

# The Thick-billed Murre Population of the Thule District, Greenland

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**ABSTRACT.** The population of thick-billed murres (*Uria lomvia*) in the Thule District, North Greenland, was surveyed in 1987. Counts from photos indicated a total of 285 000 murres present at the five colonies in the area, corresponding to about 214 000 breeding pairs. Counts of large murre colonies are likely to underestimate numbers, and the true population size probably falls in the range of 210 000 – 250 000 pairs. The need for future monitoring is stressed in light of the threat to murre populations posed by human activities such as hunting, petroleum development, and commercial fisheries.

Other seabird species recorded during the survey, including the Atlantic puffin (*Fratercula arctica*) and the Razorbill (*Alca torda*), are briefly referred to.

**Key words:** thick-billed murre, *Uria lomvia*, Greenland, Thule, seabirds

**RÉSUMÉ.** En 1987, on a effectué un relevé de la population de marmettes de Brunnich (*Uria lomvia*) dans le district de Thulé au nord du Groenland. Le comptage à partir de photos révèle la présence de 285 000 marmettes dans les cinq colonies de la région, ce qui correspond à environ 214 000 couples reproducteurs. Le comptage d'importantes colonies sous-estime probablement le nombre d'oiseaux, et la taille réelle de la population se situe sans doute dans la gamme de 210 000 à 250 000 couples. On souligne le besoin à l'avenir de surveiller la population de marmettes de Brunnich, en tenant compte de la menace que constituent pour cet oiseau les activités humaines comme la chasse, l'exploitation pétrolière et la pêche commerciale.

On mentionne brièvement d'autres espèces d'oiseaux marins que l'on a rencontrés lors du relevé, parmi lesquelles se trouvent le macareux moine (*Fratercula arctica*) et le gode (*Alca torda*).

**Mots clés:** marmette de Brunnich, *Uria lomvia*, Groenland, Thulé, oiseaux marins

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## INTRODUCTION

The thick-billed murre (*Uria lomvia*) breeds in large colonies throughout the Arctic, forming an extremely important element in high and low arctic marine ecosystems.

In the western Atlantic sector, the distribution and numbers of the thick-billed murre have been reviewed by Nettleship and Evans (1985): it breeds in eastern Canada from Newfoundland north to Jones Sound and along the entire west coast of Greenland. Major concentrations occur in Hudson Strait, East Baffin Island, Lancaster and Jones sounds, the Thule District, and in northern West Greenland between Disko Bay and Upernavik District. Fairly accurate population figures are now available from the Canadian colonies (Nettleship and Evans, 1985) and from most of West Greenland (Kampp, 1988a). In contrast, only provisional population estimates are available for colonies located in the Thule District, North Greenland (Salomonsen, 1950). More recent estimates of population size are either unpublished (e.g., Salomonsen revisited the area four times between 1968 and 1978) or non-existent. Because alarming population declines have recently occurred in West Greenland from Disko Bay to Upernavik (Evans, 1984; Kampp, 1988a), all thick-billed murre colonies in the Thule District were visited and surveyed in 1987. The results of the 1987 census are given here, together with brief accounts of some other species encountered during the survey.

## THE THULE DISTRICT

Greenland is subdivided into three regions: West Greenland, from Lindenows Fjord just northeast of Cape Farewell northwards along the west coast to 75°N in Melville Bay; North Greenland, from Melville Bay north and east to Nordostrundingen; and East Greenland, comprising the entire

east coast. Of a total Greenland population of more than 50 000 people, about 90% live in West Greenland.

The Thule District, forming the westernmost part of North Greenland (Fig. 1), is the only permanently inhabited area in that region, with a population of about 800 Greenlanders. The majority, about 450 people, live in the main town of Qaanaaq; five smaller settlements hold between 30 and 130 inhabitants each. Thule Air Base supports 1200-1400 Danes and U.S. citizens.

