POLAR BEAR TAGGING

CLYDE RIVER AND BROUGHTON ISLAND, N.W.T.

SPRING 1981

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N.W.T. WILDLIFE SERVICE

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ABSTRACT

Sixty-six polar bears (29 males, 37 females) were captured in the Clyde River and Broughton Island regions during April and May, 1981. Nine of the bears were recaptures from previous studies, some from as far away as Boothia Peninsula. Twenty-three polar bears were immobilized successfully with carfentanil and 42 were immobilized with ketamine HCl and xylazine HCl. No recycling of the drug was observed. Bears appeared to be thinly distributed (0.56 bears/hour flown) and consequently no suitable sites for an observation tower were found.

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INTRODUCTION

This study represents the initial phase of a 3 year investigation of the population ecology of the polar bear in northeastern Baffin Island. The mark and recapture study on the Clyde River and Broughton Island areas during April and May of 1981. Factors such as; (1) distribution and movements, (2) population size, (3) age structure, and 4) mortality and natality will ultimately be determined. Similar studies have been undertaken previously in the vicinity of Pond Inlet (Schweinsburg et al. 1980) and Cumberland Sound (Stirling et al. 1980), but did not extend into the Clyde River and Broughton Island region. A short exploratory tagging program was conducted near Clyde River in the fall of 1980 (Lee 1982) and denning surveys were carried out in 1961 and 1979 (Harrington 1961; Wooley 1979).

During the course of this study, we hoped to be able to evaluate possible sites for the placement of an observation tower. We also intended to further test a new immobilizing drug, carfentanil, which was used for a short time in 1980 (Lee and Schweinsburg 1982).

STUDY AREA

The study area (Fig. 1) consists of the northeastern coast of Baffin Island, a distance of approximately 900 km. The northeast portion of Baffin Island is characterized by steep sided fiords which result in deep southwesterly oriented coastal indentations in the north and less severe and more westerly indentations in the south. The coast, for the most part, is fronted by a broad coastal lowland possessing many ponds and marshes. The area is described in detail by Dunbar and Greenaway (1956).

