found off southern Vancouver Island, and contains 3 pods with 75 whales. Another inhabits northern Vancouver Island, and contains 13 pods with 150 whales. The third community travels throughout British Columbia, and contains 17 pods with 50 whales. All pods within a community travel together at some time, but pods from one community do not mix with those from another. Killer whales are seen in British Columbia all year, but are most common during July-September.

App. A



Province of
British Columbia

File: _____

MINISTRY OF
ENVIRONMENT AND PARKS
ECOLOGICAL RESERVE PERMIT

Pursuant to the Ecological Reserve Act and Regulations thereunder permission is hereby granted to

_____ of _____
name address

to enter Ecological Reserve No. _____ for research and educational purposes.

This authorization is valid from _____ to _____ and is subject to the following conditions:
date date

1. That no plants, animals or other materials shall be damaged, destroyed or removed from the Reserve.
2. That no motorized vehicles or equipment shall be used on the Reserve.
3. That no foreign objects, animals or other materials shall be introduced to or deposited on the Reserve.
4. That in conducting research and studies within the Reserve the procedures and methods used shall be minimally disruptive to the natural environment of the area.
5. That the person or persons hereby authorized shall accept full and complete responsibility for ensuring adherence to the conditions of this permit.

SPECIAL PROVISIONS

This permission does not grant or imply any right to occupation or exclusive use of the Reserve land.

In consideration for granting permission to enter the ecological reserve the permit holder acknowledges that there may be unusual dangers in the ecological reserve and the permit holder agrees with the owner that the owner shall not be liable or responsible in any way for any death or injury arising from or out of any occurrence upon the ecological reserve or for loss or damage to property of the permit holder whether or not such damage, loss, injury or death results from the negligence of the owner, or whether or not such damage, loss, injury or death results from the failure by the owner to warn the permit holder of any unusual dangers in the ecological reserve. Further, the permit holder hereby releases the owner from any action or claim whatsoever which the permit holder may or shall have against the owner by reason of any such damage, loss, injury or death.

On behalf of the Minister of
Environment and Parks

The terms and conditions set forth above are hereby agreed to and accepted:

Dated at _____ this _____ day of _____ 19 _____

Signature of permittee:

App. 2



State of Florida
DEPARTMENT OF NATURAL RESOURCES

DR. ELTON J. GISSENDANNER
Executive Director
Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard, Tallahassee, Florida 32303

BOB GRAHAM
Governor
GEORGE FIRESTONE
Secretary of State
JIM SMITH
Attorney General
GERALD A. LEWIS
Comptroller
BILL GUNTER
Treasurer
DOYLE CONNER
Commissioner of Agriculture
RALPH D. TURLINGTON
Commissioner of Education

December 30, 1986

Robin E. Taylor
Natural Resources Management Program
Simon Fraser University
Burnaby, B.C. V5A 1S6

Dear Sir/Madam:

There are several agencies within the State and Federal governments that share the enforcement responsibility of endangered species which include the manatee.

The United States Department of Interior's Special Enforcement Agents have a direct responsibility and are also commissioned as State enforcement officers to enforce State regulations.

Florida Game and Freshwater Fish Commission's wildlife enforcement officers have full police powers to enforce all State laws and regulations. They are also commissioned as federal wildlife agents.

The Department of Natural Resources' Florida Marine Patrol officers have full police powers to enforce all State laws and regulations. They are also commissioned as federal wildlife agents.

There are no jurisdictional conflicts between the applicable agencies on manatee enforcement.

Also, there are no special regulations for researchers and photographers. Scientific programs are reviewed and may be approved if they could be beneficial to the animals and compatible to law enforcement efforts.

Thank you for your interest in the manatee.

