

A note on sightings of bowhead whales in the North Water Polynya, Northern Baffin Bay, May-June, 1998

M. HOLST* AND I. STIRLING†

Contact e-mail: ian.stirling@ec.gc.ca

ABSTRACT

As part of a multidisciplinary research cruise by icebreaker in the North Water Polynya in northern Baffin Bay, we conducted shipboard surveys of marine mammal distribution and abundance throughout the area from April to July 1998. Fourteen sightings of at least ten individual bowhead whales (*Balaena mysticetus*) were made during May and June. Five additional large baleen whales, whose identities were not confirmed, were also seen. As well as being an important feeding ground, the polynya may also serve as an overwintering site for bowhead whales of the Davis Strait/Baffin Bay stock.

KEYWORDS: BOWHEAD WHALE; ARCTIC; INCIDENTAL SIGHTINGS; SURVEY-VESSEL

INTRODUCTION

Polynyas are areas of open water surrounded by ice. Those that remain open throughout the winter and recur in the same location each year have long been thought to be important spring feeding and breeding grounds for many species of marine mammals and birds, as well as overwintering sites for bearded seals (*Erignathus barbatus*), walrus (*Odobenus rosmarus*), white whales (*Devinapterus leucas*) and possibly bowhead whales (*Balaena mysticetus*) (Stirling, 1980; 1997; Dunbar, 1981). The North Water Polynya, situated in northern Baffin Bay between Ellesmere Island (Canada) and Greenland, is one of the largest and most biologically productive polynyas in the Arctic (Stirling, 1980; 1997).

Most polynya areas are remote and expensive to conduct research in and thus published observations of their inhabitants, particularly those that occur offshore, are limited. In 1998, an international research cruise was undertaken to facilitate a multidisciplinary study of the physics, oceanography and biology of the North Water Polynya in order to develop an understanding of why the region is so biologically productive. In this note, we report on incidental sightings in the North Water Polynya of bowhead whales from the endangered Davis Strait/Baffin Bay stock.

SURVEY METHODS

The icebreaker CCGC *Pierre Radisson* sailed to the North Water from Québec City, Canada, via southern Davis Strait and the shorelead system along the west coast of Greenland (Stirling, 1997; Fig. 1), arriving on 7 April 1998. Roughly once a month, from 8 April until 24 July, the ship traversed as much as possible of the North Water Polynya, depending on ice conditions. The predetermined survey lines (Fig. 1) included oceanographic sampling stations at fixed intervals, from the north end of the polynya to the south.

Although the principal focus was on ringed (*Phoca hispida*) and bearded seals, we also recorded all sightings of other marine mammals. We surveyed for marine mammals whenever the ship was travelling along these survey lines, between them, or, opportunistically, along the floe edge on

the Canadian side (Fig. 1). In Greenland waters, the vessel was restricted to entering and leaving on the same straight east-west lines, and was not permitted to approach closer than 12 n.miles from shore; helicopter surveys were forbidden. Thus, survey coverage on the Greenland and Canadian sides of the polynya was not equal. Marine mammal surveys were undertaken from the bridge of the ship, 15m above sea level, using 10 × 50 binoculars. The location, time, group size and distance from ship of all bowhead whale sightings were recorded, on or off transect.

When the ship was operating in open water in the northern two-thirds of the polynya, the helicopter covered approximately 4-5,000km of low-level flying transporting people back and forth between shore-based camps, coastal settlements or floe edge sampling sites at distances of up to 100km from the ship. Passengers were eager to sight any wildlife and recorded observations of marine mammals, particularly those of whales or polar bears (*Ursus maritimus*).

The locations of the ice edge in northern Baffin Bay for 25 May, 1 June and 15 June were taken from Baffin Bay Ice Analysis maps produced by the Canadian National Ice Center and from NOAA-AVHRR satellite data for 8 May (Fig. 2).

RESULTS

A total of 2,547km were surveyed in April, 2,178km in May, 2,702km in June and 1,918km in July, plus an additional 552km of floe edge surveys along the east coast of Ellesmere Island in May, June and July (Fig. 1). During the four month period, the amount of open water and the distribution of pack-ice in the polynya varied with wind and ocean currents (Fig. 2). In April and the beginning of May, the polynya was relatively small and restricted to the northern part of the study area. By the end of May, the polynya extended south to Devon Island, after which it spread east and south.

No bowhead whales were seen in the shoreleads or pack-ice in southern Davis Strait or along the West Greenland coast while the ship was *en route* to the polynya. A total of 14 bowheads were sighted in the polynya area, of

* Department of Biological Sciences, University of Alberta, Edmonton, AB, Canada T6G 2E9.

