

Robson Bight (Michael Bigg)

Ref. No.:

970

ECOLOGICAL RESERVES COLLECTION
GOVERNMENT OF BRITISH COLUMBIA
VICTORIA, B.C.
V8V 1X4

**World Wildlife Fund Canada Report
December, 1989**

**Non-Consumptive Use and Management of
Killer Whales (*Orcinus orca*) in
Johnstone Strait, British Columbia**

David Duffus

Philip Dearden

**Department of Geography
University of Victoria**

This report updates the results of research designed to analyze non-consumptive whale use at Robson Bight on the northeast coast of Vancouver Island. Funding from World Wildlife Canada was used in conjunction with other grants to carry out a study of human and physical dimensions of whale use. Non-consumptive use of whales provides a valuable conservation function. This program documents the growth and nature of the activity as well as changes that have occurred over the past four years.

1.0 Project Objectives

The objective of the original project was to analyze the growing non-consumptive use of wild whales at two sites in British Columbia coastal waters, and document the human and physical dimensions of whale use. This report presents the results of the continuing components of the program that are designed to study growth and change through a monitoring program, and describes new sub-projects. The physical parameters of the encounters between boats and whales (duration, boat type, whale group configuration, boat behaviour, whale behaviour), are collected through a monitoring program of all whale-vessels encounters in the study area (Map appended). The human dimensions have been studied through social surveys. Part of the 1989 program included surveys of specific components of the user group to analyze two aspects of wildlife recreation. First, was to test the usefulness of the recreational specialization continuum as a predictor of the characteristics of growth of whale-watching. Second, was to update some information from the original survey done in 1986. Of particular interest were the economic impacts and change in the demographics of the whale-watchers.

The main concern with whale-watching and other non-consumptive interaction with whales is that the use of wild species as a resource base pressures the host ecosystem which may alter the factors that attract the organisms to the particular location which in turn causes degradation of the recreational opportunity. A prime motive for continuing this research was to obtain the basic data required to develop management plans to maintain whale-watching opportunities. We believe that contact with wild species in their natural setting is a pre-requisite to the development of a more vigorous nature consciousness in Canada.

2.0 Assessment of Project Success

Although we consider the research to be successful in meeting its objectives, work towards conservation and management to protect the whale/habitat association and to maintain the whale-watching opportunity has been painfully slow.

During the three years of field study we have amassed an extensive data base about whale-watching and whale-watchers. To the best of our knowledge this is the most thorough analysis of whale-watching encounters and whale-watchers that has ever been undertaken. The observation program monitored 1046 vessel-whale encounters over three years, the social survey was delivered to slightly over 1400 whale-watchers at Robson Bight over two survey seasons. The most significant success of the project is the large scale data collection about wildlife recreationists and the potential understanding that will be developed from that information. This understanding has both theoretical implications and practical value for the management of non-consumptive wildlife use sites.

In the three years of project operation the contact with recreationists during survey delivery, as well as public talks given by members of the research team represented a large educational effort. Many whale-watchers became aware of the presence of the Ecological Reserve and regulations concerning whale-watching solely as a result of the research team's efforts. In 1989 a follow-up effort by the Parks Branch of the Ministry of Environment established a visitor contact program through a contract to private consultants. This program has virtually no authority and is based on the goodwill of the users, something which is becoming less universal as whale-watching activity grows. To increase management capability we, amongst others, have lobbied the Department of Fisheries and Oceans to enter the management arena at Robson Bight as they are the only body that can currently apply the Cetacean Protection Regulations under the Fisheries Act. Initial contact between the provincial Minister of Parks (since replaced) and the federal Minister of Fisheries and Oceans (since replaced) in 1989 had produced a favourable climate for co-operative management initiatives, although a new provincial Minister may alter those conditions. In addition the authors have worked with conservation groups (Western Canada Wilderness Committee, Sierra Club, Canadian Parks and Wilderness Society, Friend of Ecological Reserves, Outdoor Recreation Council of B.C.) to help raise public awareness of the management issues at Robson Bight. We have recently been asked to represent the public

interest on the Tsitika Follow-up Committee, a government body that oversees resource management issues in the Tsitika Valley which includes the Robson Bight shorelines (Dearden-representative, Duffus-alternate).

