

# Polar Bear, *Ursus maritimus*, Predation on Belugas, *Delphinapterus leucas*, in the Bering and Chukchi Seas

LLOYD F. LOWRY,<sup>1</sup> JOHN J. BURNS<sup>1</sup> and ROBERT R. NELSON<sup>2</sup>

<sup>1</sup>Alaska Department of Fish and Game, 1300 College Road, Fairbanks, Alaska 99701

<sup>2</sup>Alaska Department of Fish and Game, Box 1148, Nome, Alaska 99762

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Two incidents of Polar Bear predation on Belugas which occurred off the coast of western Alaska in April 1984 are described. A single subadult Beluga was killed at a small lead in the Chukchi Sea, probably by a female bear with three cubs, and at least 40 whales were killed at an ice entrapment by one or more bears in the northern Bering Sea. A review of such occurrences off Alaska, Canada, and Eurasia indicates that Belugas are normal prey of Polar Bears. Bear predation may occur when whales are entrapped by ice or while unrestrained whales are passing through leads or surfacing at holes in deteriorating ice sheets. Bear predation probably has little effect on Beluga populations, although it may be of occasional significance at entrapments when many whales are killed that eventually would have been released. Belugas are large in comparison to other potential prey and may be of some local importance in Polar Bear diets.

Key Words: Polar Bear, *Ursus maritimus*, Beluga, *Delphinapterus leucas*, predation, Alaska.

Although it is generally recognized that Polar Bears, *Ursus maritimus*, may at times prey on Belugas (white whales), *Delphinapterus leucas* (e.g. Tomilin 1957; Kleinenberg et. al. 1964), there are no published records of such occurrences in the waters off Alaska. We present observations of Polar Bear predation on Beluga Whales in the Bering and Chukchi seas, describe the environmental circumstances surrounding the events, and discuss the possible significance of this phenomenon.

## Observations

During spring of 1984, a marine mammal research program was conducted in the eastern Chukchi Sea near Cape Lisburne, Alaska. Field operations included helicopter flights over the shorefast ice, flaw zone, and drifting pack ice. Below-normal temperatures prevailed in the area throughout the first part of April. The low temperatures followed almost a month of above-normal temperatures and resulted in continual freezing of leads. On 24 April open water areas appeared in the flaw zone and rapidly developed into an extensive lead system. Hundreds of Belugas were seen moving northward through the leads from 25 to 27 April. The leads were again mostly refrozen from 29 April to 3 May. During this period whales were occasionally sighted in small cracks and under thin ice. Impressions of Belugas, made when thin ice formed over the backs of stationary whales, were seen throughout the flaw zone. The leads reopened on 4 May and Belugas were seen moving northward from then until our observations ended on 13 May.

During a flight over the flaw zone on 27 April, we sighted a female Polar Bear accompanied by three one-year-old cubs. Blood was evident on the cubs' fur, so we circled to examine the area. A large Polar Bear was feeding on the carcass of a Beluga about 300 meters from the sow and cubs. We landed and examined the carcass and kill site (68°54.9'N, 166°48.5'W).

The carcass was on a large piece of thick ice that formed one edge of a lead that had numerous medium-sized floes adrift in it (Figure 1). With the exception of some very small openings, the area between the floes was filled with thin ice and slush. An obvious trail of blood led from the carcass to the edge of the lead where it ended in slush ice. It was unclear exactly where the kill had been made. However, when we later searched the area from the air, we located a patch of blood-stained snow and numerous bear tracks on a floe that was drifting slowly up the lead, about 150 meters from where the blood trail ended. The bear had apparently caught the whale from the drifting ice when the floe was against the edge of the lead, pulled the whale onto the floe, then dragged it onto the more stable ice.

