

RESEARCH NOTE

White-beaked dolphins trapped in the ice and eaten by polar bears

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Abstract

Polar bears (*Ursus maritimus*) depend on sea ice, where they hunt ice-associated seals. However, they are opportunistic predators and scavengers with a long list of known prey species. Here we report from a small fjord in Svalbard, Norwegian High Arctic, a sighting of an adult male polar bear preying on two white-beaked dolphins (*Lagenorhynchus albirostris*) on 23 April 2014. This is the first record of this species as polar bear prey. White-beaked dolphins are frequent visitors to Svalbard waters in summer, but have not previously been reported this far north in early spring. We suggest they were trapped in the ice after strong northerly winds the days before, and possibly killed when forced to surface for air at a small opening in the ice. The bear had consumed most parts of one dolphin. When observed he was in the process of covering the mostly intact second dolphin with snow. Such caching behaviour is generally considered untypical of polar bears. During the following ice-free summer and autumn, at least seven different white-beaked dolphin carcasses were observed in or near the same area. We suggest, based on the area and the degree to which these dolphins had decayed, that they were likely from the same pod and also suffered death due to entrapment in the ice in April. At least six different polar bears were seen scavenging on the carcasses.

Polar bears (*Ursus maritimus*) inhabit Arctic areas where sea ice is present for significant parts of the year (Amstrup 2003). In most areas, they mainly feed on ringed (*Pusa hispida*) and bearded seals (*Erignathus barbatus*). Other species of marine mammals may be of importance based on their availability as prey or for scavenging (Thiemann et al. 2008).

The warming of the Arctic is significantly changing the ecosystem and relations between species (Post et al. 2013). As the polar bear habitat shrinks in coming decades, scientists anticipate reductions in where polar bears are observed, and these changes are predicted to be significant in the Svalbard and Barents Sea area (Durner et al. 2009).

Seven whale species are among the reported species of prey and food known to have been eaten by polar bears (Derocher 2012). The two smaller of these whale species,

white whales (*Delphinapterus leucas*) and narwhals (*Monodon Monoceros*), are hunted by the bears in some circumstances (Freeman 1973; Smith & Sjare 1990). Five other species, all of them too large to be prey, have been observed scavenged by polar bears. The bowhead (*Balaena mysticetus*) is adapted to the Arctic and sea-ice covered areas, as are narwhals and white whales. The other four species—fin whale (*Balaenoptera physalus*), grey whale (*Eschrichtius robustus*), minke whale (*Balaenoptera acutorostrata*) and sperm whale (*Physeter macrocephalus*)—are frequently encountered in Arctic areas but are not true Arctic species. Here we report a new whale species eaten by polar bears, the white-beaked dolphin (*Lagenorhynchus albirostris*), a species usually encountered in more sub-Arctic waters and less frequently in the sea-ice covered areas (Reeves et al. 1999).

Material and methods

Svalbard consists of a group of islands in the Norwegian part of the Barents Sea area (74–81°N, 10–30°E). A branch of the North Atlantic Current extends north up along the west coast of Spitsbergen, the largest of the islands in the archipelago. It brings warmer water from the south, while more eastern areas are influenced by cold Arctic currents from the north-east (Loeng 1991; Piechura & Walczowski 2009). From 1970 to the present, the upper layer water temperatures have increased substantially in the north-west Svalbard area (Lind & Ingvaldsen 2012). A recent decrease in summer sea-ice cover of 14% over a decade in the Barents Sea area has been reported (Zhang et al. 2008).

The observations described here were recorded during a polar bear capture–recapture programme conducted annually by the Norwegian Polar Institute in April, using a Eurocopter 350 Ecureuil, and in summer to autumn, from tourist ships. The research vessel RV *Lance* was used as a helicopter platform for the work in spring.

Results and discussion

At 16:37 on 23 April 2014, we encountered an adult male polar bear at the carcass of a white-beaked dolphin

in Raudfjorden, at 79°45'1" and N 11°56'28". The carcass (dolphin A) was on the sea ice about 5 m from shore. The remains of a second dead white-beaked dolphin (dolphin B) were observed on land, about 50 m farther south and 5 m from the shore. Tracks from the bear showed he had also been feeding on dolphin B. About a metre from dolphin A was a hole about 60 by 75 cm in diameter, covered with ice slush (Fig. 1). The surrounding sea ice was about 20-cm thick. This was the only location in the fjord without solid ice, and appeared to be a breathing hole kept open by the dolphins. We therefore considered it likely that dolphin B was also taken by the bear at this hole. Little more than the spine, rib cage and skull of dolphin B remained when we found it. Dolphin A was more or less intact, as only the outer fat layer was removed from parts of the dorsal side and no meat was taken (Fig. 1).

