



Cumberland Sound Beluga

Background

Historically, belugas in Cumberland Sound were hunted both commercially and for subsistence. In 1990, the Southeast Baffin – Cumberland Sound beluga population was designated as “Endangered” by the Canadian Committee on the Status of Endangered Wildlife in Canada (COSEWIC) following declines in beluga numbers estimated from aerial surveys data.

Until recently, Cumberland Sound belugas were thought to belong to a Southeast Baffin Island population that was hunted by the communities of Iqaluit and Kimmirut as well as by Pangnirtung. Growth measurements, genetic and contaminants profiles, and satellite tracking data, collected since the late 1980s, have confirmed that most belugas hunted in Cumberland Sound are distinct from those hunted near Iqaluit and Kimmirut. Local hunters, however, report that there are different types of belugas hunted in Cumberland Sound.

The community of Pangnirtung hunts Cumberland Sound belugas under a quota system. The hunt is co-managed by the Nunavut Wildlife Management Board (NWMB) and Fisheries and Oceans Canada (DFO). Hunting regulations are implemented by DFO under the Fisheries Act and the Marine Mammal Regulations. A quota of 35 belugas has been in force for this population since 1991. As of the 2002/03 hunting season, the quota has been increased to 41 as part of a community-based management system. This RAP is being done in support of this management requirement.

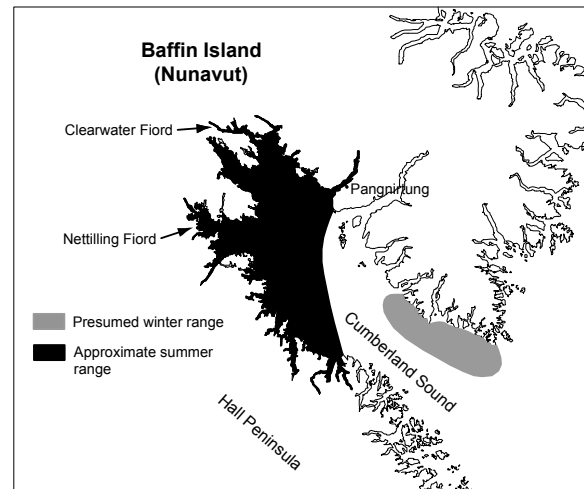


Fig. 1. Distribution of Cumberland Sound belugas during summer and winter months.

Summary

- Recent data on movements obtained from tagged whales suggest that belugas reside in Cumberland Sound year-round.
- Growth measurements and genetic and contaminant profiles, collected since the 1980s, have confirmed that most belugas hunted in Cumberland Sound are distinct from those hunted near Iqaluit and Kimmirut. Local hunters report there are two or three different types of belugas hunted in Cumberland Sound.
- Between 1992 and 2001, hunters landed an average of 36.5 belugas each year. Struck-and-lost rates were not reported. During the same period, belugas were also taken occasionally during ice entrapments.
- Aerial surveys, conducted in 1999, produced a population estimate of 1547 belugas (95% confidence limits: 1187-1970). Local knowledge and comparison of the 1999 estimate

to earlier estimates both suggest the population is increasing in size and recovering from historic depletion by commercial whaling.

- The DFO and the NWMB have authorized an increase in quota from 35 to 41 belugas, starting in 2002, as part of a community-based management system.

Species Biology

The beluga or white whale (*Delphinapterus leucas*) (*qilaluga* in Inuktitut) is a toothed (Odontocete) whale characterised by a blunt head, slight beak, fat, stocky body and lack of a dorsal fin. Newborn calves are light to dark-mottled grey in colour. Juveniles gradually lighten in colour as they age until they become almost pure white between seven and nine years of age. Belugas are usually found in arctic and subarctic waters and vary geographically in size and weight (Sergeant and Brodie 1969). In Cumberland Sound, adult females and males reach mean lengths of 362 cm (11.9 ft) and 428 cm (14.0 ft) respectively (Brodie 1971) and weigh from 800 to 1000 kg (1750-2200 lbs). Females typically reach sexual maturity at about 5 (range: 4-7) years of age (Brodie 1971; Heide-Jørgensen and Teilmann 1994). Males typically reach maturity at 6-8 years of age (Brodie 1971; Heide-Jørgensen and Teilmann 1994).

