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Some Characteristics of Polar Bears Killed during Conflicts with Humans in the Northwest Territories, 1976-86

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ABSTRACT. We examined 265 cases where polar bears were killed in the Northwest Territories as a result of bear-human encounters between 1 July 1976 and 30 June 1986. Age and sex of the bears, time of year and general circumstances of the cases were characterized. Subadult animals constituted 53% of the aged sample, and males accounted for 70% of the sexed bears. Subadult males represented 40% of known age and sex bears. Problem kills occurred throughout the year but were most frequent in the ice-free season (August-November). In 222 cases where circumstances surrounding the death were known, 63% were associated with Inuit on the land, 18% with settlements, 15% with industrial sites and 4% with research activities. Most problem kills (87%) were not included in the quota harvest. This mortality in excess of the quota may adversely affect some populations. Therefore, wherever possible we encourage the inclusion of problem bears on community quotas.

Key words: polar bear (*Ursus maritimus*), problem bears, bear-human encounters, Arctic, Northwest Territories

RÉSUMÉ. Nous avons examiné 265 cas où des ours polaires ont été tués à la suite de rencontres entre l'homme et l'ours, dans les Territoires du Nord-Ouest entre le 1er juillet 1976 et le 30 juin 1986. Nous avons caractérisé l'âge et le sexe des ours, l'époque de l'année et les circonstances générales qui entouraient chaque cas. Dans 53% des cas où l'âge a été déterminé, il s'agissait de jeunes adultes. Les mâles représentaient 70% des ours dont le sexe a été déterminé. Les jeunes adultes mâles représentaient 40% des ours d'âge et de sexe connus. Les mises à mort d'ours-problèmes avaient lieu tout au long de l'année, mais elles étaient plus fréquentes pendant la saison libre de glace (d'août à novembre). Parmi les 222 cas où les circonstances entourant la mort étaient connues, 63% étaient associés à des Inuit sur terre, 18% à des lieux d'habitation, 15% à des sites industriels et 4% à des activités de recherche. La plupart des mises à mort d'ours-problèmes (87%) n'étaient pas comprises dans les quotas de chasse. Cette mortalité qui dépasse les quotas peut affecter certaines populations de façon défavorable. Nous encourageons donc autant que possible l'inclusion des ours-problèmes dans les quotas de la communauté.

Mots clés: ours polaire (*Ursus maritimus*), ours-problèmes, rencontres entre l'homme et l'ours, Arctique, Territoires du Nord-Ouest

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INTRODUCTION

Encounters between polar bears (*Ursus maritimus*) and humans have been taking place in the Canadian Arctic since long before permanent northern communities were established or industrial activities began (McClintock, 1860). Circumstances that lead to the death of problem bears in such encounters include bears raiding food caches, damaging vehicles or equipment, attacking dogs or entering industrial sites, settlements or camps and endangering public safety.

The growth in population of most northern settlements and the continued interest in use of both renewable and nonrenewable resources in arctic Canada (Stirling and Calvert, 1983) will increase the numbers of humans living and working in polar bear habitat. Thus, the potential for an increase in polar bear-human encounters is high. Since 1981, the Northwest Territories (N.W.T.) Department of Renewable Resources (DRR) has been working to develop effective bear deterrents and establish public education programs (Bromley, 1987) to reduce the number of bear-human interactions.

Polar bears in the N.W.T. are harvested by Inuit and guided sport hunters under an annual community quota system. This quota is usually filled. In addition to the quota, a number of problem bears are also killed in the defense of life and property. The local Hunters' and Trappers' Associations (HTA) have the option of including these polar bears in their community quota allocation.

Bear-human encounters have long been a concern in national and provincial parks, and there has been considerable attention focused on problem black bears (*U. americanus*) and grizzly bears (*U. arctos*) (reviewed by Herrero, 1985). In contrast, little information has been presented in the literature on problem polar bears. Problem kills in and around Churchill, Manitoba, have been documented (Kearney, in press; Leonard, in press) and Fleck and Herrero (in press) characterized case histories of polar bear-human encounters to develop guidelines for human safety in Canada's northern parks. Currently no publication exists describing characteristics of polar bears killed during conflicts with humans in the N.W.T. This paper summarizes information on these bears for the period 1 July 1976 to 30 June 1986 and characterizes age, sex, season and general circumstances of the incidents. We deal only with bears that were ultimately killed and do not include those that left on their own initiative or were deterred.

