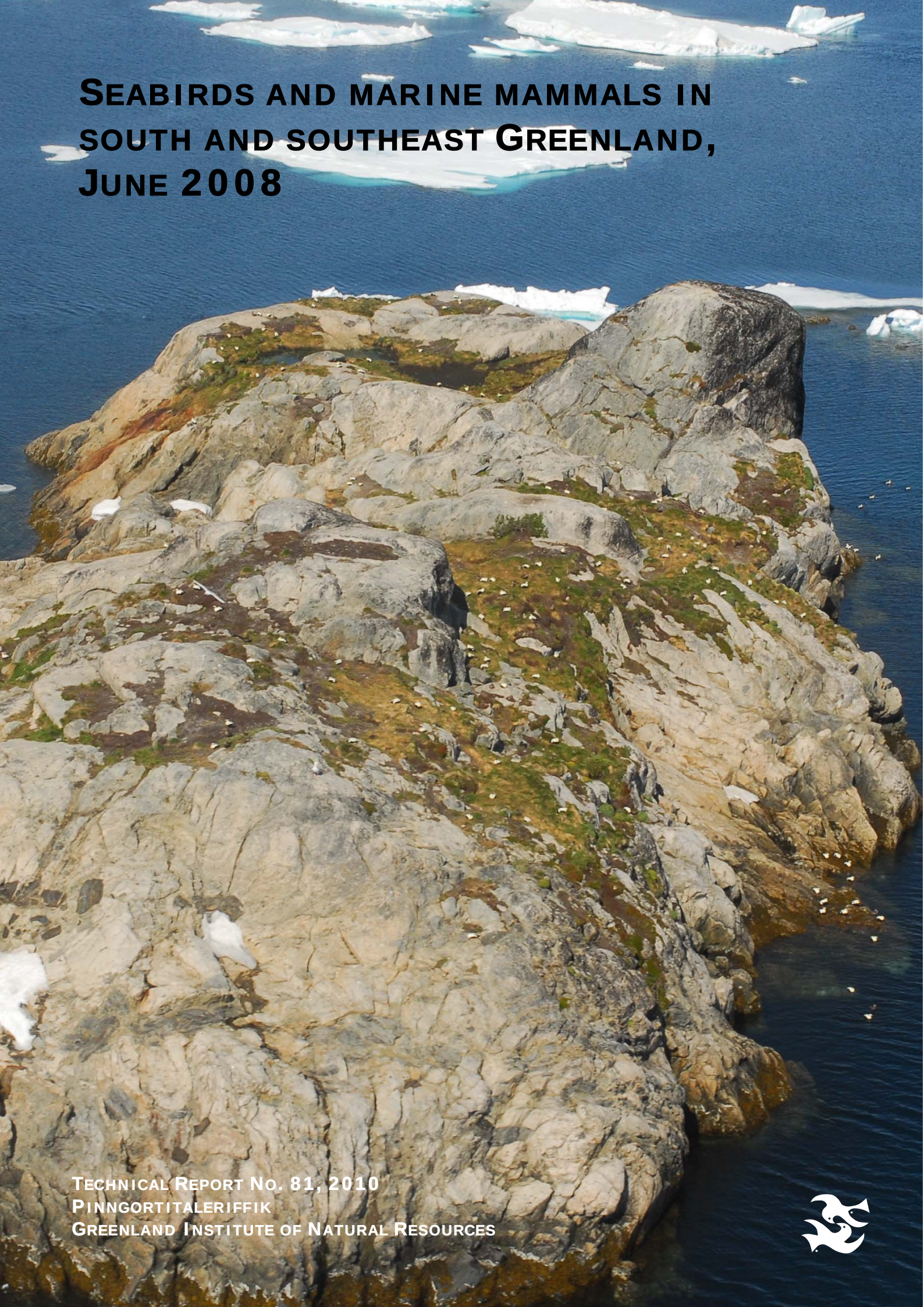
Seabirds and marine mammals in south and southeast Greenland, June 2008



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Author(s):	Flemming R. Merkel, Lars Maltha Rasmussen & Aqqalu Rosing-Asvid
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Prints can be requested from:

Pinngortitaleriffik
Postboks 570
3900 Nuuk
Greenland

Phone. +299 36 12 00
Fax. +299 36 12 12
info@natur.gl

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Flemming Ravn Merkel
National Environmental Research Institute,
Aarhus University

Lars Maltha Rasmussen
Greenland Institute of Natural Resources

Aqqalu Rosing-Asvid
Greenland Institute of Natural Resources

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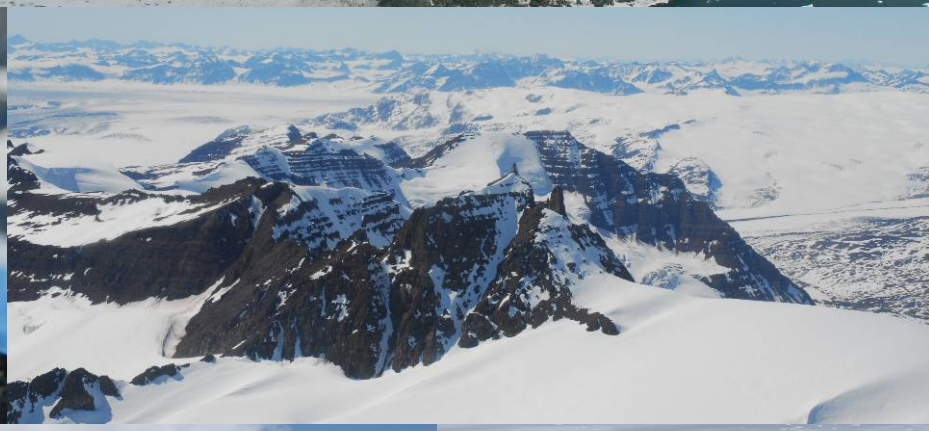
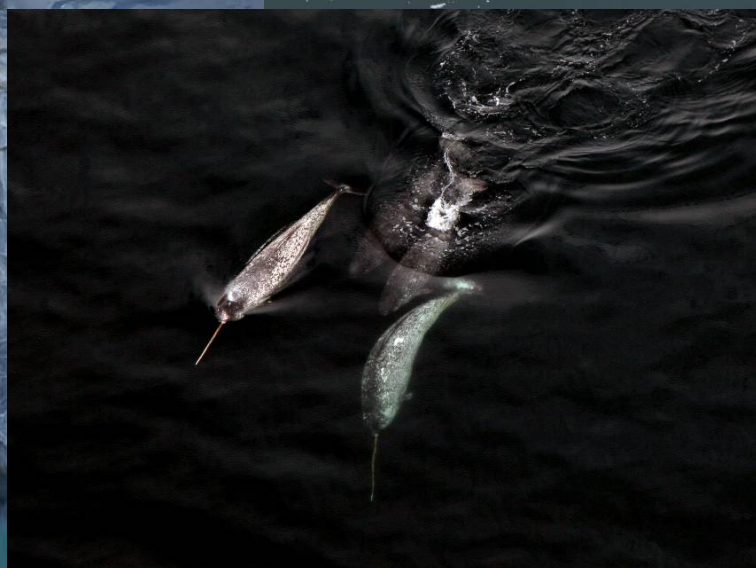




Contents

Greenland Institute of Natural Resources

Technical Report No. 81

Summary

We conducted an extensive aerial survey in South and Southeast Greenland in the period 12 - 26 June, 2008. The main objective was to detect important breeding areas for the common eider, for which the prior knowledge in Southeast Greenland was very limited. A second priority was to identify breeding sites for harbour seals in the southern part of the survey area. This species has been severely reduced throughout West Greenland over the past century and are now only regularly reported near Kangerlussuaq/Sdr. Strømfjord and the southern tip of Greenland. As far as possible other species of marine mammals and birds were also recorded.

We used a Partenavia P-68 Observer aircraft equipped with bubble windows and all observations were treated as total counts. The survey altitude was 250 feet. In general, we followed the shoreline of the outer coast and the fjords and made detours to cover "offshore" islands. En route we recorded new seabird colonies and controlled previously described colonies. The total survey effort was ~9,400 km.

Seabird density in Southeast Greenland was highest in the area between Qulleq (61.4ºN) and Umiivik (64.3ºN) and along the northern part of Blosseville Kyst. These two areas plus the area around Tasiilaq were identified as having the highest species diversity. The most common breeders in Southeast Greenland were the common eider (18,530 indv.), Iceland gull (1,285 indv.), black guillemot (971 indv.) and glaucous gull (603 indv.), respectively. Northern fulmar, great cormorant, barnacle goose, great back-blacked gull, lesser back-blacked gull, black-legged kittiwake and Arctic tern were also breeding, but were sparsely distributed. Breeding birds of great northern diver, red-throated diver, mallard, long-tailed duck, red-breasted merganser and ivory gull were also observed, but our survey covered only a small proportion of suitable breeding habitats. Two species were recorded as pre-moulting in Southeast Greenland; the common eider and pink-footed goose.

The status of 38 seabird colonies, among 47 colonies known to Southeast Greenland previously, was controlled at the survey and 51 new colonies (first-time records) were located (not including black guillemot). The detection of new colonies was especially high in the area between Qulleq (61.4ºN) and Umiivik (64.3ºN), with common eider and Iceland gull as the two most important species.

For the common eider the most important breeding area in Southeast Greenland was the area between Qulleq and Umiivik. Ten of 11 new colonies detected in Southeast Greenland in 2008 were found in this area. The northern part of Blosseville Kyst has previously been identified as an important breeding area and this was confirmed by our survey. One new colony was detected here in 2008. The two areas with the highest concentration of eider colonies also had the most extensive open water areas at the beginning of the survey period in mid June. In contrast to the typical situation in West Greenland, the common eider was frequently observed as a solitary breeder in many fjords and coastal areas of Southeast

Greenland, especially the large fjords around Timmiarmiut (62.6°N) and Saqqisikuik/Skjoldungen (63.3°N). When combining estimates of colonial breeders and solitary breeders a minimum of ~1.600 pairs of eiders were breeding in Southeast Greenland in 2008. In addition to this, mixed eider flocks of males and females were frequently observed on the water throughout the survey area and some proportion of these were probably also breeding birds. Another proportion of the eiders were detected as male-dominated flocks and we speculate that these were post-breeding or non-breeding birds from Iceland. Guessing that half of the mixed eider flocks were breeding birds, we estimate that 1,600 – 3,200 pairs were breeding in Southeast Greenland in 2008.

In South Greenland, between Kap Farvel and Paamiut, the common eider was by far the most numerous species recorded (8,170 indv.). However, colonies previous recorded in this area were not confirmed in 2008. It is a possibility that eiders were scarce away from the colonies prior to our arrival (due to the noise), or perhaps the timing of the survey did not match the incubation period. Among other species in South Greenland, the endemic Greenland mallard subspecies *conboscha* was relatively common in South Greenland (23 obs., 52 indv.). This was also the case for black guillemot and the larger gull species, but these species were not consistently recorded. A few observations of Canada goose, murres/razorbills and white-tailed eagles were also made in South Greenland.

Nine previously registered breeding sites of harbour seals in southern Greenland were controlled in the period 12-17 June. However, no harbour seals were seen on any of these locations. Attempts were made to revisit two other sites, but this was abandoned due to poor weather conditions. The absence of harbour seals around and east of Kap Farvel was unexpected and subsequent work in this area (August/September 2009) also confirmed that harbour seals do occur here.

A remarkable observation of a juvenile bowhead whale was done in the southern part of Blosseville Kyst, and this indicates that the very small and critically endangered Spitsbergen stock of bowhead whales is reproducing. Several observations of narwhales along Blosseville Kyst confirmed that the northern part of Southeast Greenland is important as summer residence for narwhales in East Greenland.

Sammenfatning

Denne rapport viser resultaterne af en omfattende rekognoscering fra fly i Syd- og Sydøstgrønland i perioden 12. – 26. juni 2008. Det primære formål var at identificere vigtige yngleområder for alm. ederfugle, idet den eksisterende viden om udbredelsen af ederfugl i Sydøstgrønland var meget sporadisk. Endvidere var det formålet at identificere ynglepladser for spættet sæl i det sydligste Grønland. Forekomsten af spættet sæl er gået drastisk tilbage i hele Vestgrønland i løbet af de forrige århundrede, og den rapporteres nu kun regelmæssigt fra et område ved Kangerlussuaq/Sdr. Strømfjord og omkring Kap Farvel. Så vidt muligt blev andre arter af havpattedyr og fugle ligeledes registreret.

En Partenavia P-68 Observer forsynet med boblevinduer blev anvendt som observationsplatform. Flyvehøjden var 250 fod og optællingerne blev foretaget som totaloptællinger. Rekognosceringen fulgte generelt kystlinjen langs yderkysten og i fjordene, afbrudt af afstikkere til udenskærs øer eller øgrupper. Undervejs blev nye havfuglekolonier registreret og allerede kendte lokaliteter blev kontrolleret. Den samlede rekognoscering strakte sig over ~9.400 km, eksklusiv færgeflyvning.

I Sydøstgrønland var densiteten af havfugle størst i området mellem Qulleq (61.4ºN) og Umiivik (64.3ºN) og langs den nordlige del af Blosseville Kyst. I disse to områder samt i området omkring Tasiilaq blev den største artsdiversitet registreret. De mest almindelige ynglefugle i Sydøstgrønland var henholdsvis alm. ederfugl (18.530 indv.), hvidvinget måge (1.285 indv.), tejst (971 indv.) og gråmåge (603 indv.). Mallemuk, skarv, bramgås, svartbag, sildemåge, ride og havterne blev registreret som fåtallige ynglefugle. Dette var også tilfældet for islom, rødstrubet lom, gråand, havlit, toppet skallesluger og ismåge, men surveyet inkluderede kun i ringe grad ynglehabitater for disse arter. To arter blev registreret som fældefugle i Sydøstgrønland: Alm. ederfugl og kortnæbbet gås.

Blandt 47 tidligere registrerede havfuglekolonier i Sydøstgrønland blev 38 kolonier genbesøgt, og 51 nye/ubeskrevne kolonier blev registreret (ekskl. tejst) i 2008. Flest nye kolonier blev registreret i området mellem Qulleq (61.4ºN) og Umiivik (64.3ºN), med alm. ederfugl og hvidvinget måge som de vigtigste arter.

For alm. ederfugl i Sydøstgrønland udgjorde det nævnte område mellem Qulleq og Umiivik det vigtigste yngleområde, hvor 10 ud af 11 nye kolonier i Sydøstgrønland blev registreret. Den nordlige del af Blosseville Kyst er tidligere identificeret som et vigtig yngleområde i Sydøstgrønland, og dette blev bekræftet i 2008. En enkelt ny koloni blev fundet i dette område. De to områder med den største koncentration af ederfugle kolonier var samtidig de to områder med den mindste isudbredelse i starten af undersøgelsesperioden (medio juni). I modsætning til den typiske ynglestrategi hos ederfugl i Vestgrønland, blev der gjort hyppige fund af solitære ynglefugle Sydøstgrønland, særligt i fjordsystemet omkring Timmiarmiut (62.6ºN) og Saqqisikuik/Skjoldungen (63.3ºN). Summen af enkelvise ynglefund samt kolonirugende fugle i Sydøstgrøn-

land udgjorde et minimum på ~1.600 ynglepar i 2008. I tillæg blev der observeret blandede flokke af hanner og hunner på vandet i det meste af undersøgelsesområdet, hvoraf en del sandsynligvis også var ynglefugle. En anden stor andel af ederfuglene var udbredt i flokke med en stor overvægt af hanner, og det antages at disse fugle var kommende fældefugle (endnu flyvedygtige) fra Island. Hvis der gættes på at halvdelen af de blandede flokke var ynglefugle, kan den samlede ynglebestand i Sydøstgrønland anslås til 1.600 – 3.200 ynglepar i 2008.

I Sydgrønland, her defineret som området mellem Kap Farvel og Paamiut, var alm. ederfugl ligeledes den mest talrige art (8.170 indv.). Tidligere registrerede kolonier i området kunne dog ikke umiddelbart genfindes fra luften, men kan skyldes at ederfuglene i Sydgrønland er mere sky og derfor forlader kolonierne på forholdsvis stor afstand. Det er desuden muligt, at timingen af optællingerne i Sydgrønland ikke matchede ederfuglenes rugeperiode i tilstrækkelig grad. Blandt de øvrige arter i Sydgrønland var den for Grønland endemiske underart af gråand *conboscha* forholdsvis talrig (23 obs., 52 indv.). Det samme var tejst og de store måger, men disse blev imidlertid ikke registreret konsekvent i Sydgrønland. Canadagås, lomive/alk og havørn blev registreret fåtalligt.

Ni lokaliteter i det sydligste Grønland som tidligere har været udpeget som ynglepladser for spættet sæl, blev genbesøgt i perioden 12.-17. juni. Ingen sæler blev imidlertid set disse steder. Yderligere to lokaliteter blev forsøgt kontrolleret, men dårlige vejforhold forhindrede dette. Det komplette fravær af sæler i området omkring Kap Farvel var overraskende, og ved et senere besøg (august/september 2009) blev det da også konstateret, at spættet sæl stadig forekommer i dette område.

En bemærkelsesværdig observation af en juvenil grønlandshval blev gjort ud for den sydlige del af Blosseville Kyst. Observationen fastslår at den lille og udryddelsestruede Spitsbergen bestand af grønlandshval er reproduktionsdygtig. Adskillelige observationer af narhvaler langs den nordlige del af Blosseville Kyst bekræfter at dette område udgør en vigtig del af oversomringsområdet for østgrønlandske narhvaler.

Eqikkaaneq

Matuma nalunaarusiap takutippai 12. – 26.- Juni 2008-mi Kujataani Tunullu Kujataani timmisartumik alapernaarsuinermiit annertuumiit inernerit. Pingaarnertut siunertaasimavoq mitit piaqqisarfiinik pingaarutilinnik sumiissusersiuinissaq, tassami Tunup Kujataani mitit siammarsimaffii pillugit ilisimasat siammasissuinnaammata. Aammattaaq siunertaasimavoq qasigissat Kalaallit Nunaata kujaterpiaani piaqqisarfiisa sumiissusersinissaat. Kalaallit Nunaata Kitaani tamani ukiuni hunnorujukkuutaami siuliani qasigiaqassuseq sakkortuumik kinguariarsimavoq, maannakkullu aalajaatsumik nalunaarutigineqartarput taamaallaat Kangerlussuup qinnguata eqqaani Nunallu isuata eqqaani. Sapinngisamik aamma imaani miluumasut timmissallu allat ilanngullugit nalunaarsorneqarput.

Partenavia P-68 Observer-eq silammut qaarajuttunik igalaartalik alapernaarsuiffittut atorneqarpoq. Portussuseq 250 fod timmiffigineqarpoq kisitsinerillu takusanik tamanik kisitsinertut ingerlanneqarlutik. Alapernaarsuinermi sineriak avalleq kangerluillu sinerllugit, ilaatigullu qeqertat qeqertaqatigiiaallu avasissumiittut qulaakkiartorneqartarlutik. Ingerlaarnermi timmissat imarmiut piaqqisarfii nutaat nalunaarsorneqarput ilisimaneqareersullu qularnaarneqarlutik. Alapernaarsuinermi ataatsimut ~9.400 km-isut isorartussusilik ingerlaarfigineqarpoq, mikkiartornerit uternerilu ilanngunnagit.

Tunup kujataani timmissat imarmiut Qullermiit (61.4°N) og Umiivinnut (64.3°N) Blosseville Kyst-illu avannaa tungaa (Kangikajiup kujataatungaani) najornerusimavaat. Piffinni taakkunani marluusuni kiisalu Tasiilap eqqaani timmissat pissuseqatigiiaat assigiinngitsut amerlanerpaaffiisut nalunaarsorneqarput. Timmissat piaqqisut nalinginnaanerpaat tassaapput mitit (18.530-it), naajaannaat (1.285-it), serfat (971-it) naajarujussuillu (603 indv.). Qaqulluk, oqaatsoq, nerlernaq, naajarluk, sildemåge, taateraaq imeqqutaalarlu amerlanatik piaqqisartutut nalunaarsorneqarput. Tuullik, qarsaaq, qeerlutooq, alleq, paaq naajavarsullu aamma taamatut insissisimapput, misissuinermili tamakkua piaqqisarfii annikitsuinnarmik ilanngunneqarput. Pissuseqatigiit marluk Tunup kujataani isasartutut nalunaarneqarput: Miteq nerlerlu siggukitsoq.

Tunup kujataani timmissat imarmiut piaqqisarfiisut nalunaarsimasuni 47-suni 38-t orneqqinneqarput, piaqqisarfiillu 51-it nutaat/allaatigineqanngitsut 2008-mi nalunaarsorneqarput (serfaq ilanngunnagu). Piaqqisarfiit nutaat amerlanersaat Qulliup (61.4°N) og Umiiviillu (64.3°N) akornanni nalunaarsorneqarsimapput, miteqarfiit naajaannaqarfiillu taakkunani pingaarnersaallutik.