In Cumberland Sound, the peak in breeding appears to occur in May with calves being born in late July or early August after a gestation period of about 14.5 months (Brodie 1971; Kilabuk 1998). Calves nurse for up to two years. The calving interval is estimated to be one calf born every three years on average (Brodie 1971) although local

hunters report that females may give birth annually (Kilabuk 1998). The population growth rate is not known exactly for this population.

The oldest female and male sampled from the catch in Cumberland Sound to date are 26 and 24 years respectively (R. Stewart, unpublished data). In many stocks, belugas live to be 35-40 years of age or older (Smith 1999). A 49-year-old female and a 57-year-old animal were reported from the Eastern Beaufort Sea stock (Harwood *et al.* 2000). Average annual survival of beluga is reported to range from 90.6% per year for a hunted stock (Burns and Seaman 1985) to 97% per year for a stock that is not hunted (Béland *et al.* 1988). Sources of natural mortality include polar bears (Smith 1985, Lowry *et al.* 1987, Smith and Sjare 1990), killer whales (Byers and Roberts 1995), ice entrapments (Porsild 1918, Freeman 1968) and, possibly, disease (O. Nielsen, personal communication).

Belugas occupy mostly the western side of the Cumberland Sound in spring and early autumn (Fig. 1). In summer, they are found mainly in Clearwater Fiord and adjacent bays where they are reported to feed on a variety of fish and invertebrate species (Brodie 1970). Based on recent results obtained from satellite-tagging studies, belugas spend most of their time in the centre of the Sound in late autumn, then move to the eastern side near the mouth of the Sound in early winter. During the late autumn and early winter belugas dive to depths of 300 m or more in the middle of Cumberland Sound, likely to feed on deep-water species such as Greenland halibut, also known as turbot, (*Reinhardtius hippoglossoides*) (P. Richard, unpublished data). Local hunters also report that belugas at the

floe-edge in spring prey mainly on Arctic cod (*Boreogadus sp.*) and turbot under the ice (Kilabuk 1998).

The Hunt

Year	Quota	Catch
1992	35	35
1993	35	15
1994	35	35
1995	35	31
1996	35	41
1997	35	47
1998	35	35
1999	35	50
2000	35	37
2001	35	39

Table 1. Number of belugas struck and landed by Pangnirtung hunters between 1992 and 2001 (hunt statistics provided by DFO Iqaluit Area Office).

The annual quota for belugas in Cumberland Sound was 35 whales between 1992 and 2001, and was increased to 41 whales in 2002. As a condition of increasing the quota, the community is collecting information on struck and loss rates and landings. Hunters hunt belugas mostly in summer and avoid taking calves and females with calves. Total landings between 1992 and 2001 fluctuated between 15 and 50, averaging 36-37 belugas per year (Table 1). Over the same period, additional belugas were hunted opportunistically when they became trapped by ice. In addition to belugas that are struck and landed, some whales are killed but lost. While struck-and-lost rates have not yet been recorded for the Cumberland Sound hunt, data were collected for other southeastern Baffin hunts during 1999-2001. For every 100 beluga struck and landed by Iqaluit and Kimmirut hunters, another 13 were

struck and lost and another 14 belugas were wounded but escaped (DFO Iqaluit Area Office, unpublished data). It is not known whether wounded animals live or die as a result of their injuries. If struck-and-lost and wounded-and-escaped rates are similar for the Cumberland Sound hunt, then on average between 41 ($36.5 \times 1.13 = 41$) and 46 belugas ($36.5 \times 1.27 = 46$) actually have died from the hunt each year. Despite that, the population indices indicate a growth of the population in the last decade.

