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A survey in July 2001

NERI Technical Report No. 368

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Carsten Egevang
David Boertmann
Department of Arctic Environment

Data sheet

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Abstract: The three Ramsar sites of Disko Island in West Greenland were surveyed for breeding and staging waterbirds in July 2001. Two of the areas (no. 1 and 2) held a high diversity of waterbirds and proved to be of international importance for the Greenland white-fronted goose, while the third (no. 3) held very few waterbirds and hardly meet any of the specific waterbird criteria of the Ramsar convention.

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Tel.: +45 33 95 40 00
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Contents

Preface

The Greenland Ramsar sites were included in the Ramsar list of international important wetlands in 1988. Since then, only few surveys have been carried out at the sites, and these have mainly been part of regional surveys covering many other sites. Therefore more thorough and detailed surveys of the Ramsar sites have been in needed.

A status report of the Greenland Ramsar sites was recently issued (Egevang & Boertmann 2001), and in this the three Ramsar sites on Disko were characterised as having a high to medium conflict potential with human activities as well as a high to medium need of management.

We therefore designed a survey in the three Ramsar sites on Disko for the summer of 2001. Financial support was granted (see below), and the survey was carried out in July. The present report describes the results of that survey.

DANCEA
Danish Cooperation for Environment in the Arctic
Ministry of Environment and Energy

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Acknowledgement

Thanks to Finn Steffens for help and skilful navigation of the ship "Maja S" and to the staff (Frantz Nielsen) and management of Arktisk Station for hospitality and support and to Peter Nielsen the Nature and Environment Directorate of the Greenland Government for comments and suggestions to a draft.

Summary

The three Ramsar sites on Disko, West Greenland were surveyed in the period 3-25 July 2001. The focus was on birds, particularly waterbirds, but other fauna as well as flora were surveyed and the main habitats were described.

Site no. 1, Aqajarua, Sullorsuaq and Qaamassoq

This site (Figure 2 p. 10) held a high diversity of waterbirds, particularly large numbers of breeding and moulting geese. The numbers of white-fronted geese were higher than previously recorded, and constituted between 1.6 and 2.1 % of the total population, thus making the site of international importance to the Greenland white-fronted goose.

The level of human activity was high in the marine part of the site, and illegal hunting on waterfowl was recorded.

Site no. 2, Kangersooq and Kuussuaq

High numbers of both breeding and moulting geese were recorded at this site (Figure 17 p. 33). The numbers of breeding and moulting of white-fronted geese were almost similar to earlier counts while the number of Canada geese was much higher. The numbers of white-fronted geese constituted 1.3 % of the total population, thus making the site of international importance to the Greenland white-fronted goose.

Site no. 3, Kuannersuit Kuussat

This area is characterised by recent glacier activity. In 1995-1999 a glacier surged in over the northern part of the site, and it covers today app. 14 % of the Ramsar site.

Only low numbers of waterbirds (and other birds) were recorded. The site (Figure 23 p. 44) does not meet any of the Ramsar site designation criteria based on the occurrence of waterbirds (B5 and B6). The source of previous information of many moulting white-fronted geese cannot be traced, and confusion with another site at Disko may have taken place.

Dansk resumé

De tre Ramsar-områder på Disko i Vestgrønland blev undersøgt i perioden 3.-25. juli 2001. Undersøgelserne fokuserede på optællinger af vandfugle, men også andre fugle, pattedyr, invertebrater og flora blev noteret, ligesom de forskellige habitater blev beskrevet.

Område nr. 1, Mudderbugten, Kvandalen og Flakkerhuk

Her (Figur 2 side 10) var en høj diversitet af vandfugle. Først og fremmest mange gæs, både fældende og ynglende, og vi registrerede flere blisgæs og Canadagæs end tidligere. Antallet af blisgæs i området var af international betydning (mere end 1% af den samlede bestand), og der er ikke tvivl om at området lever op til sin status som Ramsar-område.

Der var et højt menneskeligt aktivitetsniveau i de marine dele af området, og der konstateredes jævnligt jagt (illegal) på ederfugle.

Område nr. 2, Nordfjord og Stordal

Her (Figur 17 side 33) var også store antal af vandfugle. Antallet af ynglende og fældende blisgæs var i samme størrelsesorden som ved tidligere optællinger, mens antallet af Canadagæs var steget meget markant. Antallet af blisgæs var af international betydning, og der er ikke tvivl om at området lever op til status som Ramsar-område.

Område nr. 3, Kuannersuit Kuussat

Kun få fugle blev registreret i dette område (Figur 23 side 44), som er meget præget af recent gletsjer aktivitet. Den "galopperende" gletsjer, som skød frem for nogle år siden dækker f. eks. ca. 14 % af Ramsar området i dag.

Baseret på sommerens optællinger, ser området ikke ud til at leve op til sin status som Ramsar-område, i det mindste ikke ud fra de kriterier, som er baseret på fugleforekomster (B5 og B6). Den oprindelige kilde til de tidligere høje tal af fældende blisgæs kan ikke spores, og tallene skyldes måske forveksling med et andet sted.

Introduction

The Convention on Wetlands (signed in Ramsar, Iran, 1971) is an intergovernmental treaty which provides the framework for national action and international co-operation for the conservation and wise use of the Worlds wetlands and their resources. Presently (September 2001), the Convention has 127 contracting parties, and 1085 wetland sites (totalling more than 822,000 km^2) are included in the "Ramsar List of Wetlands of Internationally Importance".

In 1997 the Greenland government decided to apply for Ramsar status for eleven sites in Greenland. I n January 1998 these sites were acknowledged by the Ramsar secretariat and included in the Ramsar list of international important wetlands. More than 13,400 km^2 of Arctic ecosystems are located both in East Greenland (three sites) and in West Greenland (eight sites) and include wetlands in marine, tidal and fresh-water environments. Compared with the other Ramsar sites in the world, the Greenland sites include a higher proportion of marine habitats (Frazier 1999), and none of the sites comprise permanent human settlements.

Generally, the ecological information from the Greenland sites is very limited, and dates in some cases back to when or even before the sites were designated. Surveys and studies have been scattered and mainly of opportunistic character, and no monitoring programmes have been established.

Through the 1990ies information available on the Greenland Ramsar sites were collected, and subsequently published in 1990, 1993 and 1996 together with similar information from the Danish Ramsar sites by the National Forest and Nature Agency in Denmark (Jepsen et al. 1990, 1993 and 1996). The 1999 report is more general and only published on the Ramsar homepage: (http://www.ramsar.org/index_cop7.htm).

Recently a more thorough status report describing the Greenland Ramsar sites was published (Egevang & Boertmann 2001).

Three of the Greenland Ramsar sites (Figure 1) are located on Disko Island in central West Greenland. The three sites were originally designated because they hold significant proportions of the World population of Greenland white-fronted goose (*Anser albifrons flavirostris*), and one of the sites (no. 1) in earlier day also was the most important moulting ground for king eiders (*Somateria spectabilis*) in Greenland.

Note that we have amended the name of site no. 1 to include the third main area of the site.

Table 1: Overview of the Greenland Ramsar sites: number, name, size, habitat distribution in percent and occurrence of international important waterbird populations in the eleven Ramsar sites.

No	Name	Size (km^2)	Terrestrial/ marine	Species of importance
1	Aqajarua, Sullorsuaq & Qaamassoq, Disko	224	80/20	White-fronted goose, king eider
2	Kangersooq & Kuussuaq, Disko	65	72/28	White-fronted goose, king eider
3	Kuannersuit Kuussat, Disko	52	100/0	White-fronted goose
4	Kitsissunnguit	69	12/88	Arctic tern
5	Naterneq	1840	84/16	White-fronted goose
6	Eqalummiut Nunaat & Nassuttuup Nunaa	5795	95/5	White-fronted goose
7	Ikkattoq & adjacent archipelago	449	50/50	Red-breasted merganser
8	Kitsissut Avalliit	45	4/96	Breeding auks
9	Heden	2524	95/5	Barnacle goose, pink-footed goose
10	Hochstetter Forland	1848	93/7	Pink-footed goose
11	Kilen	513	72/28	Light-bellied brent goose

Methods

The three Ramsar sites on Disko were visited in the period 3 July-25 July (Appendix I). This period was chosen to insure the best counts of white-fronted geese – the most important species at the sites. At this time the non-breeding geese are moulting in large flocks and the eggs of the breeding pairs have hatched. Other species are more difficult to register at this time. Shorebirds are for example about to hatch their eggs in early July. On the other hand, July is too early to survey the other important species - the king eider. The king eiders arrive during July and August to the moulting grounds in West Greenland including Kangersooq/Nordfjord (site no. 2) and Aqajarua/Mud-derbugten (site no. 1). The best time to survey moulting king eiders is in August/September when numbers are highest (Mosbech & Boertmann 1999).

The transportation between the three sites was undertaken by the chartered ship "Maja S" of Qeqertarsuaq.

The marine parts of the sites were surveyed from "Maja S" when we arrived and departed the sites. An inflatable (Zodiac) was used for short distance transport within the sites and also served as observation platform. Furthermore, the marine areas were overlooked from land.

The fieldwork on land was conducted on foot. Three methods were applied: 1/ Total counts of geese, when the valley floors were surveyed with telescope (32 X) from several high points, and the potential habitats in the heathlands were located on maps and aerial photos and subsequently visited. 2/ Transect counts of lapland buntings at Ramsar site no. 1 on 6 July (see p. 28), and 3/ opportunistic recording of other species when searching for geese.

The total counts were adequate for surveying the flocks of moulting geese, while the goose breeding pairs with chicks were more difficult to locate and some may have been missed.

During the opportunistic records brooding birds, birds with chicks and also birds showing distinct territorial behaviour were recorded as breeding birds. Species like red-throated divers (nests in the open) and Arctic skuas (noisy territorial behaviour) were rather easy to locate. On the other hand, purple sandpipers were merely found by shear luck when walking through their territories, and many more pairs probably bred in the areas than we recorded.

Arial photographs (approximately scale 1:50,000) of the sites were used for navigation, identification of habitat types and plotting of bird distributions. A handheld GPS and topographical maps (1:250,000) were also used for navigation.

A detailed itinerary of the fieldwork is given in Appendix I.

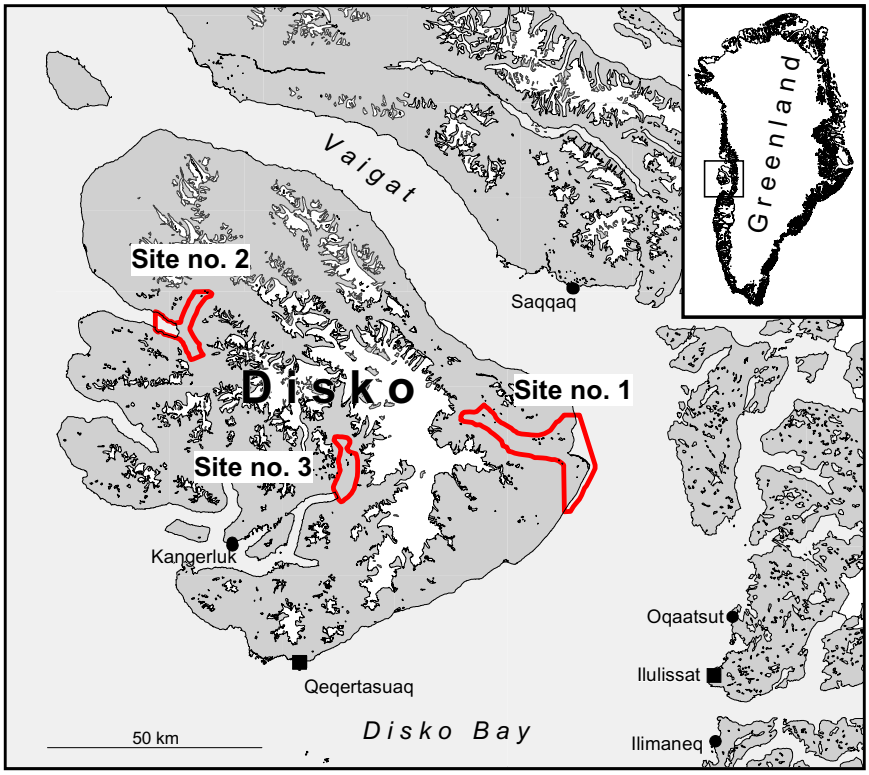

Figure 1. Map of Disko and the three Ramsar sites on the island. The towns (squares) and settlements (dots) of the region are indicated.

Site no. 1

Greenland name: Aqajarua, Qaamassoq and Sullorsuaq

Danish name: Mudderbugten, Flakkerhuk and Kvandalen

International Ramsar site no. 385

International and national significance

The site was originally designated due of the large numbers of king eiders moulting in Aqajarua and due to significant number of Greenland white-fronted geese occurring in Sullorsuaq.

Site description

This site covers about 224 km², and consists of three markedly different habitats, which will be described individually. The entire site is situated below the 200 m contour.

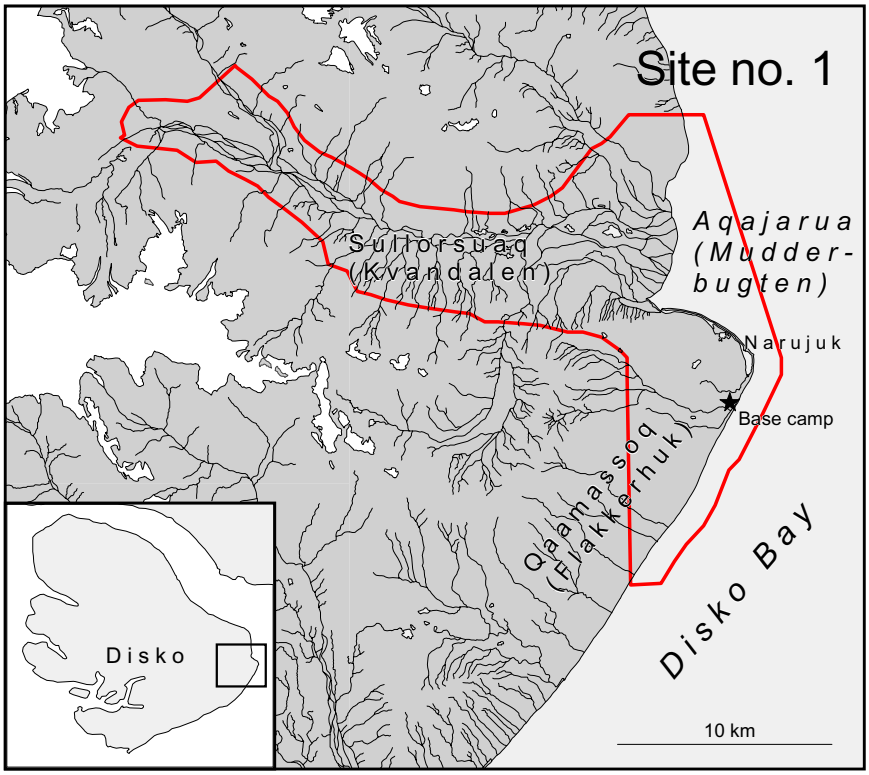

Figure 2. Map of Ramsar site no. 1 Aqajarua, Qaamassoq and Sullorsuaq.

