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Observations on the Narwhal *Monodon monoceros* in Eastern Canadian Waters

by

A. W. Mansfield

Arctic Biological Station, Fisheries and Marine Service
Department of the Environment, Ste. Anne de Bellevue, Que., Canada

Introduction

In the summers of 1963, 1964 and 1965 field studies on the narwhal were carried out in the Pond Inlet area of northern Baffin Island. Sixty two narwhals were examined, most of which were captured in nylon nets 100 yards long and of 14 or 18 inch stretched mesh. These were set at strategic points in Koluktoo Bay, 100 miles southwest of the settlement at Pond Inlet, and were tended as regularly as weather and ice conditions permitted.

External characteristics

Like its close relative the white whale *Delphinapterus leucas*, the narwhal shows marked colour changes with age. At birth the skin is slate grey, but as the animal grows older, patches of white appear about the anus and genital slit and gradually extend up the flanks. At maturity the body becomes almost completely white ventrally and black dorsally with a variegated pattern of dark and light patches on the sides of the body and upper surface of the flukes. The contrast in dorsal and ventral colouration is most pronounced in old males.

The narwhal's name means "corpse whale" in Norwegian and refers to the presumed likeness of its mottled skin to that of a drowned man. By far the most conspicuous feature of the narwhal is the long tapering tusk, from which the scientific name *Monodon monoceros* is derived. In embryos two pairs of teeth develop in each upper jaw, the posterior ones remaining rudimentary and eventually disappearing (Eales 1950, Fraser, 1938). In the adult

male the left anterior tooth develops into the tusk, which appears rarely to exceed 200 cm in external length. The right anterior tooth, which measures about 20 cm in length, normally remains embedded in the skull but sometimes develops into a tusk. In females the two anterior teeth develop in the same way as the right anterior tooth of the male. Usually they remain embedded in the skull, but sometimes the left one develops into a tusk, and occasionally both. Two-tusked narwhals are very rare in nature, but their skulls are usually more common in museum collections than the normal form. The tusk appears to be a secondary sexual character which may play a part in aggressive male display. Tusks are probably not used in feeding since the females manage perfectly well without them, but they are invariably worn smooth at the tip. It seems most likely that such wear results from the tusk inadvertently furrowing the bottom when the narwhal is pursuing some of its prey, particularly shrimps and flatfish.

Distribution and seasonal movements

In Canada narwhals occur regularly on the east coast of Ellesmere I.; in Jones and Lancaster Sounds; in Prince Regent Inlet, Navy Board Inlet and Pond Inlet; at Clyde River on the east Baffin coast; and at Repulse Bay in northern Hudson Bay. They also occur occasionally in Cumberland Sound and Frobisher Bay; at Lake Harbour and Cape Dorset in Hudson Strait; at Coral Harbour, Southampton Island, and at Igloolik in northern Foxe Basin (Fig. 1).

Narwhals are deep water cetaceans. They probably spend the winter in open water in Baffin Bay, especially in the 'North Water' which occasionally extends northwards into Smith Sound. In June and July, as the ice begins to break up, they move along the cracks and shore leads into Pond Inlet, Lancaster Sound, Jones Sound and Inglefield Bay in northwestern Greenland. By late July and early August they are found at the heads of certain fiords and bays which they frequent year after year.

Population status and catch

No extensive aerial surveys have been made, but a count of animals passing northern Bylot Island in the summer of 1957 indicated a minimum population of 6000 (Tuck, MS 1957). About another 2500 animals are estimated for the Thule area of northwestern Greenland (Bruemmer, MS 1971). Thus a conservative estimate for the total narwhal population of Canada and northwestern Greenland is about 10,000.

Table 1 shows the catch of narwhals reported by the RCMP for the period 1962-1971. The maximum catch of 203 whales occurred

in 1963, while the mean catch for six years of fairly complete reporting was 113 whales. These figures should probably be doubled to account for sinking losses resulting from the hunting technique of shooting the animal before harpooning it (Bruemmer, MS 1971).

Research results

Age determination

The skulls, tusks and teeth of all netted specimens, were kept. Well defined laminae in both the tusks and lower jaws appear to be potentially useful in determining the age of the individual animals, but a larger sample, possibly obtained from the Inuit (Eskimo) catch, will be required in order to construct life tables from which mortality rates can be derived.

Feeding

Few of the 62 specimens examined contained food. A small number of squid beaks and otoliths from polar cod *Boreogadus saida* were found in 10 stomachs and small amounts of unidentified fish remains in another 3 stomachs. No remains of arctic char *Salvelinus alpinus* were found in spite of the extensive runs of this species from the Robertson River which flows into Koluktoo Bay. In northwestern Greenland most narwhals appear to feed on Greenland halibut *Reinhardtius hippoglossoides*, polar cod and shrimps of several species (Bruemmer, MS 1971; Vibe 1950).