The carcass was that of a young Beluga (standard length 230 cm), probably 2 years old. The skin and blubber had been entirely removed from the head and torso but was still intact on the flukes. A detached section of skin (about 60 by 100 cm) was near the carcass. All of the blubber had been chewed or scraped off that piece of skin. The chest and abdominal cavities had been opened but all organs

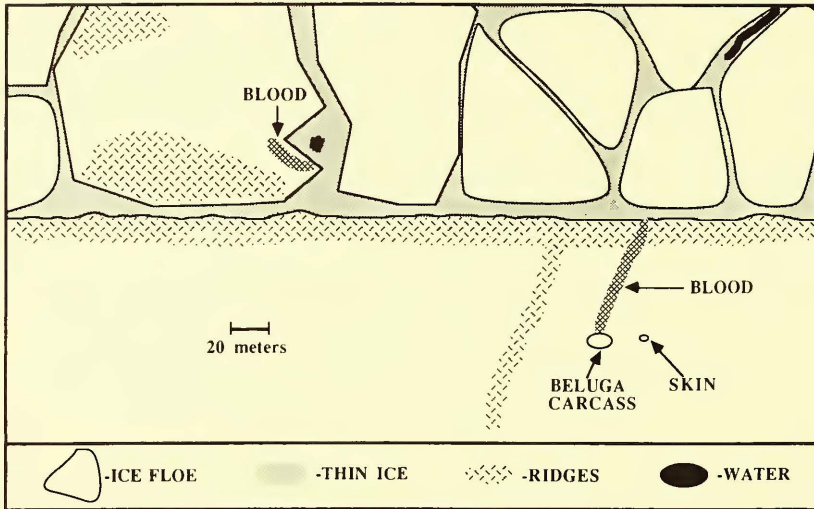


FIGURE 1. Diagram of the area where a Polar Bear killed a Beluga in the eastern Chukchi Sea, 27 April 1984.

were intact. Both front flippers and some ribs were missing, and the muscle of the axial skeleton had been removed to the bone. The lower jaw was broken. The carcass was not frozen although the air temperature at the time was  $-10^{\circ}\text{C}$ .

The second instance of predation also occurred in the spring of 1984. Bears and dead whales were first seen and photographed on 24 April from an airplane flying just south of Bering Strait, between Fairway Rock and Little Diomed Island (approximate location  $65^{\circ}41.5'\text{N}$ ,  $168^{\circ}45.0'\text{W}$ ). At that time it was reported that there were 15 Polar Bears and a large number of carcasses longer than 2 meters spread around a hole in the ice (John Fray, personal communication). A diagram of the situation was constructed from photographs (Figure 2). It was difficult to identify all Beluga carcasses because many were partially covered by drifting snow or obscured by ice ridges. Nevertheless, counts indicated a minimum of 40 Belugas on the ice, and an additional 12 to 15 possible carcasses. Most of the carcasses had been fed upon only minimally, and appeared to be of gray, subadult animals. Five bears visible in the photographs were all medium to large animals. The pilot reported that at the time of the sighting there were numerous leads nearby, and open water was visible in the photographs at a distance of about 1 km.

The kill site was observed again on 6 May by residents of Little Diomed Island (Little Sister Joseph Alice, personal communication). By that time the ice had drifted to a location about 4 km north of

Little Diomed (approximate position  $65^{\circ}48.2'\text{N}$ ,  $168^{\circ}54.0'\text{W}$ ). An estimated 30 Polar Bears were scavenging carcasses of Belugas that were scattered around the opening in the ice.

We also received reports of Polar Bear predation on Belugas in the southern Chukchi Sea in April 1984, but we were unable to document the circumstances through personal examination or photographs. The first report was from people snowmachining in the vicinity of Cape Thompson ( $68^{\circ}08'\text{N}$ ,  $166^{\circ}00'\text{W}$ ) who saw where Polar Bears had killed "at least" one Beluga (Roland Quimby, personal communication). The second report was from a pilot (David Furber, personal communication), who reported seeing numerous Belugas in two small holes in an area of extensive refrozen leads (approximate position  $67^{\circ}49'\text{N}$ ,  $165^{\circ}15'\text{W}$ ). Several Polar Bears and several dead Belugas were on the ice nearby.