Qaamassoq (Flakkerhuk)

This gently sloping foreland is situated between a low mountain ridge (up to 680 m asl.) to the west and the coast to the east. The western parts within the Ramsar site reach about 60 m asl.

Qaamassoq is traversed by a number of shallow rivers, which probably dry more or less up during the summer (Figure 7). The surface is mainly loose sediments, only with a single short (200 m long) rocky ridge in the western part and reaching 94 m asl. The Qaamassoq part covers about 43 km^2.

The sediments are Cretaceous sands and sandstones, and the few cliff ridges are Tertiary basalt dikes.

The coastal part consists of a rather steep sand beach, with low dunes on the top (Figure 3), forming a barrier behind which an extensive and shallow lagoon is situated. During low tide (tidal amplitude usually about 2 m), small mudflats becomes exposed at the river outlets. The lagoon is most prominent around the northeastern corner of Qaamassoq (Narujuk) and some km towards south-east. Along the north coast the lagoon becomes more like a channel, which is open to the west and detaching the beach from the mainland (Figure 4). In the western end the barrier forms a spit in front of the head of Sullorsuaq. Further south on Qaamassoq and just west of the dunes, small lagoons alternate with salt marshes and dwarf scrub heaths. The water in the lagoons is more or less brackish. Extensive salt marshes with creeks are found at two sites: just to the north of our base camp and at the north coast (Figure 5) where a small river has its outlet to the channel.

Inside the coastal zone, dwarf scrub heath (Figure 6) and grasslands predominate with extensive barren deflation flats intermixed. Qaamassoq holds a single lake and many ponds are scattered throughout the area. Along these and along the rivers and in depressions several marshes (Figure 8) are located - the most extensive in connection to the ponds near our base camp near the coast.

Along the north coast of Qaamassoq, steep sedimental slopes rise (up about 30 m asl.) just behind the channel, and they extend further west into Sullorsuaq.

The coastal waters are rather shallow down to 10 meters with one or more shallow bars within 1 km from the beach. Off Narujuk a narrow very shallow bar perpendicular to the coast stretches from the beach and some 100 meters off shore.

The vegetation on the low dunes and on the backside of the coastal barrier is very sparse, with scattered stands of a.o. *Elymus*, *Honckenya* and *Mertensia*. On the lower parts of the salt marshes *Puccinellia phryganodes*, *Carex subspathacea*, *C. ursina* and *Juncus arcticus* are dominating often forming dense cover. In the higher parts of the salt marshes *Carex rariflora* becomes frequent. *Carex stans* is the most prominent *Carex* species in the marshes where it forms dense stands. Both species of *Eriophorum* are common there, while *C. saxatilis* occurs here and there. Where the marshes becomes drier they transform into grassland mainly with *Carex bigelowii*.

Figure 3. The beach of Qaamassoq, with low dunes on top of the barrier and lagoons behind it.

Figure 4. The north coast of Qaamassoq and Aqajarua with the barrier and the opening of the channel in the centre. A tent camp is visible on the barrier.

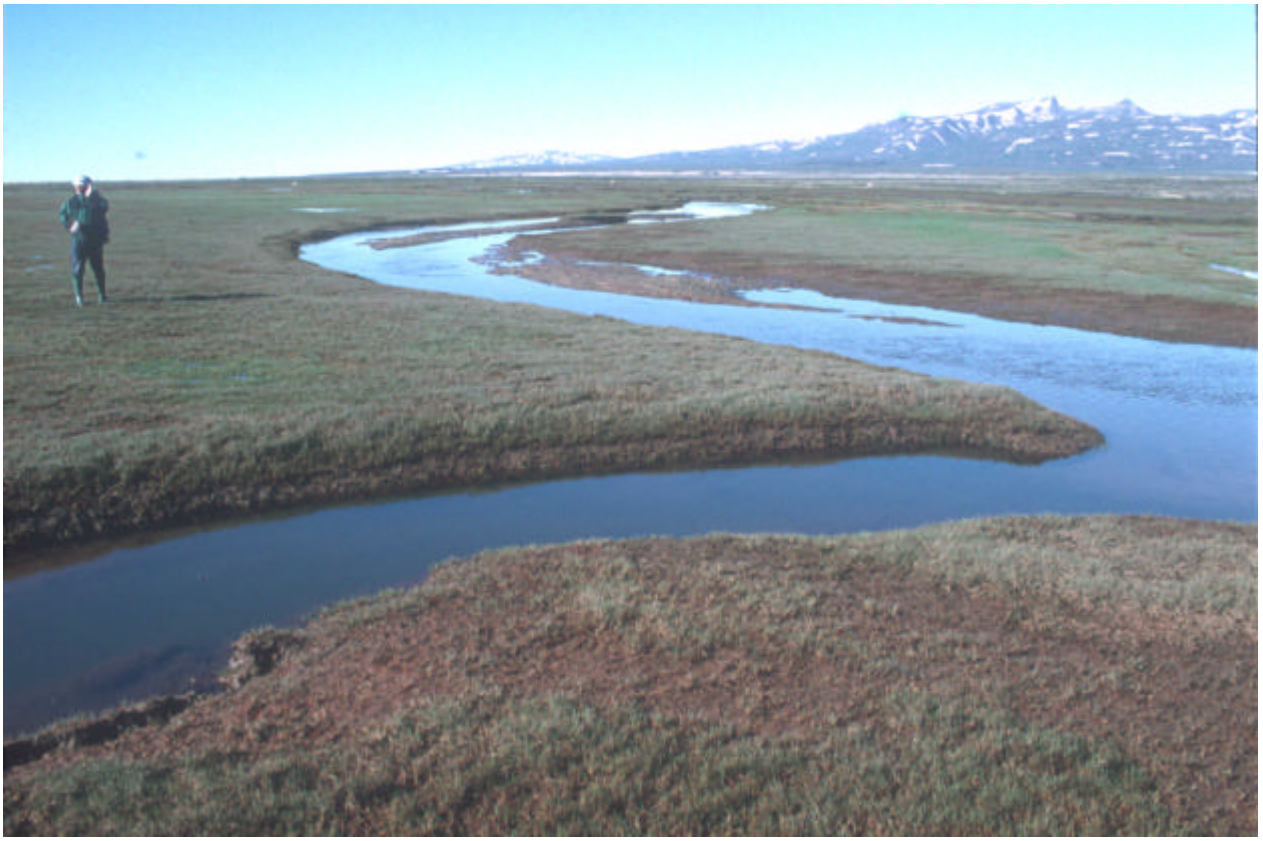

Figure 5. The extensive salt marsh on the east coast of Qaamassoq.

Figure 6. Dry dwarf scrub heath in the higher parts of Qaamassoq. In the rear the only rocky outcrop - a Tertiary basalt dike - of the Qaamassoq part.

Figure 7. An almost dried out river in Qaamassoq. Near the outlet at the coast.

Figure 8. Marsh with extensive stands of Carex stans in Qaamassoq. Breeding site for red-necked phalarope, long-tailed duck and possible red phalarope.

The dwarf scrub heaths show a considerable variation from very dry lichen rich heaths to moist, moss rich and hummocky heaths. Species like *Empetrum*, *Cassiope*, *Salix* are most frequent while *Dryas* and *Rhododendron* seems to be much more restricted in Qaamassoq.

On the dry rocky outcrop species like *Saxifraga tricuspidata*, *Arnica angustifolia*, *Potentilla hookeriana* and *Campanula uniflora* were found, and on the extensive gravel flats only hardy lichens and a few mosses occurred very scattered.

Aqajarua (Mudderbugten)

This is the shallow water outside the Sullorsuaq river mouth between Narujuk (the northeastern corner of Qaamassoq) and Alakkariaq (Figure 9). It covers about 30 km^2. In the innermost parts extensive (up to 500 m wide) mudflats are exposed during low tide. Further off shore the waters are very shallow gradually descending towards deeper waters outside the Ramsar site. We had no opportunity to measure the depths in the bay. But several stranded icebergs suggested that large parts were much more shallow than 25 m. Just a bit north of the central part of the bay a skerry is located, and it is usually visible above the water surface during high tide. On the nautical chart covering the bay a depth of 85 m is indicated for the outer central part of the bay and 28 m at the southern outer part, both within the Ramsar site. The bottom is, except around the skerry, soft and made up from sand and mud.

Figure 9. View across Aqajarua towards north. Most of the icebergs are stranded. In the foreground boats and dinghies fishing arctic char.

Sullorsuaq (Kvandalen)

This is a large u-shaped glacially eroded valley with a large braiding melt-water river in the floor. Sullorsuaq covers about 136 km^2. The valley sides (inside the Ramsar site) are gently sloping towards the riverbed, and many tributaries to the main river cross the valley sides. Most of these are melt water rivers, however; a few have clear water from homeothermic springs further up the valley sides. In the outer part of the valley, these rivers have cut deep canyons in the Cretaceous sands. Many of the tributaries have formed extensive alluvial fans on the valley sides. Tertiary basalt dikes form rocky outcrops in a few places. The mountains around the valley are formed by Tertiary basalts, and they reach altitudes of more than 1000 m asl. These are outside the Ramsar site.

Figure 10. View across Sullorsuaq towards north. Extensive marshes in the foreground and ablation flats in the rear.

In the mouth of the valley, both on the northern and southern side, extensive almost barren deflation flats occur, like on Qaamassoq. A few ponds are found on the valley sides. In the valley floor extensive gravel and mud banks are located in the riverbed. Outside the riverbed large areas are covered by a turfy very uneven surface, with up to c. 2 m high turf banks and with several clear water ponds and lakes as well as marshes and fens located in depressions (Figure 10, 11 and 12). These turfy areas are found as far inside the valley as our camp on the 10 July. Further up Sullorsuaq and in Charles Polaris valley, there is only gravel and mud banks in the valley floor, and the dwarf scrub heath go all the way down to the river bed without marshes or moist areas in the lower parts.

The vegetation on the valley sides is dominated by dwarf scrub heath, mainly rather dry with Betula, Empetrumand lichens. Here and there it is more hummocky and moist with Salix and mosses. Along streams and ponds narrow marshes are located, and in some more protected sites there is Salix scrub as high as 2.5 m. In the valley floor Salix is dominating in the dryer areas on gravel banks and dried out riverbeds. These Salix scrubs are usually rather open and may reach a height of 0.5 m. Mosses and herbs like Polygonumviviparumand Bartsia are numerous in these open Salix scrubs. In the marshes Carex stans and Eriophorumtriste and E. scheuchzeriare dominating and often forming dense stands.

A flora list from Ramsar site no. 1 is presented in Appendix V.

Figure 11. Lake in Sullorsuaq borders with extensive stands of Carex stans. Breeding site for long-tailed duck, mallard and red-necked phalarope.

Figure 12. The Lymnaea pond in the outer part of Sullorsuaq. The high turf banks are a characteristic feature of the valley floor in this part of Sullorsuaq.

Previous surveys

Several ornithologists have visited the area. Salomonsen (1967, 1981) visited the site through the 60's and in 1989-1992 Frimer (1992, 1993a) and Frimer & Nielsen (1990) have paid several visits. Scientists from NERI have through the 1990's over-flown the area surveying king eiders (Mosbech & Boertmann 1999) and geese (Glahder 1999). Furthermore, have students and teachers from Arctic Station (scientific field station in Qeqertarsuaq run by the University of Copenhagen) conducted numerous short-time studies at the site, especially in Sullorsuaq.

Ramsar site no. 1 is, seen form a natural history point of view, probably one the best known of the Ramsar sites in Greenland.

Fieldwork 2001

The site was visited on 4-13 July 2001. Qaamassoq was surveyed on 5-7 and 13 July, while Aqajarua and Sullorsuaq were surveyed on 8-12 July (see Fig. 13 and Appendix I).

The geese in the extensive delta and the outer parts of Sullorsuaq (more than 6 km wide) were rather difficult to count due to the long distances, and the survey of this area was split into two days. This

did, however, introduce the possibility of counting the same birds twice as the flocks were very mobile.

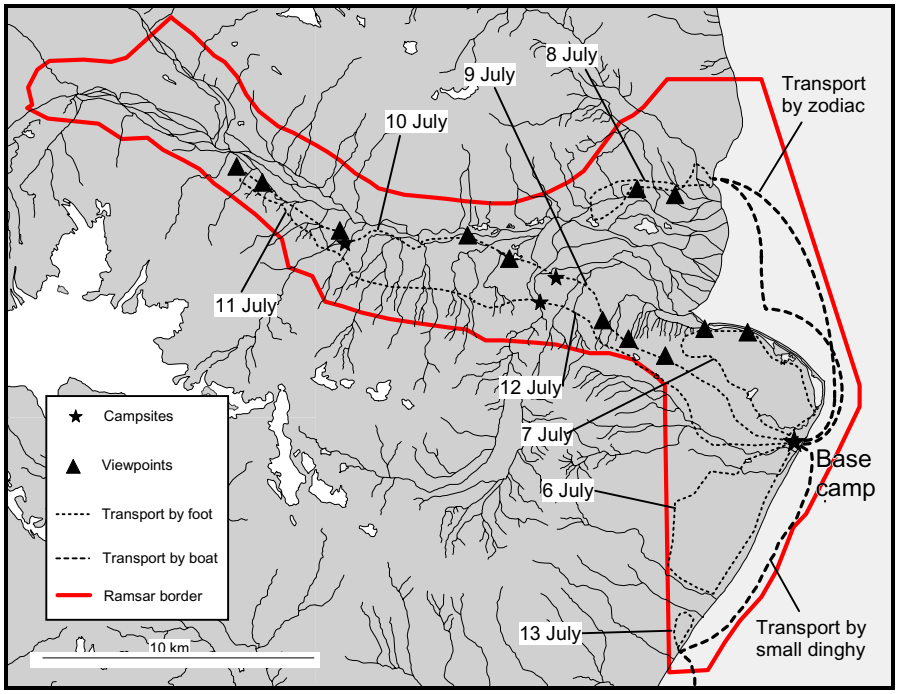

Figure 13. Map of Ramsar site no. 1. Walking and sailing routes as well as campsites and viewpoints, used when counting geese are indicated.

Bird observations

Table 2 and 3 presents an overview of selected waterbirds observed at Ramsar site no. 1.

See also Appendix II for detailed information on date and location of observed bird species. Note that Appendix II may mention species, which are not presented in the species account below.

Table 2. Staging and moulting waterbirds at Ramsar site no. 1

Species	Present survey	Previous surveys
White-fronted goose *Anser albifrons flavirostris*	**468-637**	**372** (1995)[1], **248** (1994)[2], **385-450** (1994)[4], **397** (1992)[1], **254** (1989)[3]
Canada goose *Branta canadensis*	**199**	**128** (1995)[1], **8** (1994)[4], **22** (1992)[1], **13** (1989)[3]
Mallard *Anas platyrhynchos*	**42**	**93** (1994)[2]
Common eider *Somateria mollissima*	**100-150**	**c. 700** (1989)[3]
King eider *Somateria spectabilis*	**1,575**	**1,074** (1998)[5], **104** (1995)[7], **469** (1994)[7], **1,023** (1993)[7], **max. 400** (1990-1992)[8], **30,000** (1954)[6]

[1] Glahder 1999a, [2] NERI unpubl. 2001, [3] Frimer & Nielsen 1990, [4] Heegaard et al. 1994, [5] Boertmann & Mosbech 2001, [6] Salomonsen 1967, [7] Mosbech & Boertmann 1999, [8] Frimer 1993b.

