Research Note

Aerial strip surveys of polar bears in the Barents Sea

ØYSTEIN WIIG AND VIDAR BAKKEN

Wiig, Ø. & Bakken, V. 1990: Aerial strip surveys of polar bears in the Barents Sea. *Polar Research 8*, 309–311.

Aerial strip surveys of polar bears in the Barents Sea were performed by helicopter in winter 1987. The number of bears within 100 m on each side of the helicopter was counted. A total of 263.6 km^2 was surveyed and 21 bears were counted. Most of the bears were found in the southern part of the area, which indicates that the southwestern ice edge area in the Barents Sea is a very important winter habitat for polar bears.

Øystein Wiig and Vidar Bakken, Norsk Polarinstitutt, P.O. Box 158, N-1330 Oslo Lufthavn, Norway; *February 1990 (revised May 1990).*

The polar bear has a circumpolar distribution, and is confined to ice covered sea areas. The bears are, however, not evenly distributed but demonstrate habitat preferences (Stirling et al. 1981; Ramsay & Stirling 1986; Amstrup & DeMaster 1988). According to Larsen (1986), the polar bears in the Svalbard area are concentrated between the southern ice edge and 82°N. These borders change with the seasonal distribution of the drifting ice. No differences in distribution within this zone have previously been detected (Larsen 1972, 1986).

Lønø (1970) noted that the occurrence of polar bears in various areas around Svalbard is largely determined by the extension of the pack ice. Parovshchikov (1967) and Larsen (1986) state that the bears move southwestwards with the expanding winter ice. At Bjørnøya (74°30'N 19°00'E), which is at the very edge of the Svalbard pack ice area, most observations of bears occur during February and March (Larsen 1986).

In 1984 the Norwegian Government presented plans to open the Barents Sea from the Norwegian coast to 74°30'N and between 15° and 32°E for petroleum activities. The southern limit of the drift ice area in the Barents Sea overlaps this area. Polar bears in the southern part of the Svalbard area may be affected by such activity. The number of bears in the area is, however, not known.

Seabird surveys have been carried out in the area between 74° and 77°30'N and 19° and 32°E in the period 1986–1988 (Bakken & Mehlum 1988). During these surveys, mammals were also recorded. The data recorded during the winter surveys in 1987 suggest that this area is very important for polar bears in that part of the year.

Five surveys were conducted at different days in the period 28 February to 7 March from a Lynx helicopter. The speed during the surveys was approximately 160 kmph at an altitude of 60 m above sea level. All polar bears observed along a 100 m wide strip on each side of the helicopter were recorded by two observers in the rear seats. Two pilots in the front seats were also used as observers, particularly in front of the helicopter. Sighting marks on the windows were used to determine the transect width.

The surveys were haphazardly situated in the area. The target species of the survey was, however, not polar bears but birds. The area surveyed was selected in order to estimate bird densities in different distances from the ice edge and over different sea depth. The distance flown on any one survey was influenced by the weather conditions and the range of the helicopter. The flights were broken into several straight lines with a fixed course (Fig. 1). Data were recorded along each of these lines as samples from the area. Family groups were treated as one observation.

The extension of the ice in the area varied considerably during the survey period. The approximate ice edge one week before the surveys started and at the end of the survey period is