### Discussion

Prior to 1984 we received few reports of Polar Bear predation on Belugas in the Bering and eastern Chukchi seas. On 26 March 1967, Robert Curtis saw a dead Beluga on the ice in the southern Chukchi Sea that he said had been caught and partially eaten by a Polar Bear (personal communication to Francis H. Fay). Nelson Walker, who for many years was engaged in guiding Polar Bear hunters in the central Chukchi, often saw small groups of Belugas entrapped by ice in the region west of  $168^{\circ}\text{W}$  longitude (personal communication). Bears hunted at



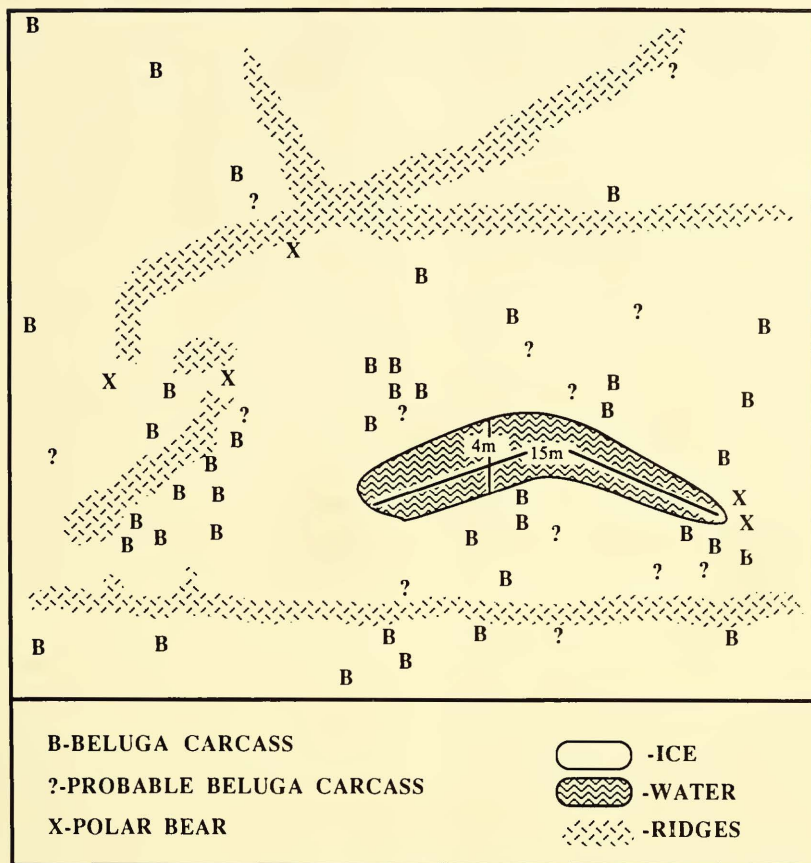


FIGURE 2. Diagram of the area where Polar Bears killed Belugas in the northern Bering Sea, April 1984.

many of the entrapments, and up to seven dead whales were seen. On 15 May 1979, in the northeastern Chukchi Sea near Point Barrow ( $71^{\circ}01'N$ ,  $157^{\circ}25'W$ ), Don K. Ljungblad (personal communication) saw four Polar Bears, two of which were feeding on a Beluga carcass, while a third was pulling a whale out of the water through very thin ice. The kills had been made at the north end of a narrow lead. An estimated 40 to 60 Belugas were milling about in a wider portion of the lead just to the south. Another occurrence was documented by a photograph in Mitchell and Reeves (1981) taken on 12 July 1975 in the Beaufort Sea approximately 110 km north of the Mackenzie River delta which shows a subadult Beluga lying on a deteriorating ice floe near a small hole. Two Polar Bears were feeding on the carcass when it was located, and numerous Belugas were seen a few kilometres away surfacing in holes in similar ice.