Table 3. Breeding waterbirds (pairs) at Ramsar site no. 1

Species	Present survey	Previous surveys
Red-throated diver *Gavia stellata*	**6**	**4** (1989)[1]
White-fronted goose *Anser albifrons flavirostris*	**34**	**5** (1995)[2], **13** (1994)[3], **2** (1992)[2], **5** (1989)[1]
Canada goose *Branta canadensis*	**87**	**1-3** (1989)[1]
Mallard *Anas platyrhynchos*	**15**	**3** (1989)[1]
Red-necked phalarope *Phalaropus lobatus*	**24**	*extremely abundant*[1]
Purple sandpiper *Calidris maritima*	**16**	*common*[1]
Arctic skua *Stercorarius parasiticus*	**10**	**8** (1989)[1]
Arctic tern *Sterna paradisaea*	**8**	**100-150** individuals (1990)[4]

[1] Frimer & Nielsen 1990, [2] Glahder 1999a, [3] Heegaard et al. 1994, [4] NERI-AE & OC 2001.

Waterbirds

Red-throated diver *Gavia stellata*

A total of 6 breeding pairs and an additional of 13 birds were recorded.

The species is a common breeder especially in Sullorsuaq (five pairs recorded). The red-throated divers use the waters off the delta of Sullorsuaq as feedings ground and up 9 birds were seen here.

Frimer & Nielsen (1990) recorded a total of five pairs breeding within 1 km^2 in the northern part of the Sullorsuaq delta. We recorded a more evenly distribution.

Greenland white-fronted goose *Anser albifrons flavirostris*

A total of 468-637 moulting birds and 34 pairs with chicks were recorded.

The number of moulting birds is presented as a range with a difference of 169 birds. This is due to the difficulties counting the birds mainly in the outer parts of Sullorsuaq, where the majority of the moulting white-fronted geese were found (Figure 14 and 15). There may be a considerable overlap in the higher figure (637), but it is not possible to exclude the possibility that birds counted close to the main river in Sullorsuaq on the 8 and 9 July (see Figure 14) may in fact have been different individuals.

The moulting birds were found at the outer part of Sullorsuaq and a single flock (45) in the northern part of Qaamassoq. Breeding pairs

was primarily found in the lower and central part of the valley while only five pairs were found in the upper part of the valley. The total number of white-fronted geese present in Ramsar site no. 1 in July was 534-707 excluding chicks. These numbers constitutes 1.6 -2.1 % of the total population (= 33,000 birds), making the site internationally important to the population.

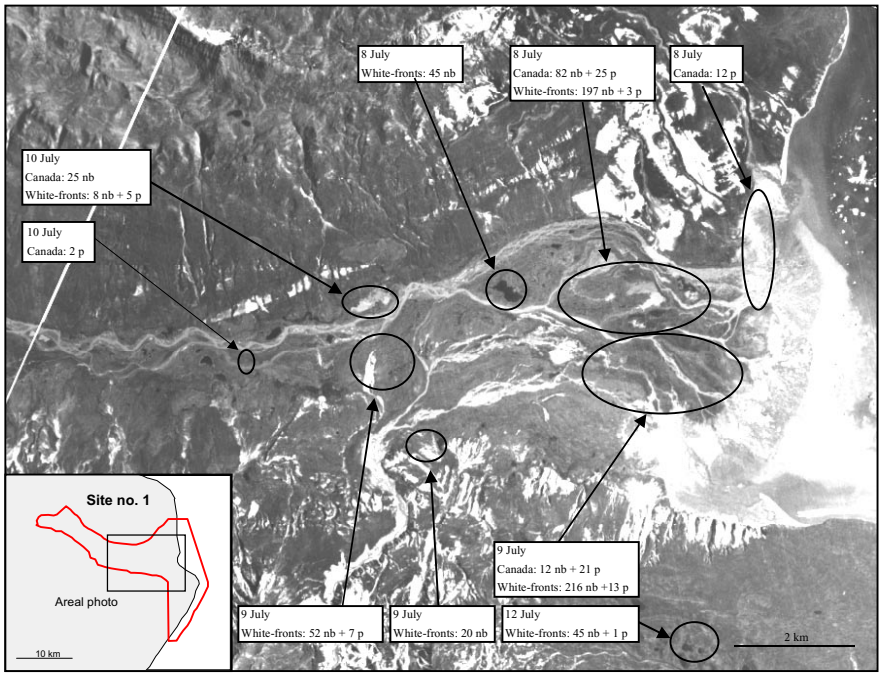

Figure 14. Aerial photograph of the outer part of Sullorsuaq, Ramsar site no. 1, with the distribution of geese shown. The geese in the central part of the delta counted on 8 and 9 July are treated as partly overlapping while geese counted on other dates are believed to be different birds. Canada = Canada geese, White-fronts = white-fronted geese, nb = non-breeders, p = pairs with goslings. Inserted in lower left corner show the approximate coverage of the aerial photograph.

Earlier counts from aircraft in 1992-1995 (Glahder 1999, NERI unpubl.) revealed between 250 and 400 moulting birds, while only 2-5 breeding pairs were recorded. Ground-based counts in 1989 revealed 254 moulting birds and five breeding pairs (Frimer & Nielsen (1990) and in 1994 385-450 moulting birds and min. 13 pairs (Heegaard et al. 1994).

Compared with the figures from the site in the 1990's the present survey indicate a slight increase in the numbers of moulting geese (of both species). The recorded number of breeding pairs (again both species) are considerable higher than previous counts. This can at least partly be explained by different survey platforms (ground versus aircraft), and by the fact that the present survey was much more thorough compared with the previous. But there is no doubt that the breeding population of Canada geese has increased considerably since the late 1980's.

Unfortunately only a few clutches were counted (Table 4). Frimer & Nielsen (1990) recorded an average of 3.4 goslings among five pairs of white-fronted geese in 1989 also in Sullorsuaq.

Table 4. Number of goslings/pair in Ramsar site no. 1

Clutch size	1	2	3	4	5	6	7	Average
White-fronted n = 9	2	1	0	2	3	1	0	3.7
Canada n = 3	0	0	0	1	1	1	0	5.0

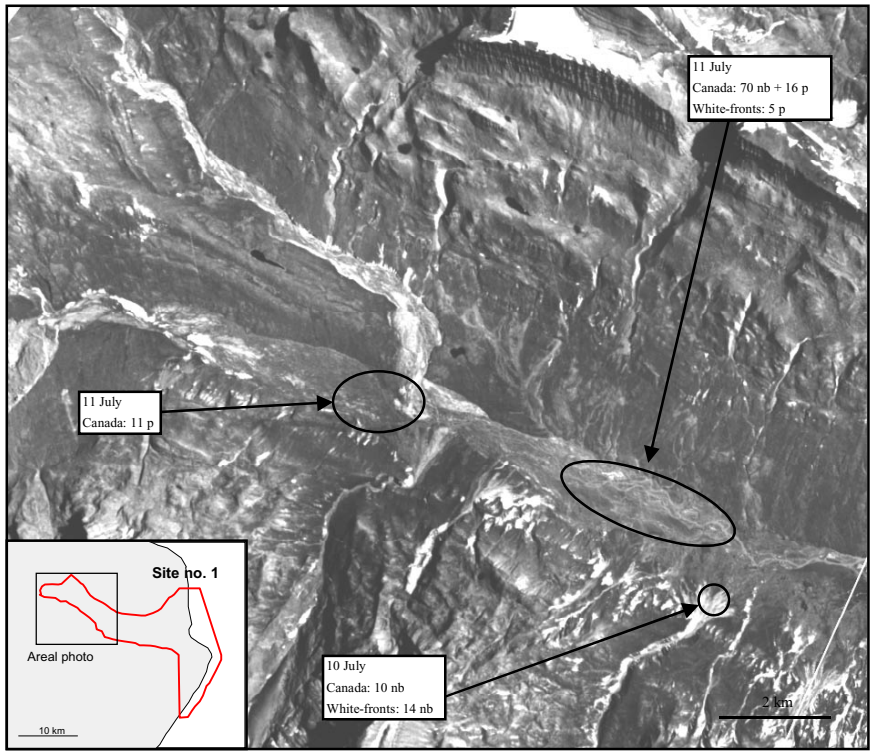

Figure 15. Aerial photograph of the inner part of Sullorsuaq, Ramsar site no. 1 with the distribution of geese on 10 and 11 July shown. Canada = Canada geese, White-fronts = white-fronted geese, nb = non-breeders, p = pairs with goslings.

Canada goose *Branta canadensis*

A total of 199 moulting birds and 87 pairs with goslings were recorded.

Both breeding and moulting birds were exclusively found in Sullorsuaq with none observed at Qaamassoq. The pairs with goslings were concentrated in either the delta/lower part of the valley or in the upper part of the valley (Figure 14 and 15).

Previous aircraft based counts showed 128 (1995) and 22 (1992) moulting birds (Glahder 1999, NERI unpubl.) with no records of breeding pairs, while Frimer & Nielsen (1990) mention 13 moulting birds and 1-3 pairs in Sullorsuaq in 1989.

Only three clutches were counted (Table 4).

Mallard ***Anas platyrhynchos***

A total of 15 breeding pairs and an additional of 42 birds were recorded in Qaamassoq and Sullorsuaq with highest numbers found in the latter.

Frimer & Nielsen (1990) found 3 pairs and an additional of 20 birds in Sullorsuaq in June/July 1989 and 93 staging birds were observed from aircraft in late August 1994 (NERI unpubl.).

Pintail ***Anas acuta***

No pintails were observed in July 2001.

The species is considered a rare breeder in West Greenland (Boertmann 1994), but particularly from Sullorsuaq there are many observations: 2-3 adult males (Kampp & Kristensen unpubl. 1979) 1 female with ducklings + 12 adults (Bennike 1990), 1 pair + 10 adult (Frimer & Nielsen 1990), 3 females with ducklings (Heegaard et al. 1994).

Lesser scaup ***Aythya affinis***

A female bird was seen in the small ponds in central Sullorsuaq on 10 July. The behaviour of the bird indicated breeding, it was a.o. very philopatric, returning to the same pond over and over again. The lesser scaup is an accidental guest from North America with the nearest breeding grounds in Quebec.

King eider ***Somateria spectabilis***

The largest number of king eiders (1575 birds) was seen when we arrived to the site on 5 July. They occurred both in Aqajarua and off the coast of Qaamassoq. The following days only small flocks of king eiders were observed. All the king eiders were capable of flying and no signs of moulting birds were recorded.

Aqajarua was a very important moulting site for king eiders in West Greenland. Here follows a review of all published and known survey results of king eiders from the bay:

1/ The first account of king eiders in the Aqajarua is Salomonsen (1950, 1967). In 1954 on 9-10 August he recorded several flocks of 10.000 in Aqajarua and along Qaamassoq (unpublished notes). These were later quoted as 30.000 (Salomonsen 1967).

2/ In 1975 (19 July) and 1976 (21 July) 2800 and 2500 were counted in Aqajarua (Boertmann 1979). All these birds were flying.

3/ During the years 1990 to 1992 Frimer (1993b) studied the ecology and behaviour of eiders at Disko. He counted max. 400 king eiders present in Aqajarua during July-September in these years.

4/ On 26 August 1993 Mosbech & Boertmann (1999) surveyed Aqarajua from the air, and recorded 1074 king eiders, of which a large part were flying birds rather far from the bay.

5/ The 1993 aerial survey was repeated in 1994 (30 August), and 469 king eiders were recorded, (125 were flying) (Mosbech & Boertmann 1999).

6/ Again in 1995 this aerial survey was performed (3 September), and only 105 king eiders were seen (Mosbech & Boertmann 1999).

7/ During 18 July to 4 August 1994, students from Arctic Station stayed at Aqajarua, and recorded max. 500 staging king eiders. Birds flying were frequently seen (Heegaard et al. 1994).

8/ On 22 July 1998 an aerial survey was conducted and 1074 flying king eiders were recorded (Boertmann & Mosbech 2001).

Common eider ***Somateria mollissima***

The largest number (100-150) of common eiders was seen off the coast of Qaamassoq on 4 July. No signs of breeding were observed and the species probably do not breed within the site.

Kampp & Kristensen (unpubl. 1979) mention the species as a potential breeder in Sullorsuaq, but no proof was found. Frimer & Nielsen (1990) reported that up to 700 birds stayed in the area in June/July 1989.

Long-tailed duck ***Clangula hyemalis***

A total of 17 breeding pairs and an additional of 32 birds were recorded.

Long-tailed ducks is a common breeder in the small ponds of Qaamassoq and in Sullorsuaq. Furthermore, Aqajarua and the coast off Qaamassoq were used as foraging and staging area.

Frimer & Nielsen (1990) recorded 30 birds including 4 pairs in Sullorsuaq in 1989.

Red-breasted merganser ***Mergus serrator***

Six birds were recorded on several occasions off the coast of Qaamassoq. No signs of breeding were recorded.

Shorebirds

The site - mainly Qaamassoq - is probably one of the best shorebird localities in West Greenland both in terms of breeding birds and of staging migrants, and many records of Nearctic vagrants have been published (e.g. Frimer & Nielsen 1990, Nordin 1985).

Great ringed plover ***Charadrius hiaticula***

A total of 5 breeding pairs and an additional of 5 birds were recorded.

Breeding birds were only seen in Sullorsuaq, where they occurred in riverbeds with extensive gravel flats or in areas where barren deflation flats bordered to marshes. The beach of Qaamassoq may serve as a small-scale (up to three birds seen) staging area for non-breeding birds.

Frimer & Nielsen (1990) recorded 11 birds including three breeding pairs at Sullorsuaq. Kristensen & Petersen (1992) report one breeding pair on Qaamassoq in late July.

Heegaard et al. (1994) counted 22 staging at Qaamassoq in late July and Frimer (1992) had daily observations of up to 13 birds in August 1990.

Grey plover ***Pluvialis squaterola***

A total of 16 birds were recorded at the delta of Sullorsuaq and on the beach of Qaamassoq.

The majority (14) of the birds were seen in a single flock foraging on the large mudflats of the Sullorsuaq-delta.

The grey plover was recorded as a breeder at Qaamassoq in 1989-1991 (Frimer & Nielsen 1990, Frimer 1993a) and the species is known as a regular visitor in the Disko Bay area. Kristensen & Petersen (1992) had daily observations of 2-3 birds at Qaamassoq in a 7-days period. Frimer (1993a) recorded flocks up to 16-18 birds in mid-July.

Red knot ***Calidris canutus***

A single adult bird was seen on the beach of Qaamassoq on 12 July.

Qaamassoq may serve as a stopover on the autumn migration for knots breeding in North Greenland and high arctic Canada. Earlier records include flocks up 205 July/August (Frimer 1992, Christensen & Petersen 1992, Heegaard et al. 1994).

Sanderling ***Calidris alba***

Three adult birds were seen on the beach of Qaamassoq on 8 July.

Up to 24 individuals have previously been recorded staging at Qaamassoq in July/August (Frimer 1992, Kristensen & Petersen 1992, Heegaard et al. 1994).