† Canadian Wildlife Service, 5320 122 St, Edmonton, AB, Canada T6H 3S5 and Department of Biological Sciences, University of Alberta, Edmonton, AB, Canada T6G 2E9.

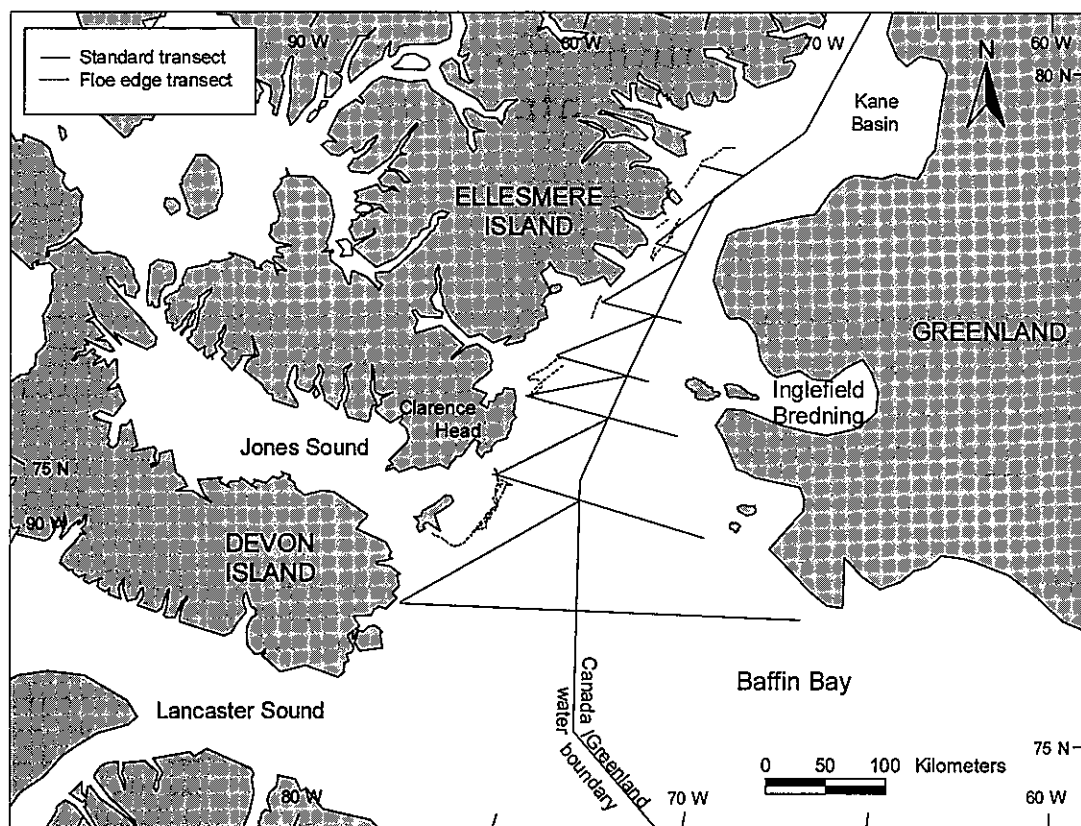


Fig. 1. Map of the fixed transect lines traversed by the CCGC *Pierre Radisson* in the North Water, once per month from April through July, 1998. Dotted lines indicate routes of opportunistic surveys along the floe edge in June.