Growth

At birth the narwhal measures about 160 cm in length and weighs just over 80 kg. Fully grown adult females attain a length of 400 cm and weight of 900 kg, and the males a length of 470 cm and weight of 1600 kg. Between 30 and 35 percent of the body weight is blubber, 25 percent meat and 10 percent skin.

Reproduction

The greater proportion of specimens taken were adult females and their calves. This does not imply an uneven sex ratio in the population, but probably indicates either a bias in catching more naive calves and subsequently their mothers, or a selection of the deep bays at this time of the year by the females

with calves. In 1963 two newborn calves with remains of the umbilical cord attached were captured on 9 and 16 August, and in 1965 two foetuses measuring 18 and 28 cm were collected on 19 August. In the Inglefield Bay area of northwestern Greenland three foetuses ranging in length from 25 to 38 cm were also found in females killed in late July and early August and two newborn calves with fresh umbilical scars were killed in early August (Bruemmer, MS 1971). This and other evidence in the literature confirms the recent findings by Best and Fisher (1974) that birth occurs about mid July and conception about mid April. Assuming a gestation period of 15 months and a lactation period of about 20 months, as in the white whale, calving would occur about once in 3 years.

Narwhals are born when the pregnant females are entering their traditional summering areas in the deep bays and fiords. The newborn calves appear to be adequately protected from the thermal stress of cold water by a 2.5 cm layer of blubber unlike calves of the white whale which are usually born in the comparatively warm environment of river estuaries (Sergeant, 1973).

Although the reproductive rate is unknown it may be assumed that it is similar to that calculated for the closely related white whale. This appears reasonable since the white whale has a gestation period of 14.5 months, similar to that of the narwhal, and calving is at approximately the same time of year. Brodie (1971), studying the population of white whales in Cumberland Sound, gave a rate of increase of 0.09, based on the attainment of sexual maturity at 5 years for females, a 1:1 sex ratio and an age of 21 years at the last birth. Sergeant (1973), from samples taken in western and northern Hudson Bay, estimated the annual crude birth rate as 0.12. The increase of Sergeant's estimate results from a slightly lower age of female sexual maturity (4.5 years) and the fact that a quarter of the females calve every 2 years instead of every 3 years.

Management considerations

Based on a Canadian and northwestern Greenland herd of 10,000 and a minimum rate of increase of 0.09, the annual production of narwhals is estimated to be about 900. The maximum recorded Canadian catch in 1963 (Table 1) was 203. The hunting technique in Canada probably results in a 50% loss by sinking, which would increase the maximum catch to about 400. Bruemmer (MS 1971) estimated the annual catch in northwestern Greenland to lie between 100 and 135 narwhals. The total estimated maximum kill of about 540 is therefore well below the annual production of 900.

The regulations for the protection of narwhals (Canada: PC 1971-120) limit the take of narwhals to five per Inuit hunter. The annual take of this species is usually restricted to four villages; Pond Inlet, Clyde River, Grise Fiord and Arctic Bay, which had a combined human population in 1972 of 1068. With the demographic structure now prevalent, this population would contain approximately 290-300 males between the ages of 15 and 70. Under the present legislation such a population of hunters could legally kill up to 1500 narwhals. When allowance is made for sinking losses, this could result in a kill more than twice the annual production.

Though such a large increase in catch is unlikely in view of the decrease in the number of dogs and the corresponding smaller requirement for whalemeat, there is some concern that the high prices paid for ivory may induce the hunters to kill many more males for their tusks. Clearly the catches will have to be monitored carefully and the regulations altered as required. Perhaps the setting of quotas for each settlement would be the most appropriate way of handling the problem.

Another important management consideration is the protection of traditional narwhal summer areas from disturbance, either from heavy hunting activity or commercial activities. In the Thule district of northwestern Greenland the Eskimos have themselves forbidden the use of motor boats in the narwhal-hunting areas during the summer months (Bruemmer, MS 1971). A more efficient means of capturing the whales, such as netting, might also be introduced in order to prevent the high sinking loss.