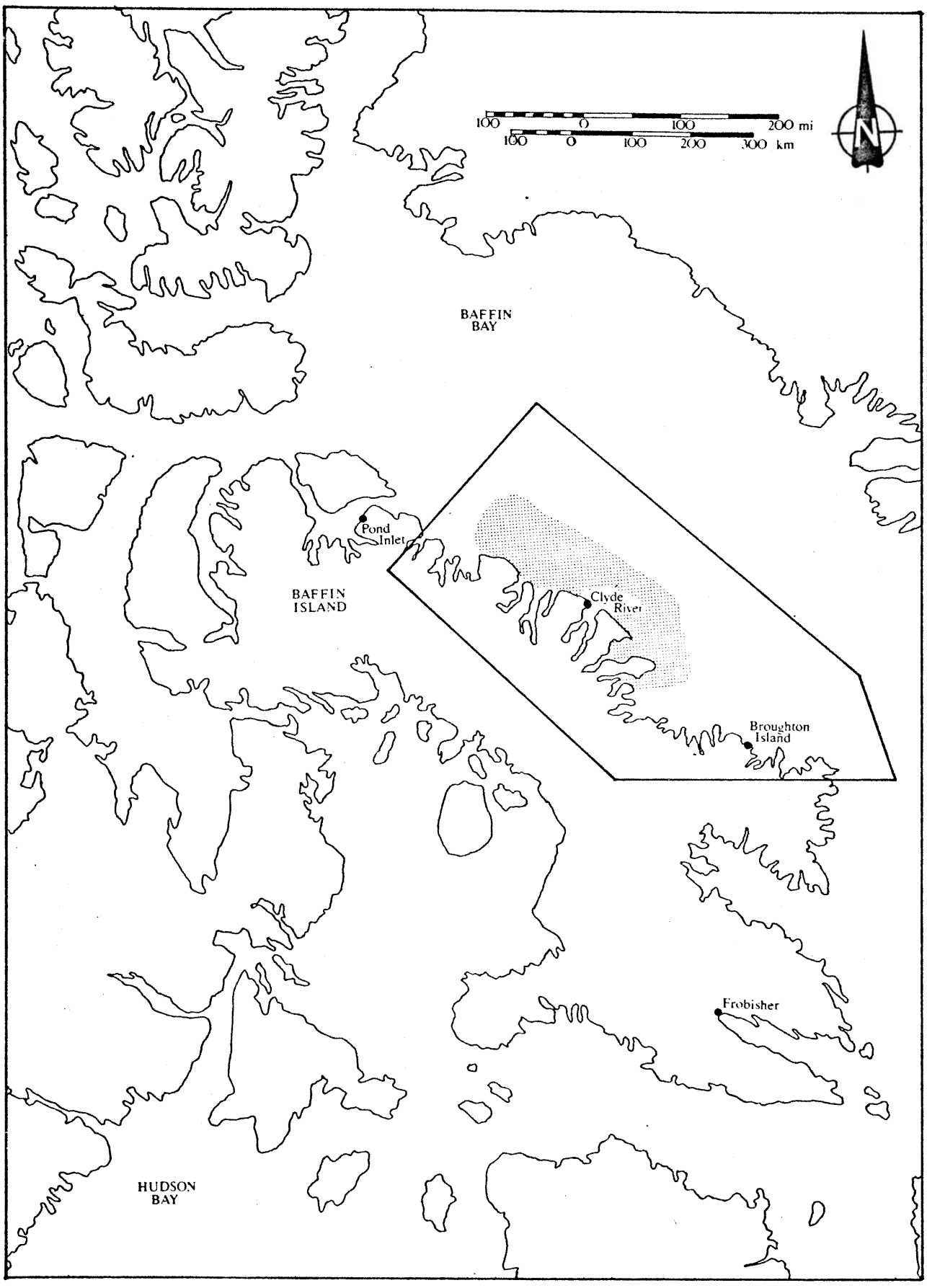

Figure 1. Study area and area searched (shaded) by helicopter for polar bears during April and May, 1981.

METHODS

We flew a total of 117 hours in this study. Figure 1 outlines the area searched and Table 1 summarizes the search effort. The period of 08 April to 12 May was spent working north and south from Clyde River, while 13 May to 28 May was spent near Broughton Island. A Bell 206B helicopter was used to search for polar bears. Most bears were located by tracking as densities were too low to utilize visual scanning efficiently. Search effort was concentrated over ice habitats such as floe edges and areas of drifted pressure ridges which have proved productive in previous studies. Areas of high track density were given particular attention during search time. Where ice floes were large and coherent enough, searches were made beyond the floe edge to distances of up to 130 km offshore.

Table 1. Summary of search effort for polar bears during April and May, 1981.

Area searched	Hours flown	Bears/hours flown
NW of Clyde River (250 km)	56.7	0.51
SE of Clyde River (125 km)	28	0.39
Home Bay Region	7.3	0.55
Broughton Island/Kivitoo area	25	0.88
Overall	117	0.56

Standard techniques of polar bear capture and handling were used (Lentfer 1968; Larsen 1971). Once polar bears were immobilized, they were marked with individually numbered polyurethane ear tags and were tattooed on the insides of both upper lips with a corresponding number. Data recorded for each bear included weight, sex, total length, chest girth and physical and reproductive condition. The first premolar was pulled for age determination. Each bear was painted with a number for subsequent identification from the air. Blood samples for blood chemistry, haematology and epidemology as well as hair samples for mercury analysis were taken from most bears.

Immobilization was accomplished with a combination of ketamine HCl[1] and xylazine HCl[2] administered intramuscularly at a dosage of 6 mg/kg of body weight (Lee et al. 1981). We also used carfentanil[3] for immobilization of some bears in two standard doses, 3.0 mg and 5.0 mg. Preloaded darts containing 3.0 mg carfentanil were administered to most bears other than cubs of the year (COY), while darts containing 5.0 mg were used to immobilize some larger bears. After tagging was completed, carfentanil drugged bears were given two narcotic antagonists to revive them. M5050[4] was administered subcutaneously at 0.35 mg/kg body weight,

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1 Ketamine, Parke Davis, Brockville, Ontario

2 Rompun, Bay Vet, Mississauga, Ontario

3 Carfentanil, Janssen Pharmaceutica, Beerse, Belgium

4 Revivon, Reckitt and Colman Pharmaceutical, Hull, Quebec

and naloxone[5] at 0.016 mg/kg . Approximately 1/3 of the naloxone dose was injected intramuscularly while the remainder of the drug was administered intravenously via the sublingual vein. Azaperone[6] was given at a standard dosage of 100 mg to bears other than cubs as a respiratory stimulant and muscle relaxant.