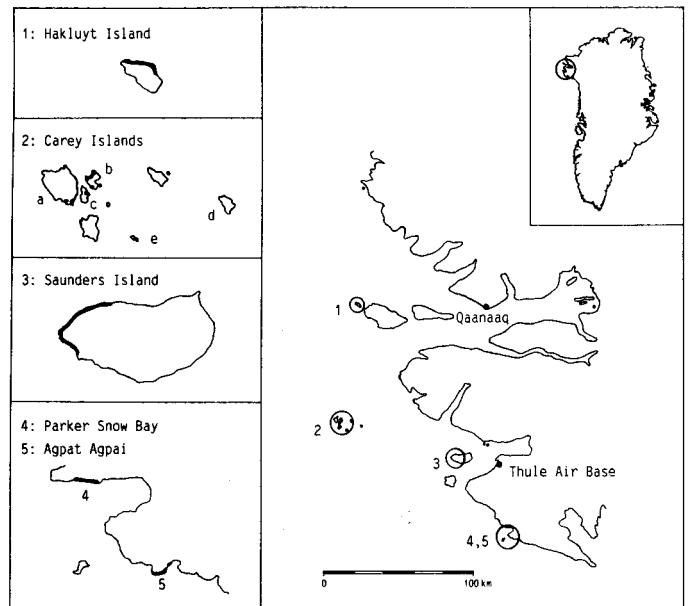


FIG. 1. The five thick-billed murre colonies in the Thule District. Islets indicated on the map of the Carey Islands are 1) Nord vestø; 2) Isbjørnø; 3) Mellemø; 4) Bjørlings Ø; 5) Hollænderhatten.

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Most of the Greenlandic population depends on subsistence hunting of marine mammals, the most important species being ringed seal (*Phoca hispida*), walrus (*Odobenus rosmarus*) and narwhal (*Monodon monoceros*). Seabirds are taken during summer, in particular the dovekie (*Alle alle*); murrelets are hunted but the total annual take probably does not exceed a few thousand (E. Born, pers. comm. 1987). Boat trips from Thule Air Base are infrequent and few murrelets are shot for sport.

The climate of the Thule District is high arctic, with ice break-up in the fjords taking place in July, often in the second half of the month. All major breeding places for seabirds (including murrelets) are located at the outer coast near the North Water, a recurrent polynya off-shore the district. A clear association exists between breeding locations of highly colonial seabird species in the High Arctic and the presence of recurrent polynyas, because the birds need open and productive waters within foraging range of the colonies (Brown and Nettleship, 1981).

#### METHODS

Five murre colonies are known in the Thule District (Fig. 1) and it appears very unlikely that others exist. Inuit hunters travel far and are keen observers, and they would hardly fail

to recognize a murre colony even if seeing it at a time when no birds were present.

The present survey was conducted during the first half of August 1987. We spent three days on the Carey Islands and visited each of the other four colonies for 2-5 h. About 30% of the murre eggs had hatched on 7 and 9 August (Saunders Island and Carey Islands respectively), and no chicks older than about one week were seen. It therefore appears that only a negligible number of chicks had left the colonies at the time of our visits.

The colonies were photographed from the sea using a 35 mm Leica R4 camera with an Apo-Telyt 180 mm lens (census photos). Where cliffs were unusually high a Telyt 400 mm lens was used instead. In addition, a number of survey photos were taken using a 35 mm Elmarit lens. Examples are given in Figure 2. All photos were color slides, mostly Kodachrome 64, but in some cases Kodachrome 200 or Ektachrome 100 films were used.

The slides were later projected on paper using two parallel projectors. As a first step, "maps" showing the coverage of the census photos were produced by drawing outlines of the census photos on projections of the survey photos. These sketches (one for each survey photo) show which part of a particular section of the cliff is covered by each census photo, and how these parts are positioned relative to each other.

