

# Birds off SE and S Greenland, October 2011

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(Med et dansk resumé: Fugle ud for Sydøst- og Sydgrønland i oktober 2011)

**Abstract** Seabirds were surveyed in the waters off SE Greenland and in Julianehåb Bight in October 2011. In the waters off SE Greenland only low densities of birds were recorded (Thick-billed Murres *Uria lomvia*, Little Auks *Alle alle* and Atlantic Puffins *Fratercula arctica*). The highest densities (Thick-billed Murres) were found during brief visits to the cold waters of the East Greenland Current (on the 50-70 km wide coastal shelf), and also in Julianehåb Bight. Gyrfalcons *Falco rusticolus* were observed far offshore (up to 140 km from land) foraging on Little Auks. Ivory Gulls *Pagophila eburnea* were unexpectedly found in Julianehåb Bight. The survey indicates that very few migrating seabirds stage in the relatively warm Atlantic waters off SE Greenland and that more may be found in the colder waters of the East Greenland Current closer to the coast. These shelf waters should be surveyed for seabirds in autumn and winter before they are considered opened for oil exploration.

## Introduction

The waters off SE Greenland (south of the Denmark Strait) is an almost 'white area' on the Greenland seabird abundance map. In all other Greenland waters – except for the ice covered seas off N Greenland – extensive seabird surveys have been carried out in recent decades. These have mainly been performed in relation to oil exploration, either by the authorities or by the companies doing seismic surveys. Seismic surveys are subject to regulation, which demands that the Marine Mammal and Seabird Observers (MMSOs) also include systematic seabird counting among their tasks, and that the data are transferred to a central database maintained by Department of Bioscience, Aarhus University (Boertmann

*et al.* 2010, Johansen *et al.* 2012). These seabird data are included in the background information used for regulation of oil activities, for strategic environmental impact assessments of oil activities (the most recent covers the waters west of Disko Island; Boertmann *et al.* 2013), and for contingency planning. The data are also available for companies, which shall prepare environmental impact assessments (EIAs) of their activities. Several oil exploration licenses have been granted in the waters off W and NE Greenland, while the waters off SE Greenland are still closed, although some seismic surveys have taken place. Knowledge on seabird abundance will therefore be in demand if the area is opened for licence rounds. So far, only one seabird survey has been reported from