The events of 1989 allow for guarded optimism that Robson Bight will be given more protection in the near future, and whale-watching will garner enough attention from government agencies to lay a foundation for future regulation should the need arise.

Several research papers will be published in the scientific literature (e.g. Duffus & Dearden, In Press, *Biological Conservation*, and Duffus & Dearden presented to the Third International Orca Symposium, March 1990) outlining the results of the research. All will acknowledge the financial support of WWF and copies will be forwarded to WWF as they become available. In addition a Ph.D. dissertation and a Masters of Resource Management were completed, and an Honours thesis is in preparation based largely on this research.

3.0 Work Done with World Wildlife Fund Support

Work done with the participation of WWF supporting grants helped maintain three field research crews since 1986 at Robson Bight. In June, July and August of 1986, 1987 and 1989 a monitoring and survey program was carried out at Robson Bight. World Wildlife Fund grants were used in conjunction with other grants and funding programs in the amount of approximately \$81,000 to support the entire research project.

4.0 Results

4.1 Physical Dimensions

Throughout three field seasons at Robson Bight 1046 whale-vessel encounters were recorded. The actual number of encounters in 1986 and 1987 remained about the same but encounter numbers rose by 30.4% in 1989 (Table 1; Table 2). The number of encounters

per day fell from 5.67 in 1986 to 5.54 in 1987 and rose to 6.65 in 1989.

Table 1: Records of Whale-Watching Encounters by Boat Type,

Boat Type	Number of Encounters (Percent of Encounters)		
	1986	1987	1989
Charter Motor Vessels	78 (23.0%)	74 (23.4%)	104 (25.2)%
Charter Sailing Vessels	11 (3.2%)	16 (5.1%)	38 (9.2%)
Small Pleasure Sailing Vessels	7 (2.1%)	13(4.1%)	24 (5.8%)
Large Pleasure Sailing Vessels	19 (5.6%)	18 (5.7%)	27 (6.6%)
Small Pleasure Motor Vessels	67 (19.8%)	102 (32.3%)	84 (20.4%)
Large Pleasure Motor Vessels	31 (9.1%)	32 (10.1%)	22 (5.3%)
Kayaks	17 (5.0%)	28 (8.9%)	59 (14.3%)
Launches ¹	5 (1.5%)	-	-
Research Vessels	101 (29.8%)	33 (10.4%)	54 (13.1%)
Miscellaneous ²	3 (0.9%)	-	-

1. During 1986 launches originating from other vessels were recorded separately, in 1987 and 1989 launches were recorded as small pleasure motor vessels.

2. Miscellaneous refers to whale-watching from aircraft which was not recorded in 1978 or 1989.

Table 2:Duration of Human-Whale Encounters by Boat Type,

Boat Type		Number of Records	Mean Duration (min.)	Standard Deviation (min.)	Range (min.)	Total Duration	Proportion of Total Time
Charter Motor	1986	76	51.4	36.4	5-195	3906	26.4%
	1987	74	60.2	46.2	2-213	4453	28.7%
	1988	104	73.8	46.1	5-236	7675	33.9%
Charter Sailing	1986	10	39.7	25.1	15-100	397	2.7%
	1987	16	61.8	37.5	7-138	989	6.4%
	1989	38	66.0	42.5	10-175	2508	11.2%
Small Pleasure Sailing	1986	7	19.7	9.8	10-30	138	0.9%
	1987	13	22.5	10.3	5-39	293	1.9%
	1989	24	41.4	27.8	6-127	994	4.5%
Large Pleasure Sailing	1986	21	34.1	35.0	2-160	717	4.9%
	1987	18	29.5	23.9	7-77	531	3.4%
	1989	27	44.4	33.5	4-130	1199	5.4%
Small Pleasure Motor	1986	64	47.8	45.8	2-239	3056	20.7%
	1987	102	33.0	27.5	1-121	3368	21.7%
	1989	84	41.4	32.6	16-146	3477	15.5%
Large Pleasure Motor	1986	30	32.9	24.4	4-107	986	6.7%
	1987	32	30.3	23.7	4-104	970	6.2%
	1989	22	37.8	22.5	10-101	831.6	3.8%
Kayaks	1986	16	17.1	12.7	2-43	272	1.8%
	1987	28	21.3	20.2	4-109	595	3.8%
	1989	59	37.2	22.7	8-113	2195	10.0%
Research	1986	89	58.7	54.8	3-345	5220	35.3%
	1987	33	131.4	112.1	15-420	4335	27.9%
	1989	54	60	42.6	10-217	3240	14.9%
Launches	1986	5	18.6	2.2	15-20	93	0.6%
Total	1986	318	46.5		2-345	14785	
	1987	316	49.2		1-420	15534	
	1989	412	54.0		4-236	22284	

