

Predation of Belugas and Narwhals by Polar Bears in Nearshore Areas of the Canadian High Arctic

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ABSTRACT. On 18 August 1988 we found four narwhals and two dead belugas stranded on a low beach at Creswell Bay, Somerset Island. All of the narwhals and two of the belugas had been attacked and partially eaten by polar bears. At Cunningham Inlet, where belugas concentrate in large numbers, we have noted ten strandings over the period 1980-88, without bear predation on these occasions. One bear, hunting from an ice floe in deep water at Cunningham Inlet, killed two sub-adult belugas in July 1985. Belugas seem to exhibit curiosity towards swimming polar bears that might serve to drive bears out of the area and reduce the risk of predation. The potential large summer food resource for bears represented by odontocete whales in the High Arctic Archipelago seems to be underutilized. The timing and location of beluga concentrations are known and dates of probable strandings are somewhat predictable, which might allow us to assess the extent of bear predation on whales in the future.

Key words: beluga, narwhal, polar bear, predation, Arctic

RÉSUMÉ. Le 18 août 1988, nous avons trouvé quatre narvals, dont deux qui étaient encore vivants, et deux bélugas échoués sur une plage à la baie de Creswell. Ils avaient été attaqués et partiellement dévorés par les ours polaires. A Cunningham Inlet, où se groupe un grand nombre de bélugas à l'été, nous avons remarqué dix échouages durant la période Juin - Août de 1980 à 1988. Durant ces incidents, il n'y a eu aucune mortalité causée par les ours polaires. Un our chassant des morceaux de glace flottant dans les eaux profondes de Cunningham Inlet a tué deux veaux bélugas en Juillet 1985. Les bélugas en groupe montrent une curiosité envers les ours blancs qui nagent dans la mer. Ceci pourrait servir à éloigner les ours et réduire le risque de prédation. Le grand nombre d'odontocé habitant cette région de l'arctique pourrait être une ressource alimentaire estivale importante pour les ours polaires, mais elle est apparemment sous-utilisée. Nous connaissons les saisons et les endroits d'aggrégation des bélugas et les dates probables d'échouage en rapport avec l'amplitude des marées. Ceci pourrait nous permettre, dans le futur, d'évaluer les taux de prédateurs par les ours polaires.

Mots clés: béluga, narval, our blanc, prédation, Arctique

INTRODUCTION

Polar bears, *Ursus maritimus*, are large, powerful predators that sometimes attack and kill species such as the walrus, *Odobenus rosmarus* (Kiliaan and Stirling, 1978) and the bearded seal, *Erignathus barbatus* (Stirling and Archibald, 1977; Smith, 1980), which can be heavier and larger than themselves. During the summer polar bears sometimes attempt to take belugas, *Delphinapterus leucas*, in shallow waters, but apparently with very little success (Smith, 1985). Most of the reported successful kills of belugas are based on sightings of bears feeding on whale carcasses around ice holes (*savsatts*) or leads where the whales had become entrapped (Freeman, 1973; Lowry *et al.*, 1987).

Along the south coasts of Cornwallis and Devon islands and around Somerset Island in Barrow Strait, belugas and narwhals, *Monodon monoceros*, are abundant during July and August. Although ice cover varies from year to year, large expanses of open water allow both species access to the nearshore areas. Belugas concentrate in Creswell Bay (72°48'N, 93°18'W) and Cunningham Inlet (74°05'N, 93°45'W) (Fig. 1). Narwhals prefer deeper water than belugas and are frequently sighted in considerable numbers somewhat offshore from the belugas in Creswell Bay, Prince Regent Inlet and Peel Sound (Smith *et al.*, 1985).

Because of the low density of polar bears and the large distances of uninhabited coastlines where they hunt, there are few documented accounts of bears killing whales. In 1988 we found one area in Creswell Bay where bears had attacked stranded narwhals and belugas (Fig. 1). At Cunningham Inlet between 1980 and 1988, we witnessed bears stalking belugas

