RESEARCH NOTE

First recorded ice entrapment of a beluga whale (*Delphinapterus leucas*) in east Greenland

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Abstract

Beluga whales are rare along the coast of east Greenland and the closest recognized stock occurs around Svalbard. Here we report on an ice entrapment of an adult beluga whale (*Delphinapterus leucas*) in north-east Greenland. The whale was observed entrapped in the fast ice on 21 April 2023 in Loch Fyne (73°54′N, 21°51′W) during a visual aerial survey for polar bears (*Ursus maritimus*). The whale was located >100 km from open water (i.e., pack ice) and appeared in poor body condition. A literature review back to the early 1900s failed to produce any other records of beluga whale ice entrapments in east Greenland.

Keywords
Sea ice; sassat; white whale; freeze-up

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Introduction

Beluga whales (*Delphinapterus leucas*) have a discontinuous circumpolar distribution throughout the Arctic and sub-Arctic and relatively high site fidelity to summering and wintering areas (Hobbs et al. 2019). In Greenland, the eastern High Arctic stock of beluga whales resides in the coastal ice-free waters off the west coast during winter. No belugas regularly occur along the east coast of Greenland during any season and there is no recognized stock in this area. The geographically closest stock is the Svalbard stock, a population of resident whales that inhabits fjords and glacial fronts (Hobbs et al. 2019).

Ice entrapments (*sassat* in the Greenlandic language) occur when changes in weather and sea ice conditions rapidly freeze up open-water areas used by whales. Ice entrapments have been documented over several centuries (Porsild 1918; Ivashin & Shevlyagin 1987; Lowry et al. 1987; Siegstad & Heide-Jørgensen 1994; Mymrin & Huntington 1999; Heide-Jørgensen et al. 2002) and can result in a large subsistence harvest of entrapped animals. Sea-ice entrapments occur most frequently for belugas and narwhals (*Monodon monoceros*), although they have also been reported for other species such as bowhead whales (*Balaena mysticetus*; Eschricht & Reinhardt 1861), killer whales (*Orcinus orca*; Matthews et al. 2019), grey whales (*Eschrichtius robustus*; Caroll et al. 1989) and white-beaked dolphins (*Lagenorhynchus albirostris*; Aars et al. 2015). In central west Greenland, ice entrapments of belugas are not uncommon and some events have included up to 3000 individuals (Siegstad & Heide-Jørgensen 1994).

Observations

A visual aerial line transect survey of polar bears (*Ursus maritimus*) was conducted along the east coast of Greenland between 20 March and 9 May 2023 from a de Havilland Twin Otter. The survey covered inshore and offshore coastal areas along the east coast between 66°N and 83°N. During this survey, an adult beluga whale of unknown sex was observed entrapped in the fast ice on 21 April 2023. The whale was located at 73°54′N, 21°51′W, in Loch Fyne, a long narrow fjord south of Godthåb Golf and Clavering Island (Fig. 1). The whale was in a small hole, measuring 1.3 km long and 0.4 km at the widest point, based on high-resolution (3 m) satellite imagery from Planet (Planet Team 2023). The opening had an area of ca. 0.26 km^2 and the distance to the nearest open water (pack ice) was approximately 100 km.

The whale was first observed on the evening of 20 April 2023; however, it was submerged several metres underwater and was not possible to identify the species. Fuel limitations precluded further investigation and the plane returned to the site on the morning of 21 April 2023 to positively identify the animal as a beluga whale.

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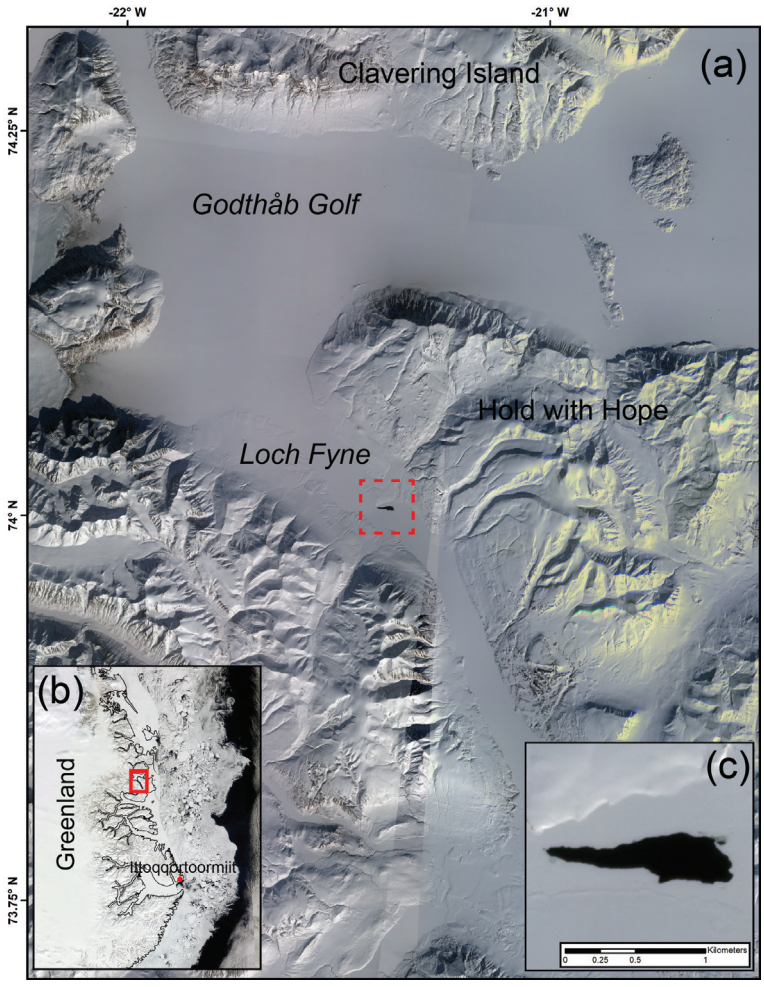