The total duration of whale use rose by 43.45% between 1987 and 1989 and the mean duration of encounters rose by 10%. The earliest encounter was recorded at 0910H and the latest encounter ended at 1700H. In general terms whale-watching began roughly 1 hour earlier and extended 2 hours later in 1989.

Within the user group, the largest users remain the charter vessels, (roughly 25% by encounters), although total duration of encounters rose 7.5% to account for 33.9% of the total duration of all encounters between 1987 and 1989 (Table 1; Table 2). Small pleasure motor vessels account for 20% of the use by encounter and 15% by total time, which represents a decrease from past years. The fastest growing components of the user group are charter sailing vessels and kayaks. Charter sailing vessels encountering whales almost doubled the 1987 rate becoming responsible for 9.2% of the encounters and 11.2% of the total time in 1989. Kayak borne whale-watchers has steadily increased in terms of the number of encounters and have jumped from 3.8% to 10% in terms of total time with the whales. Research activity had dropped considerably due to the completion of two major projects, and has since risen in terms of encounters, but has dropped further in total time with the whales as a consequence of the sampling design of the main research project. As noted previously (Duffus 1988) this component of total use can change rapidly with the addition and completion of research projects.

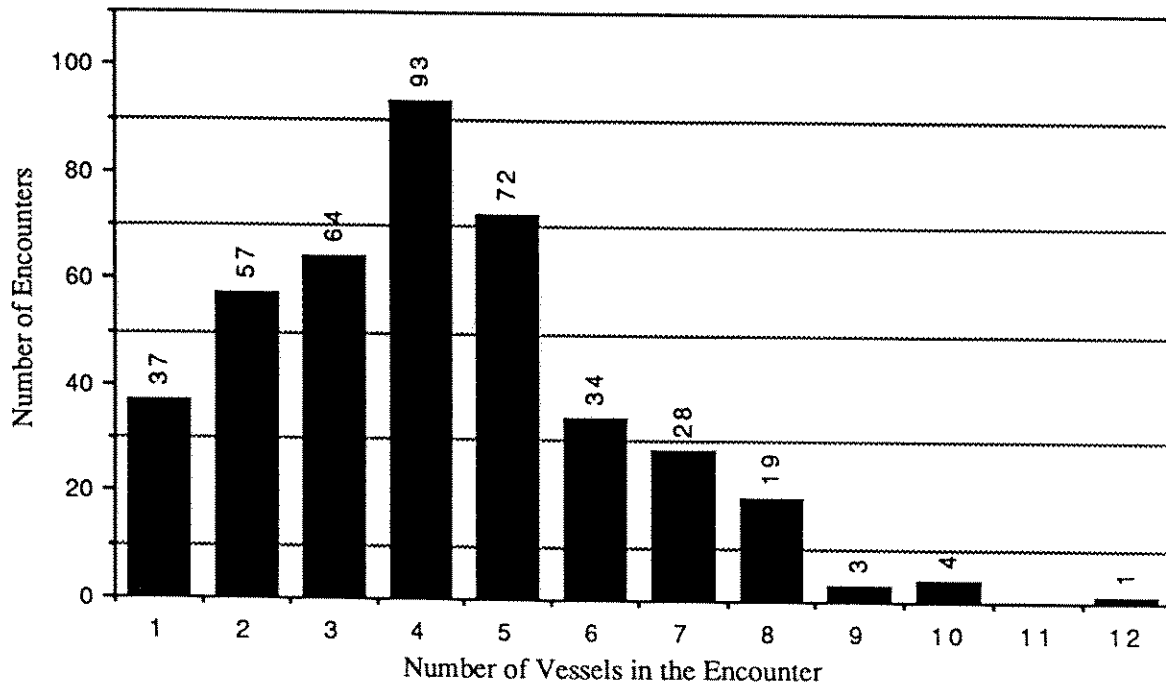
The amount of recreational use of whales also must take into account pulses of high use through multiple encounters. As indicated in Table 3, there is considerable periodicity in whale-watching activity in the study area. Days with a very high number of encounters are interspersed with no whale-watching activity, which may be due to a lack of whales during daylight hours, poor weather, or no whale-watching vessels.