Tunup kujataani Qulliup Umiiviillu akornat miternut piaqqisarfittut pingaarnersaapput Tunup Kujataani piaqqisarfinni nutaajusuni 11-ni 10-t tassani nalunaarsorneqarlutik. Blosseville Kyst-ip avannaa tungaa siornatigut piaqqisarfittut pingaarutilittut inissisimasimavoq, tamannalu 2008-mi uppernasineqarpoq. Piaqqisarfik nutaaq ataaseq piffimmi tassani nassaarineqarpoq. Piffiit mitinut piaqqisarfeqarnersaat marluusut, misissuinerup aallartinnera (junip qeqqani) ilutigalugu sikoqannginner-

paasimapput. Kitaani mitit piaqqeriaasiisa akerlianik, Tunup kujataani ataasiakkaarlutik piaqqisut siumorneqarajussimapput, immikkut Timmiarmiut (62.6ºN) Saqqisikuik/Skjoldungen (63.3ºN) eqqaanni kangerloqarfinni tamanna atuussimavoq. Tunup kujataani ataasiakkaarlutik ataatsimoorlutillu piaqqisut katikkaanni 2008-mi piaqqisut minnerpaamik ~1.600-simapput. Ilanngullugu angutivissat arnavissallu akuleriillutik ataatsimoortut misissuiffigineqartup annersaani takuneqarput, taakku ilarpaalui piaqqisuusimanissaat ilimanarluarluni. Mitit ilaat amerlalluavissut ataatsimoortuniipput angutiviartaqarnerusuni, ilimanarporlu timmissat taakku Islandimiit isajartortuusimassasut (suli timmisinnaasut). Akuleriiaarlutik ataatsimoortut piaqqisuusimanissaat eqqoriarneqarsinnaappata, Tunup kujataani 2008-mi piaqqisut 1.600-llu 3.200-llu akornanniinnissaat missingerneqarsinnaapput.

Kujataani, matumani Paamiut Nunallu isuata akornanniitinneqartumi, mitit aamma pissuseqatigiinni tamani amerlanersaapput (8.170-it). Piaqqisarfiit siornatigut nalunaarsorneqarsimasut silaannarmiit imaaliallaannaq nassaareqqinneqarsinnaasimanngillat, pissutaasimasinnaavorli Kujataani mitit nujuarneruneri sulilu ungasillutik piaqqisarfitik qimattarsimasinnaagaat. Imaassinnaavortaaq Kujataani kisitsinerup nalaa mitit ivaneri naammattumik nalerorsimanngikkaat. Kujataani pissuseqatigiinni allani Kalaallit Nunaata qeerlutuui Kalaallit Nunaanniinnaq nassaassaasut *conboscha* amerlakannerput (23 obs., 52 indv.). Taammaapputtaaq serfat naajallu anginerit, taakkuli Kujataani aalinagersimasumik nalunaarsorneqarsimanngillat. Canadap nerleri, appat nattorallillu ikittunnguit nalunaarsorneqarput.

Kalaallit Nunaata kujaterpiaani piffiit qulingiluat siornatigut qasigissat piaqqisarfiisut tikkuarneqarsimasut piffissami 12.-17. Juni alakkaqqinneqarput. Piffinnilli taakkunani puisinik takusoqanngilaq. Ilanngullugit piffiit allat marluk takusarniarneqarsimagaluarput, silalli ajornerata taamaattoqarnissaa akornusersimavaa. Nunatta Isuata eqqaani puisinik taammattuugassaqanngivinnera tupaallannarsimavoq, kingusinnerusukkulli (august/september 2009) alakkarterinermi tamaani suli qasigiaqarnera paasineqarpoq.

Blosseville Kyst-ip kujataa tungaata avataani takunninnermi eqqumiitsumi arfivik piaqqaraq siumorneqarpoq. Takunninnerup qularnaallisippaa Spitsbergen-ip eqqaani arfiveqatigiit piaqqisinnaasimasut. Blosseville Kyst-ip avanna tungaani qilalukkanik qernertanik takunninnerit arlallit uppernarsivaat piffik tamanna Tunup qilalugaanut aasisarfiit pingaarnerit ilagigaat.

1 Introduction

This report presents the results from an extensive aerial survey conducted in South and Southeast Greenland in June 2008. The main objective of the survey was to detect important breeding grounds for the common eiders (*Somateria mollissima*), map their distribution and to the extent possible quantifying the breeding numbers. Until this survey existing knowledge about the occurrence of common eiders in Southeast Greenland was very limited. A few papers exist from the 1920s and 1930s (e.g., Helms 1926, Knudsen 1935), but not until decades later additional information was published (Glahder 1995, Boertmann 2004). In all cases these sources deal only with minor geographical areas, leaving huge areas of Southeast Greenland undescribed.

Next to the thick-billed murre (*Uria lomvia*), common eider is the most important game bird in Greenland. From time to time requests for extending the hunting season in East Greenland have been raised in the Greenland Parliament; however, due to insufficient knowledge the Greenland Institute of Natural Resources (GINR) has not been able to give advice to this issue. This survey is the first step in providing a basis for future management of the common eider in East Greenland. It is currently unknown whether this breeding population winters in the Southwest Greenland open water area or in Iceland waters, and thus unknown whether it is or has been influenced by the harvest of eiders in Southwest Greenland.

A second target species was the harbour seal (*Phoca vitulina*), for which we aimed to identify breeding sites around the southern tip of Greenland. The harbour seal population has been severely reduced in all of West Greenland during the last century (Teilmann & Dietz 1994, Rosing-Asvid in press) and GINR and NAMMCO are now recommending a complete stop of hunting on harbour seals. Harbour seals are now only seen regularly near the southern tip of Greenland. They are normally gregarious and concentrate in colonies during the breeding season and are believed to give birth somewhere along the coast of Southeast Greenland. The presence of drift ice (storis), which normally makes the area inaccessible by boat in June when the pupping season is likely to peak, probably serves the seals some protection. However, the drift ice has dropped significantly in recent years and an unusual lack of drift ice during summer in 2003 and 2005 coincided with record high catches of harbour seals (Teilmann & Dietz 1994, Rosing-Asvid in press).

Teilmann and Dietz (1994) provided a list of published and by then unpublished records of harbour seal observations in Greenland; categorized as breeding sites, former breeding sites or presumed breeding sites. We tried to revisit all these locations to verify their status as breeding sites for harbour seal.

Since previous survey activity in Southeast Greenland is very limited, we also included observations of other species of seabirds and marine mammals. This survey is the first aerial survey in Southeast Greenland contributing with an unbroken coverage between Kap Farvel and Scores-

bysund Fjord (Fig. X). Surveys for seabirds and marine mammals were also carried out in Northeast Greenland in 2008 (Boertmann *et al*. 2009b). This was done as part of a strategic environmental impact assessment (SEIA) of hydrocarbon activities in the so called KANUMAS East area (~68°N–79°N). Together, the Boertmann *et al.* (2009b) survey and our survey will form an important baseline for the occurrence of seabirds and marine mammals in all of East Greenland.

Part of our survey activity in South Greenland, from Kap Farvel and north to Paamiut (~62.0°N), was carried out as part of a strategic environmental impact assessment (2009-2011) of hydrocarbon activities in South Greenland.

1.1 Acknowledgements

We wish to thank pilot Leif Petersen, Danish Air Survey ApS, for skilled navigation of the aircraft OY-CAG and for contributing to the data collection. Thanks to the staff of Constable Pynt, especially Henrik "Thy" Jensen, to David Boertmann, NERI, for arranging the transport of fuel to Constable Pynt, to Ib Krag Petersen, NERI, for lending us a Trimble GPS, and to Morten Bjerrum and Kasper Johansen, both NERI, for GIS support. The Greenland Institute of Natural Resources funded the survey.

2 Methods

2.1.1 Survey methods

We carried out the survey in the period 12 - 26 June, 2008. Since the survey was primarily designed to obtain quantitative information on the distribution of common eiders and their breeding colonies in Southeast Greenland and to locate possible breeding sites for harbour seals in South- and Southeast Greenland, the survey was timed to coincide with the egg laying/early incubating period of the eiders and the period when harbour seals haul out at breeding grounds, giving birth to the pups. During egg laying and early incubation the adult males of the eiders usually accompany the females at the nest site, making it easier (being predominantly white) to detect colonies from the air.

Our survey operations were based out of the airport of Narsarsuaq (10-18 June), Kulusuk (18-23 + 25-26 June) and Constable Pynt (23-25 + 26-28 June). Due to a shortage of fuel (Avgas) in Narsarsuaq we visited Paamiut twice to fuel.

Since the occurrence of wildlife species in Southeast Greenland is generally poorly described, we recorded all seabirds and marine mammals as far as possible. Exceptions were seals other than harbour seals (P*hoca vitulina*) and bearded seals (*Erignathus barbatus*), which were not consistently recorded. Occasionally, terrestrial birds and mammals were observed, but neither was consistently recorded. In South Greenland black guillemot and the larger gull species were not consistently recorded.

The observation platform was a Partenavia P-68 Observer aircraft equipped with bubble windows at the seats behind the pilot seats (Fig. 1). The complete survey was carried out as "total counts" (cf. Laursen *et al*. 2008) flying in an altitude of 250 feet (85 m) and with a speed of about 90 knots (160 km/t). Occasionally lower or higher altitudes were applied if conditions required this. Ferry flights usually took place in an altitude of 5000 feet. Ferry flights, at which we made no attempts to observe, are not shown in Figure 2 and 3.

In general, we followed the outer coastline and conducting "total count" surveys. When approaching a fjord we followed the shoreline and covered one side of the fjord on the way in and the other side on the way out. In addition, we made a large number of small detours to cover "offshore" islands. We looked for new seabird colonies and previously described colonies were revisited if possible. Colonies were often photographed to verify our estimates of the number of birds present. Despite an extensive survey effort (9,405 km, excluding ferry flights), especially in Southeast Greenland, the coverage was not complete. Various fjords, bay areas and islands were skipped or partly skipped (Fig. 2-3), due to low sighting rates in neighbouring areas, extensive ice coverage, poor weather conditions or due to fuel considerations.

We recorded observations of seabirds and marine mammals on tape recorders along with the time of observation. A GPS (Trimple GeoXT) re-

corded the track, and subsequently we geo referenced the records by combining the time of observation and the GPS-time. Clocks were synchronised according to the GPS-clock (UTC-time).

The aircraft was navigated by pilot Leif Petersen (LP) and the observers were Flemming Ravn Merkel (12-26 June), Aqqalu Rosing-Asvid (12-17 June) and Lars Maltha Rasmussen (18-26 June).

Fig. 1. The Partinavia Observer (OY-CAG) and pilot Leif Petersen in Kulusuk. Photo: L. M. Rasmussen

2.1.2 Data presentation and references

Since all sightings were treated as total count observations all the maps show the raw data points and no attempts to extrapolate the data to uncovered areas were made. As a consequence, all numbers represent minimum estimates of the species recorded. A simple grid cell analysis was applied to the bird data from Southeast Greenland to identify the most important areas in terms of species diversity and overall bird density. The grid cells used were extracted as the overlapping cells between a UTM Zone 25N grid with size 25 x 25 km and the survey track. The number of species encountered within each grid cell may be biased by an uneven survey effort between grid cells, however, since more survey activity usually was adapted as a consequence of more birds in general in this area, we did not compensate for uneven survey efforts.

All the GIS maps are shown with the UTM Zone 25N projection, however, rotated 42^{o} anticlockwise to reduce the amount of space used for each figure. In the text place names (in Greenlandic, Danish or both) are often accompanied by the approximate latitudinal coordinate to quickly guide the reader to the area in question if unfamiliar with the place

names in Southeast Greenland. Geographical coordinates are given in decimal degrees. In this report Southeast Greenland is defined as the area between the southern tip of Greenland (Kap Farvel) and north to Scoresbysund Fjord (but not including the fjord). South Greenland is referred to the area from Kap Farvel and northwest to Paamiut.

In 1993 Boertmann (1994) produced a comprehensive checklist of bird observations in Greenland. Most of what was previously known about Southeast Greenland is included here and in most cases we cite this review rather than the original literature since Boertmann (1994) also includes information that has not been published elsewhere. More recent unpublished information was extracted from the Greenland Seabird Colony Database, which is referred to as NERI (2007).

Local knowledge about the distribution of seals and birds from Southeast Greenland was collected by Aqqalu Rosing-Asvid during fieldwork near Tasiilaq in 2005 and 2006. The local knowledge was provided by Vittus Mikaelsen who has spent most of his life as a hunter near Pikiulleq and Isortoq (south of Tasiilaq). Vittus has made numerous hunting-trips along the Southeast Greenland coast from Kangerlussuaq and south to Kap Farvel and he is one of the richest sources of local knowledge of the wildlife in Southeast Greenland. Relevant information is mentioned under the species account (3.1) and referred to as Mikaelsen (2006, pers. comm.).

2.1.3 Ice coverage

An extensive belt of drift ice was still present in Southeast Greenland at the start of the survey, on June 12 (Fig. 4). However, in most areas the more dense ice coverage occurred slightly offshore, leaving a band of open water along the shoreline. The belt of drift ice was nearly absent between Timmiarmiut (62.5°N) and Umiivik (64.3°N) and most fjords had extensive open water areas. In Ikeq/Køge Bugt (64.7°N), Ikertivaq (65.4°N) and in the area from Kap Gustav Holm (66.5°N) and north to Nansen Fjord (68.2°N) coastal fast ice was still widely distributed (Fig. 4).

At the end of the survey, on June 26, most of the drift ice had disappeared in Southeast Greenland (Fig. 5). Dense ice was still present from around Nansen Fjord (68.2°N) and c. 200km to the south, in Ikertivaq (65.4°N) and in Ikeq/Køge Bugt (64.7°N).

Fig. 2. Survey routes undertaken in South- and Southeast Greenland in the period 12-22 June, 2008

Fig. 3. Survey routes undertaken in the northern part of Southeast Greenland in the period 23-26 June, 2008.

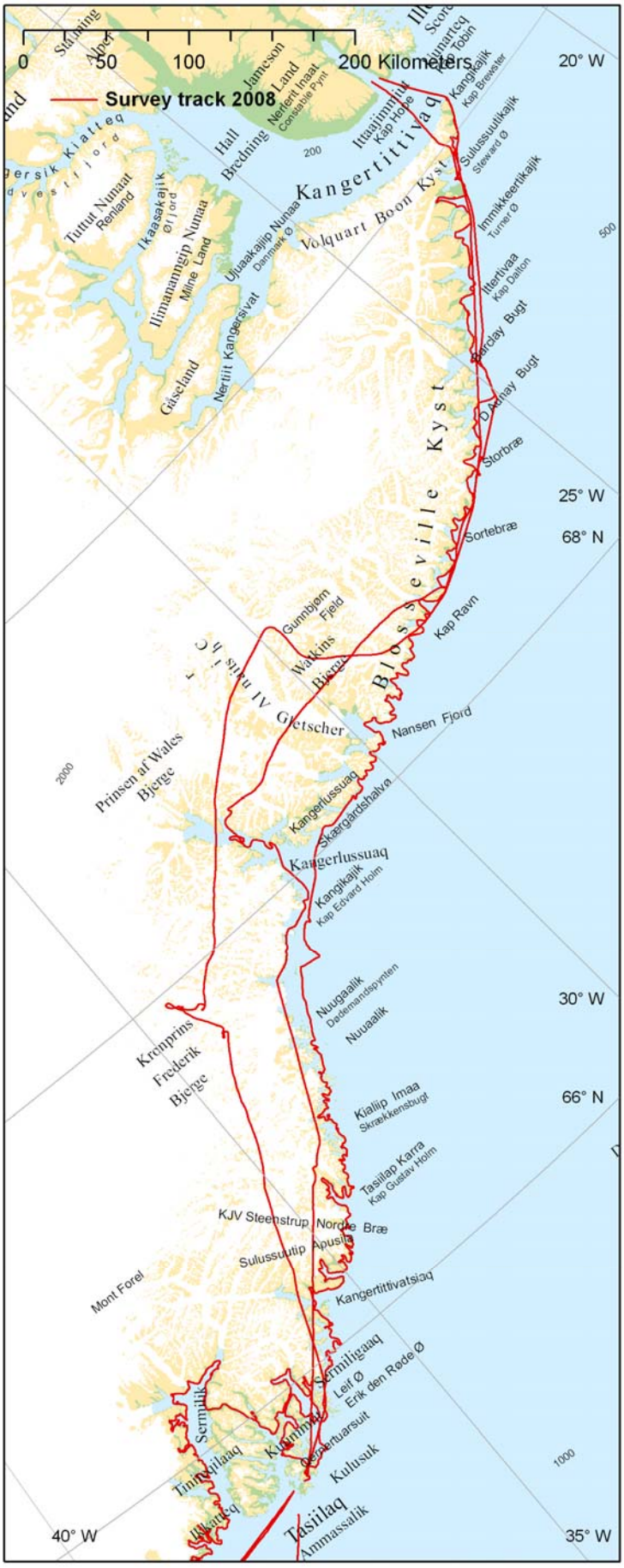


Fig. 4. Ice coverage in S- and Southeast Greenland on June 12, 2008, based on AMSR-E passive microwave images from the Aqua satellite (www.seaice.dk). Purple and red means high ice concentration, while yellow and green is low and blue is referring to no ice.

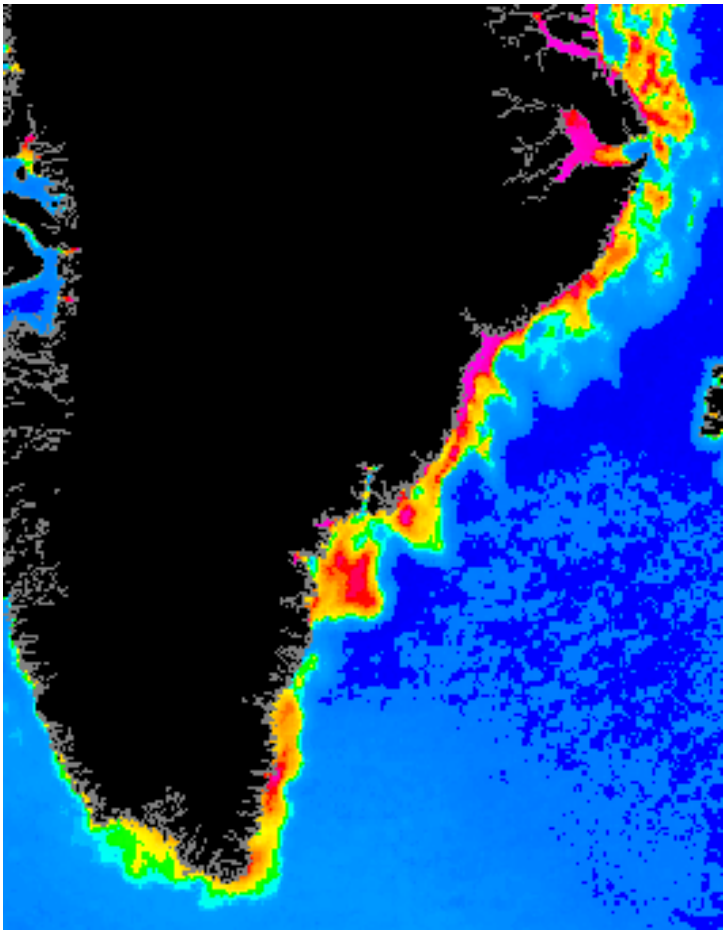
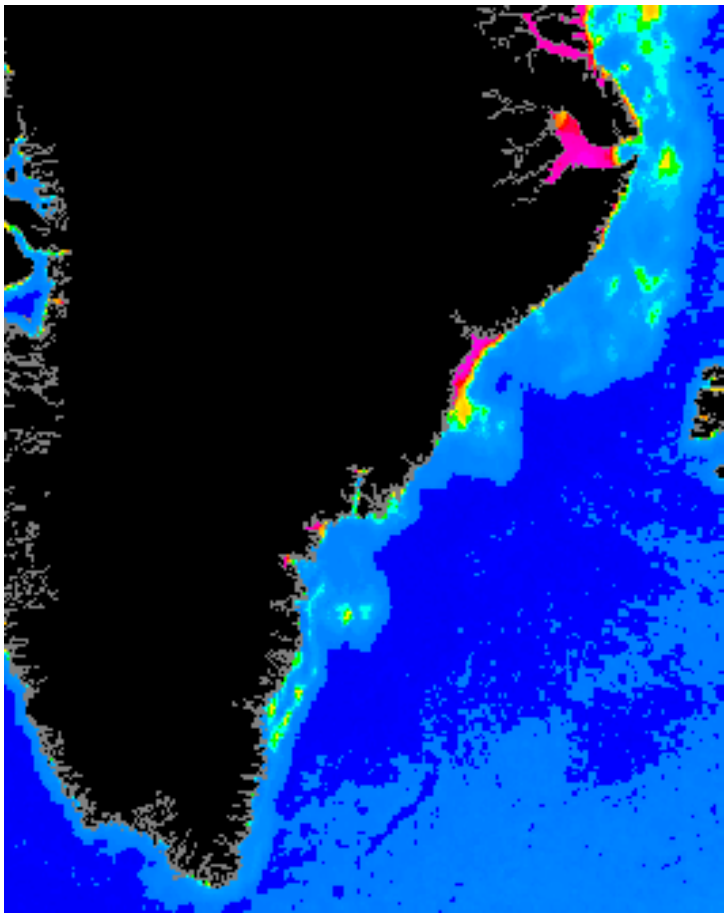


Fig. 5. As above, but for June 26, 2008.



3 Results and discussion

3.1 Species account

3.1.1 Birds

Great northern diver (*Gavia immer*)
Only two coastal observations and one fjord observation recorded. One pair was seen at the coast of Blosseville and two single birds were observed farther south (Fig. 6). In mid June most birds will be distributed at inland breeding locations (lakes) and coastal birds are often non-breeders (Boertmann 1994).

The great northern diver is known as a regular or scarce breeder as far north as Qaanaaq on the west coast and Dove Bugt in East Greenland (Boertmann 1994). A possible breeding pair has been observed as far north as Fyn Sø at approximately 80° 30′N (Boertmann *et al*. 2009b).