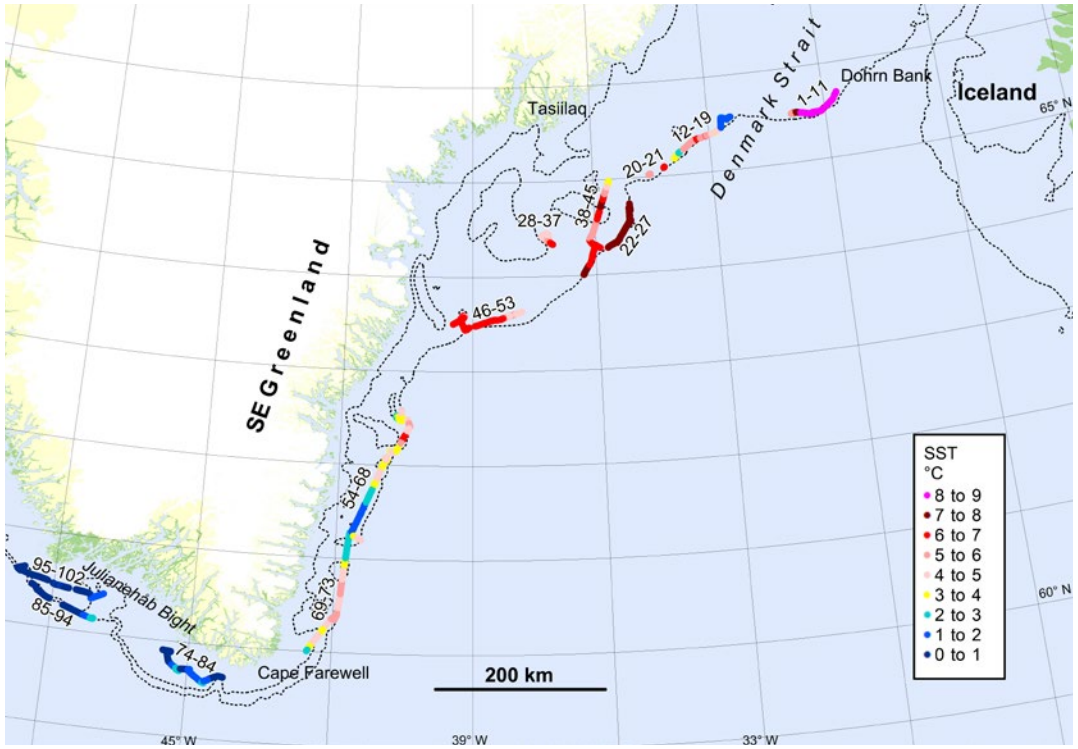


Fig. 1. Map showing the locations of the seabird observation transects in October 2011 (see also Tab. 1). Colour codes indicate sea surface temperatures (SST) for each two-min. period, with the blue shades below 3 °C. Figures indicate sub-transect numbers and dotted lines the 200 m and 500 m depth contours.

Transekternes placering (numre vist; se også Tab. 1) og de i to-minutters perioderne registrerede temperaturer i havoverfladen (SST).

the waters off SE Greenland, in August 1990 (Glahder 1993), at the very beginning of the autumn migration. The most recent information from this region derives from tracking studies, which show that Long-tailed Skuas *Stercorarius longicaudus*, Arctic Terns *Sterna paradisaea*, Sabine's Gulls *Xema sabini*, Ivory Gulls *Pagophila eburnea*, Thick-billed Murres *Uria lomvia* and Little Auks *Alle alle* from NE Greenland and Svalbard pass through on autumn migration and – in case of Ivory Gulls and Thick-billed Murres – also winter there (Egevang *et al.* 2010, Gilg *et al.* 2010, 2013, Stenhouse *et al.* 2012, Fort *et al.* 2013, Steen *et al.* 2013). As the combined autumn populations of these species numbers millions of individuals, potentially very high densities of seabirds may stage on the waters off SE Greenland in October.

In October 2011, I joined a German research vessel to study this hypothesis. Institute of Sea Fisheries in Hamburg carries out annual groundfish surveys in Greenland waters aimed especially at estimating biomass of Atlantic cod *Gadus morhua* (Fock 2007), and I participated on the first leg of the survey between Denmark Strait and Julianehåb Bight. The results of this work are reported here.

## Methods

The observation platform was the German research vessel Walter Herwig III, a 65 m stern trawler. Seabird data were collected according to the strip sampling method applying a 300 m wide transect on one side of the ship, extended to 500 m if observation conditions were optimal (Tasker *et al.* 1984). The observation methods followed the detailed guidelines by Webb & Durinck (1992) and Johansen *et al.* (2012). On-transect flying birds were recorded in 'snap-shots', adjusted to the speed of the ship (cf. Webb & Durinck 1992). The daily transect was divided in sub-transects when observations were interrupted or when the ship changed course, and all sub-transects were numbered in succession (Fig. 1). Observations were carried out in two-minute observation periods, corresponding to 651 m at a cruising speed of 10.5 knots. Seabirds observed outside the 300 m transect, following the ship or seen outside observation periods were recorded as 'off-transect'. Observations were done throughout the daylight hours from an observation box on top of the wheelhouse (eye level 14 m

above sea level), both when steaming and during trawling. Cod sampling took place at fixed trawling stations, many grouped close to each other and each sample lasting for about half an hour.

The systematic observations were initiated at Dohrn Bank on 18 October, continued in the waters off SE Greenland until 28 October, and ended with three observations days in Julianehåb Bight (west of Cape Farewell) on 29-31 October (Fig. 1). The total length of the observation transects was 1094 km. Trawling (3.5-4 knots) comprised 164 km (15%), while steaming at 10-13.5 knots accounted for 890 km (81%) and at slower speeds (5-9 knots) for 40 km (4%; Tab. 1). The transects were all placed on the shelf break close to or inside the 500 m depth contour (Fig. 1).

During the entire survey, oceanographic data were continuously sampled with 10 s intervals. The sea surface temperatures (SST) were extracted and applied to the two-minute observations periods (Fig. 1).