Fig. 1 (a) Beluga ice entrapment location shown on a satellite image (©2023, Planet Labs PBC) on 21 April 2023. (b) Satellite-based Moderate Resolution Imaging Spectroradiometer picture on 21 April 2023, showing the larger geographic area, with a red square indicating the location of (a). (c) A close-up of the entrapment shown in (a).

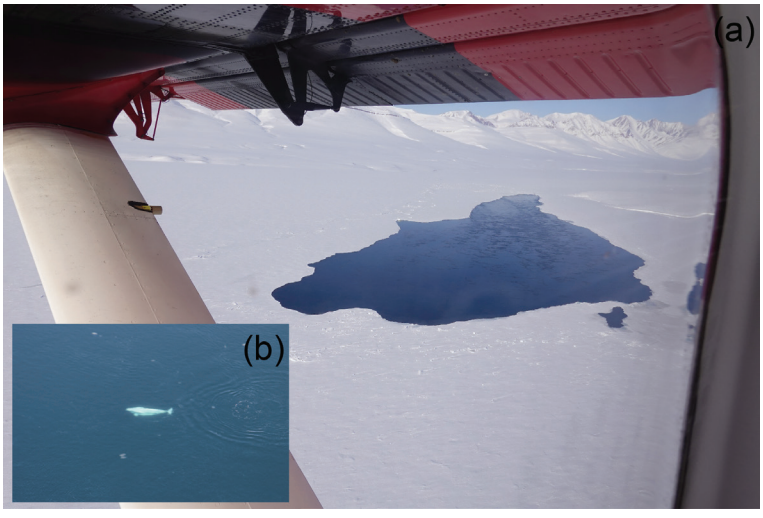

Fig. 2 (a) Photograph of the beluga ice entrapment in Loch Fyne taken on 21 April 2023 from a bubble window of a Twin Otter aircraft at 122 m altitude (photo: M. Zahn) and (b) image of the beluga at the surface (photo: K. Laidre).

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During the observation period, the whale was either resting just below the surface or submerged 1–2 m underwater. It appeared to be in poor body condition, with visible undulations along the ridge of the back reflecting the vertebral processes and a general lack of rotundness along the lateral flanks (Fig. 2). The aircraft passed over the entrapment several times while observers collected photographs and observations. Polar bear tracks were seen around the entire perimeter of the hole and multiple adult polar bears were sighted within 20 km.

Loch Fyne is a narrow fjord, approximately 45 km long, with its head located in the isthmus area of Hold with Hope. The entrapment site was midway down the fjord in an area that narrows to approximately 1 km across. Loch Fyne annually freezes solid with fast ice in the fall. However, the area where the entrapment occurred is reported by the Danish military and local bush pilots to have open water all winter on account of strong currents and shallow depth (some areas are 2 m). Loch Fyne is in an uninhabited area and not located near any subsistence communities.

The entrapment most likely initially occurred in autumn, during the process of fast-ice freeze-up, similar to previous beluga entrapments in the Canadian Arctic, where whales get stuck in pools that gradually reduce in size through the winter (Freeman 1968; Heide-Jørgensen et al. 2002). High-resolution optical and microwave satellite imagery showed Loch Fyne was ice-free until at least 20 October 2022 and was completely frozen over no later than 23 November (documenting the exact date was prevented by cloud cover). Imagery showed the open water at the entrapment site gradually reduced in size until early December. Spring sea-ice break-up began in late June 2023, and by 5 July the fjord was entirely ice-free with some fast ice remaining in Godthåb Golf. We therefore estimate the whale had been trapped for at least six months at the time of the sighting and, assuming it survived, was trapped for at least eight months total. The fate of the whale is unknown. Belugas are capable of maintaining small openings while trapped in the fast ice. However, over time, fatigue and limited food reduce body condition. Polar bears often attack and wound or kill them (Lowry et al. 1987).

The geographic origin of the whale observed here is unknown; the closest stock is a population of approximately 500 belugas that remain resident in coastal waters around Svalbard (Hobbs et al. 2019; Vacquié-Garcia et al. 2020). Two months before this observation, during March 2023, five beluga whales were harvested by the community of Ittoqqortoormiit, indicating belugas had ranged along the east coast of Greenland for at least a few months (Å. Hammekken, pers. comm.). A literature review of ice entrapments in Greenland waters going back to the early 1900s (Porsild 1918) did not turn up another recorded ice entrapment of a beluga whale in east Greenland.

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Disclosure statement

The authors report no conflict of interest.

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