

Three recent ice entrapments of Arctic cetaceans in West Greenland and the eastern Canadian High Arctic

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ABSTRACT

Three ice entrapments of Monodontids have been reported in the western North Atlantic since 1993. Hunters in Disko Bay, West Greenland, discovered one in March 1994 that included about 150 narwhals (*Monodon monoceros*). The entrapment occurred during a sudden cold period which caused ice to form rapidly. The trapped whales were subject to hunting, but about 50 of the killed whales could not be retrieved in the ice. The whales were trapped in a small opening in the ice and because of that they would probably have succumbed even if not discovered by hunters. Two entrapments involving white whales or belugas (*Delphinapterus leucas*) occurred in the eastern Canadian Arctic in May 1999; one in Lancaster Sound discovered by polar bear (*Ursus maritimus*) researchers and one in Jones Sound discovered by hunters. The first included one bowhead whale (*Balaena mysticetus*) and about 40 belugas that were being preyed upon by polar bears. The second involved at least 170 belugas, of which about 100 were killed by polar bears and 17 were taken by hunters. The entrapments in Disko Bay and Jones Sound both occurred in areas where entrapments have previously been reported, whereas the one in Lancaster Sound was in a new area.

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INTRODUCTION

The three high Arctic cetaceans, the bowhead whale (*Balaena mysticetus*), the white whale or beluga (*Delphinapterus leucas*) and the narwhal (*Monodon monoceros*) are susceptible to mortality from entrapment in the ice. The phenomenon has been known from Greenland for centuries (Egede 1788) and is termed among Greenlanders as 'sassat' (previously spelled 'savssat'), which means 'something that is being served'. The most famous

'sassat' took place in Disko Bay in January 1915 and involved at least 1,000 narwhals that were trapped in heavy fast ice (Porsild 1918). In Disko Bay particularly, there are several other reports of ice entrapments involving considerable numbers of whales: 1955 about 3,000 belugas (Golodnoff 1956), 1968 about 600 belugas and narwhals, and 1970 about 1,000 belugas (Siegstad and Heide-Jørgensen 1994). When discovered by hunters in Greenland and Canada the trapped whales are usually hunted providing a minimum estimate of the number of whales involved in the event.

Bowhead whales have only once before been reported to be entrapped in the ice in the Eastern Arctic. After a winter with severe ice coverage, 14 dead bowhead whales were discovered in Disko Bay, West Greenland, in 1750 (Eschricht and Reinhardt 1861).

Whales that are trapped are likely – and in some cases known - to die of predation, exhaustion or famine, and Siegstad and Heide-Jørgensen (1994) hypothesized that the mortality involved in ice entrapments is part of the natural mortality of the whales. If this is the case, hunting of the trapped whales is not ‘fishery mortality’ but rather ‘natural mortality’, and models of exploited Monodontid populations should take this into account. Thus documentation of the fate of un-harvested, trapped whales is important. Furthermore, the occurrence of entrapments seems to be related to sudden and unpredictable changes in ice cover. Since such variations in ice formation may be attributable to climatic changes, whether natural or anthropogenic, the occurrence and distribution of entrapments should be documented.

Siegstad and Heide-Jørgensen (1994) summarised information on ice entrapments of Monodontids in Greenland. Few entrapments have been documented in Arctic Canada, which can be attributed to the fact that most of the areas where ice entrapments may occur are virtually uninhabited. This note documents three entrapments after 1993; one in Greenland and two

in Canada, of which one included a bowhead whale.

A possible entrapment of narwhals mentioned by Palsbøll *et al.* (1997) at Savissivik (76° N 65° W), West Greenland, in February 1994 is not included as it is poorly described and may not be a ‘true ice entrapment’ (cf. Siegstad and Heide-Jørgensen 1994).

RESULTS AND DISCUSSION

Disko Bay 1994

Hunters discovered an entrapment of narwhals at Kitsissuarsuit (68° 50’ N, 53° 00’ W) in the mouth of Disko Bay on 26 March 1994. Nearly 150 narwhals were trapped in a small hole (10 m²), which was covered with thin and fragile ice (Fig. 1). Immature and mature narwhals of both sexes were present in the entrapment.

