# THE EFFECT OF RADIO TRANSMITTER HARNESSES ON FREE-RANGING POLAR BEARS

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*Int. Conf. Bear Res. and Manage. 6:219–221*

Satellite transmitters attached to polar bears (*Ursus maritimus*) with harnesses have been used in Alaska, Canada, Svalbard, and Greenland (Lentfer et al. 1977, Kolz et al. 1978, Larsen 1981, Schweinsburg and Lee 1982, Taylor 1982). These harnesses appear to affect the behavior of polar bears. Therefore, telemetry data from harnessed bears may be biased.

The purpose of this paper is to summarize the information on the effects of radio harnesses on polar bears.

## METHODS

Just before 21 June 1978, 5 female polar bears with cubs were captured (Lentfer 1968, Larsen 1971) at Radstock Bay, Devon Island, Northwest Territories. The adults were fitted with simulated satellite transmitters held in place by a harness system. This system was identical to the transmitter harness used to attach the Nimbus-6 satellite transmitters (Fig. 1) except that we used RF transmitters (1.5 kg) on the 164–165 MHz band and the collars were constructed of fiber belting rather than the rigid, cast lexan housing (10.2 kg) used for the satellite collars (Kolz et al. 1978, Larsen 1981, Schweinsburg and Lee 1982).

From 21 June to 1 July and 11 July to 21 July 1978, we observed harnessed and non-harnessed polar bears at Radstock Bay, Northwest Territories, Canada. These observations were possible because polar bears in that area move from the unstable pack ice of Lancaster Sound to the more stable shorefast ice that persists in the bays throughout the summer (Stirling 1974, Stirling and Smith 1975, Stirling and Latour 1978, Smith 1980). Observations were made from a cliff-top cabin approximately 230 m above the sea ice, using 15–60 power telescopes. Behaviors were recorded to the nearest minute whenever the bears were in view. Because only females with cubs were harnessed, only observations of females with cubs are included in the analysis.

Hunting postures were divided into standing still hunting, sitting still hunting, and lying still hunting. Sleeping was distinguished from lying still hunting by posture and location (at a seal hole or not). All behaviors except hunting, sleeping, walking, sitting, standing, feeding, and grooming were pooled as "other." Chi-square was used to compare time budgets of harnessed and non-harnessed bears.

## RESULTS AND DISCUSSION

The polar bears seemed to readily adapt to the harness system. Except for the 1st few hours after capture, the bears gave no indication that they were aware of the collar or harness. For example, 2 harnessed females were observed fighting over a seal; neither bear appeared to be inhibited by their harness.

The 5 harnessed females were observed 115.8 hours and 8 non-harnessed females were observed 96.9 hours (Table 1). There were significant differences in the time budgets of harnessed and non-harnessed females (Table 1).

Harnessed bears spent about twice as much time hunting and about half as much time sleeping as non-harnessed bears. Harnessed bears killed twice as many seals and spent about twice as much time feeding as non-harnessed bears. Non-harnessed animals spent about 4 times as much time grooming, although the amount of time grooming was less than 1% of the total time budget for observed bears. Harnessed bears sat 10 times as much as non-harnessed bears. Harnessed bears killed 0.83 seals/day vs. 0.49 seals/day for non-harnessed bears. Harnessed bears killed 0.08 seals/hour of hunting vs. 0.09 seals/hour of hunting for non-harnessed bears.

The substantial difference between harnessed and non-harnessed bears in time spent sitting may be related to differences in feeding patterns. Most sitting behavior occurred during feeding; as bears became satiated, they sat and looked about before eating more. Therefore, the increase in sitting may be related to the increase in feeding noted for harnessed bears.

If the harness system irritated the bears, one might expect increased grooming activity among harnessed bears. However, we observed no such increase for harnessed bears. Most grooming occurred after feeding and was directed at cleaning the paws and face. It was not clear why harnessed bears spent more time

Table 1. Comparison of time (minutes) spent per behavior for harnessed vs. non-harnessed polar bears.

| | Non-harnessed | Harnessed | Chi-square |
|---|---|---|---|
| Kills/hour hunting | 0.0896 | 0.0806 | 0.1165[b] |
| No. kills observed | 2 | 4 | — |
| Hunting behaviors | | | |
| Lying still | 1214/20.9[a] | 2238/32.2[a] | 205.8[b] |
| Standing still | 121/2.1[a] | 702/10.1[a] | 336.8[b] |
| Sitting still | 4/0.07[a] | 37/0.5[a] | 19.8[b] |
| Walking | 1127/19.4[a] | 1734/25.0[a] | 56.4[b] |
| Lying-sleeping | 3096/53.2[a] | 1531/21.8[a] | 1331.8[b] |
| Sitting | 11/0.02[a] | 139/2.0[a] | 87.9[b] |
| Feeding | 65/1.1[a] | 174/2.5[a] | 32.4[b] |
| Grooming | 32/0.5[a] | 10/0.14[a] | 14.7[b] |
| Other | 145/2.5[a] | 381/5.5[a] | 70.9[b] |
| Total (minutes) | 5815 | 6946 | |

[a] Minutes observed/percent of total time observed.
[b] Significant at $\alpha \leq 0.001$.

feeding and less time grooming than non-harnessed bears.

