



AERIAL SURVEY OF GEESE, SEADUCKS AND OTHER WILDLIFE IN THE DISKO BAY AREA, WEST GREENLAND, JULY 2015

Technical Report from DCE – Danish Centre for Environment and Energy

No. 78

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Data sheet

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Abstract:	In July 2015 seabirds and moulting geese were surveyed from aircraft in the Disko Bay area in West Greenland. The survey is part of an environmental study programme securing background data for a strategic environmental impact assessment of raw material activities in the region, which will be opened up for petroleum exploration in late 2016. The survey confirmed that areas previously identified as internationally important for moulting white-fronted geese are still important. However, the numbers of this threatened goose population are declining overall, and this trend was also observed in the moulting sites. In contrast to this, the population of Canada geese has increased. The number of moulting common eiders along the west coast of Disko Island had increased threefold since a similar survey in 1998.
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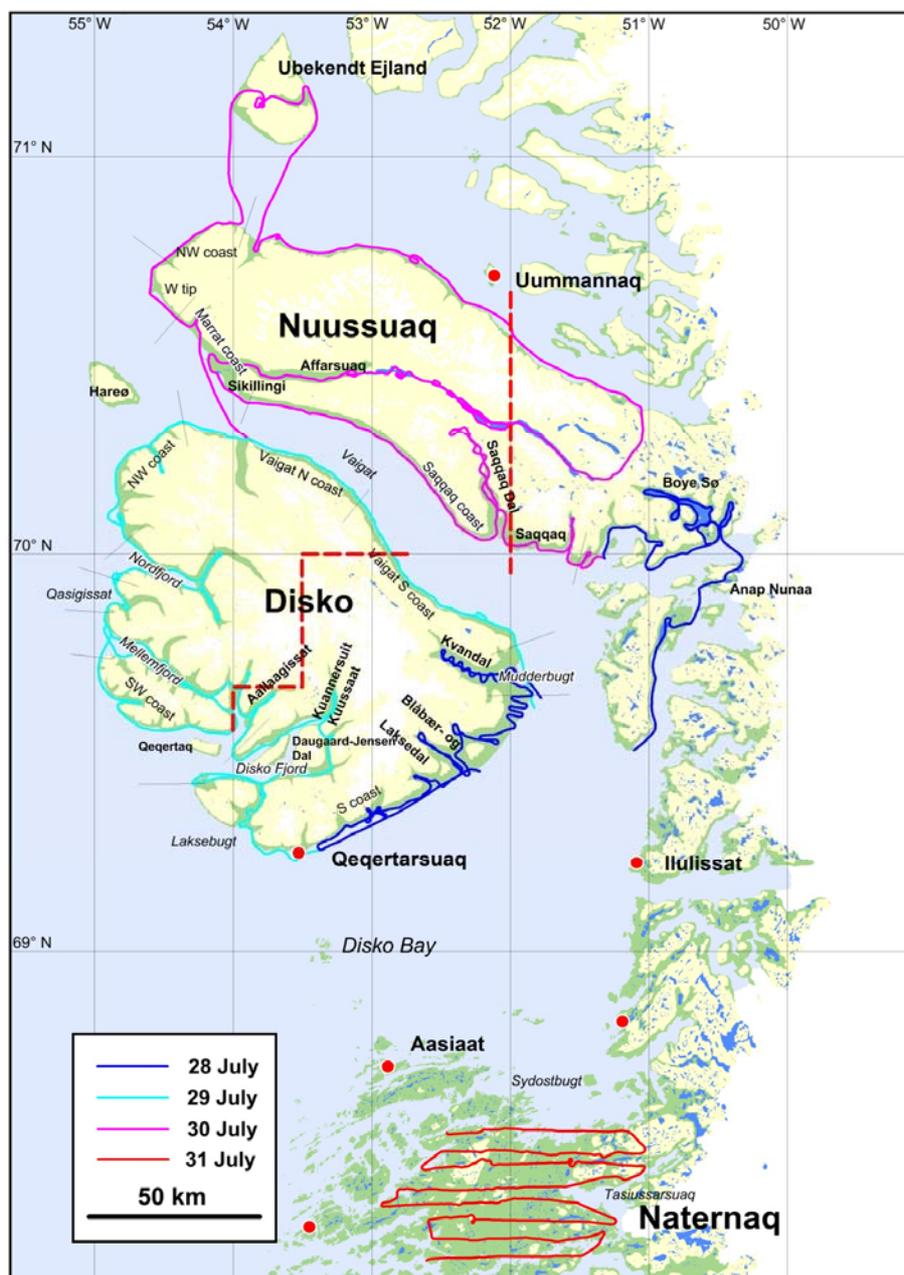
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Preface

The background for the survey reported here is, that Disko Island and the western part of Nuussuaq Peninsula are planned to be opened up for land-based oil exploration by a licensing round to commence late in 2016 (Figure 1). In relation to this licensing round, DCE was requested to prepare a strategic environmental impact assessment, and the Environment Agency for the Mineral Resources Activities (EAMRA) of the Greenland government has funded a number of field studies to update the existing knowledge on selected environmental issues. Among these studies was a survey of moulting geese and seaducks, as these species previously have been shown to occur in significant and internationally important concentrations within the proposed license blocks (Boertmann et al. 2008, Glahder 1999, Egevang & Boertmann 2001).

Figure 1. The study area and survey routes flown on July 28 to July 31, 2015. Major towns shown with red dots. Thin black lines delimit the eider count areas along the coasts of Disko and Nuussuaq cf. Table 3. The three proposed license blocks are shown by hatched red lines – one covering the western half of Nuussuaq and two on Disko (excluding the islands of Hareø and Qeqertaq).



Summary

In July 2015 seabirds and moulting geese were surveyed from aircraft in the Disko Bay area in West Greenland. The survey is part of an environmental study programme securing background data for a strategic environmental impact assessment of oil exploration activities in the region, which will be opened up for exploration in late 2016. The survey confirmed that areas previously identified as internationally important for moulting Greenland white-fronted geese are still important. However, the numbers of this threatened goose population are declining overall, and this trend was also observed in the moulting sites. In contrast to this, the population of Canada geese has increased. The number of moulting common eiders along the west coast of Disko Island had increased threefold since a similar survey in 1998.