Purple sandpiper ***Calidris maritima***

A total of 16 breeding pairs and an additional of 16 birds were recorded.

A common breeder both at Qaamassoq and in Aqajarua. Furthermore, a small flock (8 individuals) of non-breeders was seen at the beach of Qaamassoq on 12 July.

Frimer & Nielsen (1990) described the species as "common" in Sullorsuaq in 1989.

Ruddy turnstone ***Arenaria interpres***

No observations in July 2001.

Turnstones have been recorded breeding at Qaamassoq at several occasions (Salomonsen 1967, Nordin 1985, Kristensen & Petersen 1992) and up to 105 staging birds have been recorded in July/August (Heegaard et al. 1994). The breeding birds are believed to be of the American sub-species *morinella* (Frimer & Nielsen 1990, Kristensen & Petersen 1992).

Red-necked phalarope ***Phalaropus lobatus***

A total of 24 breeding pairs and an additional of 27 birds were recorded.

The species is a very common breeder both at Qaamassoq and in Sullorsuaq and Qaamassoq serve as a staging area for migrating birds. Kristensen & Petersen (1992) recorded a flock of 254 individuals in late July and Frimer (1992) saw flocks up to 45 birds in early August.

Red phalarope ***Phalaropus fulicarius***

A male showing strong territorial behaviour was observed on three dates on Qaamassoq indicated breeding. Furthermore, the remains of a killed (presumably by a falcon) bird were found at the southern part of Qaamassoq approximately 4 km from the above-mentioned bird.

The red phalarope is a scarce breeder in the northern part of West Greenland (Boertmann 1994), but has previously been mentioned as a potential breeder at Qaamassoq (Salomonsen 1967, Frimer 1993a).

Skuas, gulls, terns and auks

Several species from these taxa do not necessarily breed within the Ramsar site, but utilise the marine part as feeding and staging area.

Pomarine skua ***Stercorarius pomarinus***

Up to 18 birds were seen off the coast of Qaamassoq usually stealing prey from kittiwakes.

This non-breeding summer visitor occurs in fluctuating numbers in the Disko Bay area and elsewhere in West Greenland (Boertmann 1994).

Arctic skua *Stercorarius parasiticus*

A total of 10 breeding pairs and an additional of 27 birds were recorded.

The species is a fairly common breeder both at Qaamassoq and in the eastern part of Sullorsuaq.

Frimer & Nielsen (1990) recorded 8 breeding pairs in Sullorsuaq and up to 33 birds feeding off the coast.

Long-tailed skua *Stercorarius longicaudus*

A total of five birds were recorded in Qaamassoq. Three of the birds flew over Qaamassoq towards Aqajarua while the other two shortly landed inland at Qaamassoq. But no signs of breeding were recorded.

Qaamassoq is one of the very few breeding sites for this species in West Greenland (Salomonsen 1967, Kampp 1982). It is remarkable because lemmings (their main prey during the breeding season) are not present, and the long-tailed tailed skuas here have a summer feeding biology similar to the Arctic skuas (Kampp 1982).

Iceland gull *Larus glaucoides*

Iceland gulls and also glaucous gulls *Larus hyperboreus* were frequently seen flying through Sullorsuaq. Furthermore, up to 350 Iceland and glaucous gulls used the beaches of Qaamassoq as staging area mainly at Narujuk.

The Iceland gull is a common and widespread breeder in West Greenland and several larger colonies are located in the Disko Bay area (Boertmann 1994).

Great black-backed gull *Larus marinus*

Largest number of birds recorded was 8 immature birds off the coast of Qaamassoq.

The species is a widespread breeder especially in the southern parts of West Greenland (Boertmann 1994).

Kittiwake *Rissa tridactyla*

Up to 200 birds seen off the coast of Qaamassoq.

The species does not breed within the Ramsar site, but is very common off the coast. The nearest breeding colonies are at Ritenbenk on the eastern side of Disko Bay and in Torsukattak further north.

Arctic tern *Sterna paradisaea*

A total of 8 pairs were recorded territorial more or less dispersed on the eastern beach of Qaamassoq.

The species breed in low numbers along the beaches of Qaamassoq and Aqajarua and up to 100-150 individuals have previously been recorded (NERI & OC 2001).

The summer of 2001 seemed to be a very bad breeding year for Arctic terns in the Disko Area. We controlled the three breeding colonies at Nipissat west of Qeqertarsuaq, on our way to Nordfjord, and all were without birds.

Other birds

Peregrine falcon *Falco peregrinus*

An adult bird (presumably a male) killed and ate a long-tailed duck in the central part of Qaamassoq on the 5 July.

Rock ptarmigan *Lagopus mutus*

A total of 4 breeding pairs and 3 additional bird, were recorded.

Raven *Corvus corax*

Few observations of birds both in Sullorsuaq and at Qaamassoq. No signs of breeding within the Ramsar site.

Northern wheatear *Oenanthe oenanthe*

In total two breeding pairs were recorded in the rocky parts of Qaamassoq and Sullorsuaq.

Redpoll *Carduelis flammea*

Redpolls were only recorded in lush *Salix* scrubs of Sullorsuaq with a total of 21 breeding pairs.

Lapland bunting *Calcarius lapponicus*

A very common breeder in the dwarf scrub heath habitats of both Qaamassoq and Sullorsuaq. In total 191 breeding pairs were recorded.

On 6 July, 48 breeding pairs were recorded on a 16.2 km long walk at the southern part of Qaamassoq. Assuming that we recorded breeding birds up to 50 m on each side of this transect, the resulting density is approximately 29 pairs/km^2. This is somewhat more than previously reported from the site (Frimer 1981: 17 pairs/km^2) and much lower than earlier reported from inland sites in West Greenland (a.o. Fox et al. 1987: 41 pairs/km^2 in a year with late spring and 128 pairs/km^2 in a year with an early spring).

Snow bunting *Plectrophenax nivalis*

Only four pairs were recorded, and only in the very restricted rocky parts of the site.

Mammal observations

Arctic fox *Alopex lagopus*

Although tracks from arctic fox were widespread over large parts of the site, especially at Qaamassoq, no observations were made during our survey.

Other vertebrates

Arctic char *Salvelinus alpinus* occurs abundantly along the coasts of Aqajarua, as an intensive fishery for this species was carried out there. We saw small char in some of the clear water tributaries in Sullorsuaq.

Stickle backs *Gasterosteus aculeatus* were very abundant in the shallow lagoons of Qaamassoq.

Invertebrate observations

The butterflies northern clouded yellow *Colias hecla* and Arctic fritillary *Clossiana chariclea* were common in both Sullorsuaq and Qaamassoq and seen daily. Two cocoons of the moth *Gynaephora groenlandica* were found in Sullorsuaq.

A single specimen of either the caribou warble fly (*Oedemagena tarandi*) or caribou nostril fly (*Cephenomyia trompe*) was seen in Aqajarua, despite the fact that caribou have been absent from Disko for decades.

Furthermore, were bumblebees (*Bombus polaris/hyperboreus*) recorded frequently.

The snail *Lymnaea vahlii* was present in the Lymnaea Pond in Sullorsuaq, and also in other ponds in the valley and in the pond at the base camp at Qaamassoq.

Human activities

The distance to the towns of Ilulissat and Qeqertarsuaq is 55 km and 80 km respectively and to the settlements Saqqaq, Qeqertaq and Oqaatsut only 40-45 km (Figure 16). The northbound traffic from Ilulissat through the Vaigat is rather intensive, and particularly the small boats use the Aqajarua as a way-point.

Arctic char gill net fishing is popular in the muddy waters of Aqajarua , and when the weather is good, several boats and tents are present (Table 5, Figure 9). Tracks and camp sites also indicate extensive use of the coasts.

Small boats and dinghies were frequently sailing along the coast of Qaamassoq (Table 6).

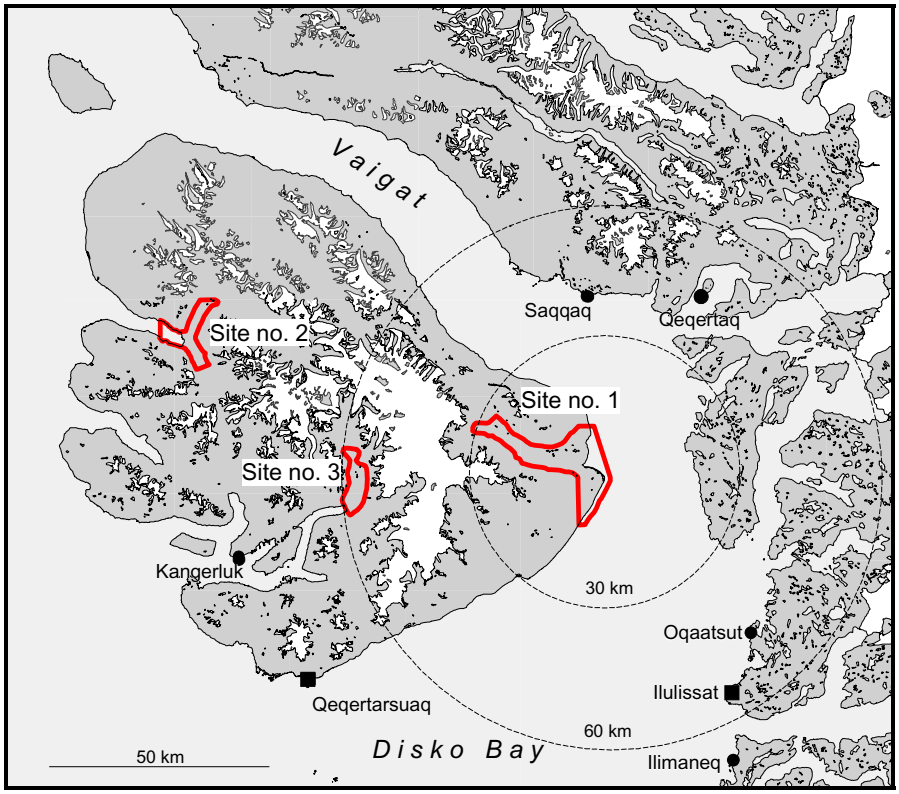

Figure 16. Map of the Disko Bay area. Dotted circles indicate 30 and 60 km distances from site no. 1. 30 km is the approximately travel distance per hour of a middle sized dinghy with a middle sized outboard engine (30 hp).

Table 5. Human activities in Aqajarua (within the Ramsar site).

Date	Dinghies	Small boats	Tents	Shots*	Comments
5 July	4	-	2	4	Only heard during a short period without motor noise from "Maja S"
7 July	5	5	2	1	Rifle shot at flying white-fronted goose
8 July	1	-	1	-	-

* Not recorded systematically

Table 6. Human activities along the coast of Qaamassoq.

Date and time	Dinghies	Small boat(s)	Shots	Comments
6 July 20:00-20:30	-	2	-	Passing by heading north
7 July 9:20-9:55	-	1	10	The boat was on passage heading north, when it stopped, hunted eiders, and then went on again.
7 July 10:17	1	-	2	-
8 July 22:05	2	-	2	Eider hunting on passage heading north
12 July 12:00	2	-	-	Passing by close to the coast heading north

Although the period of the survey was well within the closed hunting season of all potential gamebird (Anonymous 1989), eider and goose hunting was practised. On 7 July a king eider was shot just outside the coast of Qaamassoq and an additional of nine shots were heard. Later that day two white-fronted geese were shot at (riffle) in Aqajarua, but without luck. On 8 July two boats were seen sailing close to the coast of Qaamassoq shooting at a flock of king eiders but apparently no birds were hit.

Scallop trawling in, and close to, Aqajarua has been mentioned (Frimer 1993, Egevang & Boertmann 2001) as a potential threat to eiders using the site. Not because they take the scallops, but due to the disturbance caused by the activity. No scallop trawlers were seen in the period when we visited the site. In the period 1991-1998 (data provided by Greenland Institute of Natural Resources, and later data is not available) this fishery mainly took place in July-November, and mainly off Qaamassoq just outside the Ramsar site border, although trawling occasionally took place inside the site and in Aqajarua. The scallop fishery at Aqajarua has in the most recent years apparently ceased.

Status

The large numbers of white-fronted geese and the high diversity of other waterbirds at the site make the Aqajarua/Sullorsuaq highly relevant in Ramsar convention terms. The site meets the criterion B6 (Appendix VI) as approximately 1.6-2.1 % of the total population of Greenland white-fronted geese of 33,000 individuals (Fox et al. 1999) occur at one time within the site.

Aqajarua and the cost off Qaamassoq used to be a very important moulting ground for king eiders in the 1950's, but only small numbers have been observed through the last decades. The numbers of king eiders are today too low to meet the specific criteria based on waterbird numbers in the Ramsar convention. Aircraft-based surveys through the 1990's (Boertmann & Mosbech 2001) showed that king eiders were present in Aqajarua in July prior to the moulting season, but left the area when the critical moulting period started. This picture was confirmed by

the current survey, when 1575 individuals were present at our arrival. These birds soon disappeared, probably due to hunting and disturbance.

Future work at the site

To monitor, both the moulting geese and other breeding waterbirds, a 6-7 day period in July is needed. The wide delta of Sullorsuaq has to be overlooked both from the northern and the southern sides of the valley to include all flocks of geese. The main river in the valley is probably impossible to cross by foot in the outer parts, why an inflatable or a dinghy is required. Sullorsuaq is relatively easy to walk in and the entire valley floor can be overlooked from high points on one of the sides.

The Qaamassoq part of the Ramsar site can be surveyed on two full days while the Sullorsuaq part requires three days.

The moulting eiders should be counted in late August/start of September. The eiders are most conveniently counted from land or from aircraft.

Although the staging shorebirds are of secondary importance in Ramsar convention context, the best time to survey these would be in late July/early August.

Site no. 2

Greenland name: Kangersooq and Kuussuaq

Danish name: Nordfjord and Stordal

International Ramsar site no. 386

International and national significance

A significant proportion of the Greenland white-fronted goose population moult in the valleys of this Ramsar site. The Kangersooq is an important moulting ground for king eider.

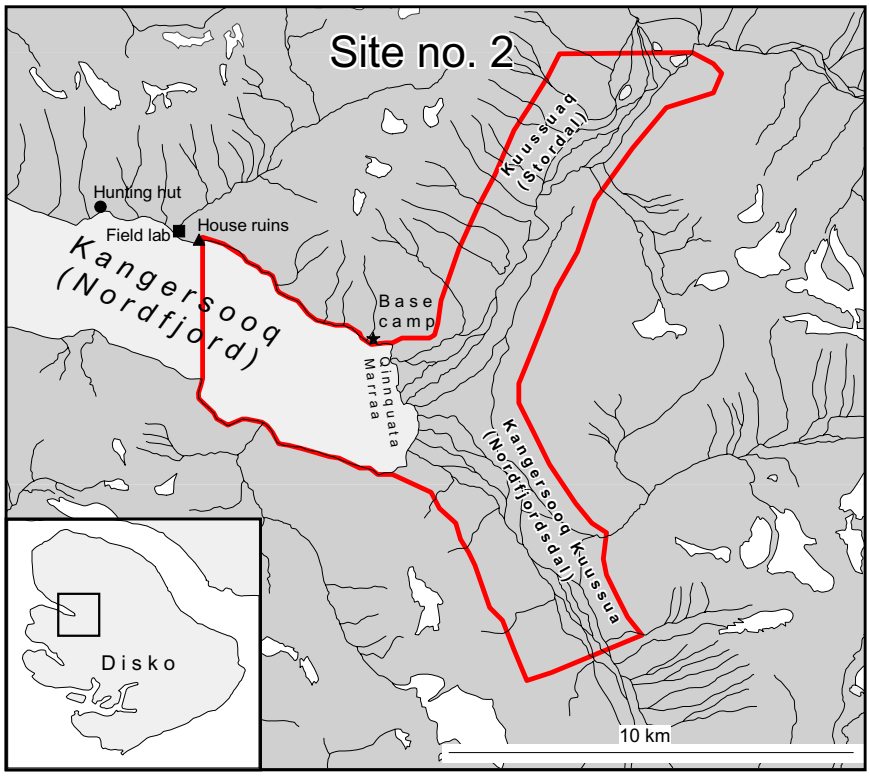

Figure 17. Map of Ramsar site no. 2 Kangersooq and Kuussuaq.