METHODS

The data were derived from a number of sources: N.W.T. Renewable Resource Officer (RRO) reports and investigation files, reports from industry, the N.W.T. polar bear hunter kill return program and the shared federal, provincial and territorial polar bear data files.

When a problem bear is killed, an RRO investigates the incident, notes the sex of the animal and the circumstances leading to the kill, collects the lower jaw for aging and seizes the hide. However, in some cases where bears are killed in remote areas or by inexperienced people, all or part of this information may be lost and much of the detail surrounding the encounter is unknown. Data in this paper represent minimum numbers, since some kills may not be reported for fear of prosecution.

The N.W.T. DRR license year runs from 1 July to 30 June. For example, bears killed in the 1981/82 season were killed between 1 July 1981 and 30 June 1982. Information was sum-

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marized beginning in the 1976/77 season when an annual territorial polar bear harvest information collection program was initiated. During the first few years of the program emphasis was placed on collecting information for the quota harvest; problem bears received second priority. Beginning in 1979/80 equal effort was given to both.

We divided the data on encounters into four general categories or camp types. "Native" generally involved bear-human encounters that occurred in association with outpost camps (permanent camps consisting of one or two families living away from a settlement) and Inuit camping or travelling on the land. "Industry" included permanent camps such as mines, well sites, Distant Early Warning (DEW) line stations and temporary exploration camps. "Settlement" involved communities of at least 50 people living in permanent buildings on a long-term basis. The fourth category, "research," included activities associated with expeditions and scientific research in the North.

Ages of problem bears were determined using dental cementum analysis and were divided into three age classes: cubs 0-1 years, subadults 2-5 years, and adults 6 years and older.

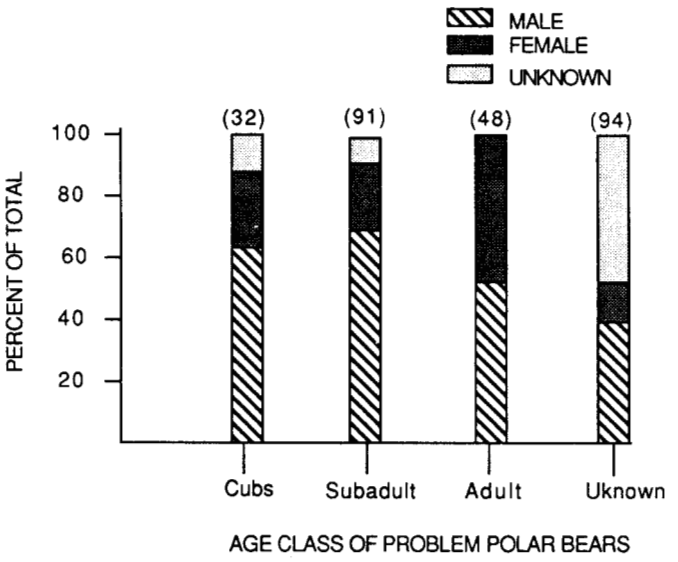

FIG. 1. Age and sex of problem polar bears killed in N.W.T., 1 July 1976-30 June 1986. Numbers in parentheses are sample sizes.

RESULTS

Between 1 July 1976 and 30 June 1986, 265 problem polar bears were reported killed in the N.W.T. (Table 1). In 1979/80, the number of reported kills increased dramatically. Over the 10 years, 35 bears (13.2% of total problem kill) were included in community quotas, an average of fewer than 4 bears each year.

A substantial proportion of problem kills where camp type was known occurred in association with the native camp type (Table 1). This was seen through all years, with the native camp category contributing 54-78% of annual problem kills.