The polar bear was immobilized using a method described by Stirling et al. (1989) and an examination of its tooth wear yielded an estimated age of about 16–20 years. With clearly visible ribs, the bear was very skinny (Fig. 1). Figure 1 also shows that the bear had a very full belly, reflecting a recent large meal—likely much of dolphin B and parts of dolphin A. The male was in the process of covering dolphin A with snow. This could



Fig. 1 A male polar bear on the carcass of a white-beaked dolphin, 23 April 2014. The bear has started to cover the remains with snow. Just to the left of the dolphin is a hole in the ice, assumed to be a breathing hole that dolphins trapped in the ice have kept open.

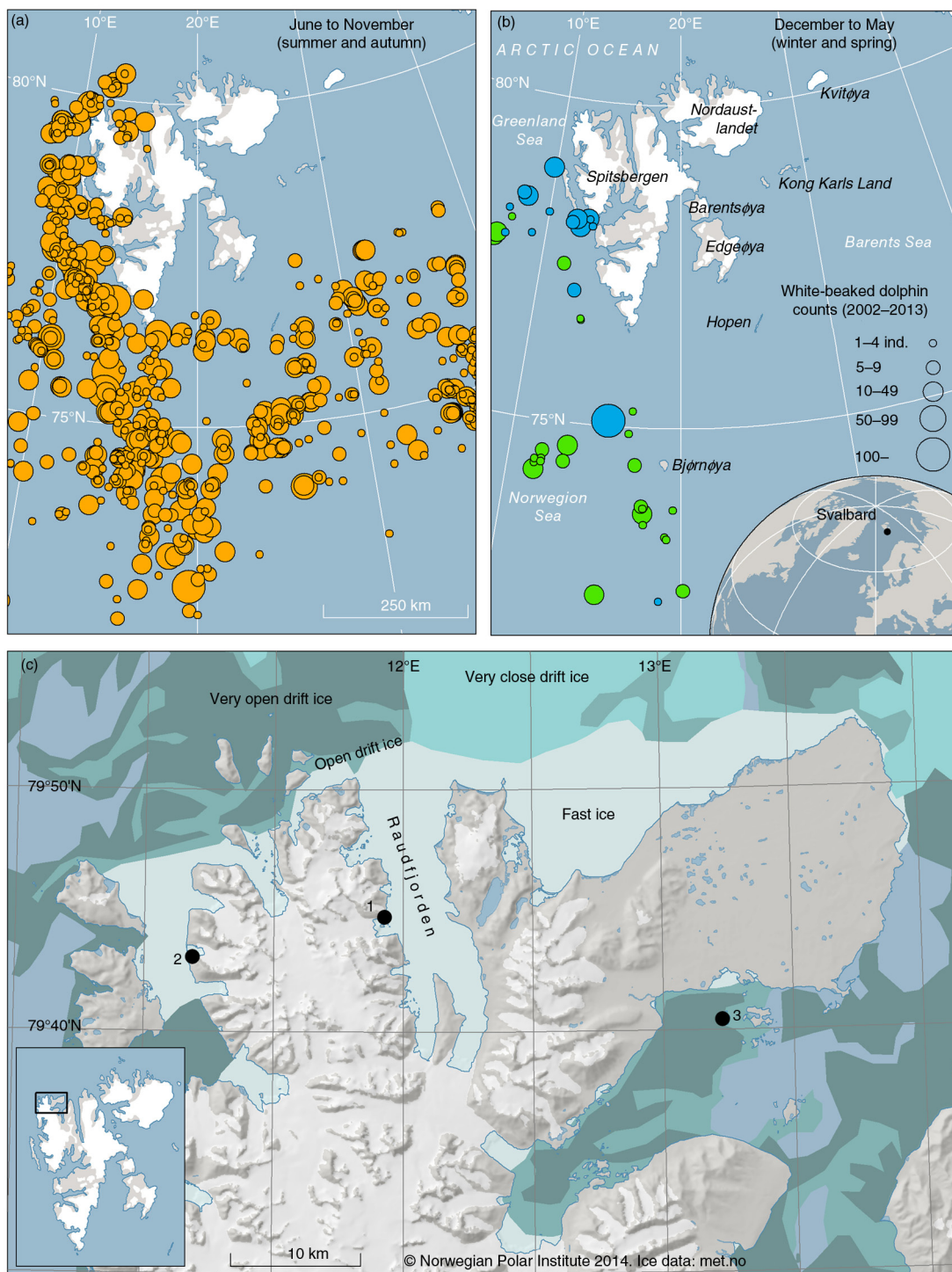


Fig. 2 (a) Sea-ice distribution in April 2014 and the position (1) where the bear and the two white-beaked dolphins were observed at that time. The other observations of carcasses and scavenging bears from summer and autumn were at position (1) as well as positions (2) and (3). All reported observations of white-beaked dolphins from 2002 to 2013 in (b) June–November and (c) December–May. Circle sizes denote the estimated group sizes of the pods observed. Green circles are from December to March, blue from April to May. The observations are from the Norwegian Polar Institute's marine mammal sightings database (www.mms.data.npolar.no/), an archive of reported observations from different sources, particularly cruise ships, operating in the waters of Svalbard.

decrease the likelihood of other bears, foxes or gulls scavenging the remains. Although covering fresh kills with snow has been observed among polar bears (Stirling 1974), caching is suggested to be rare in this species (Amstrup 2003). Polar bears digest much of the fat they consume from a carcass within a day (Best 1985). The time needed to keep competitive scavengers away is therefore relatively short.

Among six species of dolphins in the genus *Lagenorhynchus*, only white-beaked dolphin and Atlantic white-sided dolphin (*L. acutus*) have been observed in the waters of Svalbard. For white-beaked dolphins, Reeves et al. (1999) reported a range in body length of 154–278 cm and 55–309 kg among individuals measured. The white-sided dolphin has not been recorded in the more northern areas of the archipelago (Reeves et al. 1999). Earlier observations of white-beaked dolphins as far north as northern Spitsbergen have all been made in summer and autumn (June–November; Fig. 2). Prior to this report, no recording of the species has been made in winter or spring this far north in Svalbard. The fjords and around the coast of northern Spitsbergen, an area normally covered by annual ice, were ice-free in winter 2013/14. It is likely