Sammenfatning

Her rapporteres resultaterne af en flybåren optælling af fugle i Disko Bugt-området i Vestgrønland i juli 2015. Optællingen var en del af et forskningsprogram, som skal levere information til en strategisk miljøvurdering af olieaktiviteter, idet Diskø-øen og den yderste halvdel af Nuussuaq-halvøen planlægges åbnet for olieefterforskning i efteråret 2016. Optællingen bekræftede, at de tidligere lokaliserede vigtige områder for fældende grønlandske blisgæs stadig var vigtige for bestanden. Denne er i alvorlig tilbagegang, hvilket også kunne ses på optællingsresultaterne i de enkelte områder. Desuden optaltes fældende ederfugle langs kysterne, og her kunne det konstateres, at der var tre gange så mange som ved en helt tilsvarende optælling på samme tidspunkt i 1998. Dette er formentlig et resultat af en ændring i jagtreglerne i 2001, hvor forårsjagten blev begrænset væsentligt.

Eqikkaaneq

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1 Introduction

During four days of flying between July 28 and 31, 2015 an aerial survey was carried out in the Disko Bay region in West Greenland, primarily to map the distributions of moulting geese and seabirds.

Surveys from aircraft has proved efficient for goose surveys in Greenland (Fox & Glaeder 2010, Boertmann et al. 2015), and in this case, the observation platform was a Partenavia P-68 V (Figure 2). Although the project originally planned to use a Cessna C-337 'push-and-pull' from Iceland, this aircraft was grounded due to technical malfunctions on the day of departure for our survey. We therefore were constrained to use what aircraft were available within West Greenland, and luckily, the tour operator AirZafari could spare one of their three Partenavias for our survey. We have used Partenavias for surveys in Greenland many times before in the period 1988 to 2009, although always the 'Observer' version with perspex-cone and bubble windows allowing for excellent observation conditions. The Partenavia of AirZafari was the traditional P-68 V type. As the surveys were planned to generate total counts, as opposed to gathering data from line transect surveys, this aircraft therefore fully met our requirements. The airport of Ilulissat (BGJN) was used as the base, from where all survey flights were initiated and ended.

The survey period was chosen as the time to optimise the period when non-breeding geese are supposed to be flightless due to wing moult and breeders also are flightless and moving in association with unfledged young.



Figure 2. The observation platform, a Partenavia P-68 V in Ilulissat airport.

2 Methods

The survey was performed over four days (Table 1), and all data generated were from total counts (Komdeur et al. 1992, Laursen et al. 2008), i.e. all observed birds and mammals were recorded in the habitats that were selected and surveyed. The surveys also included areas outside of the planned license blocks: namely the eastern part of the Nuussuaq Peninsula, Ubekendt Ejland and the Naternaq plains (see Figure 1). Eastern Nuussuaq Peninsula was surveyed to get an overall impression of the environment of the entire Nuussuaq Peninsula, and in case of Naternaq to achieve a reference to the goose populations in the license blocks, as Naternaq is one of the most important goose moulting areas in West Greenland (Glahder 1999). Ubekendt Island was surveyed because it was close to our survey areas and because the lake-area on the plateau in 2007 was found to hold many post moulting geese (Fox & Glahder 2010).

Table 1. Summary of survey flights in July 2015, exact routes are shown in Figure 1.

Date	Area surveyed	Airborne time UTC*	Survey distance km**
July 28	East Disko Island and east Nuussuaq Peninsula	17:40-21:42	600
July 29	Disko Island	11:36-16:45	753
July 30	Nuussuaq Peninsula and Ubekendt Island	12:12-17:38	802
July 31	Naterna/Lersletten	12:14-16:09	530

* incl. ferry flights

**only survey flights

Naterna was surveyed along parallel tracks (Figure 1), although without applying 'distance sampling' procedures.

The two observers were placed in the co-pilot seat and in the seat behind the pilot, surveying to each side of the aircraft (Figure 2). Navigation was visual and guided by GPS. Flying altitude and speed during survey were maintained at 250 feet (85 m) and 90 knots (160 km/h), respectively.

All observations were recorded on tape recorder, and each observation was dictated together with the observation time. A GPS (Nomad Rugged PDA IP67) recorded the flown track lines, and each observation was geo-referenced by combining the observation time and GPS time. All clocks were synchronized with the GPS clock (UTC-time).

3 Results

Table 1 summarizes the surveys, and the flown tracks are shown on the map in Figure 1.

The results are grouped according to the important species groups – geese and seaducks, while observations of other species are briefly listed after these.

3.1 Geese

In total, 4634 (143 flocks) Canada geese (*Branta canadensis*) and 1631 (78 flocks) white-fronted geese (*Anser albifrons*) were located. In addition, a large number of unidentified geese (4160, 112 flocks) were recorded. The two species can be very difficult to separate under suboptimal observation conditions, which was often the case during the survey. Figures 3, 4 and 5 show the distribution of the geese and Table 2 summarizes the numbers in some of the more important sites.

Only a single snow goose (*Chen caerulescens*) was seen at the coastal lagoon on the NW coast of Disko Island on July 29.

Table 2. Numbers of geese observed in July 2015, summarized by subareas (cf. Figure 1).

Site	White-fronted		Unidentified
	goose	Canada goose	goose
Disko Island			
Blåbær- og Laksedal	88	75	113
Kvandalen	319	317	576
Kuannersuit Kuussaat	0	82	0
Stordal/Nordfjord	293	126	85
Laksebugt	0	129	1060
Mellemfjord	128	561	4
N of Qasigissat	50	0	0
Daugaard-Jensen Dal	30	42	0
Coast E of Godhavn	0	0	176
Aallaagissat	0	133	0
Disko NW coast	0	65	0
Nuussuaq			
Aaffarsuaq	201	789	81
Saqqaq Dal	122	369	0
Ubekendt Ejland	40	110	65
Naternaq	335	1469	1702

Figure 3. Distribution of observed Greenland white-fronted geese. Black dots indicate single flocks, red dots number of individuals aggregated in regions (N = 1631 individuals in 78 flocks). Dot size drawn to same scale as in Figure 4 and 5.