Red-throated diver (*Gavia stellata*)
A total of 28 birds were seen in flocks up to three birds. Except for two sightings along the coast of Blosseville, all birds were seen in the southern part of the survey area, on the east coast below 63°N and in Julianehåbsbugten on the west coast (Fig. 7).

The red-throated diver is known as a widespread and common breeder throughout Greenland, usually nesting near shallow ponds close to the coast. Birds seen along the coast may represent non-breeders or foraging breeders (Boertmann 1994).

Northern fulmar (*Fulmarus glacialis*)
Two breeding colonies were known from Southeast Greenland prior to this survey (NERI 2007). One is located very close to Kap Farvel (colony 59010) and several flocks of fulmars were seen close to this colony. The other colony is located in the northern part of Blosseville Kyst (Dunholm, 69502), but no birds were detected in this area. A single bird was observed in the drift ice at 65.1°N and a single flock in South Greenland (Fig. 8)

Great cormorant (*Phalacrocorax carbo*)
We had four observations of great cormorant in Southeast Greenland south of Tasiilaq at 65.1°N (Pikiulleq) and 65.6°N (Isortoq). One larger group of birds (n=25) flushed from what appeared to be a roosting site and the remaining sightings were single-bird observations (Fig. 9).

The great cormorant was previously reported as breeding in the area of Tasiilaq (Helms 1926), but then disappeared as a breeding bird (Boertmann 1994). One colony (59013) was registered near Kap Farvel in 2003 (NERI 2007), but no cormorants were observed here in 2008.

According to Mikaelsen (2006, pers. comm.) the number of great cormorants have increased significantly near Isortoq in recent years.

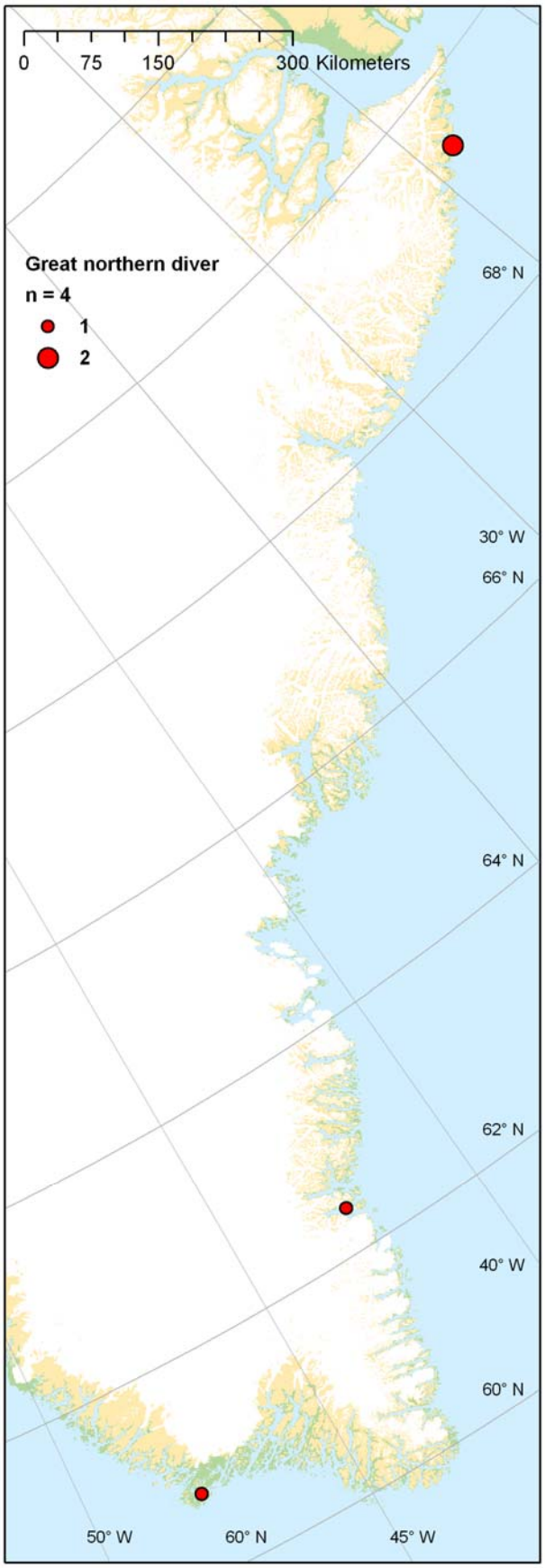


Fig. 6. Distribution of great northern diver observations during aerial surveys in Southeast Greenland, 12-26 June, 2008.

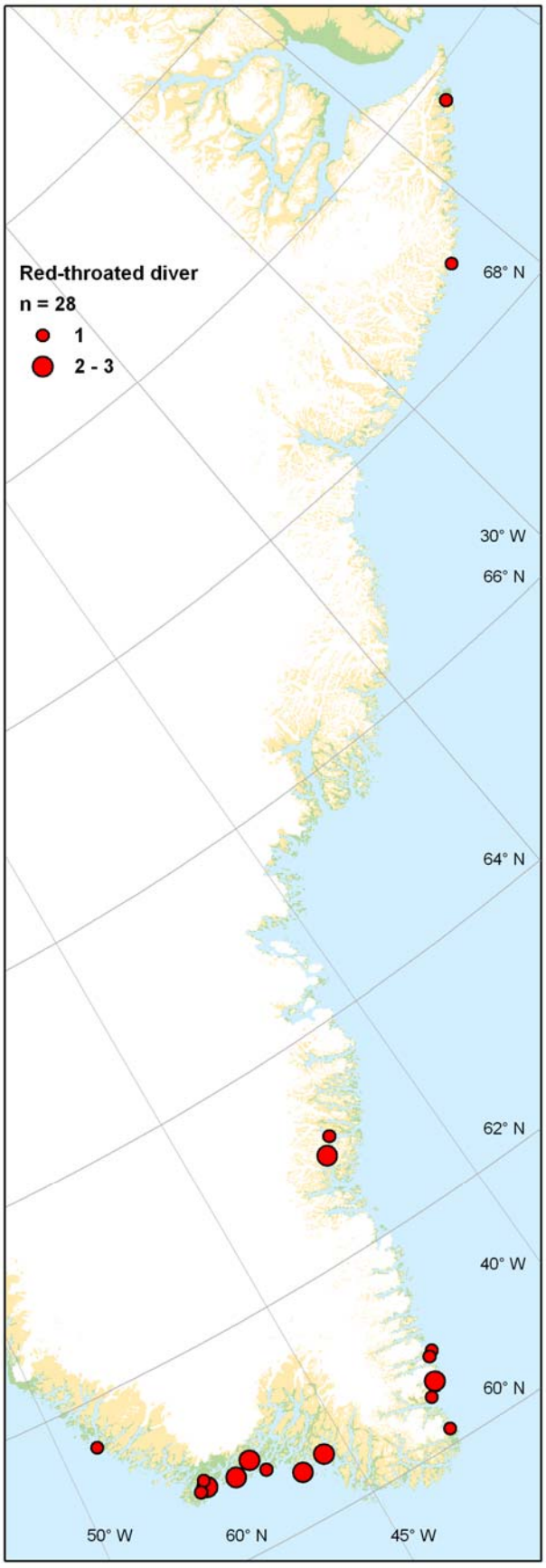


Fig. 7. Distribution of red-throated diver observations during aerial surveys in Southeast Greenland, 12-26 June, 2008.

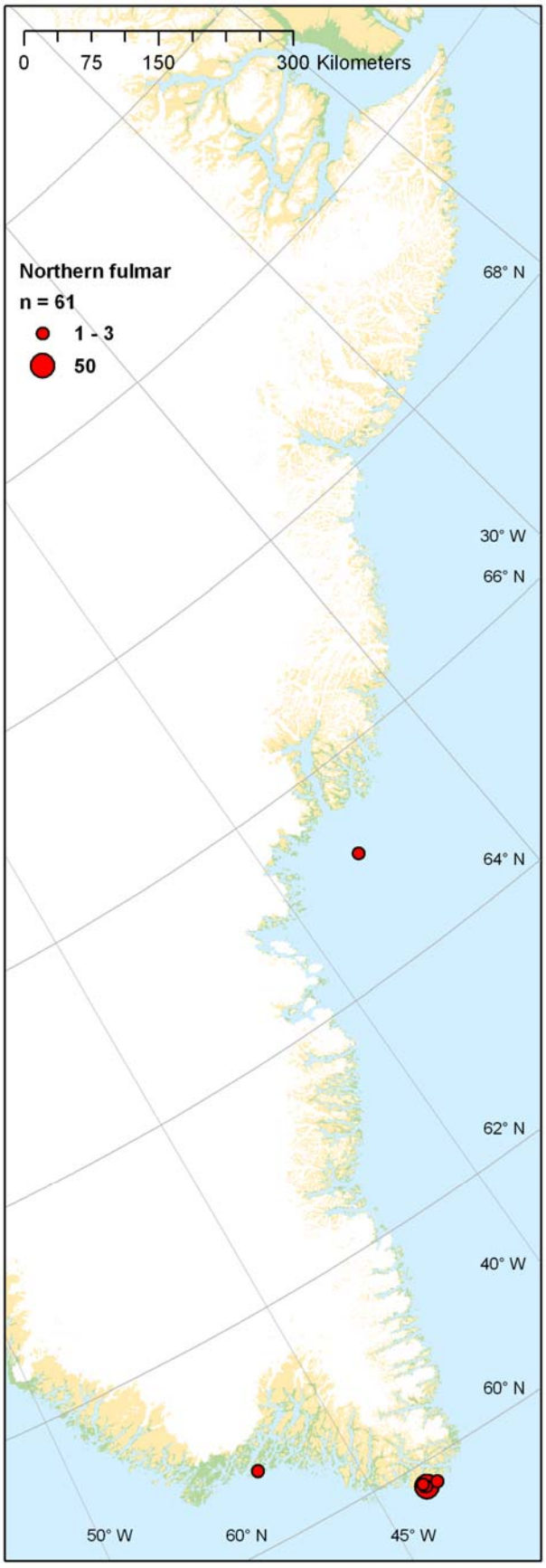


Fig. 8. Distribution of northern fulmar observations during aerial surveys in Southeast Greenland, 12-26 June, 2008.

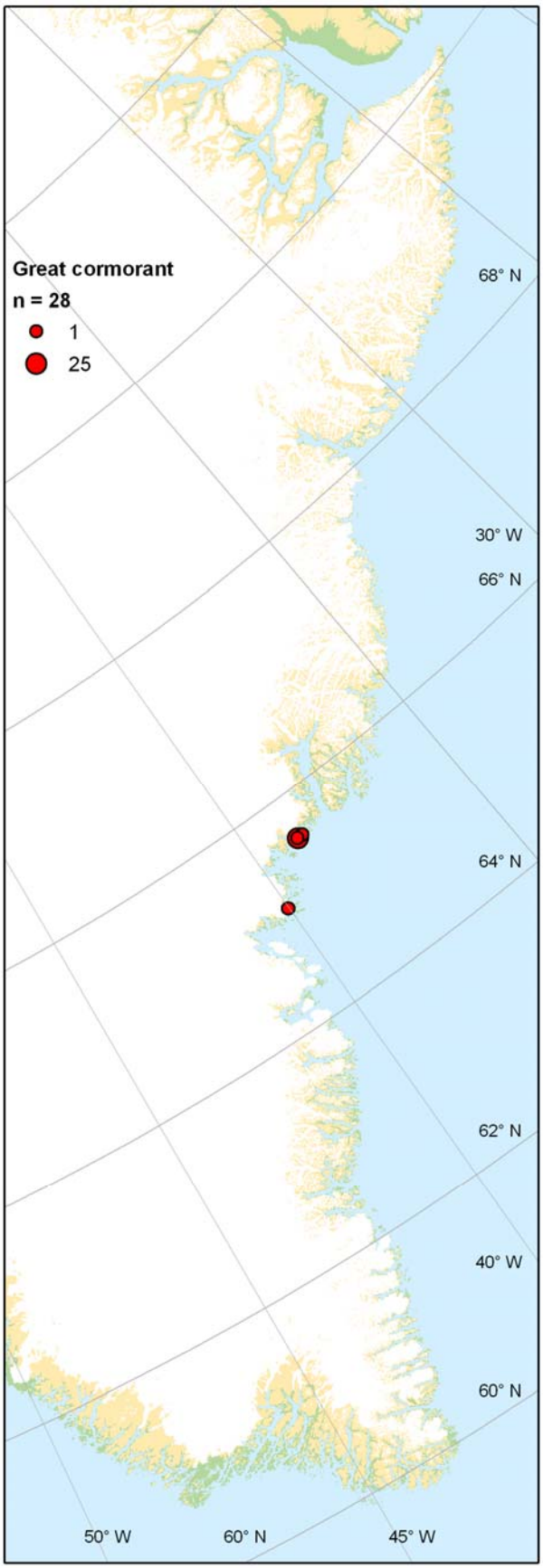


Fig. 9. Distribution of great cormorant observations during aerial surveys in Southeast Greenland, 12-26 June, 2008.

He remembered the first case of breeding near Pikiuleq in the early 1980s. Subsequently, the birds moved from this nesting site to Isortoq. On 21 Juli 2006 Rosing-Asvid and Mikaelsen visited the nesting site near Isortoq (65.63°N, 39.03°W), but found only gulls breeding there. Previously, great cormorants were also breeding at two other locations (65.70°N, 39.25°W and 65.65°N, 39.18°W), but as in the first case only gulls were present in 2006. However, a breeding colony was further towards the mouth of the fjord (7-10 km away), which according to Mikaelsen was new. A total of 22 nests were counted and 3 chicks could be seen in most nests.

These breeding birds may originate from West Greenland or from Iceland. In both places the breeding population refers to the subspecies *carbo*.

Barnacle goose (*Branta leucopsis*)
Two breeding sites were observed at the northern section of Blosseville Kyst (Fig. 10). Birds were seen taking off from breeding ledges. A total of 10 birds were recorded, but probably more birds were present at the ledges.

The two observed breeding sites represent the southern breeding range of barnacle goose in Greenland and both colonies represent recent findings (2004 and 2008). The breeding area continues northwards to Hertugen af Orleans Land at ~77°N (Boertmann 1994)

Pink-footed goose (*Anser brachyrhynchos*)
The main breeding distribution of pink-footed goose in Greenland is from Steward Ø, just south of Scoresbysund and north to Germania Land (~77°N). In addition to these breeders a large number of non-breeding birds from Iceland moult in East Greenland (Boertmann 1991).

The geese observed on this survey were probably moulting Icelandic non-breeders. Birds were observed in small flocks as flying or staging in fjords at the mouth of various rivers. All birds were observed in late June (19 – 25), which is when the Icelandic birds usually start arriving in East Greenland (Boertmann 1991). Most Icelandic breeders migrate to moult in Northeast Greenland, but also observations from Southeast Greenland have been reported (Boertmann 1994), including the fjords around Saqqisikuik/Skjoldungen (~63.5°N) and the Sermilik fjord north of Tasiilaq, where we observed several flocks. The few birds observed outside these two known moulting areas appear to be new records for Southeast Greenland (Fig. 11).

Canada goose (*Branta canadensis*)
Only observed in South Greenland between Narsalik and Kap Farvel (Fig. 12). The birds were probably non-breeding summer visitors and according to Boertmann (pers. comm.) among the most southern observations in West Greenland. Canada goose is getting increasingly common as a breeding bird between Nuuk and southern Upernavik (Bennike 1990, Malecki *et al*. 2000, Kristiansen & Jarrett 2001).

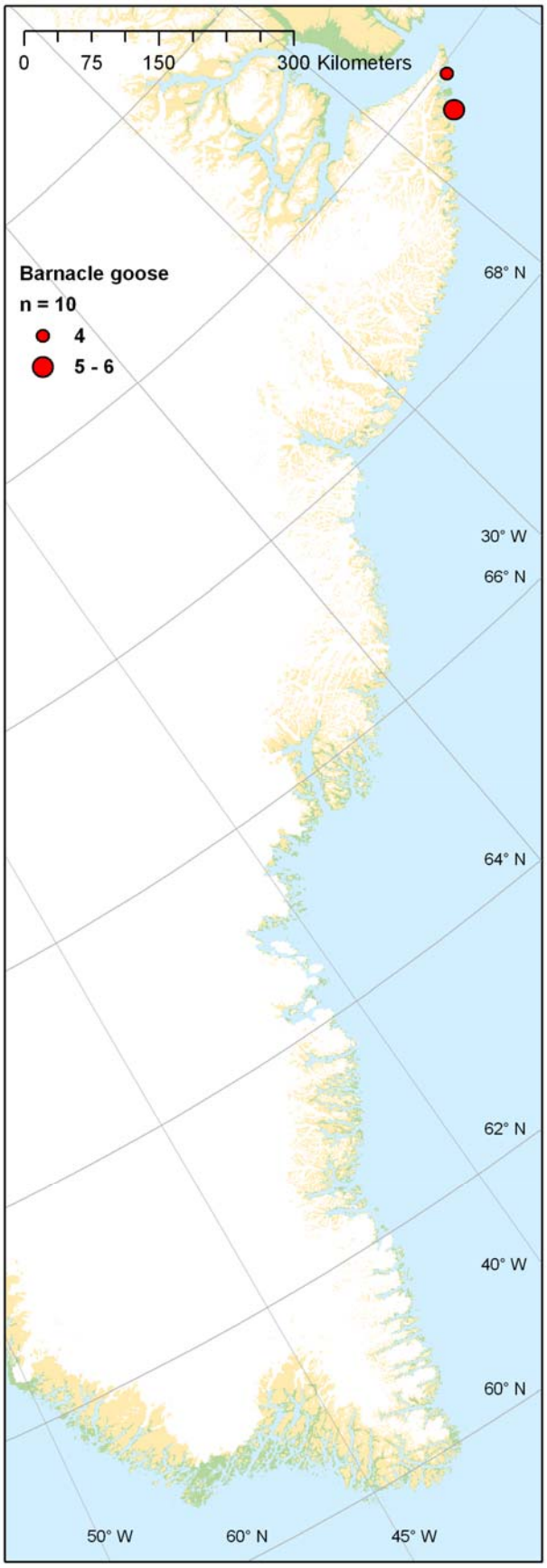


Fig. 10. Distribution of barnacle goose observations during aerial surveys in Southeast Greenland, 12-26 June, 2008.

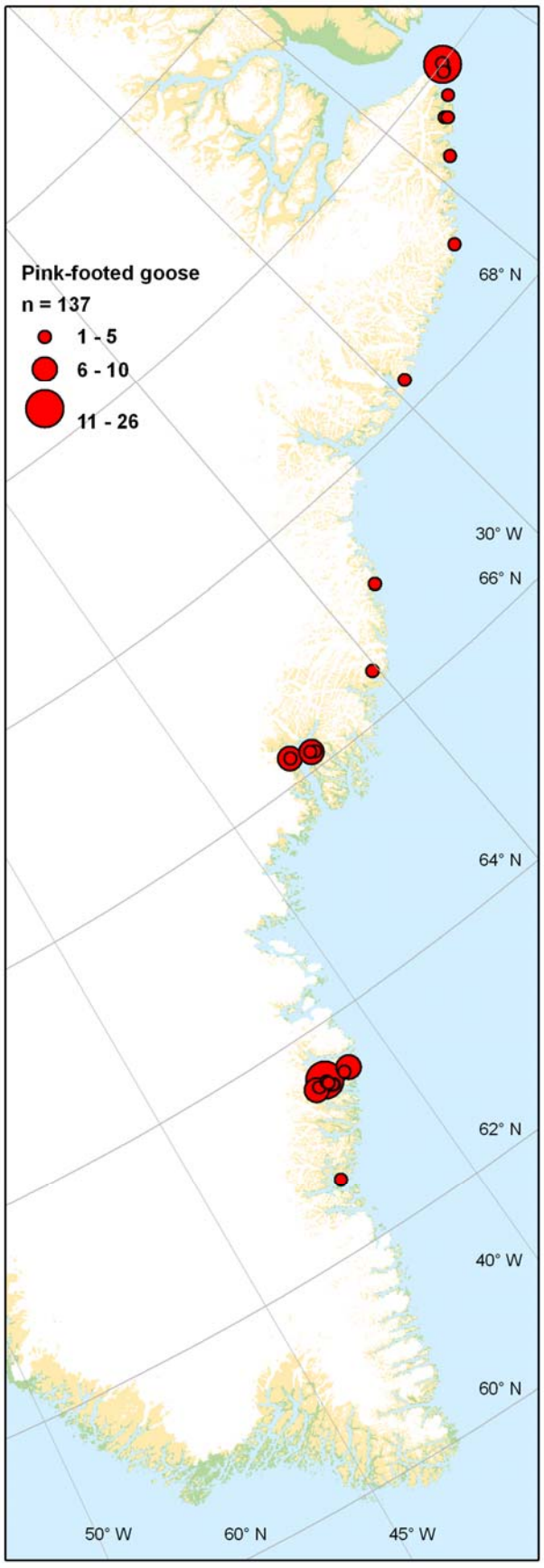


Fig. 11. Distribution of pink-footed goose observations during aerial surveys in Southeast Greenland, 12-26 June, 2008.