There are few reports describing interactions of Polar Bears and Belugas in the eastern Canadian Arctic. Degerbøl and Freuchen (1935) reported that bears were known to attack Belugas entrapped in ice in Baffin Bay. Freeman (1973) provided an interesting description of an event that occurred in March 1970 near the southeastern tip of Ellesmere Island. Local hunters reported that a medium-sized female Polar Bear had caught and removed three Belugas (one subadult, one adult female, and one adult of unknown sex) from a small open water area alongside a partially grounded iceberg. When Freeman visited the site some days later at least two other bears had been in the area, and two of the Beluga carcasses had disappeared, apparently having fallen into the water. Heyland and Hay (1976) examined a stranded juvenile Beluga in Cunningham Inlet, Somerset Island, that had deep, healed, parallel scars on the posterior

portion of the body that they thought were probably inflicted by a Polar Bear. They also noted that Polar Bears had once attacked captive Belugas being held in a tank at Churchill, Manitoba. Smith (1985), also working in Cunningham Inlet, reported nine sightings of Belugas with wounds that were ascribed to Polar Bears.

We are aware of only two published records of Polar Bear predation on Belugas in Eurasian waters, both from the vicinity of Novaya Zemlya. Tomilin (1957) stated that hunters there once found a group of 34 Belugas trapped near shore by ice. Three whales that had apparently been killed by bears were on the ice. Kleinenberg et al. (1964: p. 370) described an incident that occurred in 1940 as follows: "They saw that the bear was lying at the end of an ice floe with outstretched paws, and that the water in the hole was billowing with agitated Belukhas. As soon as a Belukha came to the surface near the bear, it received a crushing blow on the head, and the Belukha, weighing several hundred kilograms, was dragged on the ice. Thirteen Belukhas lay near the bear, but he did not cease killing."

These observations confirm that Polar Bears are capable of capturing and killing Belugas. Bear predation may occur in three basic environmental settings. The first is in situations where whales are entrapped in ice, which have been termed *savssats*<sup>1</sup>. Such entrapments may be of long duration — for example when whales fail to move to favorable areas prior to extensive freeze-up in the fall (Hill 1967<sup>2</sup>; Freeman 1968), or of short duration when the movement of whales is temporarily restricted due to ice conditions. The other two settings involve free-ranging Belugas moving through narrow lead systems (e.g. our observation from off Cape Lisburne) or surfacing in holes in deteriorating ice sheets (Mitchell and Reeves 1981). These settings are similar in that the whales' access to air is restricted to small areas of open water where bears can hunt more effectively.

Polar Bears and Belugas may also interact in shallow, ice-free areas, where many whales spend the summer. Smith (1985) made detailed observations in one such area (Cunningham Inlet), and considered that although opportunities for

predation do occur, bears are rarely successful in catching whales and Belugas therefore do not make up a significant part of their summer diet.

Predation at entrapments appears to be the most widespread and common type. However, Brodie (1982) observed that the travel patterns and establishment of settlements of Canadian Inuit have evolved such that they take advantage of locations where whales may become entrapped. This creates a bias in that reports of entrapment are more common near inhabited and travelled areas. Also, *savssat* are reportedly easy to detect due to condensing vapors from the open water and breathing of the animals (Porsild 1918), and the noise whales make when surfacing (Vibe 1950). The success of Polar Bears hunting entrapped Belugas is virtually assured, and large numbers of whales may sometimes be killed.

Predation that occurs at leads or holes in deteriorating ice may be much less easily observed for several reasons. An event is more likely to involve a single bear and a single whale, and evidence of the kill may be obscured by moving ice or drifting snow. Also, predation may occur far from villages or travel routes on the ice and will go undetected unless the kill site is seen from an aircraft at low altitude. It is likely that hunting success of bears attempting to catch free-ranging Belugas in the ice is relatively low overall. The probability of successful capture will vary with ice conditions and the abundance of whales and bears in specific areas. Belugas that migrate through the lead system off western Alaska on their way to the eastern Beaufort Sea number at least 11 500 (Davis and Evans 1982<sup>3</sup>). Their migratory path passes through areas where we have regularly observed large numbers of Polar Bears. In our opinion, successful predation by bears on Belugas in the northern Bering and Chukchi seas probably occurs annually during the spring migration, simply because of the numerous opportunities for such interactions. In 1984, warm temperatures during March allowed the northward migration to begin as usual. Cold temperatures during April impeded the migration, causing some temporary entrapments, and also resulted in large aggregations of whales which passed Cape Lisburne in pulses when the leads were open. These conditions