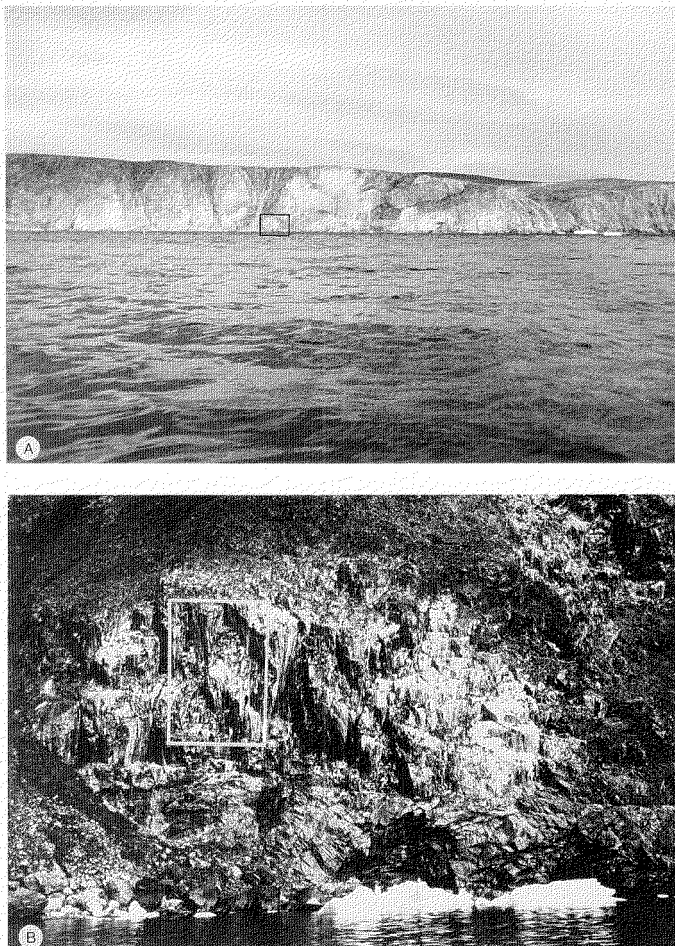


FIG. 2. The thick-billed murre colony in Parker Snow Bay (A), with one of 30 survey photos (B) and one of 133 census photos (C) used in counting the birds. Contours of B are framed in A, and contours of C in B.

Birds were subsequently counted one by one from the census photos projected on paper, with census photos covering contiguous sections of cliff shown in the parallel projector. This procedure permitted a complete count to be made without running the risk of double counting overlap zones between photos. (Nettleship [1976] provides a short description of a different technique using black-and-white photos.) Uncovered gaps in the mosaic were examined on the projected survey photos, and if murres were present their numbers were roughly estimated. All the photos and sketches are deposited at the Zoological Museum, Copenhagen.

The number of individual birds present was converted to numbers of breeding pairs by multiplying by a factor of 0.75. This conversion factor is based on detailed studies of eastern Canadian arctic thick-billed murre colonies during late incubating and hatching (Birkhead and Nettleship, 1980; Gaston and Nettleship, 1981; Nettleship and Evans, 1985) and appears to apply to murres in West Greenland as well (P.G.H. Evans, unpubl. report 1987).

Included in the description of each murre colony are remarks on the occurrence of other seabird species. Owing to the limited time available, only razorbills (*Alca torda*) and Atlantic puffins (*Fratercula arctica*) were counted, and numbers given for other species are not intended to indicate more than reasonable orders of magnitude. Unless otherwise stated, numbers refer to individuals. Breeding was not confirmed for razorbills or puffins but was strongly suggested by their presence on land.

## RESULTS

The exact locations and extent of the five thick-billed murre colonies in Thule District are shown in Figure 1. They are briefly characterized below, with estimates of murre numbers summarized in Table 1.