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5 Narron, Endo Labs, Baie d'Urfe, Quebec

6 Azaperone, Janssen Pharmaceutica, Beerse, Belgium

RESULTS AND DISCUSSION

Sixty-six polar bears (29 males and 37 females) were captured (Appendix A) over the period of 08 April to 21 May, 1981 (Fig. 2, Table 2). Eleven family groups were captured; 6 groups of 2 Cubs of the year (COY), 3 groups of 1 COY, 1 group of 1 yearling, and one group of 1 2-year-old. Nine of the 66 bears (Fig. 3) captured had been tagged previously for a 13% recapture rate. Three of the recaptured bears had been originally tagged south of Cape Dyer, Baffin Island (Stirling et al. 1980), 2 bears had been tagged on Boothia Peninsula (Schweinsburg et al. 1980) and 1 bear had been captured 8 months previously in the Clyde River area (Lee 1982). Although some tags had been damaged or lost, all bears were identifiable from their lip tattoos. Six bears marked in this study were resighted as the study progressed; 1 female accompanied by a COY was resighted twice and 4 single bears once. Two tagged bears were killed by local hunters 2-3 weeks after they had been captured. These bears were killed in the same general area where they had been tagged. All bears sighted were captured. Forty percent of the bears captured were found on flat landfast ice, 24% on rough landfast ice, 26% on the floe edge, 7% on rough offshore ice, and 3% on smooth offshore ice.

Originally we had anticipated capturing 100 or more bears, but after the first several days it became evident that this would be a problem. Very few bears were located by chance sighting; most captures required at least 15 to 30 minutes of tracking while some bears were tracked for an hour or more. The apparent low