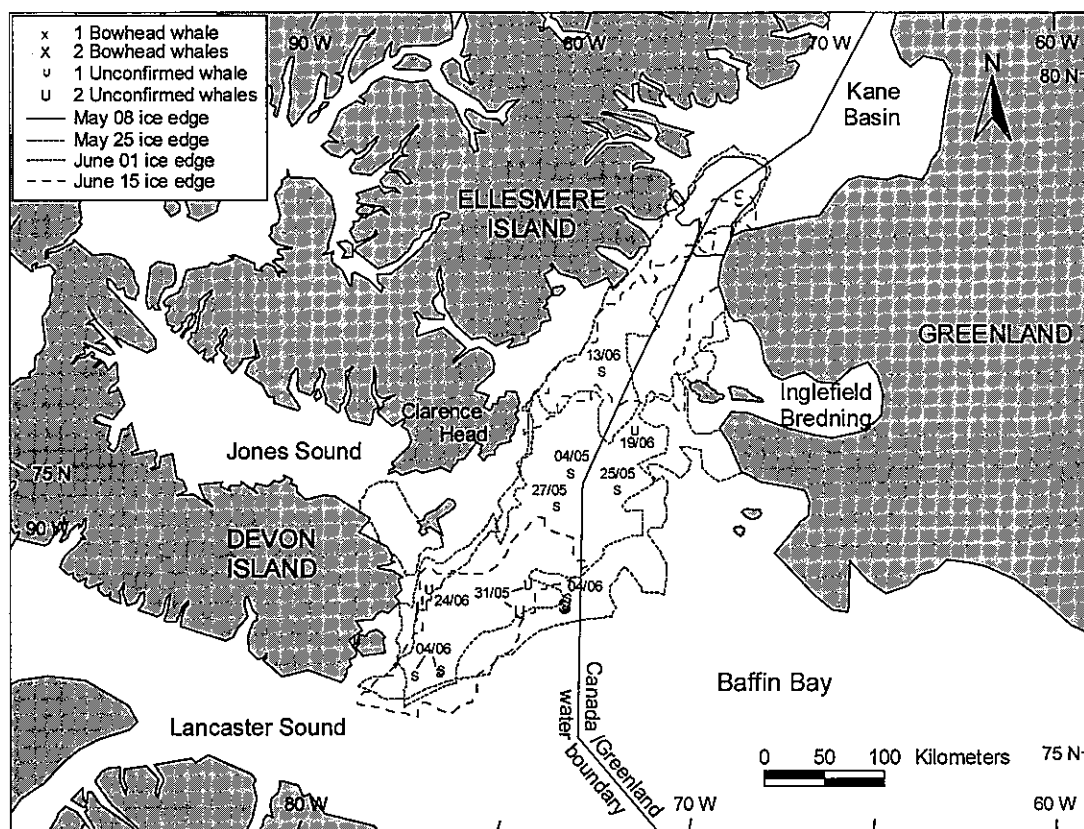


Fig. 2. Locations and dates (day/month) where bowhead and unidentified whales were sighted in relation to the amount of open water present in the North Water Polynya from 8 April through 24 July, 1998.

which 12 were alone and 2 were together (Fig. 2). It is unknown if any animals were sighted more than once. The northernmost whale seen, on 4 May, was lying at the surface in a small lead in 9/10 pack ice. All other bowhead whales were seen between 25 May and 13 June in open water in the southern half of the polynya to the east of Clarence Head and Devon Island. Ten of these were sighted on 4 June during a continuous transit, so it is unlikely that any of them were counted more than once (Fig. 2). No bowhead whales were seen during the floe edge surveys although 11 of the animals seen in open water were between 2 and 13 km from the floe edge. Two bowhead whales seen at the end of May were near the middle of the polynya, 30-40 km from the floe edge. No bowhead whales were seen during any of the helicopter flights.

In addition to the confirmed sightings of bowhead whales, five other large baleen whales were seen. The identities of two single animals seen on 19 and 24 June were unconfirmed but were thought to be bowheads (Fig. 2). On 31 May, two large whales of unconfirmed identity were seen together as well as a single animal which could have been either one of the same pair or a different animal (Fig. 2). Although the identities of these whales were unconfirmed, they had white on the underside of their flukes, serrations along the trailing edges of the flukes and a bump on the back which were all visible when diving. These characters suggest that the unconfirmed sightings were possibly of humpback whales (*Megaptera novaeangliae*).

DISCUSSION

Historically, bowhead whales were abundant in the Baffin Bay/Davis Strait area, numbering at least 11,000 in the early 1800s (Mitchell and Reeves, 1981). The current population is thought to be in the low hundreds (Davis and Koski, 1980; Reeves *et al.*, 1983; Finley, 1990; Zeh *et al.*, 1993). In recent years, most sightings of bowhead whales have been made in conjunction with fairly extensive surveys in and around Lancaster Sound and Isabella Bay on the eastern coast of Baffin Island, similar areas to where they were found during the commercial whaling era (e.g. Davis and Koski, 1980; Finley, 1990).