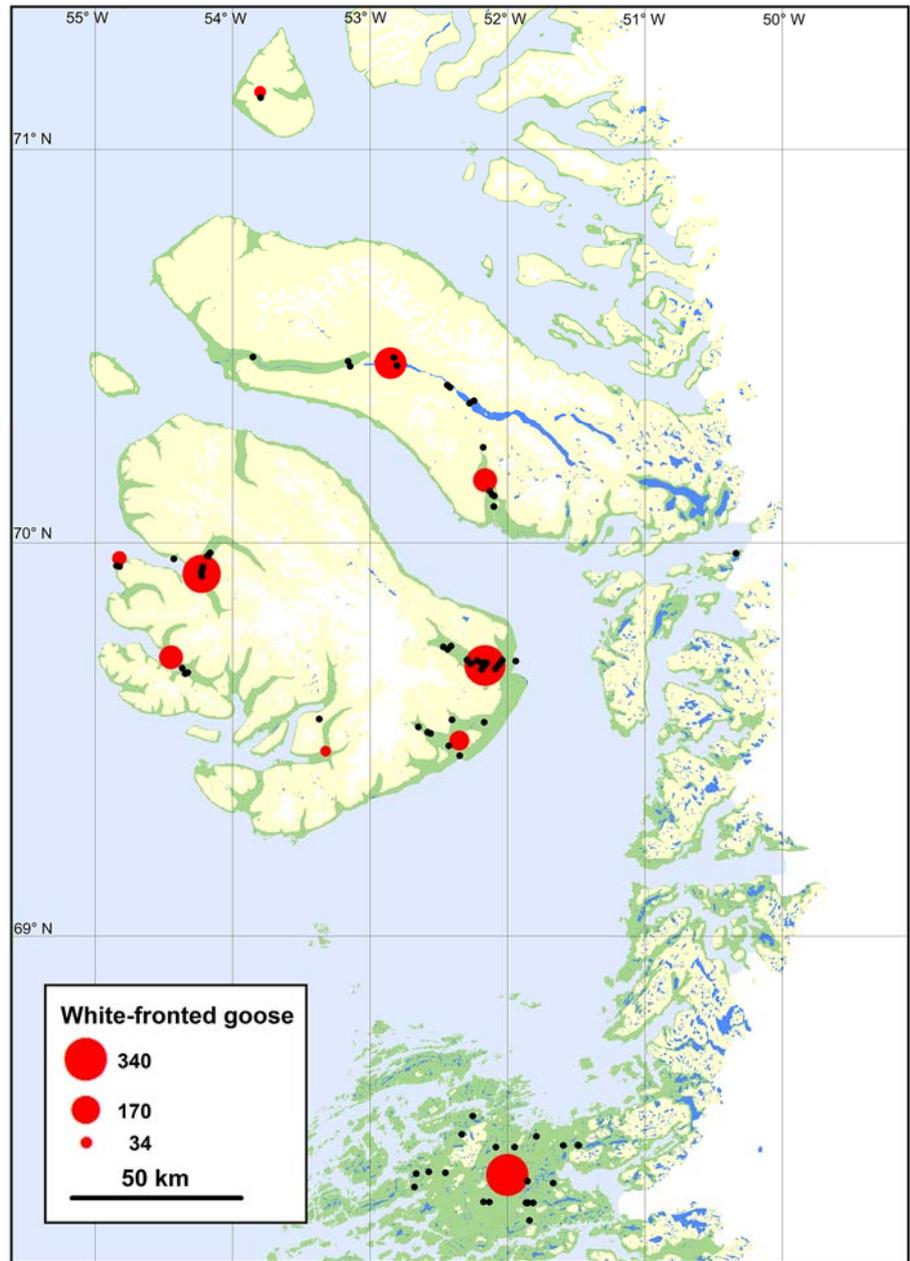


Figure 4. Distribution of observed Canada geese. Black dots indicate single flocks, red dots number of individuals aggregated in regions (n = 4634 individuals in 143 flocks). Dot size drawn to same scale as in Figure 3 and 5.

