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SUMMER POLAR BEAR OBSERVATIONS AROUND WAGER BAY, NORTHWEST TERRITORIES

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This report has been submitted for publication in the Arctic Island Pipeline Project (AIPP) report series. The AIPP report format has been used rather than that of the N.W.T. Wildlife Service.

ABSTRACT

Aerial observations of polar bears (Ursus maritimus) were made along the shorelines of Wager Bay, Northwest Territories, during the summers of 1976 and 1977. The distribution, density and percentage of cubs were determined. A complete survey of the shorelines on 2 September 1977 indicated a minimum population of 54 bears (36 adults and 18 cubs). Bears were more common on the high cliffs of the south shore than on the more gently sloping north shore. In 1977 we observed an average of 85 bears/1000 km of shoreline. This is high in comparison to polar bear densities observed in other areas. Of the 136 adults observed over both summers, 25% were accompanied by cubs. The mean litter size was 1.75 $\pm$ 0.11 for cubs of the year and 1.27 $\pm$ 0.12 for older cubs. Increased industrial activity or the creation of a National Park in the area will cause potential conflicts between man and bears. Such conflicts would be reduced if people were to avoid areas of high bear density such as the south shore between the Paliak Islands and the Reversing Falls.

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1. INTRODUCTION

The discovery of gas on Melville Island and the subsequent proposal to transport it south by pipeline led to the creation of the Arctic Islands Pipeline Program. That program was set up by the Department of Indian Affairs and Northern Development to examine the environmental and social consequences of the construction and use of such a pipeline. Wager Bay in northern Keewatin may well be used as a supply port during construction as the pipeline passes within 100 km. Tourism may also increase since Parks Canada proposed that Wager Bay be considered as a site for a National Park (Anon. 1978).

Polar bears were known to frequent Wager Bay but there was no information on the distribution, abundance and population structure of polar bears in the area. To document the importance of Wager Bay for polar bears, and to identify the areas used most intensively by bears, we conducted aerial surveys there during the summer of 1976 and 1977.

2. STUDY AREA

Wager Bay is an inland arctic sea about 150 km long, up to 36 km wide and is connected to Roes Welcome Sound by a channel only 3.5 km wide (Fig. 1). The south shore of Wager Bay rises sharply from the water to about 500 m. The north shore, especially at the west end, is also high and steep, but a coastal plain about 16 km wide separates the high hills from the bay. Water at both ends of the bay is kept ice-free all year as the tide surges through the narrow channels. The rest of the bay breaks up in early July and is completely ice-free by August. Freeze-up occurs sometime after mid-September.

3. METHODS

Between early June and mid-September in 1976 and 1977 we flew in the vicinity of Wager Bay at least once a week while carrying out our caribou and peregrine falcon research. Most of our polar bear observations were incidental sightings made during those flights.

On three occasions in 1977 we searched the coastline of Wager Bay specifically for polar bears. The north shore was surveyed on 13 August, the south shore on 21 August, and the entire coast on 2 September. Our search path followed the coasts of the mainland and all islands. Observations were made from a Cessna 185 aircraft at speeds ranging between 160 and 225 km/hr. We flew at altitudes between 60 and 90 m (asl) when we were over the gently sloping north shore and ascended to 150 m over the south shore so as not to overlook the bears which were high up on the adjacent cliffs. On most surveys, observers sat in the front right and left rear seats. The exception was the 13 August survey when the pilot acted as the left observer.

The location and estimated age of each bear was recorded. Bears were classified as first-year cubs, older cubs, or adults. Cubs were small bears that were accompanied by a much larger bear. First-year cubs were distinguished from older cubs by their small size.

On both 13 August and 2 September 1977 the sky was clear with unlimited visibility. Overcast conditions prevailed on 21 August. The tide was low on 13 August and on the longer survey of 2 September, it rose from a near low to a high level.

4. RESULTS AND DISCUSSION

4.1 Distribution and Density

Bears were observed around the shorelines of Wager Bay and Ford Lake in 1976 and 1977. Most were observed on land within 100 m of the shore but it was common to see them swimming in the bay or sitting high up on the cliffs on the south shore. The locations of bear sightings made on the three 1977 surveys are plotted in Figure 1.