## Oceanography

The oceanography off SE Greenland is complex (Rudels *et al.* 2002, Sutherland & Pickart 2002), but in general there are two dominating currents at the surface: (1) the cold East Greenland Current, running on the shelf near the coast, carries nutrient-rich, polar water (< 0 °C) and Arctic Intermediate Water (0-3 °C); (2) further offshore the Irminger Current, transporting warmer (> 3 °C) and relatively nutrient-poor Atlantic water (Foldvik *et al.* 1988). The major part of the seabird observation transects, especially those off SE Greenland, were in the Atlantic water. In the Julianehåb Bight, on the other hand, the SSTs of the transects were considerably lower, indicating the waters of the East Greenland Current (Fig. 1).

## Observation conditions

The weather was generally rough with wind ranging between 0 and 18 m/s, peaking at 26 m/s on 20 and 22 October. Observations were tried, but given up on 20 October and not even tried on 22 October. Visibility was good except for brief periods of snow and rain.

No drift ice was encountered during the survey, and only a few and scattered icebergs were observed.

### Northern Fulmar *Fulmarus glacialis*

Widespread and recorded all days, and by far the most numerous ship-follower. Highest numbers were recorded on Dohrn Bank (18 October), when up to 8000 were present around the ship during trawling. Less than one percent of these birds were of the dark morph (DD), but the fraction increased to 5-6% of up to 650 ship-follow-

Tab. 1. Overview of the surveyed transects.  
*Oversigt over transekterne, hvor der blev set efter fugle.*

Date in October <i>Dato i oktober</i>	Sub-transect no. <i>Deltransekt nr.</i>	Daily transect length (km) <i>Daglig transekt-længde (km)</i>
18	1-11	59.1
19	12-19	79.8
20	20-21	0
21	22-27	78.2
23	28-37	49.0
24	38-45	118.3
25	46-53	87.2
26	54-63	69.2
27	64-68	105.9
28	69-73	165.6
29	74-84	114.0
30	85-94	66.7
31	95-102	100.7

ing fulmars when we trawled in the Julianehåb Bight. Only few were recorded sitting on the water except on 21 October, when we passed the only area on the survey where commercial trawling took place.

### Sooty Shearwater *Puffinus griseus*

Six birds were observed. On 19 October, one followed the ship for an hour, and on 21 and 20 October, one and two, respectively, passed the ship. On 29 October, two followed the ship for a brief period.

Sooty Shearwaters occur regularly in low numbers in Denmark Strait and as far north as Disko Bay in W Greenland, generally during June - early October; my observations are the hitherto latest reported from Greenland.

### Gyrfalcon *Falco rusticolus*

Gyrfalcons were observed on several occasions. All were white-morph birds seen far from land. On 23 October, a juvenile bird was seen twice, with an interval of 3.5 hours, when we trawled 140 km from land. On 24 October, two falcons were at the ship 102 km from the coast; one was a juvenile female, which carried a Little Auk in its talons until it dropped it when being mobbed by a juvenile male falcon. On 26 October, an adult Gyrfalcon passed the ship on a determined flight towards land 60 km to the west. On 27 October, two falcons (at least one juvenile) were hunting Little Auks 50-60 km from land. On 28 October, a juvenile circled the ship before continuing towards land 48 km away. On 29 October, a juvenile passed the ship 35 km from the coast, on 30 October a juvenile circled the ship 62 km from land, and on

31 October a juvenile (possibly the same as the previous day) passed the ship 18 km from some offshore islands.

It was recently documented by satellite telemetry that Gyrfalcons stay far offshore in the Denmark Strait in winter, when sea ice is dense (Burnham & Newton 2011). My observations indicate that Gyrfalcons also occur there during other periods. The birds on 23, 24 and 27 October were staying and hunting Little Auks in the area and were certainly not migrating. In these offshore waters falcons can only rest on the very scattered icebergs; the two falcons on 24 October had 25 km to the nearest iceberg, and the falcon on 28 October had 18 km. Falcons may also settle on ships, but none of the observed falcons did so.

**Pomarine Skua** *Stercorarius pomarinus*

Only seen on 21 October when three single birds were observed off-transect.

**Arctic Skua** *Stercorarius parasiticus*

Two juveniles were observed on 19 October.

**Glaucous Gull** *Larus hyperboreus*

Glaucous Gulls were numerous as ship followers, with daily maxima ranging from 20 to 65.

**Iceland Gull** *Larus glaucooides*

Very few were observed off the SE Greenland coast, ranging between nil and two following the ship per day. More were seen in Julianehåb Bight, and on 31 October up to 100 were present around the ship when sampling.