Site description

This Ramsar site consists of the head of a fjord and two valleys, adjoining in a common mouth. The Tertiary basalt mountains surrounding the valleys and the fjord reach altitudes up to 1256 m asl. The valley sides are mainly extensive talus areas and below these less steep areas with solifluction soil. The Ramsar site only covers the lower part (below 200 m asl.) of the valley sides.

The depth in the middle of the fjord is about 85 m at the Ramsar site border. Further inside the fjord the waters gradually becomes lower until a steep rise just in front of the extensive mudflats exposed during low tide (the tidal amplitude is about 2 m).

Figure 18. The valley to the south of the delta. View towards north. In the foreground moist dwarf scrub heath.

Figure 19. The northern part of Ramsar site no. 2. Note the pingos in the centre.

Both valleys are u-shaped glacial valleys with braiding melt water rivers in the floor (Figure 18 and 19). Only few rivers join the main river in the valley floor, and these are with extensive alluvial fans. However, many small streams with clear water, often from homeothermic springs run down the valley sides.

The common river delta is delimited from the sea by low barrier islands and spits from the mainland. This delta consists of extensive mudflats, which become covered by seawater during spring high tide. Salt marshes are found on the higher parts of the delta islands as well as along the mainland coast.

Further up the valleys extensive marshes and many ponds are found along the river bed. Most of these ponds have clear water, probably originating from homeothermic springs. Outside the Ramsar site, further up the valleys marshes, seemed to be absent, and the dwarf scrub heath were in direct contact with the gravel riverbed.

In the northernmost part of the Ramsar site, where the river from Steenstrup Dal joins the river from Kuussuaq, five pingos (mud volcanoes) are located. These show different stages of development from a tall steep hill to more or less collapsed mounds. More pingos are found further north outside the Ramsar site.

The vegetation on the valley sides exposed towards south, south-west and south-east are dominated by dense dwarf scrub heath, usually rather moist and in some places with hummocks. Species like *Betula*, *Salix*, *Vaccinium*, *Cassiope* , *Dryas*, and *Ledum* are common. More active solifluction soils have an open and low vegetation also with *Tofieldia*, , *Pedicularis* ssp. and *Pyrola*. The valley sides exposed more or less to the north (only seen from long distance), have much more sparse vegetation cover and the talus often reach the sea or the valley floor.

The salt marsh areas have *Puccinellia phryganodes*, *Carex ursina* and *C. subspathacea*, and in the higher, drier or less salty parts also *Carex rariflora*, *Mertensia*, *Honckenya* and *Koenigia*.

In the marshes along the riverbed *Carex stans* and the two species of *Eriophorum* predominates, and the marshes transform gradually into a more grassland like flora with decreasing moisture. Along streams on the valley sides small marshes may occur, also with species like *Saxifraga aizodes*.

On the higher gravel and mud banks of the riverbeds, low and open *Salix* scrubs are found.

Previous surveys

Biologists have visited the site only on few occasions and published information is very scarce. Kampp and Kristensen (unpubl. 1979) visited the site on their survey of bird localities on Disko in 1979 and O. Frimer spent some time in the area during his eiders studies (Frimer 1993b). The site has been over-flown on several occasions

through the 1990's by NERI on seaduck and goose surveys (Glahder 1999a, Mosbech & Boertmann 1999).

Fieldwork 2001

The site was visited on 15-21 July 2001. As in site no. 1 surveying was done by a combination of overlooking the area from elevated points and walking through the area. The major part of the time was spent in the Kuussuaq area from where it also was possible to overlook the large delta Qinnquata Marraa. On the 17 July we walked through Kangersooq Kuussua and on 18 July we surveyed the northern coast of Kangersooq (Figure 20).

Compared to site no. 1 the topography of the site (the two valleys) in combination with shorter observation distances reduced the possibility of counting the same geese twice.

The marine part of the site and the outer parts of Nordfjord were covered from the ship "Maja S" on arrival and departure from the site. A small inflatable boat was used to cross the fjord.

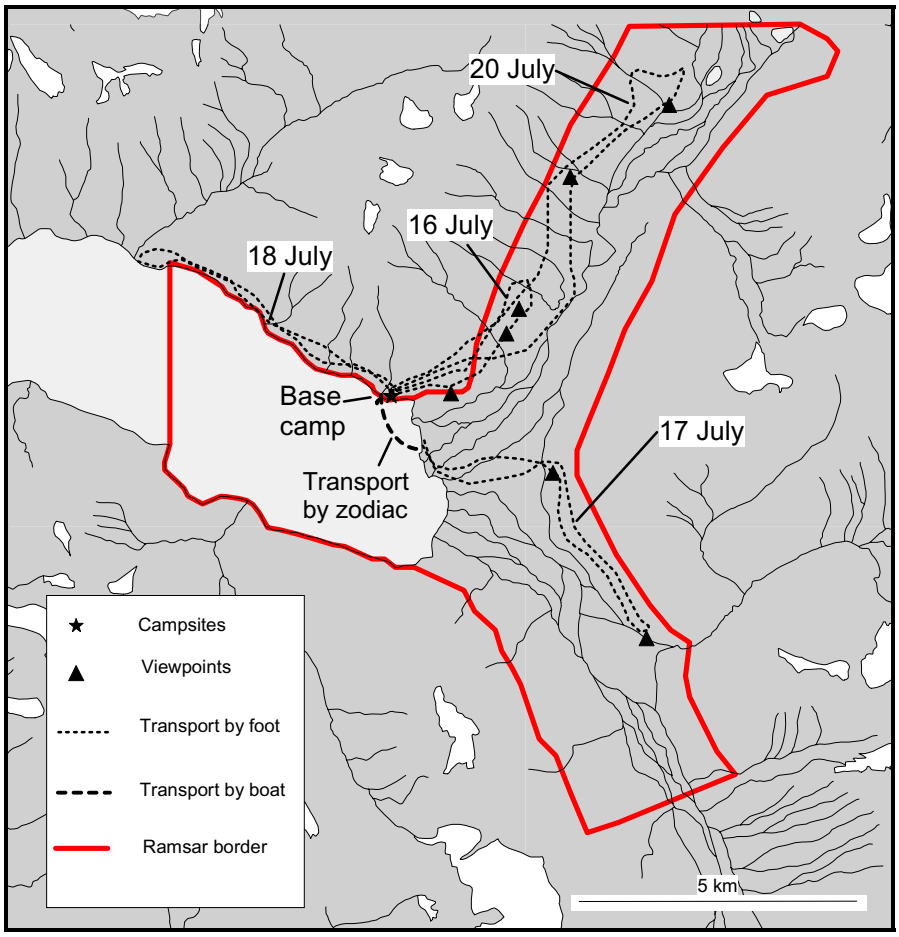

Figure 20. Map of Ramsar site no. 2 with campsite, viewpoints and routes used in connection with the fieldwork shown.

Bird observations

Table 7 and 8 presents an overview of selected staging, moulting and breeding bird species at Ramsar site no. 2.

Se also Appendix III for detailed information on date, number and location of bird observations. Please note that Appendix III may contain species, which are not presented in the account below.

Table 7. Staging and moulting waterbirds at Ramsar site no. 2

Species	Present survey	Previous surveys
White-fronted goose *Anser albifrons flavirostris*	**395**	**539** (1995)[1], **168** (1992)[1]
Canada goose *Branta canadensis*	**962**	**174** (1995)[1], **79** (1992)[1]
Brent goose *Branta bernicla hrota*	**-**	**156** (1995)[2], **42** (1994)[2]
Common eider *Somateria mollissima*	**250**	**641** (1994)[4], **2-300** (1991, 1992)[3]
King eider *Somateria spectabilis*	**74**	**7,000** (1994)[4], **1350** (1993)[4], **>1000** (1990-1991)[3]
Red-breasted merganser *Mergus serrator*	**53**	**35** (1994)[5], **65** (b. 1990)[6]

[1] Glahder 1999a, [2] Boertmann et al. 1997, [3] Frimer 1993b, [4] Mosbech & Boertmann 1999, [5] NERI unpubl. 2001, [6] Jepsen et al. 1993.

Table 8. Breeding waterbirds (pairs) at site Ramsar site no. 2

Species	Present survey	Previous surveys
Red-throated diver *Gavia stellata*	**3**	**5** (1979)[1]
White-fronted goose *Anser albifrons flavirostris*	**23**	**4** (1995)[2]
Canada goose *Branta canadensis*	**110**	**3** (1995)[2], **1** (1992)[2], **1** (1979)[1]
Red-necked phalarope *Phalaropus lobatus*	**2**	**-**
Purple sandpiper *Calidris maritima*	**5**	**-**

[1] Kampp & Kristensen unpubl. 1979, [2] Glahder 1999a, [3] Bennike 1990

Waterbirds

Red-throated diver *Gavia stellata*

A total of 3 breeding pairs and an additional of 12 birds were recorded. Up to 12 birds was seen feeding just off the delta.

Kampp & Kristensen (unpubl. 1979) recorded 5 pairs breeding within a distance of only 500 meters in Kuussuaq. Although we checked the ponds mentioned by Kampp & Kristensen we only recorded a single pair at the site.

Great cormorant *Phalacrocorax carbo*

Up to 42 birds used the outermost islands in the delta as a staging ground. The species does not breed within the site, but several "resting cliffs" were noted along the shores of Kangersooq.

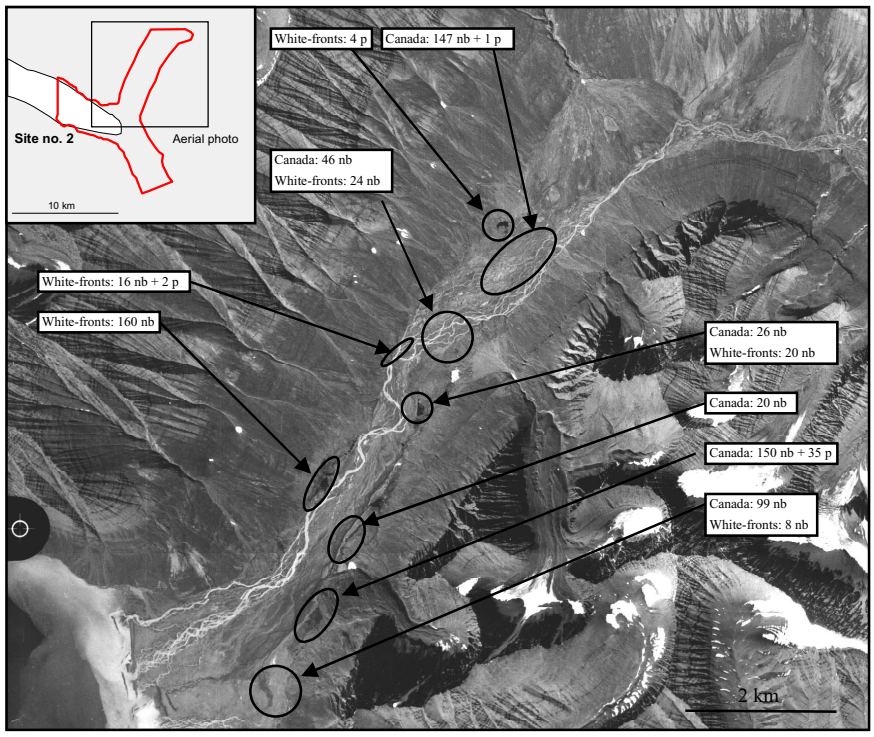

Figure 21. Aerial photograph of Kuussuaq, Ramsar site no. 2, with the distribution of geese on 20 July 2001 shown. Canada = Canada geese, White-fronts = white-fronted geese, nb = non-breeders, p = pairs with goslings.

Greenland white-fronted goose *Anser albifrons flavirostris*

A total of 23 pairs with goslings and 395 non-breeding birds were recorded. In total 441 white-fronted geese (excluding chicks) were recorded. These constitutes 1,3 % of the total population (33,000), making the site of international importance for the population.

The white-fronted geese were rather evenly distributed between the two valleys and the number geese present in Kuussuaq seemed very

constant (213, 192 and 228) on three different dates, when counts were conducted (see also Appendix III).

Earlier counts (Glahder 1999, NERI unpubl.) of moulting white-fronted geese at Ramsar site no. 2 showed that 169 was present in 1992 while 539 birds were seen in 1995. In 1992 no breeding pairs were recorded, whereas 4 pairs were recorded in 1995. These surveys were however, aircraft based, and breeding pairs are easily overlooked when using this survey platform. Furthermore, Jepsen et al. (1993) mention 50 breeding pairs at site no. 2 but this figure is of unknown origin and probably not based on actual counts made in the area.

It was possible to count the clutch size (double recordings may occur) of 19 pairs (Table 9). The average is somewhat lower than the average number of goslings/pair of white-fronted geese found at Ramsar site no. 1 (3.7 gosling). It is furthermore lower than average clutch size reported from central West Greenland ranging from 3.7 to 4.5 per pair in 1995 (Glahder 1999b).

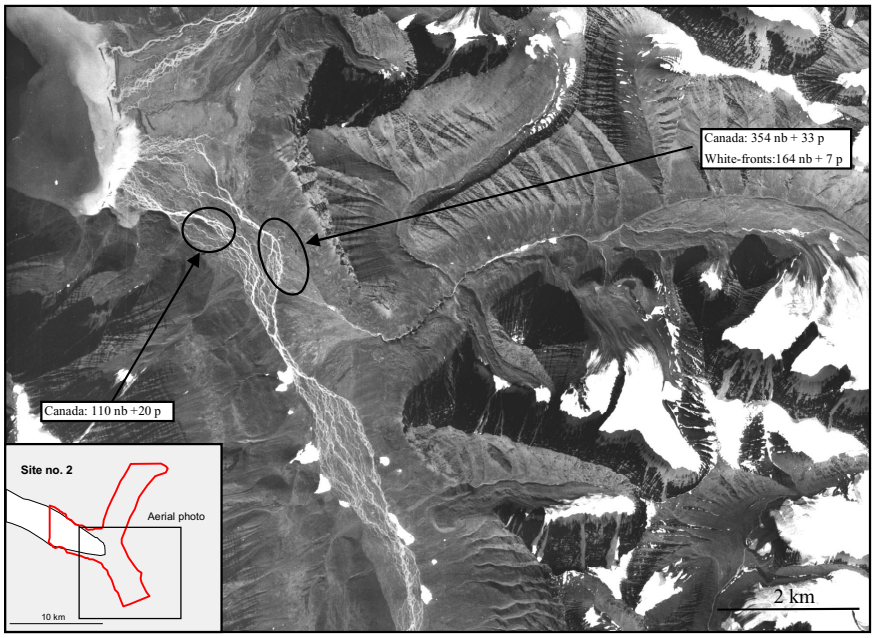

Figure 22. Aerial photograph of Kangersooq Kuussua, Ramsar site no. 2, with the distribution of geese on 17 July 2001 shown. Canada = Canada geese, White-fronts = white-fronted geese, nb = non-breeders, p = pairs with goslings.