In 1977, we observed an average of 85 bears per 1000 km of shoreline along Wager Bay (Table 1). Bear density on the south shore was significantly higher than on the north shore (Table 2). The high cliffs on the south shore may cause bears to concentrate along the shore by restricting their movement inland.

The density of both adults and cubs in September was higher than in August (Table 2), but the differences in density between months were not significant ($p>0.05$).

In 1976 we made only two flights for which bear densities could be calculated. We saw 55 bears/1000 km of shoreline between Reversing Falls and Handkerchief Inlet on 31 July, and 94 bears/1000 km on 11 August in the same area (Table 3).

The 1976 densities were lower than the densities observed in the same area in 1977, but this reflects the normal build-up in bear density as summer progresses (Table 3). Bear densities on the coast usually increase throughout the summer as ice melt progresses (Schweinsburg pers. comm.). Ice floes were numerous on 31 July 1976 but the bay was ice-free during the August and September surveys. The increase in bear density in August could have resulted from bears coming from Hudson Bay.

The density of bears on the shores of Wager Bay was high in comparison to other areas. Johnson et al. (1976) found 12 $\pm$ 1.7 (S.E.) bears/1000 km on Lancaster Sound coastline between 8 August and 7 September 1976. On Admiralty Inlet, north Baffin Island, Schweinsburg (1976) found 16 $\pm$ 5 bears/1000 km between 10 and 22 August 1975. Jonkel et al.

(1972) counted bears along the coast of Hudson Bay in Manitoba and Ontario adjacent to inland denning areas. They found an average of 171 bears/1000 km of coastline (181/1000 km in August and September 1969 and 163/1000 km in September 1970). Since their counts included bears observed inland, the results are not strictly comparable to ours.

The high density of bears found along the Wager Bay shoreline may be related to the abundance and availability of seals (Stirling and Smith 1977). It is well known that when the sea is ice covered, bears eat mainly ringed seals (Phoca hispida), catching them at their breathing holes or in their birth lairs (Stirling and Archibald 1977). Observations by Furnell and Oolooyuk (1980) in Wager Bay show that bears prey on ringed seals in summer also, at least occasionally catching them in open water. Heard and Donaldson (1980) documented a relatively high density of ringed seals (1.0/km^2) in Wager Bay in 1977. In addition to being relatively abundant, ringed seals in Wager Bay may be more available to bears. Ice likely persists longer into the summer in Wager Bay than in surrounding areas because of its shape. Since bears presumably find it easier to catch seals at breathing holes than in open water, they may frequent areas where the ice remains later. Whatever the reason for the attraction, bears do concentrate in areas where the ice persists longest (Stirling et al. 1977).

4.2 Numbers

Our only estimate of the number of polar bears in Wager Bay was from our complete count on 2 September 1977. That day we saw 54 bears, 36 adults and 18 cubs (Table 4). This count is undoubtedly a minimum estimate of the Wager Bay bear population since we probably failed to distinguish some bears amongst the jumbled grey rocks along the shore. Furthermore, we made no systematic attempt to estimate the number of bears which may have been inland or swimming far from shore. In northern Manitoba and on north Baffin Island bears do wander far from the coast during the ice-free season (Stirling et al. 1977). However, we saw no bears inland despite many hours of flying looking for caribou.

4.3 Population Structure

We recorded 187 bear sightings during both summmers (Table 5). First-year cubs comprised 15% of all bear observations; all cubs represented 27%. Twenty-five per cent of the adult bears were accompanied by cubs (34/136), 12% by first-year cubs (16/136), 11% by older cubs (15/136), and 2% by cubs (3/136) of unknown age (Table 5).

The mean litter size of first-year cubs was 1.75 $\pm$ 0.11, whereas the litter size of older cubs was significantly smaller at 1.27 $\pm$ 0.12 ($X^2 = 7.24$, $p < 0.005$, one-tailed median test). Litter size of first-year cubs was slightly higher and that of older cubs slightly lower than has been found elsewhere. For example, the litter sizes of first year and older cubs were respectively 1.68 and 1.56 in the Beaufort Sea (Stirling et al. 1976), 1.56 and 1.39 in Victoria Strait (Stirling et al. 1979), 1.63 and 1.64 (Stirling et al. 1979) and 1.65 and 1.55 (Schweinsburg et al. 1980) in Lancaster Sound.