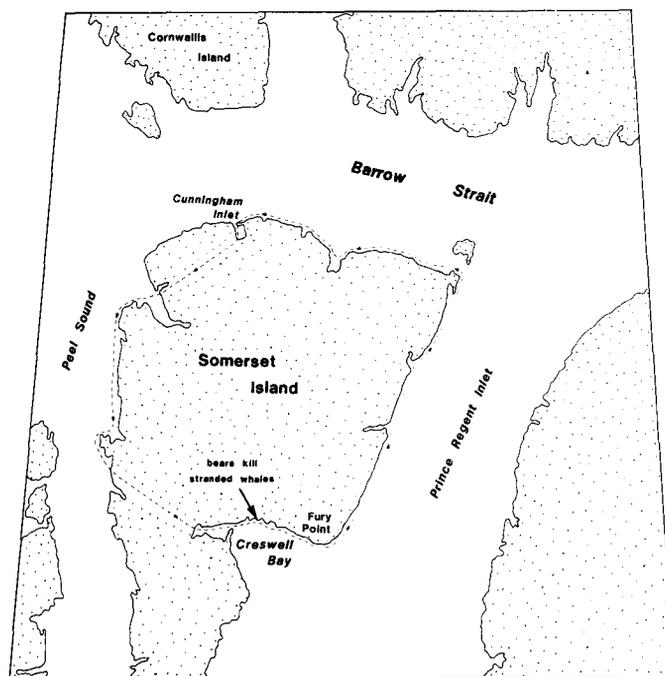


FIG. 1. Study area showing main areas of beluga whale concentrations and location of stranded whales (--- helicopter flight path).

in shallow water and making two successful kills of sub-adult whales in deeper waters. We describe the hunting strategies and kills, along with some interactions of polar bears and belugas in the water.

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METHODS

In 1988 opportunistic coastal surveys were made using a Bell 206 helicopter flying at heights from 170 to 330 m at 140 km/h. Flights paralleled the coastlines approximately 500 m offshore, with the forward observer sitting on the left side and the rear observer on the right side of the helicopter. All whales seen were counted. When bears or carcasses of whales were sighted, we circled at low altitude and landed to examine the kills.

Observations of polar bear-beluga interactions were made from 1980 to 1988 during the period early July to mid-August at Cunningham Inlet on the north coast of Somerset Island. All of the bear sightings were made from an observation hut located 32 m above sea level on the west side of the inlet. A detailed description of the study area is given by Sjare and Smith (1986). Observations were aided by the use of Bushnell 25 to 40 × power telescopes and 7 × 35 mm binoculars.

RESULTS

Attacks on Stranded Whales

On 8 August 1988 at Creswell Bay (72°48'N, 93°18'W) on eastern Somerset Island we sighted eight polar bears and several whale carcasses from the helicopter. There were two female bears with two yearling cubs each, two presumed adult male bears, five belugas and four narwhals, including a neonate. Two of the three adult female narwhals were still alive (Fig. 2:specimens 2 and 4) on dry land approximately 200 and 150 m from the ocean. All three adult narwhals bore

extensive claw marks and the blubber had been stripped dorsally from the head area about 150 cm back toward the caudal peduncle. Though severely wounded, the two live narwhals gave vigorous exhalations and thrashed with their tails when we touched them.

The two dead belugas (Fig. 2:1 and 5) were almost totally eaten and probably had been killed several days before the narwhals. Gulls had scavenged the remains for some time. All the narwhals might have been stranded or driven ashore at the same time. The carcass of the neonate narwhal, which evidently had been dragged inland, appeared to be as fresh as those of the adult female narwhals (Fig. 2:6).

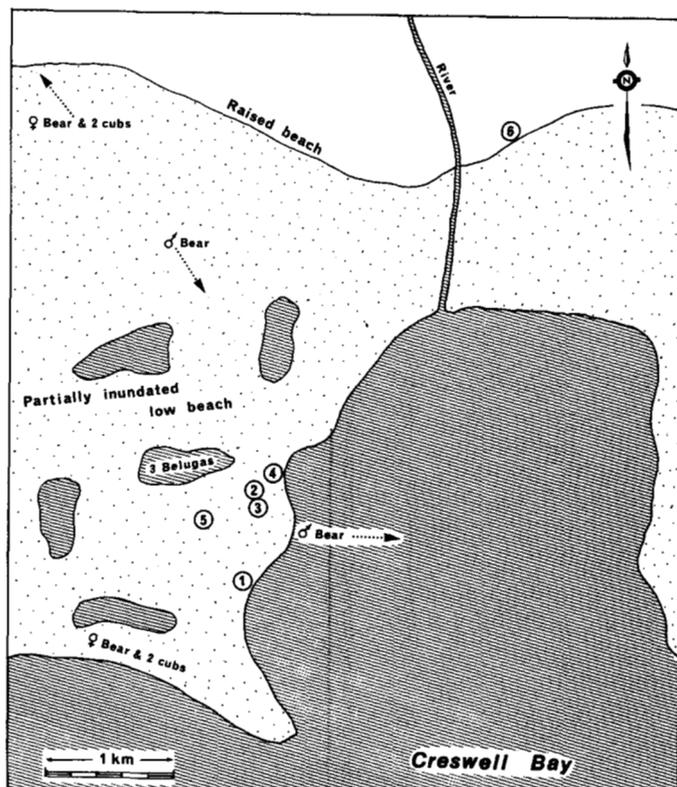
Two adult belugas and one calf estimated to be two-thirds the length of the large whales were still alive and entrapped in a tidal pool about 300 m from the adult narwhal carcasses (Fig. 2). The water was about 2 m deep, allowing them sufficient room to swim and submerge completely.