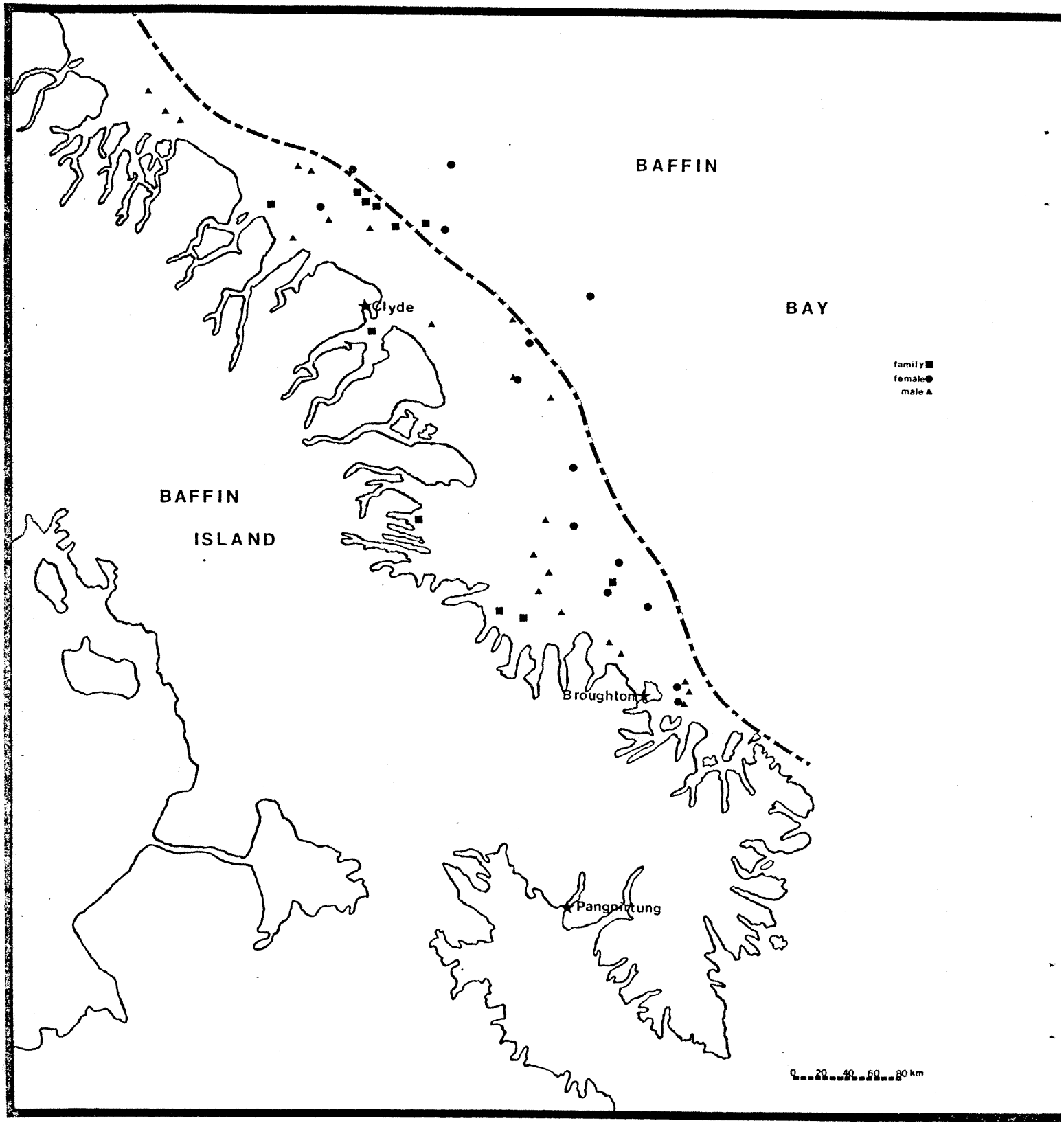

Figure 2. Capture locations of polar bears during April and May, 1981. Broken line indicates approximate location of floe edge.

Table 2. Age distribution of polar bears captured near Clyde River and Broughton Island during April and May, 1981.

Age	Males	Females	Males and Females
0	7	8	15
1	0	0	0
2	1	3	4
3	5	5	10
4	4	2	6
5	2	2	4
6	3	3	6
7	1	3	4
8	0	2	2
9	2	1	3
10	0	4	4
11	2	0	2
12	1	0	1
13	0	1	1
14	0	1	1
15	0	0	0
16	1	1	2
17	0	0	0
18	0	1	1
19	0	0	0
20	0	0	0
21	0	0	0
22	0	0	0
23	0	0	0
24	0	0	0
Total	29	37	66

