

## Status of the common eider breeding in the municipality of Avanersuaq (Thule), north-west Greenland



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Late in the summers of 1997 and 1998 surveys of common eider (*Somateria mollissima*) colonies were conducted throughout Avanersuaq Municipality in north-west Greenland. Although old information from eider colonies was available, these surveys provided the first thorough census of almost all colonies in the district, thereby improving the baseline data for assessing future population changes. The surveys were based on nest counts, and all but two colonies in the district were counted. In total, 3800 nests were counted, and an educated guess for the total common eider population in Avanersuaq Municipality, including the two inaccessible colonies, would be around 5000 pairs. Average clutch size was 3.74, similar to or higher than in other areas of Greenland and high Arctic Canada, suggesting favourable conditions for eiders in the survey area. Comparison with older data suggests that the breeding population in Avanersuaq is stable. This observation contrasts with the declines observed in other parts of Greenland. Further studies into possible population-specific migration routes and wintering areas as well as the direct and indirect effects of the intensive winter hunting in south-west Greenland are warranted.

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In the Arctic, hunting still provides a significant portion of the food for a household. In particular, seabird species are harvested widely, often causing national and international management concerns (CAFF 1996, 1997). In Greenland, considerable effort has been put into surveying breeding populations of the most important seabird quarry, the thick-billed murre (*Uria lomvia*) (Kampp et al. 1994; Falk & Kampp 1997), while little is known of the current status of the second most hunted species, the common eider (*Somateria mollissima*).

Approximately 80 000 common eiders are reported to be shot annually in Greenland, while

the real figure might be much higher (Frich 1997). Available information suggests that a considerable proportion of the harvested population is wintering birds that breed in Canada (Nunavut), but due to lack of data, the relative contribution of birds from colonies in Greenland cannot be assessed. The breeding eider population in west Greenland has been reduced considerably during the 20th century (Salomonsen 1967), and although only a few recent surveys have been conducted, the downward trend appears to continue in the most populated areas of west Greenland (Boertmann et al. 1996). A substantial breeding population decline has recently been found in an

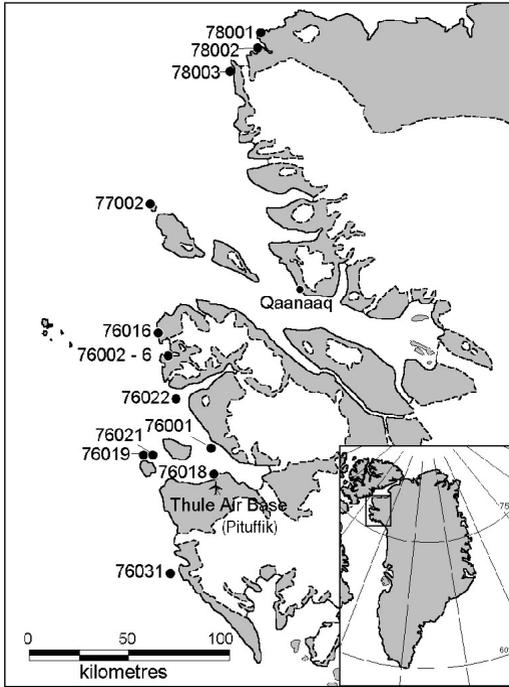


Fig. 1. Map of the known and surveyed sites in the Avanersuaq area, north-west Greenland (see numbers in Table 1); white areas on land indicate ice cap and glaciers.

area with low human population density in west Greenland (Frich et al. 1997). Evidence of declining eider populations (common and king eiders [*S. spectabilis*]) have also been reported from Arctic Canada (Cooch 1986; Reed & Erskine 1986; Dickson 1997; Robertson & Gilchrist 1998). The high hunting toll in certain areas, combined with the scant information on population status, has led managers to call for intensified surveys and improved population monitoring of eiders in the Arctic (CAFF 1997).

Although not known for certain, it is highly unlikely that the southern parts of west Greenland—where most people live—should hold large, undiscovered eider colonies. However, according to existing information collated in the *Greenland seabird colony database* (DMU-AM & OC 1999), thinly populated north-west Greenland might hold large colonies. Therefore, field surveys were conducted in the Avanersuaq (Thule) Municipality in 1997 and 1998 to provide up-to-date information on the status of the common eider for use in resource management initiatives (CAFF 1997), and for establishing a basis for future population monitoring.