Table 3: The Number of Whale-Watching Encounters Observed Per Day.

Date	Number of Encounters			Date	Number of Encounters		
	1986	1987	1989		1986	1987	1989
July 2	0	0	0	August 1	0	0	10
July 3	0	0	4	August 2	14	15	6
July 4	0	0	0	August 3	4	3	15
July 5	4	0	5	August 4	10	0	9
July 6	14	0	5	August 5	5	0	0
July 7	1	0	5	August 6	17	3	9
July 8	2	0	17	August 7	0	13	16
July 9	0	0	8	August 8	12	9	2
July 10	0	5	0	August 9	16	6	0
July 11	0	0	1	August 10	8	11	8
July 12	5	13	2	August 11	18	0	5
July 13	3	5	8	August 12	11	0	10
July 14	0	0	0	August 13	11	11	0
July 15	4	0	0	August 14	10	15	18
July 16	8	0	0	August 15	0	0	11
July 17	7	13	0	August 16	10	0	0
July 18	6	8	0	August 17	0	5	13
July 19	15	0	12	August 18	9	0	8
July 20	8	12	16	August 19	8	0	16
July 21	3	0	13	August 20	8	22	0
July 22	0	18	8	August 21	13	13	0
July 23	0	12	15	August 22	5	16	0
July 24	8	6	0	August 23	20	1	0
July 25	0	0	16	August 24	12	11	0
July 26	5	13	24	August 25	6	0	14
July 27	10	12	5	August 26	0	0	7
July 28	0	13	8	August 27	0	5	7
July 29	13	12	23	August 28	NR	10	3
July 30	1	0	2	August 29	NR	NR	4
July 31	0	0	2	August 30	NR	NR	9
				August 31	NR	NR	6
				September 1	NR	NR	5
				September 2	NR	NR	0
				September 3	NR	NR	1

The number of vessels simultaneously watching a particular group of whales may be an important indicator of increased activity that has implication for the whales. Multiple sources of acoustic signal may be more stressful than single noise sources to whales. In addition multiple hulls may influence the whales perception of potential flight avenues. The distribution of the number of vessels per encounter is indicated in Figure 2. The modal number of vessels simultaneously engaged with a group of whales is 4.

Figure 2: Frequency Distribution of the Number of Vessels Simultaneously Engaged with A Whale Group



The number of close contacts that may interfere with the whales, defined as running between members of a whale group or obviously chasing whales, was recorded on 28 occasions in 1986, 89 occasions in 1987, and on only 25 occasions in 1989. Most of these were done by small pleasure motor vessels, research vessels, and in 1987 by charter motor vessels, particularly a new small charter operator. In 1989 the majority of these encroachments were by small pleasure motor vessels. This measure does not account for infractions of the *Guidelines* presented by the Department of Fisheries and Oceans. Vessels commonly travel within the 100 metre distance approach guideline, in particular research vessels, who may have permits to undertake research inside the provincial Ecological Reserves, which clearly does not give permission to violate federal Fisheries guidelines.

Some elements of whale group behaviours were recorded to see if any patterns may be discerned. Whale group spacing, speed

and orientation were recorded, at the initiation and cessation of every encounter (Table 4).

Table 4: Whale Group Behaviour Changes

	1986	1987	1989	Total
Group Speed				
Increased	3	19	13	35
Decreased	0	26	6	32
Group Spacing				
Tightened	3	19	31	53
Loosened	8	51	47	106
Group Orientation				
Directional	8	23	39	70
Non-directional	6	30	28	64

Of these observations only group spacing appears to have a strong difference. Whale groups loosen more frequently than tighten in the presence of whale-watching vessels. Displays of surface behaviours have been recorded over three years with several hundred examples of percussive fluke slapping, pectoral flipper slapping, breaching and spyhopping. No pattern has become evident in the presentation of these displays because whales engage in these behaviors without vessels present. While this study was not directed towards an experimental analysis of whale reactions to vessels, we have some impressions garnered from our extensive observation of whales and boats. For example, when whales were engaged in certain activities they reacted differently to the presence of vessels. During obvious foraging activity whales did not appear to react to vessels, however, when approaching the rubbing beaches whales appeared to engage in percussive surface behavior when followed by vessels. There also seemed to be a time limit that whales would allow close approaches, after which they would react and begin evading vessels in some cases. Although these are speculations, due to a lack of control observations, it is quite apparent that killer whales sometimes direct displays toward nearby vessels, although the meaning of such actions are not known.