The mean cubs per adult and the proportion of adult bears accompanied by cubs was slightly higher in 1976 than in 1977 (Table 5) but the differences were not significant.

5. CONCLUSIONS

The numbers of polar bears in Wager Bay increased from June to September as the bay became ice-free. The highest concentrations were on the south shore, particularly between the Paliak Islands and the Reversing Falls. The relative high density of bears observed in September 1977 indicates that Wager Bay is an important area for polar bears, particularly adult females with cubs. If industrial activity or tourism were to increase in Wager Bay the potential exists for adverse man-bear conflicts. Encounters with polar bears could be reduced if people avoid areas used most intensively by bears, incinerate garbage and use recommended deterrent devices to keep bears away from camp sites.

Table 1. Number of polar bears per 1000 kilometers of Wager Bay shoreline observed during the three 1977 surveys.

	Adults/ 1000 km		Cubs/ 1000 km		Total bears/ 1000 km		
	Aug.	Sept.	Aug.	Sept.	Aug.	Sept.	Months combined
North shore (312 km)	42	45	3	29	45	74	59
South shore (204 km)	78	103	29	34	107	137	123
Both shores (516 km)	56	68	14	31	70	99	84
Average	62		23		85		

Table 2. Comparison of numbers of polar bears observed on the north and south shores of Wager Bay during the three 1977 surveys.

		Number of adults		Number of cubs		Total bears	
		Observed	Expected	Observed	Expected	Observed	Expected
August	North shore	13	17.52[a]	1	4.23	14	21.75
	South shore	16	11.48	6	2.77	22	14.25
	Total	29		7[b]		36	
	X^2	2.95				6.98[d]	
September	North shore	14	21.15	9	9.67	23	30.82
	South shore	21	13.85	7	6.33	28	20.18
	Total	35		16		51	
	X^2	6.11[c]		0.12		5.02[c]	
Months combined	North shore	27	38.67	10	13.20	37	52.57
	South shore	37	25.33	13	9.10	50	34.43
	Total	64		23		87	
	X^2	8.90[d]		2.77		11.65[d]	

a total bears x $\frac{\text{length of north shore}}{\text{length of north and south shores}} = 29 \times \frac{312}{516}$

b $p = 0.016$; binomial test used because of the small sample size.

c $p < 0.05$

d $p < 0.01$

Table 3. Polar bear densities observed in Wager Bay between Reversing Falls and Handkerchief Inlet in 1976 and 1977.

Date	Number observed	Density (bears/1000 km)
31 July 1976	7	55
11 Aug. 1976	12	94
21 Aug. 1977	21	164
2 Sept. 1977	24	188

Table 4. Number of polar bears observed on the three 1977 surveys of Wager Bay.

	13 Aug. 1977	21 Aug. 1977	2 Sept. 1977	Total
North shore				
Adults	13	-	14	27
First-year cubs	0	-	3	3
Older cubs	1	-	6	7
Sub-total	14	-	23	37
South shore				
Adults	-	16	21	37
First-year cubs	-	2	4	6
Older cubs	-	1	3	4
Cubs not aged	-	3	0	3
Sub-total	-	22	28	50
Ford Lake				
Adults	-	-	1	1
First-year cubs	-	-	2	2
Sub-total	-	-	3	3
Total	14	22	54	90

Table 5. Population structure of polar bears observed at Wager Bay during the summers of 1976 and 1977.