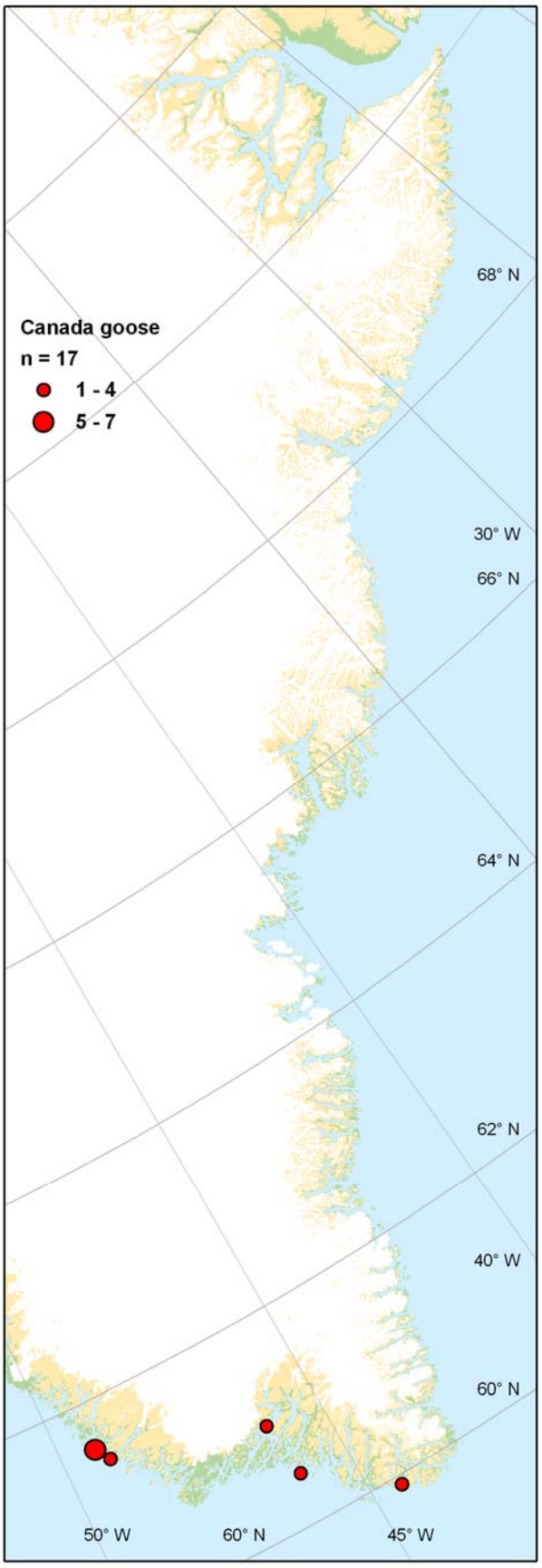


Fig. 12. Distribution of Canada goose observations during aerial surveys in Southeast Greenland, 12-26 June, 2008.

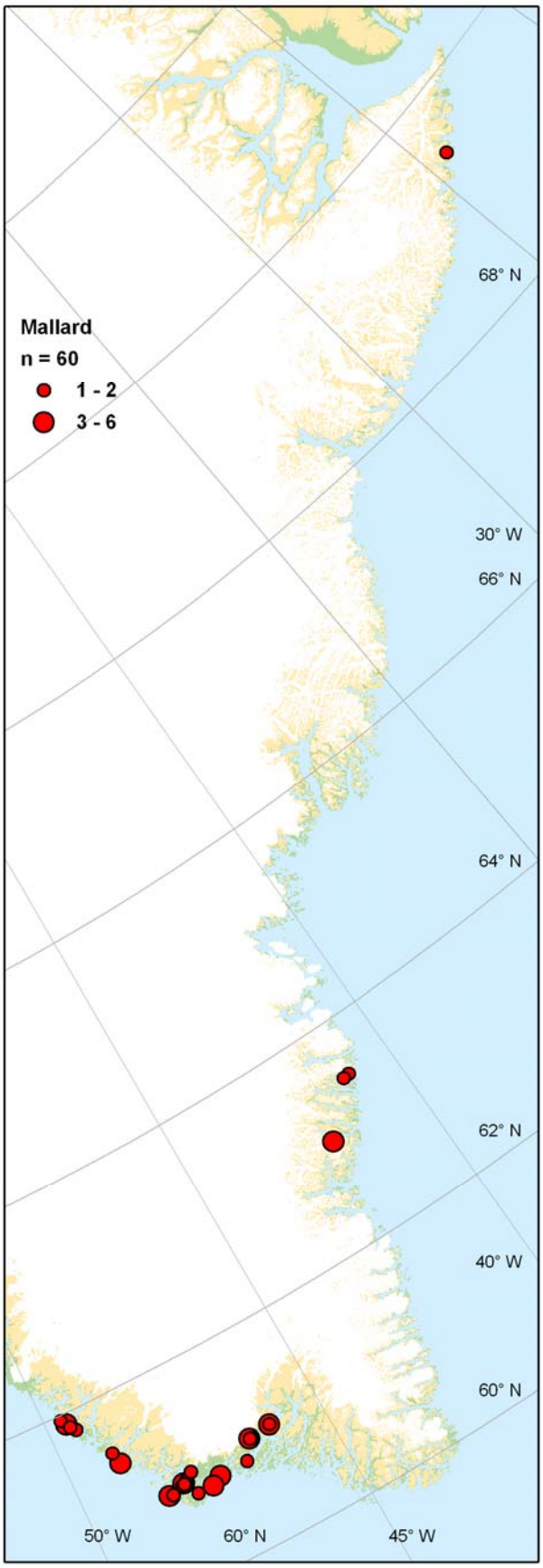


Fig. 13. Distribution of mallard observations during aerial surveys in Southeast Greenland, 12-26 June, 2008.

Mallard (*Anas platyrhynchos*)
Most observations of mallards occurred in South Greenland between Paamiut and Narsaq (Fig. 13). Only four observations in Southeast Greenland widely scattered between Kong Dan Halvø (~63ºN) and the northern part of Blosseville Kyst (~69ºN). Most birds were seen taking off from sheltered coasts or near-coastal freshwater habitats and probably represent local breeders. The mallards in Greenland belong to the endemic subspecies *conboscha*, and is known as a common breeder in West Greenland north to southern Upernavik and in East Greenland assumingly common south of Kangersittuaq at 68ºN (Boertmann 1994). Mallards were also seen at Blosseville Kyst earlier in June in 2008 by Boertmann *et al.* (2009b).

Common eider (*Somateria mollissima*)
With a total of 8.170 birds and 525 observations in South Greenland and 18.530 birds and 1304 observations in Southeast Greenland the common eider was the most numerous species recorded on the survey. In Southeast Greenland the eiders were distributed throughout most of the outer coast and in nearly all fjords visited during the survey. Only in the area from Dødemandspynten (67.3ºN) and north to Barclay Bugt (69.2ºN) at Blosseville Kyst the detection rate was distinctly lower than elsewhere. In the southern part of this section of the coast, between Dødemandspynten and Kangerlussuaq (68.2ºN), the coastal areas were still blocked by sea-ice and probably explain the absence of eiders here. Farther south in Ikeq/Køge Bugt (~64.8ºN) and Ikertivaq (~65.5ºN) the low density may be related to large amounts of ice, but also to a poor coverage of the interior bay areas.

The timing of the survey was ideal for detecting eider colonies. The males were still present in the colonies, being easily detectable from above. I most cases we passed the colonies a second time and made photographs to be able to count the number of males afterwards (Fig. 18). In one case we were also able to count the number of nesting females from the photos and this showed a 1:1 ratio between females and males in the colony. Eiders did not flush from the colonies during passage of the aircraft, at least not in Southeast Greenland.

Four colonies were detected in the northern part of the survey area (Fig. 14), of which one was new and situated on the southern side of Manby Halvø (~69.8ºN). There was still a lot of ice in this area and the nearby colony northeast of Manby Halvø and on Dunholm (Fig. 20) many females were not yet nesting (25/6). Ten new colonies were detected in the southern part of Southeast Greenland, between 61.6 ºN and 64.4ºN, with ca. 260 breeding pairs counted (photos) in the largest colony. Especially the area of Timmiarmiut (62.6 ºN) appears to be an important breeding area with four colonies detected within a small area. A total of ca. 750 breeding pairs in 11 new colonies were detected in Southeast Greenland. Considering that not all the potential breeding habitats were surveyed, this represents a minimum estimate of the previously unregistered colonies in Southeast Greenland. According to local knowledge three breeding areas are important for common eiders south of Tasiilaq; Timmiarmiut, Imaasivik and Umiivik. Our observations of colonies correspond well with this information. During fieldwork in 2005 A. Rosing-Asvid discovered two colonies farther north (64.95ºN, 39.83ºW and 65.02ºN, 40.00ºW) in an area near Pikiullit that we did not survey in 2008.

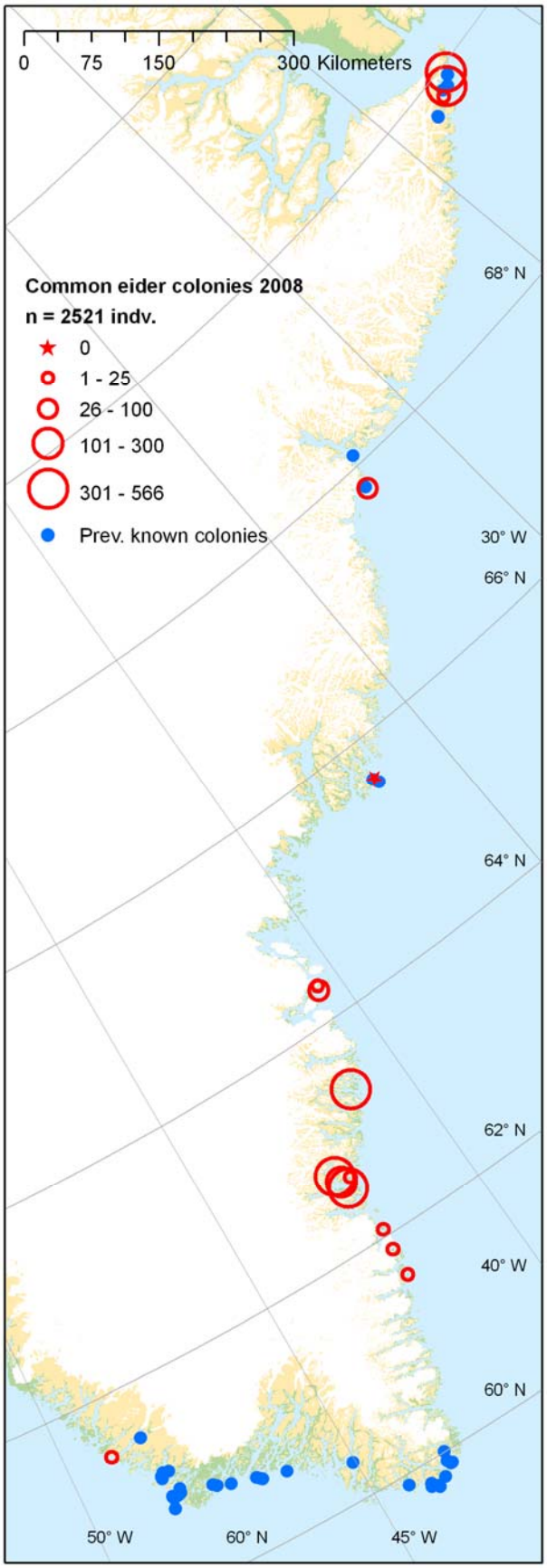


Fig. 14. Distribution of common eider colonies observed during aerial surveys in Southeast Greenland, 12-26 June, 2008 and the colonies previously known.

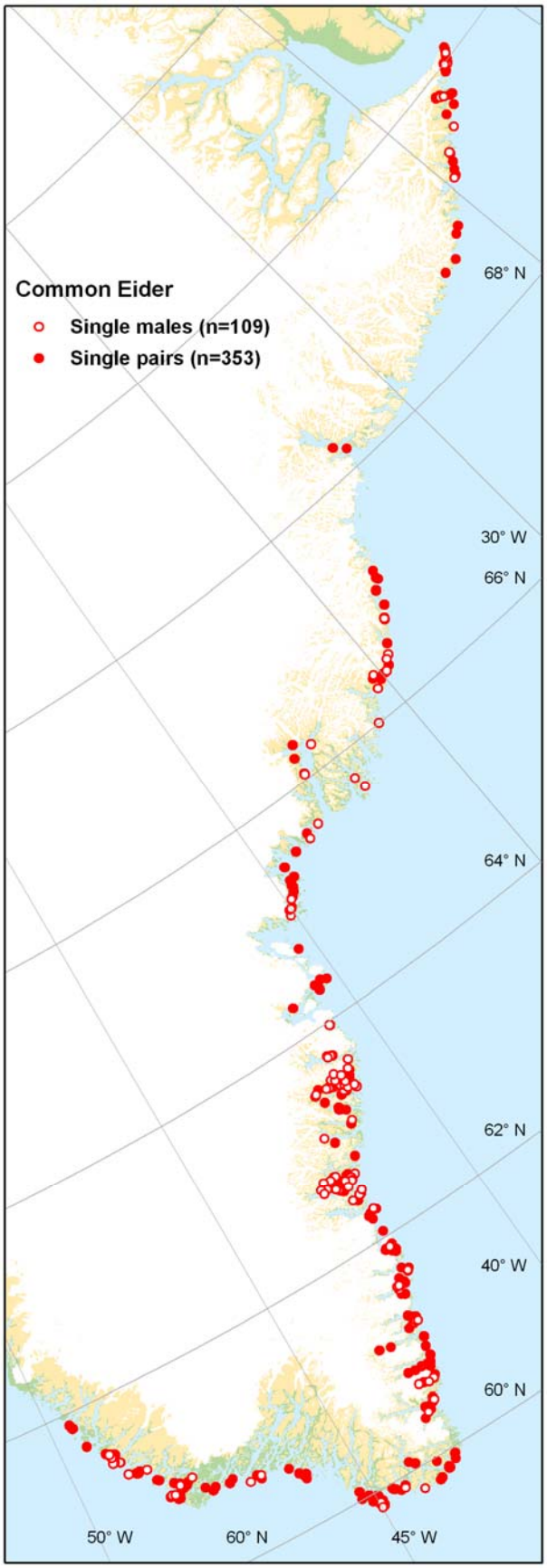


Fig. 15. Distribution of single males or pairs of common eider observed during aerial surveys in Southeast Greenland, 12-26 June, 2008.

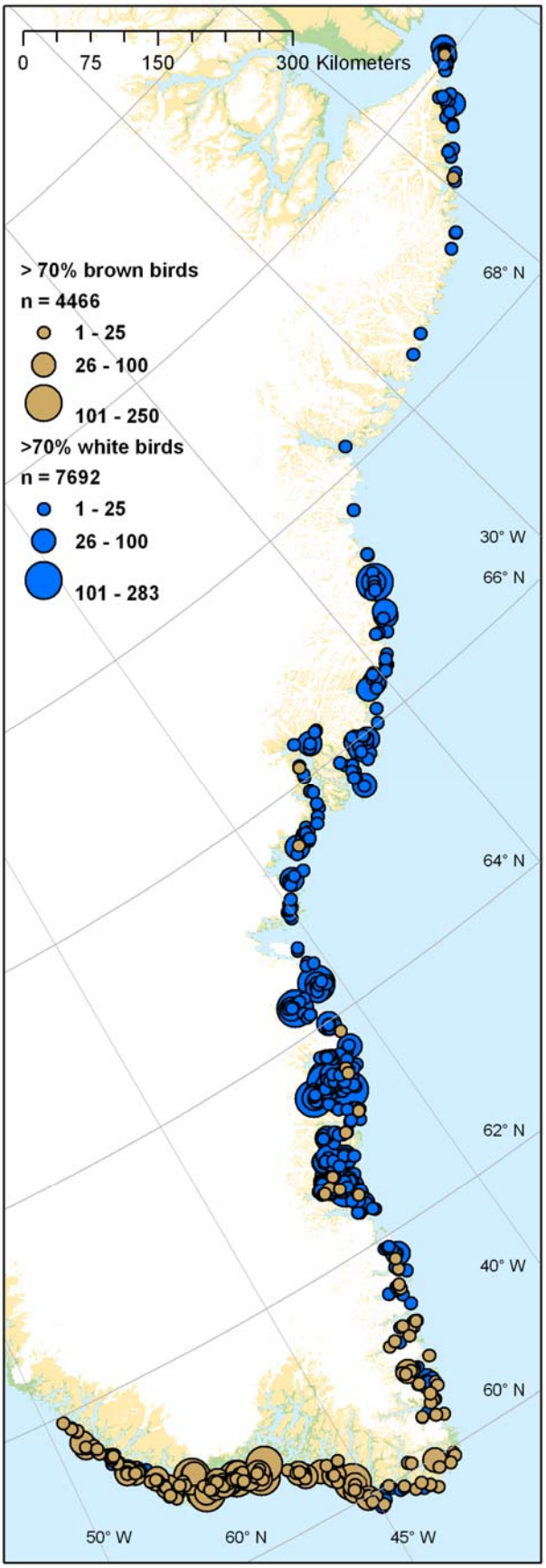


Fig. 16. Distribution of common eider flocks having either a majority of brown birds (females + young males) or white birds (adult males).

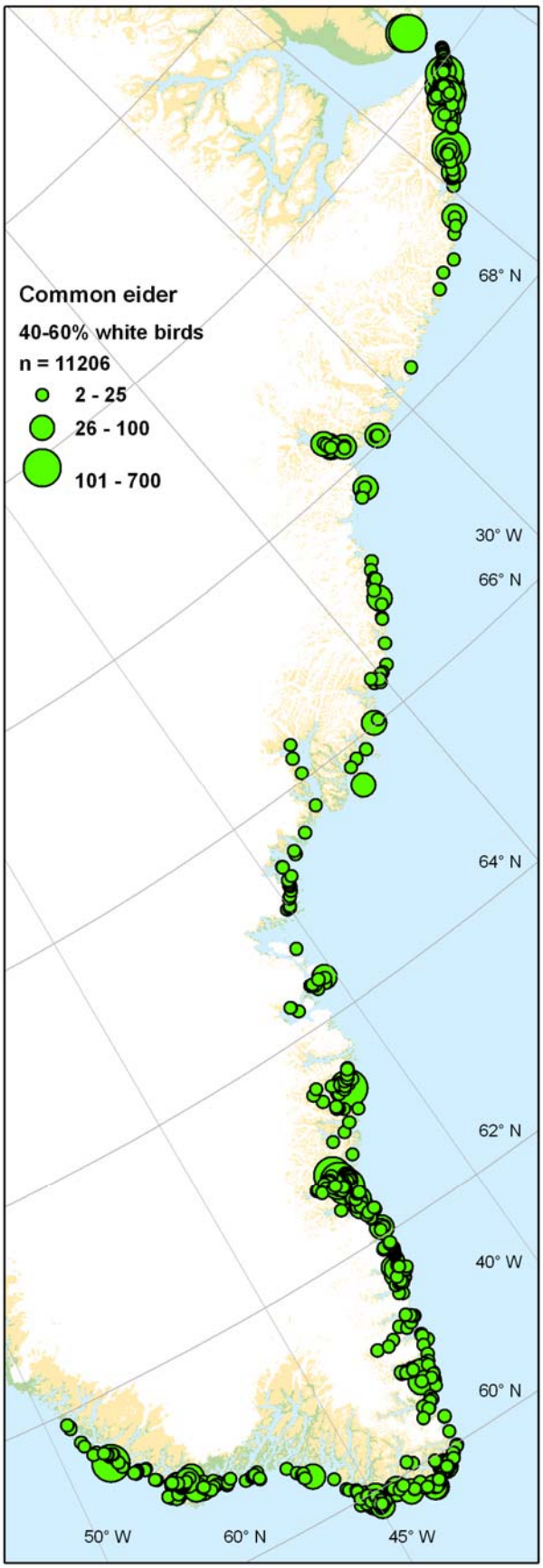


Fig. 17. Distribution of common eider flocks having an ap-p. equal percentage of brown (females + young males) and white birds (adult males).

Twelve among 18 previously known colonies in Southeast Greenland were revisited in 2008. These were all colonies close to the northern tip of Blosseville Kyst or colonies close to Kap Farvel. A total 508 pairs were registered as breeding pairs in three of these colonies. For all the colonies controlled near Kap Farvel (7 colonies) the breeding status is uncertain. Possible breeders were seen on the water near most of the colonies, but no birds were detected on the islands. It is possible that the birds in the water were in fact breeding birds that had flushed their colonies or alternatively, that incubation was not yet initiated at the time of the survey (16/6).

Fig. 18. A common eider colony in the area of Timmiarmiut (62.6 ºN), Southeast Greenland. The white dots on top of the islands are male eiders. The nesting females are also present. Photo: F. R. Merkel

Along the shorelines in many fjords and in coastal bays we saw a large number of eiders that appeared to be territorial single pairs or individual males (Fig. 15). I most cases these birds were separated from larger flocks of eiders (see below) and we believe that these birds represent breeding birds. Usually common eiders avoid nesting on the mainland due to the risk of predation from Arctic fox (*Alopex lagopus*), however, the strategy of solitary breeding may be more common in Southeast Greenland due to low densities of foxes here (Vibe 1967). It is less likely that individual pairs and males observed in South Greenland were breeding birds, since the age and sex distribution indicates that these birds are probably oversummering individuals from the winter population in Southwest Greenland (se below).

There was a distinct pattern in the sex-distribution within eider flocks. Flocks with a clear overweight of males (shown as >70% white birds in Fig. 16 and 19) were highly abundant in the central part of Southeast

Greenland, while flocks consisting primarily of females and young males (>70% brown birds) were numerous in South- and Southeast Greenland below 62°N (Fig. 16). Southwest Greenland is important as a wintering area for common eiders breeding in Canada and West Greenland (Boertmann *et al*. 2004, Mosbech *et al*. 2006) and it is common for non-breeders to stay over-summering in Southwest Greenland (Lyngs 2003). To a large extent this will be first and second year birds that are not yet capable of breeding and this can probably explain the large proportion of brown birds south of 62°N.