<sup>1</sup>Porsild (1918) described ice entrapment of marine mammals and introduced the anglicized Greenland Inuit term *savssats* (pronounced s'sets) into the scientific literature. According to Schultz-Lorentzen (1927) *savssat* is plural and refers to "whales or seals locked in a hole in the ice." The singular *savssaq* refers to one entrapped animal. In Alaska the equivalent words used by Inuit living in the area from Bering Strait to Point Hope are *sapraq* (singular) and *saprat* (plural).

<sup>2</sup>R. M. Hill. 1967. Observations on beluga whales trapped by ice in Eskimo Lakes winter 1966/67. Inuvik Research Laboratory Report, Inuvik, N.W.T.

<sup>3</sup>Davis, R. A., and C. R. Evans. 1982. Offshore distribution and numbers of white whales in the eastern Beaufort Sea and Amundsen Gulf, summer 1981. Report by LGL Limited, Toronto, Ontario, for SOHIO Alaska Petroleum Co. Anchorage, Alaska, and Dome Petroleum Limited, Calgary, Alberta. 78 pp.



may have enhanced the success of Polar Bears hunting Belugas.

Without further quantification, it is not possible to fully assess the significance of bear predation on populations of Belugas. Predation at leads and holes may involve mostly subadult whales, and is probably infrequent and of minimal significance. At entrapments, on the other hand, bears may kill many animals, both subadults and adults. In situations where whales would have perished due to prolonged entrapment in severe ice conditions during winter, predation would not increase the level of mortality but only change the cause. In situations where whales would have escaped from temporary entrapment, mortality due to predation would be additive. Since people hunt *savssat* there is little information on natural survival (Mitchell and Reeves 1981). It is, however, inappropriate to assume that all such confinements are fatal, as there is evidence that even after long periods of entrapment whales may survive and eventually escape to more favorable areas (Vibe 1950; Freeman 1968). Based on the photographs we examined, whales entrapped in the northern Bering Sea in 1984 would have escaped when nearby leads opened.

A final consideration is the possible importance of Belugas in the diet of Polar Bears. The prey of Polar Bears in the Canadian Arctic is primarily the Ringed Seal (*Phoca hispida*) and, secondarily, the Bearded Seal (*Erignathus barbatus*) (Stirling and Archibald 1977; Smith 1980). There have been no comprehensive studies of the diet of Polar Bears in Alaska. During our operations at Cape Lisburne in April-May we examined seven Polar Bear kill sites. In addition to the Beluga already described, those included two Ringed Seals, three Bearded Seals, and a group of five eider ducks (*Somateria* sp.). Best (1977) estimated that a Ringed Seal weighing 27.8 kg could supply the energy requirements of a 229 kg Polar Bear for 6.4 days. Assuming that the composition of the animals is similar, an average Beluga, which may weigh 600 kg, could provide the equivalent of 140 days of nourishment. Our observations, and those of others, indicate that when many Belugas are killed they are only partially eaten, while when only one whale is caught it may be entirely consumed. While the potential importance of Belugas in the diet of Polar Bears is clearly large, due to the difficulty of hunting free-ranging whales and the sporadic nature of *savssat*, this importance is probably rarely realized. It is possible, however, that the hunting strategy of Polar Bears in some areas may take advantage of places favorable for capturing Belugas. There are also several records of Narwhals (*Monodon monoceros*) found dead on the ice, presumably due to predation by

Polar Bears (Mitchell and Reeves 1981). Both Belugas and Narwhals should be considered as components of the diet of Polar Bears, with their importance, relative to other prey species, depending on environmental conditions and patterns of distribution and abundance.

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