## Materials and methods

### Survey area

All available data on colonial seabird populations in Greenland are compiled in the *Greenland seabird colony database*, which was used to localize existing eider colonies between 76° and 79° N in the Avanersuaq Municipality, north-west Greenland. A total of 14 eider colonies, all of which were on small groups of islands, were registered in the database for that region. In addition, detailed maps and aerial photographs were studied to identify other small islands that could be potential breeding sites for eiders. Compared to other parts of Greenland, the survey area had only few small islands, and no archipelagos, so the potential breeding sites for eiders are limited. This made surveys relatively straightforward, except for logistical constraints imposed by weather, ice and the distances involved.

By means of outboard powered boats we attempted to visit all known colonies and potential sites late in, or just after, the incubation period. In the survey area, sea ice breaks up only a few weeks before the eiders leave the colonies, providing only a narrow time window to reach the colonies by boat. Therefore, it was necessary to split the survey between two years. In 1997 (12–27 August) the effort was concentrated on the northernmost area, and in 1998 (29 July–19 August) the southernmost colonies were surveyed. Even so, the northernmost sites were inaccessible due to heavy drift ice in the 1997 survey period.

### Survey methods

The survey was based on counts of nests. On small islands one or two observers counted all nests. To avoid double counting, each nest was marked with a piece of sugar (to dissolve with the next rain). On the bigger islands, flat areas with some vegetation were searched thoroughly; while steep slopes and areas devoid of vegetation were also searched since they were found to contain a few scattered nests. In one case, a relatively large island (in Three Sister Bees group) with many scattered nests, the survey was based on line transects. The nests were counted on two approximately 370 m transects starting on the lower north-western part and ending on the higher (15 m) south-eastern part of the island; these

transects were located within the area with eider nests (approximately 50 % of the island). When a nest was found, the perpendicular distance from the transect to the nest was measured. The number of nests/hectare was estimated employing the PC software “Distance” (Laake et al. 1993) using the half normal model.

Common eiders make a depression in the ground for their nest, which is first lined with plant materials and then with down (Cramp 1977). Many nests are reused, leading to formation of a depression that probably remains for many years under high Arctic climatic conditions, with little rain and frozen ground most of the year. In some parts of the area local inhabitants collect eider down after the birds leave their nests. During the survey, many of the nests were found empty of down due to the collection, but still with quite fresh plant material in the bottom. Hence, in the survey we distinguished between: i) nests with eggs and/or young; ii) nests with down; iii) nests with fresh plant material; and iv) old nest cups. In the third category it is possible that new

plant material could have been deposited by birds which were merely prospecting for nest sites. But since we only found category iii nests on islands, where we knew down collection had taken place, we assumed that these nests had been used within the breeding season. The first three categories were therefore considered as representing breeding pairs while the latter category was excluded. For nests with eggs, the clutch size was noted.

## Results

In Avanersuaq Municipality, 12 of the 14 known sites were surveyed in the two years. Some sites comprised several islands, so the total number of islands surveyed added up to 21 (in the database, it is not consistent whether groups of islands are pooled into one record, or data from each island recorded separately). The two northernmost known sites could not be reached because of sea ice. The location of all colonies is shown in Fig. 1, and the number of nests counted in each

Table 1. Results of a common eider colony survey in Avanersuaq (Thule) Municipality, north-west Greenland, 1997-98.