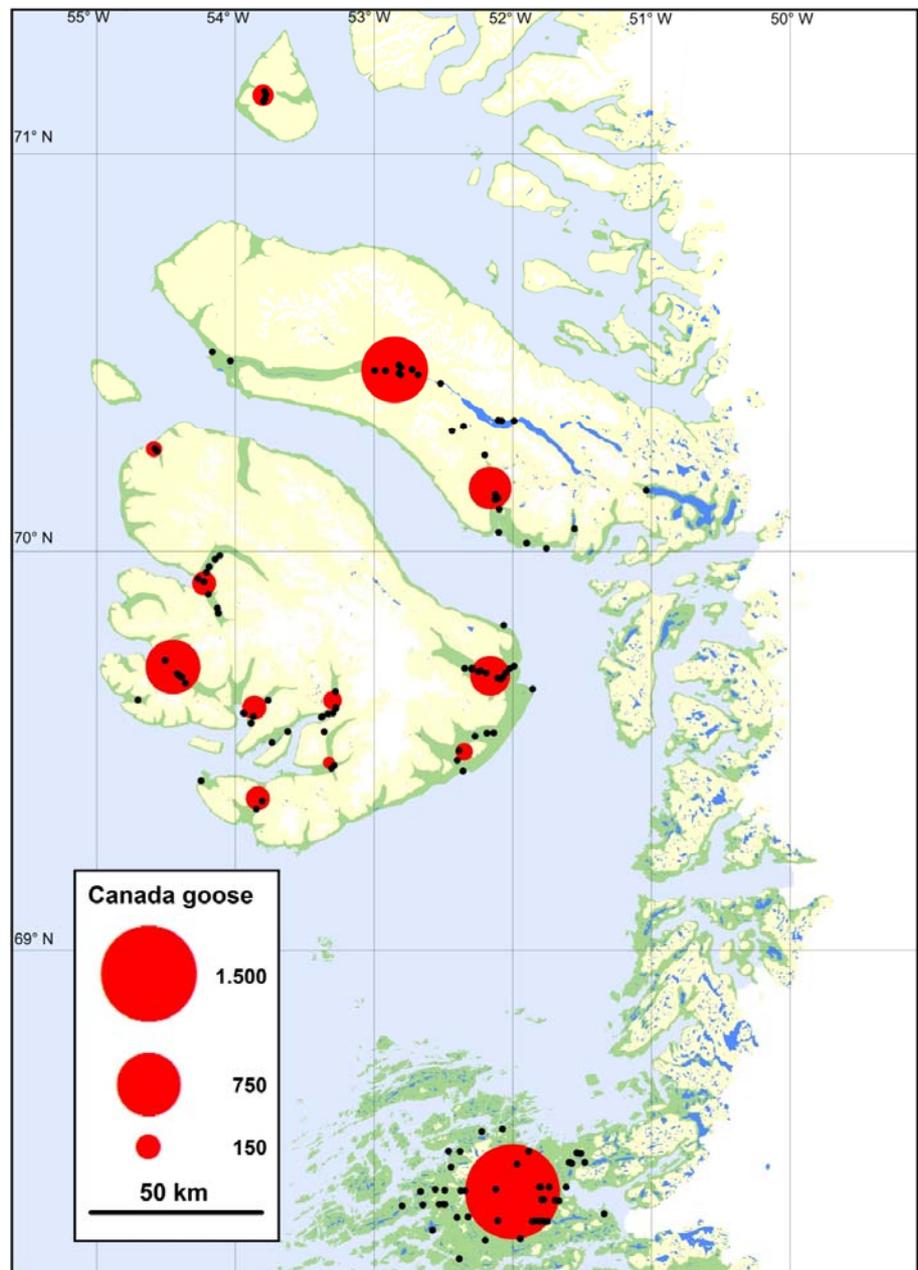
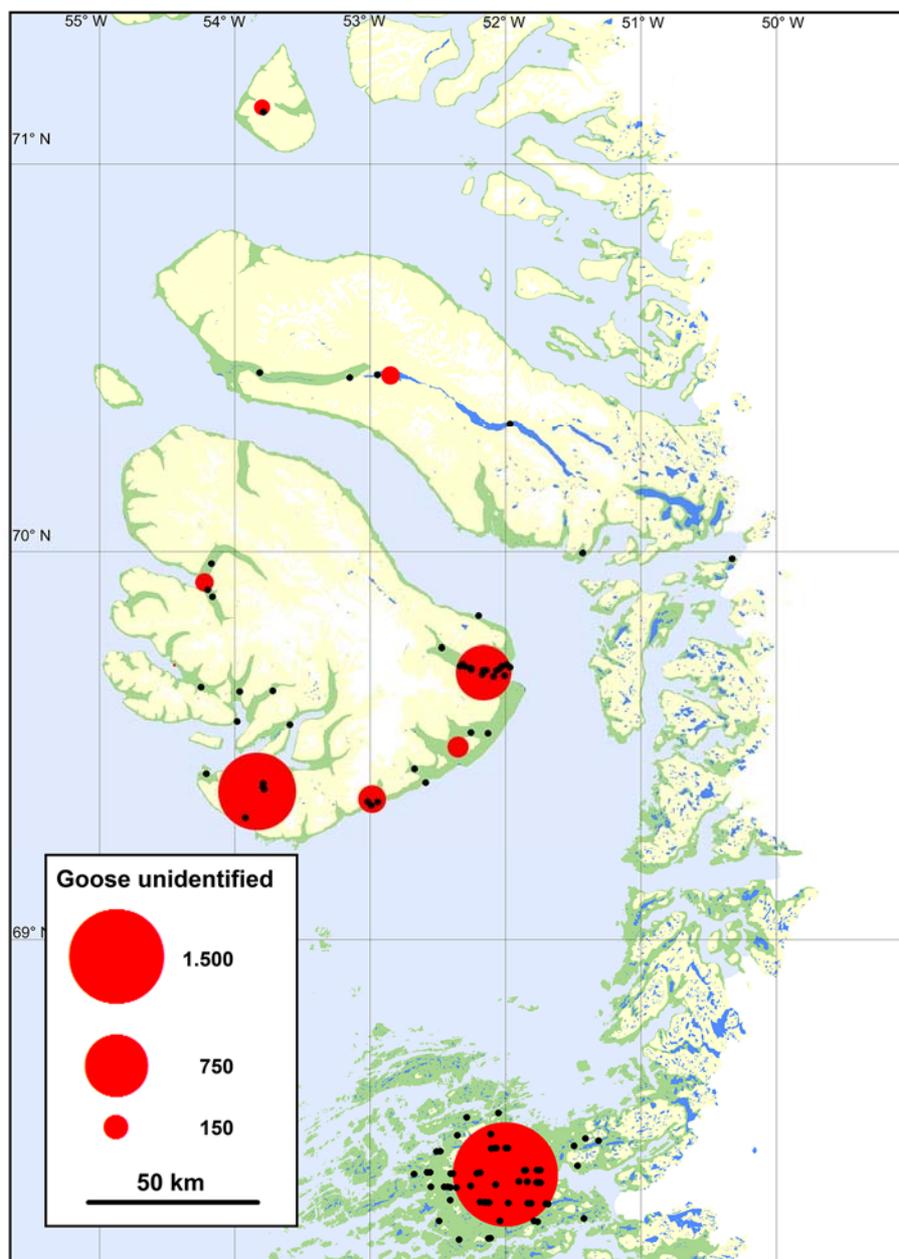


Figure 5. Distribution of observed unidentified geese. Black dots indicate single flocks, red dots number of individuals aggregated in regions (n = 4160 individuals in 112 flocks). Dot size drawn to same scale as in Figure 3 and 4.



3.2 Seaducks

In total, 37,769 common eiders (*Somateria mollissima*) were recorded of which the majority (33,299) was counted along the Disko W coast (Figure 6). The largest flocks (> 1000) were recorded in Qasigissat and off NW Disko. Moreover 3100 were recorded along the NE coast of Disko (Table 3).

A few common eider broods (n ≈ 10) were seen in the Naternaq-area, most in the Tasiussarsuaq fjord, where there are several colonies on the islands. Elsewhere, all observed birds were adults, and most of these were able to fly, indicating that the survey took place early in or even before the main moulting period.

Figure 6. Distribution of observed common eiders (n = 37769).