Concerning the large proportion of male-dominated flocks in central Southeast Greenland we suggest that these could be post-breeding birds from Iceland. In terms of the breeding phenology of eiders in Iceland this is indeed possible (Aevar Petersen, pers. comm.). Up until 2003 there was only three recoveries in Southeast Greenland of eiders ringed in Iceland and normally this would not indicate any large-scale movements between these two areas (Lyngs 2003). However, since human activities in Southeast Greenland are rather scarce we would not expect large numbers of band returns even if Southeast Greenland was frequently used as moulting grounds for Icelandic breeders. Post-breeding birds were also observed in large numbers (ca. 5000 birds) in July-August (2008) when Boertmann *et al* (2009b) conducted aerial survey along the Blosseville Kyst (69% males).

Fig. 19. A flock of male eiders in Southeast Greenland including two young males. Photo: F. R. Merkel

We also observed a large number of eider flocks with more even proportions of white and brown birds (Fig. 17). It is unknown whether these were breeding birds of Southeast Greenland, post-breeding birds from Iceland or a mixture. Considering the relatively small number of colonies in Southeast Greenland recorded so far, we think that it is most likely Icelandic post-breeders. The even proportions of white and brown birds could be explained by a mixture with immature males that appear brownish until their second year, or by non-breeding females and failed

breeders from Iceland, depending on the breeding conditions there. The overall percentage of white birds observed north of 62°N was 68% (colonies included), while only 36% in South- and Southeast Greenland below 62°N.

Combining the number of breeding birds from all the colonies observed in 2008 (new and old) with all observations of individual males or individual pairs, assuming that all these are breeding birds, the breeding population in Southeast Greenland adds up to a minimum of ~1,600 pairs. If we also assume that some proportion of the eider flocks observed in Southeast Greenland as having even proportions of white and brown birds (6,425 birds) in fact were breeding birds (and not Icelandic moulting birds), although not yet established as such at the time of the survey, the breeding number could easily be much higher. Assuming, that half of these eiders were breeders would add another ~1,600 pairs to the breeding population in Southeast Greenland. Considering that this assumption is most uncertain, but taking into account that not all potential breeding areas were surveyed, we roughly estimate a breeding population of 1,600 – 3,200 pairs in Southeast Greenland.

In South Greenland we detected a single new colony (~10 pairs) between Arsuk and Paamiut (Fig. 14). However, among the colonies known from previous surveys, mainly Boertmann (2004), no breeding birds were detected for certain. As in the case of the Kap Farvel colonies, birds may have flushed the colonies or not yet initiated incubation. Possible breeders did occur in the area (Fig. 17).

Fig. 20. Part of Dunholmene at the northern Blosseville Kyst (23/6). There is still a lot of ice, but a few eiders had started breeding (males visible). Photo: F. R. Merkel

King eider (*Somateria spectabilis*)
We had only three observations of king eider (n=4). These were all recorded on 19 June near Tasiilaq (Sermilik and Kuummiit). Previous information about king eider in Southeast Greenland is limited to a few old records of migrants or summer visitors around Tasiilaq and Kangersittuaq (Boertmann 1994).

Long-tailed duck (*Clangula hyemalis*)
Apart from one observation at the northern Blosseville Kyst, one at Kap Farvel and a few in South Greenland (Arsuk), most long-tailed ducks were found aggregated in small flocks in the fjord-system north of Tasiilaq (Fig. 21).

The long-tailed duck is a fairly common breeder in West- and NE-Greenland and large numbers winters in Southwest Greenland (Merkel *et al*. 2002), but little information exits for Southeast Greenland. Breeding has been reported from the Miki Fjord area (~68.1°N), the Tasiilaq-area and Lindenow Fjord (60.4°N) and a few observations of wintering birds in the Tasiilaq -area (Boertmann 1994).

Red-breasted merganser (*Mergus serrator*)
Birds were observed in South Greenland and occasionally in Southeast Greenland north to Tasiilaq (Fig. 22). Only one or two birds were seen at a time and mainly in connection with sheltered coasts or near-coastal freshwater habitats and the birds were probably local breeders. Our observations are in line with previous descriptions of the breeding distribution in Southeast Greenland, i.e., north to Tasiilaq (Boertmann 1994)

Great black-backed gull (*Larus marinus*)
In Southeast Greenland great black-backed gulls are previously reported from the area of Tasiilaq and at the mouth of Scoresbysund (Boertmann 1994). Our observations are also from these areas (Fig. 23). Two of three known colonies in Southeast Greenland were revisited and birds were observed in both of them. Observations of lesser black-backed gulls indicate a similar distribution for this species, although misidentification cannot be excluded (Fig. 24).

Boertmann (2004) detected a large number of colonies in South Greenland in late July 2003, but great black-backed gull was not consistently recorded in South Greenland in 2008. A single colony was registered (Fig. 23).

Lesser black-backed gull (*Larus fuscus*)
This species is expanding its breeding range in Southwest Greenland (Lyngs 2003), but probably also in Southeast- and Northeast Greenland (Boertmann 2008). On this survey we found a new colony in the Tasiilaq-area and one farther north at Blosseville Kyst (Fig. 24). In July 2008 Boertmann (2009b) observed two colonies in the same area of Blossewille Kyst. Probably more of the birds observed in the Tasiilaq-area were breeding birds.

Boertmann (2004) found several new colonies in South Greenland in 2003, but only few colonies were registered in 2008. However, this species was not consistently recorded in South Greenland.

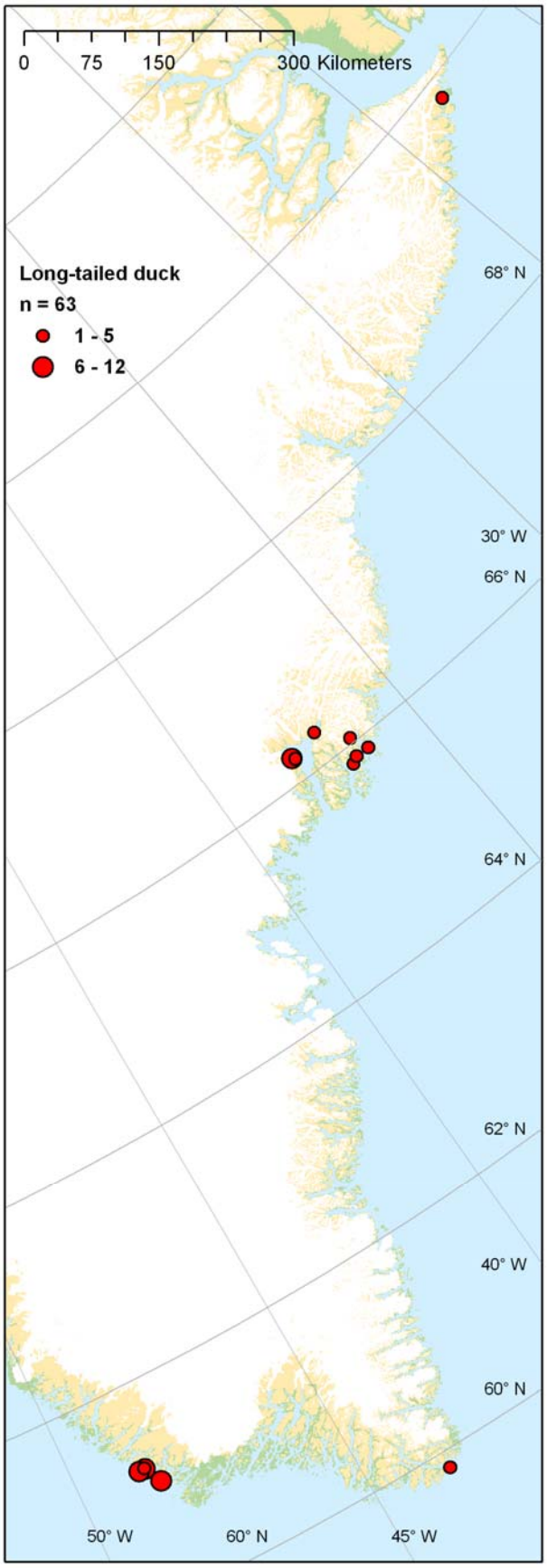


Fig. 21. Distribution of long-tailed duck observations during aerial surveys in Southeast Greenland, 12-26 June, 2008.

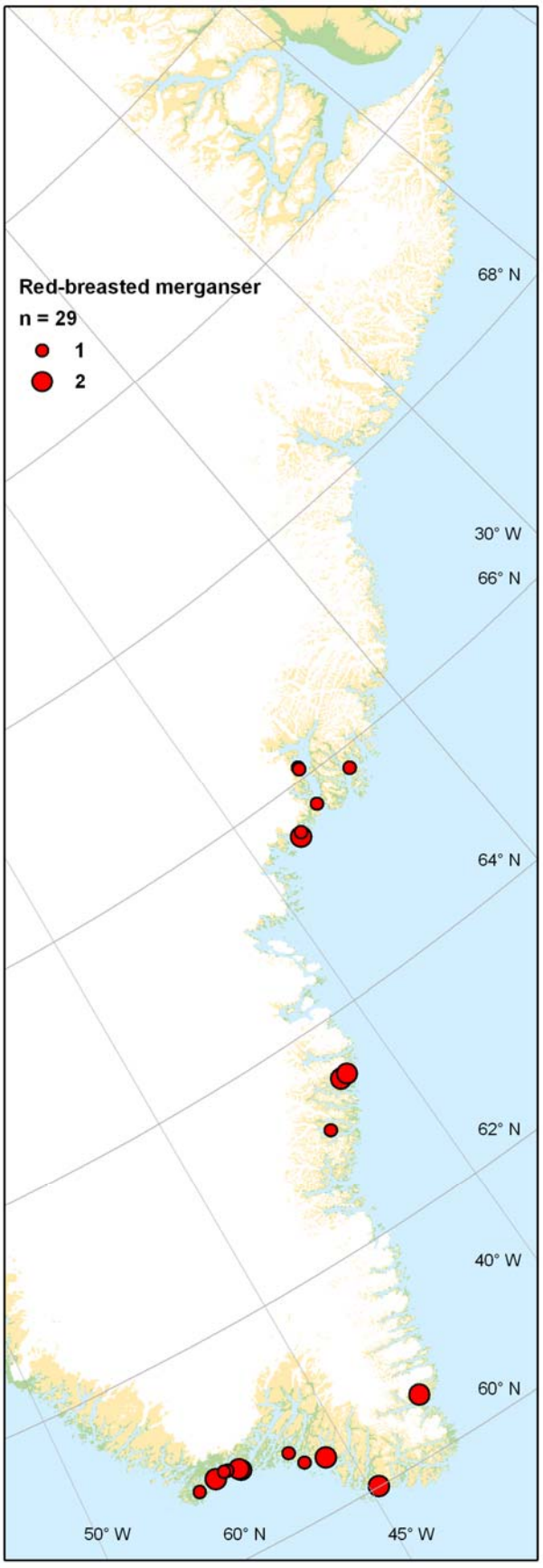


Fig.22. Distribution of red-breasted merganser observations during aerial surveys in Southeast Greenland, 12-26 June, 2008.

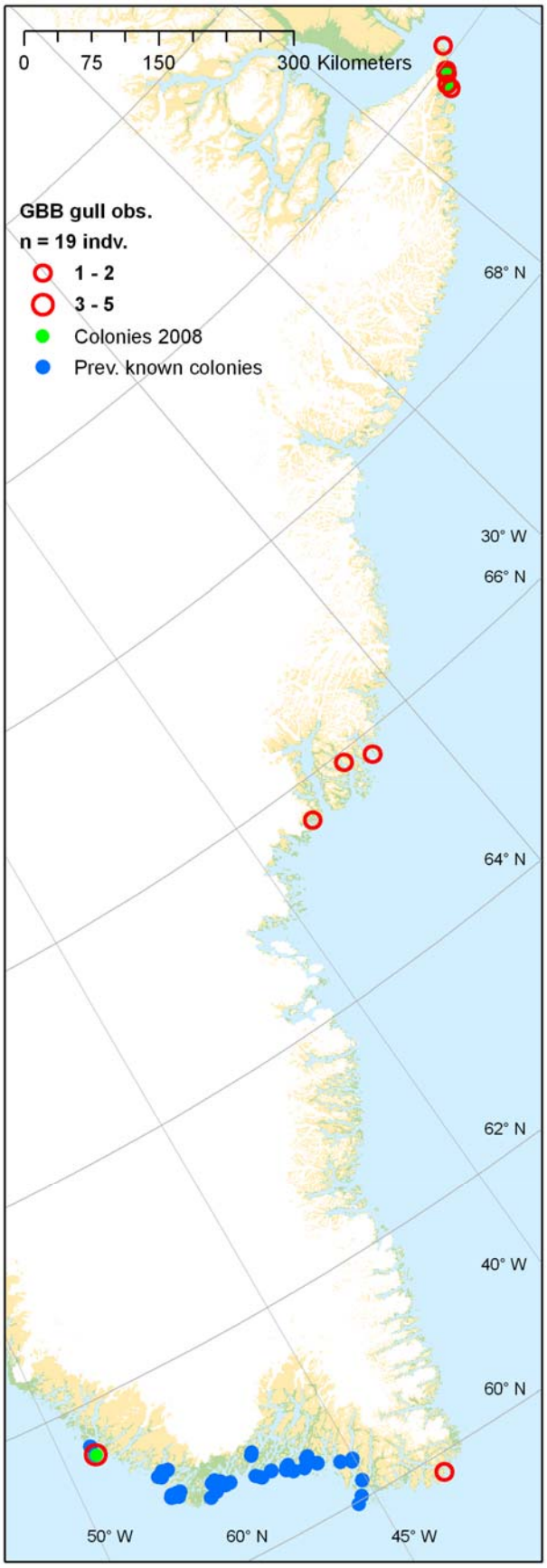


Fig. 23. Distribution of great black-backed gull observations during aerial surveys in Southeast Greenland, 12-26 June, 2008 and the colonies previously known.

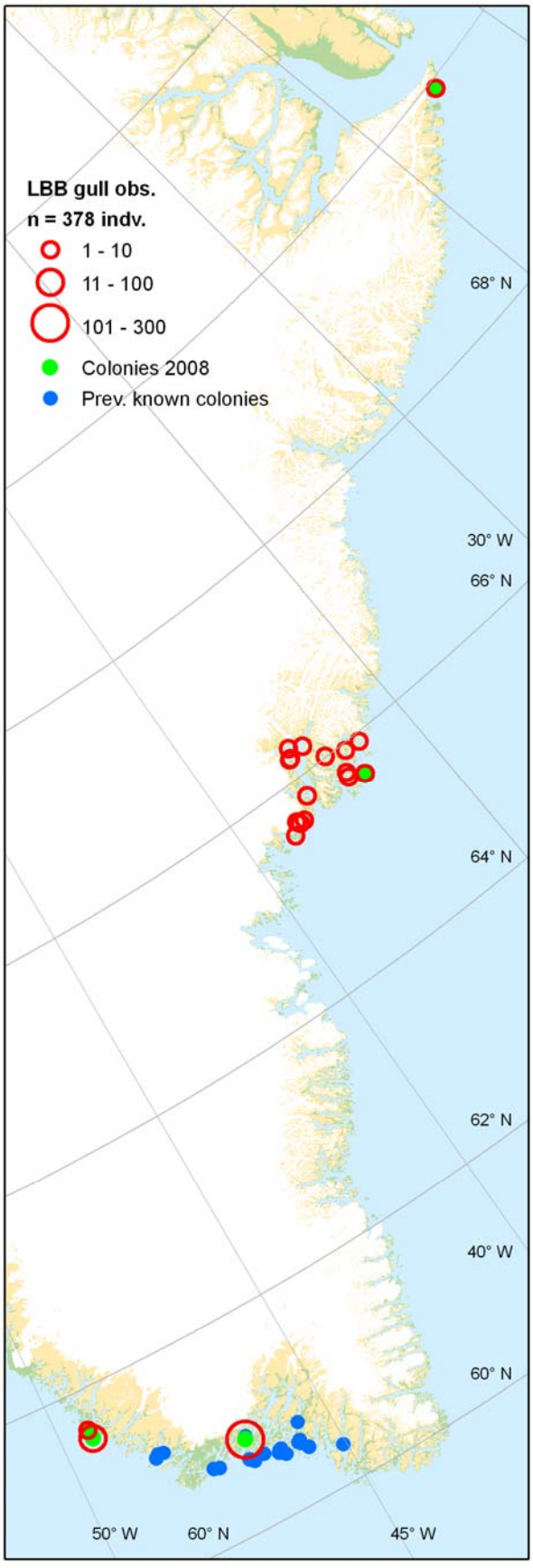


Fig. 24. Distribution of lesser black-backed gull observations during aerial surveys in Southeast Greenland, 12-26 June, 2008 and the colonies previously known.

Herring gull (*Larus argentatus*)
A single observation of a subadult (3K) herring gull was done at 67.0°N. No observation of this species has previously been reported from Southeast Greenland. However, it is known as a rare summer vagrant in the Scoresbysund-area and as far north as Germania Land (Boertmann 1994).

Glaucous gull (*Larus hyperboreus*)
Having similar adult plumages the two species glaucous gull and Iceland gull are difficult to distinguish from an airplane. Only when seen together the differences in size between the two species is conspicuous. Both species usually breed in colonies on steep cliffs facing the sea, but may also form colonies on small islands. In addition, glaucous gull frequently breeds solitary on small islands and often in connection with common eider colonies. Due to the identification issue some observations were lumped as Iceland/glaucous gull (Fig. 25 and 26).

In South Greenland glaucous gull was not consistently recorded and only a couple of colonies were registered (Fig. 25). In Southeast Greenland all gulls were registered. Glaucous gull was most numerous in the Tasiilaq-area, however, only a relatively small number of breeding colonies were registered – 13 colonies, of which seven was new. Most records were of roosting or scavenging gulls or gulls following foraging common eiders. In total 255 observations and 603 individuals were recorded in Southeast Greenland, not including birds lumped as Iceland/glaucous gull.

A substantial proportion of these observations probably represent breeding birds near their nesting site. Our survey appears to confirm previous descriptions of glaucous gull as a widespread breeder in Southeast Greenland (Boertmann 1994), maybe except around Kangerlussuaq (~68°N) and the southern part of Blosseville Kyst.

Iceland gull (*Larus glaucoides*)
Concerning identification issues see under glaucous gull. Several colonies of Iceland gull were found in the fjords south of Bernstoff Isfjord (63.6°N, Fig. 25). There are no previous registrations of breeding colonies from this area, although Salomonsen (1990) noted that Iceland gull was scarce breeder in Southeast Greenland north to Kangerlussuaq (68°N).

We identified very few Iceland gulls between Kap Møsting (63.7°N) and Tasiilaq, but in the fjord system north of Tasiilaq and north to Tasiilap Karra (66.6°N) we found several breeding colonies. We had no reliable observations from Tasiilap Karra to Nansen Fjord (68.2°N), but on the southern Blosseville Kyst we registered three small colonies. In total 29 colonies were detected in Southeast Greenland, of which one was previously known. A total of 1,285 individuals were observed, not including birds lumped as Iceland/glaucous gull.

Since our survey did not cover all islands and steep cliffs some colonies probably went undetected. At least some remote colonies 75-100 km south of Tasiilaq together with breeding black-legged kittiwakes were not detected, of which one had up to 100 pairs of Iceland gull in 2005 (A. Rosing-Asvid, pers. obs.).

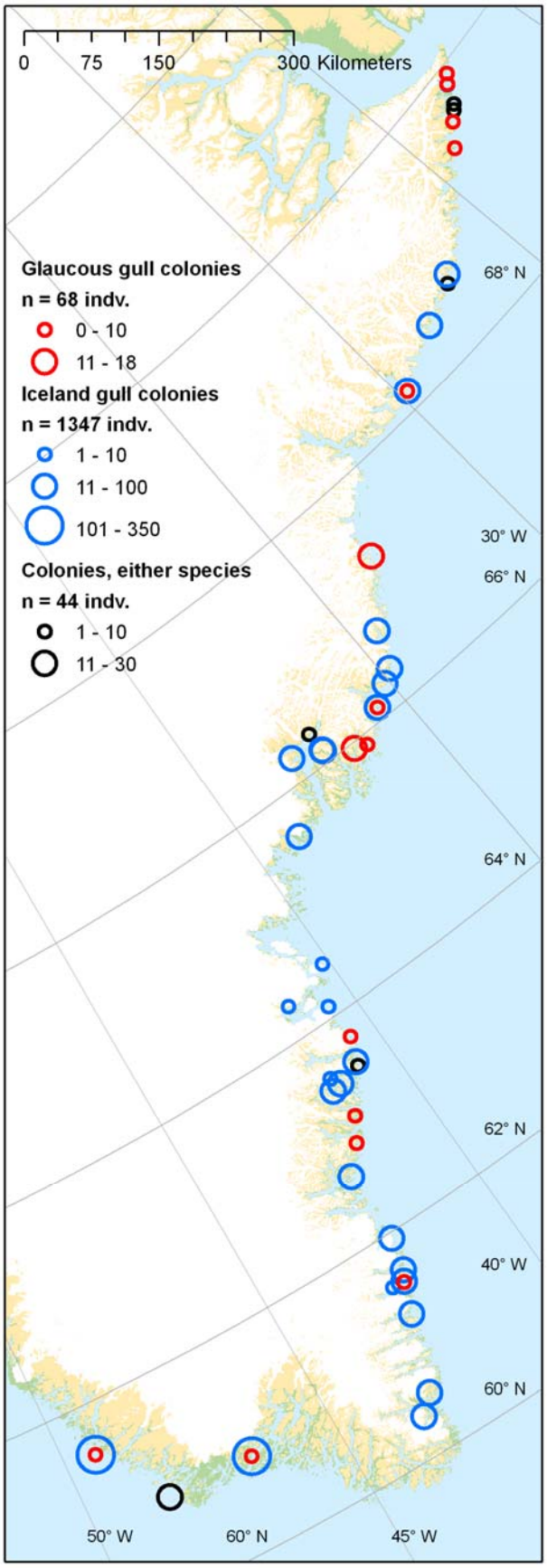


Fig. 25. Distribution of glaucous gull and Iceland gull colonies (including colonies not identified to species) observed during aerial surveys in Southeast Greenland, 12-26 June, 2008.