Resource User Perspective

The Inuit of the southeast Baffin region have long depended on the hunt of belugas in Cumberland Sound for their survival and culture. During the commercial whaling period, large numbers of belugas were killed. Hunters see variation in the numbers of belugas from year to year but they are seeing more belugas today than they did in the recent past. Predation by killer whales and disturbance caused by noise from numerous motorised boats and snowmobiles are the primary concerns of Pangnirtung hunters for the welfare of belugas in Cumberland Sound. Restoring some order, traditional laws and practices in the hunting of belugas and holding community consultations to make the public more aware of the problems were two recommendations presented in a recent report on Inuit traditional knowledge (Kilabuk 1998). Other recommendations presented in the report included making traditional knowledge part of the school curriculum, organising community hunts better and improving the DFO Whale Sampling Program. Many people that reside in the vicinity of Cumberland Sound live off the land and, for that reason, Cumberland Sound has the most outpost camps in

the Region. There may be some interest in allocating whales for the outpost camps separate from the community quota.

Resource Status

Stock Delineation

Cumberland Sound belugas, tracked with satellite-linked tags, do not appear to range beyond Cumberland Sound. Genetic and contaminant profiles suggest that belugas, caught in the waters off southeast Baffin Island since the late 1980s, belong to a different population than belugas caught in Iqaluit and Kimmirut (Brown Gladden *et al.* 1997; de March *et al.* 2002, in press; B. de March, unpublished data). Thus, Cumberland Sound belugas are thought to belong to a single, distinct population. However, according to traditional knowledge, there may be a few different beluga groups or populations in Cumberland Sound and they can be distinguished by their appearance, size, health and behaviour (Kilabuk 1998).

Two different groups can be distinguished by size. There is no information on ages of these whales. Local hunters report that groups of small belugas appear first at the floe-edge in Cumberland Sound in April. They are seen when hunters are hunting narwhals. They are small in size, somewhat skinny and adults are white in colour. The texture of their blubber or *maktaq* is soft. Although they are relatively easy to hunt, because they come close to the ice edge and remain underwater for short periods, usually only a few are taken. Herds of larger belugas arrive at the floe edge in late April and May and eventually move to Clearwater Fiord for the summer. In spring, their outer skin layer is yellow

and just starting to shed. Hunters report these animals are noticeably larger and better than the smaller ones at avoiding hunters.

During the summer, belugas are also seen in Netilling Fiord and southward in the bays and coastal waters of the western side of Cumberland Sound. Like the early floe-edge whales, these belugas are smaller in size and thinner than the Clearwater whales. It is not clear whether these western whales are the same animals as the small whales seen at the floe edge but the *maktaq* tastes the same. In the last three years, large numbers of small whales have been seen in summer. These whales have been observed only, not measured, so it is difficult to compare their size with those seen at the floe edge.

Genetic analyses has revealed there may be differences in haplotype frequencies in the beluga samples taken in Clearwater Fiord in the early 1980s compared with the samples taken in the 1990s outside Clearwater Fiord (de March *et al.* 2002, in press). It is possible that the belugas hunted in Clearwater Fiord in the 1980s belong to a different stock than those hunted outside the Fiord.

Stock Size

Two of three photographic surveys of Clearwater Fiord in 1999 produced counts of 720 and 777 whales visible at or near the water surface. A total of 64 belugas were counted on-strip and off-strip during the surveys over the northern (excluding Clearwater Fiord) and western sectors of Cumberland Sound in 1999. Using dive data obtained from belugas tagged and tracked in Cumberland Sound in 1998

and 1999, the 1999 survey data were corrected for diving animals missed during the surveys to produce a population estimate of 1547 belugas (Fig. 2; 95% confidence limits: 1187-1970) (P. Richard, unpublished data). If the western sector whales represent a second stock, the total estimate for the animals summering in Clearwater Fiord and adjacent waters would then be reduced by about 40 animals.

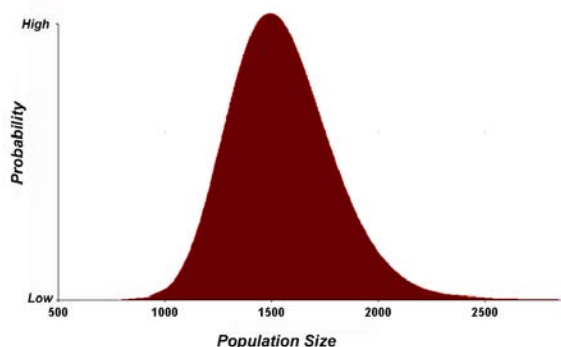


Fig. 2. Distribution of estimated population sizes. The higher the shaded area extends above the x-axis (i.e., the horizontal line), the more probable that the estimated population size is close to the actual population size. Conversely, the lower the shaded area extends above the x-axis, the less probable the estimated population estimate is correct. All estimated population sizes on the x-axis are possible, but not all are probable.