**Great Black-backed Gull** *Larus marinus*

Off SE Greenland, the daily maximum numbers of ship-following Great Black-backed Gulls ranged between nil and six. When sampling in the Julianehåb Bight, the numbers increased to 20-30.

**Black-legged Kittiwake** *Rissa tridactyla*

Very few were recorded as ship-followers, for example up to 10 on 18 October, and they usually did not stay for long. However, migrating birds were observed on several occasions, e.g. on 19 October when 34 were recorded on-transect, and on 27 October when 36 were recorded on-transect and many more off-transect.

**Ivory Gull** *Pagophila eburnea*

Five adult birds were seen on 30 October in Julianehåb Bight. Three were resting on the water and two flew by. On the following day, two more adults passed the ship. None of them were attracted to the ship.

Satellite-tracked adult birds from breeding sites in N Greenland, Svalbard and Russia arrived to S Greenland

in December and were all north of 68° N in late October (Gilg *et al.* 2010). The birds I observed were much further south – at about 60° N.

**Thick-billed Murre** *Uria lomvia*

Although the Thick-billed Murre was the most numerous bird species recorded on the water during the survey, numbers were not high – only 914 on-transect on the water and 891 flying. Of these, 256 and 588, respectively, were observed east of Cape Farewell. On most transects, only very few were observed on the water, with locally higher densities on e.g. 19 October (sub-transects 12-15) and 27 October (sub-transect 68) in cold water transects (Fig. 1). Many more birds were observed migrating off-transect: On 23, 24 and 25 October, flocks were continuously moving S and SW, especially during the morning hours. The numbers increased on 26 and 27 October, and on 30 October (west of Cape Farewell) thousands of Thick-billed Murres migrated W and NW throughout the day, followed by even more massive movements in the morning of 31 October.

The highest densities of murres on the water were recorded on sub-transect 100, with 41.2 birds/km<sup>2</sup> (over the entire sub-transect); other high-density sub-transects were #32 (23 October, 16.3 birds/km<sup>2</sup>), #80 (29 October, 16.5 birds/km<sup>2</sup>) and #81 (29 October, 11.9 birds/km<sup>2</sup>). The high-density areas coincided to a high degree with the cold East Greenland Current water (< 3 °C) (Tab. 2).

Ring recoveries show that the murres wintering in SW Greenland have their origin in NE Atlantic colonies, i.e. on Svalbard, Jan Mayen, Russia and Iceland (Lyngs 2003). These birds most likely pass through the Denmark Strait in autumn. Birds ringed on Svalbard have been recovered in SW Greenland from October and in Newfoundland waters from November (Bakken & Mehlum 2005), and tracked birds from Svalbard (incl. Bjørnøya) were located in shelf waters off SE Greenland in October-November and the following winter months, indicating that some Thick-billed Murres winter there (Steen *et al.* 2013).

**Common Murre** *Uria aalge*

In total, 12 were recorded on-transect in the Denmark Strait. Most were seen on 24 October, when seven were recorded. These observations are actually the first of this species to be reported from SE Greenland waters (Boertmann 1994), except for a satellite-tracked bird wintering there (Linnebjerg 2012). However, the species is probably not rare there, as Common Murres breed numerously in adjacent Iceland and many probably drift with the Irminger Current to SE and SW Greenland after the breeding season.

Tab. 2. Thick-billed Murre densities per two-minute periods, distributed by Sea Surface Temperature (SST) intervals. Tæthedder af Polarlomvier (pr. to-min. observationsperiode) fordelt på samtidig målt temperatur i havoverfladen (SST).

SST interval (°C)	Mean density birds/km <sup>2</sup> (SD)	Max. density birds/km <sup>2</sup>	Min. density birds/km <sup>2</sup>	No. of two-min. periods	Pct. of two-min. periods with murre
Overflade-temperatur (°C)	Gennemsnitstæthed af fugle (standard-afvigelse)	Højeste tæthed registreret indiv./km <sup>2</sup>	Laveste tæthed registreret indiv./km <sup>2</sup>	Antal to-min. perioder	Andel af to-min. perioderne med observationer af Polarlomvier (%)
0.4-1.0	7.2 (27.2)	307.8	0	386	21.5
1.1-2.0	4.5 (14.5)	151.2	0	211	21.8
2.1-3.0	4.3 (18.7)	162.0	0	166	13.3
3.1-4.0	0.3 (1.6)	13.5	0	180	2.8
4.1-5.0	2.0 (10.2)	123.4	0	358	8.1
5.1-6.0	0.5 (2.8)	27.0	0	168	5.4
6.1-7.0	0.7 (4.0)	40.5	0	331	5.1
7.1-8.0	0.0 (0.3)	4.9	0	225	0.4
8.1-9.0	0.1 (0.8)	7.7	0	99	1.0