I suggest that the harness package caused some minor irritation that precipitated active (hunting) rather than passive (sleeping) behavior. If some irritation was present, it may have been particularly bothersome when the bear was lying down. In support of this, harnessed bears spent substantially more time sitting still hunting than non-harnessed bears. Standing still hunting comprised 24% of the time spent hunting for harnessed bears vs. 9% for non-harnessed bears.

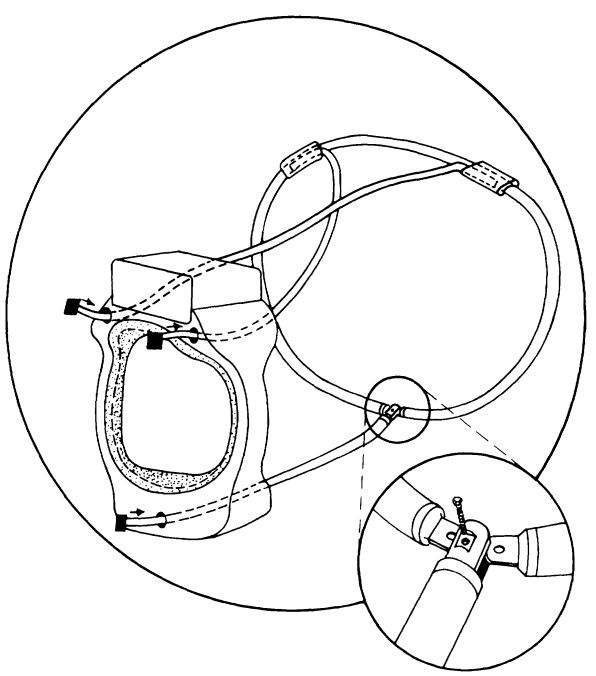

Fig. 1. The Nimbus-6 polar bear transmitter was a cast lexan collar that slipped over the bear's head and was held in place by a harness.

Two of the bears harnessed in Radstock Bay in 1978 were recaptured in June 1979, 11 months after initial capture (J. Lee, pers. commun.). This provided information on the long-term wear pattern caused by the harness system. One bear (bear X3189) still wore the collar portion of the harness and showed slight signs of wear on the fur around the neck but appeared unaffected otherwise. The 2nd bear (X4438) had lost its harness system. It showed slight signs of wear in the fur from the collar and harness and had a 20 cm scar behind the left shoulder. Bear X4438 and an accompanying yearling appeared in good condition.

Bear X4438 was recaptured in spring 1980. She had been through a summer molt and showed no sign of harness wear. No scars were reported, but the capture personnel did not search for scars. She was with a 2-year-old, and both animals were judged to be in good condition (J. Lee, pers. commun.).

Bear X5105, a female harnessed with a satellite transmitter collar in 1979, was recaptured on 30 April 1980. She had a fresh wound on her right rear flank. The 30 cm wound appears to have resulted when 1 of the shoulder cables failed and the harness was partially shed and dragged around. The girth cable acted as a belt holding the transmitter until it also failed.

A male polar bear (bear 430), harnessed with a satellite transmitter in the Greenland Sea in spring 1979, was killed by an East Greenland Inuit hunter (C. Vibe, pers. commun.). The hunter reported the

bear had no radio harness and showed no signs of injury from the harness.

*Acknowledgements.*—Financial support was provided by the U.S. Dep. of Int., Fish and Wildl. Natl. Lab.; Univ. of Minn.; Can. Wildl. Serv.; and the Dep. of Renew. Resour., Gov't of the N.W.T. Dr. Ian Stirling provided the opportunity to observe free ranging polar bears in the Canadian High Arctic. Drs. I. Stirling, R. Schweinsburg, and D. DeMaster initiated this project and harnessed the bears. Thanks to P. Mills and J. Pin for their clerical and editorial assistance. Special thanks to Pauline Smith who supervised the field observation portion of this study and introduced me to polar bear biology.

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