Canada goose *Branta canadensis*

A total of 110 pairs with goslings and 962 non-breeders were recorded.

The Canada geese were, like the white-fronted geese, rather evenly distributed between the two valleys of the site.

The Canada goose has shown a dramatic increase in West Greenland during the past two decades, which the figures from Ramsar site no. 2 clearly reflect. Kampp & Kristensen (unpubl.) recorded one pair and three additional birds in 1979, whereas Bennike (1990) observed six pairs and an additional of 24 birds in 1989. Aircraft based counts

(Glahder 1999, NERI unpubl.) revealed 79 moulting birds plus one breeding pair in 1992 and 174 moulting birds and three pairs in 1995. Although it is possible that many breeding pairs were overlooked during the aircraft-based surveys, the figures from our survey show a significant increase in both breeding pairs and the number of moulting Canada geese in site no. 2.

It was possible to count the number of goslings in 40 pairs (Table 9).

Table 9. Number of goslings/pair in Ramsar site no. 2

Clutch size	1	2	3	4	5	6	7	Average
White-fronted n = 19	6	7	2	2	1	0	1	2.4
Canada n = 40	4	11	9	8	7	1	0	3.2

Mallard ***Anas platyrhynchos***

A maximum of 14 mallards was seen in Kuussuaq and four in Kangersooq Kuussua. No proof of breeding was recorded.

King eider ***Somateria spectabilis***

Highest numbers recorded in the fjord were 74. All king eiders seen were capable of flying.

The large numbers (Frimer 1993b, Mosbech & Boertmann 1999) of king eiders utilising the fjord as a moulting ground had presumably not yet arrived. The moulting period (non-breeders and males) are initiated in mid-July. Previous aircraft based counts (Mosbech & Boertmann 1999) revealed about 7,000 king eiders moulting in early September.

The moulting king eiders occur throughout the fjord, why we in our previous report (Egevang & Boertmann 2001) suggested to enlarge the Ramsar site to include the entire fjord.

Common eider ***Somateria mollissima***

A single female with 5 chicks and up to 250 staging birds were found within the site borders.

Smaller flocks (up to 300 birds) of common eiders have previously been recorded in Kangersooq during July to September (Frimer 1993b, Boertmann & Mosbech 2001).

Long-tailed duck ***Clangula hyemalis***

Up to 12 individuals were recorded in the fjord just outside the delta. No signs of breeding were recorded.

The species has previous been recorded breeding at the site by Kampp & Kristensen (unpubl. 1979).

Red-breasted merganser ***Mergus serrator***

Small flocks (of up to 53 individuals) of mainly moulting males were recorded.

Previous records of 35-65 birds (NERI unpubl.) have been reported from the site.

Shorebirds

Purple sandpiper ***Calidris maritima***

A total of 5 pairs were recorded. Two in Kuussuaq and three in Kangersooq Kuussua, at the latter site two clutches (3+1) were observed.

Red-necked phalarope ***Phalaropus lobatus***

Two pairs were recorded in Kuussuaq.

Skuas, gulls, terns and auks

Arctic skua ***Stercorarius parasiticus***

A maximum of four birds was recorded in the delta. No breeding activities were recorded. However, the species may breed close to the site.

Kampp & Kristensen (unpubl. 1979) mention a single potential pair in Kuussuaq.

Iceland gull ***Larus glaucoides***

A breeding colony with app. 70 individuals were located just outside the border in Kangersooq Kuussua on the eastern cliffs at an altitude of app. 400 m asl.

Other birds

Peregrine falcon ***Falco peregrinus***

A single adult bird was seen near our base camp 2 dates. Furthermore sounds of a "prey-delivery" were heard (but no bird seen) in the upper Kuussuaq near the northern border of the site. On the steep cliffs an ideal site for a falcon nest with orange lichens and white stains were located.

Rock ptarmigan ***Lagopus mutus***

Two single birds were seen close to the base camp.

Northern wheatear *Oenanthe oenanthe*
A total of 6 pairs were recorded.

Most of the pairs were found in the upper part of Kuussuaq.

Lapland bunting *Calcarius lapponicus*
A total of 12 pairs were recorded.

Snow bunting *Plectrophenax nivalis*
A total of 9 pairs were recorded.

The densities of passerines were obviously much lower at this site compared to Ramsar site no. 1.

Mammal observations

Harp seal *Pagophilus groenlandicus*
Daily observations of 1-8 individuals in the inner part of Kangersooq.

Arctic fox *Alopex lagopus*
Tracks from foxes were seen several places within the site. A fox was heard 19 July in Kuussuaq.

Arctic hare *Lepus arcticus*
Two adult hares were seen on 20 July in Kuussuaq.

Other vertebrates
Arctic char *Salvelinus alpinus* occurred along the coasts of Kangersooq.

Invertebrate observations
The butterflies northern clouded yellow *Colias hecla* and Arctic fritillary *Clossiana chariclea* were rather common and seen daily. Furthermore, were bumblebees (*Bombus polaris/hyperboreus*) recorded on several days.

Archaeology

Three house ruins of unknown age are located close to the eastern border (inside the Ramsar site) of the site on the northern coast of Kangersooq.

Human activities

This site is rather remote and during our stay no other human

activities were recorded. There were, however, a camp site on the northern side of Qinnquata Marraa probably used in connection with fishing for Arctic char or hunting in the area.

In Qeqertarsuaq, we were told that people often go to Kuussuaq to collect amethysts. The sample site is close to the northern border of the Ramsar site. We saw rather fresh foot-prints near this site. In a fast speed-boat it should be possible to go from Qeqertarsuaq to Kangersooq in a couple of hours.

Just outside the Ramsar site on the northern shore of Kangersooq, an old field laboratory (in a very poor condition) and a hunting hut is located (0.5 km and 2.5 km from the border respectively) (see Figure 17).

When we left the site on 21 July, a scallop trawler was observed at the mouth of Kangersooq.

Status

Approximately 1.3 % of the white-fronted goose population occur within the site at one time, making it of international importance to this population, and the site meets the specific waterbird criteria B6 (Appendix VI). The remote location of the site makes it attractive to the geese and more than 2000 individuals (both species including goslings) are located in the two valleys during the summertime.

The moulting king eiders in August/September are distributed all over the fjord, and in fact a large proportion of the birds are actually located outside the site borders.

Future surveys

The two important species in Ramsar convention terms are king eider and white-fronted goose.

The geese are most conveniently surveyed in mid-July when the non-breeders are moulting and most breeding pairs have goslings. The site can, under optimal weather conditions, be surveyed in two days: One to cover Kuussuaq and one to cover Kangersooq Kuussua.

The rivers of the two valleys seemed very difficult (if not impossible) to cross close to the delta and means of transportation (boat) across the inner part of Kangersooq is recommended.

The many moulting king eiders that use the site (and adjoining areas) are best surveyed (from the coast or by aircraft) in August/ September when numbers are the highest (Mosbech & Boertmann 1999).

Site no. 3

Greenland: Kuannersuit Kuussuat

Danish name: None

International Ramsar no. 385

International and national significance

The site was designated due to a high number of moulting white-fronted geese.

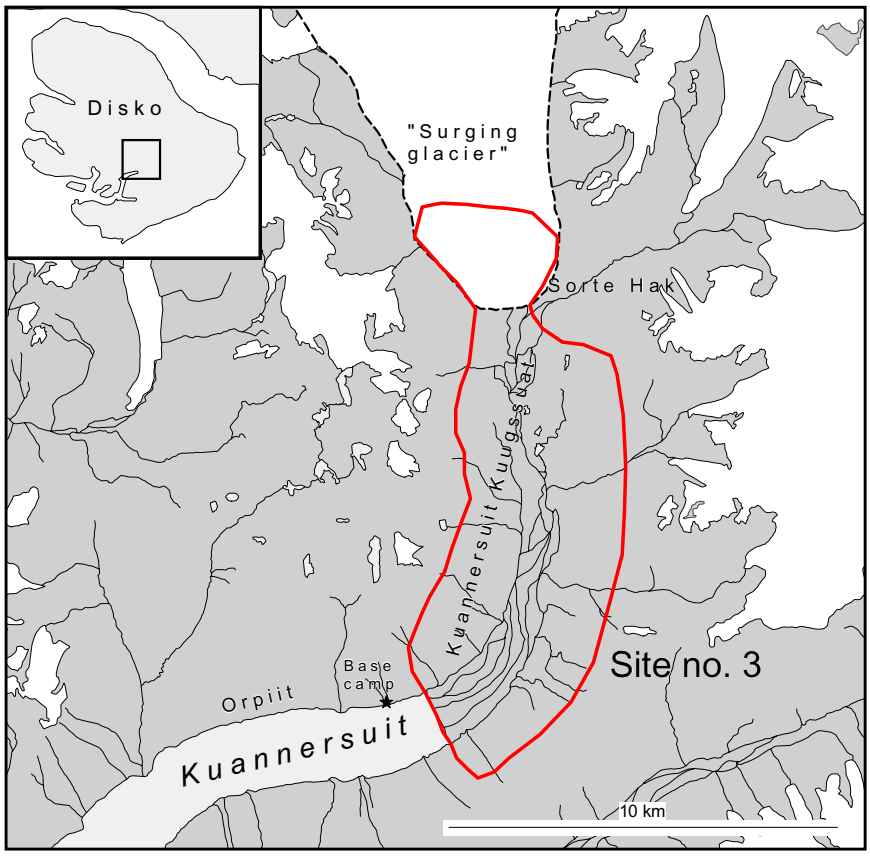

Figure 23. Map of Ramsar site no. 3, Kuannersuit Kuussuat. Note the glacier in the northern part of the site that recently surged into the site.

Site description

This site also is a glacial u-shape valley with a braiding melt water river. The Ramsar site does not include the inner part of the fjord and the border is situated along the outer boundary of the river delta (at low tide). The riverbed is very wide and covers almost completely the entire valley floor in the outermost 7 km of the Ramsar site. A single small pingo is located near the south-western border of the Ramsar site. The delta is as wide as the riverbed, and during low tide (amplitude about 2 m) extensive mudflats become exposed.

The following 2.5 km towards north of the valley floor, recently de-iced moraines dominate the landscape (Figure 24): Naked gravel hills, gravel and boulder plains, wasted ice, deep ponds at different altitudes, some with clear water and a few with strongly turbid water. The riverbed is in this part much narrower that further down.

Further 3.7 km northwards the valley floor is a wide melt water out-wash plain with some moraines (with wasted ice inside) and with the river strongly braiding (Figure 25).

The northernmost 2 km of the Ramsar site is now covered by a glacier, which in the years 1995-1999 surged more than 10 km. It covers 7.2 km^2 (about 14 %) of the Ramsar site.

Previous surveys

The site has only been visited sporadically by ornithologists and no actual survey has ever been conducted at the site. Kampp and Kristensen (unpubl.) visited the site in 1979 and Frimer (1993a) also spent some time in the adjoining fjords. The site has furthermore been over-flown by NERI in connection with geese surveys in 1992 and 1995 (Glahder 1999b). The published information from the site is very limited.

Fieldwork 2001

The site was visited on 22-25 July 2001. The western side of the valley was surveyed by foot, while the eastern side was overlooked from high-elevated points on the western side using spotting scope. A base camp was established just outside the site border (nearest landing site for a boat) and a temporary camp was used in the central part of the site (Figure 26).

Figure 24. Central part of the valley in site no. 3. In the foreground the river, and behind some of the many ponds.

Figure 25. The northern part of site no. 3. The extensive out-wash plain is seen in the centre and behind it the surging glacier is apparent.

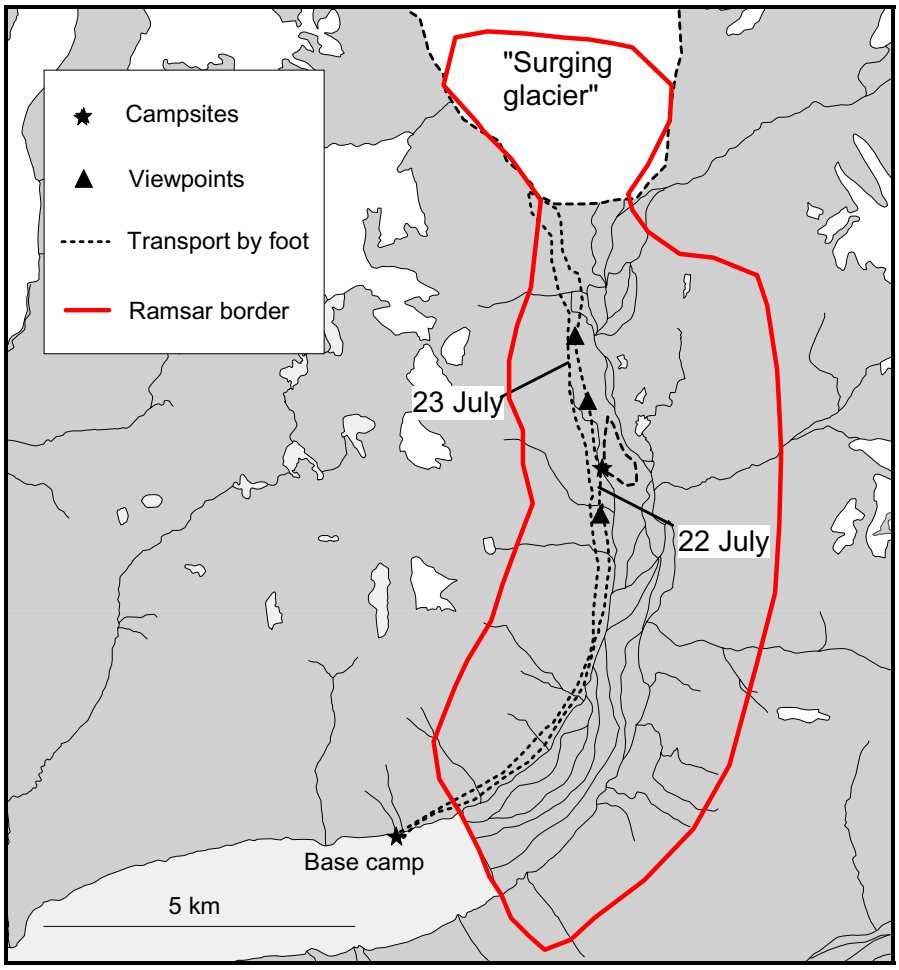

Figure 26. Map of Ramsar site no. 3 with routes, campsites and viewpoints used in connection with fieldwork at the site.