Following the discovery of the entrapped whales, intensive hunting took place. Using mirrors to search under the ice, a number of dead and living whales were spotted. The dead whales, which were frozen into the solid portion of the ice, were secured when possible. The live whales were watched intensively to predict their next surfacing in the hole. When a whale approached the surface the hunters shot at it with rifles. A biologist from the Greenland Institute of Natural Resources (Pia Barner Neve) witnessed the entrapment and she estimated that about 100 narwhals were killed and



Fig. 1.
Hunters waiting for the narwhals to appear in the hole where the whales were entrapped in Disko Bay in March 1994. The tail of one narwhal that has been retrieved is anchored to the ice in front of the hunters (Photo: Pia Barner Neve).

retrieved and approximately 50 were killed-but-lost. The 50 whales sampled spanned the possible lengths of narwhals: the 20 females were 230 to 440 cm and the 30 males were 230 to 490 cm in length (Fig. 2).

The weather conditions were similar to conditions at other entrapments (see Siegstad and Heide-Jørgensen 1994); extremely low temperatures and with little wind had rapidly frozen the previously open sea (Fig. 3). The entrapment occurred in an area of frequent entrapments and given the changes in weather conditions the hunters expected that some whales would be trapped (Siegstad and Heide-Jørgensen 1994).

This relatively large group of narwhals had access to a quite limited area of open water and the continued narrowing of the hole and the exhaustion of the whales fighting for access to the air would likely have resulted in the death of the whole group if it had not been killed by hunters.

Lancaster Sound 1999

During helicopter searches for polar bears an entrapment in the ice with an estimated 40 or more belugas and one bowhead whale was discovered on 30 May in Lancaster Sound off the Brodeur Peninsula, Baffin Island (73° 58.515' N, 86° 8.585' W, Fig. 4 and 5). There were a total of 5 small pools of open water, each of which had whales in it. Because of extensive ice coverage this entrapment could easily have been overlooked, even when passing at a distance of a kilometre or two. Researchers were following the trails of a female polar bear with two yearling cubs. Immediately after these bears were found, 20 or 21 bears were seen without extra search effort. It was assumed that as many as 40 bears were in the area. Bears were in the pools or standing on the edge grabbing at the whales with their forepaws. At least a dozen whales had been hauled out and consumed. Four bears were captured and they appeared very fat for that time of the year. The ice edge was about 15 km to the east. By 10 June there were at least 20 bears in the vicinity and the ice edge was 21 km to the east. By 19 June the ice had completely broken up. Since the belugas were entrapped in relatively stable fast ice,

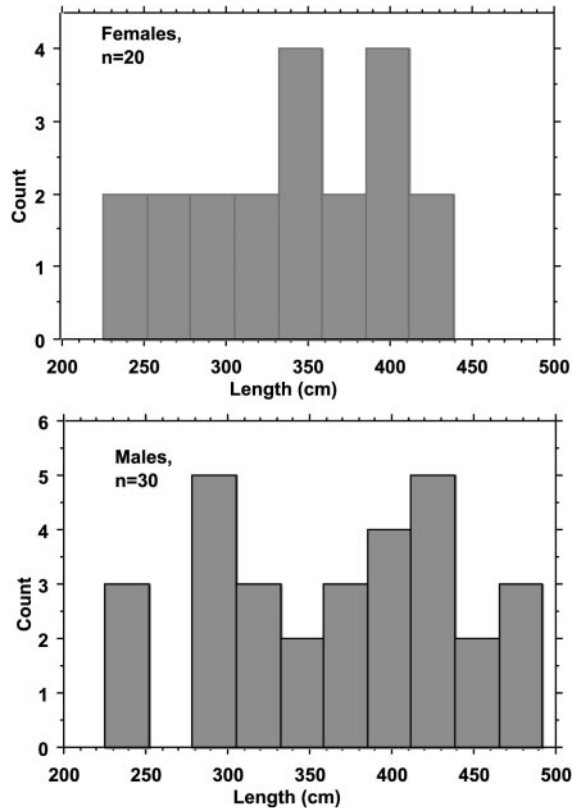


Fig. 2. Length distributions of the narwhals sampled at the entrapment in Disko Bay, March 1994.