There have been few surveys for marine mammals in the North Water, particularly in the offshore areas, from late winter through early summer prior to breakup. However, the data that are available are generally consistent with the observations presented here. Finley and Renaud (1980) conducted over 4,000 km of aerial surveys in March-April 1978 and March 1979, mainly along the Canadian side of the North Water from the eastern end of Devon Island to the southern end of Kane Basin, but saw no bowhead whales. Similarly, Koski and Davis (1979, figs 47 and 48) flew several hundred kilometres on a north-south grid to the southeast of Clarence Head on 31 May-1 June 1978, followed on 5 July by a survey along the floe edge from Jones Sound, north along the eastern coast of Greenland to southern Kane Basin, south along the Greenland coast to about 77°N and then west across the North Water back to Ellesmere Island. Again, no bowhead whales were seen. Six additional aerial surveys for marine mammals occurred across the eastern entrances to Jones and Lancaster Sounds and up to about 100 km offshore of Devon Island and southeast of Clarence Head, totalling several thousand kilometres between 9 May and 20 June 1978. Koski and Davis (1979, fig. 41) saw one bowhead whale on 8 June near the southeast entrance to Jones Sound, three near the east coast of Devon Island, five in the eastern entrance to

Lancaster Sound and one about 100 km offshore, near the area where we sighted 10 animals on 4 June. All other whales were sighted to the south of the polynya and later in the year. However, Davis and Koski (1980) were told of a sighting of 10-15 bowhead whales in Robeson Channel to the north of Kane Basin on 15 July 1978. In March 1993, Richard *et al.* (1998, fig. 4) sighted one bowhead whale in the mouth of Jones Sound and one to the east of Clarence Head. These were areas where their satellite photo indicated the recent presence of open water and leads. Most of our helicopter flights were made over the northern two-thirds of the polynya but no bowhead whales were seen.

Bowheads and other large whales have also been observed opportunistically during surveys for other species along the coast of Greenland. While surveying for seabirds on 10 May 1996, D. Boertmann and A. Mosbech (pers. comm.) observed two bowhead whales engaged in courtship behaviour at the ice edge near the southwest entrance to Inglefield Bredning. Between March and May 1982, 16 whales were seen during surveys along the coastal system of shoreleads and broken pack-ice in the Disko area off the west coast of central Greenland between approximately 69°N and 71°45'N (Born and Heide-Jørgensen, 1983). Reeves and Heide-Jørgensen (1996) analysed the current distribution and abundance of bowhead whales in the Disko Bay area and reported that at least a few tens of bowheads were present during the West Greenland surveys between 1981 and 1994. These studies indicate that bowhead whales still occupy their historical wintering range near the southeastern edge of the Davis Strait pack-ice off central West Greenland (Born and Heide-Jørgensen, 1983; Reeves and Heide-Jørgensen, 1996).

Humpback whales are also known to occur along the west coast of Greenland. Based on tail fluke photographs from 1981-1983, Perkins *et al.* (1985) made a mark-recapture estimate of 271 ± 71 for West Greenland while preliminary analyses based on photographs taken in 1988 and 1989 indicated about 400 individuals feeding there during the summer (Larsen and Hammond, 1990). Born (1987) reported a sighting of two humpbacks in Inglefield Bredning on 6 August 1985, at approximately 77°30'N.

The reaction of bowhead whales to large vessels is variable but, in general, they show avoidance of approaching ships at distances of several kilometres or more (Richardson and Malme, 1993). Thus, although we saw several whales at distances of less than 1 km from the ship, it is possible that other whales were present but not seen in the area. Even so, when all the data from our shipboard surveys are considered, along with the opportunistic surveys made on helicopter flights and the literature reviewed above, there is a reasonably consistent pattern. In general, few bowheads have been seen north of Clarence Head (roughly 72°N). Sightings between late March and early May have been in the vicinity of the entrance to Jones Sound and east of Clarence Head, in areas with recurrent leads and openings in the pack-ice, suggesting that small numbers of bowhead whales probably spend the winter in that vicinity in most years. It also seems likely that the bowhead whales seen in the North Water Polynya east and south of eastern Devon Island from late May to early July have migrated from wintering areas along the central west coast of Greenland toward summer feeding areas in the Lancaster Sound region and western Baffin Bay (Davis and Koski, 1980; Reeves *et al.*, 1983; Reeves and Heide-Jørgensen, 1996).

Neither of the observers who saw the unidentified large whales with white on the undersides of their flukes had previously observed a humpback whale. However, the

well-known presence of humpbacks along the West Greenland coast as far north as Inglefield Bredning in summer leaves open the possibility that a few individuals may sometimes be trapped by freeze-up and drifting pack-ice and are then forced to winter in the southern portion of the North Water Polynya. There is one record of a humpback whale entrapment in Disko Bay (Porsild, 1922) and several more in Newfoundland (Mitchell, 1979; Mitchell and Reeves, 1981).