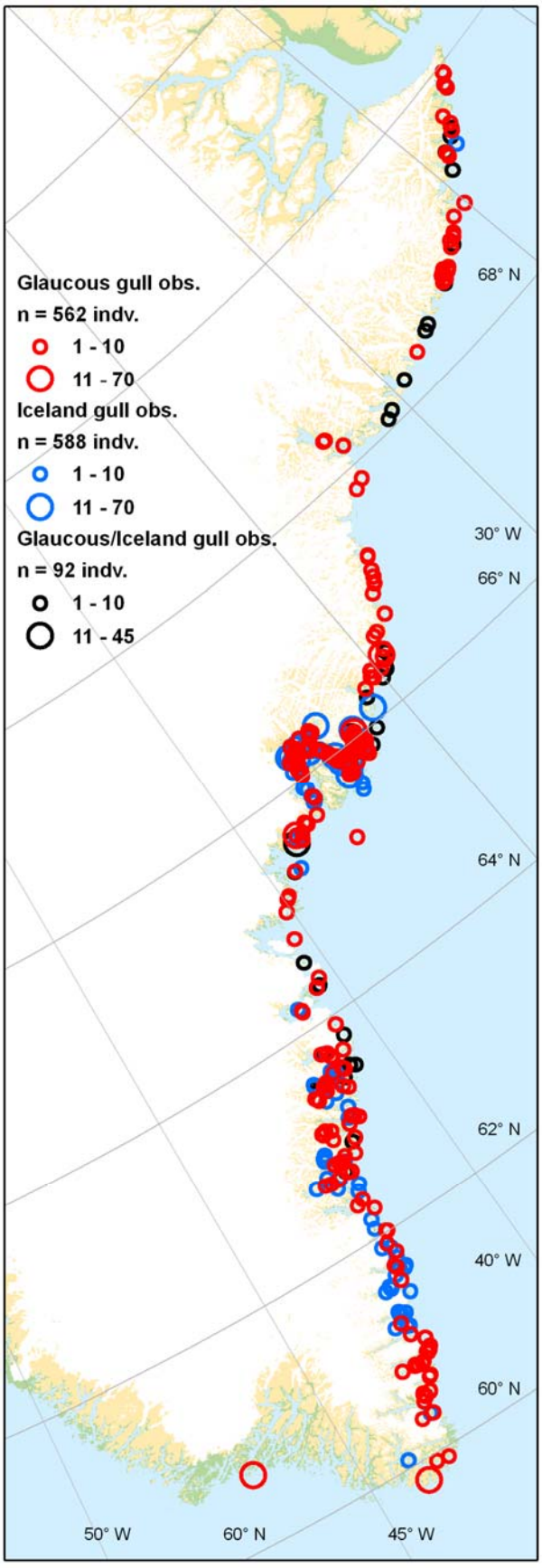


Fig. 26. Distribution of glaucous gull and Iceland gull observations (vagrant birds) during aerial surveys in Southeast Greenland, 12-26 June, 2008.

As with the glaucous gull, Iceland gull was not consistently recorded in South Greenland and only a couple of colonies were registered (Fig. 25)

Black-legged kittiwake (*Rissa tridactyla*)
Two previous unknown colonies of kittiwakes were found in the southern part of Southeast Greenland (Fig. 28), one holding at least 150 birds at Taateraat Kangersuasiat (61.2°N). Despite the fact that the name means "kittiwake fjord" there is no previous reports of kittiwakes in this colony (61501). A known colony at the northern tip of Blosseville Kyst (69502, Dunholm) was the only other observed colony of kittiwakes. Two previously registered colonies were found empty (Fig. 28).

Our survey did not cover all islands and steep cliffs and some colonies probably went undetected. In 2005 Aqqalu Rosing-Asvid visited some cliffs 75-100 km south of Tasiilaq and found five smaller colonies of kittiwakes each holding from 20-120 pairs, in an area not surveyed in 2008. These cliffs were only visited shortly and the following quick estimates were made on 25 and 26 July 2005:

Position: 65.25°N, 39.37°W – About 100 pair of black-legged kittiwake and 100 pair of Iceland gull. All kittiwake chicks had fledged except in two nests that had small chicks. The Iceland gulls had large chicks. The birds on these cliffs had been stable in numbers (Mikaelsen 2005, pers. comm.).

Position: 65.23°N, 39.38°W – About 20 kittiwakes and 20 Iceland gulls were seen on the cliffs, but empty nests indicated that most birds had left the cliffs.

Position: 65.23°N, 39.40°W – About 70 pair of kittiwakes and 20 pair of Iceland gull all with small chicks. This was a new nesting site according to Mikaelsen who had not seen birds on these cliffs before. Some nests were only half a meter above sea level.

Position: 65.08°N, 39.72°W - About 120 pair of kittiwakes. The number of birds on these cliffs had increased in recent years according to Mikaelsen. The chicks were about ready to fledge. Nineteen of the nests were close to the sea level one of these nests had 1 chick, 17 nests had 2 chicks and one had 3 chicks.

Position: 65.00°N, 39.72°W – about 40 kittiwakes, 40 Iceland gulls and 5 glaucous gulls were seen on the cliffs.

In addition to these observations two other cliffs, position 64.97°N, 40.10°W and 64.78°N, 40'.60°W were visited. According to Mikaelsen kittiwakes used to breed there, but only a few Iceland gulls and glaucous gulls were seen in 2005. The 2008 survey included these two locations, but also on this occasion the kittiwakes were absent.

Despite the high variability in phenology, it seems that the phenology for the majority of the nests in Southeast Greenland is similar to other parts of Greenland.

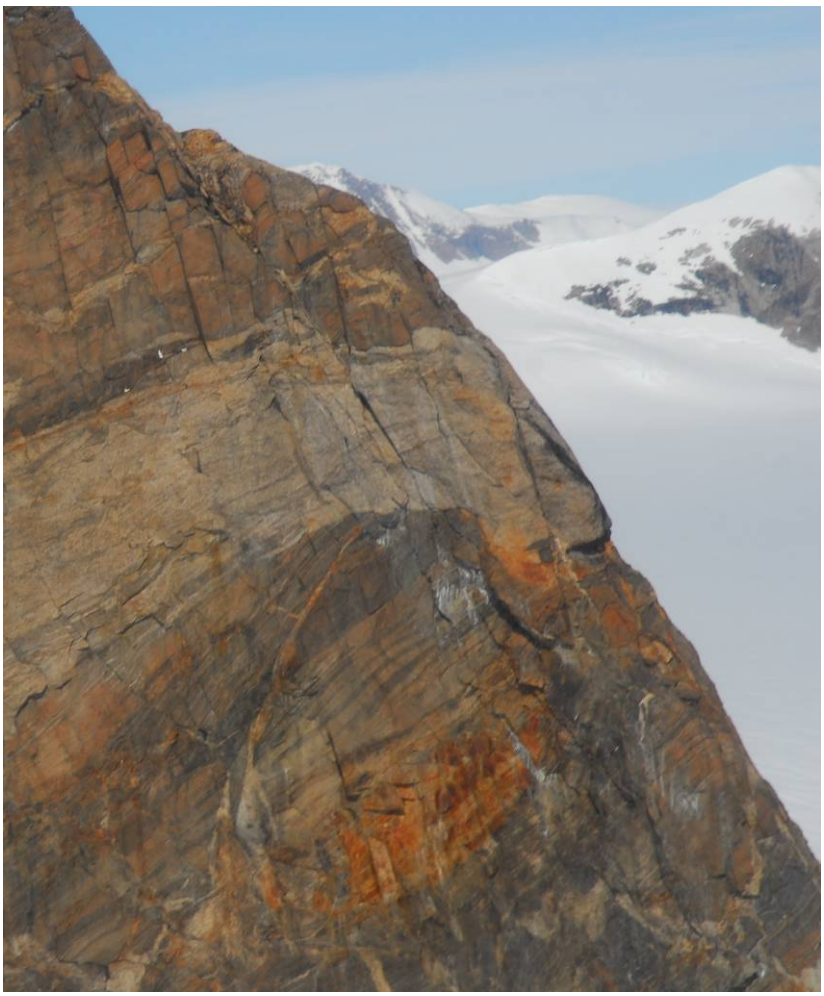


Fig. 27. Ivory gull colony in Southeast Greenland (67501). Three of 26 birds observed in the colony are visible on the photo (upper left corner). Photo: L. M. Rasmussen.

Ivory gull (*Pagophila eburnea*)
On two occasions when foggy weather did not permit survey activity along the coast we searched nunataks for ivory gull breeding colonies. We visited three previously known breeding sites and found two colonies empty and the third with a minimum of 26 birds present (Fig. 27 and 29). Farther north, in Watkins Bjerge (68.6°N), we found a new breeding site with 2 birds present. One bird was seen in the Tasiilaq Fjord (66.6°N), app. 20 kilometres from a known inland breeding site. All the remaining ivory gulls were seen foraging at the outer coast or a few kilometres offshore along the edge of the pack ice, mainly along Blosseville Kyst.

Ivory gulls are frequently observed north of 66°N, especially in the fjord Agtertia at 67.3°N (Mikaelsen 2006, pers. comm.). In July 2008 several new colonies of ivory gull were found in NE-Greenland (Boertmann *et al*. 2009b).

Arctic tern (*Sterna paradisaea*)
Previous records of arctic tern in Southeast Greenland include a few colonies at Sermilik in the Tasiilaq-area and a single colony south of Kangerlussuaq (68°N) farther north (NERI 2007). Two of the colonies in the Tasiilaq-area and the colony near Kangerlussuaq were revisited in 2008, but no birds were seen. We detected three new colonies south of Tasiilaq, with Kap Møsting (63.7°N) as the most southern location (Fig. 30). The timing of the survey might have been a little too early for some

colonies, which is also indicated by the observation of arctic terns in the pack ice far from land.
On 26 July 2005 Rosing-Asvid estimated that approximately 20 pars were nesting near an eider colony at 65.02°N 40.00°W.

In South Greenland the timing of the survey may also have been too early for the terns. We had only a single observation and none of the colonies registered by Boertmann (2004) in late July 2003 were re-sighted in 2008.

Murres/Razorbills
Six observations of murres or razorbills (104 birds) were done in South Greenland, two at the mouth of Arsuk Fjord, three at Indre Kitsissut and one near Nanortalik. The auks were probably thick-billed murres and probably from the nearby breeding colonies in Arsuk Fjord and Ydre Kitsissut. A single bird was observed near Kap Olfert Fischer (61.1°N) in Southeast Greenland. No breeding colonies are known from this area, but visitors are known to occur year-around (Boertmann 1994). In 2009, however, local hunters from the Kap Farvel area informed Rosing-Asvid about one murre colony near Kap Farvel and two colonies about 200 km. up the east coast - information that not yet has been confirmed or disconfirmed.

Black guillemot (*Cepphus grylle*)
A total of 218 observations and 971 individuals of black guillemot were observed in Southeast Greenland (Fig. 31). Especially along Blosseville Kyst the encounter rate was high, while observations were more sporadic in the area of Tasiilaq and south to Kong Dan Halvø (62.9°N). Most of our observations probably represent breeding birds, but for smaller colonies it is often difficult to pinpoint the exact position of the colony from the aircraft. Prior to our survey 24 colonies were known from Southeast Greenland, primarily along Blosseville Kyst. We did not attempt to distinguish between breeding locations and foraging birds. However, our survey confirms previous descriptions of black guillemot in Southeast Greenland, being a widespread and common breeder (Boertmann 1994)

In South Greenland only larger aggregations of black guillemot were recorded. However, a large number of colonies are known from this area (NERI 2007).

Other bird observations
A number of other bird species was observed in South- and Southeast Greenland. Most of these species are only remotely affiliated with coastal areas during the breeding season and as a consequence were poorly covered by the survey. Furthermore, they were not always consistently recorded (Table 1). However, because general information on birds in Southeast Greenland is relatively limited the records are included anyway and are roughly listed below.

- A single Lapland bunting was recorded south of Tasiilaq, where this species is known as a common breeding bird.
- A single individual of purple sandpiper was recorded on Blosseville Kyst (68.9°N). This species is known to breed in Southeast Greenland from Scoresbysund and south.

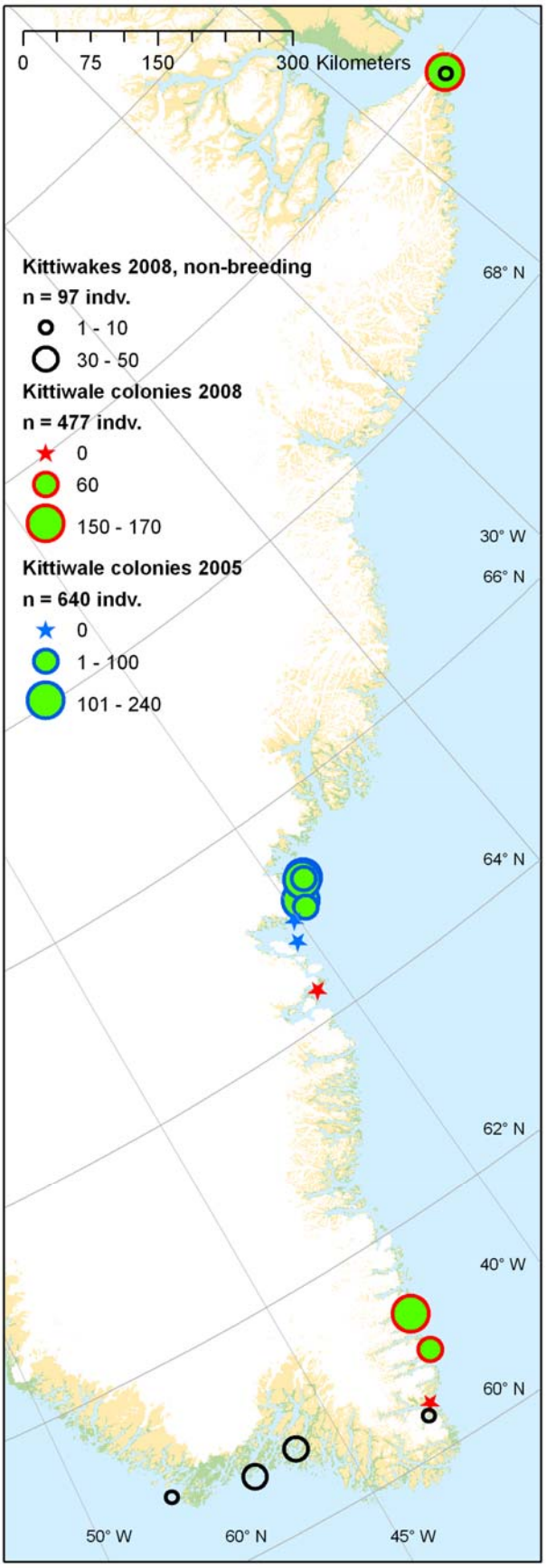


Fig. 28. Distribution of black-legged kittiwake observations during aerial surveys in Southeast Greenland, 12-26 June, 2008 and colonies visited in 2005 by A. Rosing-Asvid.

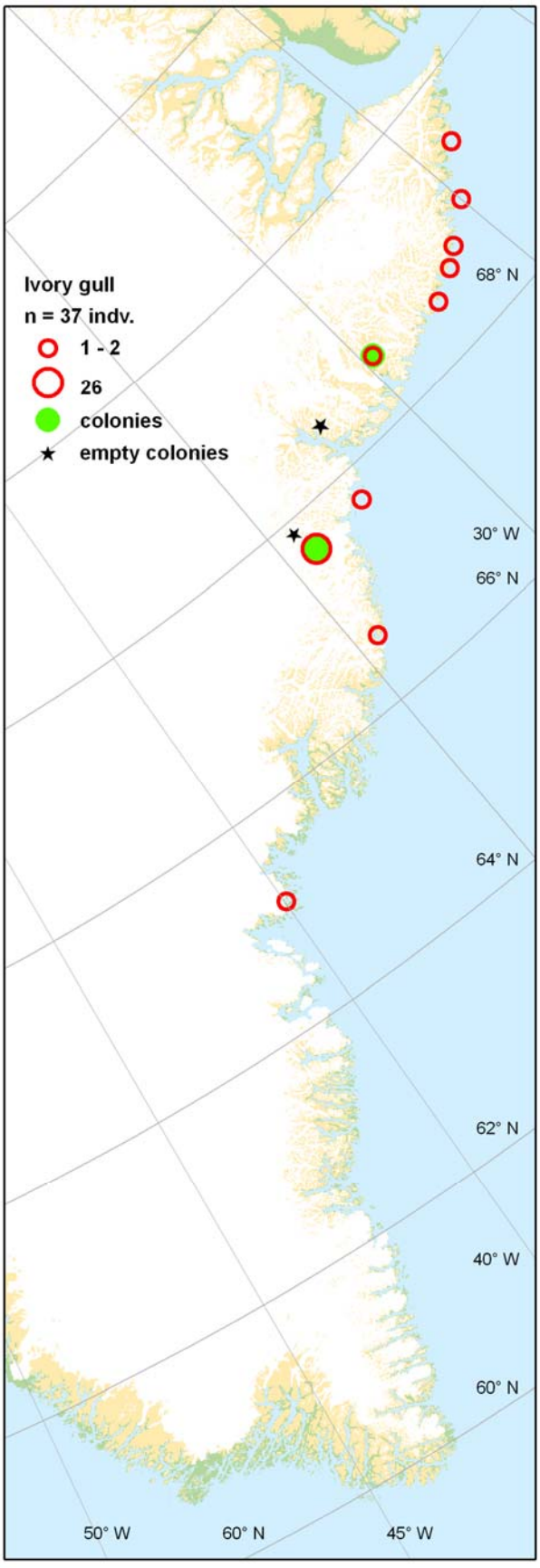


Fig. 29. Distribution of ivory gull observations during aerial surveys in Southeast Greenland, 12-26 June, 2008.

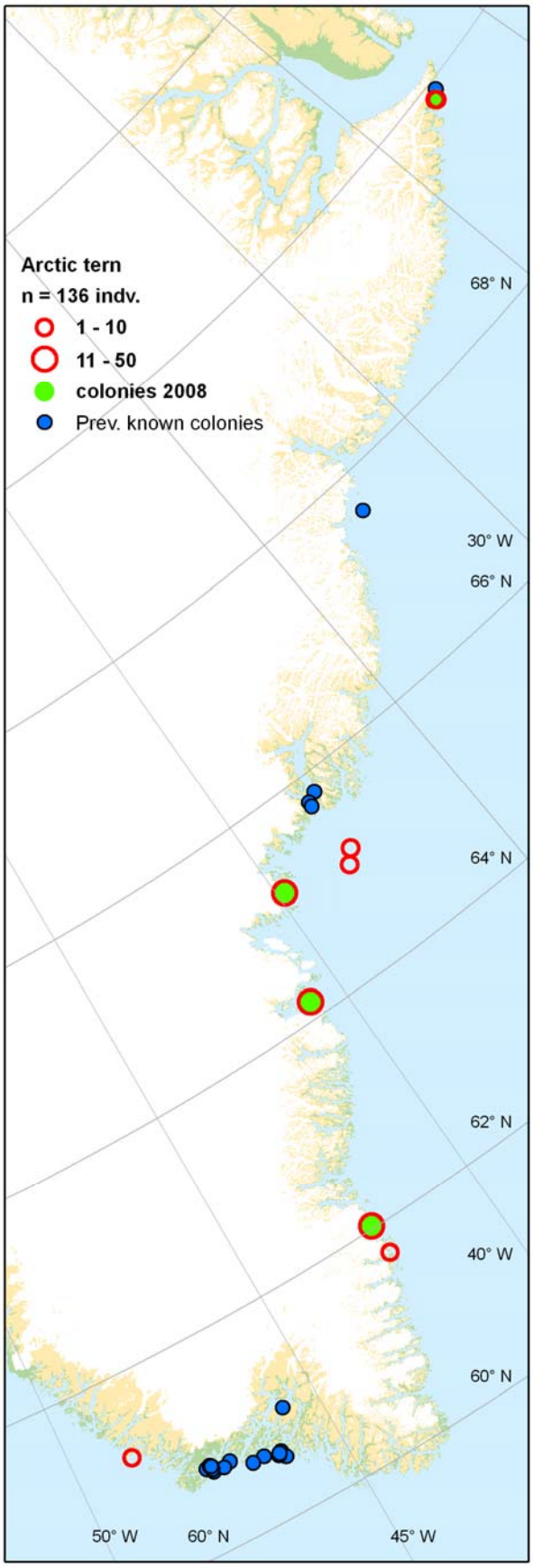


Fig. 30. Distribution of arctic tern observations during aerial surveys in Southeast Greenland, 12-26 June, 2008 and the colonies previously known.