Date	First-year cubs	Accompanying adults	Older cubs	Accompanying adults	Cubs not aged	Accompanying adults	Other adults	Total
June 1976	0	0	0	0	0	0	1	1
July 1976	2	1	1	1	0	0	4	9
Aug. 1976	4	2	3	2	1	1	11	24
1976 total	6	3	4	3	1	1	16	34
June 1977	0	0	0	0	0	0	1	1
July 1977	2	1	0	0	0	0	0	3
Aug. 1977	11	7	6	5	3	2	61	95
Sept. 1977	9	5	9	7	0	0	24	54
1977 total	22	13	15	12	3	2	86	153
Total	28	16	19	15	4	3	102	187
Percent	15	9	10	8	2	2	55	101

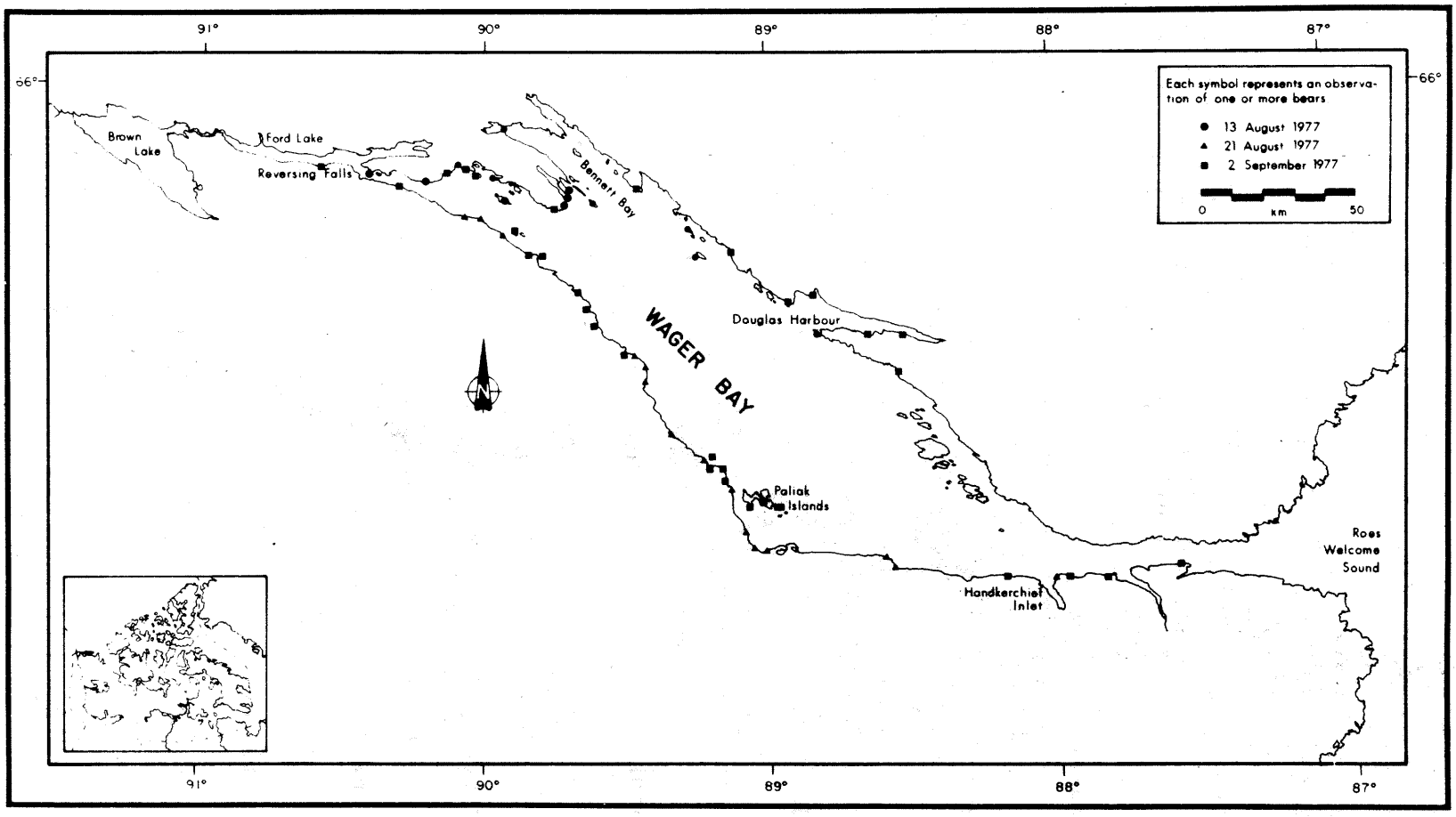

Figure 1. Location of polar bears in Wager Bay observed during three aerial surveys in 1977.

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