Sincerely,

J. J. Brown, Inspector
Florida Marine Patrol
P. O. Box 2790
Homosassa Springs, FL 32647

App. B

DEPARTMENT OF PARKS AND RECREATION

Pan Mateo Coast District
95 Kelly Ave.,
Half moon Bay, CA 94019
415/726-6203

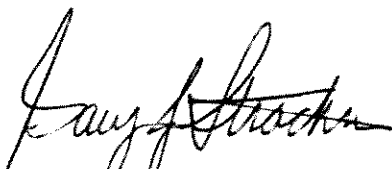


May 30, 1987

Robin E. Taylor
Natural Resources Management Program
Simon Fraser University
Burnaby, B.C. V5A 1S6

Dear Robin:

Enclosed is the information which you requested concerning Ano Nuevo State Reserve. Hopefully these will answer any questions you may have on our seal management program. Please feel free to contact me if I can be of any further assistance.


Gary Strachan
Supervising Ranger
Ano Nuevo State Reserve

GS/vm

App. 6
Ano Nuevo State Reserve

and

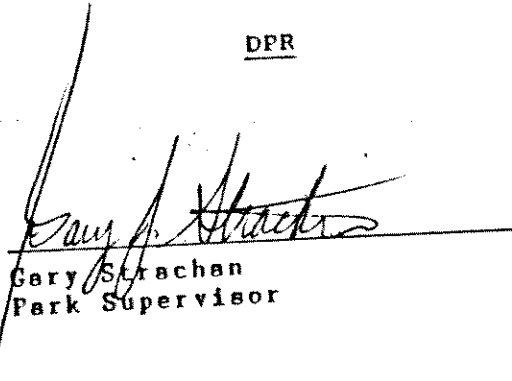
University of California at Santa Cruz
Annual Research Program Operating Agreement
and Closure Exemption

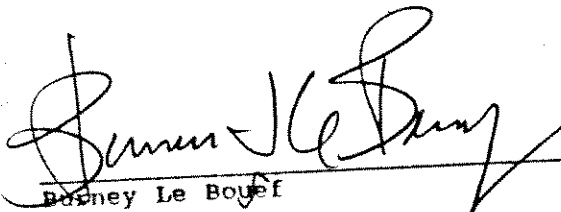
1986/1987 SEASON
JANUARY 1987


UCSC

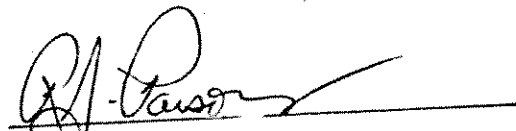

Steve Davenport
UCSC

DPR


Gary Strachen
Park Supervisor


Rodney Le Bouef
Research Director
UCSC


Rod Parsons
Chief Ranger


District Superintendent

App. 8
ANO NUEVO S.R. - U.C.S.C.

ANNUAL RESEARCH PROGRAM OPERATING AGREEMENT AND CLOSURE EXEMPTION

The purpose of the Ano Nuevo Elephant Seal Closure Area is to protect the pinniped calving and breeding habitat. Formal exemption to the Closure Order 2-156 has been granted for authorized UCSC Elephant Seal Research Program personnel in order that they may conduct permitted research activities inside of the Ano Nuevo closure areas consistent with the management goals, directives and policies of the Reserve. (For further information see Closure Exemption.)

The primary purpose of the Reserve is to preserve and promote wildlife and its habitat. Research activities increase the knowledge necessary to meet that purpose and are an essential component of the interpretive and management programs. These activities at Ano Nuevo primarily involve observation; however tagging, marking and other special activities authorized by National Marine Fisheries Service and State Park Commission Permits, and the District Superintendent, also part of the research program. Although it is understood that some interaction with the animals is unavoidable, researchers will strive to conduct their activities in a manner that minimizes disturbance to the animals, particularly the mother-pup relationship or calving or breeding success.

All persons working in the Reserve must remember that their activities are taking place under the critical public eye. Interpretation based on a clear understanding of activities performed can greatly enhance good public relations and prevent negative feelings from developing.

For the 1986-87 elephant seal breeding season, it is agreed that:

1. Only authorized identifiable researchers are to be involved in the research activities within the Ano Nuevo Closure Area. A list of research personnel will be submitted to the Reserve Supervising Ranger by the Research Program Director designating mainland and island researchers. No other persons (friends, guests, VIP's) may accompany researchers in the Closure Areas except with clearance from the Research Program Director and his notification by phone or message to the Supervising Ranger prior to their entry.
2. Mainland researchers will wear one of the blue UCSC identity jackets or vests in the Closure Area.
- 3a. Researchers will adhere to the twenty-foot closure whenever possible and approach animals more closely only when necessary for data collection or research purposes. Any activities that require approaching seals closer than twenty feet (such as reading tags) in view of the public will be limited to two researchers.

- 3b. Researchers will avoid contact with the animals in view of the tour groups whenever possible, especially if their activities are likely to arouse the animal and cause it to react. If a circumstance exists in which it is necessary to interact with an animal in view of the public, the researcher will consult with the Point Ranger. Tagging and marking of subdominant bulls, yearlings and weaners not near harems of females may take place in the public viewing area and Rangers and guides will interpret these activities to the tour groups.
- 3c. Mainland crews will sign in and out. Any special mainland crew that will be conducting research other than observation, tagging or marking will advise park personnel by verbally indicating special activities to Unit Ranger when signing in. It is especially important to indicate when an animal will be removed to Long Marine Laboratory or returned to the Reserve.
- 3d. Animals will be marked with five letter/number combination maximum, (whenever possible) to be kept as small as possible.
4. In order to facilitate important and essential communication between Rangers, researchers and tour guides:
 - a. The responsible researcher in the field and the Point Ranger will confer daily to reach consensus about planned activities including changes in tour trails, special research activities for that day, the presence of the press or other visitors and current information regarding seals or operations.
 - b. Rangers and tour guides will inform researchers of unusual seal activities that occur when researchers are not present.
 - c. Census data taken both by Rangers and researchers will be kept inside the Park Entrance Station.
 - d. A co-ordination meeting will be held bi-weekly with the Supervising Ranger, Gary Strachan, and UCSC representative, Steve Davenport, to discuss ongoing operations and/or management changes.
 - e. Researchers are encouraged to communicate information regarding low flying aircraft violations to Rangers as soon as possible.
 - f. The Research Program Director will give copies or reprints of research papers and articles to the Reserve Library, as they are compiled.
 - g. All written communications will be processed through the entrance station between DPR and UCSC.

5. Park personnel will be notified when researchers are making a channel crossing to the island, who will remain on the island, and for how long. This is accomplished by the crew leader signing in and out at the Park Entrance Station. When possible and when requested, researchers will provide transportation for an Ano Nuevo Patrol Ranger to and from the island, providing that the Ranger adapts to the research Crew's time schedule and instructions.
6. Researchers will endeavor to minimize the disturbance to mainland animals when they are using the vehicle to gain access to the beach for raft launching or retrieval. This is especially important in the presence of public tours and in the area of mainland female harems. Vehicles should be parked out of view of the tour trails and if they are to be left for an extended period of time, they should be parked at the Handicapped Pad parking area. The Reserve's back service road and north point roads must not be used for vehicle traffic when they are soggy from rain as severe damage occurs which prolongs their impassibility.
7. Park Rangers are responsible for operational activities and management at Ano Nuevo State Reserve. Conflicts in interpretation of permitted activities will be decided by the Point Ranger. His/her decision will be followed pending administrative review.
8. The UCSC - Ano Nuevo Research Director will give a general research plan, activity schedule and research personnel list to the Reserve Supervisor by December 15th each year.
9. To minimize numbers of persons in the closure area, the maximum number of researchers allowed per day will be ten (10). Any deviation of this will be requested prior to the date requested. The request will be made to the Supervising Ranger, Gary Strachan.

App 18
Memorandum

Date : 27 October 1986

To : DPR/ANIA STAFF

From : Department of Parks and Recreation
Gary Strachan - Supervising Ranger

Subject:

MEDIA TOUR POLICY

DEFINITION: All employed persons on assignment with any newspaper, television, magazine, or radio station that would further the educational purposes of Año Nuevo State Reserve. A photocopy of the current agreement from the media employer must be received by our office prior to arrival at the Park.

All media tour groups are required to display proper identification when so requested by park staff upon arrival.

LIMIT: No more than one media group per time slot will be permitted.

3 persons per group maximum.

Time slots are 10am and 2pm, Mondays and Fridays only.

1 media tour/season

EQUIPMENT: All equipment must be carried by media personnel the entire distance - no state service is provided.

TOUR: Media groups must walk out with the general public tours, a distance of 1.5 miles each way. The media tour will be met by a Point Ranger at which time, the group will leave the tour. When the media session is over, the Point Ranger will send the media tour back with another general public tour group.

All media personnel must adhere to the directions of the tour guide or they will be sent back from the tour.

RESERVATIONS: Reservations accepted by phone beginning December 13, 1986 and continuing through March 15, 1987, Tuesday - Friday between 9:00am and 4:00pm ONLY.

Phone: (415) 879-0454

Media packets will be supplied.

PROCEDURE: ANIA Office Manager (Bonnie Merkin Wilson) will accept reservations, give clear instructions, and send a confirmation sheet to interested parties. For a questionable situation or group, she will refer to Gary Strachan, Ranger II. Otherwise, she'll be 'in charge' of decisions regarding Media tour eligibility.

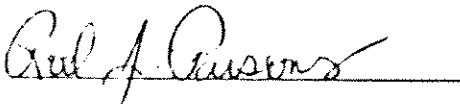
App. 3

State of California
Department of Parks and Recreation

Order Number 274-001-87
May 1st, 1987

1. All lands and facilities of Ano Nuevo State Reserve are hereby closed to public use, entry or occupancy between the hours of sunset and 8:00a.m of the following day.
2. It is hereby found that there exists in Ano Nuevo State Reserve certain areas that require protection from indiscriminate intrusion by the general public to preserve and safeguard the wildlife therein and the natural environment.
3. All of those areas of Ano Nuevo State Reserve as described below are hereby declared prohibited areas:
 - A. Ano Nuevo Island including all areas down to the Low Tide mark.
 - B. All areas within a distance of twenty feet of any elephant seal or any other marine mammal.
4. All of that portion of Ano Nuevo State Reserve comprising the sand dune area and adjacent beaches is declared a prohibited area with the following exceptions:
 - A. Entry will be permitted from December through April while on an officially guided tour. Persons so entering must remain with the guided tour at all times.
 - B. Entry will be permitted May through November to those persons with a visitor use permit which are issued daily on a first come, first serve basis beginning at 8:00 a.m.
5. Public access may be further limited at any time by order of the District Superintendent, San Mateo Coast District.
6. Exceptions to this order may only be granted in writing by the District Superintendent, San Mateo Coast District, 95 Kelly Ave., Half Moon Bay, CA 94019.
7. Nothing herein shall be construed in derogation of other provisions of law.

Signed:



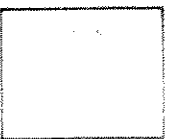
Acting District Superintendent
San Mateo Coast District

Authority:

State of California Public Resources Code Section 5003
California Administrative Code, Title 14, Section 4325, 4327

HPC

Thank you for participating in Lore Quest's whale survey. We are monitoring the movements, behaviour and acoustics of the whales and dolphins found along the B.C. Coast. Initiated in 1984 and based in Echo Bay the project continues year-round. We are living among these whales to explore their mysteries and to provide guidelines for their protection. If you sight whales please radio 'BLUE FJORD' on channel 16 and/or fill out this postcard. Your assistance is appreciated.



To: Alexandra Morton
LORE QUEST
Simoom Sound
B.C. Canada
VOP 1S0

WHALE SIGHTING POSTCARD

ORCA



GRAY



HUMPBACK



MINKE



Name _____ Vessel name _____

Address _____

Date _____ If Orca How Many Big Fins: _____

Type of Whale _____ Number of whales _____

Location _____

Direction of travel _____

Travelling with or against tide _____

Behaviour _____