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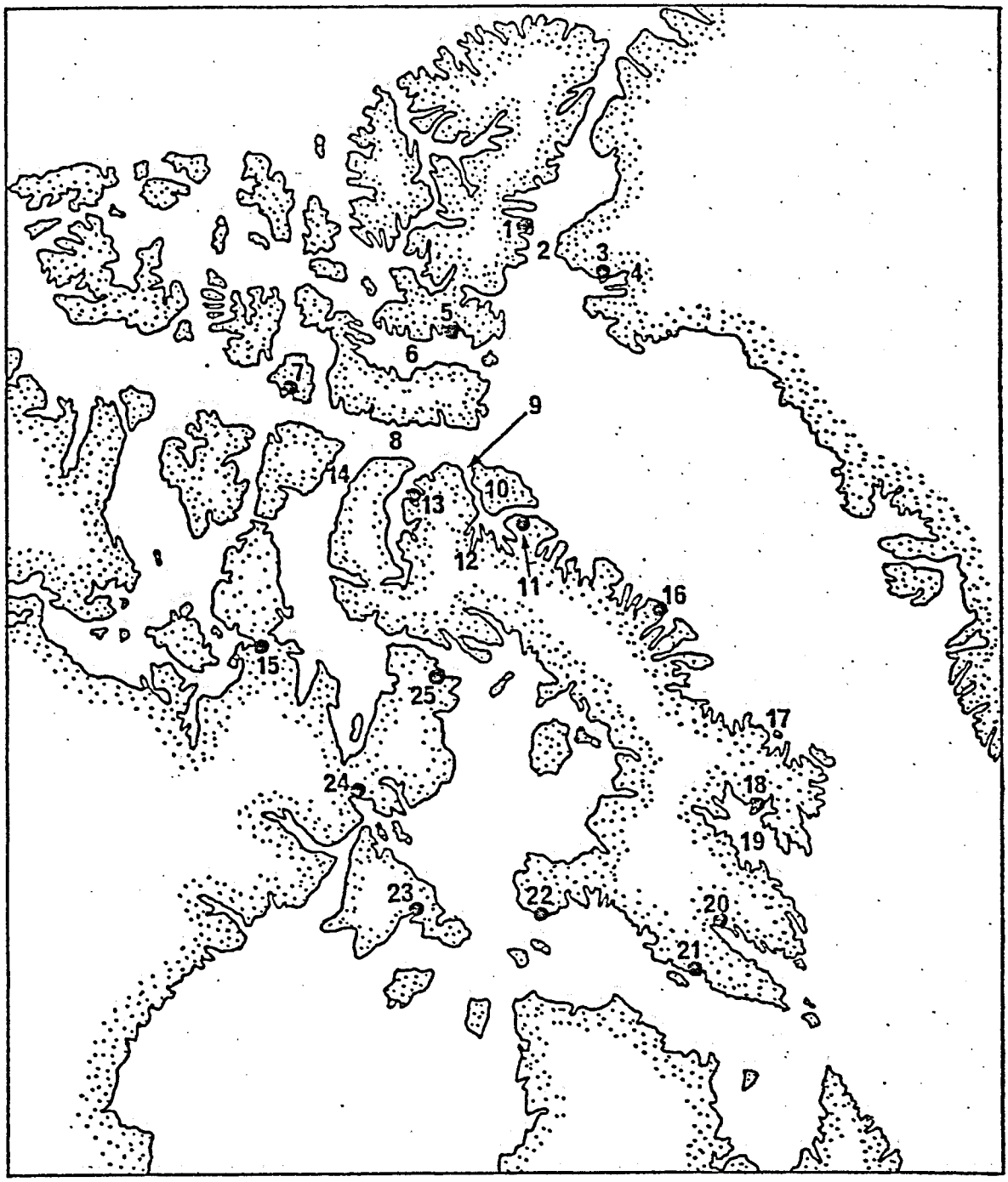

Figure 1. Distribution of the narwhal in Canada and northwestern Greenland. Numbers refer to the following place names mentioned in the text: (1) Alexandra Fiord; (2) Smith Sound; (3) Thule; (4) Inglefield Bay; (5) Grise Fiord; (6) Jones Sound; (7) Resolute; (8) Lancaster Sound; (9) Navy Board Inlet; (10) Bylot Island; (11) Pond Inlet; (12) Koluktoo Bay; (13) Arctic Bay; (14) Prince Regent Inlet; (15) Spence Bay; (16) Clyde River; (17) Broughton Island; (18) Pangnirtung; (19) Cumberland Sound; (20) Frobisher Bay; (21) Lake Harbour; (22) Cape Dorset; (23) Coral Harbour; (24) Repulse Bay; (25) Igloolik.

Table 1. Narwhal catch from R.C.M.P. game reports for the years 1962-1971.

	Alexandra Fiord	Broughton Island	Clyde River	Grise Fiord	Lake Harbour	Pangnirtung	Pond Inlet	Repulse Bay	Resolute Bay	Spence Bay	Total
1962					0	80-100*	65		6		
1963			50	0	0	33*	115		2		203
1964	1		25	20	0	0	60		0	4	119
1965			18	0	1	0	60		0	6	85
1966			15	27	0	11	58		0		111
1967			24	0	0	1	40		0	25	90
1968			8	7	0	0	50		0		65
1969		7	13	5		0			0		
1970			9	49	0	5				20-30	
1971				25	0			5		0	

(*Driven in by killer whales)

Mean = 113