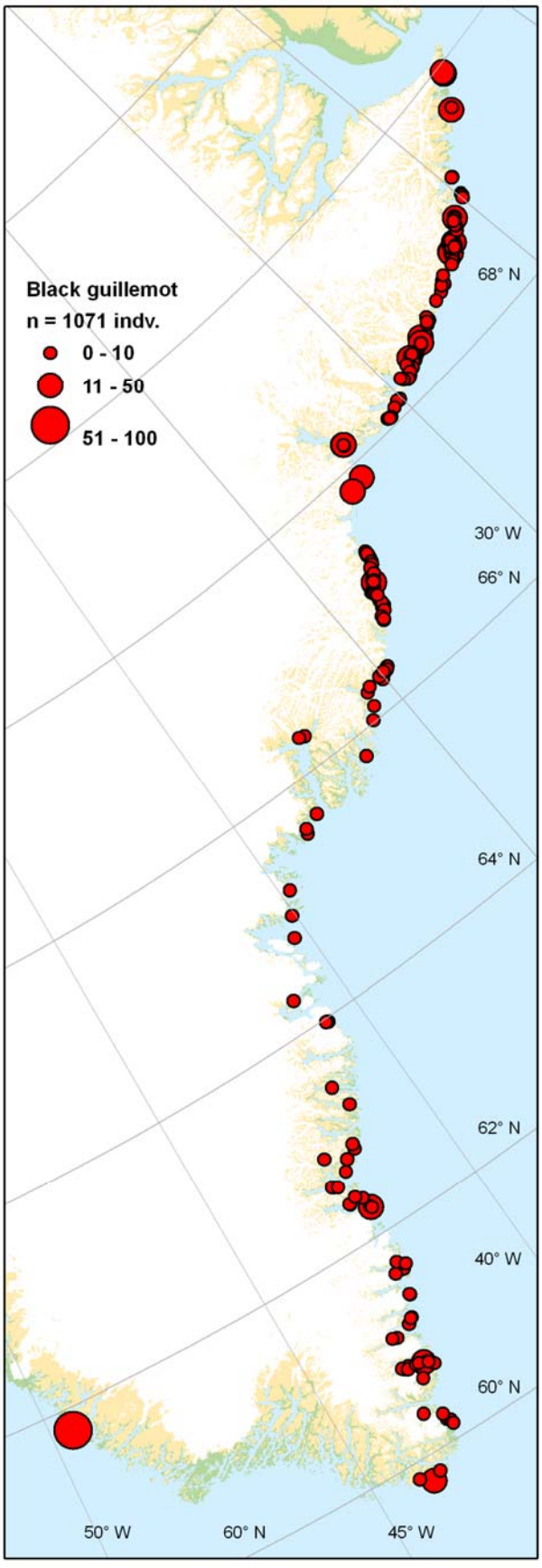


Fig. 31. Distribution of black guillemot observations during aerial surveys in Southeast Greenland, 12-26 June, 2008.

Table 1: Other bird species observed during the aerial survey in South and Southeast Greenland, 12-26 June, 2008

Lapland bunting*	*Calcarius lapponicus*
Purple sandpiper*	*Calidris maritima*
Raven*	*Corvus corax*
Gyr falcon	*Falco rusticula*
White-tailed Eagle	*Haliaetus albicilla*
Rock Ptarmigan*	*Lagopus mutus*
Snowbunting*	*Plectophenax nivalis*
Arctic Skua	*Stercorarius parasiticus*

* not consistently recorded

- Raven was observed as single birds or pairs scattered along the entire coastline. In several instances they were seen on islands off the coast. Raven is common as a breeding bird in East Greenland, south of Kong Oscar Fjord (72°N).
- Three individuals of Gyrfalcon were observed from Saqqisikuik/Skjoldungen to Blosseville Kyst (63.2-69.9°N). Gyrfalcon is known as a widespread, but sparse breeder in practically all Greenland.
- Seven white-tailed eagles were recorded in South Greenland. One observation was an adult lifting off a nest on a cliff.
- White males of rock-ptarmigan can occasionally be detected from the air. To males was observed in Southeast Greenland (61.7-62.7°N). The species is known as a common breeder throughout Greenland (Boertmann 1994).
- Snow bunting is also known as a widespread breeding bird in Southeast Greenland. We recorded a total of 11 buntings (61.5-69.8°N).
- A single arctic skua was observed in South Greenland north of Qaqortoq, but no observations in Southeast Greenland.

Fig. 32. Polar bear and cup at an ice floe in Southeast Greenland. Photo: F. R. Merkel

3.1.2 Marine mammals

Polar bear (*Ursus maritimus*)
Seven polar bears were observed on the survey, including a female with a small cub (Fig. 32 and 35). One bear observed near Kap Cort Adelaer (61.9°N), was moving on coastal cliffs with no sea ice in sight. A recently used den with tracks was observed just north of Nansen Fjord (68.3°N). Many new and older bear tracks were seen on the ice in areas north of Tasiilaq, showing their movements along the ice edge.

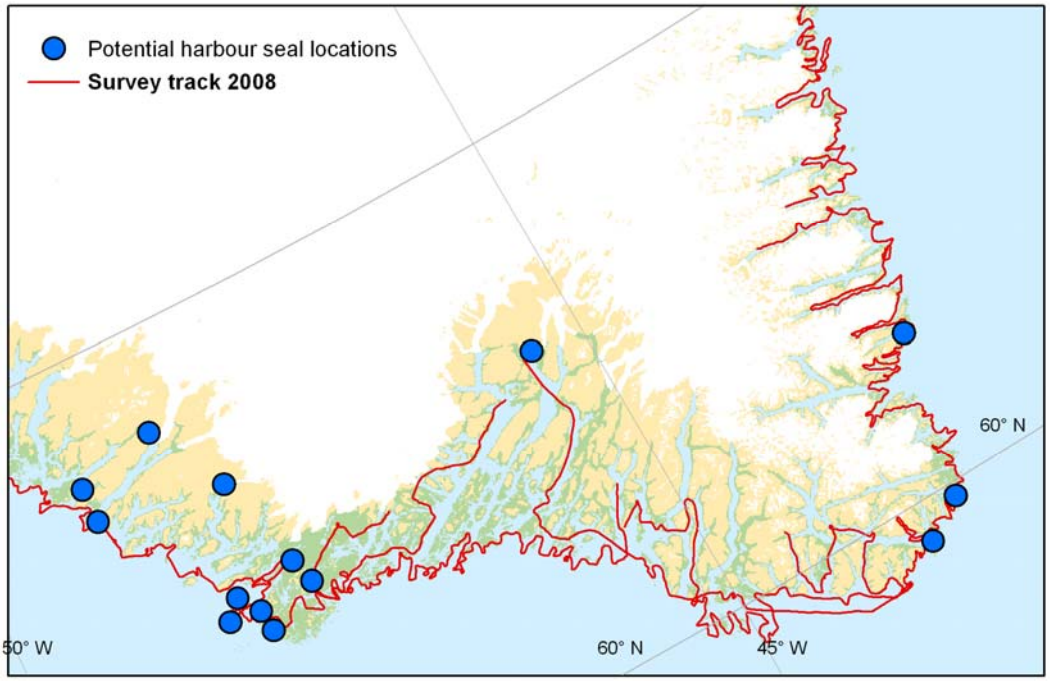


Fig. 33. Potential harbour seal breeding locations as listed by Teilmann & Dietz (1994) and the survey route in 2008.

Harbour seal (*Phoca vitulina*)
Nine of the 16 locations listed in Teilmann & Dietz (1994) as active or former breeding sites of harbour seals were over-flown in the period 12-17 June, 2008. These locations cover most of the previously registered breeding sites in South Greenland, but no harbour seals were seen on any of these locations. Attempts were also made to visit the off-shore location Ydre Kitsisut (60.75°N 48.40°W) and a location near Kap Farvel (Itillip Illua, 59.75°N, 43.78°W), but these were missed due to bad weather conditions.

The most western breeding areas in South Greenland can be visited by boat in June in most years. Many of them are close to Ivittuut and according to the wild life officer from Ivittuut these breeding sites have been without seals for many years now (Per Nukaaraq Hansen, pers. comm.). Three of these locations were not checked during this survey. The absence of harbour seals around and east of Kap Farvel was unexpected. There are, however, still harbour seals in the area and in August/September 2009 Rosing-Asvid and others captured 8 harbour seals in this area and equipped them with satellite transmitters. This will hopefully give a better understanding of their habitat use and reveal their present breeding sites.

Other seals

The vast majority of unidentified seals shown in figure 37 were ringed seals, but these were only recorded by the left-seated observer and not always consistently. In some areas ringed seals on the ice were very numerous and the vast majority of seals near the coast and in the fjords were ringed seals. The large offshore dot south of Tasiilaq represents mainly hooded seal (*Cystophora cristata*). Bearded seal was mainly observed between Timmiarmiut (62.6° N) and Umiivik (64.3°N) (Fig. 38).

Bowhead whale (*Balaena mysticetus*)

A single bowhead whale was seen moving very slowly at the surface off the Blosseville Kyst, near Storbræ (68.8°N). From a photo the whale could be identified as a juvenile, still with rather pale grey skin, especially on the lower jaw, and only the outermost tip of the chin was white (Fig. 34) The bowheads in East Greenland belongs to the very small Spitsbergen stock, and this observation is interesting since it is the southernmost observation and the only young individual reported in this stock for decades (Boertmann *et al*. 2009a)

Narwhal (*Monodon monoceros*)

A large number of 100 to 150 narwhals were observed between Barclays Bay and Kap Dalton (69.3°N) at the Blosseville Kyst on June 23, consisting of several groups of whales with flock sizes between 5 and 20 individuals (Fig. 42) - shown here as a single observation (Fig. 36). On the 25th and 26th of June several smaller flocks were observed, mainly moving southwards, and some of these individuals may have been the same as those observed on 23 June. The fjord complexes of Sermilik (~66°N), Kangerlussuaq (68.2°N) and Scoresbysund (70.5°N) are known as important summering areas for narwhales in East Greenland (Dietz *et al*. 1994) .

Fig. 34. A juvenile bowhead at Blosseville Kyst. Photo: F. R. Merkel

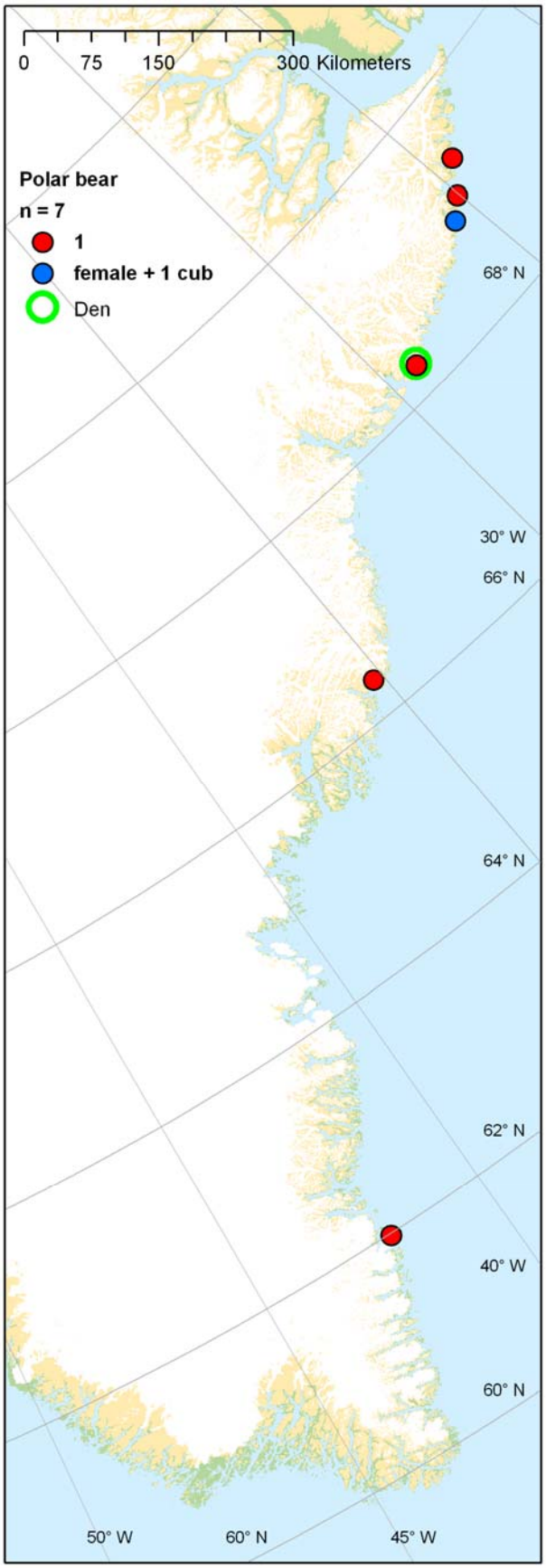


Fig. 35. Distribution of polar bear observations during aerial surveys in Southeast Greenland, 12-26 June, 2008.

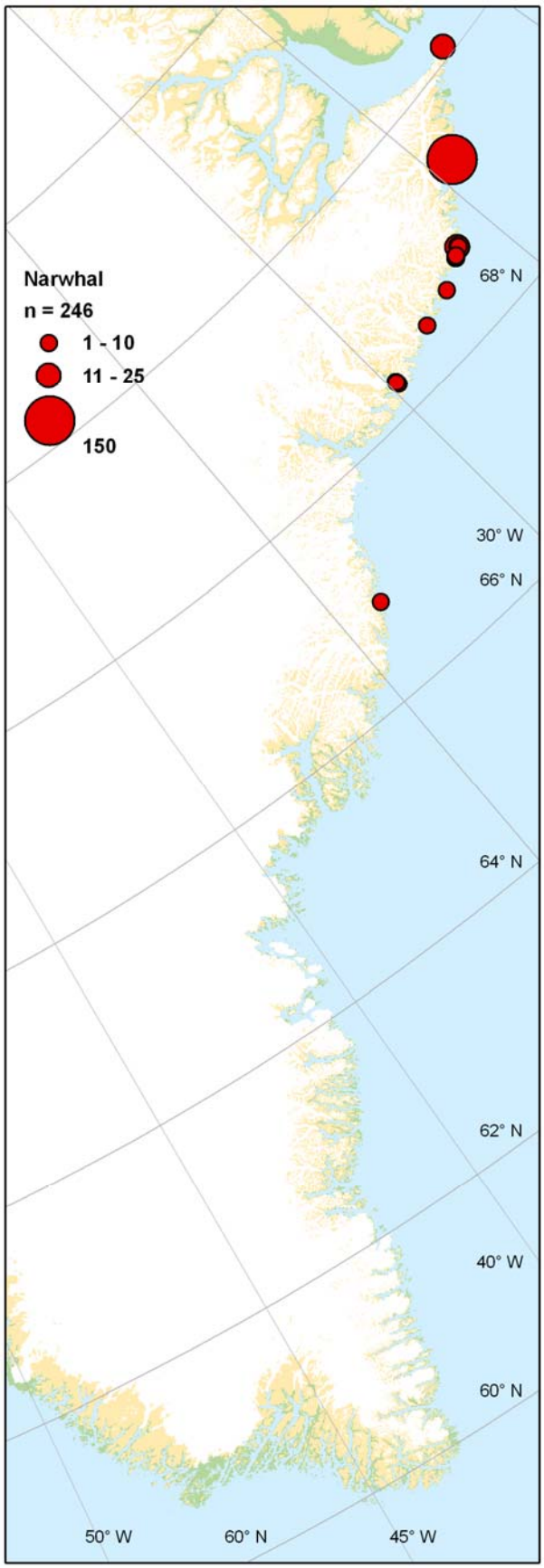


Fig. 36. Distribution of narwhal observations during aerial surveys in Southeast Greenland, 12-26 June, 2008.

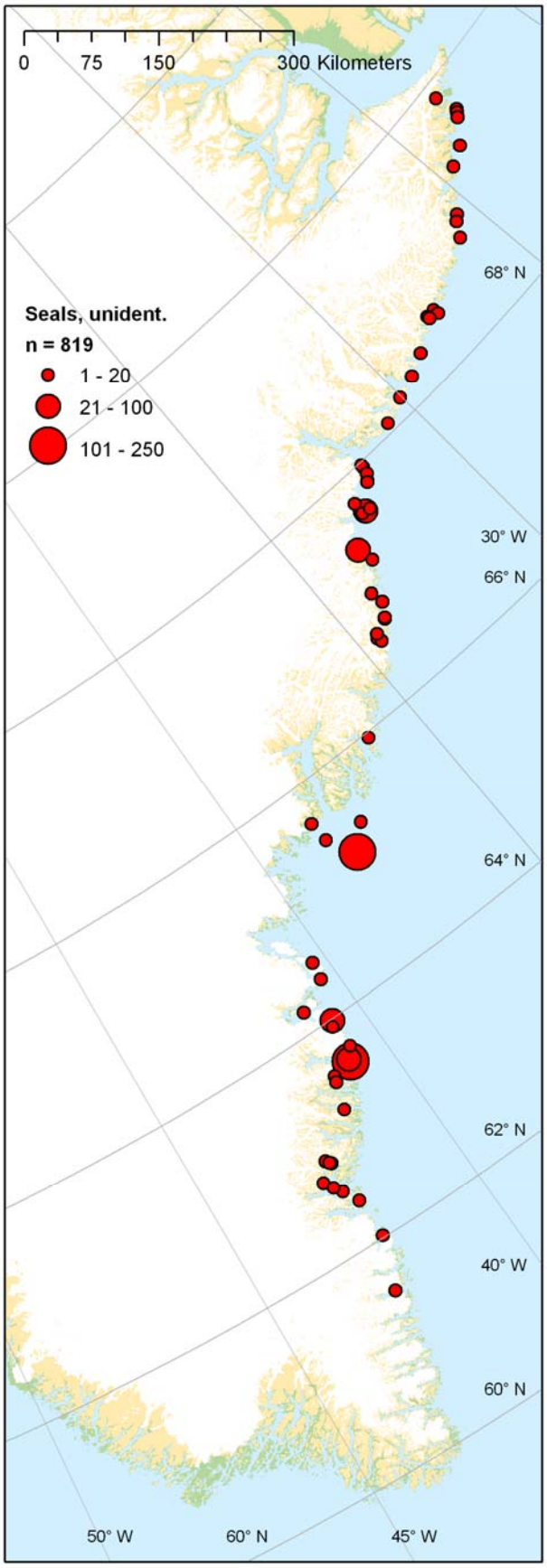


Fig. 37. Distribution of unidentified seals during aerial surveys in Southeast Greenland, 12-26 June, 2008.

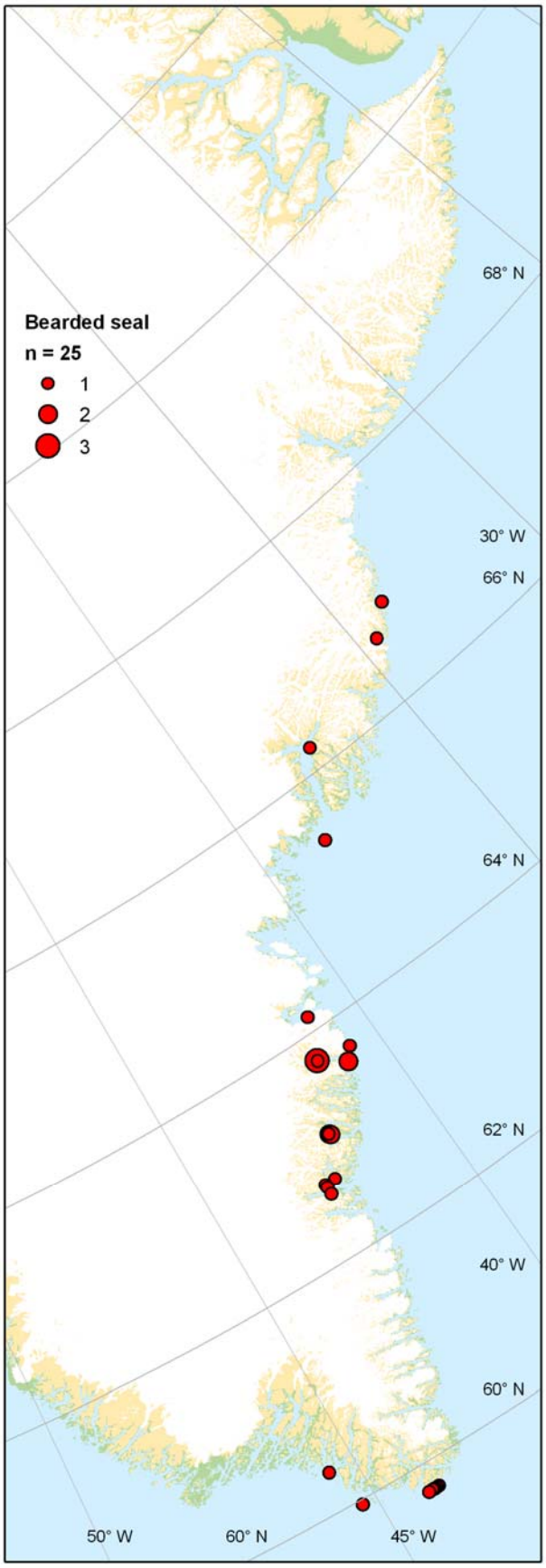


Fig. 38. Distribution of bearded seals during aerial surveys in Southeast Greenland, 12-26 June, 2008.