Other research, summarized in many publication of M.A. Bigg and colleagues has documented the identity of every whale in the resident community that frequents Robson Bight. This situation

allowed us to document the identity of whales engaged in whale-watching encounters (Table 5). Clearly there are differences in the most frequently watched whales, which is simply a function of which whales are most frequently using the area. Subpods such as A1 (currently termed A36) was a dominant group in 1987, only to be supplanted by the A2 (currently A30) subpod in 1989. Similarly, the C5's became frequent subjects of whale-watching in 1989, whereas the D pods were not evident. There are likely mechanisms at work that allocate the spatial arrangement of small whale groups, thereby subjecting certain whales to more whale-watching pressure than others. Of considerable interest are questions relating to the movement of whales around the core study area at Robson Bight. Patchiness of food supply and possible behavioural or ecological factors may dictate spatial behaviour. This area requires more study (See Section 7.0)

Table 5: The Proportion of Whale Sub-pods engaged in Whale-watching Encounters.

POD	SUBPOD	1987	1989
A1			
	A1(36)	25.43%	5.92%
	A12	3.70%	0.33%
	A2(30)	17.78%	43.91%
A4			
	A11	2.47%	0.82%
	A 24	1.73%	0.49%
A5			
	A 5	6.42%	0
	A23	0	0.82%
	A14	2.96%	1.32%
B1		3.70%	8.22%
C1		12.35%	2.30%
	C4(6)		1.97%
	C5		28.95%
D1		4.94%	0
	D3		0
	D7		0
G1		0.99%	0
	G4	0	0
	G3	0	0
	G17	0	0
	G18	0	0
	G12	0	0
H1		4.44%	2.14%
I1		0.99%	1.32%
I2		0	0
I11		0	0
	I11	0	0.16%
	I15	0	3.62%
I18			
	I17	0	0
	I18	0.74%	0
I31		0.25%	0
	I31	0	2.63%
	I33	0	0
R1		7.16%	0.16%
	R2	0	0.16%
	R5	0	0
	R9	0	0.82%
W1		3.95%	0
P1		0	0.66%
Q3		0	0.66%

4.2 Human Dimensions

The human dimensions of whale-watching include aspects of recreation, economic impact, conservation and management. Within each of the above there are a wide range of approaches each a

significant area of study on its own. We have studied selected aspects that we believe are significant to an understanding of the relationship of humans and wildlife in a theoretical sense and those which have particular application to management of non-consumptive wildlife activity.

Surveys carried out in 1986 indicated that whale-watchers at two study sites around Vancouver Island were stratified along a range of interest from specialized whale-oriented individuals to general outdoor recreationists. The data evoked the use of a theoretical framework, the leisure specialization continuum, described by Bryan (1977, 1979). We found that underlying attitudes toward whales and whale conservation were high and uniform, but the main body of recreational users were not whale specialists. To confirm this hypothesis and obtain a further analysis of the dimensions of the continuum of specialization we surveyed two groups in 1989, that were believed to have distinctive characteristics. We census surveyed kayak-borne whale-watchers and sample surveyed charter vessel passengers.

5.0 Conservation Significance

We believe that the combination of uniqueness, the tenuous position of Robson Bight in the face of industrial activities, and the high potential to allow benign contact between whales and humans identify this site as one of high conservation significance. The significance does not yet appear to have influenced government decision making, although a group of non-government conservation groups have stepped up efforts to bring the impending industrial use of the area into the public eye.