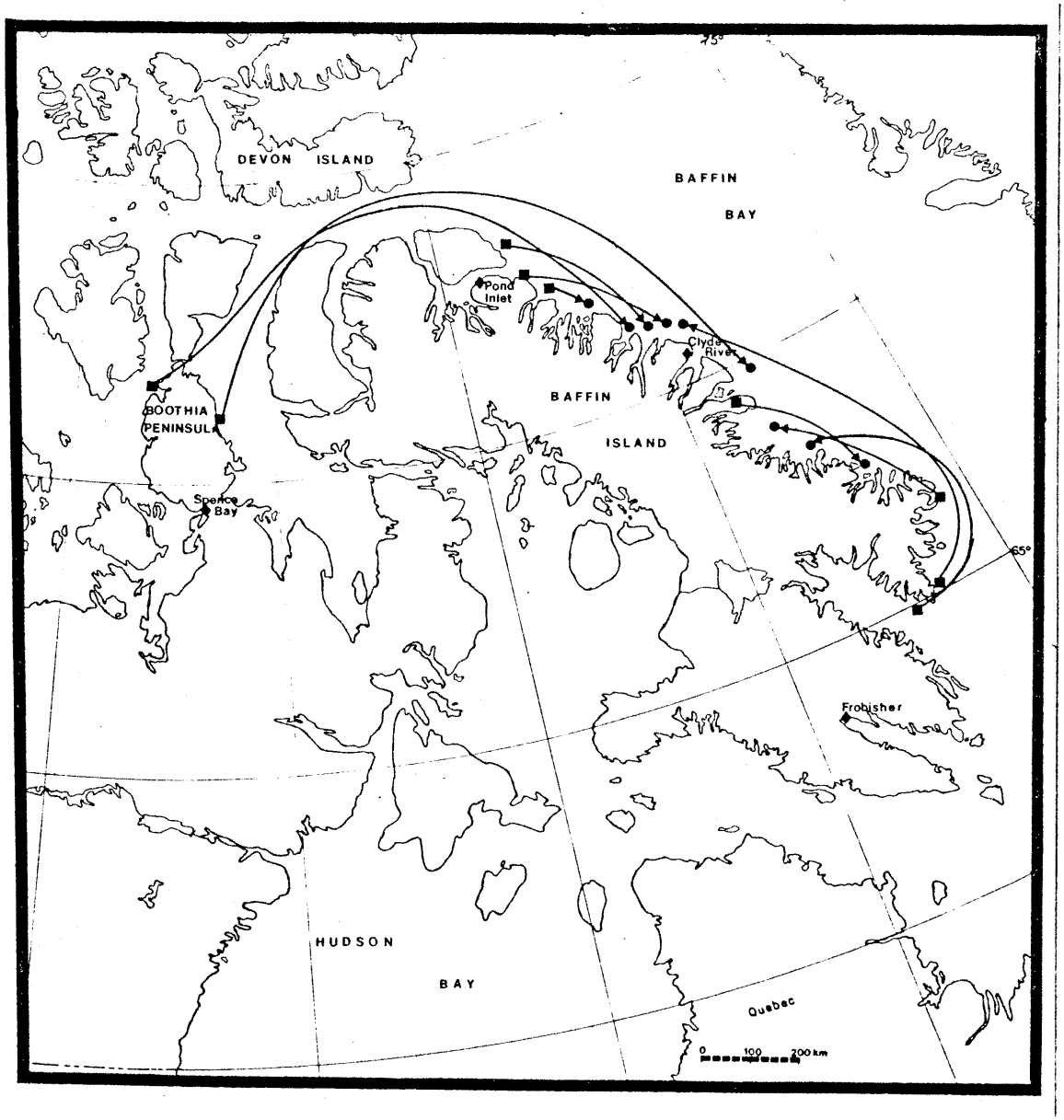

Figure 3. Capture and recapture locations of marked polar bears captured during April and May, 1981.

density of bears in the study area may be attributed to one or more factors: (1) 1981 may not have been a representative year and the concentration of bears was lower than normal; (2) conditions in Baffin Bay produce a thin dispersion of bears; or (3) the local people have traditionally hunted the bears in late summer and early fall when the animals are concentrated on shore and this may have led to overhunting and a population decline. Several flights were made out past the floe edge over the pack ice for a distance of about 130 km. No obvious change in bear density was evident.

There appeared to be a lack of estrous females in the capture samples. Only 3 of the 19 adult females were in estrus. The overall sex ratio was 0.81 (M/F), the adult sex ratio was 0.85 (M/F), and the cub sex ratio was 0.7 (M/F). There seemed to be a gradual increase in the proportion of males appearing in the sample as time went on (Fig. 4). This may have resulted from males moving onto the floe edge and landfast ice region to locate females for breeding.

Three bears died during the course of the study. One bear, although it lay down, failed to become immobilized after injection of 1900 mg each of ketamine and xylazine. When approached this animal charged and had to be shot (Appendix B). Two COY died after they had been abandoned by their mother. One of the cubs which had been caught in a fox trap near Clyde River, later died on the land, while its sibling died after being captured by the local people and sent south.