Of the 265 bears killed, 171 (65%) were aged and 209 (79%) were sexed. Subadults constituted more than half (53%) of the aged sample of bears (Fig. 1). Males were killed more than twice as often as females, accounting for 70% of the sexed sample. In the cub and subadult age classes males were killed three times as often as females, although both sexes were equally represented as adults. Subadult males represented 40% of all known age and sex bears (n = 159), more than twice as many as any other single group. The distribution of age and sex classes of problem bears differed significantly from that of the quota harvest ($X^2 = 57.8$, $p<0.001$) and that found in bears captured during tagging studies ($X^2 = 84.0$, $p<0.001$) (Table 2).

Although problem bears were killed throughout the year (Fig. 2), the majority of kills occurred during the ice-free period between August and November (60%, n = 251) ($X^2 = 89.4$, $p<0.001$). October accounted for almost 18% of the bears killed. During all months males outnumbered females.

The relative proportion of problem kills in the four Government of the N.W.T. administrative regions in polar bear habitat is illustrated in Figure 3. The distribution of problem kills by region was not proportionate to the quota ($X^2 = 209.6$), $p<0.001$). The Baffin Region had approximately 43% of the quota but accounted for 71% of the problem kill.

DISCUSSION

The increased effort begun in 1979/80 to monitor the problem bear kill could account for the abrupt rise in the number of reported kills that season. Additionally, in 1978/79 the opening date for the quota hunt was changed in many areas from 1 October to 1 December, with the intention of protecting denning females. This delay in hunting may have resulted in problem

TABLE 1. Harvest quotas, camp types and problem bears killed in the Northwest Territories 1 July 1976-30 July 1986

				Camp type[1]				
Season	Quota	Problem kills	Kills off quota	Native	Industry	Settlement	Research	Unknown
1976/77	517	11	0	6	2	1	0	2
1977/78	530	15	1	6	3	0	1	5
1978/79	590	16	2	7	2	2	1	4
1979/80	580	43	1	19	7	6	1	10
1980/81	609	31	3	13	0	7	1	10
1981/82	614	39	9	25	5	7	1	1
1982/83	614	33	7	19	4	3	2	5
1983/84	614	21	3	11	3	3	3	1
1984/85	617	24	6	13	5	6	0	0
1985/86	575	32	3	21	2	4	0	5
Total	5860	265	35	140	33	39	10	43
Mean	586	26.5	3.5	14	3.3	3.9	1	4.3
Percentage of known camp types				63	15	18	4	

[1]See text for description of camp types.

TABLE 2. Percentage distribution of age and sex classes in problem kills (1976/77-1985/86), quota harvest (1976/77-1983/84)[1] and polar bears captured during tagging research (1976/77-1983/84)[1]

		Cubs		Subadults		Adults	
	(n)	M	F	M	F	M	F
Problem kills	(159)	12.6	4.4	40.0	13.2	16.4	13.8
Quota harvest	(3457)	3.4	2.7	29.7	19.6	27.4	17.2
Captured bears	(1628)	11.5	11.8	14.8	15.5	21.7	24.7

[1]Unpublished data from N.W.T. DRR and Canadian Wildlife Service.

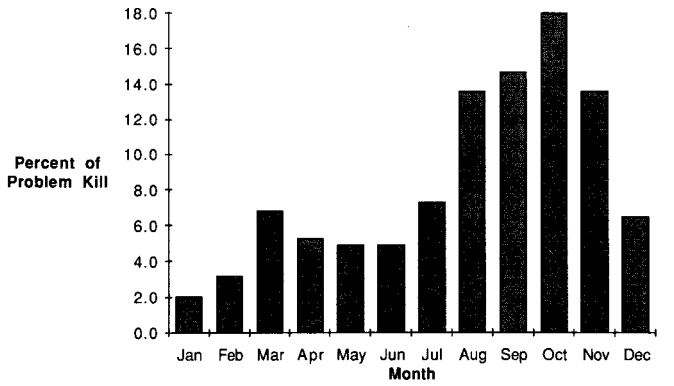

FIG. 2. Distribution of 251 problem polar bear kills by month, 1 July 1976-30 June 1986.