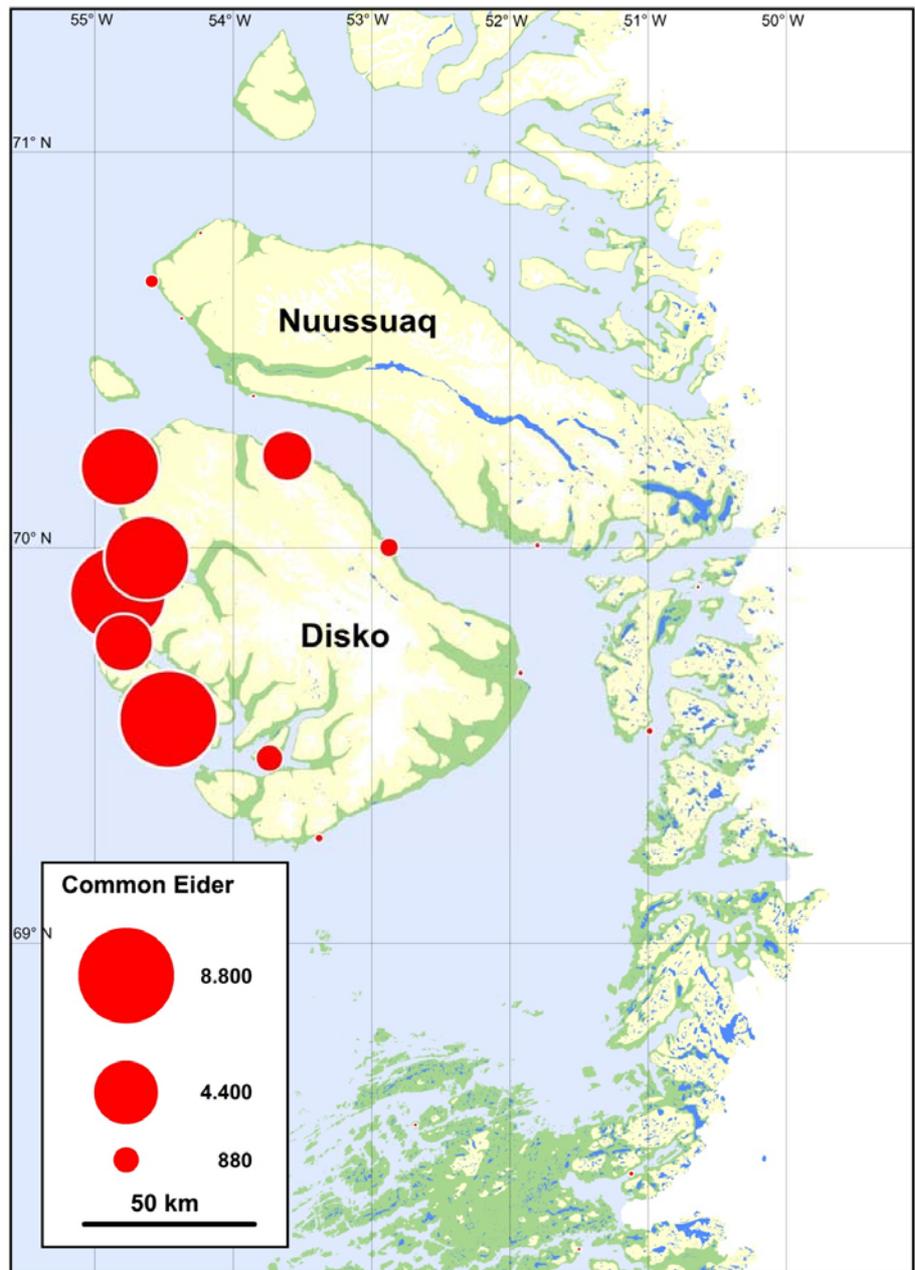


Table 3. Numbers of seabirds recorded in selected regions (cf. Figure 1) of the survey compared to a similar survey on July 22 and 30, 1998 (Boertmann & Mosbech 2001). This was performed with a Partenavia P-68 Observer, and the authors of this report participated as observers. The platform in 2015 was however without bubble windows, which bias the observed numbers of birds to the low side. nc = surveys not comparable, ns = no survey.

Site	2015				1998			
	Common eider	King eider	Red-breasted merganser	Long-tailed duck	Common eider	King eider	Red-breasted merganser	Long-tailed duck
Disko Island								
Disko Fjord	826	1	1	8	26	0	5	1
SW coast	8728	19	3	0	242	0	0	0
Mellemfjord	3452	404	30	0	458	107	14	0
Qasigissat	8439	10	21	0	7203	402	26	23
Nordfjord	6812	1814	80	0	428	578	5	0
NW coast	5868	212	0	4	3225	750	8	0
Vajgat coast N	2674	710	0	0	491	65	0	0
Vajgat coast S	426	87	0	0	125	0	0	0
Mudderbugt	33	150	4	0	75	341	0	0
S coast	74		7	7	19	0	3	0
Disko total	37332	3407	146	19	12292	2243	61	24
Nuussuaq								
NW coast	4		0	0	0	0	0	0
West tip	251	70	0	0	67	15	0	0
Marrat coast	14	0	0	0	0	0	0	34
Saqqaq coast	25	0	1	0	ns	ns	ns	nc
Naternaq	77	0	26	0	nc	nc	nc	nc