When we returned by helicopter the following day there were no bears in the immediate area, but we sighted one large bear about 5 km to the east along the beach. The three live belugas were still active and remained entrapped in the tidal pool. We could not land because of extreme high winds. If the whales had become entrapped during the series of high tides that occurred from 29 July to 1 August, they would probably not have been able to get free until the next high tides, which occurred on 28-30 August. The fate of these animals remains unknown.

Attacks and Kills of Belugas in the Water

On 13 July 1985 at 13:20 a large polar bear, presumed to be a male, was observed by telescope walking on ice floes that had drifted in along the eastern shore of Cunningham Inlet. The bear stayed throughout the afternoon at the edge of a floe and watched the whales swimming close by. At 21:35 the bear made an unsuccessful aquatic stalk (Stirling, 1974) of a bearded seal that was lying on an ice floe. Subsequent hourly observations indicated that the bear stayed at the edge of the original ice pan throughout the night and early morning hours. During this period the ice pan drifted to a position 1.0 km from the main river channel and approximately 1.5 km from the observation point. Between 05:40 and 06:30 the bear presumably jumped into the water and killed a 200-250 cm long beluga calf (Fig. 3:1). At 06:30, when we first observed the estimated 140-250 kg calf (D.W. Doidge, Arctic Biological Station, unpubl. weight-length data) on the ice pan, the bear had already eaten some skin and blubber on the back. Feeding continued until 08:15, after which time the bear fed intermittently. At 11:41 the bear dragged the carcass into the water, swam with it for a short distance and then pulled it back up onto the same ice floe. Only a little blubber and skin remained on the tail stock of the beluga carcass. At 14:00 he abandoned the carcass and walked across several ice floes to a location approximately 500 m from the west shore of the inlet. He lay down near the edge of an ice pan and slept continuously for 23 hours.

At approximately 16:00 on 15 July the bear resumed watching whales surfacing near the edge of the ice floe. Between 17:40 and 17:43 he again captured a 200-250 cm beluga calf (Fig. 3:2). We did not observe the actual capture, but we heard a loud splash, which we interpreted as the bear leaping into the water from the ice floe.