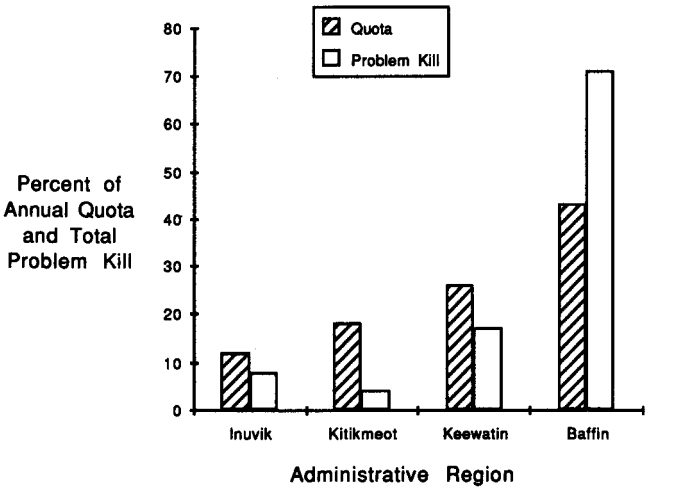

FIG. 3. Distribution of problem polar bear kills by Government of N.W.T. administrative regions, 1 July 1976-30 June 1986.

bears being killed that would have normally been harvested as a part of the regular quota. When we combined unpublished data from 1970/71 to 1975/76 with our sample, the mean annual proportion of problem bears killed in October and November increased from 15% before the season change to 32% after.

In general, polar bears spend the winter and spring (December-July) on the sea ice hunting and return to land during the ice-free period (August-November). During this latter period, the bears spend time in snow dens or day beds (Schweinsburg, 1979) and wandering shorelines. In some areas bears congregate in what are known as summer retreats (Stirling, 1974). If these areas overlap with human land use activity, there are likely to be more bear-human encounters. Although year-to-year variability exists, some areas have bear problems on a regular basis.

Between late August and early September the period of maximum open water begins and is followed by an abrupt rise in problem kills. The degree of this seasonal increase can vary depending on ice conditions and the timing of freeze-up. During early freeze-up bears will move offshore to hunt, while a late freeze usually results in more problem incidents (Kearney, in press). In the N.W.T., ice formation begins in sheltered bays and fiords by early October, but no substantial accumulation occurs until early November. As freeze-up progresses the number of problem kills decreases, until by January and February there are only isolated incidents.

Although annual problem kill varied, the proportion of kills among the four camp types remained similar each year. Including camps and settlements, 81% of problem kills took place in relation to native land use activities. There are 26 permanent Inuit settlements and approximately 50 active outpost camps in coastal N.W.T. Almost 50% of these are located in the Baffin region, many near polar bear winter feeding or summer retreat areas. This region averaged over 70% of the problem bear deaths.

The industry camp type accounted for a relatively small proportion of the problem bears (15%) killed during this study. Although there is no doubt that northern industrial development has some affect on polar bear-human encounters, not all encounters necessarily must lead to the death of a bear. As suggested by McCullough (1982), the use of proven deterrents (see Stirling, 1986) and an understanding of basic animal behaviour do provide alternatives for dealing with problem bear situations.

Although all age/sex classes were represented in the problem bear kill, the most common was the subadult male (Fig. 1). This pattern has also been observed for black bears (Rogers *et al.*, 1976; Singer and Bratton, 1980). Male-biased dispersal of subadults is not uncommon in species with polygynous mating systems (Greenwood, 1980; Dobson, 1982). Males also tend to be more aggressive (Tate and Pelton, 1980; Ramsay and Stirling, 1986), and subadult bears may be less cautious than older, more experienced animals. In addition, subadults may be nutritionally stressed more than older bears, since the body size, skill and experience required to catch seals efficiently takes time to develop (Stirling and Latour, 1978). This combination of characteristics probably contributes to the higher number of subadult males in the problem kill.