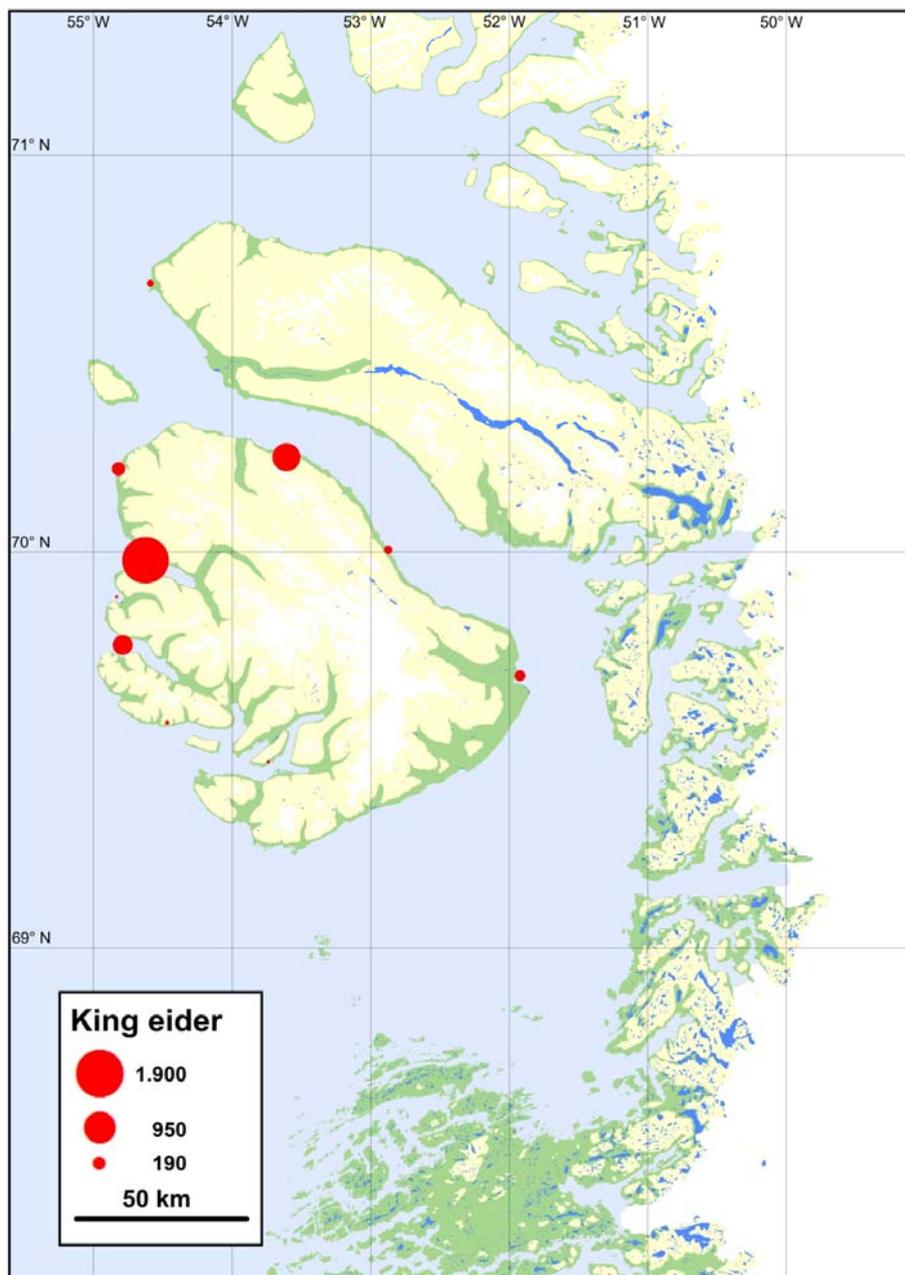
Of king eiders (*Somateria spectabilis*), 3477 were recorded, with the majority (1814) in Nordfjord. Figure 7 and Table 3 show their distribution. None were observed as being flightless.

Two black scoters (*Melanitta nigra*), a male and a female, were observed on the NW coast of Disko Island on July 29.

Red-breasted mergansers (*Mergus serrator*) were observed scattered along most of the surveyed coasts. In total, 53 sightings of 182 birds. The majority were seen in Nordfjord, Qasigissat and Mellemfjord of Disko Island (in total 135, 35 flocks) and 26 were seen in the Naternaq area (Table 3).

Long-tailed duck (*Clangula hyemalis*), 7 sightings, 19 birds, only on Disko Island, and both inland and at coasts.

Figure 7. Distribution of observed king eiders (n = 3477).



3.3 Other species

Mallard (*Anas platyrhynchos*), 12 sightings of 39 birds, scattered over the entire surveyed area (inland and along coasts).

Great northern diver (*Gavia immer*): No individuals of this species were observed within the proposed license blocks. A pair in Boyes Sø, two pairs and a single bird on Anap Nunaa (one pair with two chicks), and on Naternaq 8 sightings of 16 birds (including two pairs with each one chick).

Many other bird species were recorded along the coasts and in the inland areas: Red-throated diver (*Gavia stellata*), fulmar (*Fulmarus glacialis*), great cormorant (*Phalacrocorax carbo*), Arctic skua (*Stercorarius parasiticus*) especially along the east coast of Disko Island, pomarine skua (*Stercorarius pomarinus*), Iceland gull (*Larus glaucoides*), glaucous gull (*Larus hyperboreus*), great black-backed gull (*Larus marinus*), lesser black-backed gull (*Larus fuscus*): two

adults in a tern colony in Sydostbugt, kittiwake (*Rissa tridactyla*), Arctic tern (*Sterna paradisaea*), red-necked phalarope (*Phalaropus lobatus*); six on a lake in Aaffarsuaq Valley, black guillemot (*Cepphus grylle*), gyr falcon (*Falco rusticolus*): a bird at a presumed nest site near Sikillingi on the S coast of Nuusuaq, and raven (*Corvus corax*).

3.4 Mammals

Very few terrestrial mammals were observed: Only a single caribou in Aaffarsuaq Valley, and three sightings of muskoxen in Naternaq (15, 6 and 1). See Figure 8.

3.5 Seabird colonies

Information from 28 previously known seabird breeding colonies were obtained. In addition, five colonies not previously recorded were found, and two of these inside the assessment area: A small colony with black guillemots and another small colony with Iceland gulls.

Figure 8. Distribution of observed muskoxen (n = 22) and caribou (n = 1).



4 Discussion

The most important of the surveyed species – seen from a conservation point of view – is the Greenland white-fronted goose. It has an unfavourable conservation status, because of a severe decline in numbers over the recent 26 years, and the total population is now (spring 2015) at 18,884 individuals, based on surveys on the winter grounds in the British Isles (Fox et al. 2006, 2014, 2015).

Several of the surveyed sites are known to hold internationally important numbers of this separate population (i.e. > 1 % of the total population). The most recent survey on Naternaq was in 1995, when in total 2562 white-fronted geese and 117 Canada geese were counted (Glahder 1999). Today the numbers of these species have completely shifted, with a minimum of 335 identified white-fronted geese (Tables 2, 5). Although a large number of unidentified geese were observed, the major part of these most likely was Canada geese. Tables 4 and 5 give an overview of survey results from selected sites in Disko and Nuussuaq.