Colony code <sup>a</sup>	Site name	No. of islands surveyed	No. of islands with eiders present	Survey year	No. of pairs	Comments from older sources
78001	Pikulleq (MacGary/Eider islands)	0	-	-	?	• “large colony” (1936) <sup>b</sup> • 5000 eggs taken annually (sites 78001 + 78002) (1980s) <sup>c</sup> • <2500 eggs taken annually (sites 78001 + 78002) (1980s) <sup>d</sup>
78002	Knorr Islands	0	-	-	?	• “large colony” (1936) <sup>b</sup> • see also comments above
78003	Sutherland Island	1	0	1997	0	• “large colony” (1936) <sup>b</sup>
77002	Hakluyt Island	1	1	1997-98	9	no comments (new site, this study)
76016	Qeqertaaraq	1	1	1997	105	• 50 - 66 (1987) <sup>e</sup>
76002-6	Booth Sound (several islands)	7	5	1997	866	• 220 (1968) <sup>f</sup>
76022	Three Sisters Bees	3	3	1998	349	• “large colony” (1936) <sup>b</sup> • “colony” (1988) <sup>c</sup>
76001	Manson Islands	4	3	1998	652	• 100 (1985) <sup>g</sup>
76019	Igannaq (Dalrymple Rock)	1	1	1998	255	• 400 (1988) <sup>h</sup>
76021	Qeqertaarsuit (Ederfugleøer)	1	1	1998	1572	• “large colony” (1936) <sup>b</sup> • 1000 (1988) <sup>h</sup>
76018	Nuulliaarsuit	1	1	1998	24	no comments (new site, this study)
76031	Igannaq (Conical Rock)	1	0	1998	0	• “large colony” (1936) <sup>b</sup>
Total		21	16		3832	

<sup>a</sup> Colony code according to the *Greenland seabird colony database* (DMU-AM & OC 1999)

<sup>b</sup> Salomonsen (1950)

<sup>c</sup> A. Rosing-Asvid (pers. comm.)

<sup>d</sup> Born (1987)

<sup>e</sup> K. Kampp (pers. comm.)

<sup>f</sup> Salomonsen (unpubl. notes)

<sup>g</sup> L. Wellander in Vaughan (1988)

<sup>h</sup> M. Kofoed (pers. comm.)

colony (or group of islands) summarized in Table 1.

The 16 islands with evidence of breeding common eiders contained a total of about 3800 nests (Table 1). Three new breeding sites were identified: in the Manson Islands group (no. 76001 in Table 1) a small islet with 522 nests was found; a new colony (76018) with 24 nests was found near Thule Air Base (Pituffik); and on the large Hakluyt Island (77002) a few scattered nests were found.

At two of the “known” sites no nests were found. According to local hunters, eiders breed on Sutherland Island in some years, but the only apparently suitable nesting area we found contained only a single possible old nest cup, so the island cannot hold a major colony. On Igannaq (76031), there was no suitable eider nesting habitat, so it seems unlikely that there has ever been an eider colony here; the site has probably been included in the database due to the observer’s confusion with another island of a similar name.

The largest colonies were usually found in areas with vegetation on small (2 - 5 ha), low-lying islands; this was the case at the Booth Sound islands, Qeqertaarsuit, Manson Islands (522 of the 652 nests on a small island), and Three Sisters Bees (341 of the 349 nests on a small island). On Three Sisters Bees, the estimate of 341 pairs was based on counts of 46 nests using the line transect method. The larger islands (> 100 ha) usually only held relatively few nests, such as on Igannaq and in the Manson Islands (107 nests of 652). On the larger islands the eiders avoided steep bare areas and seemed to concentrate in areas with vegetation close to the shore.

Most of the nests were found empty because the survey was conducted late in the season. In 1997, 59 % of the nests contained young, eggs or down and 41 % contained only plant material, but down collection had taken place on the island and therefore the nests with only plant material were assumed to represent breeding pairs. In 1998, none of the nests contained only plant material--all nests contained young, eggs or down. This was probably because the 1998 survey was conducted earlier in the season, before down had been collected. In the Manson Islands, the average clutch size was 3.74 (s.d. = 1.53) among 239 nests with eggs.

In three cases, the eiders were found nesting close to other bird species, potentially assisting in fending off mammalian predators such as the Arctic fox (*Alopex lagopus*). In the Manson

Islands, eiders nested near greater snow geese (*Anser c. caerulescens*), a species that has been expanding its range in the Avanersuaq area in recent years (Boertmann 1994); on Three Sister Bees, Arctic terns (*Sterna paradisaea*) aggressively protected the main breeding island, and on Hakluyt Island the few eider nests were found near a colony of glaucous gulls (*Larus hyperboreus*).