#### Atlantic Puffin *Fratercula arctica*

In total, 78 birds were recorded on-transect on eight of the 12 observation days. The highest number was 42 on 24 October. The birds were most likely of NW European origin, as the number of breeding puffins in this part of Greenland is very low. Earlier observations between Ice-

land and Cape Farewell (Glahder 1993, Boertmann 2011) indicate that puffins from Iceland and perhaps also Norway, Faroes and Scotland move west to the Davis Strait and perhaps further on to waters off Newfoundland and Labrador (Boertmann 2011). This is actually supported by unpublished satellite tracking studies of Icelandic



Fulmars were often observed on the surface feeding on lion's mane jellyfish *Cyanea capillata*. Mallemukker blev ofte set fouragere på brandmænd *Cyanea capillata* i havoverfladen.

puffins, of which some moved to the waters between Greenland and Canada (Æ. Petersen pers. comm.), and ringed juvenile Icelandic Puffins have been recovered at Newfoundland (Petersen 1998).

#### **Little Auk** *Alle alle*

In total, 355 birds were observed on-transect, and the species was recorded on all observation days. Peak daily numbers were recorded on 18 and 24 October, with 81 and 90 birds, respectively. This is surprisingly few, considering the huge numbers of Little Auks on Svalbard and central E Greenland known for a large part to winter off SW Greenland and Newfoundland (Bakken *et al.* 2003, Lyngs 2003). Indeed, tracked individuals from Svalbard moved through the present survey area in mid-October (Fort *et al.* 2013).

#### **Other species**

A few individuals or small flocks of Long-tailed Ducks *Clangula hyemalis* ( $n = 3$ ), Common Eiders *Somateria mollissima* ( $n = 17$ ), Red-breasted Mergansers *Mergus serrator* ( $n = 1$ ) and Snow Buntings *Plectrophenax nivalis* ( $n = 6$ ) were observed off the SE Greenland coast, all just passing the ship.

### **Discussion**

The August 1990 survey reported only very low densities of seabirds in this region of Greenland (Glahder 1993), and it was expected that higher densities would be encountered in October 2011 (see the introduction). However, very few seabirds (mainly Thick-billed Murres and Little Auks) were actually staging in the waters off SE Greenland with a SST above 3 °C. Many of the observed seabirds were either ship-followers or birds actively migrating. For example, during the entire day of 26 October only three birds were observed resting on the water. Where are the millions of Thick-Billed Murres and Little Auks at this time of the year, if they are not in the Atlantic water off SE Greenland? They can either stage in the cold East Greenland Current water closer to the coast, or they can overfly this offshore part of Greenland.

The brief visits to the cold waters off SE Greenland during the survey revealed higher densities of staging Thick-billed Murres, e.g. on 27 October when SST dropped to 1.5 °C and there were up to 86 Thick-billed Murres on the water per km<sup>2</sup> and 2-min. period. An association with cold water was even more evident in Julianehåb Bight, where all transects were in cold water (SST-recordings at 0.7-1.5 °C), and 2-min. period densities peaked at 308 murres/km<sup>2</sup>. That some (or perhaps many) of the Thick-Billed Murres just overfly the SE Greenland waters, heading for Julianehåb Bight, is a

likely possibility, cf. that a high proportion of the murres recorded east of Cape Farewell were flying, that intense migration was observed on several days, and that high densities of Thick-billed Murres were observed in Julianehåb Bight.

Thick-billed Murres from Svalbard have recently been shown to winter on the shelf off SE Greenland (Steen *et al.* 2013), while another study showed that this region was avoided by Black-legged Kittiwakes throughout the year (Frederiksen *et al.* 2012). This indicates that at least murres may stage and feed in the cold polar waters during the migration, a situation also observed to the north and northwest of Iceland (Petersen 1995).

The results of this study imply that the cold waters off SE Greenland should be surveyed more thoroughly for concentrations of especially Thick-billed Murres in autumn and perhaps also in winter before the area is opened for oil exploration.