Table 4. Results of aerial surveys of moulting white-fronted and Canada geese in selected sites of Disko Island, compared to the results of the 2015 survey. ns = no survey, ni = no information. 1992 data from Glahder (1999), 1995 data from Glahder et al. (2002) and Glahder unpublished and 2003 data from Madsen (2004).

Site	1992				1995				2003				2015			
	White-fronted goose		Canada goose		White-fronted goose		Canada goose		White-fronted goose		Canada goose		White-fronted goose		Canada goose	
	Moulting indivs	Breeding pairs	Moulting indivs	Breeding pairs	Moulting indivs	Breeding pairs	Moulting indivs	Breeding pairs	Moulting indivs	Breeding pairs	Moulting indivs	Breeding pairs	Moulting indivs	Breeding pairs	Moulting indivs	Breeding pairs
Kvandalen	397	0	22	0	372	5	128	0	ns	ns	ns	ns	319	0	317	0
Stordal/Nordfjord	199	0	79	1	513	4	174	3	92	0	290	16	293	0	126	0
Kuannersuit Kuussuat	30	0	0	0	74	0	0	0	ns	ns	ns	ns	0	0	82	0
Blåbær- og Laksedal	ni	ni	ni	ni	230	1	0	0	ns	ns	ns	ns	88	0	75	0

Table 5. Results of aerial surveys of moulting white-fronted and Canada geese in selected sites of Nuussuaq Peninsula and in Naternaq, compared to the results of the 2015 survey. ns = no survey, ni = no information. 1992 data from Glahder (1999) and Fox et al. 1996, 1995 data from Glahder et al. (2002) and Glahder unpubl. and 2003 data from Madsen (2)004.

Site	1992				1995				2003				2015			
	White-fronted goose		Canada goose		White-fronted goose		Canada goose		White-fronted goose		Canada goose		White-fronted goose		Canada goose	
	Moulting indivs	Breeding pairs	Moulting indivs	Breeding pairs	Moulting indivs	Breeding pairs	Moulting indivs	Breeding pairs	Moulting indivs	Breeding pairs	Moulting indivs	Breeding pairs	Moulting indivs	Breeding pairs	Moulting indivs	Breeding pairs
Saqqaq Valley	17	0	0	0	105	0	0	0	0	0	0	0	122	0	369	0
Aaffarsuaq	683	10	0	0	877	3	166	0	203	13	364	c. 35	201	0	789	0
Naterna	2588	ni	11	0	2562	70	117	0	ns	ns	ns	ns	335	0	1469	0

In the other important sites for Greenland white-fronted goose, the decline has not been as pronounced as in Naternaq. In Saqqaq Valley, more birds than previously recorded actually were located (Table 5). Especially the Kvandal and the two valleys at the head of Nordfjord on Disko remain very important sites for this goose population, while the Aaffarsuaq Valley on Nuussuaq shows declining numbers (Tables 4, 5), however, still over the 1 % criterion for being of international importance (this corresponds currently to 190 birds).

The Canada goose population has increased dramatically in West Greenland since 1976 both in number of breeding birds and in moulting birds (Fox et al. 2012), and the increase seems to continue. Almost all the surveyed sites had higher numbers than during previous surveys (Tables 4, 5) and the species now outnumber the white-fronted goose in many sites (Table 2).

The numbers of king eiders recorded on the west coast of Disko are low compared to surveys carried out in 1993-1994 (Mosbech & Boertmann 1999). These were, however, performed four weeks later in the season – late August to early September – and as almost all king eiders observed in 2015 were able to fly, it is most reasonable to assume that only a fraction had arrived from the breeding grounds when we surveyed (cf. also Mosbech et al. 2006). But compared to a similar survey in 1998 (Boertmann & Mosbech 2001) the numbers along the west coasts of Disko were actually higher, especially in Nordfjord and Mellemfjord (Tables 3, 6). As in previous years, Nordfjord again proved to be the most important site for king eiders in the Disko Bay region in 2015 (Frimer 1993, Mosbech & Boertmann 1999, Mosbech et al. 2006).

The distribution of common eiders was similar to the survey results from July 1998 (Boertmann & Mosbech 2001), but numbers were three times higher (Table 2). In 1998, the highest numbers (7200) were recorded in the bay of Qasigissat, which also held the highest concentrations in 2015. Compared to similar surveys in 1993 and 1994, when surveys also circumnavigated Disko although a months later, there were also many more common eiders in July 2015 (Table 6). This increase mirrors the general increase in breeding eiders in West Greenland, which is a result of a revision of the hunting regulation limiting spring hunt and introduced in 2001 (Merkel 2010).

Table 6. Survey results of seaducks from the west coast of Disko Island. Airborne (Partenavia P-68 Observer) surveys in August/September 1993 and 1994 covering all coasts of Disko, and with both authors of the present report participating (DCE unpublished).

Species	Aug. 26, 1993	Sep.1-2, 1994
Common eider	4601*	8308**
Long-tailed duck	329	758***
Red-breasted merganser	29	6

*1557 i Qasigissat + 2519 NW coast

**1096 i Qasigissat + 4465 NW coast

*** all in Qasigissat

The interior parts of the fjords Nassuttoq and Arfesiorfik (part of the Naternaq area) are known to hold high numbers of moulting red-breasted mergansers (Boertmann & Mosbech 2001), but these were not found when we surveyed the Naternaq area. However, the survey here focused on terrestrial sites with moulting geese, and only a few marine areas were actually surveyed. The

highest numbers of mergansers were found in the fjords of NW Disko, and many more than in July 1998 and in August 1993 and 1994 (Tables 2, 3). It is not likely that an increase in the red-breasted merganser population in West Greenland is caused by changed hunting regulation, as the species is fully protected and the species is not considered as worthwhile hunting. But it is a population that very well could be favoured by climate change.

The long-tailed ducks had apparently not yet arrived to the known moulting sites along the Disko coasts in July 2015. Qasigissat is especially known to hold significant numbers later in the season (Tables 3, 6).