Bird observations

Table 10 and 11 present an overview of selected staging, moulting and breeding bird species at site no. 3.

Se also Appendix IV for detailed date, number and location on bird observations. Please note that Appendix IV may contain species, which are not presented in the species account below.

Table 10. Staging and moulting waterbirds at Ramsar site no. 3

Species	Present survey	Previous surveys
White-fronted goose *Anser albifrons flavirostris*	**0**	**74** (1995)[1], **30** (1992)[1]
Mallard *Anas platyrhynchos*	**7**	**11** (1995)[2]

[1] Glahder 1999b, [2] NERI unpubl. 2001.

Table 11. Breeding waterbirds (pairs) at Ramsar site no. 3

Species	Present survey	Previous surveys
Red-throated diver *Gavia stellata*	**1-2**	- unknown numbers[1]
White-fronted goose *Anser albifrons flavirostris*	**1**	**2** (1995)[2]
Canada goose *Branta canadensis*	**2**	
Mallard *Anas platyrhynchos*	**0**	- unknown numbers[1]
Common eider *Somateria mollissima*	**1**	**3** (1979)[3]
Long-tailed duck *Clangula hyemalis*	**1**	- unknown numbers[1]
Red-breasted merganser *Mergus serrator*	**0**	- unknown numbers[1]
Red-necked phalarope *Phalaropus lobatus*	**2**	**3** (1979)[3]

[1] Jepsen et al. 1993, [2] Glahder 1999b, [3] Kampp & Kristensen unpubl. 1979.

Waterbirds

Red-throated diver *Gavia stellata*

One - possible two - breeding pairs were recorded.

Greenland white-fronted goose *Anser albifrons flavirostris*

The only observation of this species was a pair with one gosling at the small moraine lakes in the central part of the valley.

Jepsen et al. (1993) mention 200 white-fronted geese using the site as moulting grounds, but this figure is unconfirmed and of unknown origin. Aircraft-based surveys in 1992 and 1995 (Glahder 1999b) revealed that 30 and 74 moulting birds respectively used the site and two breeding pairs were seen in 1995.

Canada goose *Branta canadensis*

Two pairs of Canada geese with goslings (2 and 4) were seen in the riverbed at the lower part of valley. No moulting birds were observed.

Observations of Canada geese at this site have not been published before.

Mallard *Anas platyrhynchos*

A total of seven birds were recorded. Although no certain breeding pairs were recorded, the species probably breed within the site.

Common eider ***Somateria mollissima***

A female was seen in the delta just outside the site border. On the following day two chicks (app. 3-5 days old), but not in company with an adult bird, were seen in the delta.

The species has previously (Kampp & Kristensen unpubl. 1979) been reported as breeding at the site (3 pairs), and very remarkably at the lakes in the central part of the Ramsar site.

Long-tailed duck ***Clangula hyemalis***

A single female was seen on one of the small lakes in the central part of the site.

The species has previous been reported as breeding at the site.

Red-necked phalarope ***Phalaropus lobatus***

A total of two pairs were recorded. One in the delta and the other in the small lakes in the central part of the site.

Kampp & Kristensen (unpubl. 1979) report 3 pairs breeding with only 30-40 m apart in the lakes.

Glaucous gull ***Larus hyperboreus***

Two birds showed territorial behaviour in the lower part of the site and may have bred in the vicinity.

Other birds

Peregrine falcon ***Falco peregrinus***

An adult bird was seen and heard at a potential nest cliff near the southern border of the site on several occasions.

Gyrfalcon ***Falco rusticolus***

A family of four birds (two ads. and two juveniles) was seen in the central part of the site.

Northern wheatear ***Oenanthe oenanthe***

A total of 4 pairs were recorded.

Redpoll ***Carduelis flammea***

A total of 5 pairs were recorded.

Lapland bunting ***Calcarius lapponicus***

A total of 8 pairs were recorded.

Snow bunting *Plectrophenax nivalis*

A total of 6 pairs were recorded.

Mammal observations

Arctic fox *Alopex lagopus*

Tracks were seen at several places within the site, but no animals were recorded.

Invertebrate observations

Northern clouded yellow *Colias hecla,* Arctic fritillary *Clossiana chariclea* and bumblebees (*Bombus polaris/hyperboreus*) were common.

Human activities

The valley is a favoured excursion site for geologists, biologists and geographers from Arctic Station. Following the glacier surge in 1995-1999, the activity in the area has increased considerably. In the summers of 1999-2001 research camps have been present in the upper and central part of the site and the amount of traffic into (by helicopter and foot) and within (by foot) the site has been significantly higher than the years before. During our stay, we recorded two tent camps with a total of nine tents and five scientists staying at the lakes in the central part and near the glacier front.

Just outside the Ramsar site a camp site were located on the western shore. And several remedies for gill net fishing were found, indicating that the head of the fjord is a popular fishing site, although it is prohibited according to a local municipality order (Anonymous 1986).

Status

The July 2001 survey confirms the suspicion that Ramsar site no. 3 hardly meet any of the specific criteria (B5 and B6 see Appendix VI) on waterbirds in the Ramsar convention. The site is spectacular in terms of landscape, but the number and diversity of breeding and staging/moulting waterbirds within the site is far from unique compared with equal sized wetlands in other places in central West Greenland. The wetlands suitable for waterbirds are very limited, and moreover not unique in an ornithological context.

We find it unlikely that the site - as it looks today - can sustain large numbers of moulting geese, due to the limited extensions of the wetlands preferred by the geese.

We have moreover tried to trace the origin of the high numbers of geese, which was the main reason for the designation (Jepsen et al.

1993), but without any luck. And it cannot be excluded that confusion with another site at Disko may have occurred.

Future monitoring

The terrain of the site is rather easily walked (western side of the valley) and the site can by covered on foot during one or two days. The main river seemed very difficult to cross, but the narrowness of the valley makes it possible to overlook the riverbed and the ponds of the site from the western side. An exception is two small lakes located about 60 m asl. in the interior part of the valley c. 1.5 km south of Sorte Hak.

Conclusions

The two Ramsar sites, 1 and 2 both regularly supports more than 1% of the individuals of the total population of the Greenland white-fronted goose. They are therefore internationally important sites for waterfowl, and as such meet the specific waterbird criterion (B6) of the Ramsar Convention.

Furthermore, the sites are excellent representatives of the characteristic wetlands on Disko and especially site no. 1 show a rich diversity in breeding waterbirds.

Ramsar site no. 3 on the other hand, proved to hold far from internationally important numbers of waterbirds (white-fronted geese). Previous high numbers reported from the site cannot be confirmed, and perhaps these figures originate from another site.

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Appendix I

Itinerary 3 July – 1 August 2001

3 July: Travel from Denmark to Aasiaat in Greenland. Stayed for the night at the "Sømandshjem"

4 July: Travel from Aasiaat to Qeqertarsuaq on Disko. Stayed at Arctic Station of the University of Copenhagen. Made preparations for the field trip.

5 July: Site no. 1 - Sailed from Qeqertarsuaq 7.30 with "Maja S" and arrived at Aqajarua 15.00. Field camp established on the coast of Qaamassoq. Survey in the vicinity of the camp. Weather: Sunny and calm, temperature up to 15º C. Huge amounts of mosquitoes.

6 July: Site no.1 - Surveyed the southern part of the Qaamassoq-part of the Ramsar site. Weather: Fog in the morning, but later sunny and calm, temperature up to 15º C. Huge amounts of mosquitoes.

7 July: Site no.1 - Surveyed the northern part of Qaamassoq. Weather: Sunny and calm, temperature up to 15º C. Huge amounts of mosquitoes.

8 July: Site no.1 - Surveyed Aqajarua (zodiac) and the northern side of Sullorsuaq. Weather: Sunny and calm, temperature up to 15º C. Huge amounts of mosquitoes.

9 July: Site no. 1 - Surveyed the central part of Qaamassoq and the south side of Sullorsuaq. Satellite camp established in Kvandalen. Weather: Sunny and calm, temperature up to 15º C. Huge amounts of mosquitoes at Flakkerhuk, less in Kvandalen.

10 July: Site no. 1 - Surveyed the central part of the southern side of Sullorsuaq. New satellite camp in Sullorsuaq. Weather: Sunny and calm, temperature up to 15º C. Many mosquitoes.

11 July: Site no. 1 - Surveyed the innermost part of southern side of Sullorsuaq. Same camp as yesterday. Weather: Sunny and calm, temperature up to 15º C. Many mosquitoes. Fog observed in the morning in the mouth of the valley. A rather strong valley breeze from noon.

12 July: Site no. 1 - Returned to the Qaamassoq camp. Weather: Sunny and calm, temperature up to 15º C. Huge amounts of mosquitoes and some Simulidae. Weather: Sunny and calm, temperature up to 15º C. In the evening clouds arrived from west and the temperature decreased.

13 July: Site no. 1 - Picked up by "Maja S" and before return to Qeqertarsuaq the coastal waters of Qaamassoq and the southernmost part of the Ramsar site were surveyed. Quarters at Arctic Station. Weather: Sunny and calm, temperature up to 15º C.

14. July: Qeqertarsuaq. Preparations for the next field trip. Quarters at Arctic Station. Weather: Sunny and calm, temperature up to 15º C. Few mosquitoes.

15 July: Site no. 2 - Left Qeqertarsuaq 7.30 AM with "Maja S" and sailed towards Kangersooq. Several seabird colonies on the route were studied, and we went ashore the southern coast of Qeqertaq to study the remains of a stranded Greenland Whale. Arrived at Kangersooq 21.30, where a camp was established on the north shore as far inside the fjord as it was possible to sail.

16 July: Site no. 2 - Surveyed the delta and the outer parts of Stordal. Weather: Cloudy in the morning, later some sun. Rather calm and temperature up to 12º C. Rather few mosquitoes.

17 July: Site no. 2 - Surveyed the delta and the southern valley. Weather: Cloudy in the morning, later sun. Rather calm and temperature up to 12º C.

18 July: Site no. 2 - Surveyed the north shore of the fjord. Weather: Sun in the morning, but rain from

noon and this persisted throughout the day. Fog in the evening. Temperature max. 11º C.

19 July: Site no. 2 - Surveyed the outer parts of Stordal. Fog until 11.00. Rain from noon, and this persisted throughout the day and the night. Temperature max. 9º C.

20 July: Site no. 2 - Surveyed Stordal to the pingos. Weather: Rain until 13.00, then cloudy and rather strong wind from west. Max. 11º C.

21 July: Site no. 2 - "Maja S" arrived from Qeqertarsuaq, and we left Kangersooq. Visited the coastal lagoon off Hammar Dal on north-west Disko, and subsequently sailed towards Kuannersuit. Weather: In the morning sun and no clouds. Strong Fjord breeze from 10.30. Later fog when we went ashore at north-west Disko.

22 July: Site no. 3 - Arrived at Kuannersuit 7.30. Where a camp site was established just east of Orpiit. Surveyed the southern part of the Ramsar site. A satellite camp was established in the centre of the Ramsar site. Weather: Sun, calm and warm. Many mosquitoes and Simulidae.

23 July: Site no. 3 - Surveyed the remainder part of the Ramsar site. Weather: In the morning low clouds and cold. Later sun.

24 July: Site no. 3 - Surveyed the outermost part of the Ramsar site incl. the large homeothermic springs. Weather: Sunny and calm. Many mosquitoes and Simulidae. Fjord breeze from noon. Temperature max. 15º C.

25 July: Site no. 3 - Returned with "Maja S" to Qeqertarsuaq, a 7 hours trip. Weather: Cloudy in the morning, later sunny and rather strong wind in the fjord.

26- 29 July: Qeqertarsuaq. As our fieldwork was terminated somewhat earlier than planned, due to the unexpected favourable weather, and as it was impossible to change our booking (with SAS to Copenhagen) to an earlier flight, we had to wait for some days i Qeqertarsuaq. These were spend with packing our equipment and with initial writing of the manuscript to the report. We also visited some of the interesting homeothermic springs to study the flora. Stayed at Arctic Station.

30 July: Travel from Qeqertarsuaq to Kangerlussuaq, where we stayed at KISS.

31 July: Kangerlussuaq.

1 August: Travel to Denmark.

Appendix II

Bird observations at Ramsar site no. 1 on 5-13/7 2001.

In the presentation of the bird observations from the site, obvious duplicates are not presented.

MD = Aqajarua area (Mudderbugten)
KD = Sullorsuaq area (Kvandalen)
FH = Qaamassoq (Flakkerhuk)
nb. = non breeding
f. = female
m. = male
ad. = adult
imm. = immature

Red-throated diver *Gavia stellata*
5/7: 3 off the coast of FH, 1 pair – nest with 2 eggs FH; 7/7: 9 MB; 8/7: 1 pair KD; 9/7 3 KD; 10/7: 3 nests KD; 12/7: 1 the coast of FH.

Great cormorant *Phalacrocorax carbo*
The species does not breed within the site but 3 adult birds were seen off the coast of FH on 5/7.

Greenland white-fronted goose *Anser albifrons flavirostris*
5/7: 2 nb FH; 7/7: 2 pairs KD and 40 nb. FH; 8/7: 3 pairs + 242 nb. KD; 9/7: 45 nb. FH, 16 pairs + 243 nb. KD; 10/7: 14 pairs + 104 nb. KD, 11/7: 5 pairs KD.

Canada goose *Branta canadensis*
7/7: 12 pairs + 30 nb. KD; 8/7: 25 pairs + 82 nb. KD; 9/7: 21 pairs + 28 nb. KD; 10/7: 1 pair + 107 nb. KD; 11/7: 28 pairs + 69 nb. KD.

Mallard *Anas platyrhynchos*
6/7: 18 FH; 7/7: 1 pair + 4 FH, 2 MD; 8/7: 6 KD; 9/7: 14 KD; 10/7: 1 pair + 16 KD.

Lesser scaup *Aythya affinis*
10/7: 1 f. KD

King eider *Somateria spectabilis*
4/7: 1575 off the coast of FH; 7/7: 50 MB; 12/7: 60 off the coast of FH.

Common eider *Somateria mollissima*
4/7: 100-150 off the coast of FH; 12/7: 7 f. FH.

Long-tailed duck *Clangula hyemalis*
5/7: 10 off the coast of FH; 6/7: 2 pairs + 10 FH, 7/7: 15 off the coast of FH, 4 FH; 8/7: 6 pairs KD; 9/7: 1 f. and a nest with 6 eggs FH; 9/7: 3 KD; 10/7: 3 KD.

Red-breasted merganser *Mergus serrator*
4/8: 2 off the coast of FH; 5/7: 4 off the coast of FH.

Peregrine falcon *Falco peregrinus*
5/7: 1 ad. FH.

Rock Rtarmigan *Lagopus mutus*
8/7: 2 KD; 9/7: 1 FH; 10/7 2 pairs KD; 11/7: 1 KD.

Great ringed plover *Charadrius hiaticula*
7/7: 1 ad. at the beach of FH; 8/7: 2 pairs KD; 9/7: 1 pair KD; 10/7: 2 pairs + 1 KD; 12/7: 3 ad. at the beach of FH; 13/7: 2 at the beach of FH.

Grey plover *Pluvialis squatarola*
7/7: 1 2k. at the beach of FH; 8/7: 14 (one flock) in the delta of KD; 12/7: 1 ad. at the beach of FH.