*Hakluyt Island* (Agpârssuit), 77°26'N, 72°40'W: Murres were breeding on the steep cliffs along the entire north coast and part of the east coast. The remaining perimeter lacks steep cliffs and is unsuitable for murres but is inhabited by numerous dovekeys, which also breed in talus below most of the murre cliffs. Murres breed right to the cliff top in many places, i.e., up to c. 400 m at the northeast corner. Other seabirds found here were black-legged kittiwakes (*Rissa tridactyla*) (2000), glaucous gulls (*Larus hyperboreus*) (100), black guillemots (*Cepphus grylle*) (200), Atlantic puffins (30-35) and razorbills (2).

The total number of murres counted was 36 123 individuals. An additional 950 (2.6%) birds were added to account for

those not covered by the census photos, making the adjusted total c. 37 000 birds, or 28 000 pairs (Table 1).

*Carey Islands* (Kitsigsut) 76°44' N, 73°05' W: Murres breed in several small sub-colonies on three islands: Nordvestø, Isbjørneø and Mellemø (Fig. 1). The largest number occurred on Isbjørneø, but altogether the population comprises only 6700 birds (combination of direct and photo counts), or about 5000 pairs (Table 1).

The number of murres on the Carey Islands appeared to be limited by a shortage of suitable habitat. Most vertical or near-vertical cliffs visible from the sea were in fact occupied by murres, even though many of these cliffs seemed sub-optimal for breeding murres owing to the long distance to the shore (up to 1000 m; Fig. 3). Murre chicks leave the colony long before they can fly and are very vulnerable to predation from gulls and foxes during "fledging" if they have to travel some distance overland (Williams, 1975; Daan and Tinbergen, 1979). Arctic foxes (*Alopex lagopus*) do occur on the Carey Islands, at least intermittently.

Two other seabird species breed in the immediate vicinity of the murre cliffs: about 5 pairs of glaucous gulls and 30 pairs of black guillemots. Both occur on other islands in the group; 200 black guillemots were seen at Björtings Ø on our arrival. In addition, 60 Atlantic puffins and 12 razorbills were found on the twin islet Hollænderhatten.

*Saunders Island* (Agpat), 76°34' N, 70°00' W: Murres breed in numerous small and several large sub-colonies along almost 10 km of coast around the western tip of the island. Altogether, 138 851 birds were counted on the photos, with an additional 3690 (2.7%) birds estimated missed from the photos, giving a total of 143 000 birds, or 109 000 pairs (Table 1). Of these, almost half occur in the immense "main colony" on the southwest coast.

Northern fulmars (*Fulmarus glacialis*) (5000), black-legged kittiwakes (5000), glaucous gulls (100) and black guillemots (100) were also recorded. A single Atlantic puffin was seen below the cliffs at the westernmost point.

*Parker Snow Bay* (Ivssuvigsûp agpai), 76°10'N, 68°40'W: This colony is fairly compact and is situated along 2.5 km of the north coast of the bay (Fig. 2). Total count of murres from photos was 47 861, with an additional c. 1380 (2.8%) birds estimated missing from the photos, giving a total of almost 50 000 birds, or 38 000 pairs (Table 1).

Black-legged kittiwakes (2000), glaucous gulls (100), black guillemots (50) and razorbills (4) also occurred in the colony. Dovekeys were breeding in the talus slopes just east and west of the murre colony.

*Agpat Agpai*, 76°05'N, 68°25'W: Murres breed along about 4 km of coast in ten sub-colonies. There were 44 319 murres counted on the photos, with an estimated 3080 (6.5%) missed. This gives a total of nearly 48 000 birds, or 36 000 pairs (Table 1).

Other seabirds present were black-legged kittiwakes (5000), glaucous gulls (100) and black guillemots (100). Dovekeys appeared to be breeding nearby, but not immediately adjacent to the murre colony.

### Observations of Other Seabirds

Our brief visit to the Thule District did not allow detailed surveys to be conducted of other parts of the coast (i.e., lengths of coastline between murre colonies). However, cas-

TABLE 1. Thick-billed murre counts at the five colonies in the Thule District, 1987

Colony	Birds counted	Pairs <sup>1</sup>
Hakluyt Island	37 000	28 000
Carey Islands	6 700	5 000
Saunders Island	143 000	107 000
Parker Snow Bay	50 000	38 000
Agpat Agpai	48 000	36 000
Total	285 000	214 000

<sup>1</sup>Number of birds multiplied by 0.75 (see text).