An average of 26 problem bears were killed annually during the 10-year study period. Although this kill represents less than 5% of the assigned quota for the same period, some areas did account for a disproportionate number of problem bears (Fig. 3). Given the low reproductive capacity of polar bears (Ramsay and Stirling, 1986; Taylor *et al.*, 1987), additional harvest from problem kills has the potential to affect a population adversely. Therefore, the problem bear kill should be considered when setting or altering quotas.

If all problem bears became part of a community quota, the total number of bears killed each year would be reduced. Over the study period only 13% of problem bears were included in the quota. This might be because a large number of the bears killed are subadults in summer and fall, resulting in small, unprime hides of relatively low dollar value. As well, the option

of including problem bears on quota may not have been widely known or promoted.

With proper training, equipment and experience, people will be better able to deal with problem polar bears, thereby reducing the number of unplanned bear mortalities. The realization and appreciation that polar bears are part of the arctic ecosystem may enable humans and bears to cohabit this environment successfully.

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REFERENCES

BROMLEY, M. 1987. Safety in bear country, a reference manual. Yellowknife: Northwest Territories Department of Renewable Resources. 104 p.

DOBSON, F.S. 1982. Competition for mates and predominant juvenile male dispersal in mammals. Animal Behaviour 30:1183-1192.

FLECK, S.E., and HERRERO, S. In press. Avoiding close encounters with polar bears. Bear-People Conflicts Symposium, Yellowknife, N.W.T., April 1987.

GREENWOOD, P.J. 1980. Mating systems, philopatry and dispersal in birds and mammals. Animal Behaviour 28:1140-1162.

HERRERO, S. 1985. Bear attacks, their causes and avoidance. Piscataway, New Jersey: Winchester Press. 287 p.

KEARNEY, S. In press. The polar bear control program at Churchill, Manitoba. Bear-People Conflicts Symposium, Yellowknife, N.W.T., April 1987.

LEONARD, R.D. In press. An analysis of polar bear-people conflicts on National Historic Parks and sites in the Churchill area. Bear-People Conflicts Symposium, Yellowknife, N.W.T., April 1987.

McCLINTOCK, F.L. 1860. The voyage of the Fox in the arctic seas: a narrative of the fate of Sir John Franklin and his companions. Boston: Ticknor and Fields. 357 p.

McCULLOUGH, D.R. 1982. Behaviour, bears, and humans. Wildlife Society Bulletin 10:27-33.

RAMSAY, M.A., and STIRLING, I. 1986. On the mating systems of polar bears. Canadian Journal of Zoology 64:2142-2151.

ROGERS, L.L., KUEHN, D.W., ERICKSON, A.W., HARGER, E.M., VERME, L.J., and OZOGA, J.J. 1976. Characteristics and management of black bears that feed in garbage dumps, campgrounds or residential areas. International Conference on Bear Research and Management 3:169-175.

SCHWEINSBURG, R.E. 1979. Summer snow dens used by polar bears in the Canadian High Arctic. Arctic 32:165-169.

SINGER, F.J., and BRATTON, S.P. 1980. Black bear/human conflicts in Great Smokey Mountains National Park. International Conference on Bear Research and Management 4:137-139.

STIRLING, I. 1974. Midsummer observations of wild polar bears. Canadian Journal of Zoology 52:1191-1198.

_____. 1986. Research and management of polar bears, *Ursus maritimus*. Polar Record 23(143):167-176.

_____ and CALVERT, W. 1983. Environmental threats to marine mammals in the Canadian Arctic. Polar Record 21(134):433-449.

STIRLING, I., and LATOUR, P.B. 1978. Comparative hunting abilities of polar bear cubs of different ages. Canadian Journal of Zoology 56:1768-1772.

TATE, J., and PELTON, M.R. 1980. Human-bear interactions in Great Smokey Mountains National Park. International Conference on Bear Research and Management 5:312-321.

TAYLOR, M.K., DeMASTER, D.P., BUNNELL, F.L., and SCHWEINSBURG, R.E. 1987. Modeling the sustainable harvest of female polar bears. Journal of Wildlife Management 51:811-820.