ACKNOWLEDGEMENTS

We thank the officers and crew of the CCGC *Pierre Radisson* for their support and interest throughout the cruise. Funding was provided by the Natural Sciences and Engineering Research Council, the Canadian Wildlife Service, the Northern Science Training Program and the Polar Continental Shelf Project. We also thank D. Andriashek, G. Hunt, N. Karnovsky and N. Lunn for their assistance with surveying, J. Iacozza for producing the figures, D. Boertmann and A. Mosbech for permission to cite their unpublished observations and E. Born, B. Brownell and two anonymous reviewers for constructive criticisms and comments on earlier versions of this manuscript.

REFERENCES

- Born, E.W. 1987. Denmark. Progress report on cetacean research, June 1985 to June 1986. Part 1. Greenland and Denmark. *Rep. int. Whal. Commn* 37:166-8.
- Born, E.W. and Heide-Jørgensen, M.-P. 1983. Observations of the bowhead whale (*Balaena mysticetus*) in central West Greenland in March-May 1982. *Rep. int. Whal. Commn* 33:545-7.
- Davis, R.A. and Koski, W.R. 1980. Recent observations of the bowhead whale in the eastern Canadian high Arctic. *Rep. int. Whal. Commn* 30:439-44.
- Dunbar, M.J. 1981. Physical causes and biological significance of polynyas and other open water in sea ice. pp. 29-43. In: I. Stirling and H. Cleator (eds.) *Polynyas in the Canadian Arctic*. Can. Wildl. Serv. Occ. Pap. 45. 73pp.
- Finley, K.J. 1990. Isabella Bay, Baffin Island: an important historical and present-day concentration area for the endangered bowhead whale (*Balaena mysticetus*) of the eastern Canadian Arctic. *Arctic* 43(2):138-52.
- Finley, K.J. and Renaud, W.E. 1980. Marine mammals inhabiting the Baffin Bay North Water in winter. *Arctic* 33:724-38.
- Koski, W.R. and Davis, R.A. 1979. *Distribution of Marine Mammals in Northwest Baffin Bay and Adjacent Waters, May-October 1978*. LGL Ltd, Toronto, ON for Petro-Canada, Calgary, AB. 305pp.
- Larsen, F. and Hammond, P.S. 1990. Photo-identification of West Greenland humpback whales. *Eur. Res. Cetaceans [Abstracts]* 4:10-1.
- Mitchell, E.D. 1979. Canada. Progress report on cetacean research, June 1977-May 1978. *Rep. int. Whal. Commn* 29:111-4.
- Mitchell, E. and Reeves, R.R. 1981. Catch history and cumulative catch estimates of initial population size of cetaceans in the eastern Canadian Arctic. *Rep. int. Whal. Commn* 31:645-82.
- Perkins, J.S., Balcomb, K.C., Nichols, G., Hall, A.T., Smultea, M. and Thumser, N. 1985. Status of the West Greenland humpback whale feeding aggregation, 1981-1983. *Rep. int. Whal. Commn* 35:379-83.
- Porsild, M.P. 1922. Scattered observations on narwhals. *J. Mammal.* 3:8-145.
- Reeves, R.R. and Heide-Jørgensen, M.P. 1996. Recent status of bowhead whales, *Balaena mysticetus*, in the wintering grounds off West Greenland. *Polar Research* 15(2):115-25.
- Reeves, R., Mitchell, E., Mansfield, A. and McLaughlin, M. 1983. Distribution and migration of the bowhead whale, *Balaena mysticetus*, in the eastern North American Arctic. *Arctic* 36(1):5-64.
- Richard, P.R., Orr, J.R., Dietz, R. and Dueck, L. 1998. Sightings of belugas and other marine mammals in the North Water, late March 1993. *Arctic* 51:1-4.
- Richardson, W.J. and Malme, C.I. 1993. Man-made noise and behavioural responses. pp. 631-700. In: J.J. Burns, J.J. Montague and C.J. Cowles (eds.) *The Bowhead Whale*. Special Publication No. 2 for the Society for Marine Mammalogy, Lawrence, Kansas. 787pp.
- Stirling, I. 1980. The biological importance of polynyas in the Canadian Arctic. *Arctic* 33:303-15.
- Stirling, I. 1997. The importance of polynyas, ice edges, and leads to marine mammals and birds. *J. Mar. Systems* 10:9-21.
- Zeh, J.E., Clark, C.W., George, J.C., Withrow, D., Carroll, G.M. and Koski, W.R. 1993. Current population size and dynamics. pp. 409-89. In: J.J. Burns, J.J. Montague and C.J. Cowles (eds.) *The Bowhead Whale*. Special Publication No. 2 for the Society for Marine Mammalogy, Lawrence, Kansas. 787pp.