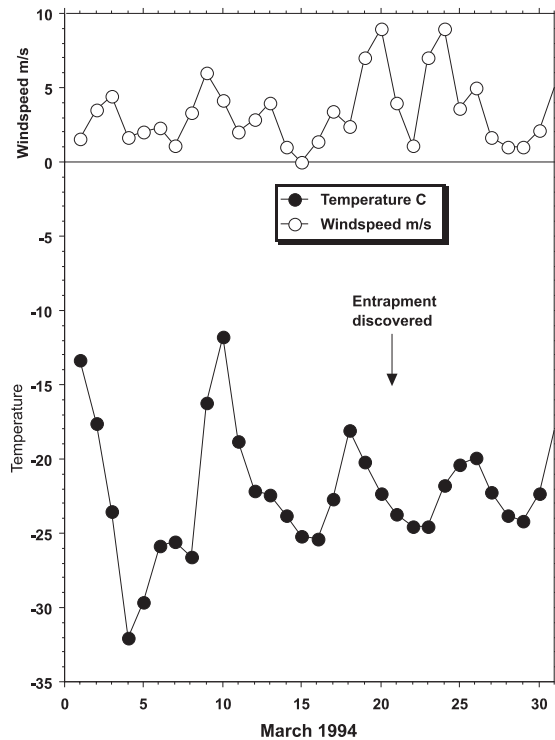
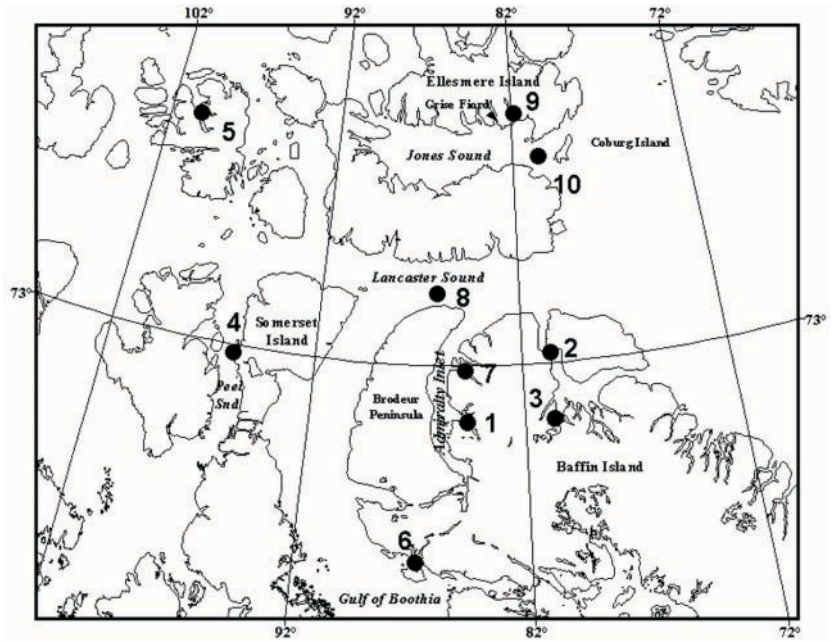


Fig. 3. Temperature and wind speed regime in Disko Bay in March 1994 prior to the entrapment.

Fig. 4.

Locations of ice entrapments in Lancaster Sound and Jones Sound. The numbers refer to reports of entrapments 1) narwhals in April 1924 (Degerbøl and Freuchen 1935), 2) belugas in the 1940s (Freeman 1968), 3) belugas in 1958 (Freeman 1968), 4) narwhals in December 1961 (Hay 1984), 5) narwhals in autumn 1977 (Sergeant and Williams 1983), 6) narwhals in October 1979, 7) belugas and narwhals in the fall (Stewart et al. 1995), 8) belugas and a bowhead whale May 1999 (this report), 9) belugas in November 1966 (Freeman 1968), and 10) belugas in March 1970 (Freeman 1973) and in May 1999 (this report).



far from open water, the predation could have been going on for up to 7 months since ice consolidation occurred at the end of October 1998 (National Ice Center 1999).

No entrapments have previously been reported in Lancaster Sound proper but there are several reports of entrapments of whales in adjacent waters (Fig. 4). In Admiralty Inlet, 600 narwhals were entrapped in April 1924, of which the Inuit secured 203 whales with tusks (males) and an equal number of females (Degerbøl and Freuchen 1935). Freeman (1968) refers to in-

formation from hunters stating that female belugas with calves were trapped in Navy Board Inlet one winter in the 1940s and that three belugas were trapped in Milne Inlet in 1958. These whales utilised a breathing hole the size of 'two tents', but a tide crack allowed many of them to escape. Narwhals were found in a regularly-occurring polynia four miles north of Cape Coulman (in Peel Sound), in December 1961 (Hay 1984). Approximately 20 partly-eaten carcasses of narwhals were found on the ice in late July 1979 at Dundee Bight (76° 05'N, 100° 15'W), but they might have become entrapped



Fig. 5.