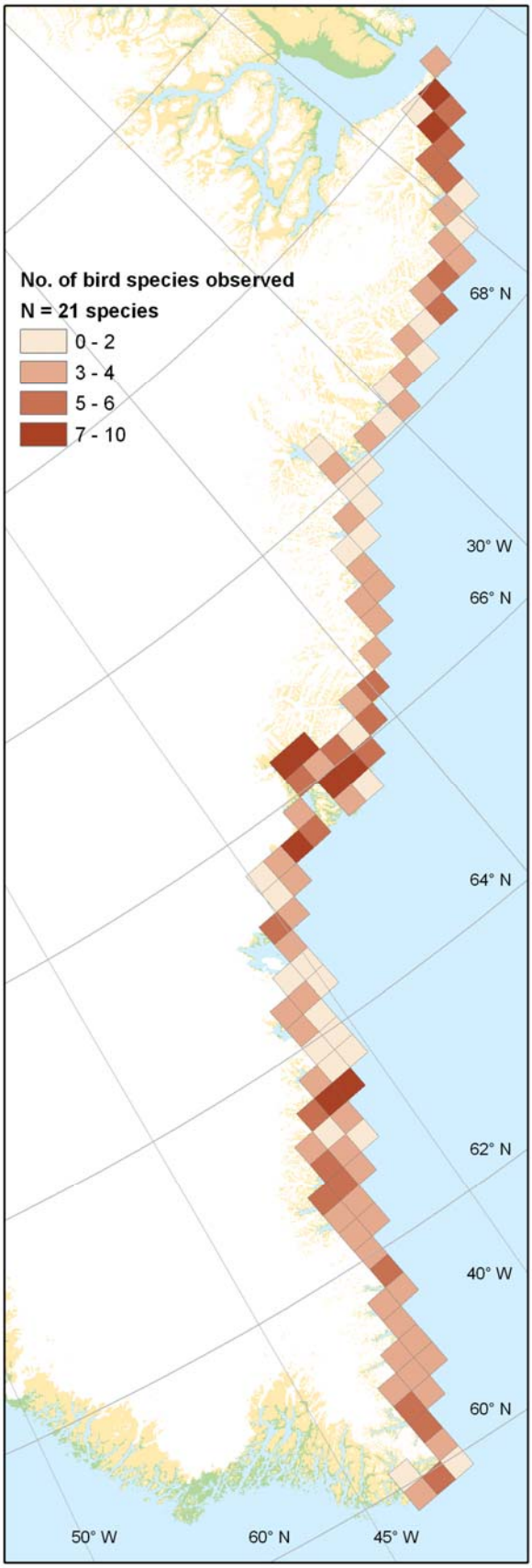


Fig. 39. The number of marine bird species observed in Southeast Greenland as summarized by 25x25km grid.

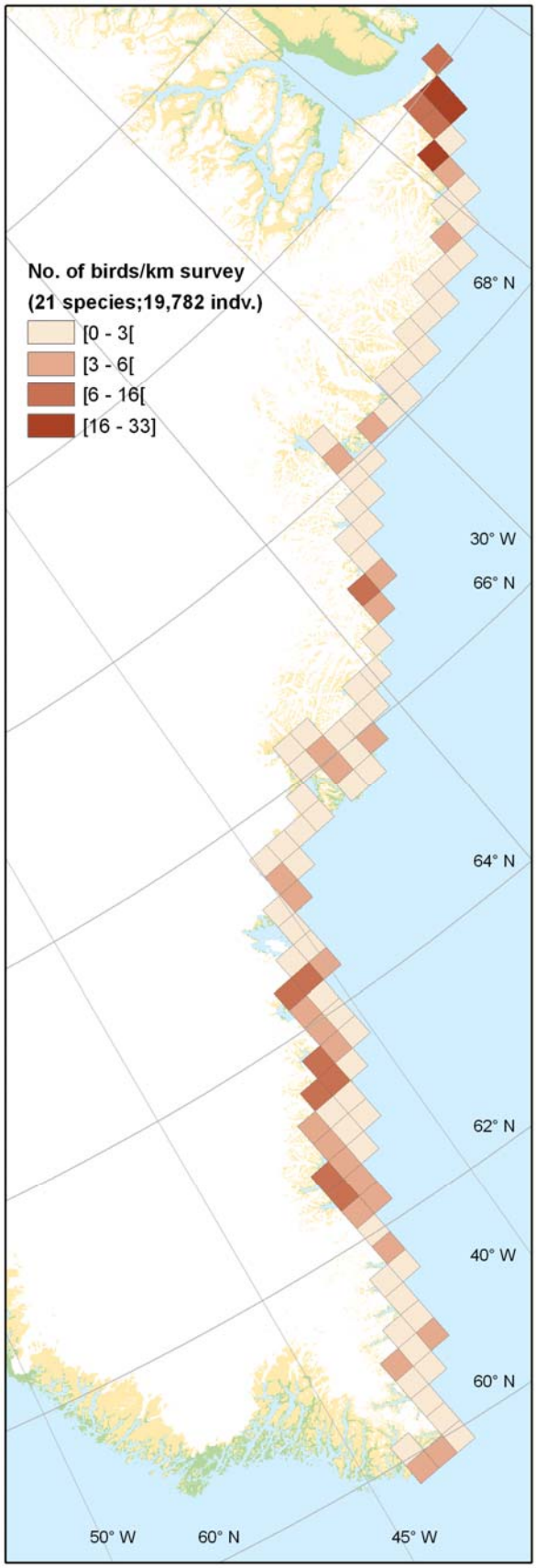


Fig. 40. The mean number of birds observed per km survey effort in Southeast Greenland as summarized by 25x25km grid cells.

3.2 Species diversity and density of birds in Southeast Greenland

In general, species diversity was low in Southeast Greenland. A total of 22 species were observed in the fjords and the coastal area when excluding occasionally observed terrestrial species (Tab. 1). As summarized within 25x25km grid, four species or less were observed in 72% of the grid cells (Fig. 39). Only in nine cases the species diversity was as high as 7-10 species/cell. The relative high species diversity occurred in the area north and south of Saqqisikuik/Skjoldungen (63.2ºN), in the Tasiilaq area and along the northern section of Blosseville Kyst (Fig. 39). Almost the same pattern was found when summarized as the density of birds (indv.) per km survey effort (Fig. 40). An exception was the Tasiilaq area, where species richness did not correspond to high bird densities, primarily because common eiders and black guillemots were less common in this area. Mean bird densities were highest in the most northern section of Blosseville Kyst with up to 33 birds/km survey effort.

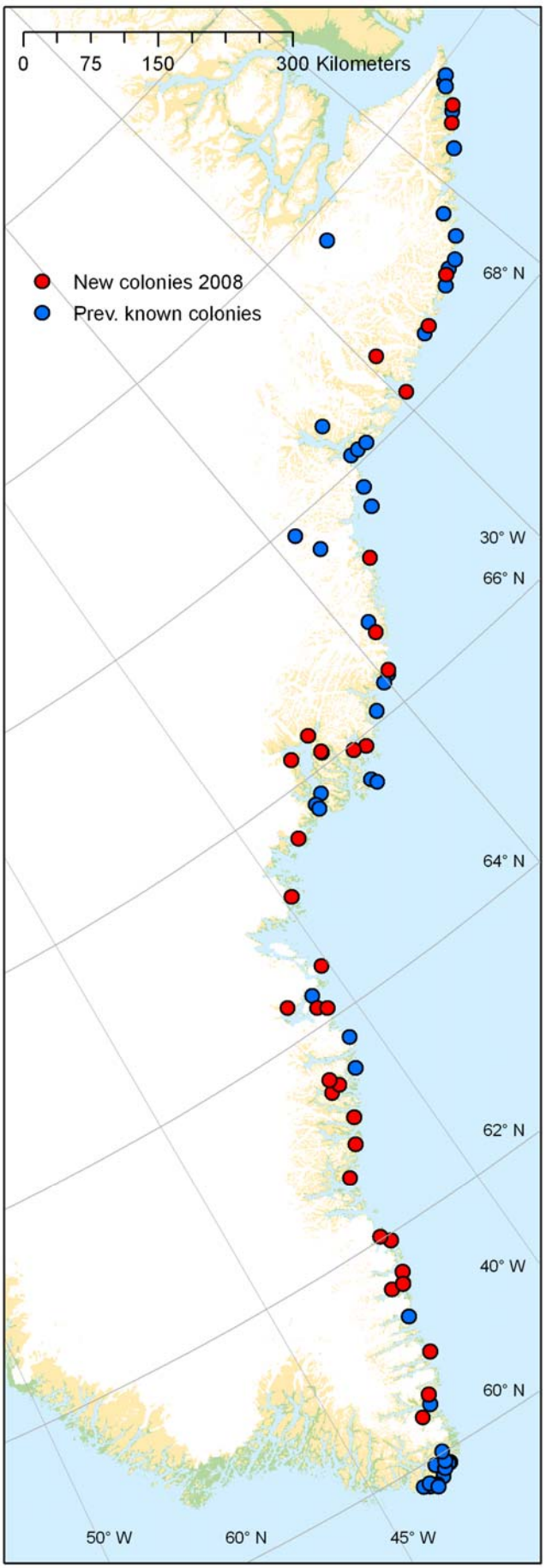
3.3 The Seabird Colony Database

In Southeast Greenland, the area from Kap Farvel and north to Scoresbysund Fjord, a total of 47 seabird colonies were known prior to our survey in 2008. Among these we revisited 38 colonies and found that a minimum of 20 colonies were occupied by at least one seabird species in 2008. An additional 51 new colonies were located during our survey, with common eider and Iceland gull accounting for the vast majority of the colonies (Tab. 2, Fig. 41). Especially in the area between Qulleq (61.4ºN) and Ikeq/Køge Bugt (64.5ºN) the rate of new colonies encountered was high, coinciding with an area of relatively high seabird densities (Fig. 40). As earlier mentioned, new colonies of black guillemot was not recorded in Southeast Greenland.

Table 2. Seabird colonies in Southeast Greenland known prior to the 2008 survey, colonies controlled in 2008 and new colonies detected in 2008.

Species	Colonies known prior to survey	Controlled in 2008	New 2008	Total	Note
Northern Fulmar	2	2	0	2	
Great cormorant	[A] 2	1	0	2	[A] incl. local knowledge (1 colony)
Barnacle goose	1	1	1	2	
Common eider	[B] 18	12	11	29	[B] incl. local knowledge (2 colonies)
Great black-backed	3	2	0	3	
Lesser black-backed	0	0	2	2	
Glaucous gull	15	6	7	22	
Iceland gull	1	0	28	29	
Black-legged kittiwake	[C] 10	2	2	12	[C] incl. local knowledge (7 colonies)
Ivory gull	6	2	1	7	
Arctic tern	[D] 7	3	3	10	[D] incl. A. Rosing-Asvid 2005 (1 colony)
Black guillemot	24	8	many	> 24	

Fig. 41. Distribution of seabird colonies in Southeast Greenland recorded for the first time in 2008 (51) and the distribution of colonies known prior to 2008 (47). New colonies of black guillemots were numerous but not registered.



4 Conclusions

4.1 Birds

Seabird density in Southeast Greenland was highest in the area between Qulleq (61.4°N) and Ikeq/Køge Bugt (64.5°N) and along the northern section of Blosseville Kyst. These two areas plus the area around Tasiilaq were also the areas with the highest species diversity. In the area between Qulleq (61.4°N) and Ikeq/Køge Bugt (64.5°N) the largest number of new seabird colonies was detected, primarily colonies of common eiders and Iceland gull. The most numerous species observed in Southeast Greenland were common eiders, Iceland gull, black guillemot and glaucous gull, respectively.

Species poorly covered by this survey

The following species are likely underreported by this survey due to a highly sporadic coverage of their breeding habitats:

- Great northern diver is a scares inland breeder in Southeast Greenland and this survey does not cover its distribution.
- Red-throated diver is a widespread inland breeder but breeding birds occur is regularly feeding along the coast.
- Mallard breeds mainly in freshwater lakes and only a few observations were made in Southeast Greenland.
- Long-tailed duck breeds on small islands in fjords and archipelagos, but also in freshwater habitats (lakes). Our observations of small flocks in the fjord-system north of Tasiilaq confirm previous reports on breeding in Southeast Greenland.
- Red-breasted merganser was observed north to Tasiilaq, mainly as single breeding pairs nearby coastal freshwater habitats, confirming exciting knowledge about the breeding distribution.
- Ivory gull was mainly observed nearby old colony records and the survey effort for inland breeding sites was limited to two occasions where coastal survey activity was obstructed by poor weather conditions. Three colonies were revisited, and one was still active. A new breeding site with just two birds was found within known breeding range.

Sparsely distributed species in Southeast Greenland

Our survey confirms that the following species are sparsely distributed in Southeast Greenland:

- Our observations confirmed that Northern fulmar is a rare breeder in Southeast Greenland. Except for the observations near the Kap Farvel colony, no breeding birds were detected elsewhere.
- Great cormorant occurs as a scarce breeder in Southeast Greenland, but no colonies were detected on this survey.
- Barnacle goose was found breeding only in two colonies in the northern part of the Blosseville Kyst and represents the southern breeding range of barnacle goose in East Greenland.

- King eider is rare and probably not breeding in Southeast Greenland. Only three individuals were observed near Tasiilaq.
- Great black-backed gull has a limited breeding range confined to the Tasiilaq area and the northern part of Blosseville Kyst, which was confirmed by our observations.
- Lesser black-backed gull seems to be expanding its breeding range to several areas of Greenland and probably also to Southeast Greenland. However, our observations of three breeding colonies were limited to the Tasiilaq area.
- A few small and previously unknown colonies of Black-legged kittiwake were found during this survey. Combined with previous records of kittiwake colonies in Southeast Greenland and accounting for the possibility that a few small colonies went undetected, the kittiwake is still among the sparsely distributed species in Southeast Greenland.
- Also for the Arctic tern a few small and previously unknown colonies was found in Southeast Greenland. Although the timing of our survey was slightly early for detecting Arctic tern colonies, the status of the species as a sparse breeder in Southeast Greenland remains.
- Our survey confirms that murres/razorbills are not breeding in Southeast Greenland; although local hunters from the Kap Farvel area recently (2009) claimed that up to three colonies exist in the southern part of Southeast Greenland at sites not covered by this survey.

Widespread breeders in Southeast Greenland

Only the following four species were found to be numerous and widespread breeders in Southeast Greenland:

- The common eider was found to be quite common as a solitary breeder in many coastal areas of Southeast Greenland. The most notable exceptions were Ikeq/Køge Bugt (64.7°N) and the area from Dødemandspynten (67.3° N) and north to Barclay Bugt (69.2° N) where extensive coastal areas were still blocked by sea-ice at the end of the survey period in late June. The highest concentration of solitary breeders was found around the large fjords around Timmiarmiut (62.6° N) and Saqqisikuik/Skjoldungen (63.3°N), where also the majority of the 11 new colonies was located (Fig. 14). This key breeding area had extensive areas of open water already at the beginning of the survey in mid June (Fig. 4). A relatively large influx of presumably post-breeding or non-breeding birds from Iceland (see below) partly complicated the identification of breeding birds; however, we roughly estimate that 1,600 – 3,200 pairs were breeding in Southeast Greenland in 2008. This number appears rather small considering that Gilg (2005) estimated app. 1,600 nests in only two of the colonies in 2004 (69502 and 69506, northern Blosseville Kyst). On the other hand, large year-to-year variation in breeding propensity should probably be expected due to the highly variable ice conditions. At this point the wintering area for common eiders breeding in Southeast Greenland is unknown. We assume that the majority of the eiders breeding in the central and northern part of Southeast Greenland winter in Iceland waters, whereas those breeding in the southern part more likely winter in Southwest Greenland. Until this has been studied further, most efficiently by tracking eiders from selected colonies in Southeast Greenland, we need to take into account that the management of the winter population in Southwest Greenland might influence the dynamic of the

breeding population in Southeast Greenland, at least the most southern part.

- Glaucous gull was numerous and widespread distributed on this survey and confirm that glaucous gull is common in Southeast Greenland (Fig. 25-26). Relatively few colonies were identified and probably many more colonies and single breeding pairs can be found. However, glaucous gull frequently breeds solitary on small islands and the exact breeding location is often difficult to determine from the aircraft.
- Iceland gull is a common breeder in Southeast Greenland. We identified colonies as far north as 68.7°N, which according to previous records of this species in East Greenland indicate a northern expansion of the breeding range (Fig. 25). Key breeding areas appear to be the fjord system north of Tasiilaq and the fjords north and south of Timmiarmiut (62.5° N).
- Black guillemot is a widespread and common breeder in Southeast Greenland, especially along the Blosseville Kyst. Our survey confirms previous descriptions of black guillemot in Southeast Greenland.

Species moulting in Southeast Greenland

Despite the fact that the survey was carried out relatively early, we identified two moulting bird species:

- Most observations of pink-footed goose were confined to three distinct areas (Fig. 11), which previously have been described as moulting areas for Pink-footed goose in Southeast Greenland. All the birds were still capable of flying, which indicate that they had recently arrived. The observation period in late June coincided with the period when Icelandic birds usually start arriving in East Greenland. Small numbers were observed at previously unknown moulting sites in Southeast Greenland, as far south as Timmiarmiut (62,5°N).
- A large number of presumably pre-moulting common eiders was observed in Southeast Greenland. Excluding the birds observed in South Greenland (west of Kap Farvel, ~7,500 birds) and the 1,600-3,200 pairs estimated to breed in Southeast Greenland, we consider the remaining 9,600-12,800 individuals to be pre-moulting birds from Iceland and Southwest Greenland. Since these birds were not yet moulting at the time of the survey, identification was based on the sex and age structure of the eider flocks and the fact that they were not present within or next to obvious breeding colonies. Based on this we suggest that the pre-moulting birds observed north of Kangeq (~61.7°N) are Icelandic post-breeders or non-breeders, while birds observed south of Kangeq primarily are non-breeding birds from Southwest Greenland. The suggestion that some proportion of the Icelandic breeding population use Southeast Greenland as moulting area is new information and additional studies are needed to fully understand the importance of this. It is a possibility that the number of post-breeding birds form Iceland will build up further in Southeast Greenland over the summer. Aerial surveys conducted in late July would reveal whether this is the case. In addition, it is recommended to track eiders from Iceland or Greenland by means of satellite transmitters or geo-locators to explore the timing and the spatiality of the presumed migration between Iceland and Southeast Greenland.

Important seabirds in South Greenland (from Paamiut to Kap Farvel)

The survey effort in South Greenland primarily targeted the outer coastline, while the extensive fjord systems were covered only sporadically. The prior knowledge about seabirds in South Greenland was relatively good compared to Southeast Greenland, and for this reason the survey effort had less priority here.

With respect to the upcoming strategic environmental impact assessment of South Greenland (2009-2011) concerning future hydrocarbon activities it is important to mention that South Greenland is part of the open water area in Southwest Greenland, which constitute an internationally important wintering area for seabirds like thick-billed murres, common eiders and long-tailed ducks (Merkel *et al*. 2002). Among the seabird species encountered during this survey in mid June the following species are most important:

- The common eider was the most numerous species encountered with ~7,500 birds recorded between Kap Farvel and Paamiut. In contrast to the central and northern part of Southeast Greenland, many eider flocks in South Greenland were dominated by brown birds (Fig. 16). A large proportion of these may have been over-summering non-breeders that also spend the winter in South Greenland (Lyngs 2003). Some birds, including the mixed white and brown flocks, were probably breeders, however, hardly any were identified as such. It is possible that breeding eiders were scared away from the colonies at our approach (in contrast to Southeast Greenland), or that males were no longer present in the colonies at the time of the survey (and thus easily overlooked). Only a single (new) colony was identified in mid June, 2008 (Fig. 14). Most of the eider colonies known from South Greenland, around 30 small colonies (< 25 pairs/colony), were identified by boat in 2003 (Boertmann 2004).
- Canada goose was observed in a few places in Southwest Greenland and probably represents non-breeding visitors. However, considering the fact that this species is expanding elsewhere in West Greenland, it is not unlikely that South Greenland will be part of the breeding range within the near future.
- In general, South Greenland is important for the Greenland endemic subspecies of mallard (ssp. *conboschas*), both for breeding and for wintering. Our survey confirmed that mallard is a common breeder here.
- Red-breasted merganser was frequently observed in South Greenland and confirms previous knowledge about the distribution in West Greenland.
- Murres/razorbills were observed a few times in South Greenland and are worth mentioning because two important murre colonies exist in this area – in Arsuk Fjord and at Ydre Kitsissut. Murres do not breed elsewhere south of Nuuk. Furthermore, the murre colony at Ydre Kitsissut is the only colony in Greenland that holds a significant proportion of common murres (*Uria aalge*). In general, the offshore islands of Ydre Kitsissut are known as the most species diverse breeding location for auks in Greenland (Kampp & Falk 1994).
- Black guillemot is a common breeder in South Greenland, however, during this survey observations of black guillemot were not recorded in South Greenland, except for a large colony near Paamiut.

4.2 Marine mammals

No harbour seals were seen during the areal survey, which for western South Greenland was expected, but unexpected for Southeast Greenland. However, subsequent revisits to the southernmost part of Southeast Greenland have shown that this area is still used by harbour seals. In August 2009 harbour seals were equipped with satellite transmitters in this area and are likely to give information about the present breeding locations of these seals (A. Rosing-Asvid, unpublished).

The most remarkable observation among the marine mammals was a juvenile bowhead whale at Blosseville Kyst, which indicate that the very small and critically endangered Spitsbergen stock at least is reproducing (Boertmann *et al*. 2009a). In fact, a mother with a calf was observed the following year in East Greenland (Boertmann & Nielsen in press).

The rather large number of narwhales observed in 2008 confirms that the northern part of Southeast Greenland is an important summer residence for narwhales in East Greenland.

Fig. 42. Narwhales at Blosseville Kyst. Photo: F. R. Merkel

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