6.0 Conservation Requirements

The results of the research project have been directed to the improved management of the Robson Bight area. Both authors have worked through public lectures, conservation groups and letters to government officials. In past reports to World Wildlife Fund we have outlined the following conservation requirements:

Short Term

- A) a program to effectively demarcate the "protected" area.
- B) negotiation with logging companies to protect the uplands on the eastern edge of the Reserve.
- C) a permanent seasonal warden trained, equipped and in communication with other authorities.
- D) a set of objectives for management that reflect the estimated protection needs of the whales.
- E) a public awareness program.

Long Term

- A) protective legislation for marine mammals above and beyond the current Cetacean Protection Regulations.
- B) an innovative agreement for the management of marine areas and adjacent lands between federal and provincial authorities, such as a designation as a Canadian Landmark.
- C) recognition of the marine wildlife heritage, both by the public, but more immediately by Fisheries and Oceans Canada who currently demonstrate a low level of interest in whales.
- D) the development of a long term research, monitoring and possibly co-operative management unit to fulfill both theoretical and applied management information needs.

The success in meeting those requirements has been varied. Robson Bight now has a much higher profile than in the past. The apparent interest in co-operative management of the site by the federal Department of Fisheries and Oceans and the provincial Ministry of Environment is a mandatory first step to management of whale-watching activity. There has been a minimal response from the provincial government to protect the resources at Robson Bight. No warden has been established through the Parks Branch, however, a private contractor did undertake a visitor contact program.

Negotiations with logging companies over the disposition of the immediate uplands of the Bight has consisted of the logging company submitting logging plans that include areas that will jeopardize the Bight and the whales through the provision of easy access to the Bight, and potential erosion and water quality changes due to clear-cutting activity. Currently the Ministry of Forests is considering logging plans that include clear cut logging on the slopes immediately adjacent to the Bight. As well cutting and road building will probably alter the stream flow, both in quality and quantity, of the

Tsitika River. It is not known what effects these activity will have on the whales. If clear cutting is allowed near the rubbing beaches there will be downslope migration of debris to the rubbing beaches.

Secondary influence may occur as a result of provision of access along the public-funded logging road into the lower Tsitika. Human presence on the rubbing beaches may cause the whales to avoid the sites.

A second area of indirect influence is the reduction in the recreational value of the area as a result of clear cut sites on the landscape. Coastal landscapes are known to be particularly sensitive to incongruous sights. Recreationists at this site have noted on our surveys that the most frequent detraction from satisfaction is landscape destruction through clear cut logging.

The provincial government uses a 'Follow-up Committee' to monitor logging plans in the lower Tsitika River valley, as the original management plans for the area called for many precautions. The authors have succeeded through the Outdoor Recreation Council of B.C. in obtaining a seat on the committee to gain further insight into the planning process for lands immediately adjacent to Robson Bight.

There have been no other moves to establish long term protection of the area and the whale habitat needs, or to further research the nature of those needs. The federal marine protected area initiatives have no program that would protect an area of this nature. There may be changes forthcoming in the Cetacean Protection Regulations of the Fisheries Act, but they have yet to be made public.

We therefore suggest that reaction to the unique wildlife recreation opportunity and the associated conservation values falls short of what is required. World Wildlife Canada has, through the support of this research project, been a principle contributor to conservation efforts. We believe that monitoring and research into whale use that is independent of B.C. government agencies should continue to assess the growth and changes in whales use, and provide and assessment of management actions.

7.0 CONTINUING RESEARCH PLANS

We plan to continue research at Robson Bight to fulfill the following objectives:

- 1) Maintain the monitoring of all whale-watching activity at Robson Bight and in the adjacent waters of Johnstone Strait. This program would continue to record whale-watching encounters, by boat type, their duration, boat behaviour, whale behaviour group configuration, and identity.
- 2) Monitor the efficacy of management activity through documentation of regulatory effort.
- 3) In 1990 to begin monitoring the movement and behaviour of whales in the areas surrounding the core zone at Robson Bight. Changes in the most frequently encountered whales in the core area will lead to research hypothesis and research into seasonal micro range habitat use. In the 1990 summer season we will make several 24 hour tracking observations to look at diurnal periodicity in habitat use with regard to the rubbing beaches and Robson Bight.
- 4) Other collaborative initiatives are in the planning stages including recording and analysis of vessel generated underwater noise during whale-watching encounters, and more detailed economic analysis.

NOV 1 1990
11:00 AM '90
6