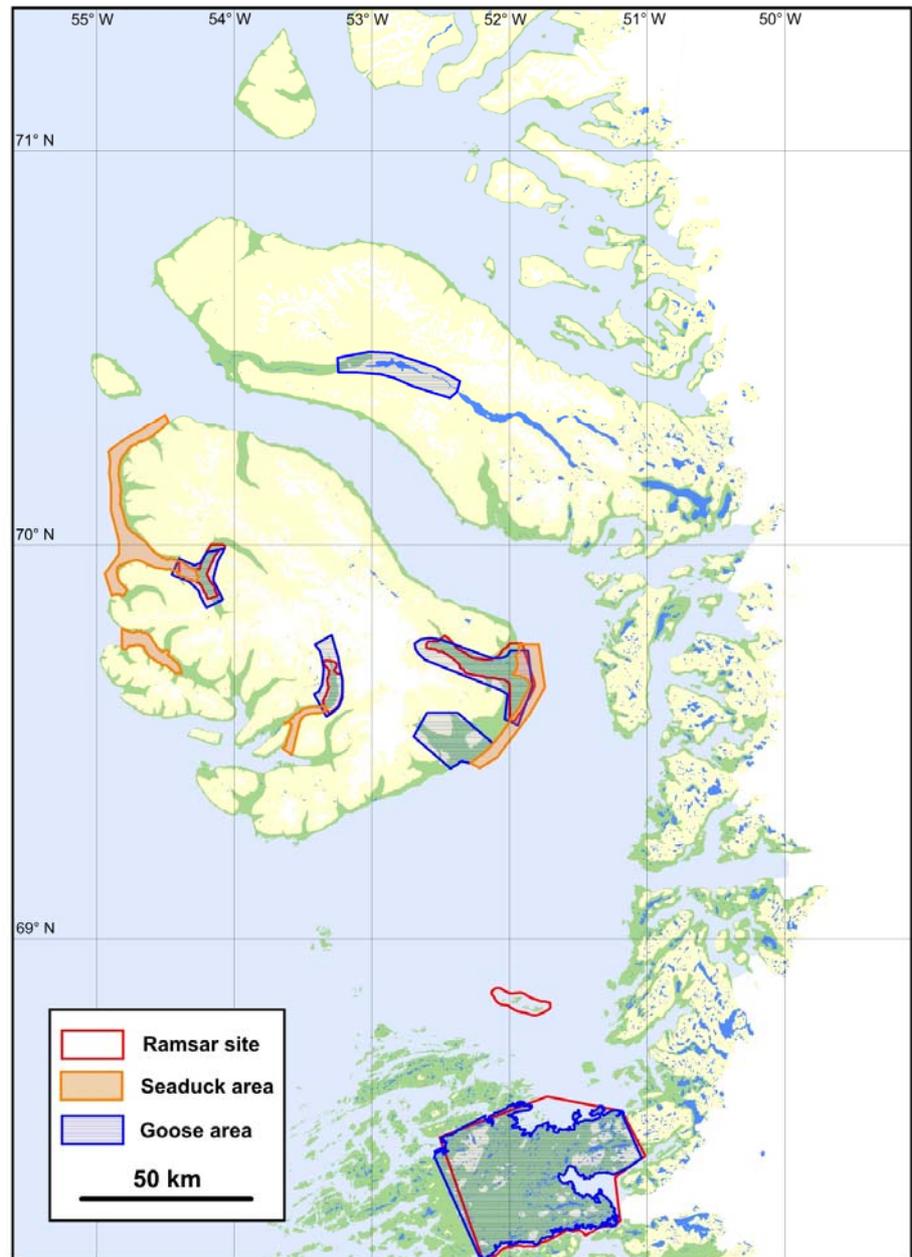
In conclusion, the results of this survey confirmed that the well-known locations and habitats for moulting Greenland white-fronted geese remain important. Based on the 2015 survey results, Kvandalen and Stordal/Nordfjord on Disko fulfil the 1 % criterion for being of international importance for the population and the same applies to Aaffarsuaq on Nuussuaq Peninsula and the Naternaq area. However, many more sites hold moulting Greenland white-fronted geese (Table 2), and in light of the unfavourable conservation status of the population, all these sites are important to protect today. Most of them are designated as 'important areas for wildlife' (Figure 9), where mineral and petroleum activities are regulated in order not to impact geese, seaducks, etc. (BMP 2000). Kvandalen, Stordal/Nordfjord and Naternaq are moreover designated as Ramsar sites (Figure 9).

The survey also confirmed that the NW coast of Disko Island is an important area for seaducks, where common eiders, king eiders and red-breasted mergansers assemble to moult. Nordfjord and the NW coast of Disko are also designated as 'important areas for wildlife' and part of Nordfjord is a Ramsar site (Figure 9).

Many of the important areas for seaducks and moulting geese within the license blocks of Disko and Nuussuaq are designated as 'important areas for wildlife' (areas where mineral and petroleum exploration activities are regulated to minimise impacts on wildlife) and some are also included in the three Ramsar areas on Disko Island (Figure 9).

There are, however, areas with goose and seaduck concentrations with no activity regulations, and some kind of regulation should be considered in these areas: in particular, site safeguard measures are needed in Saqqaq Valley, Qasigissat, the terrestrial part of Mellemfjord, in order to protect at least the Greenland white-fronted geese from disturbance.

Figure 9. Areas with nature protection commitments related to moulting geese and seaducks in the Disko Bay region. Ramsar sites and the 'important areas for wildlife' for moulting geese and seaducks are shown. The 'important areas for wildlife' are designated by the Greenland government for regulating mineral and petroleum exploration activities in order to reduce impacts on wildlife.



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AERIAL SURVEY OF GEESE, SEADUCKS AND OTHER WILDLIFE IN THE DISKO BAY AREA, WEST GREENLAND, JULY 2015

In July 2015 seabirds and moulting geese were surveyed from aircraft in the Disko Bay area in West Greenland. The survey is part of an environmental study programme securing background data for a strategic environmental impact assessment of raw material activities in the region, which will be opened up for petroleum exploration in late 2016. The survey confirmed that areas previously identified as internationally important for moulting white-fronted geese are still important. However, the numbers of this threatened goose population are declining overall, and this trend was also observed in the moulting sites. In contrast to this, the population of Canada geese has increased. The number of moulting common eiders along the west coast of Disko Island had increased threefold since a similar survey in 1998.