Stock trend

Prior to 1923, belugas in Cumberland Sound were estimated to number more than 5000 animals (Mitchell and Reeves 1981). As a result of large commercial catches, the population declined substantially between the 1920s and 1960s. Commercial hunting ended in 1960 although subsistence hunts continued. Aerial surveys, conducted in fall 1979 and summer 1980, produced a surface index of only 400-600 belugas in the northern end of Cumberland Sound

(Brodie *et al.* 1981; Richard and Orr 1986). A surface index counts only whales seen at or near the surface of the water and does not include animals diving below the surface that cannot be seen by observers. Aerial surveys conducted over Clearwater Fiord in the summer of 1985 and 1986 produced surface indices of 398 and 442, respectively, suggesting no change in beluga numbers since 1980 (Richard 1991).

Photographic surveys of Clearwater Fiord and a systematic visual strip transect survey of northern and western Cumberland Sound were conducted in August 1990 and 1999. The three photographic surveys of Clearwater Fiord in 1990 produced counts of between 454 and 497 belugas visible at or near the water surface while the 1999 surveys produced counts of 720 and 777 belugas (P. Richard, unpublished data). Comparison of the 1991 and 1999 survey results suggest that the Cumberland Sound population is increasing in size despite an average annual landed catch of 36-37 belugas per year. Hunters also report an increase in population size over the past decade.

Sustainable Hunting Rate

For toothed whales, the maximum rate of increase (the rate of population increase that could be achieved in the absence of crowding and shortage of resources; Caughley 1977) is thought to be between 2% and 6% of the total population (Reilly and Barlow 1986, Wade 1998). Based on surface counts, it appears the numbers of belugas in Clearwater Fiord increased by 46% between 1990 and 1999, or 5% per year, despite experiencing an annual landed catch of 15-50 animals per year.

To determine the sustainable hunting level, we used the survey estimate corrected for diving animals that are not seen during the surveys. The corrected survey estimate for the 1999 survey of Cumberland Sound belugas is 1547 whales (standard deviation: 240). A total harvest of 41 whales per year from this population is being proposed by the NWMB. Risk modelling suggests that this level of hunting is not likely to cause the population to decline.

Sources of Uncertainty

This population has been the subject of a number of scientific studies since the 1970s including surveys to estimate stock size and investigations of genetic, contaminant, and growth profiles to assess stock relationships between Cumberland Sound belugas and other southeastern Baffin belugas. Traditional and local Inuit knowledge of the population has also been collected and published (Kilabuk 1998). Nevertheless, several sources of uncertainty remain. No information is available on current reproductive rates and age-specific survivorship. Winter distribution of the population has not yet been confirmed. The reported catch does not account for animals that are struck and lost or those that are wounded but escape. Thus the total number of animals killed is not known precisely. Other rates of mortality resulting from predation, ice entrapments (those not observed by hunters) and other natural causes are not known. The impact of environmental variables such as changes in climate and ice conditions on belugas, their prey and predators are uncertain. The potential impacts on belugas of increases in vessel traffic in and near Cumberland Sound that may occur as a result of commercial fishing, industrial development or whale-watching are also

unknown. Hunters have reported seeing a few different groups of belugas in Cumberland Sound. It is not known whether these animals are part of the same stock or represent different stocks.

Outlook

Recent survey results and local Inuit knowledge suggest that the population is increasing in size and recovering from depletion by commercial whaling. The population modelling and risk analysis suggest that the proposed quota of 41 belugas is unlikely to cause the population to decline, assuming that no additional unexpected mortality occurs.