that the presence of the dolphins in early spring was due to the lack of sea ice in the period prior to our observation. Ice maps indicated open water as late as 28 March, but dense ice in Raudfjorden from 4 April. In the period 17–18 April, strong northerly wind packed drift ice into the fjords. We speculate that this event led to the entrapment of white-beaked dolphins, including the two we found dead. Entrapment, and later suffocation, of white-beaked dolphins in areas with heavy pack ice has earlier been reported along the coast of Newfoundland (Sergeant & Fisher 1957; Hai et al. 1996).

Dolphins can be found in larger pods in the waters of Svalbard (Fig. 2). Sightings reported to the Marine Mammal Sightings database (www.mms.data.npolar.no/) range from single individuals to pod sizes up to 200, with a median of six. In summer 2014, at least seven different white-beaked dolphin carcasses were reported in the area where we observed the two dolphins in April. In Raudfjorden, at the same location as our observations in April, at least five different carcasses were observed between 2 July and 1 September. One adult male and one adult female polar bear were seen feeding on the dolphins (Fig. 3). Farther to the west, in the bay



Fig. 3 An adult polar bear feeding on the remains of a white-beaked dolphin in Raudfjorden on 2 July 2014. The dolphin is presumed to be a member of the same pod as the dolphins eaten by a bear in April.

Frambukta, one dolphin carcass was observed on 4 July, where two bears were seen feeding on it. Another carcass was found on 22 July in Liefdefjorden, to the east of the initial observations (Fig. 2). It was scavenged by two polar bears.

The observations indicate that entrapments of pods of white-beaked dolphins may provide a significant source of food for some bears locally over a longer period of time after such an incident. Given the size of the dolphins, as prey they are more likely to be taken by male than female polar bears (Thiemann et al. 2011). An increase of white-beaked dolphins in areas where the sea ice shifts northward may, given the significant size of these animals, offer a new prey or carrion food source to bears in an environment where access to ringed seals and bearded seals may decline in future years.

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