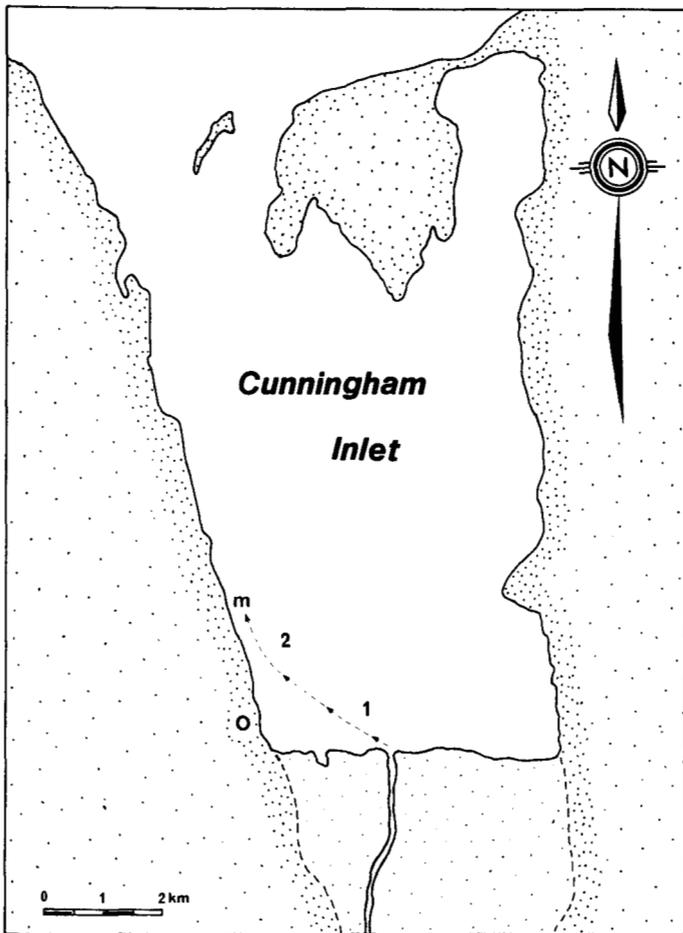


FIG. 3. Location of bear kills of beluga calves (#s 1, 2) on 13-15 July 1985 and path of movement of belugas toward a swimming bear on 30 July 1983 (O = observation hut; M = mobbing site).

The bear climbed back onto the ice pan, dragging the calf by the head, then secured the carcass with a forepaw and immediately began to bite the head and neck. The beluga calf raised and lowered its flukes several times and ceased movement at 17:57. The bear ate steadily from the carcass until 19:30, slept until 09:40 the next morning and began to eat again. At 11:15 he abandoned the kill and walked along the ice pans about 500 m to the east and again started watching the whales swimming past the edge of the ice pan. At 11:30 a mixed-age group of 15-20 belugas swam within 3 m of the ice and the bear lunged into the water without apparently making contact. He swam for the next 42 minutes northward, following the whales and making 11 surface dives near them. Whales with young calves stayed in the immediate area of the bear and appeared to swim along with him. At 12:13 the bear climbed out onto an ice pan and the whales continued to swim north.

Throughout this episode, a female bear and two one-year-old cubs were sighted feeding at the first carcass, while the presumed male slept by the second carcass. There were no interactions observed between the bears since the female and cubs were usually 0.5 to 2.0 km from the male. When the male bear left the second kill at 11:15 on 16 July, the female and cubs immediately moved to it and started feeding on the remains. At 14:30 they left the whale carcass and disappeared to the

north. Most of the blubber and parts of the muscle and viscera had been eaten from the carcass.

Interactions of Bears and Belugas in the Water

On three occasions we have seen belugas swimming in close proximity to polar bears. At Cunningham Inlet on 30 July 1983, a medium-size bear was scared into the water by us after he had come too close to our camp. The bear entered the water well away from any belugas and began swimming north out of the inlet about 100 m parallel to the west shore. It had swum about 1 km when it encountered a group of 20 belugas. At 10:41 we observed all of the approximately 100 belugas located at the mouth of the main channel make a coordinated group movement that brought them to the location of the bear. They covered the distance in about 3-5 minutes (Fig. 3).

As they approached they formed a semi-circle around the bear, which stopped swimming and began to turn around in the water. The whales maintained a 10-15 m distance, but occasionally an adult whale would approach to within 1-2 m. Eventually the whales appeared to cause the bear to move into the shallow water along the shore, where it remained in a sitting position watching the whales for several minutes. Once the bear was on the shore some of the whales returned to the river mouth, while others moved into the shallow bay directly in front of the observation hut. Four large adult whales remained 15-20 m from shore and followed the bear as it walked along the land. The bear paid no attention to them.

A similar incident at Cunningham Inlet was observed on 29 July 1988. A sub-adult bear was seen crossing the delta eastwards towards our camp. It made several unsuccessful attempts at stalking whales at the mouth of the river channels by wading into the water and moving towards the whales very slowly while standing on its hind feet. After the bear had arrived in front of our camp, it began walking north along the west coast of the inlet on the gravel beach. There were belugas all along the west side of the inlet very close to the shore. One of us followed the bear to observe it with binoculars. After walking out to the end of a small point of land, the bear continued in its northward direction parallel to the beach by wading into the water and swimming in a directed manner.