Red knot *Calidris canutus*
12/7: 1 ad. at the beach of FH.

Sanderling *Calidris alba*
8/7: 3 ad. at the beach of FH.

Purple sandpiper *Calidris maritima*
5/7: 1 at the beach of FH; 6/7: 5 pairs + 2 and 2 nests (with 3 and 4 eggs) FH; 7/7: 4 pairs + 4 and 1 nest (4 eggs) FH; 8/7: 5 pairs KD; 9/7: 1 pair + 1 KD; 10/7: 1 pair + 1 KD; 12/7: 8 staging at the beach of FH.

Red-necked phalarope *Phalaropus lobatus*
5/7: 1 pair FH; 6/7: 19 FH (14 (11 f.) in one tiny pond); 7/7: 1 pair + 3 FH; 8/7: 10 KD; 9/7: 2 pairs + 10 KD; 10/7: 5 pairs + 7 KD; 11/7: 1 KD; 12/7: 2 at the beach of FH.

Red Phalarope *Phalaropus fulicarius*
1 m. on 9/7, 12/7 and 13/7 FH.

Pomarine skua *Stercorarius pomarinus*
5/7: 18 off the beach of FH, 7/7: 1 2k. off the coast of FH; 12/7: 12 (including 1 dark phase) off the beach of FH.

Arctic skua *Stercorarius parasiticus*
5/7: 6 off the beach of FH; 6/7: 3 pairs + 3 FH; 7/7: 1 pair + 4 FH and 6 off the coast of FH; 8/7: 4 pairs KD; 10/7: 1 pair KD; 11/7: 8 off the coast of FH; 13/7: 1 pair FH.

Long-tailed skua *Stercorarius longicaudus*
12/7: 3 ad. FH, 13/7: 1 ad. + 1 2k. FH.

Iceland gull *Larus glaucoides*
Few birds seen flying through KD 7-11/7.

"White gulls" *Larus glaucoides/hyperboreus*
7/7: 50 off the coast of FH; 12/7: 350 off the coast of FH.

Great black-backed gull *Larus marinus*
6/7: 1 off the coast of FH; 8 imm. off the coast of FH.

Kittiwake *Rissa tridactyla*
5/7: 50 off the coast of FH; 12/7: 200 off the coast of FH.

Arctic tern *Sterna paradisaea*
6/7: 3 pairs FH; 5 pairs + 2 FH.

Brünnich's guillemot *Uria lomvia*
5/7: 4 off the coast of FH; 12/7: 15 off the coast of FH.

Black guillemot *Cepphus grylle*
5/7: 15 off the coast of FH; 12/7: 1 off the coast of FH.

Raven *Corvus corax*

6/7: 2 FH; 7/7: 5 FH; 10/7: 1 KD.

Northern wheatear *Oenanthe oenanthe*
8/7: 1 pair FH; 11/7: 1 pair KD.

Redpoll *Carduelis flammea*
8/7: 1 pair; 9/7: 2 pairs; 10/7: 9 pairs; 11/7: 11 pairs.

Lapland bunting *Calcarius lapponicus*
5/7: 8 pairs FH; 6/7: 48 pairs FH; 7/7: 33 pairs FH; 8/7: 23 pairs KD; 9/7: 11 pairs KD; 10/7: 46 pairs KD; 11/7: 22 pairs KD.

Snow bunting *Plectrophenax nivalis*
6/7: 1 pair FH; 10/7: 3 pairs KD.

Appendix III

Bird observations at Ramsar site no. 2 on 15-21 July 2001.

In the presentation of the bird observations from the site, obvious duplicates are not presented.

NF = Kangersooq (Nordfjord)
NFD = Kangersooq Kuussua (Nordfjordsdal)
SD = Kuussuaq (Stordal)
DEL = the delta of the two rivers in SD and NFD (Qinnquata Marraa)
nb. = non breeding
f. = female
m. = male
ad. = adult
imm. = immature
pull. = pullus (downy chick)

In the presentation of the bird observations from the site, obvious duplicates are not presented.

Red-throated diver *Gavia stellata*
16/7: 8 DEL and 1 pair SD; 17/7: 1 pair FJD; 18/7: 5 DEL; 20/7: 12 DEL and 1 pair SD.

Great cormorant *Phalacrocorax carbo*
16/7: 42 DEL; 18/7: 7 DEL; 19/7: 5 DEL.

Greenland white-fronted goose *Anser albifrons flavirostris*
16/7: 12 DEL and 213 nb. SD; 17/7: 7 pairs + 164 nb. NFD; 19/7: 8 pairs + 192 nb. SD; 20/7: 6 pairs + 228 nb. SD; 21/7: 6 pairs DEL.

Canada goose *Branta canadensis*
16/7: 46 pairs + 555 nb. SD; 17/7: 56 pairs + 464 nb. NFD; 19/7: 8 pairs + 192 nb. SD; 20/7: 36 pairs + 498 nb. SD.

Mallard *Anas platyrhynchos*
16/7: 8 SD; 17/7: 4 NFD; 19/7: 4 SD; 20/7: 14 SD.

King eider *Somateria spectabilis*
16/7: 30 NF; 17/7: 5 NF; 18/7: 74 NF; 21/7: 6 NF.

Common eider *Somateria mollissima*
16/7: 100-150 NF and 1 f. with 5 chicks DEL; 17/7: 250 NF, 18/7: 115 NF; 19/7: 166 NF; 21/7: 30.

Long-tailed duck *Clangula hyemalis*
16/7. 8 DEL; 18/7: 12 DEL; 20/7: 9 DEL, 21/7: 9 DEL.

Red-breasted merganser *Mergus serrator*
16/7: 53 NF; 19/7: 35 NF; 20/7: 15 NF.

Peregrine falcon *Falco peregrinus*
A single adult bird was seen close to the delta on 16/7 and 20/7. Potential nest side found in upper SD on 20/7.

Rock ptarmigan *Lagopus mutus*
Two birds were seen close to the base camp.

Purple sandpiper *Calidris maritima*

17/7: 3 pairs (1 + 3 pull.) NFD; 20/7: 2 pairs SD.

Red-necked phalarope *Phalaropus lobatus*
17/7: 2 pairs NFD.

Arctic skua *Stercorarius parasiticus*
16/7: 4 (light morph) DEL; 17/7: 3 (light morph) DEL; 19/7: 4 (3 light and 1 dark morph) DEL.

Iceland gull *Larus glaucoides*
A colony of 70 individuals were located just outside the border in NFD.

Glaucous Gull *Larus hyperboreus*
16/7: 8 DEL.

"White gulls" *Larus glaucoides/hyperboreus*
Dally observation of 10-15 DEL.

Great black-backed gull *Larus marinus*
16/7: 3 imm. DEL.

Raven *Corvus corax*
20/7: 3 SD.

Northern wheatear *Oenanthe oenanthe*
16/7: 1 pair SD; 17/7: 1 pairs NFD; 20/7: 4 pairs SD.

Lapland bunting *Calcarius lapponicus*
16/7: 4 pairs SD; 17/7: 5 pairs NFD; 20/7: 3 pairs SD.

Snow bunting *Plectrophenax nivalis*
16/7: 2 pairs SD; 17/7: 3 pairs NFD; 20/7: 4 pairs SD.

Appendix IV

Bird observations at Ramsar site no. 3, 22-25 July 2001.

f. = female
m. = male
ad. = adult
imm. = immature
pull. = pullus (downy chick)

Red-throated diver *Gavia stellata*
22/7: 1 + 1 pull., 23/7: 2

Greenland white-fronted goose *Anser albifrons flavirostris*
23/7: 1 pair with 1 pull.

Canada goose *Branta canadensis*
23/7 2 pairs with 4 and 2 pull.

Mallard *Anas platyrhynchos*
22/7: 4; 23/7: 3 (2 m. + 1 f.).

Common eider *Somateria mollissima*
24/7: 1 f.; 25/7: 2 pull.

Long-tailed duck *Clangula hyemalis*
23/7: 1 f.

Peregrine falcon *Falco peregrinus*
22/7: 1 ad. 24/7: 1 ad.

Gyrfalcon *Falco rusticolus*
23/7: 1 ad. m., 2 imm. and 1 imm./f. were seen in the central part of the site.

Red-necked phalarope *Phalaropus lobatus*
22/7: 2 pairs.

Iceland gull *Larus glaucoides*
22/7: 6; 23/7: 6

Glaucous gull *Larus hyperboreus*
22/7 and 23/7: 1 pair.

Great black-backed gull *Larus marinus*
22/7: 1, 23/7:1

Raven *Corvus corax*
22/7: 5

Rock ptarmigan *Lagopus mutus*
Three birds were seen close to the base camp just outside the borders of the site on 24/7.

Northern wheatear *Oenanthe oenanthe*
22/7: 3 pairs; 23/7: 1 pair.

Redpoll *Carduelis flammea*
22/7. 3 pairs; 23/7: 2 pairs.

Lapland bunting *Calcarius lapponicus*
22/7: 5 pairs; 23/7: 3 pairs.

Snow bunting *Plectrophenax nivalis*
22/7: 3 pairs; 23/7: 3 pairs.

Appendix V

Flora lists form the three sites

Species	Aqajarua/ Qaamassoq	Kangersooq/ Kuussuaq	Kuannersuit
Huperzia selago	x	x	x
Lycopodium dubium	x		
Diphasium alpinum	x		
Equisetum arvense	x	x	x
Equisetum scipoides	x		
Equisetum variegatum	x	x	x
Ranunculus hyperborea	x		x
Ranunculus lapponica	x	x	
Thalictrum alpinum			x
Dryas integrifolia	x	x	x
Portentilla egedii	x	x	x
Potentilla hookeriana	x		x
Sedum villosum			x
Saxifraga nivalis	x	x	x
Saxifraga tenuis	x		
Saxifraga cernua	x	x	x
Saxifraga hyperborea/rivularis	x	x	x
Saxifraga tricuspidata	x	x	x
Saxifraga caespitosa		x	x
Saxifraga oppositifolia	x	x	
Saxifraga aizoides		x	x
Chamaenerion latifolium	x	x	x
Epilobium hornemannnii			x
Epilubium palustre			x
Hippuris vulgaris	x		
Papaver radicatum	x	x	x
Draba glabella			x
Draba sp.	x		
Cochlearia groenlandica	x	x	x
Arabis alpina	x	x	x
Cardamina nymanni	x		x
Angelica archangelica	x		x
Salix herbacea	x		x
Salix arctophila	x	x	x
Salix glauca	x	x	x
Betula nana	x	x	
Oxyria digyna	x	x	x
Polygonum viviparum	x	x	
Rumex acetocella	x		
Koenigia islandica		x	x
Arenaria humifusa		x	
Minuartia stricta		x	
Minuartia rubella			x
Cerastium alpinum	x	x	x
Stellaria humifusa	x	x	x
Stellaria longipes s.l.	x	x	x
Stellaria calychanta			x
Honckenya peploides	x	x	x
Melandrium triflorum	x		
Melandrium affine		x	x
Viscaria alpina	x		x
Silene acaulis	x	x	x
Pyrola grandiflora	x	x	x
Cassiope tetragona	x	x	x
Harimaniella hypnoides	x		

Ledum sp.	x		x
Loiseleuria procumbens	x		
Phyllodoce coerulea	x		
Rhododendron lapponicum	x	x	x
Vaccinium uliginosum	x	x	x
Empetrum hermaphroditum	x	x	x
Mertensia maritima	x	x	x
Pedicularis lapponica	x	x	x
Pedicularis flammea	x	x	x
Pedicularis lanata	x	x	x
Pedicularis hirsuta	x	x	x
Bartsia alpina	x		x
Euphrasia frigida			x
Armeria scabra	x	x	
Pinguicula vulgaris	x		x
Campanula gieseckeiana	x	x	x
Campanula uniflora		x	x
Arnica alpina	x	x	x
Taraxacum sp.	x		x
Tofieldia pusilla	x	x	x
Platanthera hyperborea			x
Juncus castanea	x	x	x
Juncus arcticus	x	x	x
Juncus triglumis		x	x
Luzula parviflora			x
Luzula groenlandica	x		
Luzula spicata	x		x
Luzula confusa	x		x
Luzula arctica		x	x
Eriophorum triste	x	x	x
Eriophorum scheuchzeri	x	x	x
Scirpus caespitosus	x		
Kobresia myosuroides			x
Carex glarosa	x	x	x
Carex ursina	x	x	x
Carex canescens	x		
Carex rupestris	x	x	x
Carex nardina	x	x	x
Carex scirpoidea	x		
Carex stans	x	x	x
Carex bigelowii	x	x	x
Carex rariflora	x	x	x
Carex misandra		x	x
Carex saxatilis	x		
Carex norvegica		x	x
Carex capillaris		x	x
Carex subspatacea	x	x	x
Carex marina			x
Poa glauca	x		x
Festuca brachyphylla	x	x	x
Puccunellia phryganodes	x	x	x
Arctagrostis latifolia		x	x
Alopecurus alpinus		x	x
Phleum commutatum			x
Elymus arenarius	x	x	x
Dupontia psiloxantha		x	
Trisetum spicatum		x	x
Phippsia algida			x
Triglochin palustre	x		

Appendix VI

The Criteria for Identifying Wetlands of International Importance

as adopted by the 4th, 6th, and 7th Meetings of the Conference of the Contracting Parties to the Convention on Wetlands (Ramsar, Iran, 1971) to guide implementation of Article 2.1 on designation of Ramsar sites

NOTE: This is a simple list of criteria used when identifying a wetland of international importance. Further guidelines are found on http://www.ramsar.org/.

Group A of the criteria.

Sites containing representative, rare or unique wetland types

Criterion 1: A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region.

Group B of the criteria.

Sites of international importance for conserving biological diversity criteria based on species and ecological communities

Criterion 2: A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.

Criterion 3: A wetland should be considered internationally important if it supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region.

Criterion 4: A wetland should be considered internationally important if it supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions.

Specific criteria based on waterbirds

Criterion 5: A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds.

Criterion 6: A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird.

Specific criteria based on fish

Criterion 7: A wetland should be considered internationally important if it supports a significant proportion of indigenous fish subspecies, species or families, life-history stages, species interactions and/or populations that are representative of wetland benefits and/or values and thereby contributes to global biological diversity.

Criterion 8: A wetland should be considered internationally important if it is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.

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Addresses:

URL: http://www.dmu.dk

National Environmental Research Institute
Frederiksborgvej 399
PO Box 358
DK-4000 Roskilde
Denmark
Tel: +45 46 30 12 00
Fax: +45 46 30 11 14

Management
Personnel and Economy Secretariat
Research and Development Section
Department of Atmospheric Environment
Department of Environmental Chemistry
Department of Policy Analysis
Department of Marine Ecology
Department of Microbial Ecology and Biotechnology
Department of Arctic Environment

National Environmental Research Institute
Vejlsøvej 25
PO Box 314
DK-8600 Silkeborg
Denmark
Tel: +45 89 20 14 00
Fax: +45 89 20 14 14

Environmental Monitoring Co-ordination Section
Department of Lake and Estuarine Ecology
Department of Terrestrial Ecology
Department of Streams and Riparian areas

National Environmental Research Institute
Grenåvej 12-14, