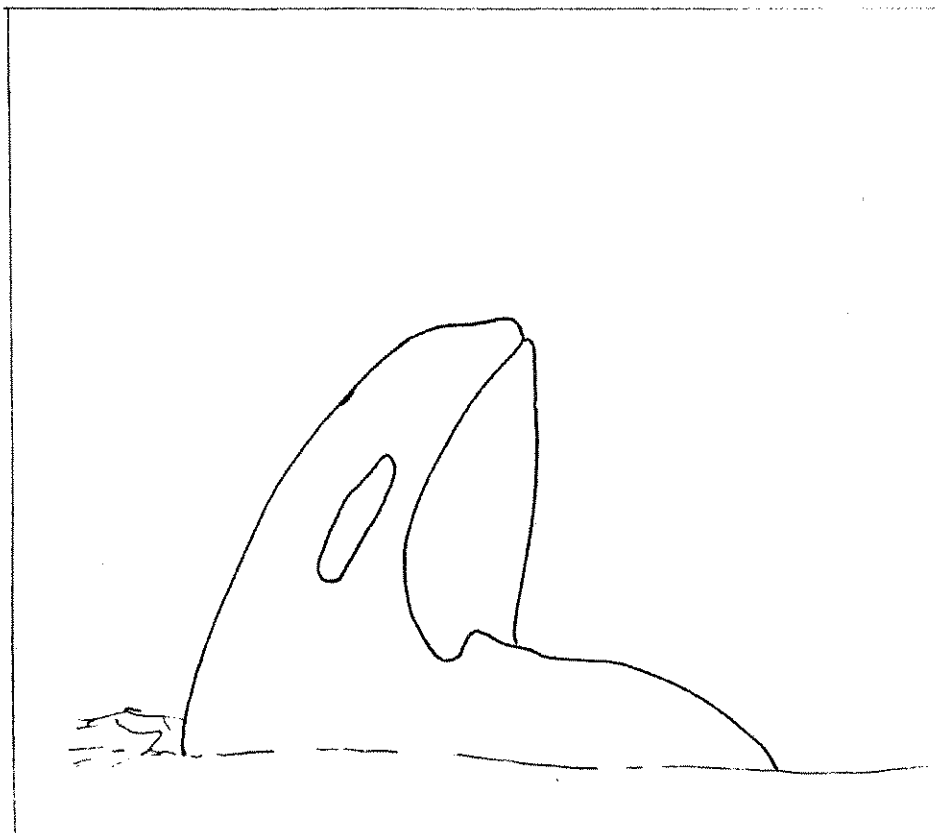


Draft

**THE IMPACT OF HUMAN ACTIVITIES
ON KILLER WHALES
IN JOHNSTONE STRAIT AND ROBSON BIGHT**

- Background Report -



Johnstone Strait Killer Whale Committee

26 February 1991



JOHNSTONE STRAIT KILLER WHALE COMMITTEE

MEMORANDUM

TO: Committee Members
FROM: Robin Taylor, Technical Assistant

DATE: February 26 1991

RE: THIRD DRAFT, BACKGROUND REPORT

Please find enclosed the third draft of the background report. Thank you again for your comments.

The next Committee meeting will be on **March 15** when all comments should be completed. Please have your comments xeroxed and ready for incorporation into the final Committee draft. John Ford was not able to reserve a boardroom at the Aquarium so we will require another venue for the meeting.

Should we be illustrating the report with photographs (PMT's are relatively inexpensive and xerox well)?

Robin

FOREWORD

The attached Draft Background Report outlines the issues and some management options regarding the impacts of human activities on killer whales. We need your help if we are to make the best recommendations to the provincial and federal governments for protection of killer whales and their habitat.

The Johnstone Strait Killer Whale Committee was formed to:

- assess the importance of Johnstone Strait and Robson Bight to killer whales;
- assess the impact of human activities on killer whales and their environment; and
- suggest management options that will ensure the continued presence of killer whales in Johnstone Strait and at Robson Bight.

We require the public's input before any final recommendations can be formulated. Proposed management options have been included in the report to stimulate communication among various groups. Four groundrules will guide the Johnstone Strait Killer Whale Committee in making its final recommendations to the federal and provincial governments.

1. **Any decision will favour the continued presence of killer whales in Johnstone Strait and Robson Bight.**
2. **Decisions will be based on ecological rather than economic principles and will not rely on burden of proof to demonstrate impacts.**
3. **Fairness and equity will be objectives for decisions regarding human resource use.**
4. **Public input will be reviewed on the basis of merit, to explore new options, rather than as a vote for any particular resource sector.**

There will be open houses and public meetings May 14-17, 1991 in Vancouver, Victoria and Port McNeill to give you information and receive written and oral comments. Specific schedules and locations will be announced. In addition, meetings with interested parties will be arranged. To be considered in the planning process, written submissions should be received by June 18, 1991. A final report will be released in early summer, 1991.

- THE JOHNSTONE STRAIT KILLER WHALE COMMITTEE

27 February 1991

NO: 1031100 23V2E38 JAC1001001
AGRICULTURAL RESEARCH COLLECTION
GOVERNMENT OF BRITAIN
COLUMBIA, B.C.
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EXECUTIVE SUMMARY

The federal Minister of the Department of Fisheries and Oceans and the British Columbia Minister of Parks have jointly appointed a committee to examine the impacts of human activity on killer whales in Johnstone Strait. The mandate of the Committee is:

- to assess the importance of Johnstone Strait and Robson Bight to killer whales;
- to assess the impact of human activities on killer whales and their environment; and
- to suggest management options that will ensure the continued presence of killer whales in Johnstone Strait and at Robson Bight.

To develop the best possible options for managing human activity, the Committee is examining the impact of all human activities upon Robson Bight-Michael Bigg Ecological Reserve (RBMBER) and the impact of whale watching activities in other areas of Johnstone Strait. The Committee's ten members have particular expertise to address the broad range of issues regarding management of killer whales in the region. Their expertise includes ocean and land habitat, tourism, forestry, native affairs, parks, commercial fisheries and whales.

We require the public's input before any final recommendations can be formulated. Proposed management options have been included in the report to stimulate communication among various groups. Four groundrules will guide the Johnstone Strait Killer Whale Committee in making its final recommendations to the federal and provincial governments.

1. **Any decision will favour the continued presence of killer whales in Johnstone Strait and Robson Bight.**
2. **Decisions will be based on ecological rather than economic principles and will not rely on burden of proof to demonstrate impacts.**
3. **Fairness and equity will be objectives for decisions regarding human resource use.**
4. **Public input will be reviewed on the basis of merit, to explore new options, rather than as a vote for any particular resource sector.**

To provide information and receive comments, the Johnstone Strait Killer Whale Committee will be hosting the following open house/public meetings:

Port McNeill	May 14	Port McNeill Community Hall?	Time?
Vancouver	May 16	Robson Square Convention Centre?	Time?
Victoria	May 17	Newcombe Theatre?	Time?

27 February 1991

BACKGROUND

Until 1970, killer whales shared the waters of Johnstone Strait mainly with merchant traffic and commercial fishing vessels. Since then, the scale of human activities in the region has grown dramatically and a highway completed in 1979 from Campbell River to Port Hardy now makes the area more accessible.

In the past ten years, the unique conservation, scientific and education values of western Johnstone Strait have been recognized, especially with regard to killer whales. In 1982, the Province established a marine ecological reserve at Robson Bight, with habitat conservation as a primary objective. In 1988, a land buffer was added, centred around the Tsitika estuary. The site is now known as the Robson Bight-Michael Bigg Ecological Reserve (#111).

Today, Johnstone Strait is widely known as the best location in the world to view killer whales in the wild. Pods of killer whales enter Johnstone Strait almost daily during summer to feed on salmon, socialize, rest and to rub on pebble beaches near Robson Bight. Rubbing behaviours have been rarely seen elsewhere because the whales require a barnacle-free substrate which will not damage their sensitive skin. Such areas are unusual. The predictability of whale sightings in these sheltered waters offer unequalled opportunities for research and wildlife viewing of these complex and visually impressive animals. Recently, concerns have arisen that human activities such as whale watching, logging, and commercial fishing cumulatively threaten continued use of the area, particularly the rubbing beaches, by killer whales.

Threats to the integrity of killer whales' environment are often hard to detect because these whales are at the top of the food chain and have a slow reproductive rate. Despite intensive research since the early 1970's, there are many unanswered questions regarding the biological requirements of these whales, such as "What are the ecological conditions that attract killer whales to Johnstone Strait?" Until such basic questions can be answered, management of human activities with potential long-term impacts must be conservative.

In Alaska, Hawaii and Baja California, vessel traffic has discouraged other species of whales from using breeding and feeding habitats. We are concerned lest a similar phenomenon occur in Johnstone Strait. However, if well-managed, we can do much to mitigate negative impacts. Any measures will require the collaboration of all resource users because it will be the cumulative effect of all human activity in the region, rather than one type of activity, which will cause damage.

CONCLUSIONS

1. Killer whales exhibit short-term disturbance if approached from land or water within Robson Bight - Michael Bigg Ecological Reserve (RBMBER). This has resulted in reduced use of habitat by killer whales in an area specifically set aside for their protection.

2. In view of the relatively high reproductive rate of the northern residents, it is unlikely that these whales are currently being affected for the long-term by the activity in Johnstone Strait.
3. Commercial fishing activity in RBMBER, accounted for the majority of land and vessel approaches at or near the rubbing beaches and the majority of disturbance reactions by killer whales.
4. Within RBMBER, whale watching by recreational boaters, commercial charters, researchers and photographers did not result in much disturbance, partially due to education, management and the full-time presence of ecological reserve information officers.
5. Outside RBMBER, disturbance of whales by the above-mentioned groups is increasing and requires more effective control than presently exists under the Department of Fisheries and Oceans. Controls are required particularly to manage recreational boaters, small charter operators and photographers.
6. Disturbance of killer whales by commercial shipping in Johnstone Strait and RBMBER appears to be minimal.
7. In all observed cases, people on shore at the beaches when whales were present resulted in the whales reacting and usually leaving the area. Any land activity at or access to the rubbing beaches should be discouraged.
8. The effects of logging, other than logging access, adjacent to RBMBER on killer whales and whale habitat are unknown. In view of the uniqueness of this habitat, and its importance in the ecology of killer whales, we must be prepared to err on the side of caution when managing this area.
9. Education is the most important tool for reducing disturbance to whales. Increased emphasis is needed to educate potential whale watchers and other users of Johnstone Strait prior to their arrival at RBMBER. Where education requires a stronger message, regulations and effective enforcement by the Department of Fisheries and Oceans are currently lacking.
10. In light of growing demand for whale watching, measures are required to control access to the Reserve and redirect this demand into land-based opportunities elsewhere.
11. Long-term research in Johnstone Strait has yielded the most significant information on killer whales in the world. Many gaps in knowledge of their life history still exist however, and the effects of many human activities on killer whales will only become known through continuing research.



PROLOGUE

Attitudes of society towards killer whales have changed radically in the past 30 years. In 1960, killer whales were considered nuisances...

"It is recommended that one .50 calibre machine gun with tripod mounting be used [at Seymour Narrows] with ball ammunition only... If the whales approach from the westward, method of attack would be to open fire when they approach... in an endeavour to turn the herd back and so prevent them from entering Seymour Narrows and continuing on to the Campbell River area... Should the whales approach from the Campbell River side, it would be preferable to withhold fire until they have passed to the westward of the gun position, to prevent turning back toward Campbell River."

Partial Terms of Reference of a committee struck by the Federal Department of Fisheries to reduce the number of killer whales at Campbell River [letter dated 28 July 1960].

In the 1990's, killer whales are viewed as important contributors to marine ecosystems and have become symbolic barometers of environmental health...

"The goal of the Department of Fisheries and Oceans and of the Ministry of Parks is to ensure that human activities [commercial fishing, whalewatching, and logging] do not discourage killer whales from using Johnstone Strait, and in particular from using Robson Bight Ecological Reserve... The proposed management options... [include] the protection of killer whale habitat in the Robson Bight area."

Partial Terms of Reference for the Johnstone Strait Killer Whale Committee announced on 7 May 1990.

26 February 1991



JOHNSTONE STRAIT KILLER WHALE COMMITTEE

THE IMPACT OF HUMAN ACTIVITIES ON KILLER WHALES
IN JOHNSTONE STRAIT AND ROBSON BIGHT

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1.0 INTRODUCTION

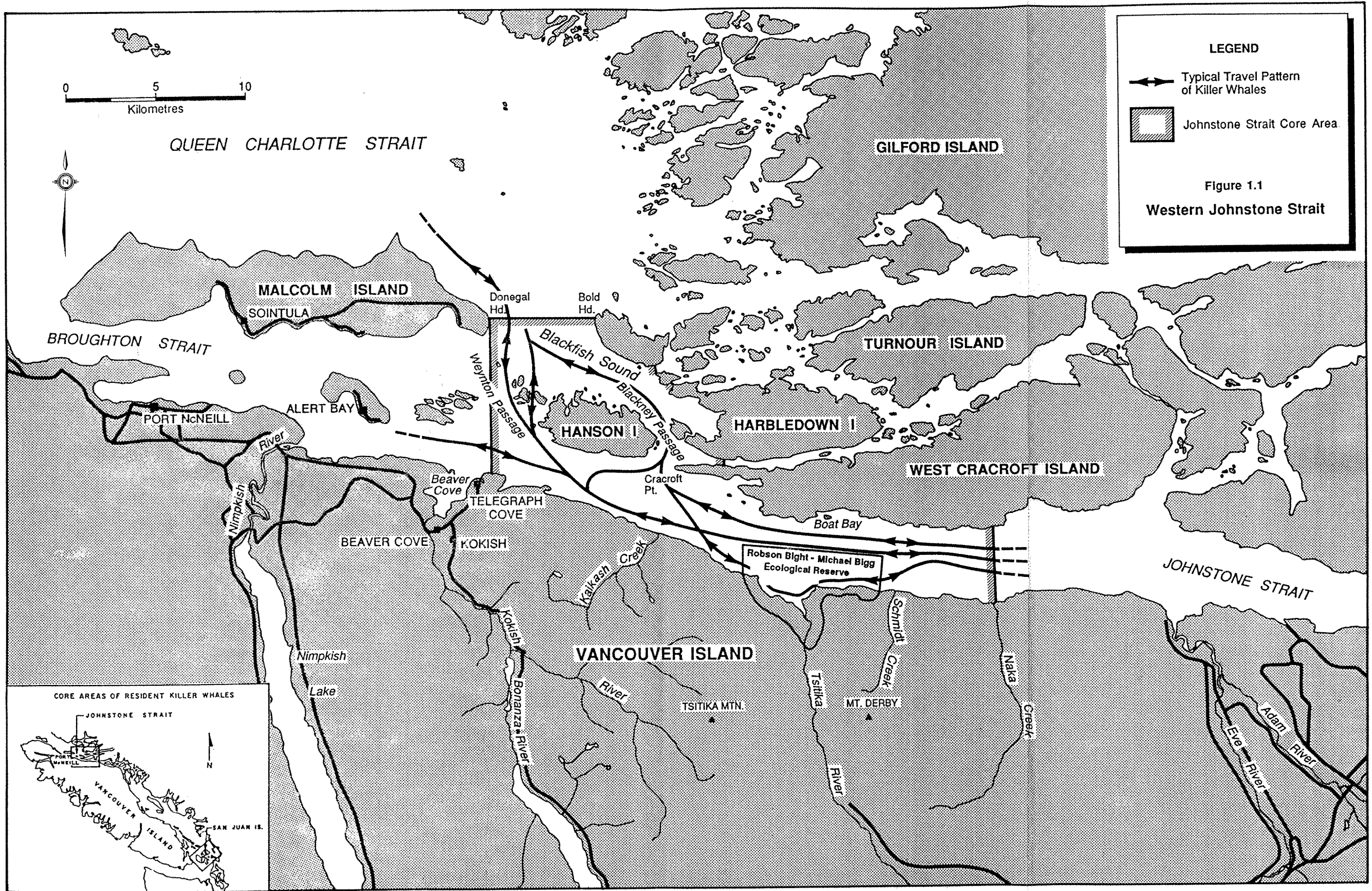
Until about 20 years ago, killer whales shared the waters of Johnstone Strait mainly with merchant traffic and commercial fishing vessels. Since then, the scale of human activities in the region has grown dramatically. In the early 1970's, researchers began routine annual monitoring of killer whale abundance and behaviour. Through the 1970's, an increasing number of boaters travelled to the region to watch whales. A highway completed in 1979 from Campbell River to Port Hardy now makes the area more accessible (Fig. 1.1).

Today, Johnstone Strait is widely recognized as the best location in the world to view killer whales in the wild. Pods of killer whales enter Johnstone Strait daily during summer to feed on salmon, socialize, rest and to rub on pebble beaches near Robson Bight. Beach rubbing has rarely been observed elsewhere. The predictability of whale sightings in these sheltered waters offer unequalled opportunities for research and wildlife viewing of these complex and visually impressive animals. Recently, concerns have arisen that human activities such as whale watching, logging, and commercial fishing potentially threaten continued use of this region by killer whales.

There are many unanswered questions regarding the biological requirements of these whales, such as "What are the ecological conditions that attract killer whales to Johnstone Strait?" The position of killer whales at the top of the food chain and their low reproductive rates makes it difficult to detect threats to their existence. Until basic questions regarding their ecology are answered, management of human activities in the region must be conservative to maintain integrity of the whales' environment. If well-managed, negative impacts can be minimized or avoided. Although we do not have all the answers at this time, we have enough information to act upon. As more information becomes available, management can be periodically re-evaluated.

In the past ten years, the unique conservation, scientific and education values of the area have been recognized by the public and the federal and provincial governments. Growing public concern for the protection of killer whale habitat resulted in recommendations by the British Columbia Ministry of Environment to halt development plans for a log handling facility at Robson Bight in 1981. Robson Bight was recommended by Parks Canada as a site of National Significance (Rennie 1982). In 1982, the marine portion of Robson Bight Ecological Reserve was established by the provincial government to protect nine km of shoreline. A land buffer was added by the British Columbia Ministry of Parks in 1988-89, along the entire length of the marine portion and centred around the Tsitika estuary. The protection of ecosystems for long-term research and education is the primary objective in ecological reserves. Late in 1990, the Reserve was renamed the Robson Bight - Michael Bigg Ecological Reserve (RBMBER) to commemorate the outstanding contribution of the late Dr. M.A. Bigg, to our knowledge of killer whale populations.

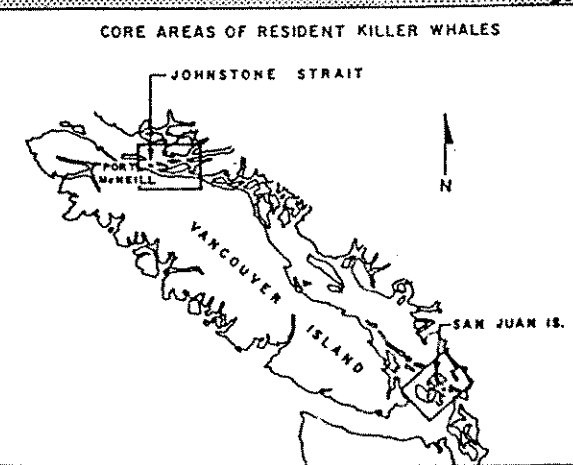
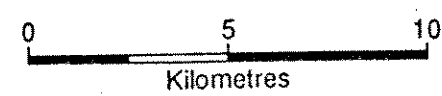




LEGEND

- ← Typical Travel Pattern of Killer Whales
- ▨ Johnstone Strait Core Area

Figure 1.1
Western Johnstone Strait



As whales have grown in society's consciousness as a symbol of the environment, we have become more interested in viewing them in the wild. Whale watching in prime areas of whale concentration such as Hawaii, Baja California, southeast Alaska, the Gulf of Maine and the Gulf of St. Lawrence has become a lucrative business. Whale watching is a relatively young industry in Canada, but with a potential economic value comparable to a commercial fishery (Breton 1990).

The exceptional killer whale viewing opportunities in Johnstone Strait and Robson Bight provided the impetus for the development of a whale watching industry beginning in 1981. Killer whales now form the basis of a multi-million dollar tour industry on northern Vancouver Island (Duffus and Dearden 1989). Tours depart from a number of harbours including Port McNeill, Alert Bay, Kelsey Bay, Campbell River, and Vancouver. Growing numbers of recreational boaters, kayakers and commercial film companies also visit the region to see and film whales. Cruiseships and in-transit boat traffic divert their courses for better views of whales. In addition, whale watching is a popular incidental attraction for sportfishermen, who frequently stop fishing to follow the whales when they travel nearby.

In Alaska, Hawaii and Baja California, vessel traffic has discouraged humpback and gray whales from using breeding, feeding and calving habitats. We are concerned that a similar phenomenon will occur in Johnstone Strait. To reduce boat congestion around whales, both the federal and provincial governments have taken measures to inform the public. Both the Department of Fisheries and Oceans and the Ministry of Parks have distributed boating guidelines to whale watchers, such as whale researchers, tour operators, recreational boaters, and photographers. A volunteer warden program under the Ecological Reserves Program has been in place since the establishment of Robson Bight as a reserve. Since 1987, the Ministry of Parks has also sponsored a seasonal information program to educate boaters entering the Reserve.

Forestry and fishing are also important economic activities in the region. Logging roads are currently being constructed near the Reserve which could provide land access to the rubbing beaches and end their protective isolation. We do not know if siltation and erosion from logging operations adjacent to the Reserve could potentially affect sensitive whale habitat at the rubbing beaches. The annual peak of commercial fishing activity takes place in the Reserve when whales are also present in peak numbers. Vessel activity associated with commercial fishing can interfere with the whales' use of the rubbing beaches and resting areas (Briggs 1991). It is important that all uses are managed to minimize disturbance to the whale population.

Given the importance of Johnstone Strait and Robson Bight to killer whales, and the value of killer whales in this region to the public, measures are needed to ensure that a suitable environment is maintained for the whales. To that end, the British Columbia Minister of Parks and the federal Minister of the Department of Fisheries and Oceans have jointly appointed this task force, called the Johnstone Strait Killer Whale Committee. The Committee is to propose management options for consideration by the two levels of government. The Committee's ten members have particular expertise to address the broad range of issues regarding management of killer whales in the region. Members' management expertise includes ocean and land habitat, tourism, forestry, native affairs, parks, commercial fisheries and whales (Appendix 1).

The mandate of the Committee is:

- to assess the importance of Johnstone Strait and Robson Bight to killer whales;
- to assess the impact of human activities on killer whales and their environment; and
- to suggest management options that will ensure the continued presence of killer whales in Johnstone Strait and at Robson Bight, taking human resource uses into account.

The Committee has examined available information regarding the impact of all human activities on killer whales in Robson Bight - Michael Bigg Ecological Reserve (RBMBER) and the impact of whale watching activities in other areas of Johnstone Strait. In the report, RBMBER is often treated separately from Johnstone Strait as a whole. This was done for three reasons:

- our knowledge of killer whales in RBMBER is more detailed;
- RBMBER contains rubbing beaches which are vulnerable and sensitive whale habitat type rarely found elsewhere; and
- current management of RBMBER, as a provincial reserve, is considerably different from the rest of Johnstone Strait, which is wholly within federal jurisdiction.

Options will define management recommendations for implementation by the Department of Fisheries and Oceans and the Ministry of Parks.

2.0 THE STUDY AREA

The areas being examined in the report are:

1. Johnstone Strait, and in particular, western Johnstone Strait (Fig. 1.1); and
2. Robson Bight - Michael Bigg Ecological Reserve (Fig. 2.1).

The main physical features of these regions are described below.

2.1 Johnstone Strait

Killer whales use western Johnstone Strait more frequently than any other coastal waterway in British Columbia. The Strait lies along a east-west axis and is located off northeastern Vancouver Island between Beaver Cove and Adam River. It is 40 km long by about 4 km wide and bordered to the south by Vancouver Island and to the north by small islands adjacent to mainland British Columbia. On the Vancouver Island side, steep mountainous terrain ascends to 1000 m. The islands on the north side of the Strait, such as West Cracroft and Harbledown, slope more gradually to lower peaks (typically 200 m). The shore drops sharply to the waterline on both sides of the Strait.

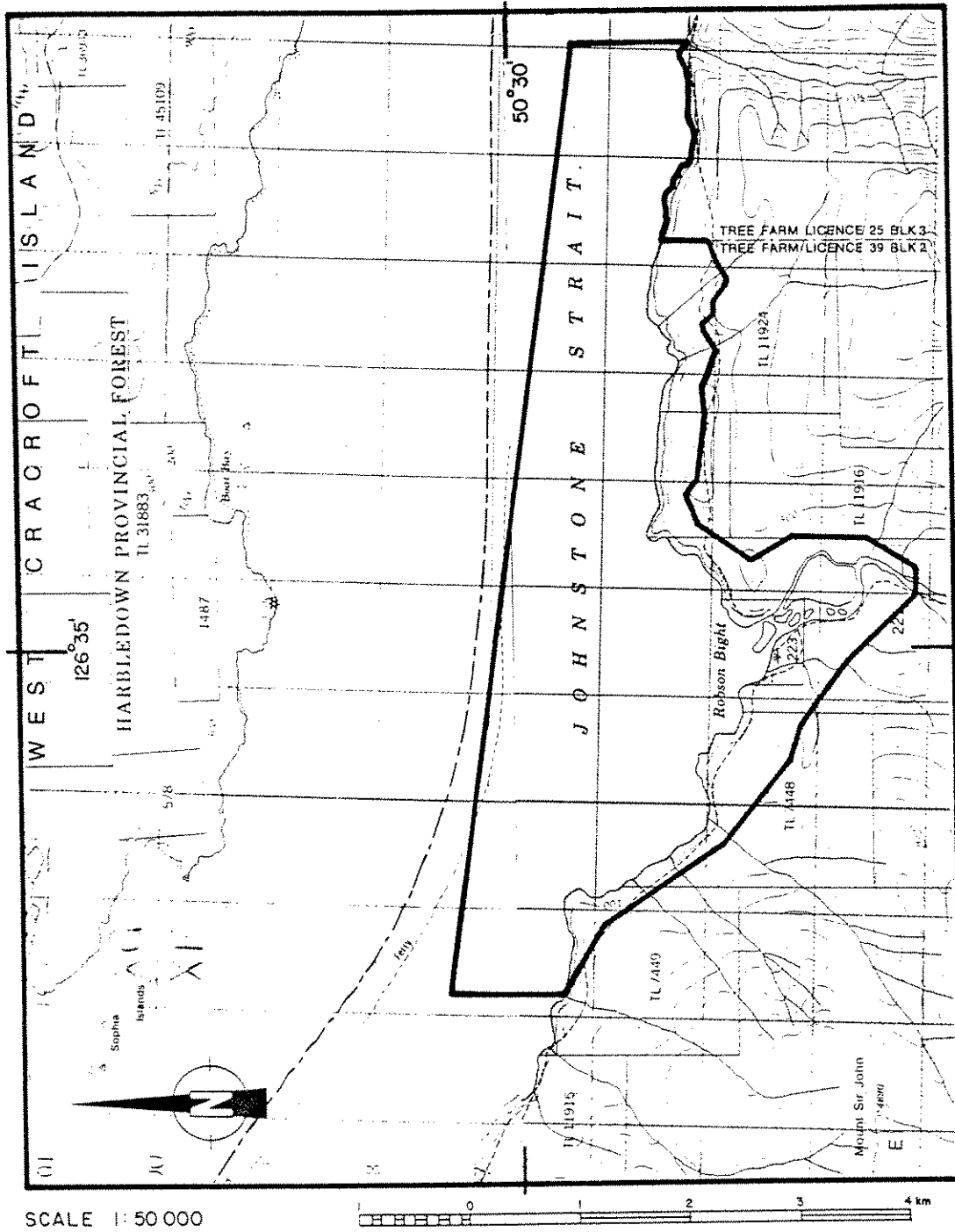
Eastern Johnstone Strait extends an additional 40 km east to Chatham Point and tends to be narrower (2 km), shallower (200 m) and with higher (1500 m) mountainous borders than western Johnstone Strait. Further to the east and northeast are numerous narrow channels which eventually connect with Georgia Strait to the southeast.

Most of the slopes on both sides of the Strait are forested, or in various stages of regrowth following logging. The area is classified under the Coastal Western Hemlock Biogeoclimatic Zone (Ceska 1981). Climate and vegetation are quite different on the north and south sides of the Strait. On the south shore, dominant tree species include western hemlock, amabilis fir, and Sitka spruce (Holmsen Forestry 1985). This reflects the high levels of rain, fog and cloud of the Vancouver Island shoreline. The islands on the north side of the Strait are drier and receive more sunshine in the summer than the islands on the south side. Relatively drought-tolerant species, such as Douglas-fir and shore pine, are common on West Cracroft Island.

Oceanographically, the Strait is characterized by cold waters (7 to 10 degrees Celsius), and high oxygen content. Thompson (1981) partially attributes this to the narrowness of the channel and rapid tidal streams. The water is in almost constant agitation from top to bottom and there is little tendency for stratification thermally or in oxygen content.

Turbulence and mixing of the water column is enhanced by tidal flushing through the narrow passes between Hanson Island, Swanson Island, Malcolm Island, Cormorant Island, and West Cracroft Island. These passes are shallower (typically 100 m) than western Johnstone Strait. Further to the west are the open waters of Queen Charlotte Strait which ultimately join with the Pacific Ocean off northern Vancouver Island.

Figure 2.1: Robson Bight - Michael Bigg Ecological Reserve, Johnstone Strait, B.C.



NTS. No. 92 L/7,10E

2.2 Robson Bight - Michael Bigg Ecological Reserve¹

The Robson Bight - Michael Bigg Ecological Reserve (RBMBER) was established;

- to protect key habitats for killer whales;
- to prevent whale harassment while using these habitats;
- to maintain unique opportunities to research and observe whales; and
- to protect a pristine estuary and shoreline.

The Reserve is located in western Johnstone Strait along the Vancouver Island shore (Fig. 2.1). A background report, commissioned by the Ministry of Parks (Blood et al. 1988), describes physical, biotic, and other features of the Reserve. The findings are briefly summarized below.

The Reserve includes marine and terrestrial components and is 1753 hectares in area, centred around the Tsitika River estuary. It stretches along 10.7 km of shoreline from the eastern boundary at Schmidt Creek to the western boundary at Sir John Creek. The marine component is 1248 ha with an outer boundary extending 1.0 to 2.3 km from shore. The land component is 505 hectares and is 200-1500 m wide from the shoreline. Both the land and marine portions are widest around the Tsitika estuary, which drains into Robson Bight. Topography is steep and rocky, except for the flood plain and estuary. The marine portion drops off quickly to 400 m in depth.

¹ The Reserve was recently renamed in recognition of the contribution of Dr. Michael Bigg to our understanding of killer whales. Dr. Bigg, formerly co-chair of the Johnstone Strait Killer Whale Committee, passed away in October 1990.



3.0 BIOLOGY OF KILLER WHALES

3.1 World

Killer whales inhabit all oceans of the world from the edge of the polar pack ice to the tropics (Heyning and Dahlheim 1988). Throughout this extensive range only one species is recognized, *Orcinus orca*, characterized by distinctive black and white markings. Adult males can reach 9.8 m in length and 10 tonnes. Females may weigh 7.5 tonnes. In adult males, the dorsal fin reaches 1.8 m compared to 0.9 m in mature females.

The largest concentrations of killer whales seem to occur in the cooler coastal waters of both hemispheres. Although there is no reliable estimate of total world population, the species is not considered abundant. They are opportunistic predators, feeding on a wide variety of fish, squid and marine mammals. Killer whales have no natural enemies, although small numbers have been taken for food or as a predator control measure off Japan and Norway and in the Antarctic. Between 1962 and 1989, approximately 125 whales were taken for aquaria from British Columbia, Washington, Iceland and Japan (Hoyt 1990).

3.2 British Columbia

Coastal British Columbia is unique in having a large concentration of killer whales which can be seen predictably each year in easily accessible, protected waters.

They have been studied extensively in British Columbia since the discovery that each individual can be recognized by unique natural markings. Two races have been identified, called **resident** and **transient** (Bigg et al. 1990). The races differ slightly in appearance of the dorsal fin and saddle patch. Although their ranges overlap, the two races do not appear to mix. Many behavioural differences exist as well. For example, residents feed almost exclusively upon fish whereas transients feed upon marine mammals. Residents predictably visit the inshore areas during summer whereas transients occur irregularly at any time of the year.

Killer whales are long-lived and slow to reproduce. Long-term population studies indicate that potential life spans for residents are 80-90 years for females and 50-60 years for males (Olesiuk et al. 1990). By age 40, cows have produced an average of 5 viable offspring and calving generally ceases after this. Calving season spans October-March. Based on gestation periods, mating occurs primarily during May-October (ibid.).

Residents typically travel in groups of 10-20 while transients travel in groups rarely exceeding five individuals. Residents use 'core areas' seasonally in Haro Strait off southern Vancouver Island and in Johnstone Strait off northern Vancouver Island. Transients do not appear to use 'core areas' and do not use rubbing beaches. Many of these racial differences may have developed from hunting two distinct types of prey.

The biology of residents is understood more completely than that of transients, although virtually all individuals have been identified and named². Residents travel in family groups called **Pods**. A pod is composed of one or more adult females and their offspring and can contain up to four generations. Individuals travel with their closest relatives in their pod all of their lives (Bigg et al. 1990). A new pod forms by the gradual splitting of an existing pod along maternal lines. Each pod has its own dialect of 7-17 stereotyped calls (Ford 1989). Residents frequently vocalize, probably using their calls to coordinate group movements and social interactions.

Of the 19 resident pods in British Columbia, 16 pods totalling 190 whales (1989 census) comprise a **northern community**. This northern community ranges along 700 km from the east and west coasts of Vancouver Island to the southern Alaska panhandle. The remaining 3 pods, totalling over 85 whales, form a **southern community** which ranges 550 km from Campbell River south to the west coast of Washington. Resident community ranges are shown in Figure 3.1. Both communities likely spend most of their time in offshore areas, perhaps within a few hundred kilometres of the British Columbia coast. The pods of both communities enter inshore waters most frequently during May-October. During this time, the whales feed extensively upon salmon which are migrating to rivers for spawning.

The northern community has grown at an average annual rate of 3.0% between 1973 and 1988, and probably at a similar rate since 1955 (Olesiuk et al. 1990). While the net rate of increase appears small, it is a high rate for such a long-lived species. The southern community has increased at a rate of 1.5% between 1974 and 1988 (ibid.). Over 35 whales in the southern community, many of which would now be of reproductive age, were captured for zoos and aquaria between 1962 and 1977 (ibid.). A small number (14-15) were also taken from the northern community (ibid.).

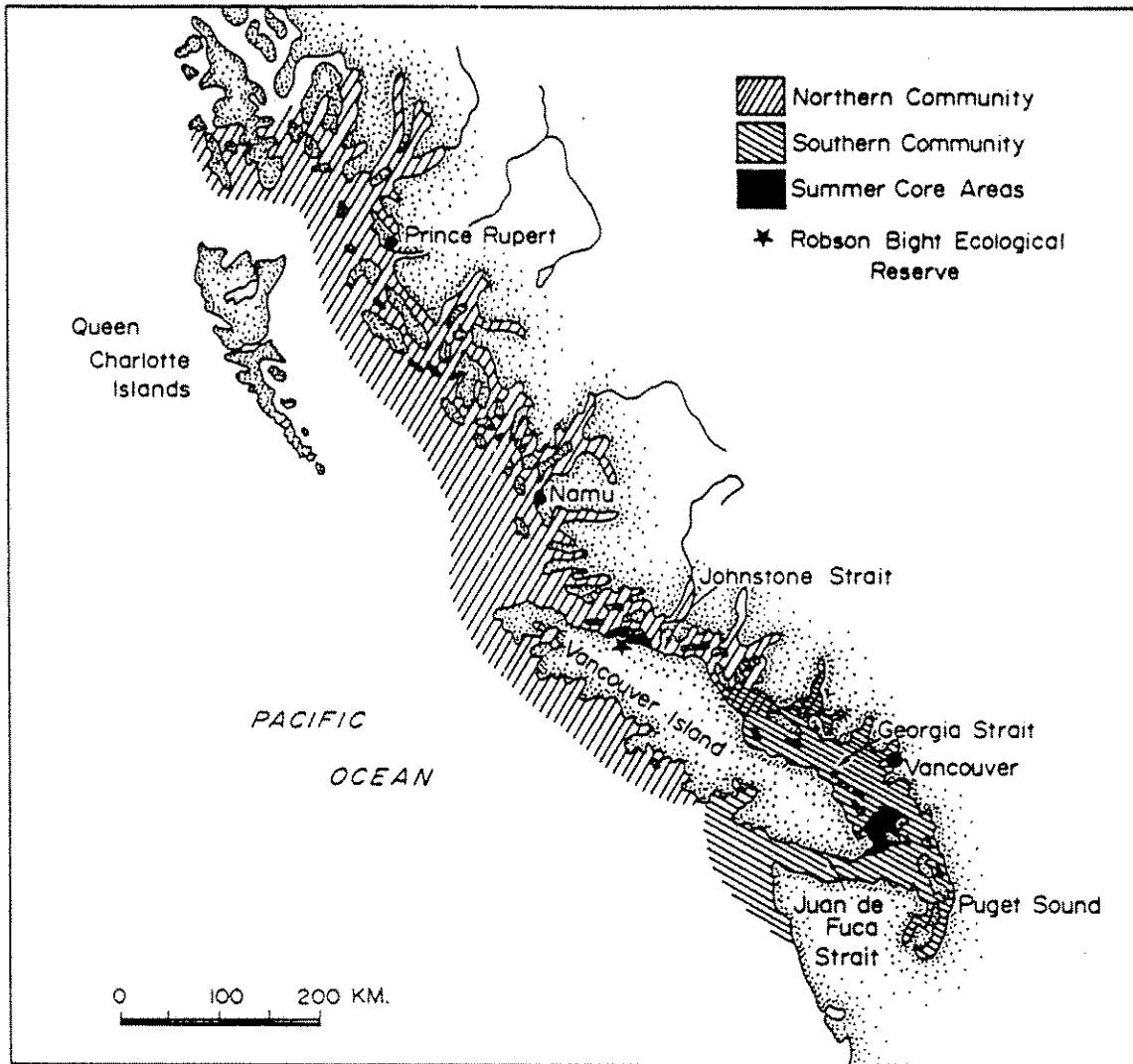
Reasons for the population increase in the northern community could be:

- 1) recovery from losses due to shooting and harassment by federal fisheries personnel, fishermen and the public prior to the mid 1960's and from military bombing during World War II (Olesiuk et al. 1990);
- 2) an improved natural environment such as increased food supply; and/or
- 3) a long-term natural cycling of the population with the current phase increasing.

At some point, the northern residents' high rate of population increase is likely to level off. We do not know how this will affect behaviours or pod associations.

² All individuals are named using an alphanumeric designation, the prefix denoting the pod or pod complex, and the numeric denoting the individual. Numbers were assigned in the order they were first sighted. For example, B6 is a member of the B pod, and was the sixth animal to be identified in that pod. For a full description of the identification system, see Bigg et al. 1987. Killer Whales: A Study of Their Identification, Genealogy & Natural History in British Columbia and Washington State.

Figure 3.1 Resident killer whale ranges in British Columbia.



Transients also travel in pods composed of close relatives, although offspring disperse more than in resident pods (Bigg et al. 1987). About 100 transients in 45 pods comprise one community (ibid.) with a single dialect (Ford 1989). Transients have a large range, along 1800 km of the coast from southern Washington to Glacier Bay, Alaska. Although transients often hunt within the ranges of the two resident communities, they use different portions of the environment (Bigg et al. 1987).

3.3 Western Johnstone Strait

Although whale sightings along the British Columbia coast are reasonably frequent, western Johnstone Strait is unique because killer whales use the area so predictably. During summer, the northern resident whales enter western Johnstone Strait from Queen Charlotte Strait through narrow channels between the islands west of the Strait (Fig. 1.1). They usually travel back and forth between approximately Adam River and the northwest side of Hanson Island for several days. Whales often exit west to Queen Charlotte Strait. Alternately, they travel east toward Campbell River and Jervis Inlet before returning.

Although killer whales are seen or heard³ in Johnstone Strait throughout the year, sightings of whales become more frequent in mid-June and by early July, increase sharply (Fig. 3.2). Nichol (1990) compiled sightings as **whale-days** (one whale-day equals one whale present on one day). Sightings peak during August and average 30-40 whales per day. Residents were seen on 86% of 486 total observation days during July-September 1980-86 (ibid.).

Johnstone Strait is the first physical constriction that killer whales and their prey encounter as they return from the open Pacific. Here, the whales feed on migrating chinook, sockeye, chum, pink and coho salmon returning to spawn in coastal streams and rivers (Bigg et al. 1990).

All northern resident pods usually visit Johnstone Strait each year. Some are seen in Johnstone Strait more consistently from year to year than others (Fig. 3.3). For example, the most frequently sighted pods, A1 and A5, were recorded on more than 80% and 50% of the whale-days respectively. Only 5 of the 16 pods were seen more than 20% of the time.

³ Killer whales are also identified from acoustic data gathered by a network of hydrophones (underwater microphones) operating in Johnstone Strait and have been seen or heard in the core area throughout December 1990 and January 1991 (Mackay, pers. comm). The difficulty of conducting research in the winter months has likely affected the frequency of winter sightings.

Figure 3.2. Mean number of whales in Johnstone Strait per month estimated from sightings and acoustic data, 1980-86 (after Nichol 1990). One whale-day equals one whale present on one day.

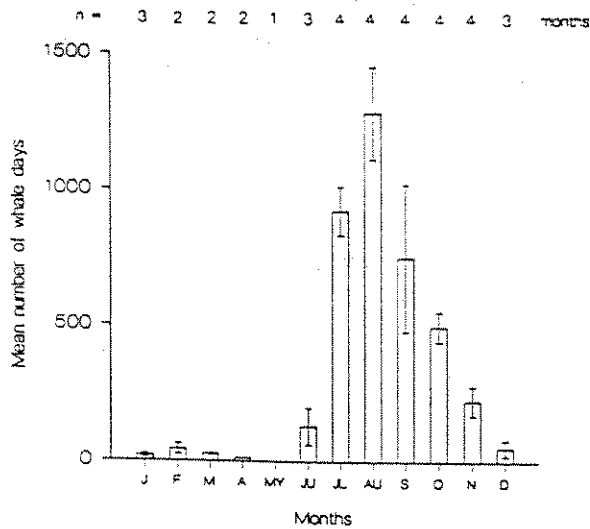
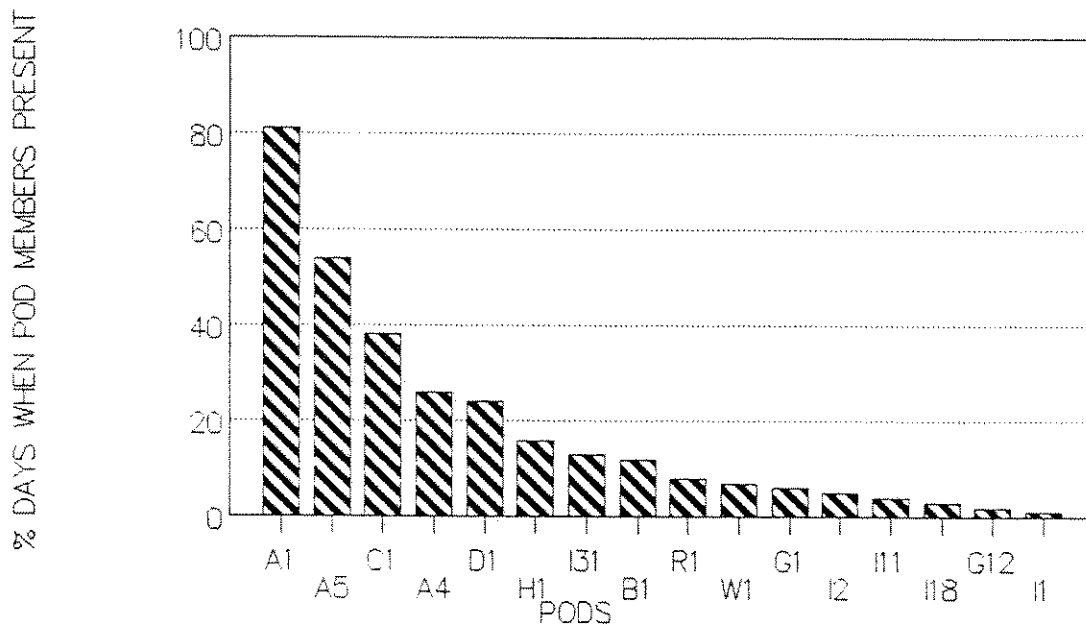
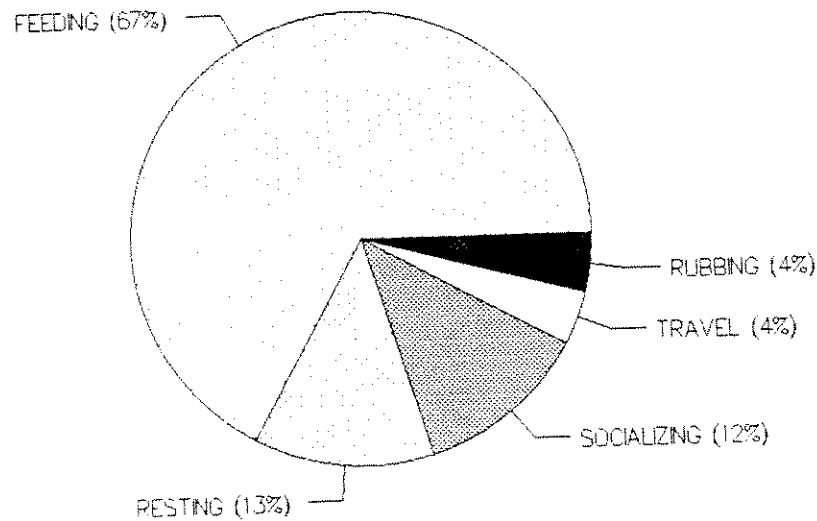


Figure 3.3. Frequency of occurrence of all or part of each northern resident pod in Johnstone Strait during July-September 1984-88 (after Nichol 1990)



Ford (1984) divided the behaviour of northern residents in western Johnstone Strait and adjacent areas into five categories: foraging, resting, socializing, travelling, and beach rubbing (Fig. 3.4). Foraging is undertaken by individuals and small groups, and is typified by active swimming and diving. Resting whales synchronize breathing while stationary or during slow swimming. Socializing includes physical interactions such as jumping, play and sexual activity. Travelling whales swim typically at speeds of 4-12 knots. Except for beach rubbing, which is described in section 3.4, all behaviours are seen throughout western Johnstone Strait.

Figure 3.4. Behaviour time budget of northern resident killer whales in Johnstone Strait, British Columbia. (from Ford 1984)



Transient killer whales are seen occasionally in western Johnstone Strait throughout the year. These whales tend only to travel and forage in the area, and do not linger in the region as do the residents.

3.4 Robson Bight - Michael Bigg Ecological Reserve (#111)

Resident killer whales entering western Johnstone Strait are also likely to visit RBMBER. Over 90% of the whales entering the Strait in 1987 and 1989 also frequented the rubbing beaches (Briggs 1991). More than 20% of total time in the Strait was spent in the Reserve (Briggs, in prep.). The strong correlation between killer whale visits to western Johnstone Strait and beach rubbing suggests that it may be partially responsible for the predictable travel pattern of whales in the core area. Beach rubbing is not encountered frequently outside of the Reserve because suitable rubbing sites are rare in the region. Rubbing behaviour is interspersed primarily with resting. Residents often feed on salmon that congregate along the bluffs and deep waters of Robson Bight.

Rubbing has also been recently observed in another population of killer whales in Alaska (Balcomb-Bartok 1990). No beach rubbing has been reported for the southern resident community of killer whales.

Rubbing whales swim slowly back and forth over pebbly barnacle-free beaches, with their flanks, bellies or sides gently touching the pebbles. Ford (1984) reported average rubbing sessions of 35 minutes, although pods might rub for 90 minutes. Briggs (1991) reported that whales would rub an average of 6 to 12 minutes/day in 1987 and 1989, but would rub as long as four hours. The reason for beach rubbing is unknown but it may be to remove skin parasites, for pleasure and for socializing. Killer whale skin is very delicate, and rubbing whales appear to exercise considerable caution when in physical contact with the substrate. There are few beaches that are possible for whales to use without injuring their skin.

When rubbing, the whales can be easily disturbed by human activity in the vicinity. Briggs (1991) found that vessel movements within 300 m of the beaches and the presence of humans on shore often caused avoidance behaviours by the whales. This is discussed further under Short-term Responses of Killer Whales (Section 6.1).

Transients occasionally pass through the RBMBER, but they do not beach rub, forage or rest in the area.

3.5 Overview of killer whale biology

Killer whales are among the most studied marine mammals in the world and more is known about the 400+ individuals along the British Columbia coast than any other killer whale population. There are two races, 1) marine mammal hunters (transients) and 2) fish eaters (residents) which differ in many other aspects besides diet. Residents' predictable occurrence, relative accessibility, stable family groupings and individual recognizability have allowed researchers to determine maximum age (50-75 years), reproductive rate (1.5-3.0%), range and exact population size.

Currently, there are over 190 whales in a distinct northern resident population, some of which frequent Johnstone Strait on an almost daily basis during the summer. While these whales are attracted here to feed on migrating salmon, they also rest, socialize and rub on certain pebble beaches in the area. The most frequently used beaches are protected within Robson Bight - Michael Bigg Ecological Reserve, where whales have been observed to rub for hours at a time if left undisturbed.

Although a great deal is known about resident killer whales, especially compared to killer whale populations elsewhere in the world, there are still many important ecological questions to be answered regarding the importance of Johnstone Strait in their life history, especially to individual pods; and responses to changes in their environment. Until these questions are answered, resource management must be cautious and conservative where it may affect them.

4.0 REGIONAL OVERVIEW OF HUMAN ACTIVITIES

The following is a general overview of human activities in western Johnstone Strait and adjacent areas. Resource use in and around Johnstone Strait generally involves forestry, fishing, tourism or transportation. Descriptions of resource activities in the vicinity of Robson Bight are also presented in Darling (1986) and Blood et al. (1988).

Chapter 5.0 deals with the potential for these activities to lead to disturbance of killer whale habitat or behaviour.

4.1 Communities of northern Vancouver Island

Western Johnstone Strait and adjacent areas lie within the Regional District of Mount Waddington. The following demographic information is based primarily on Figure 4.1 and Table 4.1.

Approximately 14,500 people live in the District, primarily in the communities of Port Hardy, Port McNeill, Alert Bay, Sointula, and Port Alice. Populations of communities are shown in Table 4.1. The District population peaked in 1986 at almost 15,000 people. Telegraph Cove, the nearest community to Robson Bight, has a permanent population of less than 20. There are also small communities or logging camps at Port Neville, Adam River, and Beaver Cove. The public highway system linking Campbell River and Port Hardy was completed in 1979. Employment and education opportunities are limited, contributing to a net outflow of residents since 1986.

Table 4.1 British Columbia Population Estimates for Mount Waddington Regional District (MWRD) (Sources: Statistics Canada, 1986; MWRD)

Name	Census 1986	Estimate 1988
MOUNT WADDINGTON	14,934	14,495
Alert Bay	679	680
Port Alice	1,387	1,360
Port Hardy	5,389	4,945
Port McNeill	2,559	2,455
Sointula		~1,000
Indian reserves	1,392	-

Figure 4.1 Communities on northern Vancouver Island.

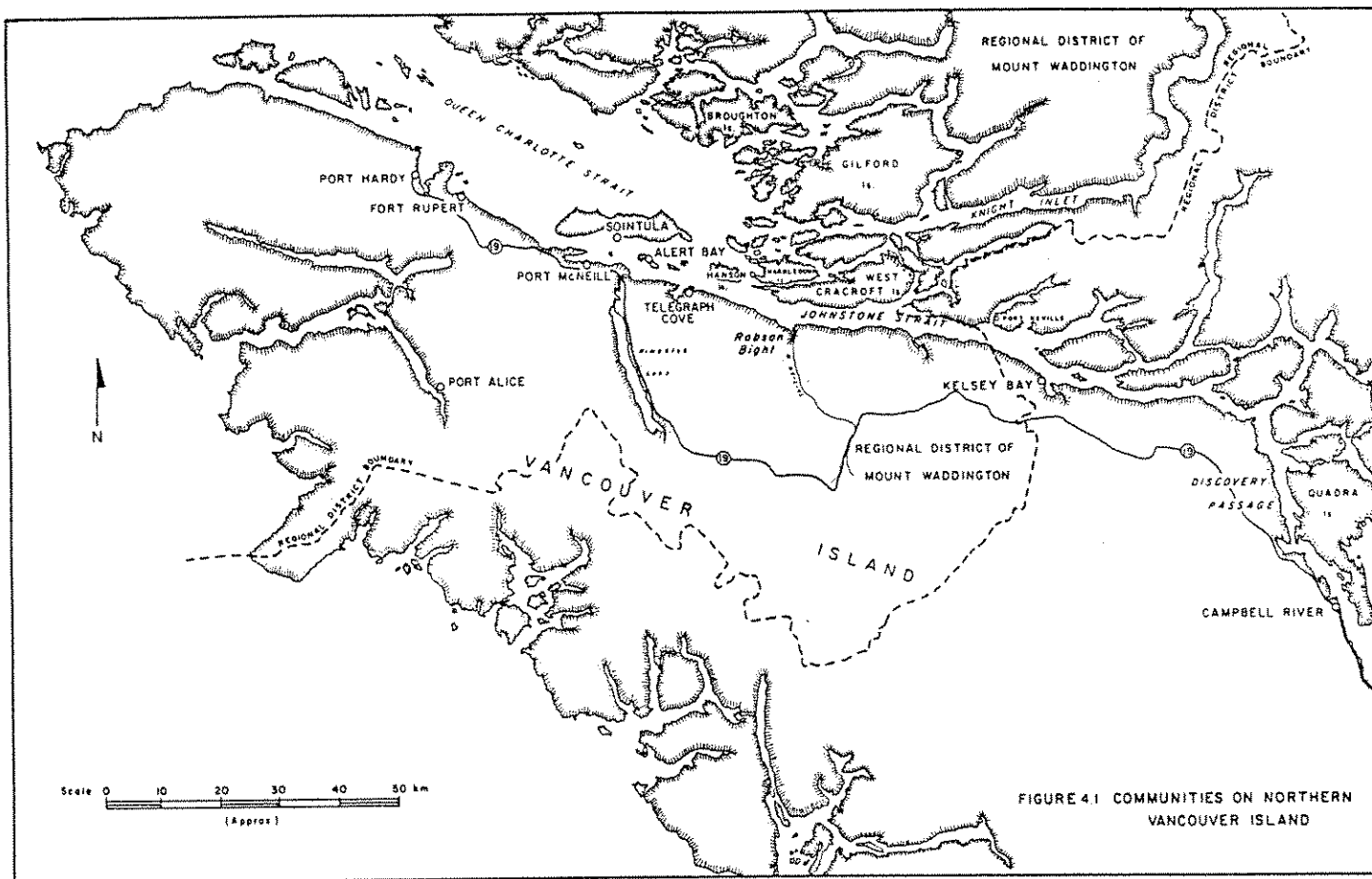


FIGURE 4.1 COMMUNITIES ON NORTHERN VANCOUVER ISLAND

Primary industries of the North Island continue to be forestry, fishing, and mining, the traditional resource-based economies of the area. These industries accounted for almost 4,000 direct and indirect jobs in the Regional District in 1989 (Mossop 1989). The Island Copper Mine near Port Hardy is a major employer in the Region, although it is scheduled to close in 1996 (Harvey, in press). Two rapidly growing sectors of the economy in 1989 were tourism and aquaculture. Tourism directly employed at least 370 full-time and 400 part-time people in 1988 in the Mount Waddington Regional District (Mossop 1989). This industry has shown dramatic expansion in the past few years (ibid.) Direct employment in aquaculture in 1988 included 68 full-time and 33 seasonal jobs (Mossop 1989).

Approximately 1,392 Natives resided on northern Vancouver Island in 1986 (Statistics Canada, 1986). Alert Bay is the largest Native community in the Johnstone Strait area. Approximately 90% of the village's men are employed seasonally in fishing and 70% of the women are employed in administration (Ambers, pers. comm.). Other sources of employment are logging, salmonid enhancement projects and tourism.

4.2 Coastal Tourism / Whale Watching

Johnstone Strait is part of the sheltered navigation corridor known as "the Inside Passage". This waterway is used by pleasure craft to explore the fjords and inlets of British Columbia for outdoor recreation, and as a scenic and safe route to Alaska. Completion of the highway from Campbell River to Port Hardy in 1979 has made northern Vancouver Island and Johnstone Strait more accessible. In 1988, more than 270,000 tourists visited the north Island. The majority visitors are in transit to the Port Hardy - Prince Rupert ferry. Tourist activity peaks from July through September and visitors participate in fishing, camping, sightseeing, boating and whale watching/nature tours (Table 4.2). With scheduled completion of the new Island Highway in 1996, access between Nanaimo and Campbell River will become freeway-standard and is expected to further stimulate tourism activity on the North Island.

Two private campground resorts, Alder Bay (64 campsites) and Telegraph Cove (120 campsites) are located in areas directly accessible to Johnstone Strait. The Regional District also operates a campground in Port McNeill, which is easily accessible to a boat launch and marina.

Mossop (1989) reported rapid growth for all charter business, including whale watching, on the north Island in 1988-89. Tourboat operations offering whale watching, located at Telegraph Cove, Port McNeill, Sointula, Kelsey Bay and Vancouver, have increased from 1 in 1980 to 27 in 1990. However, only three of these operate full-time as whale watching charters and these carry the majority of the passengers. Of an estimated 25,000 people who went whale-watching on B.C. charter vessels in 1989 (Duffus and Dearden 1990), 10,000 visits were to Johnstone Strait (Duffus, pers. comm.). This estimate includes motor vessel and sailboat passengers and kayak tours. In 1990, one tour company reported a 19% increase in visitation over previous years (Mackay, pers. comm.).

Table 4.2 Selected Visitor Activities on northeast Vancouver Island in 1988.
(Source: Mossop 1989, except where noted)

<u>Activity</u>	<u>Visitors</u>
Cruiseships in Port Hardy	11,800
Freshwater fishing	92,000*
Saltwater fishing	108,800*
At fishing lodges	9,500
Camping	40,800
Whale watching**	8,000
TOTAL	270,900

* Angler-days
** MacKay, pers. comm., 1991

Major attractions of nature tours are viewing killer whales and experiencing natural areas. Duffus and Dearden (1990) found that experience of the environment/ scenery/other wildlife added most to the whale watching event. Conversely, visibility of logging activity in Johnstone Strait was a major detraction from the recreation experience. From a tourism marketing perspective, killer whales are an important 'top of mind' image, especially for adventure travel but also more generally in experiencing 'SuperNatural BC' (Bekker, pers. comm.). Such images are the visual 'hook' in attracting visitors from around the world.

Recreational boaters include those who have come specifically to Johnstone Strait to see whales, boats passing through and those who are in the area primarily to sportfish. From 1984-87, recreational vessels in the Strait increased from 6% to 18% of all traffic.

Johnstone Strait is a popular destination for organized kayak tours and private trips. The kayaking season extends from June through October and peaks in July and August. In 1990, kayak launchings from Telegraph Cove were estimated at 1,400 - 2,000. Ocean kayaking in western United States is one of the fastest growing outdoor activities (Interagency Committee for Outdoor Recreation 1990). Much of this activity will likely take place in British Columbia because this sheltered coastline offers more opportunities for kayaking than the Pacific states (Osborn, pers. comm.).

Cruiseships and ferries in transit between southern British Columbia and Alaska make particular mention to their passengers to watch for killer whales in western Johnstone Strait, and occasionally stop or detour to view them. There were at least 19 cruiseships making regular trips between Vancouver/Victoria and Alaska in 1990 (Vancouver Port Corporation 1990). An additional three ships are being added to the B.C. - Alaska route in 1991, for a

total of 238 cruiseship calls in Vancouver enroute to/from Alaska (Daniels, 1991). The Alaska State ferries transit Johnstone Strait twice a week year-round (Alaska Marine Highway 1990).

Spectacular underwater life and excellent winter visibility have made this area a renowned diving destination. Reefs around the small islands at the western approaches to Johnstone Strait are popular dive spots.

4.3 Other Marine-based Activities

4.3.1 Fishing

Commercial Fishing

Salmon is the predominant catch of the commercial fishing fleet in this area. A small number of boats commercially fish for rockcod, lingcod, red snapper and invertebrates such as prawns, primarily in the western entrances to Johnstone Strait.

Commercial salmon fishing takes place throughout the Strait, primarily between July and October. Statistical Areas 12 and 13 (Johnstone Strait) accounted for an estimated 11,500 tonnes of salmon harvested in 1989 or approximately 13% of the British Columbia commercial salmon catch by weight (Department of Fisheries and Oceans 1990) (Appendix 2). An average of 1840 fishing vessels operated in Areas 12 and 13 from 1982-89 and many are local. In 1988, there were 231 licenced commercial vessels from Port Hardy, Port McNeill, Alert Bay, and Sointula (Mossop 1989). The experienced labour force in these communities includes 380-700 commercial fishermen (Statistics Canada 1986; Mossop 1989).

Seiners, gillnetters and trollers are the most common fishing gear types used in Johnstone Strait. Seine boats are generally 15-20 m vessels using a net which draws up like a purse around a school of fish. In order to catch salmon which tend to migrate along shorelines, seiners often make beach 'sets', tying one end of the net to a point on land and then pursuing the net. Killer whales will sometimes take advantage of this ready-made concentration of fish, eating salmon until the net is almost closed. Gillnetters are generally 10 m boats using a fine mesh net which 'gills' salmon trying to swim through it. Killer whales rarely fail to detect these nets. Trollers use hooks, bait and weighted lines.

Native Fishing

Native-owned boats in the area include 35-40 vessels based primarily in Alert Bay, Port Hardy and Fort Rupert (Cranmer, pers. comm.). Other native communities nearby such as Gilford, Turnour Island, Hopetown, and Kingcome Village have a few boats (Ambers, pers. comm.; Cranmer, pers. comm.).

Sportfishing

The sportfishery is a major attraction for visitors to north Vancouver Island, and growth in guided fishing and charters reflects this. In 1987, there were eight lodges located within

range of western Johnstone Strait; there are now approximately 18 (Regional District of Mount Waddington 1990). Guests at fishing resorts increased from 7,989 in 1987 to 9,415 in 1988, a rise of 18.5% (Mossop 1989). A number of the fishing charter/resorts also advertise guided killer whale watching.

4.3.2 Whale Research and Photography

Johnstone Strait is a unique area to observe and research killer whales. There are few other areas in the world where large concentrations of killer whales can be seen so reliably. Johnstone Strait has the additional advantages of sheltered waters and reasonable accessibility by boat. Research is carried out either from small motorized boats, from shore-based observation stations, or both.

The long-term studies conducted in Johnstone Strait have yielded the most significant information about killer whale populations in the world. Research on killer whales in western Johnstone Strait began in 1970 and has continued to the present. The number of research projects, many originating from the United States, grew from several in 1970 to a peak of 13 in 1987 (Taylor 1988a). More research permits have been approved for Robson Bight than for any other ecological reserve in British Columbia. In 1990, research effort had decreased to four teams from the 1987 peak, primarily due to lack of funding.

The detailed research findings regarding population biology and behaviour have largely been possible through cataloguing of individually recognizable whales (Bigg et al. 1987). Researchers have examined abundance, population dynamics, reproduction, seasonal movements, feeding habits, vocalizations, social organization, beach rubbing and numerous other aspects of behaviour as well as studies on the interactions between people and killer whales (Appendix 3). The continuance of research is critical to effective management of killer whales and human impacts on their behaviour and habitat.

The physical and biological conditions which fostered research in this area have also attracted photographers and film crews. Since the early 1970's, professional photographers, television news and documentary crews and cinematographers from around the world have come to western Johnstone Strait to film killer whales. Filming is usually accomplished by following whales in boats, but may also be conducted from land, air and underwater. Filming in the Reserve has been generally controlled under permits from the Ecological Reserves Program. No photography permits have been issued since 1988 to minimize disturbance to the whales in the Reserve.

4.3.3 Other marine traffic

Western Johnstone Strait is the primary route for merchant ships and other traffic that sail the Inside Passage. The Canadian Coast Guard Vessel Traffic Services estimates that Johnstone Strait is the busiest waterway on the British Columbia coast. Merchant traffic includes tugs with barges, freighters, small oil tankers and other commercial vessels. The Canadian Coast Guard, Department of Fisheries and Oceans and RCMP vessels regularly patrol the Strait. During winter storms, headlands located on either side of Robson Bight provide shelter to tugs with booms and other traffic (Balfe, pers. comm.).

4.4 Forestry

Forestry activity along Johnstone Strait consists of timber access, harvesting, silviculture and sorting and transporting logs by road, rail or water to other locations for processing. Road construction and harvesting occur primarily during spring, summer and fall. The major forestry companies operating in the area are MacMillan Bloedel Ltd., Canadian Forest Products Ltd., Western Forest Products Ltd., Fletcher Challenge Ltd. and International Forest Products.

The forestry sector employed 2858 people in 1989 in the Mount Waddington Regional District (Mossop 1989). The District accounts for 8% of the provincial timber harvest (Association of B.C. Professional Foresters 1987). Wood harvested is either processed in the Region as pulp or transported to mills on the southern Vancouver Island and the Lower Mainland.

4.4.1 Current Logging and Access Activity

Logging, either by hand, A-frame, or clearcut, has taken place along Johnstone Strait since the late 1800's. Harvested areas are in many stages of regeneration but most regrowth is between 10 and 30 years old. During the past 10 years, road construction and/or logging has taken place on West Cracroft Island, Hanson Island and on Vancouver Island.

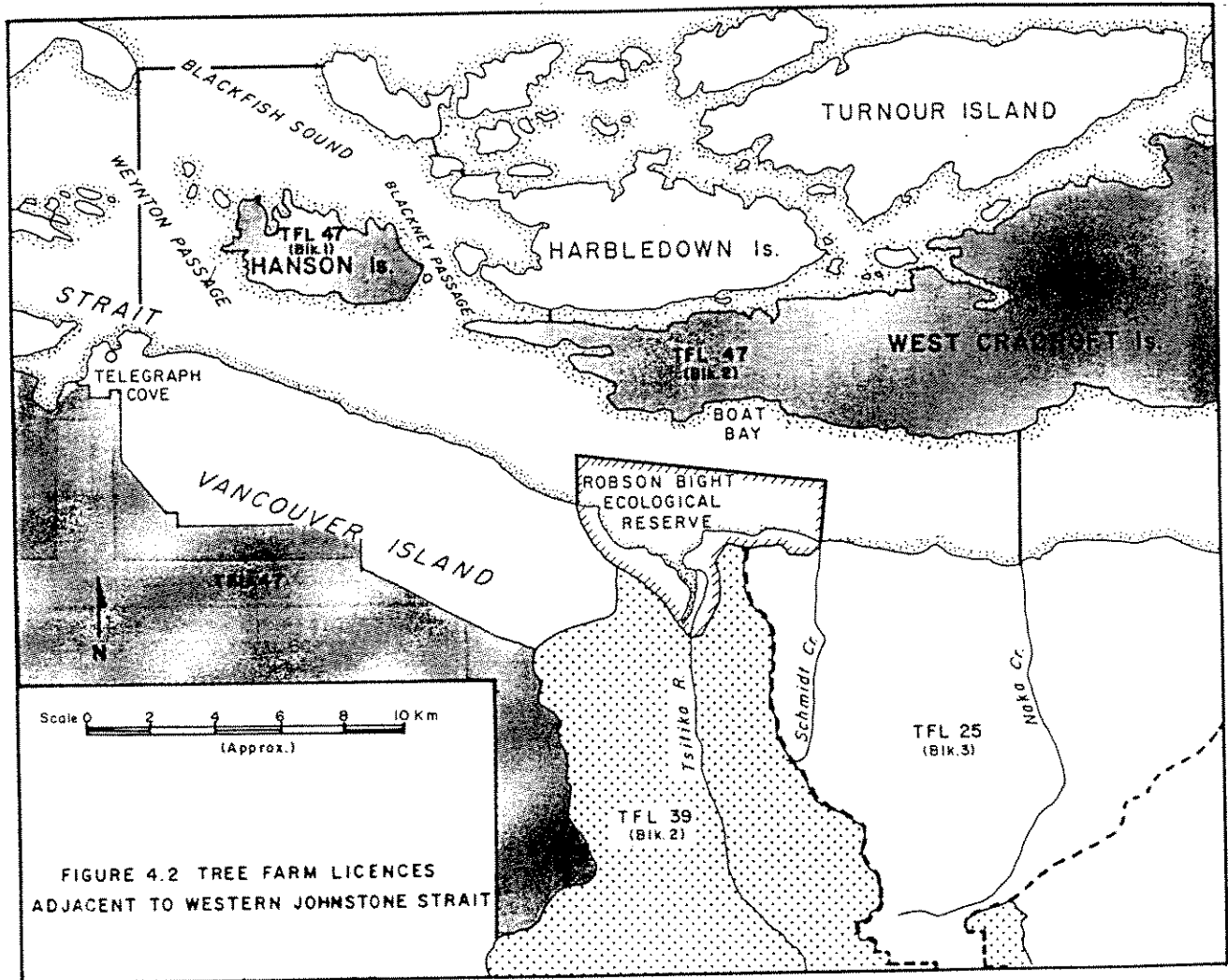
Portions of tree farm licences #25 (Western Forest Products) and #39 (McMillan Bloedel) are adjacent to RBMBER (Figure 4.2). Interfor, Fletcher Challenge (TFL #47) and Canadian Forest Products also have timber rights on the Vancouver Island shore, although these are not directly adjacent to the Reserve. Holdings within the Tsitika watershed are subject to an integrated resource plan approved in 1978. Since that time, approximately 10% (3,500 ha) of the 40,000 ha watershed has been harvested, with about 240 km of road constructed (Department of Fisheries and Oceans 1990). Many areas within the Tsitika watershed are protected as critical winter range for wildlife, or as ecological reserves (six areas). Forest harvesting has proceeded to within 4 km of the estuary; access will not be constructed below this point until the Johnstone Strait Killer Whale Committee has concluded its deliberations (Brownlee, pers. comm). A gate was installed at Catherine Creek to limit public access to the lower Tsitika watershed.

A 6 km access route was constructed in 1987 along Johnstone Strait from Naka Creek to Schmidt/Peel Creek. A gate installed 6 km east of Naka Creek in September 1990 restricts public access to the east end of RBMBER.

4.4.2 Forest Management and Planning

The Tsitika Follow-up Committee was established in 1978 to oversee the implementation of the Tsitika Watershed Integrated Resources Plan (Ministry of Forests 1990). Since that time, 12 studies have been conducted in the watershed by various agencies (Appendix 4). In addition, two studies of sedimentation affecting freshwater and marine portions of the Reserve are now underway. The marine study will examine sedimentation from the Tsitika River and Schmidt/Peel Creek and is scheduled for completion in March, 1991. A long-term sediment monitoring program

Figure 4.2 Tree Farm Licences Adjacent to Western Johnstone Strait
 (Source: Ministry of Forests n.d.)



has been initiated in the Tsitika by the Ministry of Forests. Sediment levels will be monitored at several locations on the Tsitika mainstem, as well as at the mouth of the river (Hogan, pers. comm.). Public meetings were held in November 1990 in Vancouver, Victoria, Nanaimo, Campbell River and Port McNeill to determine the public response to the implementation of the plan.

MacMillan Bloedel's current five year plan for the lower Tsitika Valley includes four cutblocks and construction of 9 km of main haul road (EARP 1990):

- Cutblock #101 (27 ha) 1990-91
- Cutblock #102 (38 ha) 1991-92
- Cutblock #103 (34 ha) 1992-93
- Cutblock #104 (34 ha) 1994

Timing and location of these cutblocks and road construction are shown in Figure 4.3. Harvesting has been approved in Cutblock #101 in 1990 and felling has been completed. The remaining cutblocks have not been approved for harvest by the Tsitika Follow-up Committee.

Western Forest Products is the licensee for TFL #25 which includes Schmidt/Peel Creek and a portion of the Tsitika drainage. Harvesting has been completed in Cutblocks #41 and #48 in the Schmidt/Peel Creek drainage (Fig. 4.3). Three other cutblocks are proposed in the current 5 year plan:

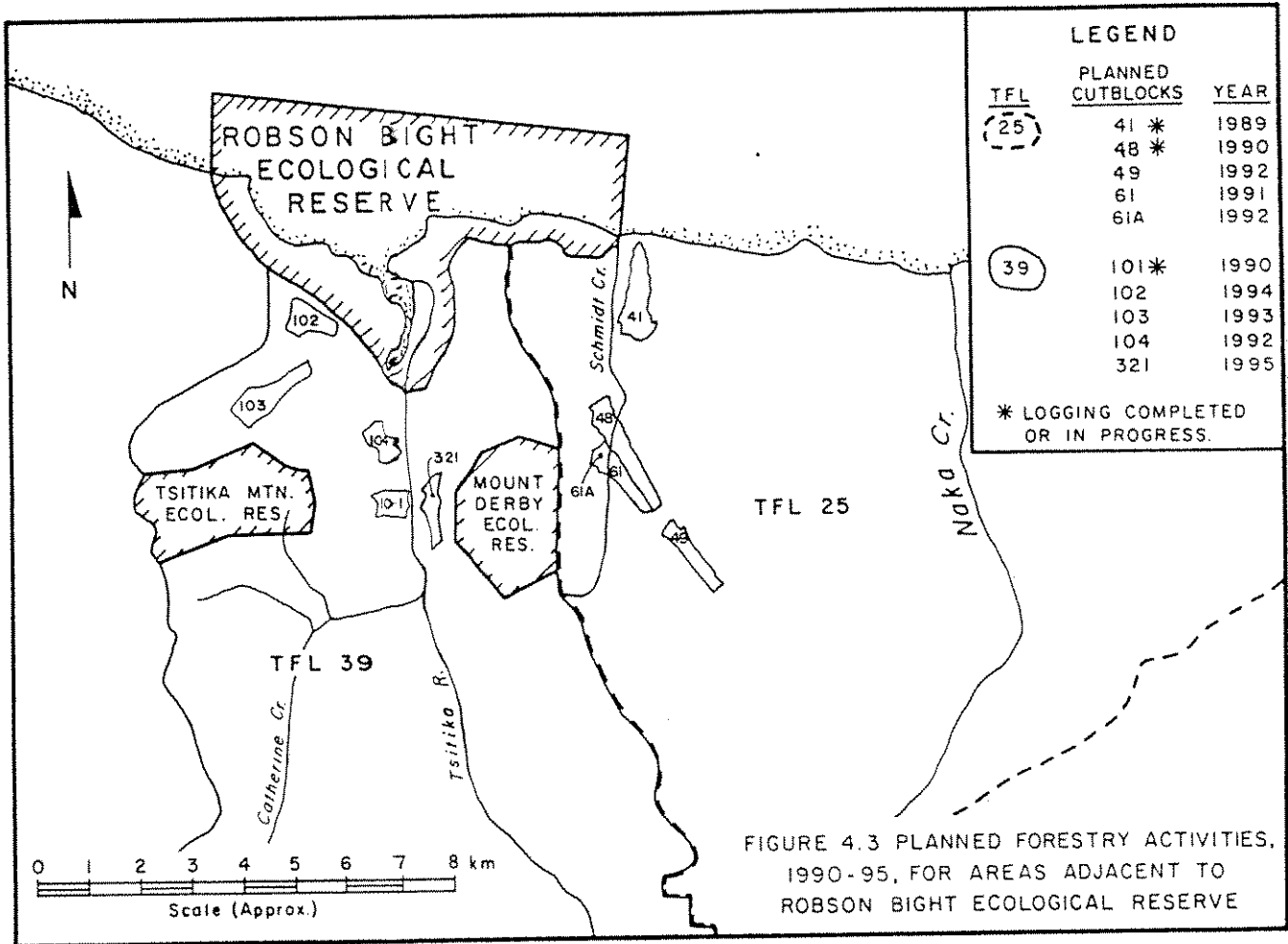
- Cutblock #61 (86 ha) 1991-92
- Cutblock #49 (70 ha) 1992-93
- Cutblock #64 (92 ha) 1994 (deferred indefinitely)

An EARP screening of the Tsitika Watershed Integrated Resource Plan was completed in 1990. The report concluded that no logging or road construction in the lower Tsitika should proceed past Block 101 until:

- the Johnstone Strait Killer Whale Committee and the Tsitika Follow-up Committee have produced their reports and the public has reviewed and commented on these reports;
- the reports on visual impacts and public access have been completed and the public has reviewed and commented on these reports;
- discussions have been held between the Tlowitsis-Mumtagilaband, MacMillan Bloedel and the Provincial Government; and
- the study on sediment generation has been completed.

The screening committee recommended that the project should be screened again under EARP on completion of the above.

Figure 4.3 Planned forestry activities, 1990-1995 for areas adjacent to Robson Bight - Michael Bigg Ecological Reserve. (Sources: MacMillan Bloedel, 1990; Western Forest Products 1990; Ministry of Forests 1991)



4.4.3 Log Handling

Dryland log sorting areas operate east of the study area at Adam River (MacMillan Bloedel) and to the west at Beaver Cove (Canfor). A third dryland sort has been constructed by Fletcher-Challenge Ltd. on Hanson Island. Fletcher-Challenge and Canfor operate log booming grounds at Beaver Cove. A dryland sort was proposed for Robson Bight, but plans were cancelled in 1981.

4.4.4 Visual Analysis

Concerns have been raised by the public regarding the potential alterations to the Vancouver Island shoreline, including the Robson Bight landscape, as a result of logging. The public has equated visual alterations of this landscape to loss of physical integrity of killer whale habitat, although there is no indication that this is the case. Perception studies, including a survey of visitors to Robson Bight (Duffus and Dearden 1990) show that unaltered landscapes are significantly preferred over those showing highly visible alterations. Vancouver Island, due to its relatively steep terrain immediately adjacent to the Strait, is more sensitive to landscape alterations than the islands on the north side of the Strait. Prior to any logging that would be visible from western Johnstone Strait, forest companies now use computer modelling to analyze the visual effect of different shapes and locations of cutblocks.

Recent logging visible from the Strait has occurred in the Eve River, Naka Creek, Schmidt Creek and Kaikash Creek drainages, and at Telegraph Cove. West of the Tsitika watershed, only one cutblock is planned for harvest in the next five years (Ministry of Forests 1991). This block, under Fletcher-Challenge T.F.L. #47, would not be visible from Johnstone Strait. International Forest Products also holds timber rights west of the Tsitika but no harvesting is planned here for the next five years (ibid.)

Evidence of logging in the Tsitika watershed, including the recently harvested Block #101, is not visible from Johnstone Strait. According to analyses completed by MacMillan Bloedel and the Ministry of Forests, Cutblocks #102, #103 and #104 in the lower Tsitika drainage would be partially visible from the Strait.

Within TFL #25, clearcuts are highly visible to the waterline immediately to the east of the Reserve. Western Forest Products reports for its five-year plan that:

- Cutblock #61 - 1991-91 - 100% visible
- Cutblock #49 - 1992-93 - < 5% visible
- Cutblock #64 - 1994 - deferred indefinitely

4.5 **Traditional Native Use and Land Claims**

Johnstone Strait and the islands to the north are within the traditional territory of the Kwakiutl people. Names given to specific sites along Johnstone Strait indicate their use for bark and wood harvesting, clamming, berrypicking and fishing (Boas 1909). There is archeological and ethnographic evidence for use and occupation of Johnstone Strait and Robson Bight by four Kwakwaka-waka-speaking tribes: the Matilpi, the Tlowitsis, the Nimpkish, and the Fort Rupert people (Eldridge et al. 1988).

In an archeological survey of RBMBER, Eldridge et al. (1988) reported prehistoric archeological sites including fish camps, a winter village or long-term camp and a fish trap. Additional evidence of traditional activity in the Tsitika estuary includes bark-stripped trees, and logged cedar trees. Bark and planks were harvested from living cedar trees for a variety of uses including housing, clothing, and household items (Stewart 1984).

The Kwakiutl consider the killer whale the most powerful spirit in the sea and have never hunted it. Its image appears frequently on totem poles, grave markers and other ceremonial items. According to myth, the killer whale people gave special powers to two kin groups of the Komkiutis tribe living at Robson Bight (Eldridge et al. 1988).

A comprehensive claim for Kwakiutl Tribal Territories is described in the Kwakiutl Declaration (Guenther, pers. comm.; Kwakiutl First Nations, n.d.). Two treaties were signed in 1851 at Fort Rupert between the Queakar and the Quakeolth Tribes and James Douglas, Chief Factor for the Hudson's Bay Company. These treaties ceded the Tribes' territories at McNeill's Harbour and Hardy Bay, extending two miles inland. The Treaties provide that the Tribes are at liberty to hunt on unoccupied lands and to carry on their fisheries as formerly.

The Kwakiutl First Nations comprehensive land claim, regarding territory which includes Johnstone Strait and the lower Tsitika valley, has been accepted by the Federal government for negotiations. However, negotiations have not yet begun.

4.6 Summary

Improved highway access from Campbell River to northern Vancouver Island since 1979 has provided a boost to tourism and coincided with the timing of forest harvesting in the Tsitika watershed. The economy of the north Island continues to be based primarily in forestry, fishing and mining, although tourism is a rapidly growing sector.

5.0 POTENTIAL SOURCES OF DISTURBANCE TO KILLER WHALES

Potential sources of disturbance to killer whales and their habitat may be marine-based or land-based. Marine-based disturbance consists primarily of vessel activity, especially where this occurs in close proximity to whales. Land-based disturbance includes physical alterations to habitat, and human activity at sites where killer whales swim close to shore, such as at the rubbing beaches.

5.1 Marine-based Disturbance

Boats are the most common mode for bringing people into contact with killer whales. Boats are used for fishing, transportation, commerce and pleasure. Disturbance by boats is the best documented type of impact on killer whales because it is easiest to observe and takes place primarily in the study area.

Vessel approaches rarely result in physical harm to killer whales, however there are isolated incidents. In December 1973, a ferry at Comox, south of Campbell River, fatally struck a killer whale with its propeller. Incidents where physical harm is intended still occur. Killer whales still appear occasionally with bullet wounds (Bigg et al. 1987).

5.1.1 Western Johnstone Strait

Duffus and Dearden (1989) described boat-whale encounters in western Johnstone Strait and RBMBER in 1986, 1987 and 1989, while conducting research on whale watching. The emphasis of their research was on recreational boats and researchers. Whale watching by cruiseships, ferries and other commercial traffic was not noted. Further studies are required to better establish patterns of behaviour. They defined encounters where boats changed direction toward and approached within 300 m of whales. They found killer whales were most frequently approached by motorized whale watching boats, small power boats and researchers (Figure 5.1). Other kinds of boats approached whales much less frequently. Numbers of encounters by whale watching charters (both motorized and sail), kayaks and sailboats increased significantly between 1986 and 1989. During 1989, whales were typically followed by four boats but boat numbers ranged from 1-12 (Figure 5.2).

Whale watching charter boats and researchers followed whales the longest, about an hour on average (Figure 5.3). Researchers spent up to 420 minutes within 300 m of whales. Other boats remained on average about half an hour following whales. Whale watching charters, sail boats and kayaks tended to remain longer with whales in 1989 than in 1986.

Figure 5.1. Whale watching encounters in western Johnstone Strait, 1986-89. Pleasure, research and charter vessel averages only. Encounters were recorded when a boat changed direction or speed and approached within 300 m of a group of whales. n = 1064. Data from Duffus and Dearden (1989)

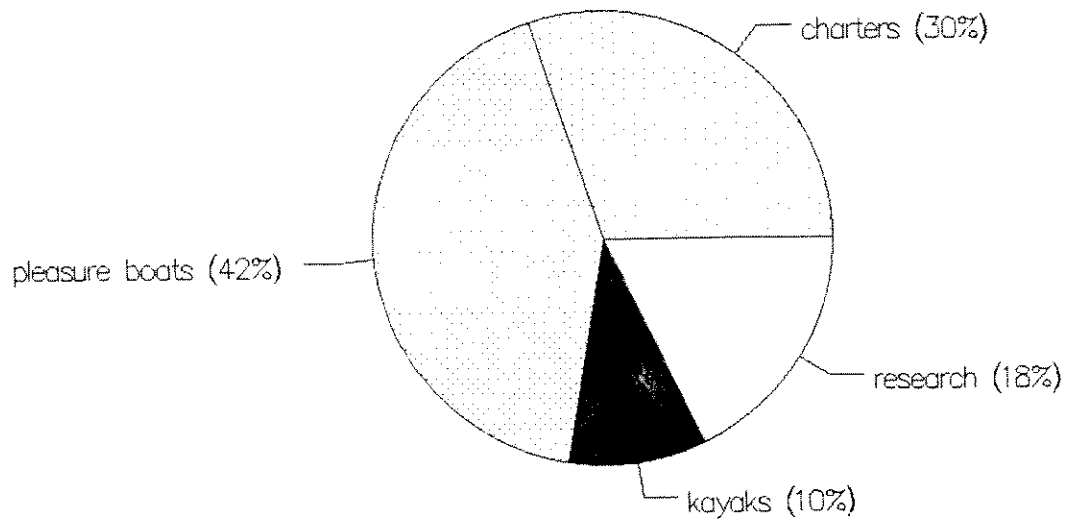


Figure 5.2 Frequency distribution of the number of whale watching vessels simultaneously encountering a group of whales in Johnstone Strait, 1986-89. Data from Duffus and Dearden (1989).

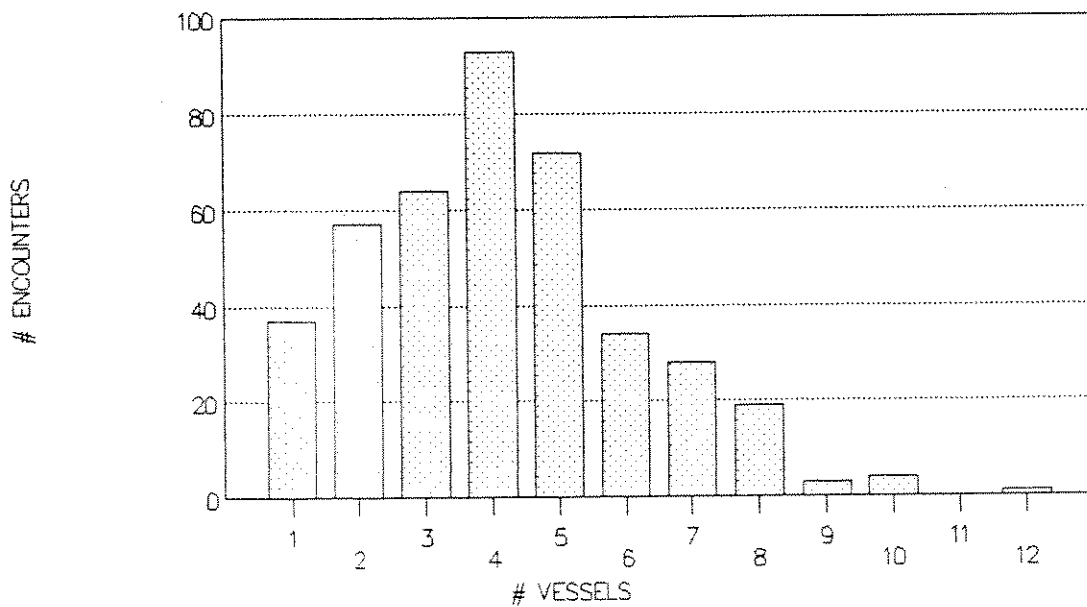
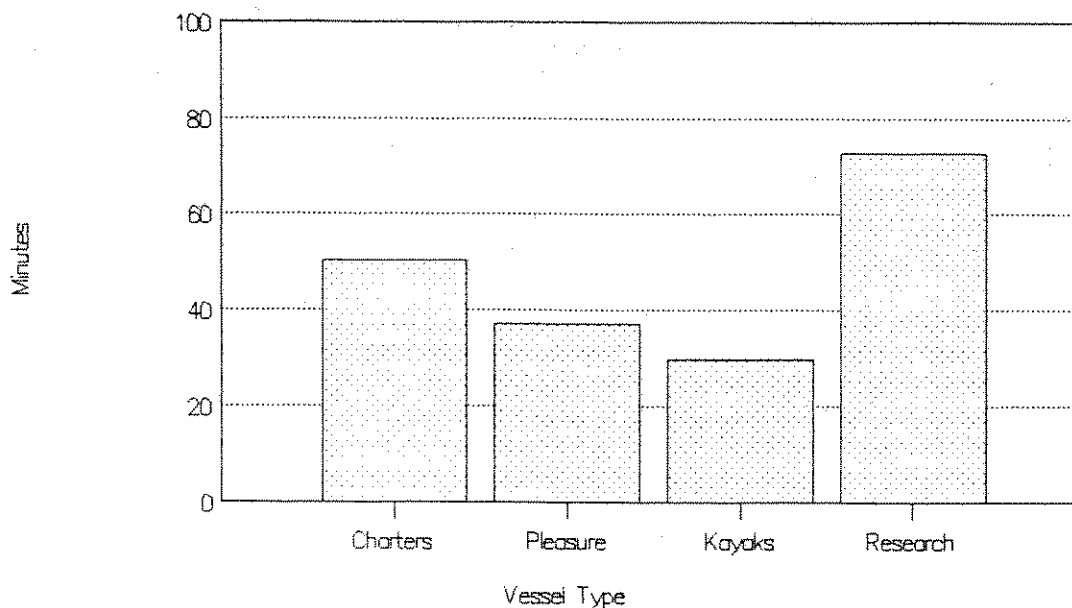


Figure 5.3 Mean duration of whale watching encounters in Johnstone Strait, 1986-89. Data from Duffus and Dearden (1989). Total encounters (n) = 1064.



Commercial Fishing Vessels

Commercial fishing vessels are the most common boat type in Johnstone Strait. During 1984-89, an average of 85% of vessels using the Strait were commercial fishing boats (Figure 5.4). Vessel numbers fluctuate widely, being most abundant during fishing openings, and numbering up to 141 at any one time (Briggs 1986). In July and August 1987, an hourly average of 3.7 seine vessels and 1.5 gillnet vessels were observed near RBMBER (Taylor 1988b). The level of commercial fishing activity in any given year is dependent on:

- size of returning salmon stocks;
- the proportion which return through Johnstone Strait; and
- the number of fishing openings.

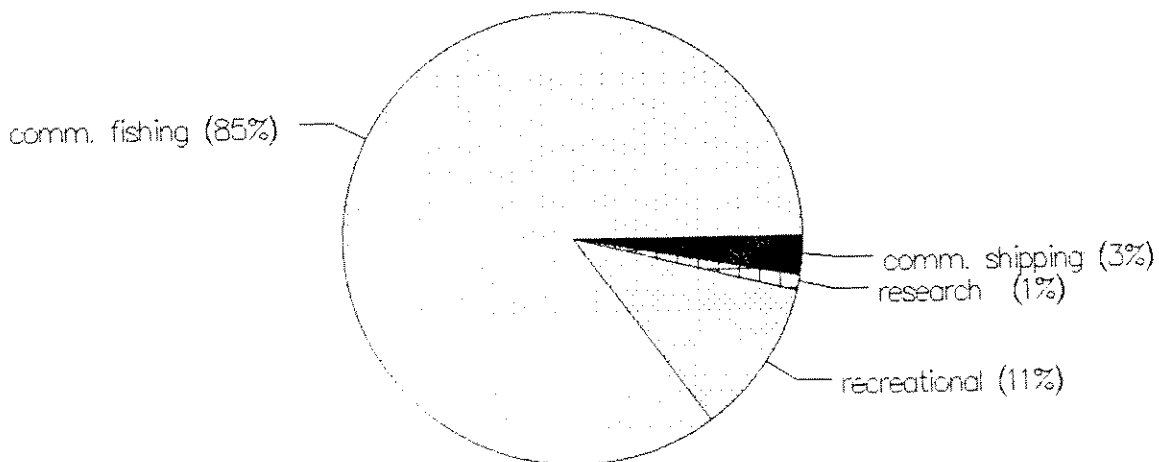
Most commercial salmon fishing occurs near the Vancouver Island side of Johnstone Strait because of fishery closures or restrictions. Seine boats may set their nets in open water or they may use a limited number of tie-up points on the Vancouver Island shoreline, including some within RBMBER. There are at least 4 tie-ups within the Bight and another 12 between the Bight and Naka Creek (Cranmer, pers. comm.). These tie-up points are often in demand during an opening and may have 2-3 boats waiting in line to use them. Some tie-ups have been in use for many years (ibid.) One of the tie-ups on the eastern shore of Robson Bight has the highest average catch per set in Johnstone Strait (Lewis, pers. comm.).

Seine vessels commonly moor for several days along the Vancouver Island shore prior to fishery openings. Sheltered waters within Robson Bight are often used by fish packers and other vessels during openings and rough weather. Seine vessels typically moor at beach tie-up points to reserve their use for the first set of the next fishery opening.

During the intense commercial fishing activity of July-September in Johnstone Strait, whales swim among and below gillnets and seines set in the area. Typically, killer whales can detect them, although rarely they entangle in gillnets, and if caught, can usually be released alive. Generally, fishing vessels and whales appear to be indifferent to each other, apart from occasional approaches by vessels to whale watch and at the rubbing beaches.

Attitudes within the commercial fishery toward killer whales have changed radically, as have general societal attitudes. In the 1950's and 1960's, killer whales were viewed as threats to be driven away from salmon fishing areas (Department of Fisheries and Oceans 1960). Today, commercial fishermen often view killer whales with indifference, tolerance or even interest. They occasionally enjoy whale watching at Robson Bight or listening to whales vocalizing through a hydrophone or underwater microphone (Mackay, pers. comm.). About 1% of the contacts made during the information program at the Reserve were with commercial fishermen who were whale watching (Taylor 1988b).

Figure 5.4 Composition (%) of vessel traffic in Johnstone Strait, 1984-89.
Data from Briggs (1986, 1988, 1991); Taylor (1988b).



Pleasure Craft (excluding kayaks)

Pleasure craft were the second most abundant boat type in Johnstone Strait. Recreational boat traffic in the Strait averaged 11% of total vessel traffic between 1984 and 1987 (Figure 5.4). In 1990, a minimum of 3,300 boat-days in western Johnstone Strait originated from the marina at Telegraph Cove Resort. Recreational traffic also originates from Port McNeill, Alert Bay, Beaver Cove and fishing lodges. Boaters concentrate in local fishing 'hotspots' at the western entrances to Johnstone Strait, Blackney Pass and Weynton Pass.

Sportfishing activity frequently stops when killer whales pass through, and boaters motor over to watch whales. Whale watching sessions in these areas are often of short duration (10-15 minutes), although commonly several boats are present. Encounters with whales in Weynton and Blackney Passes are more intense than those in the Strait proper, with frequent approaches to within 50 m, higher boat speeds and more rapid changes in boat direction. These boaters are less likely to seek out or come into contact with information regarding guidelines for appropriate boat behaviour while whale watching, because their primary interest is sportfishing.

Kayaks

Kayak activity has been estimated for Telegraph Cove, the main launching area. In 1989, the Telegraph Cove marina operators estimated that 3000 launches had been made (Taylor and Parsons 1989). Approximately 1400-2000 kayak launches were estimated for 1990 by contacting kayak tour operators. The 1990 figures do not represent a decline but rather a difference in the sampling method. In 1989, only a small proportion of the total kayak groups originated from Naka Creek (ibid.). Preliminary observations indicate that the same was true in 1990 (Briggs, pers. comm.).

Kayaks generally travel near shore where reduced turbulence and slacker currents make paddling easier than further offshore. Killer whales also typically travel close to shore and frequently feed in these areas as well. Because paddling is quieter than other forms of boating, killer whales are less able to detect the approach of these craft. Conversely, kayaks sit so low in the water that paddlers do not have the visual perspective to see whales coming. Consequently, 'surprise' encounters between kayaks and killer whales are common.

Whale Watching Charters

Although the whale watching industry in Johnstone Strait has grown from one to 27 operators in 10 years, most activity is carried out by 3-4 operators. Full-time whale watching charters in particular perform an important function of education and controlling whale watching encounters. These tours generally have interpretive programs and emphasize unique values of the area and importance of conservation. Charters, especially the vessels holding 10 passengers or more, 'concentrate' visitors in one place, rather than having a number of smaller boats maneuvering around whales. Charter captains generally show considerable restraint during encounters since they have a vested interest in the continued presence of whales in the area. Smaller part-time operators are generally less informed regarding whale watching guidelines and often have small, maneuverable boats (with a higher potential for

disturbing whales). As the whale watching industry grows however, self-policing is no longer completely effective in minimizing disturbance of whales.

Whale watching charter activity is generally concentrated around the western approaches to Johnstone Strait but range as far east as Naka Creek. Obviously, this is primarily because the whales are here, but is also related to the travel range of the charter vessels. In 1989, one major operator acquired a faster vessel with a larger range. Another full-time charter began operating the same year. As the industry grows, a trend toward larger, faster vessels is likely to continue.

Charter operators rely heavily on a marine radio network for reporting of whale sightings. Operators also use the radio to coordinate activities with each other and attempt to minimize traffic around whales. Operators and researchers often cooperate in finding whales, limiting boat activity, and reporting potential disturbance of whales.

Cruiseships and Ferries

In 1984 and 1985, merchant traffic and cruiseships accounted for 2% of all vessel activity in the western Strait (Briggs 1988). Cruiseships and Alaska State Ferry transits through Johnstone Strait in 1990 were higher than usual. Cruiseship transits for 1984-1988 averaged 196; in 1990, there were 227 scheduled trips (Vancouver Port Corporation 1990). Alaska State ferries typically make 104 transits per year (ie. twice per week); in 1990, there were 112 (Alaska Marine Highway 1990).

Cruiseships and ferries 'concentrate' visitation even more than charter vessels. The ferries often have naturalists aboard who talk about whales. These vessels occasionally alter course, slow or stop to observe whales. These ships have potential to alter the acoustic environment of whales. Research is currently underway on the acoustic environment of the southern resident community (Osborne, pers. comm.). These findings will potentially have relevance for management of the northern residents.

Research and Photography Boats

The number of research and photography vessels vary from year to year depending on projects and funding, but rarely exceeds 10 boats in a year. Relatively little of the research requires close approaches by boats. No more than three boats have been used in any one season for this type of research. Researchers in recent years have attempted to limit close approaches (less than 30 m) to the time necessary for photo identification or observation of detailed behavioural interactions (less than 0.5 hr per session). There has been no requirement for the clear identification of research boats in the past (other than the small pennants) and these boats have often been mistaken for recreational boats. Research boats have then inadvertently acted as a model for other boats to copy or have been viewed as 'harassing' whales.

Although some professional photographers and cinematographers use their own boat, others use vessels already operating in the area. In recent years, most photographers without permits have avoided the Reserve. Because of the possibility of permit abuse in the absence of ecological reserve representatives, permit holders should be monitored periodically.

Other Vessels

Other boat encounters include those with tugs towing logbooms and barges, and numerous other maritime vessels. For the most part, these larger vessels do not alter course to follow whales. Vessels moor in Robson Bight for shelter primarily during winter storms and are not likely to interfere with killer whale use of the area.

5.1.2 Robson Bight - Michael Bigg Ecological Reserve

Vessel activity in the Reserve was observed during July-August 1987 and 1989 by Briggs (1991) and Taylor (1988b). Average numbers of most boat types were higher outside the Reserve. During the operation of the information officer program in the years 1987-90, recreational boat traffic in the Reserve was considerably reduced particularly when whales were present in the Reserve. Commercial charter activity also took place for the most part outside the Reserve.

Potential for disturbance of whales was different inside the Reserve compared to outside. Whales outside the Reserve reacted to boat presence primarily while resting. Since whales most frequently use the rubbing beaches located inside the Reserve, the potential for disturbance during rubbing activities is virtually non-existent outside the Reserve.

Commercial Fishing Vessels

Similar to the rest of western Johnstone Strait, 75% or more of boats present were commercial fishing boats. They also visited the rubbing beach areas most frequently. Although numbers were highly variable, an average of 11 fishing boats were seen in the Reserve at any one time during August 1987 (Taylor 1988b).

As in other areas of Johnstone Strait, Briggs (1991) reported that seine boats frequently arrive several days early to lay claim to a favourite set location. Seiners line up near the shore to make beach sets. Gillnetters also fish within 10-50 m from shore (ibid.). During fishing operations, additional boats or planes bring in provisions or parts, vessels reposition for the next set, or fish are bought and sold to the cash buyers. Seiners and gillnetters may be present at the rubbing beach area for periods of four to seven days. They often moor on the rubbing beaches, in coves immediately adjacent to the beaches and the east and west points of the Bight at favoured sites (tie-ups).

During 1989, Briggs (1991) reported hearing gunfire on 35% of the days that commercial vessels were moored near the rubbing beaches and more than 500 gunshots were heard. Most shots were directed at shore, but sometimes targets in the water were used, such as jumping salmon. In 1987, a gillnetter was observed charging at killer whales. In 1989, an explosion was heard near a group of whales. In 1990, Briggs (in press) reported frequent disposal of garbage bags in the water and on shore in the Reserve. Drums of used motor oil and other waste were found at the beaches and subsequently removed during periods when fishing vessels were moored in the area.

Pleasure Craft and Kayaks

The second most common boat types in the Reserve were pleasure craft and kayaks. Recreational boats comprised 7% to 10% of total vessel approaches near the beaches in 1987 and 1989. Kayak approaches were an additional 7% and 2% of the total in those years. These boaters were routinely contacted by information officers from the Ministry of Parks and encouraged to either leave or remain outside the Reserve. This program probably lowered the number of recreational boats and kayaks that might otherwise have been present in the Reserve. In 1990, higher percentages of recreational vessels, charter vessels and kayaks were recorded, possibly due to different data collection procedures.

Other Vessels

Other vessel activities in the Reserve included tugs towing log booms (often within 100 m of shore) and taking several hours to pass through the area (Briggs 1991). Research/ photography boats and whale watching vessels infrequently visited the rubbing beaches. Collectively, these vessel types comprised 1% or less of all vessel approaches at the beaches, except in 1990 when data on these vessels was not collected.

5.2 Land-based Disturbance

Potential sources of short-term land-based disturbance are:

- public access
- road construction activities
- logging

5.2.1 Western Johnstone Strait

Human activities adjacent to the Reserve are primarily associated with logging and are described in Forestry (Section 4.4).

Some recreational activity occurs at suitable beaches east and west of the Reserve on the Vancouver Island shore and on Hanson and West Cracroft Islands. Campsites are at a premium and some were in constant use by kayak groups during the summer of 1990 (Arcese, pers. comm.).

Land use by commercial fishermen is limited to landings in skiffs to attach mooring lines, make beach sets, and for some recreational use.

Several researchers camp along the Johnstone Strait shoreline, generally on West Cracroft Island, to allow good vantage points for viewing whales and boater activity. In 1986, there were five research camps on West Cracroft (Taylor, 1988a). By 1990, only 2-3 camps remained.

With the exception of RBMBER, public access to the shores of Johnstone Strait is unlikely to affect killer whale use of this core habitat. Outside the Reserve, killer whales often travel

and forage close to shore, but they rarely rest, socialize or rub there. Whales commonly travel and forage as close as 50 m from the shores of Blackney Pass⁴, at sites such as Cracroft Point, southern Hanson Island and northern Harbledown Island. Whales also travel close to shore along West Cracroft Island and along Vancouver Island near Kaikash Creek. These sites have potential for land-based whale watching.

Presently, the rugged shoreline limits land-based access. There are no continuous trails near the water in western Johnstone Strait. Logging access on Vancouver Island reaches the waterline only at Naka Creek, Bauza Cove and Beaver Cove. As mentioned previously, logging access at Naka Creek and in the Tsitika valley has recently been gated to restrict recreational access. On Hanson and West Cracroft Islands, logging access is located inland.

In summary, steep terrain and poor access currently limit opportunities to approach and potentially disturb whales from land, however water-based access and associated impacts are perpetuated.

5.2.2 Robson Bight - Michael Bigg Ecological Reserve

It is not known at this time if logging adjacent to the Reserve could potentially affect killer whale habitat and use in the Reserve. Blood et al. (1988) reviewed the potential for forestry activities to negatively affect killer whale habitat. Impacts included those from public access, noise disturbance, hydrologic effects and windthrow. However, neither Blood or Briggs could detect any direct impacts of logging activities on killer whales at the rubbing beaches because all logging has taken place away from the beaches.

Public access

As in the rest of Johnstone Strait, public access to Robson Bight is still primarily by water rather than by road because of the rugged topography and lack of development. Land-based activity is generally restricted to short hikes. The estuary of the Tsitika and beaches to the west of the estuary receive some recreational use from kayak groups, commercial fishermen and whale watching charters. In recent years, this use has not increased substantially because organized groups have voluntarily kept visitation to a minimum. From 1987-90, most groups going ashore were contacted by the ecological reserve information officers and asked to minimize their stay and potential impact on whales and the Reserve.

As a result of the Reserve information program and concerted efforts by charter operators, people rarely go ashore near the rubbing beaches (Briggs 1991). Due to their activity in the area, commercial fishermen are the most frequent group ashore. Of 27 landings recorded in 1989, 19 were by commercial fishermen. Typically, they went ashore in skiffs and stayed 5-50 minutes to hike, tie mooring lines, whale watch, check rifle targets or make a fire. Recreational boaters and kayakers went ashore mainly to look for a camp site.

Land-based access to Robson Bight is currently limited. Public access from Schmidt Creek

⁴ Blackney Pass is one of the main routes for whales travelling between Johnstone Strait and Queen Charlotte Strait.

and from the Tsitika Main is restricted by gates and difficult terrain. There is some question as to whether the gates can be adequately monitored to be completely effective. By landing boats in the Reserve, it is possible to approach killer whales from land at the rubbing beaches and from a variety of promontories along the Reserve shoreline. This is consistently discouraged by information officers present at the Reserve from June through September.

Noise disturbance

It is not known if the noise associated with road construction and logging could potentially disturb whales at the rubbing beaches. Logging east of the Reserve took place in 1989 in the vicinity of the beaches. Future harvesting in TFLs #25 and #39 is proposed to take place behind 300-700 m land buffer of the Reserve. Due to the distance from the water, noise from road construction and logging are unlikely to have any direct impacts on whale use of habitat (Blood et al. 1988).

Hydrologic effects

It is not known if road building and logging adjacent to the Reserve could result in detrimental changes in habitat in the estuary and at the rubbing beaches. Sedimentation from the Tsitika River and marine transport of sediment are currently being studied (Appendix 4). While changes to the estuary are a concern, they are unlikely to seriously affect killer whale habitat at the rubbing beaches, which are several kilometres from the estuary. However, logging in small high gradient streams (such as Schmidt Creek) east of the Reserve is of more concern as it could potentially affect the beaches, both with debris and sediment transport during storm/snowmelt events (Blood et al. 1988)

Windthrow

Trees can be blown down if the orientation of logging cutblocks is poorly planned or if prevailing winds are stronger than anticipated. This phenomenon is called windthrow and has been a serious problem in the upper Tsitika watershed. There is concern that windthrow or associated debris could occur at the beaches, and obstruct whale access or use of the beaches. The potential for a 'domino effect' of windthrow to begin adjacent to the Reserve and affect the Reserve boundary west of the Tsitika was examined in a study by T. Lewis for the Ministry of Parks. The potential for windthrow east of the Tsitika has not been examined. Lewis (1989) reported that the open canopy cedar-hemlock forest predominant on the slopes above the Reserve are resistant to wind effects. He concluded that the south boundary of the Reserve generally had low potential for windthrow, except within an area 250 m west of the Tsitika River.

6.0 KILLER WHALE RESPONSES TO HUMAN ACTIVITIES

Certain species of whales respond not only to sudden and unpredictable changes in course by whale-oriented vessel traffic, at distances of at least 400 m, but also may display avoidance responses to non-whale-oriented vessel traffic up to 4 km distant (Atkins and Swartz 1988; NOAA 1987).

As would be expected, killer whales respond to different types of disturbance in different ways. In response to human activities, whales may show short-term behavioural changes, such as leaving an area one day but returning the next. Long-term responses include reduced use of a critical habitat or lowered productivity and survival due to changes in the environment, such as decreased food availability or declines in preferred habitat. With lowered productivity or survival, populations are less able to respond to additional changes in the environment.

Establishing a link between human activities and changes in the biology of killer whales is complex. Many human activities take place in the region that could affect killer whales, such as competition for the same food supply, pollution, habitat degradation and harassment. Human activities may affect, either positively or negatively, many aspects of killer whale biology, such as reproduction, mortality, distribution, social organization and behaviour. In addition, correlation between human activities and a change in whale biology may be cause and effect or entirely coincidental.

6.1 Short-term Responses of Killer Whales

Reactions by killer whales to vessel or land approaches, as previously described, include avoidance behaviours, speed changes, aerial displays (eg. breaching), and changes from one behaviour mode to another (eg. resting to travelling). While these behaviours may happen independently of boat approaches, they occur more frequently when boats are present (Kruse 1984).

6.1.1 Reactions to marine-based disturbance

Western Johnstone Strait

Killer whales avoid boats which approach them too closely by increasing speed, altering direction of travel, diving for longer periods of time or dispersing. Kruse (1984) reported that killer whales in Johnstone Strait increased their swimming speed by 1.4 times during 84 situations in which boats approached within 400 m. Swimming speed tended to be greater with an increase in the number of boats. The size of the boat did not seem to influence the degree of avoidance. Whales did not usually change direction of travel due to disturbance. Duffus and Dearden (1989) reported that while killer whales tended not to respond to boat approaches by changes in speed or direction, groups would tend to disperse.

Killer whales show considerable variability in their reaction to boats depending on:

- the proximity, course and speed of boat approaches;
- the whales' behaviour and apparent mood at the time;
- and the length of time that the whales are followed.

Kruse (1984) found that killer whales showed little reaction to any boat activity more than 300-400 m away. Within that distance, Duffus and Dearden (1989) found that the likelihood of whale avoidance typically increased as boat distance decreased. However, whales are extremely variable in their reactions - sometimes beginning avoidance behaviour at 300-400 m and at other times, not until the boat is considerably closer. As would be expected, some individuals or pods are more tolerant of boat presence than others. So far, there has been no instance of "friendly" behaviour in killer whales, that has been observed in other species.

Within 300-400 m, killer whales are disturbed more by frontal approaches than those from the side or rear. A high speed boat approach (> 6 knots) will typically result in killer whale avoidance, such as a change in swimming direction or dispersal of a group. Boats can approach to within 50-75 m if the approach is dead slow (ie. no wake), from the whales' flank and if the whales are in an approachable mood. The same pod may allow a close boat approach on one day, but not on another. Killer whales appear to be disturbed more when approached during resting, socializing or beach rubbing than when foraging or travelling (ibid.). Some habituation to close boat approaches seems to take place as the summer progresses, although Kruse (1984) did not find this. Although not rigorously documented, resting periods appear to have shortened over the years, and groups of resting whales have become smaller.

While short-term disturbances are usually not serious when considered individually, cumulatively they may be a problem. Whales may be followed from the time they enter Queen Charlotte Strait down as far as Kelsey Bay by a succession of boats. The overall effect of these avoidance behaviours may be a long-term change in distribution.

Elsewhere in the world, other species of whales have been known to desert critical habitats apparently in response to vessel traffic and noise (Appendix 5). Gray whales abandoned breeding and calving areas at Laguna Ojo de Liebre in Baja California during the years that heavy barge traffic supported a salt production plant there (Jones and Swartz 1984). The levels of whale watching, 'thrill', commercial and military traffic have been implicated in changes in humpback distribution in breeding and rearing habitat off Maui, Hawaii (Atkins and Swartz 1988).

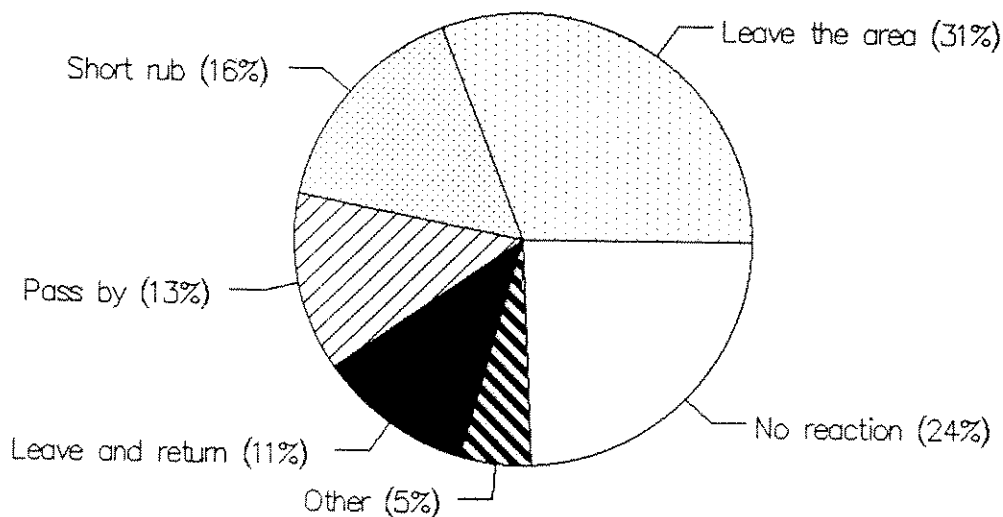
In summary, the extreme variability of killer whale behaviour from day to day, pod to pod and even individually, makes it difficult to make generalizations about reactions (other than when rubbing) to human activity in Johnstone Strait. We do know that killer whales often attempt to avoid boats approaching at speed greater than six knots and that they often react by slapping the water, spyhopping and breaching if approached while resting or socializing.

Robson Bight - Michael Bigg Ecological Reserve

Briggs (1991) examined the reaction of killer whales as they encountered commercial fishing boats, whale watching boats (charter, research and recreational) and commercial marine traffic near the rubbing beaches (Figure 6.1). Commercial fishing boats accounted for at least half of encounters recorded between whales and vessels in 1987 and 1989. On average, 76% of the 356 total encounters recorded resulted in a reaction by the whales including:

- a) leaving the area (31%),
- b) having a shorter than usual rub at the beach (16%),
- c) passing through the area without rubbing (13%),
- d) leaving and then returning (11%) and
- e) other reactions (5%).

Figure 6.1 Killer whale reactions to vessel approaches at the rubbing beaches (from Briggs 1991).



Disturbance to whales near the Reserve appears to influence their behaviour when they subsequently visit the rubbing beaches and also the behaviour of whales already at the beaches. Of the 41 interactions noted by Briggs (1991), 73% resulted in whales having a shorter rub, changing direction or passing by. In cases where part of a whale group went to the rubbing beaches and part remained outside the Reserve, when the whales outside were disturbed, those inside the Reserve left the beaches (ibid.).

On an occasion when explosions, perhaps caused by seal bombs, were heard near whales at the beaches, whales reacted by rapidly leaving the area. In two incidents when gunfire was heard from commercial fishing vessels moored near the rubbing beaches, the whales left the area in one case and did not react in the second.

Overall, killer whales at the rubbing beaches reacted to the presence of boats nearby, modifying their behaviour for at least 75% of vessel approaches. As a result, they spent less time in the Reserve than they might have otherwise.

6.1.2 Reactions to land-based disturbance

Killer whale reactions to land-based disturbance in Johnstone Strait have been documented only at the beaches in RBMBER. The reaction of whales to people on the beaches was observed during 1987 and 1989 when people were visible to the whales (Briggs 1991). Briggs reported that "Interactions resulting from the presence of people on shore in all instances resulted in whales leaving the area." This makes a very strong case for limiting access to the rubbing beaches from land.

Killer whales have not been present in any instance when the Peel Main road construction or blasting activity was taking place near Schmidt (Peel) Creek and therefore no interactions have been observed (Briggs 1988).

6.2 Long-term Responses of Killer Whales

Long-term negative responses of killer whales to disturbance would likely be manifested in changes in seasonal abundance and/or decreased reproductive rates as shown in declines in population growth.

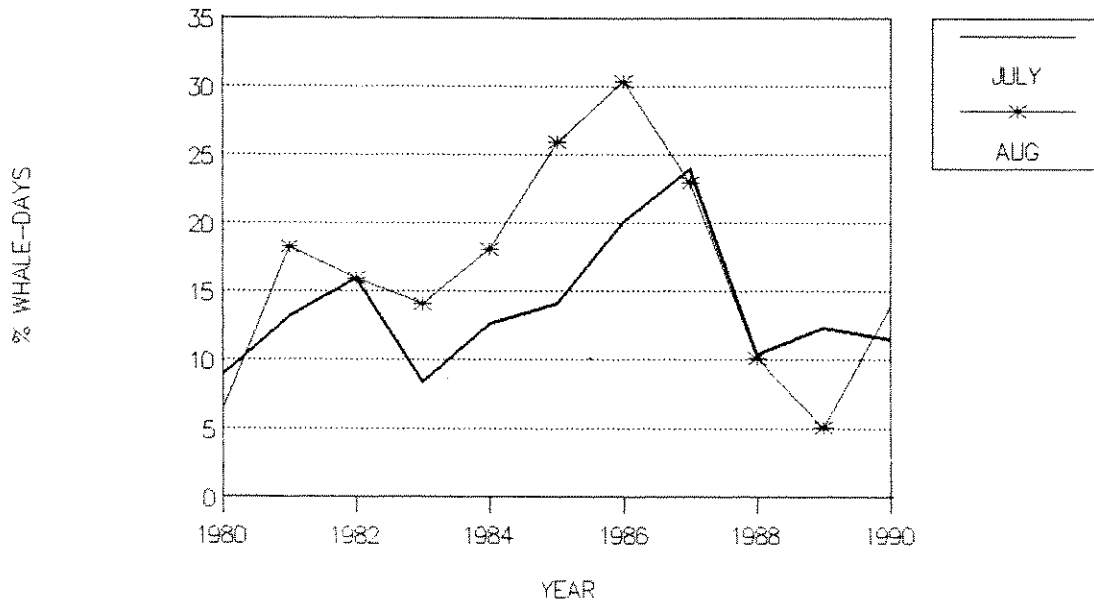
6.2.1 Changes in seasonal abundance

Western Johnstone Strait

All pods have considerable annual variability in their occurrence. For example, the most commonly seen pod (A1) entered the region only once during 1980. C pod, another common pod, was not seen at all in Johnstone Strait during 1979.

Average monthly occurrence of killer whales for July-September 1980-1990 are summarized in Figure 6.2. Analysis was based on the number of **whale-days**⁵ recorded in Johnstone Strait.⁶ On average, 16.5% of whale-days were spent in Johnstone Strait in the ten year period (more than 20% in 1986 and 1987). Although highly variable from year to year, a large proportion of the northern community's time is spent in this relatively small area of their range. Increased abundance of whale pods coincides with migrations of salmon through Johnstone Strait (Nichol 1990) and at least partially accounts for variability in whale occurrence. No overall impact on whale occurrence in Johnstone Strait by boats and other sources of human activities can be detected during the period of study.

Figure 6.2 Occurrence of northern resident killer whales in Johnstone Strait, July-August 1980-1990. Percentages are based on the number of whale-days each subpod was recorded in the study area. One whale-day equals one whale seen on one day. Data from Nichol (1990) and Spong and Symonds (unpubl.).



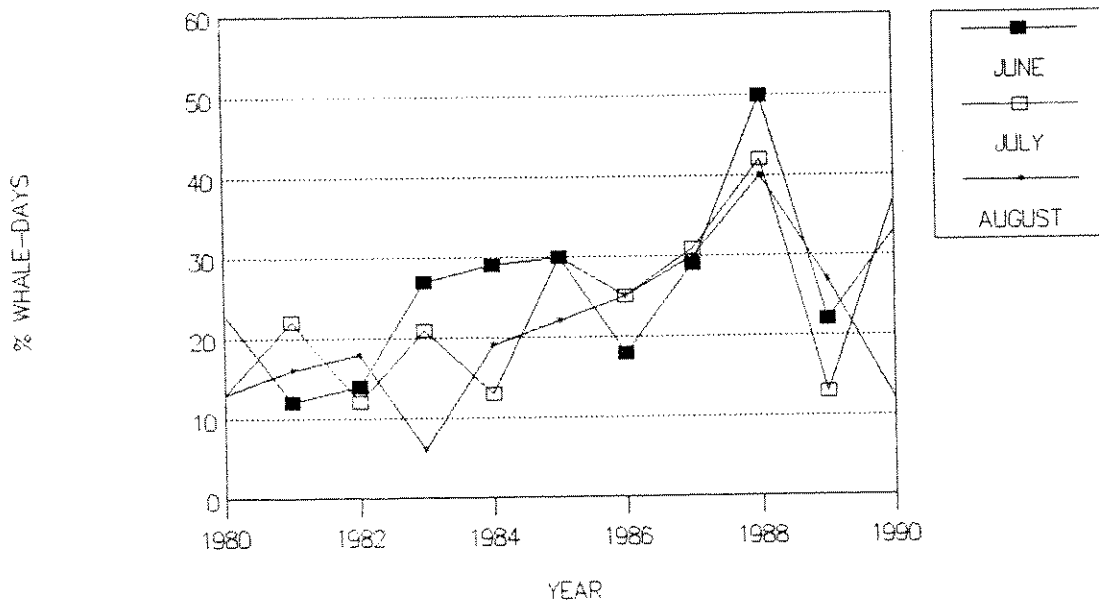
⁵ One whale-day equals one whale seen on one day. Percentages were based on the total possible whale-days if all northern residents were seen in Johnstone Strait every day of the study period.

⁶ The study area used by Nichol, Spong and Symonds extended further west in Johnstone Strait than that used by Briggs (1991), and included Blackney and Weynton Passages.

Haro Strait

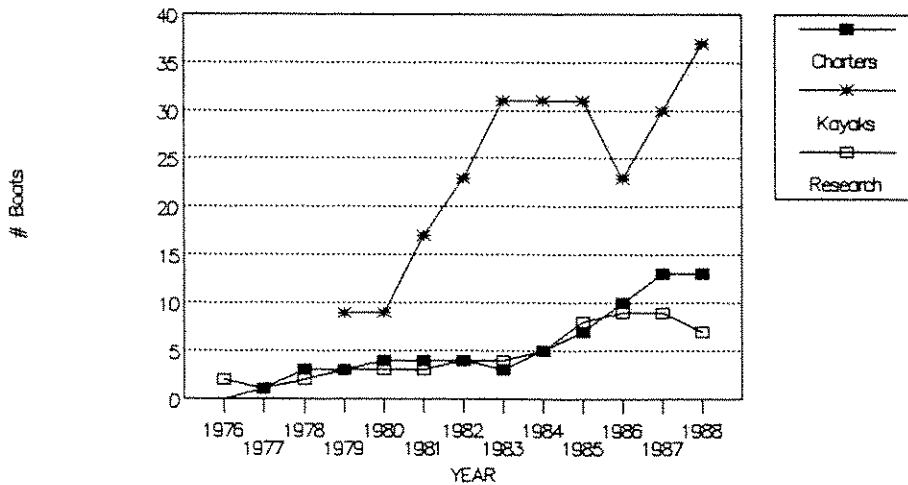
Osborne (pers. comm.) summarized the annual proportion of southern resident whales to visit Haro Strait during June-August 1980-90 (Figure 6.3). Haro Strait is the core area of the southern resident community (pop'n 85 in 1989) and thus is comparable to western Johnstone Strait. Southern residents tend to enter Haro Strait about a month earlier than northern residents do in Johnstone Strait. In the ten year study period, southern residents spent 23.4% of their time in Haro Strait (16.5% seen in western Johnstone Strait). Monthly occurrence from year to year was highly variable, eg. 12-50% for July. However, the overall trend has been for whales to enter Haro Strait more often, especially during the late 1980's.

Figure 6.3 Occurrence of southern resident killer whales in Haro Strait, June-August 1980-1990. Percentages are based on the number of whale-days each subpod was recorded in the study area. One whale-day equals one whale seen on one day (from Osborne 1988, pers. comm.).



Although more whale sightings may have resulted from better data collecting procedures in the late 1980's, Osborne (pers. comm.) believes that whales spend more time in Haro Strait during 1980-90, despite growth in whale watching activities. During 1977-88, the number of whale watching charter boats in Haro Strait rose from 1 to 13 (Fig. 6.4).

Figure 6.4 Number of whale watching operations in Haro Strait, Washington (from Osborne, 1988).



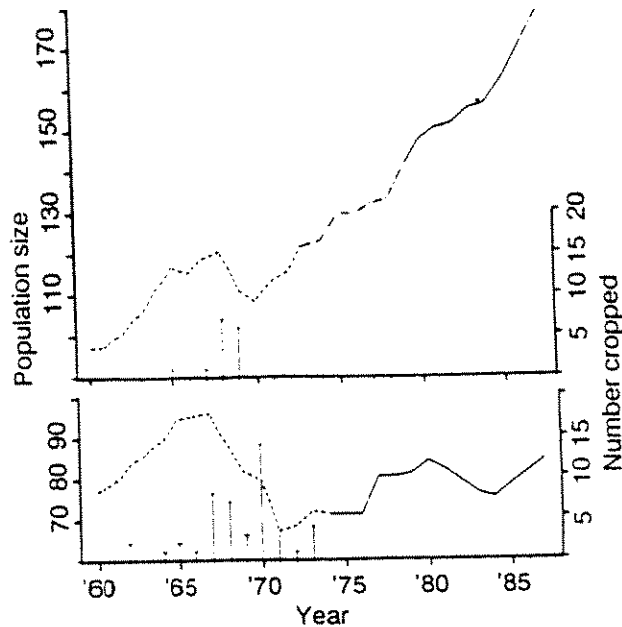
6.2.2 Population growth rates

Population growth⁷ is the net result of the interaction between many environmental factors and is a critical measure of the relationship between the northern resident killer whale population and its environment. Factors include food availability, habitat suitability and human activities throughout its range, and affect many aspects of killer whale biology, such as reproduction, mortality, disease and behaviour.

The northern resident population has been steadily increasing at an annual rate of 3.0% (Olesiuk et al. 1990). The population may have been expanding at this same rate since 1955 (Fig. 6.5), which is likely near the maximum possible for the population and indicates an optimal environment for the northern community during this period. Despite disturbance by humans, such as short-term disruptions of whale behaviour in Johnstone Strait, population growth rates have not altered substantially. However, the northern community has a large range. The role of Johnstone Strait as critical habitat for this population has not been fully defined, but the reliable occurrence of killer whales here is an indication of its importance.

⁷ Population growth is defined here as the annual rate of change in population size. This rate of change depends on the number of births and deaths each year; increasing when births exceed deaths and decreasing when deaths exceed births.

Figure 6.5 Population trends during 1960–87 in: a) the northern community; and b) the southern community (from Olesiuk et al. 1990). Dashed lines indicate population trends were projected; solid lines show population trends based on complete censuses of all pods in the community. Broken lines indicate that some pods were censused and others were projected. The vertical bars show the estimated number of animals removed from the community during the live-capture fishery.



6.3 Summary

Killer whales exhibit short-term behavioural changes, such as changes in direction or dispersal, in response to vessel approaches, particularly when the approaches are from the front and at speeds greater than six knots. Whales reacted in 75% of cases where they were approached by vessels at the rubbing beaches, usually by leaving the area. When approached from land at the beaches, killer whales reacted in 100% of cases recorded in 1987 and 1989.

Despite predictable occurrence by killer whales in Johnstone Strait, particularly during the summer, individual pods show considerable year-to-year variability in the frequency of their visits to the area. Research indicates this is likely more related to availability of prey rather than as a consequence of human activity. Population growth rates (3.0%/year) of the northern resident community are likely near the maximum possible for such a long-lived species and do not show any observed negative effect from human activity in this part of their range.

7.0 MANAGEMENT ISSUES

7.1 Key Agency Roles

The lead agencies involved in management of killer whales and killer whale habitat in Johnstone Strait are the Department of Fisheries and Oceans and the Ministry of Parks. A generalized representation of present management in Johnstone Strait is shown in Figure 7.1

7.1.1 Department of Fisheries and Oceans

The federal Department of Fisheries and Oceans is the agency primarily responsible for management of killer whales in Canadian waters. Legislation under the Department of Fisheries and Oceans Act provides for management of coastal and inland fisheries, fisheries science, fishing and recreational harbours and oceanography and hydrography. Management of whales is within the jurisdiction of the Fisheries Act and associated regulations. There is no mandate to manage killer whales differently from other whale species. However, the Department has the same responsibility for killer whales, such as protection of habitat, enforcement and research, as for other marine animals and plants whether of commercial value or not.

Under the Fisheries Act, the Department controls the location and dates of commercial fishing in B.C. coastal waters, including within RBMBER. The Cetacean Protection Regulations of the Act provide jurisdiction to prevent chasing, shooting at or harassing of whales. However, a legal description of harassment has yet to be formulated. As the problem of disturbance by commercial fishing vessels had not been studied until Briggs (1988), no restrictions had been placed on commercial fishing activity in the Reserve to specifically protect killer whales. Until harassment is legally defined or some other mechanism found to control disturbance, the main instruments of the Department of Fisheries and Oceans for controlling harassment are whale watching guidelines and education.

Other regulations could potentially be used as a model for legislation to control activities regarding whales on the British Columbia coast. For example, the Beluga Protection Regulations of the Fisheries Act specify certain geographic areas where activities outlined in the regulations may take place.

Under Section 35 of the Fisheries Act (1990), the Department has authority to ensure that logging operations do not adversely affect freshwater and marine habitats, including habitat for killer whales. Staff from the Department have been part of the Tsitika Follow-up Committee since its inception in 1978 and have closely monitored logging practices in the Tsitika Valley. The Committee reviews logging plans to ensure that the intent of the Tsitika Watershed Integrated Resource Plan is being met.

Figure 7.1 Present management of Johnstone Strait killer whale habitat.

LEGEND

Robson Bight - Michael Bigg Ecological Reserve

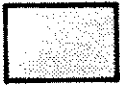


LAND No camping, lighting of fires or consumptive uses as per Ecological Reserves Act.

WATER Visitor information program and reserve management under B.C. Parks. Guidelines for no recreational or commercial charter activity in the Reserve when whales are present. Research allowed in Reserve only under permit. Commercial fishing activity and shipping traffic unimpeded.



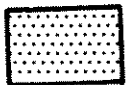
Information buoys marking the marine extent of the Reserve.



Cetacean Protection Regulations of the Fisheries Act apply, as in all Canadian waters where cetaceans (whales) are found. It is unlawful to disturb, harass whales. Enforced only where physical harm to whales has taken place or is suspected.



Potential forest management and access activity as approved by the Tsitika Follow-up Committee. Ecological reserves and wildlife ranges cover 1903 ha. Recreational access restricted by gate at Catherine Creek



Other planned forest management and access activity.

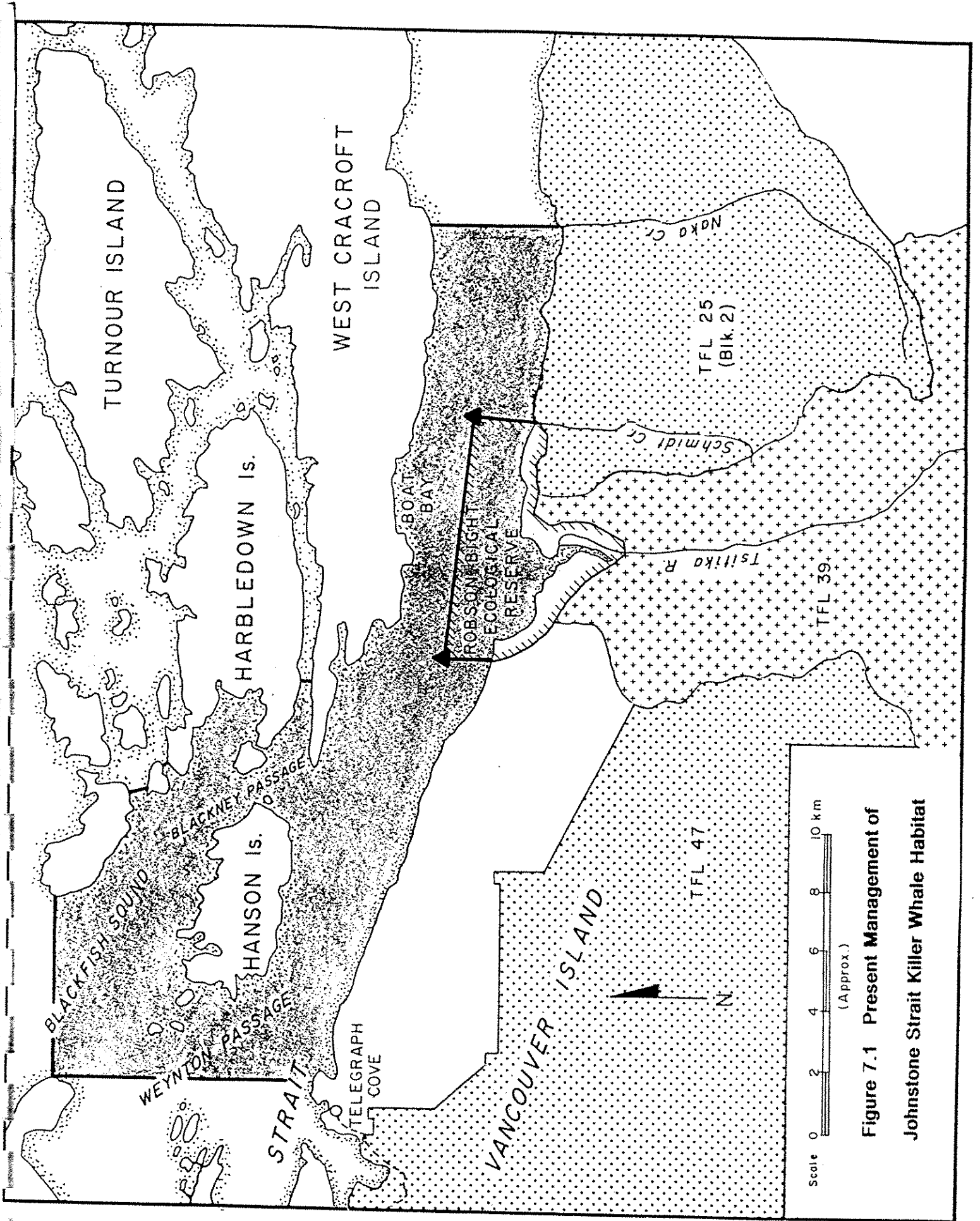


Figure 7.1 Present Management of Johnstone Strait Killer Whale Habitat

7.1.2 British Columbia Ministry of Parks

Responsibility for protection of killer whale habitat also lies with the Ministry of Parks which provides, under the Ecological Reserves Act, for preservation of the rubbing beaches and surrounding area at Robson Bight. Technically, provincial jurisdiction is limited to the land covered by water (Order-in-Council 1134) and to the upland portion of the Reserve. Ecological reserves are expressly protected from incompatible development. Three major objectives of RBMBER are:

- 1) to protect a core habitat for killer whales;
- 2) to prevent whale harassment in the Reserve; and
- 3) to provide long-term research and educational opportunities without disrupting killer whale use of the area.

To achieve these objectives, the Ministry of Parks has:

- established a marine reserve in 1982
- acquired a 505-ha upland addition for the Reserve to protect the estuary and forested slopes, and to buffer the killer whales from proposed logging in the Tsitika watershed;
- sponsored a volunteer warden program;
- developed a public information program as its main management tool to prevent whale harassment (described in Section 7.3.2)
- commissioned or contributed to numerous research projects to evaluate the possible impacts of human activities on killer whales in the Reserve (described in Section 7.3.2);
- participated since 1978 in the Tsitika Follow-up Committee, which reviews all logging plans in the Tsitika watershed - as a result of this work, six ecological reserves, including RBMBER, have been established in the Tsitika valley;
- controlled research and photography activities in the Reserve through a permit system; and
- implemented through the Canadian Coast Guard several information buoys and markers showing the marine and extent of the Reserve.

The Ministry can limit land access on ecological reserves under the Ecological Reserves Act as is done for some other reserves. To date however, casual use and landing for commercial fishing operations at the Reserve have not been restricted. The Ministry has no control over the marine waters but has jurisdiction on the land covered by water, which includes the rubbing beaches. The result of studies commissioned by the Ministry and by others will now be taken into account to determine appropriate management actions in the Reserve.

7.1.3 Management objectives

The Federal and Provincial governments, as represented on the Johnstone Strait Killer Whale Committee, have two broad management objectives concerning killer whales:

- 1) to control human disturbance of the whales in RBMBER and western Johnstone Strait;
and
- 2) to protect whale habitat in the RBMBER.

Four specific issues arise out of the management objectives:

- 1) Commercial fishing and mooring in RBMBER.
- 2) Recreational boaters, whale watching charters and researchers/photographers in western Johnstone Strait and RBMBER.
- 3) Land access to RBMBER.
- 4) Logging activities near RBMBER.

7.2 Commercial Fishing

7.2.1 Issue: Commercial fishing and mooring in the RBMBER

Commercial fishing outside the Reserve is not seen as a major source of disturbance to killer whales. This is not the case inside the Reserve. RBMBER is important to killer whales primarily for rubbing on beaches and resting close to shore. The unusual characteristics of the Reserve for this rubbing behaviour are now recognized world-wide. The biological significance of beach rubbing is not known, but may partially account for the predictable travel pattern of killer whales in Johnstone Strait. With this possibility in mind, it is prudent to be cautious when considering activities that reduce the whales' use of the area. Recent studies have shown that killer whales in Johnstone Strait spend over 20% of their time in the Reserve, resting, feeding and/or rubbing (Briggs, in prep.)

The Reserve is also used by commercial salmon fishermen to set their nets, to tie their nets to shore and to moor their boats. Between openings, fishermen are often out in skiffs visiting other boats, target-shooting, fishing, watching for signs of fish accumulation, whale watching or exploring on land. Although whales and commercial fishing have coexisted for many years, the whales' use of the Reserve appears to be reduced by commercial fishing, mooring and associated activities in the Reserve (Briggs 1988, 1991). The cumulative effects of commercial fishing in the Reserve, coupled with increased boat traffic of other types, may further reduce killer whale presence.

7.2.2 Current management practices

The Department of Fisheries and Oceans does not limit fishing activities in the Reserve for reasons of whale or whale habitat conservation. Furthermore, commercial fishing activities are presently exempt from the provincial restrictions placed on whale watching and land activities in the Reserve. Although within the mandate of the Fisheries Act, there have been few attempts to control disturbance to whales because a legal definition of harassment is lacking.⁸ Fisheries officers patrol the salmon fleet during the summer and generally do not intervene in cases of disturbance of killer whales unless there is potential for physical harm to whales, ie. where harassment can more easily be proven.

⁸ An unsuccessful prosecution for shooting at killer whales was undertaken in 1984 (Ellis, pers. comm.). This case had the potential to set a legal precedent for the definition of "harassment" based on the Cetacean Protection Regulations of the Fisheries Act. "Harassment" has not yet been subjected to a test case.

About 1% of the visitor program contacts by the information officer for the British Columbia Ministry of Parks were with commercial fishermen when fishermen were pursuing leisure activities in the Reserve such as whale watching or exploring (Taylor 1988b).

7.2.3 Key agencies and groups

Major agencies and groups having an influence on commercial fishing disturbance of killer whales in the Reserve:

<u>Groups</u>	<u>Role in reducing disturbance</u>
1. Commercial fishing industry	<ul style="list-style-type: none"> • Reporting of harassment; tolerance of whale presence; possible educational role within the fishing industry.
2. Department of Fisheries and Oceans	<ul style="list-style-type: none"> • Patrol vessels enforce regulations to protect killer whales from physical harm (ie. shooting, seal bombs, etc.) when occurrences are reported.
3. B.C. Ministry of Parks	<ul style="list-style-type: none"> • Information program and studies in the Reserve to monitor use, determine impacts and disseminate information re: resource values, boundaries and whale watching guidelines.

7.2.4 The future

Levels of commercial fishing in the Reserve have remained essentially the same over the past few decades. Commercial seining began in the 1950's in the Strait. Allocation of the salmon catch between commercial, sportfishing and Native interests shows potential for change along the entire British Columbia coast. Patterns of fishing may change with these alterations in catch allocation. Some interference with the whales' natural use of the Reserve will likely continue unless action is taken. In recent years, some commercial fishermen have taken an interest in whale watching during their leisure time.

7.3 **Whale Watching, Research and Photography**

7.3.1 Issue: Whale watching by recreational boaters, charters and researchers/photographers in western Johnstone Strait and RBMBER

Western Johnstone Strait and RBMBER are among the most reliable places in the world to see killer whales. Tourists, researchers and photographers come from around the globe and

most want to get close to the whales. However, close approaches and prolonged following can result in disturbance to the whales. Whale watchers try to anticipate the whales' location and follow them, once found. Several boats may follow one pod. Whale watchers frequently approach the Reserve to see killer whales, resulting in added boat noise and activity.

Disturbance has increased through the 1980's associated with a sharp rise in whale watching. Other species of whales have abandoned critical habitat at other locations, apparently in response to human activities in the area (Jones and Swartz 1984; Atkins and Swartz 1988). Short-term alteration of killer whale behaviour in the Strait and the Reserve has been clearly shown. As well, encounters with vessels appear to limit killer whale presence in the Reserve. Although long-term detrimental impacts from boat activity and noise have not been observed, such a cumulative impact is possible if sufficient disturbance takes place.

7.3.2 Current management practices

Western Johnstone Strait

The Department of Fisheries and Oceans has used a system of pennants and whale watching guidelines in Johnstone Strait. From 1985-86, numbered yellow pennants were provided by the Department of Fisheries and Oceans for researchers and photographers to fly on their boats for identification. Pennants were intended as signals to other boaters to stay clear and applied equally in Johnstone Strait and the Reserve. Guidelines for boaters were issued in 1985 (Appendix 6) and were also published in Bigg et al. (1987) where they have reached a large readership of potential whale watchers. Researchers are exempt from the 100 m distance guideline only where close approaches are necessary. Boaters are requested to:

- **approach whales from the side or rear, not the front**
- **not approach closer than 100 m**
- **approach and depart slowly**

Attempts to alter whale watching practices through the use of the guidelines and the pennants has been sporadic and ineffectual. Warnings have been given only occasionally in cases of intentional harassment. The effectiveness of the guidelines has not been monitored. There are currently no limits on the number of boats approaching a group of whales or the length of time that a pod may be watched by any one party. Pennants were discontinued because it was uncertain who should be issuing them. In addition, other boaters had difficulty seeing pennants and understanding their purpose.

Robson Bight - Michael Bigg Ecological Reserve

Since 1982, the Ministry of Parks has instituted a number of management programs for RBMBER, including volunteer wardens, an information program, whale watching guidelines, management studies and a permit system. The Ministry also responds to information needs by distributing Reserve descriptions, research reports and presenting slide shows on the need to protect this Reserve and its whale habitat.

Volunteer wardens

From 1982 to the present, two volunteer wardens have regularly visited the Reserve to monitor use, maintain signs and educate the public regarding conservation of the Reserve's values.

Information program

Each summer during 1987-90, at least two information officers have been present at the Reserve full-time to contact whale watchers. Recreational craft near the Reserve were approached by officers in an inflatable boat and introduced to the Reserve, its purpose, and appropriate whale watching techniques. Visitors were told about current research being undertaken, where they might see whales outside the Reserve and were invited to listen to the whales with the aid of an underwater microphone (hydrophone). Boat activity was monitored and whale sightings contributed to the research network. Signs posted near the Reserve boundaries and at Telegraph Cove provide additional information.

Wherever possible, the information officers have given talks to tourists and recreational fishermen concerning the Reserve and killer whales. In 1987, there were regular slide talks in Telegraph Cove. Slide talks have also been part of B.C. Parks special events.

Whale watching guidelines

In 1982, guidelines were established for whale watching boats inside the Reserve. The guidelines, distributed in the RBMBER brochure (Appendix 6), request that boaters:

- **refrain from entering the Reserve when whales are present**
- **if whales are encountered within the Reserve, keep at least 300 m away from them**

The brochure is distributed in the Reserve during the summer months as part of the information program, in Telegraph Cove, in the Park District office and on request from the Ministry of Parks. The media are also regularly informed of the Reserve and guidelines, during contacts with regular Park staff, information officers or volunteer wardens.

The whale watching guidelines are generally adhered to by charter operators, researchers and other informed boaters. Some recreational boaters, unaware of the guidelines, may naively enter the Reserve where they are usually intercepted by the information officers. Most people complied readily once they understood the purpose of the guidelines and the Reserve. However, the guidelines have limited effectiveness for uncooperative whale watchers because they are not backed up by appropriate legislation⁹.

Management Studies

The Ministry of Parks has subsidized research on management issues since 1986. Funding

⁹ The Ecological Reserves Act is provincial legislation which has no authority for marine waters. Currently, there is no agreement for enforcement of Federal legislation, such as the Fisheries Act, by provincial representatives within marine ecological reserves. The Fisheries Act is the body of legislation in Canada regarding the management and protection of whales.

has been provided to partially or totally fund research and reports on the possible impacts of whale watching (and other uses) may have on killer whales in the Reserve. Totally funded studies include Darling (1986), Briggs (1988, 1991, in prep.), Blood et al. (1988), and Lewis (1989). Partially funded studies include Taylor (1988a, 1988b) and Duffus (1988).

Ecological Reserve Permits

Researchers and photographers in boats have been asked not to enter the Reserve except when absolutely necessary. If entry is required, they are asked to comply to conditions of Ecological Reserve permits regarding approach, length of time spent with whales and activity at the rubbing beaches. Typically, only one to two Ecological Reserve permits are issued each year for research and photography on land at the rubbing beaches. These are issued with strict conditions regarding visibility, camping, moorage, number of people and dates. No permits for photography at the beaches have been issued since 1988, given the resulting level of disturbance observed on the whales. Permits are also used to document research activities.

7.3.3 Key agencies and groups

The main agencies and groups having an influence on the disturbance of killer whales by recreational boaters, whale watching charter operators and researchers/photographers in western Johnstone Strait and RBMBER are as follows:

<u>Group</u>	<u>Role in reducing disturbance</u>
1. Recreational boaters	<ul style="list-style-type: none"> • Adherence to whale watching guidelines.
2. Whale watching charter operators	<ul style="list-style-type: none"> • Adherence to whale watching guidelines. Set good example. Information distribution to public.
3. Researchers/photographers	<ul style="list-style-type: none"> • Adherence to whale watching guidelines and permits. Research to assess and control disturbance. Information distribution.
4. Department of Fisheries and Oceans	<ul style="list-style-type: none"> • Issue general whale watching guidelines with 100 m approach limit on the Strait. Information distribution.
5. B.C. Ministry of Parks	<ul style="list-style-type: none"> • Issue Robson Bight whale watching guidelines with 300 m approach limit. Issue permits for land-based research and photography in the Reserve.

5. B.C. Ministry of Parks (cont'd)

Seasonal information program and volunteer wardens in Reserve.
 Subsidize research re: human impacts on whales. Distribute reserve and research information to the public and researchers.

7.3.4 The future

Numbers of whale watching charter operators and recreational boaters using western Johnstone Strait are expected to continue increasing and may result in additional disturbance to the whales. Numbers of researchers and photographers seem unlikely to change substantially during the next decade. Research is necessary to continue monitoring the impact of human activities on whale biology. Professional photography, especially for documentaries, plays an important role in public education for whale conservation. Education will be especially important if public access to the Reserve is more limited in the future.

7.4 **Land Access**7.4.1 Issue: Land access to the RBMBER

The Reserve was only accessible by boat until a logging road (Naka Creek-Peel Main) was extended to the eastern boundary of the Reserve in 1987. This road has a gate located at least 10 km away from the Reserve; close to the Reserve, steep terrain limits access to the water. Another road is proposed for extension along the Reserve's southern boundary; this road (the Tsitika Main) is gated at least five km away from the Reserve. Unless careful monitoring is continued for the long-term, these roads could facilitate public access to the Reserve shore for hiking and viewing whales. More human activity on the Reserve's beaches would be detrimental since whales avoid humans here and would therefore use the beaches less (Briggs 1991). During 1987 and 1989, Briggs (1991) reported only one case of access by land (before the Naka Creek-Peel Main road was gated). All other instances of human presence on the beaches resulted from the landing of boats.

7.4.2 Current management practices

Minimizing land access to RBMBER has been a policy of the Ministry of Parks within the Tsitika Follow-up Committee. An upland buffer strip (505 hectares) along the entire length of the Reserve was acquired in 1988-89 to provide a deterrent against shoreline access. During the summers of 1987, 1989, and 1990, information officers monitored landings and contacted recreationists in the Reserve. Western Forest Products and MacMillan Bloedel have erected and posted gates on road access near the Reserve to restrict access. Since May 1990, MacMillan Bloedel has had a person stationed on the Tsitika Main to survey visitors and provide some security.

7.4.3 Key agencies and groups

MacMillan Bloedel controls road access through the Tsitika valley to the Reserve boundary. They erected and control the gate at Catherine Creek at the request of the Ministry of Forests. Similarly, Western Forest Products has erected a gate on the Naka Creek-Peel Main road. These groups and agencies are members of the Tsitika Follow-up Committee.

7.4.4 The future

Future demand for land access to view whales will likely increase as tourists become more familiar with remote areas of northern Vancouver Island. Major highway improvements in the next ten years, such as the planned Inland Highway, are expected to increase traffic to the North Island.

7.5 Forest Management

7.5.1 Issue: Forest management activities near RBMBER

Studies have been undertaken (Appendix 4) to determine whether logging on the lands surrounding the Reserve could potentially:

- result in more variable flows in Schmidt Creek and the Tsitika River;
- increase erosion and siltation;
- increase the risk of blow-down of timber in the Reserve; and
- increase noise and disturbance during road-building and harvesting activities.

Most sediments caused by logging activities result from road-building or landslides rather than runoff from cutblocks. Poor logging practices can lead to major increases in landslides and sedimentation (Rood 1984). Rice (1980) noted that all well-documented cases of channel damage and flooding resulting from logging or road-building were associated with sediment or debris sources from disturbed areas. In one California watershed, suspended sediment discharge increased by more than four times even though there was no significant increase in peak flow (ibid.). However, if careful roadbuilding and harvesting practices are used, sediment levels may be insignificant compared to those from natural sediment sources (Tassone, 1987). Those techniques include avoidance of steep and unstable slopes, backhauling excess road material rather than sidecasting, proper culvert installation and use of water bars on roads (Chatwin and Hogan, in press). Terrain mapping to identify unstable slopes has been completed for the Tsitika and Schmidt watersheds.

Given the active oceanographic environment of Johnstone Strait and the distance between the rubbing beaches and the mouth of the Tsitika River (3+ km), sediments from the river are unlikely to be deposited on the rubbing beaches. Schmidt Creek, less than 0.5 km away, is a more likely sediment source. While no adverse effects of logging on the whales' use of the Reserve have been recorded, logging near the Reserve only began in 1987 and the effect of such activities is not yet known.

Reduced forest cover can lead to increased peak flows in watersheds but as long as the proportion of unforested land is not excessive, peak flows resemble natural fluctuations (Golding 1987) and are probably not important with respect to erosion processes (Harr 1986). Increases in peak flows in Carnation Creek were not detected even when 40% of the watershed was harvested (Hetherington 1987). Forest hydrologists in coastal B.C. recommend that no more than a third of a watershed be harvested during any 20 year period to prevent major increases in peak flows (Toews and Wilford 1978). The rate of cut in the Tsitika watershed is at a level that would not be expected to result in increased peak flows.

Noise and disturbance from road-building and harvesting close to Robson Bight could potentially disturb the whales. Potential disturbance would be minimized if such activities were scheduled to occur during times of the year when whales are not likely to be present.

7.5.2 Current management practices

A land buffer (505 hectares) was acquired by the Ministry of Parks in 1988 to prevent potential habitat degradation and disturbance as a result of logging and access. The Ministry also commissioned a study to determine the windfirmness of the Reserve's southern boundary. Both the Ministry and Department of Fisheries and Oceans participate on the Tsitika Follow-up Committee, an agency-industry task force which reviews logging plans to ensure that forestry practices do not impair water quality or fish/wildlife habitat in the Tsitika valley. Harvesting and road-building practices follow the Coastal Fisheries Forestry Guidelines.

Two studies have been initiated recently by the Ministry of Forests under the auspices of the Tsitika Follow-up Committee. Marine transport of sediments is being examined in the vicinity of the Tsitika estuary and Schmidt/Peel Creek. In addition, a long-term monitoring and research study of sedimentation from the Tsitika River has begun.

7.5.3 Key agencies and groups

The main agencies and groups which influence forest management in the vicinity of RBMBER are:

<u>Group</u>	<u>Role in preventing logging impacts</u>
1. Tsitika Follow-up Committee (TFC) (Appendix 4 gives full membership list)	<ul style="list-style-type: none"> • Ensure that the Tsitika Watershed Integrated Resource Plan is followed. Identify and facilitate required research and monitoring.
2. B.C. Ministry of Forests	<ul style="list-style-type: none"> • Ensure logging operators adhere to Coastal Fisheries Forestry Guidelines and Tsitika Watershed Integrated Resource Plan. Support research for TFC.

Other members of the Tsitika Follow-up Committee contribute to forest management vis-a-vis potential impacts on killer whales as follows:

3. MacMillan Bloedel
 - Adhere to Coastal Fisheries Forestry and Tsitika guidelines. Liaison with B.C. Ministry of Parks re: potential for windthrow, access and related problems.

4. Western Forest Products
 - Adhere to Coastal Fisheries Forestry Guidelines. Liaise with B.C. Ministry of Parks re: logging plans adjacent to Reserve boundary in rubbing beach area.

4. Department of Fisheries and Oceans
 - Monitor logging operations. Enforce regulations to prevent aquatic habitat degradation.

5. B.C. Ministry of Environment (Wildlife Branch)
 - Monitor logging operations to ensure that logging operations do not impair wildlife habitat. Management of critical wildlife ranges within the watershed.

6. B.C. Ministry of Parks
 - Manage use of the RBMBER. Enforce regulations to maintain integrity of 6 ecological reserves in the Tsitika watershed. Influence peripheral land use and logging plans. Commissioned study on windthrow.

7.5.4 The future

The problem of determining the impact of logging practices on killer whale use of the Reserve is complex and poorly understood. To understand the problem more fully, long-term sediment monitoring and short-term marine circulation and coastal processes studies are currently underway.

Depending on the outcome of land claims negotiations regarding the Kwakiutl Tribal Territories (see section 4.5), there is future potential for the Kwakiutl to become more involved in the management of forest resources in the vicinity of RBMBER.



8.0 CONCLUSIONS

Summary of issues & next steps

With respect to the impacts of human activities on killer whales in Johnstone Strait, the Johnstone Strait Killer Whale Committee concludes that:

1. Killer whales exhibit short-term disturbance if approached from land or water within Robson Bight - Michael Bigg Ecological Reserve (RBMBER). This has resulted in reduced use of habitat by killer whales in an area specifically set aside for their protection.
2. In view of their relatively high reproductive rate, it is unlikely that northern resident killer whales are currently undergoing long-term negative effects from human activity in Johnstone Strait.
3. Commercial fishing activity in RBMBER, accounted for the majority of land and vessel approaches at or near the rubbing beaches and the majority of disturbance reactions by killer whales.
4. Within RBMBER, whale watching by recreational boaters, commercial charters, researchers and photographers did not result in much disturbance of whales, partially due to education, management and the presence of ecological reserve information officers.
5. Outside RBMBER, disturbance of whales by the above-mentioned groups is increasing and requires more effective control than presently exists under the Department of Fisheries and Oceans. Controls are required particularly to manage recreational boaters, small charter operators and photographers.
6. Disturbance of killer whales by commercial shipping in Johnstone Strait and RBMBER appears to be minimal.
7. In all observed cases, people on shore at the beaches when whales were present resulted in the whales reacting and usually leaving the area. Any land activity at or access to the rubbing beaches should be discouraged.
8. The effects of logging, other than logging access, adjacent to RBMBER on killer whales and whale habitat are unknown. In view of the uniqueness of this habitat, and importance in the ecology of killer whales, we must be prepared to err on the side of caution when managing this area.
9. Education is the most important tool for reducing disturbance to whales. Increased emphasis is needed to educate potential whale watchers and other users of Johnstone Strait prior to their arrival at RBMBER. Where education requires a stronger message, regulations and effective enforcement by the Department of Fisheries and Oceans are currently lacking.

10. In light of growing demand for whale watching, measures are required to control access to the Reserve and redirect this demand into land-based opportunities elsewhere.
11. Long-term research in Johnstone Strait has yielded the most significant information on killer whales in the world. Many gaps in knowledge of their life history still exist however, and the effects of many human activities on killer whales will only become known through continuing research.

9.0 MANAGEMENT OPTIONS

Proposed general and specific options for management are presented in this chapter. Comments raised by the public are encouraged, to ensure that all viable options are explored. Your input will assist the Johnstone Strait Killer Whale Committee in proposing recommendations to the Canadian Minister of Fisheries and Oceans and the British Columbia Minister of Parks.

Three general approaches for management are proposed, ranging from education to legislation. Educational measures are relatively quick to implement whereas legislation generally requires more time to draft and put in place. A combination of educational, resource management and legislated options may be required to complete an effective program.

9.1 General Options

Education

- provide year-round information program and workshops for commercial fishermen, charter operators, boaters and other resource users;
- conduct on-the-water education program throughout Johnstone Strait (rather than only at RBMBER).

Resource Management (Non-legislated)

- delegate federal powers to the Ministry of Parks for enforcement of whale protection regulations;
- close the Reserve (all or part) to all non-navigation uses except:
 - by permit; or
 - during fishing openings;
- develop special management zoning in Johnstone Strait;
- develop a land-based whale watching park on the Strait away from RBMBER;
- establish a permanent management committee or advisory board to oversee whale protection;
- restrict road-building and logging activity adjacent to the Reserve.

Enforcement and Legislation

- develop and enforce whale watching regulations;
- licence commercial whale watching operators;
- improve federal legislation for the protection of marine mammals.

Options for specific resource uses are presented below.

9.2 Options for Commercial Fishing

Issue: Commercial fishing and mooring in RBMBER.

	<u>OPTION</u>	<u>CONSEQUENCES</u>
i)	status quo fishing and mooring	- continued disturbance of whales by fishermen
ii)	continued fishing and mooring but with an education program to reduce disturbance of whales	- some continued disturbance of whales - some restrictions on vessel movements in the Reserve without changes to fishing
iii)	prohibit mooring near rubbing beach area, continued fishing	- some reduction in disturbance of whales - loss of mooring rights for fishermen, less effective fishing
iv)	prohibit commercial fishing and mooring near the rubbing beach area	- reduced disturbance of whales - some loss of fishing opportunities
v)	prohibit commercial fishing and mooring in RBMBER	- no disturbance of whales by commercial fishing in the Reserve - loss of fishing opportunities

Under Options i) - iv), commercial fishing boats will be the only boats allowed in the Reserve, except for in-transit marine traffic such as tugs and freighters. Other boats used for whale watching, recreation, research and photography will be excluded as is the current practice. However, the presence of fishing boats in Options i) - iv) may encourage other boaters to enter the Reserve.

9.3 Whale Watching

Issue: **Whale watching by recreational boaters, commercial charters and researchers/photographers in western Johnstone Strait and Robson Bight**

9.3.1 Whale watching in Johnstone Strait

<u>OPTIONS</u>	<u>CONSEQUENCES</u>
<u>Whale watching in general</u>	
i) status quo for following the whales	- continued disturbance of whales by recreational boaters, commercial charters and researchers/photographers
ii) following the whales but with full-time DFO seasonal program to complement existing EcoReserves programs	- reduced disturbance of whales - more effective control of whale watching throughout killer whale core area - effective implementation of existing DFO whale watching guidelines
iii) distance regulations prohibiting approaches closer than 100 m.	- some reduction in disturbance of whales - to be used in cases where a boat is obviously and purposefully disturbing whales despite warnings and as an educational tool
iv) regulations to direct appropriate behaviour in the presence of whales	- to be used in cases where a boat is obviously and purposefully disturbing whales despite warnings and as an educational tool
v) develop a special management area in Johnstone Strait	- to be used primarily as a focus area to educate the public and reduce disturbance of whales by progressively limiting whale watching in approach to Robson Bight

Others ?

Specific to recreational boaters

- v) public education program on the North Island
 - increased awareness of whale watching opportunities and potentially more whale watching
 - reduced disturbance of whales
- vi) develop a land-based whale watching park on the Strait away from Robson Bight
 - focus some of demand for whale watching away from sensitive whale habitat
 - may reduce disturbance to whales on the water, especially if combined with an educational program

Specific to commercial charters

- vii) charter association policing itself
 - reduced disturbance of whales
 - need to provide appropriate incentives to industry to assist in self-policing
- viii) limited entry licencing
 - reduced disturbance by charters
 - demand for whale watching may mean more recreational boaters
 - who is eligible for a licence?

Specific to researchers/photographers

- ix) permits required for work in Johnstone Strait core area and permits monitored
 - reduced disturbance by researchers/photographers in core area
 - researchers/photographers may go to other parts of killer whale range

9.3.2 Whale watching in Robson Bight - Michael Bigg Ecological Reserve

OPTIONS

CONSEQUENCES

Whale watching in general

- | | | |
|------|----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| i) | status quo for Ecological Reserve boundaries, regulations and programs | <ul style="list-style-type: none"> - some continued disturbance of whales - growth in whale watching will make current system ineffective - no enforcement powers for infractions |
| ii) | following the whales but with full-time DFO seasonal program to complement existing EcoReserves programs | <ul style="list-style-type: none"> - reduced disturbance of whales - more effective control of whale watching throughout killer whale core area |
| iii) | closure of the Reserve to all users except by permit | <ul style="list-style-type: none"> - no disturbance of whales in the Reserve - loss of some educational value of allowing visitors into Reserve - would clarify enforcement |
| iv) | conferring of Fisheries Act powers to provincial ecological reserve staff | <ul style="list-style-type: none"> - would allow operation of education program and more effective monitoring and protection of whales in RBMBER |

9.4 Land Access

Issue: Land access to Robson Bight - Michael Bigg Ecological Reserve

<u>OPTIONS</u>	<u>CONSEQUENCES</u>
i) continue road building and monitoring of gated access	- some risk of unauthorized access - potential for erosion and siltation at Schmidt Creek and Tsitika River
ii) prohibit road construction near the Reserve	- minimizes access - restricts logging
iii) establish a whale watching park on West Cracroft or Hanson Island	- may redirect public desire for land access to whales - no reduction in disturbance from water by itself - may limit disturbance when in combination with limited, licenced whale watching charters
iv) helicopter logging	- no road construction required

9.5 Forest Management

Issue: Forest management near Robson Bight - Michael Bigg Ecological Reserve.

<u>OPTIONS</u>	<u>CONSEQUENCES</u>
i) continued logging in the Tsitika watershed under the direction of the Tsitika Follow-up Committee	<ul style="list-style-type: none"> - some risk of habitat damage and disturbance - provides logging revenue and jobs - some loss of tourism value through visual impacts
ii) continued logging in Schmidt Creek watershed	<ul style="list-style-type: none"> - risk of habitat damage and disturbance at rubbing beaches
iii) additional logging restrictions and monitoring program to safeguard killer whale habitat	<ul style="list-style-type: none"> - reduced risk of habitat damage although logging continues adjacent to the Reserve - some loss of tourism value through visual impacts
iv) no further logging in lower Tsitika valley and Schmidt Creek	<ul style="list-style-type: none"> - minimum risk of habitat damage
v) defer logging in the lower Tsitika valley and in Schmidt Creek until baseline studies on sedimentation, access are completed	<ul style="list-style-type: none"> - reduced risk of habitat damage
vi) helicopter logging	<ul style="list-style-type: none"> - reduced risk of habitat damage although increased noise levels during logging - no road construction required



10.0 PROPOSED MANAGEMENT SCENARIOS

This report is written with recommended options rather than final recommendations. We require the public's input before recommendations can be formulated. Minimizing impacts on killer whales will be on the responsibility of several agencies and interest groups, ie. there will be give and take on all sides. Individuals involved in this process share a common concern for the welfare of killer whales. It is a goal of the Committee to stimulate communication among various groups to put forward solutions that reflect this common concern.

Four groundrules will guide the Johnstone Strait Killer Whale Committee in making its final recommendations to the federal and provincial governments.

1. **Any decision will favour the continued presence of killer whales in Johnstone Strait and Robson Bight.**
2. **Decisions will be based on ecological rather than economic principles and will not rely on burden of proof to demonstrate impacts.**
3. **Fairness and equity will be objectives for decisions regarding human resource use.**
4. **Public input will be reviewed on the basis of merit, to explore new options, rather than as a vote for any particular resource sector.**

This chapter to be completed upon submission of scenarios by Committee members and incorporation into the following:

Preferred: Scenario 1
Alternate: Scenario 2
Alternate: Scenario 3



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Appendix 1

**Terms of Reference
Johnstone Strait Killer Whale Committee**

26 February 1991



JOHNSTONE STRAIT KILLER WHALE COMMITTEE



Backgrounder

Robson Square
Conference Centre
May 7, 1990

Mandate

- to propose management options*

- assess importance*

- assess impact*

- propose options to protect killer whale habitat*

The goal of the Department of Fisheries and Oceans and of the Ministry of Parks is to ensure that human activities do not discourage killer whales from using Johnstone Strait, and in particular from using the Robson Bight Ecological Reserve.

The mandate of the federal-provincial Johnstone Strait Killer Whale Committee will be to propose management options which take into account the environmental requirements of killer whales in the region and the needs of various human resource users (e.g. whale watchers, loggers, fishermen).

To achieve this mandate, the committee will:

- assess the importance of Johnstone Strait and of Robson Bight to killer whales;
- assess the impact of human activities on killer whales and their environment;
- suggest management options to the federal Minister of Fisheries and Oceans and to the provincial Minister of Parks that will ensure the continued presence of killer whales in Johnstone Strait and at Robson Bight with consideration given to the requirements of the various human resource users.

For the waters outside Robson Bight, only the impact of whale watching activities on killer whales will be examined. However, within Robson Bight, all human impacts (such as whale watching, commercial fishing and logging) on killer whales will be considered. Proposed management options will be restricted to whale watching activities in Johnstone Strait and in the Robson Bight area, and to the protection of killer whale habitat in the Robson Bight area.

Mandate

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- assess importance*
- assess impact*
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Proposed management options will be restricted to whale watching activities in Johnstone Strait and in the Robson Bight area, and to the protection of killer whale habitat in the Robson Bight area.



JOHNSTONE STRAIT KILLER WHALE COMMITTEE

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Revised February 26, 1991

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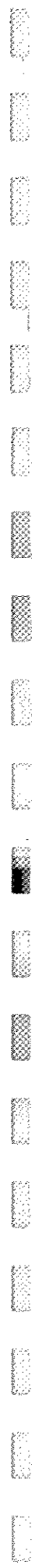
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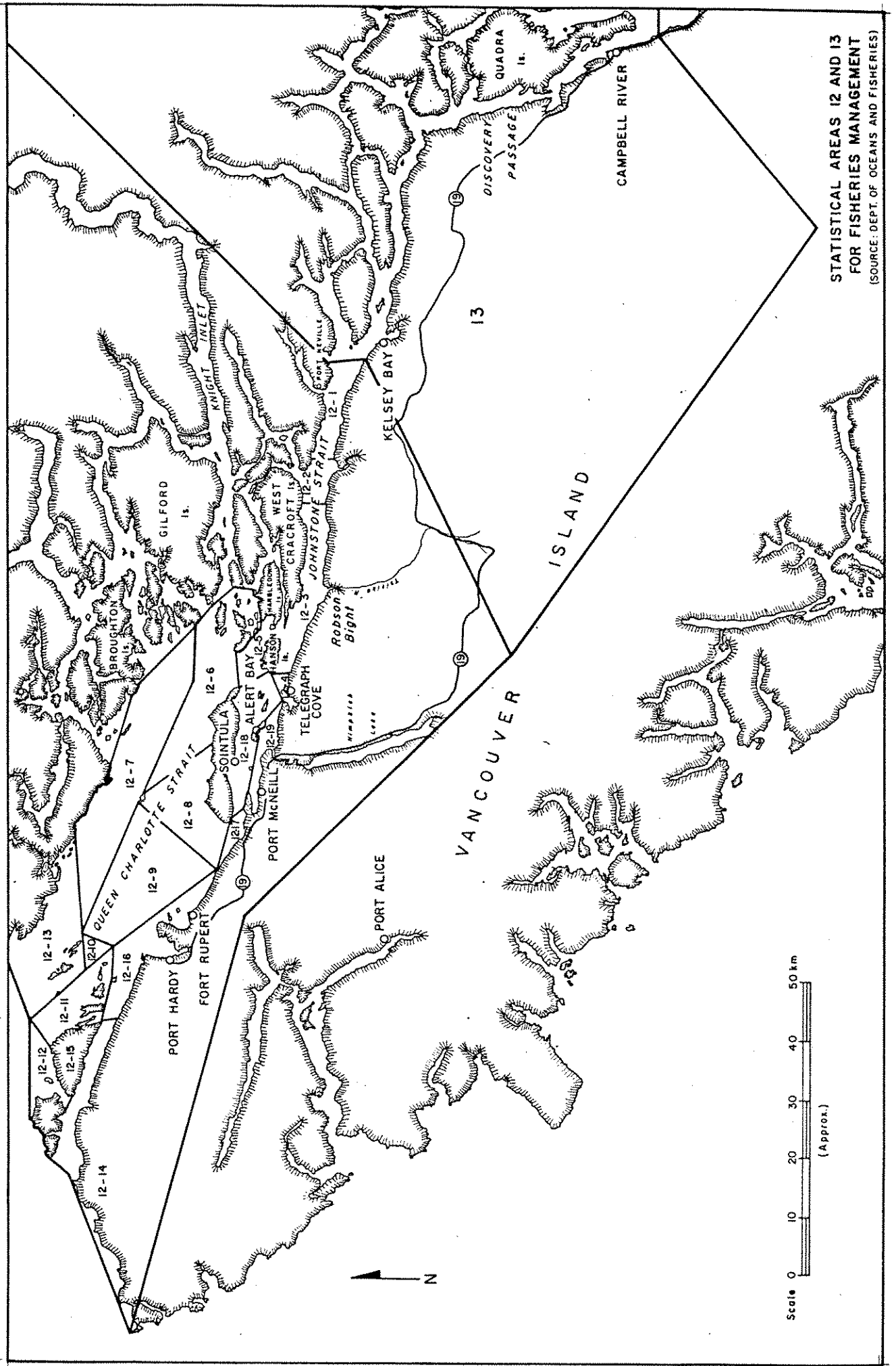


Appendix 2

**Statistical Areas Used for Fisheries Management
(Source: Department of Fisheries and Oceans)**

26 February 1991





STATISTICAL AREAS 12 AND 13
FOR FISHERIES MANAGEMENT
(SOURCE: DEPT. OF OCEANS AND FISHERIES)



Appendix 3

**Robson Bight Ecological Reserve (E.R. #111)
Reports and Publications**

26 February 1991



ROBSON BIGHT - MARINE AREA

E.R. #111

REFERENCE
NUMBER

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- 2368 Tsitika Resource Planning Committee, Public Involvement Opportunity. Phase II. 1978. Tsitika Resource Management Plan Newsletter. B.C. Forest Service, 355 Burrard St., Vancouver, B.C., V6C 2H1. pp. 1-12.
- T111-14 United Fishermen & Allied Workers' Union. 1978. Final report on the Tsitika Watershed Integrated Resource Plan. Vancouver, B.C. 7 p.

ROBSON BIGHT - TERRESTRIAL AREA

E.R. #111

REFERENCE
NUMBER

REPORTS & PUBLICATIONS

Page 13

- T111-6C Volkers, T., and D. Volkers. 1977. Tsitika River recreation study. Recreation Section, B.C. Forest Services. Victoria, B.C. 69 p.
- T111-28 Western Canadian Wilderness Committee. 1990. Lower Tsitika Valley....
- T111-14A Wood, G.A. 1981. Notes on planning considerations for the lower Tsitika watershed. Victoria, B.C. 13 p.
- T111-43 Wood, G.A., and M.E. Kay Wood. 1986. The Tsitika-Robson Bight wilderness issue; a submission to the Wilderness Advisory Committee at Nanaimo, B.C., Jan. 22, 1986. Victoria, B.C., V8X 2B8. 15 p.

TSITIKA MOUNTAIN

ER #122

MOUNT DERBY

ER #123

TSITIKA RIVER

ER #124

MOUNT ELLIOT CREEK

ER #125

CLAUD ELLIOT CREEK

ER #126

REPORTS AND PUBLICATIONS

Many reports listed in Robson Bight Terrestrial Area ER #111 are relevant to the above listed reserves.



Appendix 4

**Studies Completed on the Tsitika (1981-1989)
and Tsitika Follow-up Committee membership.**

26 February 1991

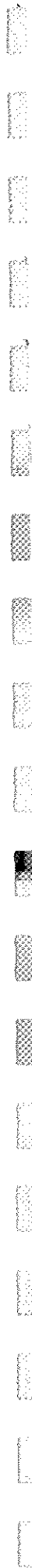


Table 2: Studies completed on the Tsitika (1981-1989)

<u>Study</u>	<u>Author</u>	<u>Date</u>
1. Killer Whale and Coastal Log Management. An overview of future uses of Robson Bight (three members of the study team were Tsitika members)		1981
2. Tsitika Plan Implementation Procedures (must be reviewed by district staff and agencies)		1983
3. Terrain Stability Mapping and Interpretations	MacMillan Bloedel and Canadian Forest Products Ltd.	1981
4. Windthrow Studies	Terry Rollerson	1984
5. Fisheries Guidelines	MacMillan Bloedel Federal Fisheries, Ministry of Environment and MacMillan Bloedel	1982
6. Introduction of New Methods Minimizing impacts <ul style="list-style-type: none"> • Line-pulling techniques • Directional falling and yarding • Road-building techniques • Special skidders and forwarder to pick up blowdown • Hoe chucking • Use of a backspar to lift logs over a stream 	Forest Companies, Ministry of Environment	ongoing
7. Evaluation of the Planning Process	Tsitika Follow-up Committee	1982
8. Channel Morphology Study	E. Karanka	1985-1989
9. Robson Bight Ecological Reserve -- Background Report	Ministry of Parks	1988
10. Robson Bight Ecological Reserve -- Evaluation of potential impacts	T. Lewis	1989
11. Landscape Analysis Studies <ul style="list-style-type: none"> • Tsitika Landscape Analysis • Video Imagery • Digital Terrain Analysis 	Ministry of Forests MacMillan Bloedel	1988 - 1989
12. Tsitika Plan Status Report		1983-1989

Table 3: Tsitika Follow-up Committee

<u>Representation</u>	<u>Affiliation</u>	<u>Name</u>
Government agencies	Ministry of Forests	Gary Sutherland (Chairman) Don Huestis Darcy Yule
	Federal Department of Fisheries and Oceans	Mike Brownlee
	Ministry of Environment	Doug Morrison
	Ministry of Parks	Ron Lampard
Labor	International Woodworkers of America	Sy Pederson
	United Fishermen and Allied Workers	Danni Tribe
Outdoor recreation	Outdoor Recreation Council of B.C.	Phil Deardon
Tourism	Stubbs Island Charters	Jim Borrowman
Public		Ed Mankelow
Industry	MacMillan Bloedel	Derek Ferguson Bill Pollard
	Western Forest Products	Cindy Fox
	Canadian Forest Products	Wayne Green

Appendix 5

Management Experience Elsewhere

26 February 1991



Appendix 5

MANAGEMENT EXPERIENCE ELSEWHERE

Robson Bight Ecological Reserve is the only killer whale sanctuary in the world. In our efforts to protect killer whales and their habitat, it may be useful to examine the management of other whale species. However, management is very dependent on the biology of the species being protected and caution is required for any extrapolation to killer whale protection.

5.1 International Experience

5.1.1 Mexico

Each fall, gray whales (Eschrichtius robustus) migrate from their feeding grounds in the Arctic to the breeding and calving lagoons on the Pacific coast of Baja California. From north to south, these lagoons include: Ojo de Liebre, Guerrero Negro, San Ignacio, and Magdalena. All but Laguna Magdalena were designated by the Mexican government as refuges in the 1970's in recognition of their importance for breeding. In Ojo de Liebre and Guerrero Negro, no barge or tourist traffic were allowed in some years during the winter breeding season to minimize impacts on the gray whales. However, whale watching, particularly in Laguna San Ignacio, has become an important destination for excursion companies based in San Diego, California. Concerns that U.S.-based tourism was having a detrimental effect on the whales prompted the Mexican government to enact regulations to manage human activities in the Lagoon (Jones and Swartz 1984).

Excursion companies require permits to enter Laguna San Ignacio. In 1987, companies were limited to three day stays and a maximum of three skiffs on the water at any one time (Taylor 1988a). Due to the isolation of the lagoon (in fact, all the lagoons) from commercial shipping lanes, any vessels found within must either have a permit, or be a local fisherman. Geographic isolation enables enforcement to be extremely straightforward and effective. The gray whales tend to control the behaviour of boats within the lagoon.¹

5.1.2 United States

Humpbacks in Hawaii

Several nearshore areas in the Hawaiian Islands have long been known as winter breeding and calving areas for humpback whales (Megaptera novaeangliae). Increasing levels of vessel traffic, low populations of humpbacks in the North Pacific (~1000), and lack of recovery from whaling have prompted a series of special management actions (NOAA 1987). In response to displacement of cow-calf pairs from nearshore habitat, the National Marine

¹ Gray whales in San Ignacio Lagoon have remarkable "reward and punishment" behaviours which tend to control the actions of boaters. They will solicit touching and other human contact if skiffs carrying people are put into neutral or motor slowly (Jones 1988; Taylor 1988a). However, this whale's reputation for ramming boats which are perceived as threats has earned it the name 'devil-fish'. Such intolerance keeps boaters 'in line', ie. no speeding, no sudden movements, etc.

Fisheries Service proposed to limit aircraft approaches to 1000 feet (300+ m.) and boat approaches to 300 yards (300 m.).

Concerns regarding the implementation of these regulated limits included:

- boats could inadvertently violate the distance regulations when whales approach vessels, or accidentally approach while not whale watching;
- there is little evidence that current human activity in Hawaiian waters is responsible for poor reproductive rate of North Pacific humpbacks; and
- the regulation seems to target the whale watching industry.

The National Marine Fisheries Service responded as follows:

- a buffer around whales is a more workable solution to protect whale habitat than limiting the number of whale watching vessels through a permit system;
- more long-term studies are needed but this does not preclude the adoption of interim protective measures;
- the regulation would apply equally to all users.

The Hawaiian situation bears resemblance to that in Johnstone Strait in the following characteristics:

- the area is not geographically well-defined as in Mexico and receives high levels of non-whale-oriented vessel traffic;
- humpbacks, like killer whales, tend to avoid vessels when disturbed, and do not show physical aggression towards boats;
- the area's role as critical habitat has not been precisely defined.

Killer Whales in Haro Strait

The southern resident killer whales frequent a core area around Haro Strait in much the same way as northern residents use Johnstone Strait (although they do not rub). However, the southern residents' range is close to large urban centres such as Seattle, Victoria and Vancouver. The increases in frequency of whale sightings and vessel activity have already been discussed (Section 6.2.1). Although there have been no obvious impacts on whale occurrence, a reduction in sleep/rest periods during daylight hours has been noted between 1986 and 1989 (Osborne 1988). Management measures have included more public education programs and research. The growth of charter businesses may have reduced the number of private recreational vessels approaching whales (the effect of 'concentration' discussed earlier). In addition, a land-based whale watching park on San Juan Island equipped with scopes, hydrophones and interpretive displays attracts many visitors who might otherwise be out on the water.

Appendix 6

Guidelines for Whale Watching

- **Barkley Sound and Clayoquot Sound**
- **Johnstone Strait**
- **Robson Bight Ecological Reserve**



September 1990

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

Your file / Votre référence

Our file / Notre référence

WHALE WATCHING GUIDELINES

For Barkley Sound to Clayoquot Sound

By following these boating guidelines you will minimize whale disturbance, still view the whales natural behaviour and allow other people to enjoy whale watching as well.

GETTING INTO POSITION

- Approach the whale from its side or rear, not head on.
- Parallel the whale, match its speed and gradually move closer.
- Use dead slow speed (no wake) when within 100 m of the whale.

FOLLOWING THE WHALE

- When viewing a whale you should maintain a distance of at least 100 m from it.
- A single boat may approach up to 50 m of the whale, but not for more than 15 min.
- If the whale avoids your boat increase your distance from it.
- If the whale closely approaches your boat, stop until it moves at least 50 m away.
- Do not suddenly alter boat direction or speed.
- All boats should remain on one side of the whale and in radio contact with each other.

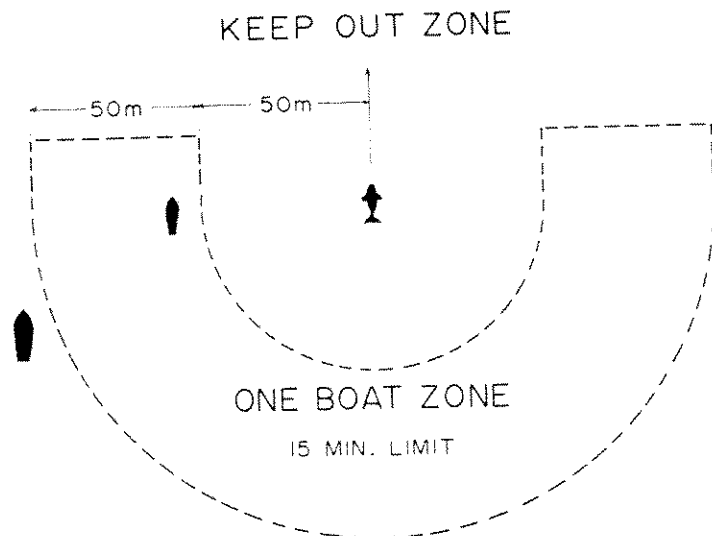
LEAVING THE WHALE

- Depart slowly until at least 100 m from the whale.

Note

Whales are protected from harassment under the federal Fisheries Act.

Pace out 50 m and 100 m on land so that you will recognize this distance on the water.



5.1.3 Whale watching management workshop

In 1988, a workshop was co-sponsored by the Center for Marine Conservation and the National Marine Fisheries Service to review and evaluate whale watching programs and management needs. Representatives of industry, conservation, management and the scientific community discussed whale watching programs in Canada, the United States and Mexico. The major conclusion of the workshop was that whales of all species would be better protected if whale watching was more regulated. Recommendations for the future included:

- regulations should be formulated that are simple to understand, follow and enforce;
- minimum approach distances should be legally enforceable;
- regulations should be specific to each region to account for differences in critical habitats, species and behavioural sensitivities, geography, and potential sources of disturbance.

5.2 National Experience

5.2.1 Federal whale watching policy

Problems caused by the growth of the whale watching industry in Canada have stimulated discussion of potential management options by the Department of Fisheries and Oceans (1990). A two stage system is proposed to educate and regulate industry and recreational boaters. While Robson Bight is mentioned as a problem area, the initial focus is to protect endangered whale populations in the Gulf of St. Lawrence, such as the beluga (Delphinapterus leucas).

In stage one, an education and public relations campaign would be instituted to make the whale watching industry and recreational boaters aware of the present regulations² and new guidelines for whale watching³. This would be coupled with an "aggressive" enforcement campaign in which vessel operators would be charged if in violation of the current regulations. Offenders would be prosecuted on the basis of ignoring guidelines and disregarding conservation-related guidelines. At the same time as the education campaign, the Department of Fisheries and Oceans would amend the Marine Mammal regulations to provide for licencing of tour boat operators, under Section 43 of the Fisheries Act. If the education campaign is successful on its own, licencing would not be pursued further. If prosecution on the current bases is inadequate, the Department would follow through with licencing.

If initial measures are unsuccessful in protecting the welfare of whales, the Department would consider amendment of the Fisheries Act itself to regulate the whale watching industry through licencing. Stage two would be pursued only if licencing under the Marine Mammal regulations is ineffective.

² The Regulations Respecting the Protection of Cetaceans and the Beluga Protection Regulations

³ Guidelines to Small Craft Owners and Tour Boat Captains to Prevent Any Disturbance and Harassment of the Whales

5.2.2 Beluga protection in the Saguenay River, Quebec

The Department of Fisheries and Oceans and Environment Canada recently published an "Action Plan to Favour Survival of the St. Lawrence Beluga Whale" (1990). The Plan identifies disturbances due to marine traffic as a key factor limiting beluga populations in the Gulf of St. Lawrence.⁴ The estuary of the Saguenay River and its confluence with the St. Lawrence are critical beluga habitat. To control disturbance of belugas here, the Department of Fisheries and Oceans has implemented a three-tiered system of guidelines, monitoring and regulation (discussed in 8.2.1). They have also published a set of guidelines limiting vessel approaches to 300 m (included in this appendix).

In early 1990, the Government of Canada and the province of Quebec signed an agreement to create a marine park at the confluence of the Saguenay and St. Lawrence Rivers. A primary goal of the park will be the conservation of resources. A management committee was formed to implement the agreement and carry out an 'Interdepartmental Action Plan to Favour Survival of the St. Lawrence Beluga Whale' (Fisheries and Oceans et al. 1990).

5.2.3 Gray whale watching on the west coast of Vancouver Island

To minimize disturbance of gray whales during migration along the west coast of Vancouver Island, the Department of Fisheries and Oceans published a set of whale watching guidelines in September 1990. The guidelines resulted from consultation with tour boat operators and other interest groups and recommend no approaches closer than 50 m, a 'one boat zone' and a 'no boat zone'.

⁴ Habitat degradation, primarily the introduction of deleterious substances into the Saguenay River and widespread pollution in the Gulf of St. Lawrence, has been also implicated in the recent decline of this population.



Government
of Canada

Gouvernement
du Canada

Fisheries
and Oceans

Pêches
et Océans

June 1985

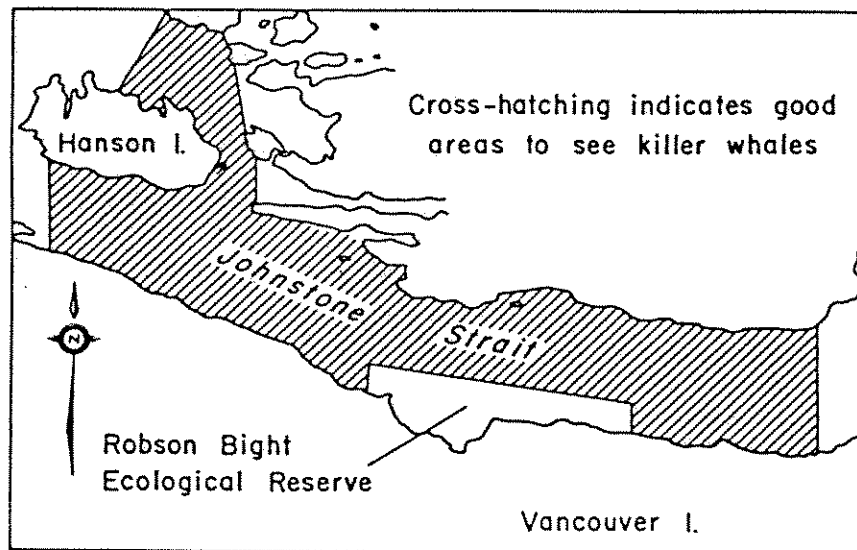
Your file

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

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.

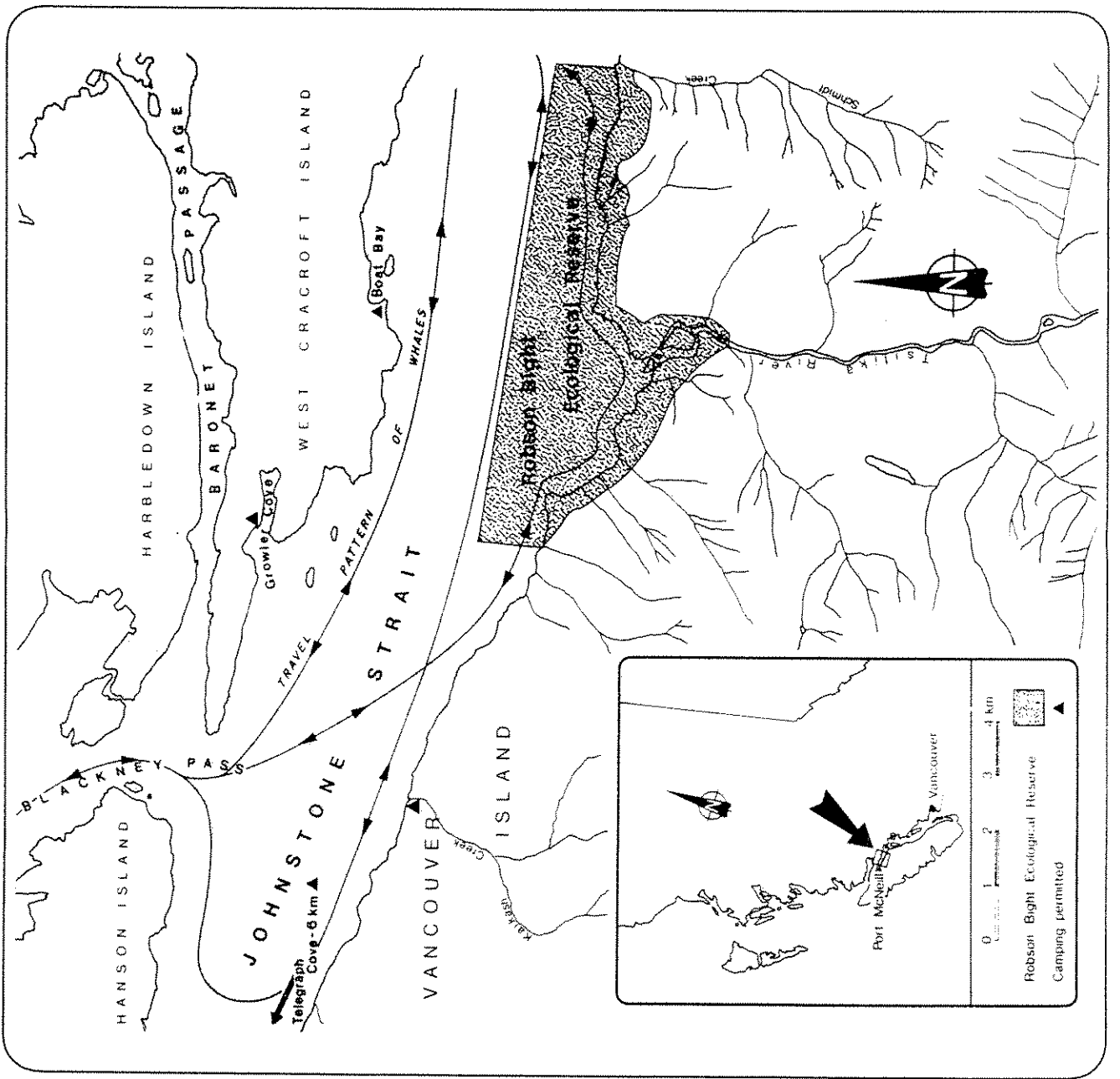
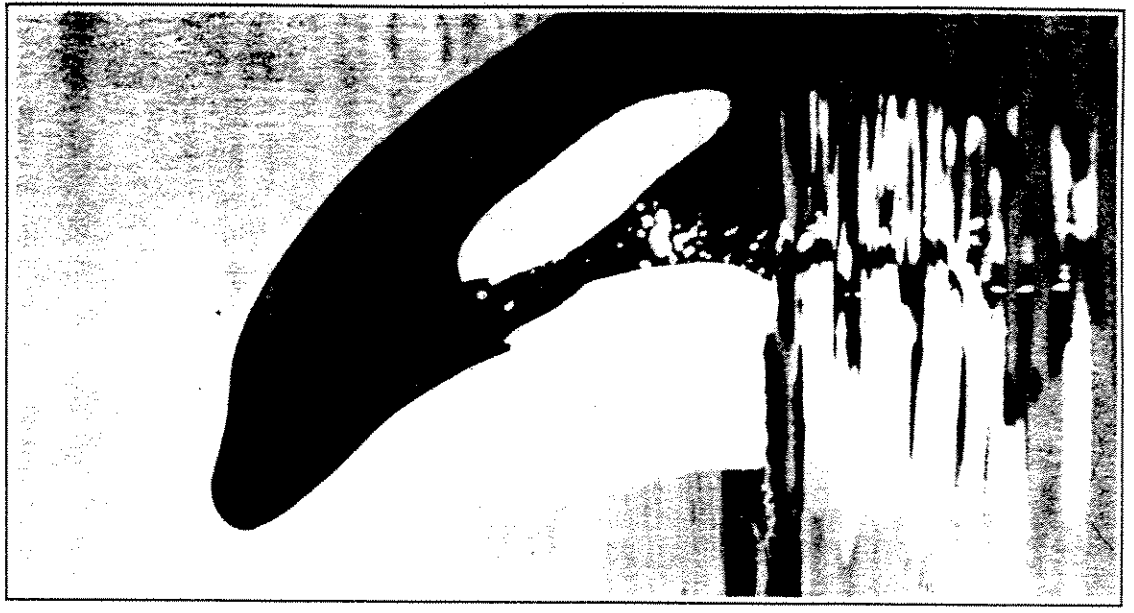
Some facts about pods of killer whales

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.



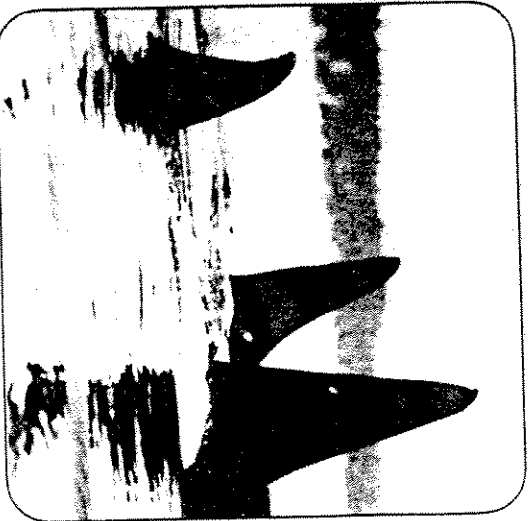
Robson Bight Ecological Reserve



Robson Bight Ecological Reserve

The 1248 ha marine portion of Robson Bight Ecological Reserve was established in June, 1982 to protect a core habitat of the killer whale for research and educational purposes. An upland buffer zone of 505 hectares was added to the reserve in 1988 and 1989.

Robson Bight is a killer whale (*Orcinus orca*) sanctuary. Scientific observations have concluded that boating traffic including kayaks and canoes can be very disruptive to the killer whales' resting and socializing patterns in the bight. **Please stay well away from whales in the bight area.**



Guidelines For Observing Killer Whales

Ecological reserves are not established for the benefit of human recreation but for the benefit of wild species and their environment. **Boaters should refrain from entering the reserve when whales are present.** Whales can easily be observed elsewhere. (See map.) To avoid disturbing the whales and for your safety, you should follow these guidelines:

- 1) Do not follow whales into the reserve.
- 2) Should you stray into the reserve, keep at least 300 metres away from the whales. Only researchers identified by a yellow pennant are issued permits to observe whales at closer range in the reserve.
- Whales may be approached to within 100 m outside the reserve without a permit.
- 3) Approach whales from the side; not from the front or the rear. Approach and depart slowly. Avoid disturbing a "line" of resting whales.
- 4) When travelling beside whales, maintain a speed of 2 to 4 knots; do not alter your speed abruptly.
- 5) Keep noise levels down — no horns, whistles, shouting or racing of motors.
- 6) 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.

Camping

Camping, lighting fires and any form of consumptive use is not permitted within an Ecological Reserve. Visitors may camp at Telegraph Cove, Kaikash Creek, Boat Bay or Growler Cove on West Cracroft Island. (See Map.) The last two sites have good anchorages and are excellent locations for whale watching; however, neither has fresh water.

About Killer Whales

A killer whale pod, or family group, usually consists of five to 20 bulls, cows and juveniles. Each whale is recognizable by its unique markings and each pod is always composed of the same individuals and has its own dialect. About 30 pods totalling 300 whales occur year around in British Columbia and Washington coastal waters. Nineteen pods (170 whales) are seen in Johnstone Strait.

Killer whales travel at 6 to 8 km/h, sometimes as a tightly-knit group and at other times dispersed over a few square kilometres. Periodically, groups join with one another and are then spread over several square kilometres. The dive sequence consists of one long dive lasting 3 to 4 minutes followed by three short dives of 15 to 20 seconds.

Killer whales range in length from 2.5 m at birth to 8 m for mature females and 9 m for mature males. Cows probably live to a maximum of 75 years and bulls to 50 years. On average a cow gives birth only once every ten years.

Whales rest in lines, abreast of each other, synchronizing their breathing. They are particularly susceptible to disturbance at this time.

For more information on killer whales or Ecological Reserves, write to:

Ministry of Parks
Planning and Conservation Services
4000 Seymour Place
Victoria, B.C.
V8V 1X5 (604) 387-5002