## Discussion

The survey included all but two of the known breeding sites for common eiders in the Avanersuaq Municipality, and revealed a total population of at least 3800 pairs. Apart from the two northernmost colonies (see below), the coverage was fairly complete. Eiders normally show high site tenacity, usually returning to previously used islands, and sometimes even the same nest cups (Reed 1975; Parker & Mehlum 1991). However, they may move depending on whether the particular nesting island is connected by ice to the mainland early in the season, when the birds select their nest site based on “security concerns” related to access of predators, especially the Arctic fox (Mehlum 1991a; Parker & Mehlum 1991). Our survey was conducted over two seasons, with no repeated counts in both years at any sites, so it cannot be ruled out that parts of the “regional population” may have been overlooked or double-counted due to this approach. Nevertheless, movements from year to year would normally be short (Reed 1975; Swennen 1990), so since our surveys in 1997 and 1998 covered rather distinct areas, we consider that the possible bias caused by inter-annual movements was minimal.

In Svalbard, the number of breeding pairs has been shown to be lower in years with late ice break-up (Mehlum 1991b). In our survey area, ice break-up was normal in the survey years, so the results should not be significantly affected by unusual ice conditions.

The mean clutch size of 3.74 in Avanersuaq was higher than values (means between 3.12 and 3.44) found for the same subspecies (*S. m. borealis*) in areas of Baffin and Ellesmere islands in eastern Canada, and higher than in Upernavik, north-west Greenland (3.31), and similar to findings of 3.82 from south-west Greenland (68° N) in 1997 and 1954 (Joensen & Preuss 1972; Prach et al. 1986; Frich et al. 1997; Salomonsen,

unpubl. notes). The eider populations of low Arctic Hudson Bay in Canada, however, lay large clutches, ranging between 4.0 and 5.6 eggs, possibly because the birds of this subspecies (*S. m. sedentaria*) are resident so they may have more energy reserves available for egg production (Robertson & Gilchrist 1998; Robertson et al. 2001 [this issue]). Since common eiders show a seasonal decline in clutch size (Mehlum 1991b; Robertson 1995; Coulson 1999) our result might partly be biased by the late survey date, when only late, presumably smaller, clutches would be recorded. Even so, the clutch size was relatively large, suggesting that conditions for eiders in the area may have been favourable.

No data are available from the two known (northern) colonies we could not survey, but archaeologists working in the area in 1996 and 1997 reported active nests (but no numbers) from MacGary Island (Bo Bendix, University of Copenhagen, pers. comm.). Before the late 1980s, local hunters have reported that up to 5000 eggs may have been harvested in some years (DMU-AM & OC 1999). Although such information is hard to evaluate, egg collection must have been substantial in some years. As the common eiders in the area lay 3 - 5 eggs, the reported egg collection suggests that more than 1000 nests may have occurred there. Hence, combined with our counts of 3800 nests, an educated guess of the total common eider population in Avanersuaq would be around 5000 pairs.

Most of the records in the database on eiders in this area contain secondhand information or very crude estimates rather than actual counts, so we have a weak basis for evaluating population trends. The best available information stems from the group of islands in Booth Sound, where counts from 1968 indicated a total population of 220 nests, and brief visits in 1987 indicated only about a few hundred nests. Comparing these figures to the 866 nests actually counted in 1997 suggests a real increase in this particular sub-area. In general, the results of the 1997-98 survey indicated colonies of similar size, or larger, than previous information suggested—disregarding the dubious cases where “known” colonies could not be confirmed. We therefore consider that the population in Avanersuaq may at least have remained stable, and avoided a dramatic decline like that seen in some areas further south in Greenland (Boertmann et al. 1996; Frich et al. 1997). To establish a firm platform for monitoring popula-

tion trends would require several years of data to account for inter-annual variability—a task hard to accomplish in this large and remote region. But this survey has improved the quantitative information available assessing major population changes in the region.

The possibly stable population in north-west Greenland raises the question whether the intensive winter hunting in south-west Greenland is actually the main reason for the declining populations in both Greenland and Canada, as is currently assumed. If eiders from different regions mix in mutual staging and wintering grounds with high hunting impact, a widespread—not a localized—population decline would be expected. Local declines, however, would be expected if a) eiders from different regions move to separate staging and wintering grounds with different hunting levels, or b) over-harvesting and/or disturbance occur mainly in the breeding areas. To identify migration routes and wintering grounds, satellite telemetry on females from breeding sites in low and high Arctic Greenland and eastern Canada would be desirable, as would be detailed studies on the direct and indirect impact of hunting in the wintering areas.

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