### **Acknowledgements**

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### **Resumé**

#### **Fugle ud for Sydøst- og Sydgrønland i oktober 2011**

I oktober 2011 deltog forfatteren på det årlige videnskabelige torskefiskeri ud for kysterne af Sydøst- og Sydgrønland. Fiskeriet foregik med det tyske havforskningssskib Walter Herwig III. Der blev optalt havfugle efter den standardiserede metode, hvor der tælles langs transekter (Tab. 1; Tasker *et al.* 1984, Webb & Durinck 1992), som gør det muligt at beregne tætheder af fugle på vandet. Der blev dog ikke observeret så mange fugle på vandet, og tætheder kunne kun meningsfuldt beregnes for Polarlomvie. Der blev i alt observeret 17 arter, hvoraf især skal fremhæves Jagtfalk, Ismåge, Polarlomvie, Almindelig Lomvie, Lunde og Søkonke.

Størstedelen af toget forgik ud for Sydøstgrønland i relativt varmt og næringsfattigt atlantisk vand, men med afstikkere ind i den kolde Østgrønlandske Strøm, der tættere på kysten fører næringsrigt vand fra Polhavet ned langs kysten af Østgrønland og op langs Vestgrønland. I Julianehåb Bugt foregik optællingerne dog hele tiden i det kolde vand (Fig. 1). Der forekom ikke havis i det undersøgte område, og isbjerge var meget spredte.

Der observeredes forbløffende få fugle i farvandet ud for Sydøstgrønland. Langt de fleste var flyvende, heraf mange på direkte træk (Rider og Polarlomvier). Større tætheder af Polarlomvier på vandet sås ved afstikkere ind i den kolde Østgrønlandske Strøm og især i Julianehåb Bugt (Tab. 2).

Søkonger var forbløffende fåtalige i betragtning af hvor store bestande, der må trække igennem det undersøgte område. Sporing af deres træk ved hjælp af lysloggere (Fort *et al.* 2013) tyder ellers på, at de passerer området netop i oktober.



Gulls (Glaucous and Great Black-backed) and Fulmars seeking lee behind the ship during a gale east of Greenland. *Måger (Grå- og Svartbag) og Mallemukker ligger i læ af skibet under en storm øst for Grønland.*

Lunder sås jævnligt, og i alt 78 blev registreret på vandet inden for tælleafstanden. Der er tale om Lunder fra Nordvest-europa (formenligt primært Island) på vej mod vinterkvarterer i Davis Stræde og farvandene ud for Newfoundland. Lundernes opholdssteder uden for yngletiden er dårligt kendt, men på de togter, forfatteren har været med på i farvandene ud for Sydvest- og Sydøstgrønland i efterårsmånederne, er der altid registreret Lunder, og det i antal, der er for høje til at kunne stamme fra grønlandske ynglepladser (Boertmann 2011).

Almindelig Lomvie sås i lave antal ud for Sydøstgrønland. Den er ikke tidligere rapporteret herfra, bortset fra at en satellit-

sporet fugl fra Sydvestgrønland overvintrede her. Men arten forekommer formentligt regelmæssigt her, da de fremherskende havstrømme fører fra de store islandske kolonier og hertil.

Jagtfalk sås jævnligt i stor afstand fra kysten og under omstændigheder, der viste, at de var på jagt efter Søkonger. Det er for nylig vist, at Jagtfulke holder til i disse farvande om vinteren, når der er is (Burnham & Newton 2011), og mine observationer viser, at de også er her i perioder uden is, hvor de må da benytte de meget få og spredte isbjerge som siddepladser.

Den mest bemærkelsesværdige observation var syv adulte Ismåger i dagene 30. og 31. oktober i Julianeåb Bugt. Disse

fugle passer ikke ind i det mønster, som satellitsporede fugle fra ynglepladser i Nordgrønland og Svalbard har udvist, idet disse fugle opholdt sig meget længere mod nord i oktober (Gilg et al. 2010).

Mine observationer tyder på, at det varme atlantiske vand ud for Sydøstgrønland ikke har den store betydning som rasteområde for trækkende havfugle om efteråret. De få observationer i det kolde vand, som strømmer over kontinentalsoklen og langs kysten her og i Julianehåb Bugt, tyder derimod på, at der her kan være væsentligt højere tætheder af især Polarlomvler, og måske er det også her, at Søkongerne raster. Det bør undersøges nærmere inden områderne evt. åbnes for olieeffterforskning.

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