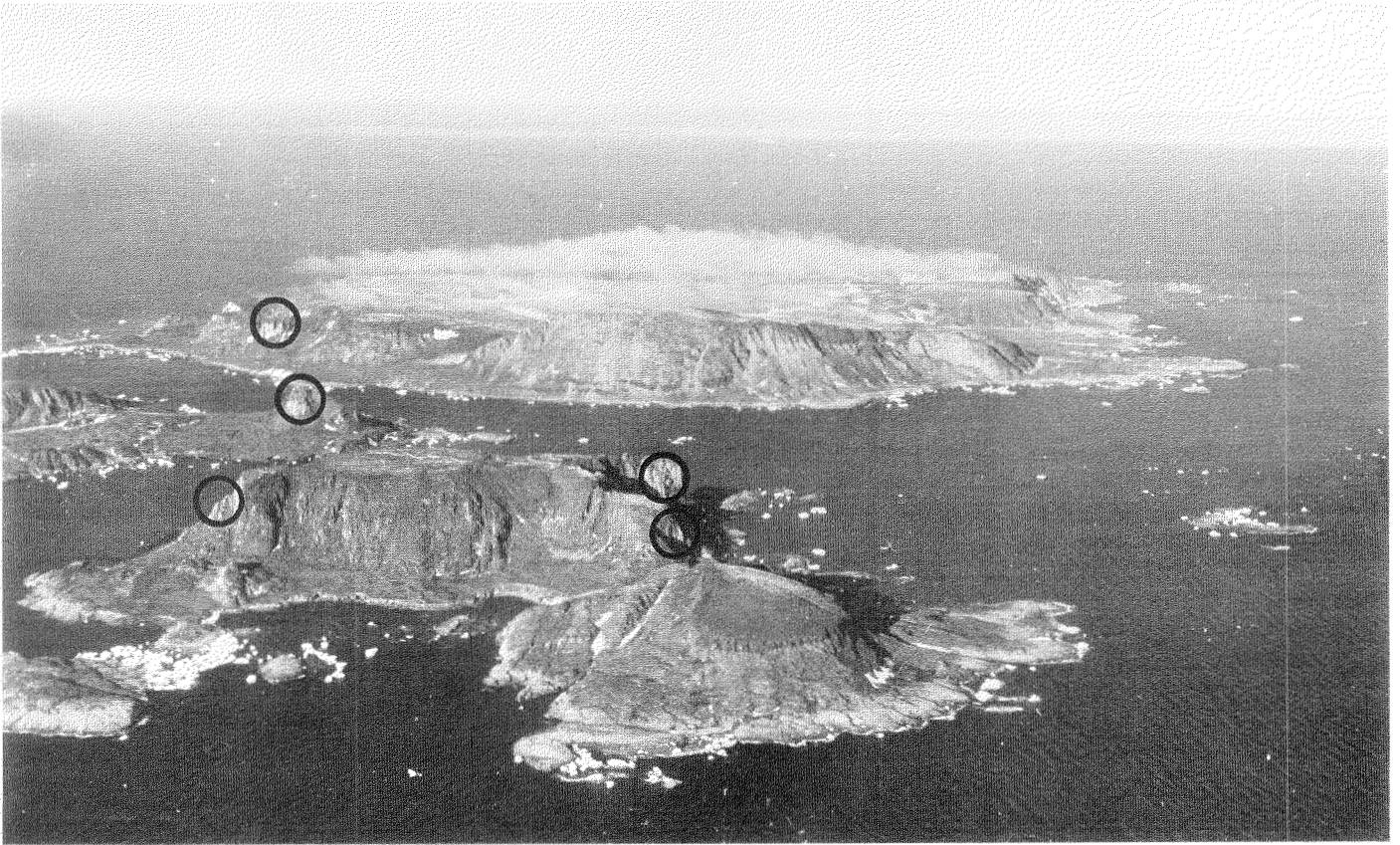


FIG. 3. Aerial photo of part of the Carey Islands group, taken from the east. Isbjørnø is in the foreground, with Nordvestø behind it; between them to the left is Mellemø. Visible murre colonies are indicated by black circles. The upper right colony on Isbjørnø was the largest in the group and held 2350 murres.