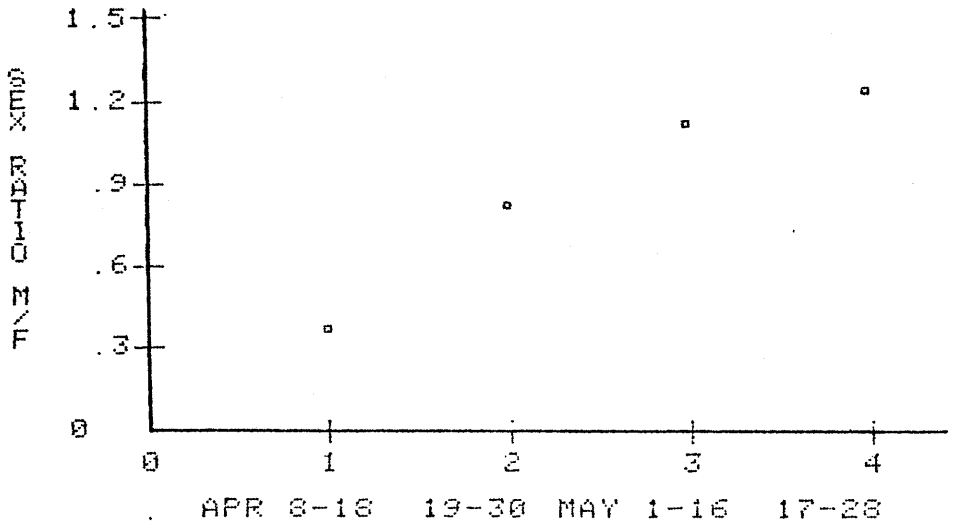

Figure 4. Sex ratio of captured polar bears during April and May, 1981 along the NE coast of Baffin Island.

We successfully immobilized 42 polar bears with ketamine and xylazine with a mean adult single injection dosage of 6.62±1.79 mg/kg (n=15) of each drug (Table 3). Adult induction times averaged 11.6±5.03 min (n=15) (Table 3).

Two of the bears immobilized with ketamine and xylazine convulsed for a short time (approximately 30 sec). One bear was a small subadult which received 3 injections (total 16.9 mg/kg)

Table 3. Summary of dosages and induction times for intramuscular administration of ketamine/xylazine and carfentanil to polar bears.

	Ketamine/xylazine		Carfentanil	
	Mean dose mg/kg	Mean induction in minutes	Mean dose mg/kg	Mean induction in minutes
Cub of the year	2.06±0.67	1.7±0.40 (n=9)	0.006±0.002	1.7±0.82 (n=6)
Adult dose single	6.62±1.79	11.6±5.03 (n=15)	0.019±0.006	5.1±3.48 (n=14)
Adult dose multiple	10.1±2.79	27.7±12.1 (n=17)	0.065±0.057	6.0±2.83 (n=3)
All adult	8.33±2.88	19.9±12.3 (n=32)	0.027±0.028	5.3±3.36 (n=17

before it was immobilized. The other bear was a large adult male which received 6.25 mg/kg of each drug. The small bear ran a considerable distance and was definitely overheated while the large bear did not walk any more than 100-200 yards over flat ice. The reaction of the bears to the drug was variable. This may be attributed to dart placement or insufficient mixing of the drug in the bottle prior to dart loading.

Twenty-three bears were immobilized with carfentanil at a mean adult single injection dosage of 0.019±0.006 mg/kg (n=14). Induction times for single administration averaged 5.1±3.5 min (Table 3) (n=14) and mean "up" times after injection of antagonist was 7.4±3.0 min (n=19). Time restraints prevented us from

checking bears the following day to determine if recycling of the drug was occurring as it had in fall 1980 (Lee 1982). Two bears which had been drugged with carfentanil were resighted several days later and appeared to be suffering no ill effects.

The general physical condition of captured bears appeared to be normal. No obese or emaciated bears were found. The average subjective fat index (1-5) was 2.3 ± 0.7 (n=65).

One adult female had some sort of skin disease which resulted in large bald scaly patches on her neck and back. Several skin samples were taken, some of which were frozen and others were fixed in 10% formalin. All samples were sent to the Western College of Veterinary Medicine in Saskatoon, Saskatchewan for analysis. Results of the analysis showed normal skin. Blood samples were analyzed for presence of antibodies to both Leptosporosis and Trichinella spiralis. All samples were negative.

ACKNOWLEDGEMENTS

We gratefully acknowledge the logistic support of the Polar Continental Shelf Project and the NWT Wildlife Service. Quasar Helicopters from Vancouver provided efficient and professional heicopter service throughout the study. Aiko Sutherland, of the NWT Wildlife Service, sectioned and aged all the polar bear teeth. The Animal Pathology Division of Agriculture Canada, Lethbridge, Alberta, examined blood samples for *Leptospirosis sp*, and C.E. Tanner of McGill University, analyzed blood samples for the presence of *Trichinella spiralis* antibodies. Special thanks to J. Haigh of the Western College of Veterinary Medicine for his expertise and cooperation in obtaining and testing carfentanil. Many thanks to Joe Tigullaraq, Field Services Officer, Clyde River and Jaco Newkingak, Wildlife Officer, Broughton Island, for their help and cooperation during our stay in their settlements. Ellen Irvine, NWT Wildlife Service, typed and assisted in the editing of this report.