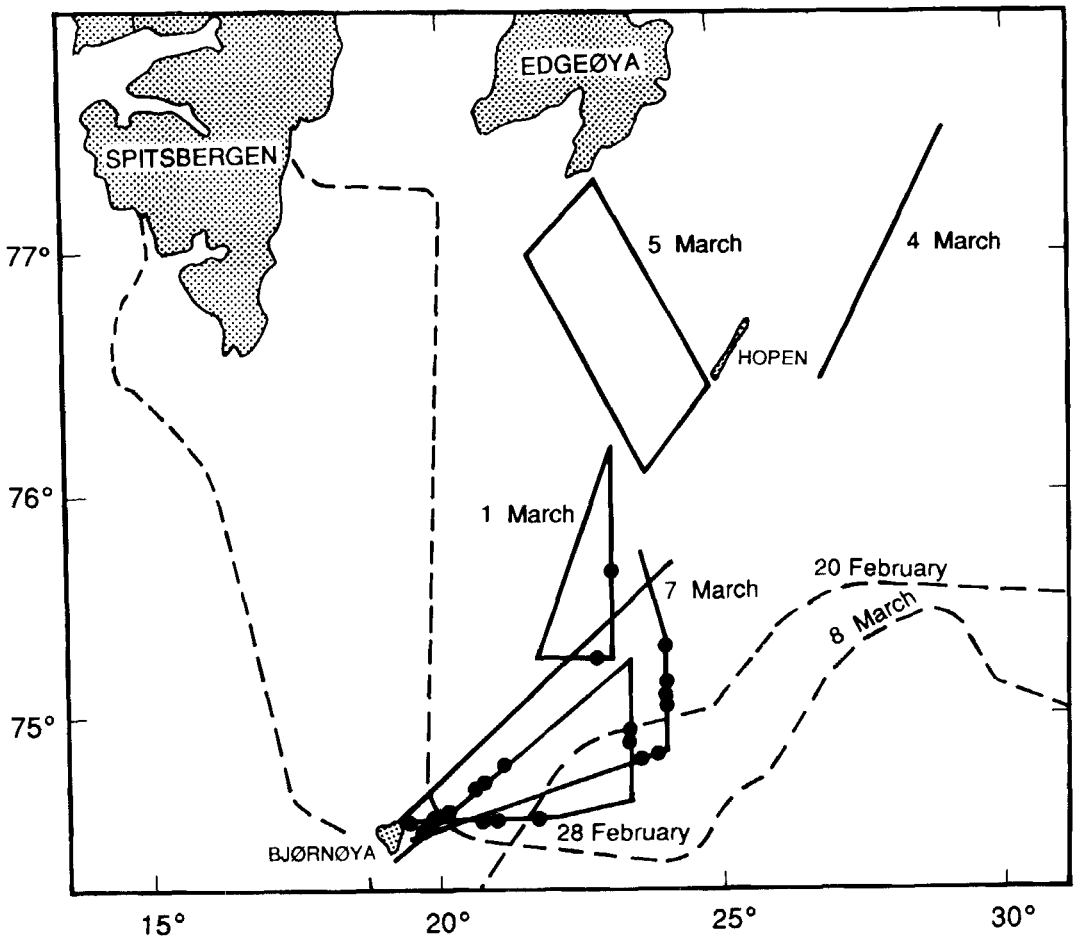

Fig. 1. Aerial strip surveys of polar bears in the Barents Sea in the period 28 February to 7 March 1987. The position of the survey lines (——) and each bear observed (●) are indicated as well as the approximate extension of the ice 20 February and 8 March (---).

indicated in Fig. 1. Flights over open water were not recorded as surveyed area.

Most of the bears (86%) were observed during the surveys performed near the ice edge (Table 1, Fig. 1), which covered less than half of the total survey area. No bears were observed during the two northernmost surveys, which covered about 35% of the total survey area.

Strip and line transect methods are commonly used to estimate the abundance of populations.

Table 1. Aerial strip surveys of polar bears in the Barents Sea in 1987. Strip width was 200 m.

Survey no.	Date	# bears counted	Area surveyed km^2	Density # bears/100 km^2
1	28 February	12	73	16.4
2	1 March	3	47	6.4
3	4 March	0	30	0
4	5 March	0	64	0
5	7 March	6	51	11.8

However, strip transects often result in biased estimates (Burnham & Anderson 1984) because the assumption that all objects on the strip are observed is not met. According to Caughley (1974), censusing from the air further increases the inaccuracies because the observer misses a significant number of animals on the transect. The number of bears counted must therefore be regarded as a minimum number.

According to monthly aerial surveys around Svalbard from March to October 1966 and 1967, no differences in abundance and distribution in relation to ice cover and quality were found (Larsen 1972). During ship surveys in summer seasons between 1967 and 1977 in the active ice zone south of 80°N, no significant differences in distribution and relative abundance of bears were found (Larsen 1986). Surveys in 1980 showed, however, that there were three to four times more bears south of 80°N than further north in July and August, which coincided with differences in ice conditions (Larsen 1986).

The results of the present study indicate that there is a concentration of polar bears near the southern ice edge in the Barents Sea in the winter. The density figures calculated further indicate that the concentration is very high. It is two to three times higher than the highest density given for the Barents Sea by Larsen (1986) and the highest densities indicated from Canada and Alaska (DeMaster & Stirling 1981; Amstrup et al. 1986). The sample design in the present study is questionable. Thus, confidence intervals for the densities and total number of bears in the area have not been estimated. Taking into account, however, that aerial surveys seem to underestimate the true number of objects in a strip transect, it seems that the southwestern ice edge area in the Barents Sea is a very important winter habitat for polar bears.

Acknowledgements. – We thank A. Derocher, University of Alberta, Edmonton, G. Garner, U.S. Fish and Wildlife Service, Anchorage, N. Øien, Institute of Marine Research, Bergen, and Mitch Taylor, Department of Renewable Resources, Yellowknife, for commenting on earlier versions of the manuscript.

References

Amstrup, S. C. & DeMaster, D. P. 1988: Polar bears. Pp. 39–56 in Lentfer, J. W. (ed.): *Selected marine mammals of Alaska: Species accounts with research and management recommendations*. Marine Mammal Commission, Washington.

Amstrup, S. C., Stirling, I. & Lentfer, J. W. 1986: Past and present status of polar bears in Alaska. *Wildl. Soc. Bull. 14*, 241–254.

DeMaster, D. P. & Stirling, I. 1981: *Ursus maritimus*. *Mammalian Species 145*, 1–7.

Bakken, V. & Mehlum, F. 1988: AKUP-sluttrapport. Sjøfuglundersøkelser nord for 74°N/Bjørnøya. *Norsk Polarinst. Rapport 44*, 1–179.

Burnham, K. P. & Anderson, D. R. 1984: The need for distance data in transect counts. *J. Wildl. Manage. 48*, 1248–1254.

Caughley, G. 1974: Bias in aerial surveys. *J. Wildl. Manage. 38*, 921–933.

Larsen, T. 1972: Air and ship census of polar bears in Svalbard. *J. Wildl. Manage. 36*, 562–570.

Larsen, T. 1986: Population biology of the polar bear (*Ursus maritimus*) in the Svalbard area. *Norsk Polarinst. Skr. 184.*

Lønø, O. 1970: The polar bear in the Svalbard area. *Norsk Polarinst. Skr. 129.*

Parovshchikov, V. Ja. 1967: Polar bears in Franz Josef Land. *Problems of the North 11*, 149–159.

Ramsay, M. A. & Stirling, I. 1986: On the mating system of polar bears. *Can. J. Zool. 64*, 2142–2151.

Stirling, I., Andriashek, D. & Calvert, W. 1981: *Habitat preferences and distribution of polar bears in the western Canadian Arctic*. Report prepared for Dome Petroleum Limited, Esso Resources Canadian Limited, and the Canadian Wildlife Service. Canadian Wildlife Service, Edmonton, Canada.