ual observations indicated that glaucous gulls were common along the entire coast in isolated pairs and small colonies. Black guillemots also occurred at several places, including Ivnaq Ungatdleq (mainland southeast of Saunders Island), where there was a major colony of at least 250 birds. Otherwise, apart from dovekies (see Roby *et al.*, 1981) and a few arctic tern (*Sterna paradisaea*) colonies, no seabird colonies were seen other than those mentioned in connection with the murre colonies.

Among the seabird species observed, the Atlantic puffin and the razorbill are of special interest, occurring here at the extreme northern edge of their ranges. The distribution of the puffin in the Thule area given by Salomonsen (1950) still applies with only minor additions. The existence of small puffin colonies on Hakluyt Island and Saunders Island has been known for a long time, but the colony on the Carey Islands was apparently first discovered in 1968 (F. Salomonsen, unpubl. field notes). In 1988, M. Kofod (pers. comm. 1988) found a previously undescribed puffin colony of roughly 100 pairs on the north coast of Dalrymple Rock ( $76^{\circ}34'N$ ,  $70^{\circ}14'W$ ), which suggests that some undiscovered colonies may still exist in the district.

The razorbill was unknown from the Thule District until recently. Salomonsen (1950) gave the northern limit of the species in Greenland as  $74^{\circ}N$  in Melville Bay. In a later account Salomonsen (1981) mentioned Carey Islands as a breeding place; this was based on the observation of six birds at Hollænderhatten on 7 August 1968 (F. Salomonsen, un-

publ. field notes). During the present study the razorbill was recorded in small numbers at three localities (Hakluyt Island, Carey Islands, Parker Snow Bay), which suggests that it is widely dispersed but rare in the Thule District.

#### DISCUSSION

The total number of thick-billed murres estimated present in the Thule District at the time of the survey was 285 000 birds, distributed on five colonies. This corresponds to 214 000 pairs. The accuracy of these figures is difficult to assess without further data. The ratio of breeding pairs to number of individuals present at the colony varies somewhat, both within and between seasons and from colony to colony (Birkhead and Nettleship, 1980) and should ideally be estimated both for each colony and at the time of census. However, the inaccuracy caused by the conversion factor is probably less than the underestimate resulting from our inability to count all birds present from photographs. Some birds are hidden behind others and some are not visible from the sea at all — e.g., the innermost birds on broad ledges or birds occupying cliff sections facing away from the sea. This is a general problem when censusing murres from the sea and can only be overcome by surveying from land or from the air. As this was not possible, an estimate of this bias in the present case is little more than a guess. However, I believe that only Hakluyt Island, and perhaps Agpat Agpai, could have held many birds (perhaps 20% or more) out of my view. At the other colonies, the proportion was probably less than 10%.

From these considerations, the thick-billed murre population in the Thule District probably numbers between 210 000 and 250 000 pairs. This implies a magnitude and range of the ratio between pairs and counted birds similar to that assumed for Akpatok Island in the Eastern Canadian Arctic by Chapdelaine *et al.* (1986). However, the authors now believe that this colony was grossly underestimated (A.J. Gaston, pers. comm. 1989). Gaston *et al.* (1985) found that only 42% of the murres present were detected on black-and-white photos of colony areas near the top of the cliffs of East Digges Island, Northwest Territories, and suggested that 50% was a reasonable average for the entire colony. It seems unlikely that this applies to the photo counts in the present study but it cannot be totally excluded; in that case the population could be as large as 400 000 pairs.