A group of 10-12 large belugas in the area approached the bear and made close underwater passes within 1-2 m of the bear while exhaling air, which burst as bubbles near him. The whales appeared to dive synchronously and reappear at the surface at about one-minute intervals. More than one whale approached the bear, which turned in the water several times in response. On one close pass by a whale or whales, the bear dove underwater and remained submerged for about 10 seconds. The flukes and tailstock of a large grey beluga were then seen to emerge, with the bear reappearing almost simultaneously beside it. The bear continued swimming in its original direction and the whales again appeared near it after some 2-3 minutes. Again on a close pass by the whales the bear made a surface dive and remained underwater for about 15 seconds. There was some thrashing just under the surface and the bear came up shaking its head. No blood was seen on either occasion, but we assumed that the bear was attempting to make contact with the whales. Shortly after that the bear headed into the nearest shoreline, about 150 m away. While

in a helicopter on 8 August 1988, we saw a large, probably male polar bear at a shallow bay in the Creswell Bay area (72°48'N, 93°18'W) partly wading and then swimming from the beach towards an area occupied by 50 to 100 belugas. Aerial photographs show that he came within about 5 m of the belugas, and several whales blew air out underwater probably as a reaction to his approach. From the photographs the whales were seen to be turning on their sides while examining the bear. Belugas assume a similar posture when they are visually and acoustically examining hydrophones we have put in the water.

DISCUSSION

Considering the large aggregation of belugas in Barrow Strait and the high numbers of narwhals frequenting the coastline of Somerset Island, it is surprising to us that polar bears do not appear to be exploiting this large summer food resource to any significant extent. We have identified two situations when bears can take odontocetes: hunts from floating ice pans in areas densely occupied by belugas and strandings of belugas and narwhals on tidal beaches during high tide periods. In our nine summers at Cunningham Inlet we have sighted only 24 polar bears, witnessed four unsuccessful attempts by them at stalking belugas in shallow water and two successful kills out of three attempts by a single bear that caught belugas by jumping from floating ice floes in deeper water.

During the same nine seasons we witnessed ten strandings of as many as three belugas at a time at Cunningham Inlet. No external disturbances were implicated in these strandings, and in all cases the whales were able to return to the ocean on the next high tide (Smith, 1985). Had bears been present during these events some whales would almost certainly have been killed. Our presence likely had a negative influence on the hunting success of the bears by shortening their stay in the area. Although this would bias our evaluation of this source of mortality, reports of polar bears killing odontocetes in other similar areas are uncommon.

Successful predation of whales that are stranded, given the unpredictability of such events, might be fortuitous. The echolocation capabilities of belugas may preclude successful aquatic stalks. The greater mobility and speed of whales in the water seems to effectively protect them from swimming bears. In fact their willingness to closely approach polar bears in the water, either out of curiosity or in a possible attempt to harass them, indicates their confidence while in the water.

The apparent ease and high probability of success of the one bear that took two belugas by jumping from a floating ice pan might indicate that it is a practised learned behaviour for this individual. While not well documented, this might resemble a hunting strategy also used by bears to hunt seals from the edge of the fast ice or floating ice pans. In these situations, the acoustic senses of the whales would not serve to protect them and escape would depend on the whale surviving the initial stunning blow or bite. Smaller whales would obviously be the most vulnerable and the larger, strongest bears the most successful. Individually learned hunting strategies are known to exist among brown bears

(Luque and Stokes, 1974; Boertje *et al.*, 1988) and it is probable that certain individual polar bears have learned to be whale hunters.

Since strandings occur during series of high tides, which are predictable from tide charts, and areas of beluga aggregations are well known, it may be possible to evaluate the impact of bear predation by conducting beach surveys at the appropriate times. Years in which floating ice is present during whale aggregation might also yield higher rates of bear-related whale mortality.

Smaller or weaker predators, such as certain passerine birds, are able to repel potential attackers such as raptors by harassing them in the air because they are faster and more maneuverable (Altmann, 1956). There might be a similar defense strategy in operation when groups of belugas make close approaches to swimming polar bears. Stirling (1984) documented a group threat display made by walruses, *Odobenus rosmarus*, to a polar bear approaching their polynyas from the ice. His observation led him to hypothesize both that the presence of the bear was made known to other walruses by underwater communication and that it might have aided in coordinating the group display. Belugas are probably the most vocal of arctic cetaceans (Sjare and Smith, 1986), and it might be reasonable to think that vocalization might also play a role in protecting them from aquatic predators.

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