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APPENDIX A. Summary of polar bears captured near Clyde River and Broughton Island during April and May, 1981.

Bear Number	Reason	Sex	Age	Date	Location	Lat.	Long.
X4512*	Recapture	F	6	Apr 8/81	8 miles E Scott Island	7110	07029
X4857*	Capture	M	COY	Apr 8/81	8 miles E Scott Island	7110	07029
X4858	Capture	M	5	Apr 9/81	10 miles N Cape Cargenholm	7155	07336
X4859	Capture	F	7	Apr 11/81	30 miles E Cape Henry Kater	6919	06537
X4860*	Capture	F	7	Apr 11/81	Mouth of Pitchforth Fiord	6856	06753
X4861*	Capture	M	COY	Apr 11/81	Mouth of Pitchforth Fiord	6856	06753
X4862*	Capture	F	COY	Apr 11/81	Mouth of Pitchforth Fiord	6856	06753
X4863	Capture	M	4	Apr 11/81	20 miles S Cape Henry Kater	6855	06616
X4864*	Capture	F	6	Apr 13/81	Ailsa Island	7018	06830
X4865*	Capture	M	COY	Apr 13/81	Ailsa Island	7018	06830
X4866*	Capture	M	COY	Apr 13/81	Ailsa Island (caught in fox trap)	7018	06830
X4867*	Capture	F	9	Apr 14/81	20 miles NE Cape Christian	7053	06740
X4868*	Capture	F	2	Apr 14/81	20 miles NE Cape Christian	7053	06740
X4869*	Capture	F	10	Apr 14/81	30 miles NE Cape Christian	7100	06730
X4870*	Capture	F	COY	Apr 14/81	30 miles NE Cape Christian	7100	06730
X4871*	Capture	F	COY	Apr 14/81	30 miles NE Cape Christian	7100	06730
X4872*	Capture	F	2	Apr 15/81	30 Miles NE Cape Christian	7108	06833
X4227*	Recapture	F	8	Apr 15/81	30 Miles NE Cape Christian	7108	06833
X4873	Capture	M	4	Apr 15/81	30 Miles NE Cape Christian	7106	06843
X4874*	Capture	F	6	Apr 18/81	50 miles NE Clyde River	7120	06848
X4875*	Capture	F	COY	Apr 18/81	50 miles NE Clyde River	7120	06848
X4876	Capture	F	3	Apr 19/81	50 miles NE Cape Christian	7115	06728
X4877	Capture	F	5	Apr 19/81	40 miles W Erik Point	7128	06952
X4878	Capture	M	4	Apr 19/81	40 NE Scott Island	7138	07000
X4879	Capture	F	10	Apr 26/81	60 miles E Clyde River	7031	06545
X4880	Capture	F	3	Apr 26/81	50 miles NE Clyde River	7100	06712
X4881	Capture	M	3	Apr 27/81	50 miles SE Clyde River	7019	06628
X4882	Capture	F	16	Apr 27/81	55 miles SE Clyde River	7016	06618
X4883	Capture	M	4	Apr 27/81	20 miles ESE Clyde River	7012	06715
X4886	Capture	M	2	May 2/81	15 miles E Erik Point	7100	07012

APPENDIX A. (continued)