Population figures for murre colonies in Thule District were previously published by Salomonsen (1950) based on his visit in 1936. From the account of that journey (Salomonsen, 1943 and unpubl. notes), it seems that the time spent at the colonies was insufficient for detailed counts, considering the difficulties in counting large seabird colonies directly without employing photographic techniques; thus the figures of Salomonsen should perhaps be regarded as educated guesses rather than estimates. They tend to be somewhat higher than my own estimates: Hakluyt Island, "fairly large"; Carey Islands, 20 000; Saunders Island, 200 000; Parker Snow Bay, "small"; Agpat Agpai, 100 000. Figures were given as "pairs" but should properly be "birds," since Salomonsen (pers. comm. 1981) assumed a 1:1 relationship between pairs and present birds. Salomonsen did not himself see the Parker Snow Bay colony in 1936 and the information he obtained on it may well have been inaccurate. In 1978, he estimated this colony to be around 100 000 birds and gave the same number for Agpat Agpai (unpubl. field notes, deposited at the Zoological Museum, Copenhagen). Very different figures for murre numbers on Hakluyt Island (1500 — 2500 pairs) and Saunders Island (1000 — 10 000 pairs) were given recently by Vaughan (1988). It seems likely that, because Vaughan's estimates were based on counts made from land during brief visits by helicopter, major parts of both colonies went undetected.

Major declines have taken place in murre populations farther south in West Greenland, where the human population is much larger, and most murre colonies there lie closer to human settlements than in Thule. The available information does not permit any precise conclusions on changes in population size of the thick-billed murres in the Thule District, but nothing suggests that declines have been as large. This is consistent with the belief, based on recovery patterns of banded birds and regional differentiation of the population declines, that declines in West Greenland have been mainly caused by hunting at or near the colonies during the breeding season (Kampp, 1983, 1988a,b, in press).

Other human-induced mortality occurring at other times of the year may have affected murre populations in West and North Greenland and in the Eastern Canadian Arctic (Nettleship, 1977; Evans, 1984; Evans and Nettleship, 1985). Winter shooting in Newfoundland-Labrador takes an estimated 450 000 murres annually, mostly thick-billed murres (Gaston *et al.*, 1983; Wendt and Cooch, 1984), and a large but unknown number is shot in southern West Greenland. During 1965-75,

between 200 000 and 500 000 murres drowned annually in gill nets set for salmon in the Davis Strait off West Greenland (Tull *et al.*, 1972; Christensen and Lear, 1977); this fishery has been strictly regulated and limited since 1975 and seems to present a negligible problem today (Falk and Durinck, 1989, in press). All these mortality factors have probably contributed to the observed population declines in West Greenland but have been masked by the effects of summer hunting. If so, the murre population in Thule has probably experienced some decrease as well. A population decline of 20-40% since the mid-fifties has been suggested for the thick-billed murre colony at Cape Hay, Bylot Island (Nettleship and Evans, 1985), but population surveys in Thule District have been too few and too crude to detect whether a similar decline has occurred there.

Murre populations are extremely vulnerable to various human activities. In addition to hunting and drowning in fish nets, the most serious are oil pollution and depletion of food stocks by commercial fisheries. The thick-billed murre population in Thule should therefore be monitored closely in order to detect negative trends at an early stage and to clarify their significance. The murres in Thule could also serve as a reference population for murre populations in West Greenland, where effects of summer hunting and other potential threats are difficult to separate.

Monitoring does not necessarily imply new total counts but could be based on photos of sample sections of colonies, providing index values of population size, which would not be burdened with the uncertainties inherent in total counts of large murre colonies. A firm basis for the monitoring program could be obtained by conducting intensive breeding studies (type I of Birkhead and Nettleship, 1980) in one or more colonies for at least two seasons. The results would permit a more reliable interpretation than is possible with data obtained by methods less demanding in time and manpower.

#### ACKNOWLEDGEMENTS

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