The entrapment in Lancaster Sound (site 8 on Fig. 4) was used both by belugas and a bowhead. The belugas display scars from polar bear attacks (Photo: Malcolm Ramsay).

in the autumn of 1977 (Sergeant and Williams 1983). About 115 narwhals (mostly females with calves) were discovered and killed by hunters in Gulf of Boothia in October 1979 (Mitchell 1981, Sergeant and Williams 1983). Both belugas and narwhals have been reported to be entrapped in ice near Arctic Bay (Adams Sound, Fig. 4) during early fall. For narwhals this is reported to be a common occurrence which recurs every 10 years or less (Stewart *et al.* 1995).

Jones Sound 1999

Hunters from Grise Fiord discovered an entrapment of belugas on 28 May 1999 85 km east of Grise Fiord at 75° 53.479 N, 80° 31.091 W (Fig. 4) in a hole 20 m long by 6 m wide. Nine polar bears were at the site, mostly big males, together with an estimated 100 whale carcasses hauled up on the ice by the polar bears (David Kalluk, Grise Fiord, personal communication). Skin, blubber and meat had been removed from the carcasses. Twenty live belugas, all badly mauled by the bears, were at the hole (Fig. 6). The whales were believed to have been entrapped in early April since little ice had been present in mid March. Hunters harvested 5 of the belugas and carried the *muktuk*, the whale skin with some blubber, back to the town.

On 29 May 1999, another hole measuring 340 cm by 190 cm was found approximately 700 m from the first hole. Fifty whales were using this hole; all had fresh scars from bear attacks. After hunters enlarged the hole a total of 12 whales were harvested. About 40 of the least injured were left undisturbed. The thickness of the ice was 72 mm. The whales immediately began using an extra hole made by the hunters about 25 m away. The site was visited again on 2 June when five more holes were made at distances of 200 to 500 m apart. The whales never used a sixth hole made 1 km away from the original hole. At that time, the ice edge, where hundreds of belugas were present, was 23 km away from the entrapment site. On 10 June, the belugas were using four of the holes. Three additional whales had been killed by polar bears, and three more were badly injured. There were five bears within 2 km of the site, all fat with their "stomachs almost dragging on the snow". On 23 June, the ice had broken up opening a lead approxi-

mately 2 km from the site, enabling the whales to escape.

The Jones Sound entrapment happened not far from where an entrapment involving 150 belugas was observed from late November 1966 through to early April 1967 (Freeman 1968). Interviews of hunters from Grise Fiord, the only village in Jones Sound, in 1993 indicate that no beluga entrapments were known to have occurred in Jones Sound between 1967 and 1993 and no narwhal entrapments have ever been found in Jones Sound (Stewart *et al.* 1995). Freeman (1973) also reported predation by polar bears on entrapped whales in March 1970 in Jones Sound.

Two types of ice entrapments

The entrapments reported here belong to two types. Disko Bay entrapments may occur anytime during the winter when weather conditions cause a sudden freeze-up of the whales' winter habitat (cf. Siegstad and Heide-Jørgensen 1994). The final closure of the open water causes the death of the whales, but a sudden change in the wind or temperature regime may also release the whales. In the eastern Canadian Arctic, whales are usually trapped in the autumn during the process of fast ice formation when they get stuck in pools that are gradually reduced in size through the winter (cf. Freeman 1968). Apparently, belugas are capable of maintaining small openings for long periods but their body condition deteriorates with the limited access to food resources and fatigue due to restricted access to the breathing hole (cf. Freeman 1968). Additionally, polar bears often attack and wound or kill them.



Fig. 6. Wounds from encounters with polar bears on belugas entrapped in Jones Sound in May 1999. This animal has lost a portion of the skin and blubber on its right side of the neck (Photo: S. Akeegok).

Compared to West Greenland, ice entrapments apparently occur less frequently and at a smaller scale in the Canadian Eastern Arctic (cf. Siegstad and Heide-Jørgensen 1994). This may be partly due to the lower density of inhabitants and therefore less surveillance of areas where entrapments may occur. More likely, it may be

explained by the more predictable ice conditions that are generally found in Canada compared to West Greenland. In West Greenland the prevailing winds from the Northwest, the jagged coastline and the variable influx of warm water from the south makes the ice conditions less predictable for the whales.

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