Bear Number	Reason	Sex	Age	Date	Location	Lat.	Long.
X4884*	Recapture(X3660)	F	13[1]	May 2/81	25 miles NE Erik Point	7109	06850
X4885*	Capture	M	COY	May 2/81	25 miles NE Erik Point	7109	06850
X4997	Recapture	M	16	May 2/81	20 miles N Erik Point	7105	06912
X4887	Capture	M	7	May 3/81	20 miles NE Scott Island	7130	06950
X4888	Capture	M	5[1]	May 3/81	8 miles N Cape Hunter	7145	07230
X4889	Recapture(X4999)	M	9[1]	May 3/81	12 miles N Cape Hunter	7148	07257
X4890	Capture	F	4	May 10/81	15 milles E Cape Eglinton	7055	06739
X4891	Capture	M	11	May 12/81	15 miles E Cape Raper	6949	06633
X4892	Capture	F	14	May 12/81	15 miles E Cape Raper	6949	06633
X4893	Recapture(X4766)	M	6	May 12/81	30 miles E Cape Raper	6944	06553
X4894	Capture	F	18	May 12/81	40 miles NE Cape Raper	6851	06536
X4895	Capture	M	11	May 13/81	15 miles SE Cape Broughton	6736	06323
X5282	Recapture	F	7	May 16/81	10 miles SE Broughton Island	6727	06324
X4896	Capture	M	3	May 16/81	10 miles SE Broughton Island	6727	06324
X4897	Capture	M	3	May 16/81	15 miles SE Kivitoo	6750	06421
X4898	Capture	M	6	May 16/81	12 miles E Kivitoo	6756	06425
X4899	Capture	F	10	May 16/81	25 miles NE Kivitoo	6810	06409
X4900	Capture	F	4	May 16/81	30 miles NNE Kivitoo	6826	06417
X4901*	Capture	F	10	May 16/81	30 miles NNE Kivitoo	6919	06425
X4902*	Capture	M	COY	May 16/81	30 miles NNE Kivitoo	6919	06425
X4903*	Capture	F	COY	May 16/81	30 miles NNE Kivitoo	6919	06425
X4904	Capture	F	3	May 16/81	25 miles NNE Kivitoo	6815	06430
X4905	Capture	F	2	May 17/81	5 miles S Cape Searle	6709	06222
X4906	Capture	M	9	May 20/81	8 miles E Broughton Dew Line	6732	06324
X4907	Capture	F	3	May 20/81	10 miles E Broughton Dew Line	6735	06329
X4908	Capture	M	3	May 20/81	20 miles SSE Cape Hooper	6424	06615
X4909	Capture	M	3	May 20/81	17 miles NE Cape Hooper	6831	06610
X4910	Recapture(X4250)	M	12	May 20/81	20 miles ENE Cape Hooper	6843	06612
X4911*	Capture	F	8	May 20/81	6 miles E Pilektuak Island	6816	06625
X4912*	Capture	F	COY	May 20/81	6 miles E Pilektuak Island	6816	06625
X4913*	Capture	M	COY	May 20/81	6 miles E Pilektuak Island	6816	06625

APPENDIX A. (continued)

Bear Number	Reason	Sex	Age	Date	Location	Lat.	Long.
X4914*	Capture	F	5	May 20/81	N End of Manitung Island	6811	06538
X4915*	Capture	F	COY	May 20/81	N End of Manitung Island	6811	06538
X4916*	Capture	F	COY	May 20/81	N End of Manitung Island	6811	06538
X4917	Recapture(X3996)	M	3	May 21/81	20 miles WNW Kivitoo	6814	06517
L07073	M. Death	F	3	May 10/81	30 miles NE Scott Island	7130	0730

* Family groups

1 Derived age

APPENDIX B. Report on polar bear shot in self defence while tagging near Clyde River in May, 1981.

REPORT ON BEAR SHOT WHILE TAGGING NEAR CLYDE RIVER, NWT, 1981

By: R.E. Schweinsburg

On May 10, 1980, we located a bear approximately 30 miles NE of Erik Pt., Baffin Island. Over the next 34 minutes the bear was injected with 3 doses of ketamine/xylazine in the following doses (mg):

dart 1 - 1000/1000

dart 2 - 600/600

dart 3 - 300/300

Since the bear weighed 96 kg, she received over twice the required dosage for immobilization. During the tagging sequence the bear acted extremely aggressive to the helicopter, chasing it from excessive distances. Finally the bear slowed down and stopped where we could only see its head behind a pressure ridge. It looked like it took a step and fell, but when we landed where we had a better view, it raised its head and looked at the helicopter, then put its head down and for all appearances was anesthetized. I had the helicopter turned off, which is not normally done until the bear is checked, because we were low on fuel. We walked up to the bear, shouting as we went, until about 20 feet away, whereupon the bear lifted its head, jumped up and charged. There was no warning such as minute muscle movements that partially immobilized bears usually make when they hear one approaching. I ran, but tripped over a pressure ridge and clogged

my gun barrel with snow. The bear hesitated at this point, some ten feet away, and then resumed its charge. At this point I told John Lee to shoot, which he did, hitting the bear through the front shoulders. We skinned out the bear taking the skull, hide and ovaries. There was internal fat and some fat (less than a centimeter) covering the back. The bear was young (3-years-old) and had not been tagged before. The hide was turned over to the Clyde River, HTA.