Management Considerations

Since 1991, the Pangnirtung Hunters and Trappers Association (HTA) has worked with the NWMB and DFO to co-manage Cumberland Sound beluga. The subsistence hunting level from 1991 to 1999 has allowed the stock to increase in size. The NWMB is now moving toward community-based management of the stock. An increase in harvest from 35 to 41 belugas per year has been proposed by the HTA and approved by the NWMB and DFO. A management plan for Cumberland Sound beluga is being developed.

To meet anticipated requirements under Species at Risk legislation, a Recovery Strategy is being developed. It is anticipated that COSEWIC will reassess the status of the population in the next two to three years.

Other Considerations

Contaminants

Arctic marine predators, such as beluga, that are near the top of the Arctic marine food chain can accumulate relatively high levels of persistent organochlorine contaminants and heavy metals. Southeast Baffin Island belugas have some of the highest levels of organochlorines of any reported to date in the Canadian Arctic but these levels are a small fraction of those measured in St. Lawrence belugas. Organochlorine levels in Cumberland Sound belugas are approximately two-thirds the levels found in belugas taken by Kimmirut or Iqaluit hunters (B. de March, unpublished data). There is no evidence that contaminants are affecting the health of Cumberland Sound belugas. Since the early 1980s, concentrations of some of the major persistent organic pollutants have stabilised or declined while new types of contaminants, now in current use, are low but have increased (G. Stern, unpublished data). Mercury and other heavy metals have been found in beluga samples from Cumberland Sound (Wagemann *et al.* 1996; G. Stern, unpublished data) but there is no evidence they are affecting the health of the whales.

Disease

Die-offs of toothed whales, in other parts of the world, have been directly caused by influenza A (Hinshaw *et al.* 1984) and distemper viruses (Lipscomb *et al.* 1994). No whales sampled from the Pangnirtung catch between 1984 and 1997 tested positive for the presence of antibodies to influenza A (Nielsen *et al.* 2001a). A small percentage of the belugas caught by Pangnirtung hunters between 1986 and 1994 tested positive for antibodies to *Brucella* bacteria (Nielsen *et al.* 2001b). There is

presently no understanding of whether *Brucella* poses a risk to belugas.

Commercial Fisheries

The current winter long-line fishery for Greenland halibut (turbot) in Cumberland Sound does not appear to pose a problem for belugas. With the allocation of the entire Canadian share of the 0A Greenland halibut fishery to Nunavut, increased ship traffic in Cumberland Sound has the potential to disturb belugas, especially if existing facilities are expanded. If gill nets were to be proposed for the turbot fishery, the potential for entanglement of belugas should be carefully considered. There is also potential competition for prey species eaten by belugas.

Noise and Disturbance

Manmade sources of noise include outboard motors, large ships, snowmobiles and aircraft. Noise from motorized boats is considered to be the main factor causing a decline in the numbers of whales seen at outpost camps and in Cumberland Sound (Kilabuk 1998). Kilabuk (1998) suggests that disturbance has caused a decline in oiliness of the blubber because whales are using more energy to avoid boats. Belugas normally lose fat when they come into Cumberland Sound but this may not be related to noise. Belugas also react to all noise at the floe edge including footsteps and snowmobiles and to low-flying aircraft. Belugas can react to the noise of large ships at distances of up to 20 or 30 km (12 to 18 miles) (Cosens and Dueck 1993). In recent years, hunters have also reported increased submarine traffic in Cumberland Sound and local changes in beluga distribution in response to submarines.

Killer Whales

Hunters have noted an increase in the numbers of killer whales using Cumberland Sound in the last few years. A group of 10 was seen recently and hunters have seen evidence of killer whale attacks on belugas. Increased numbers of killer whales will result in higher mortality of belugas.

Industrial Development

No industrial developments, marine or terrestrial, are underway or anticipated in the vicinity of Cumberland Sound.

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Personal Communications and Unpublished Data

Brigitte de March, Fisheries and Oceans Canada, 501 University Crescent, Winnipeg, Manitoba R3T 2N6. Unpublished data cited in this report contained in the following manuscript: B.G.E. de March, G. Stern, and S. Innes. In prep. The combined use of organochlorine contaminant profiles and molecular genetics for stock discrimination of belugas (*Delphinapterus leucas*) hunted in three communities on Southeast Baffin Island.

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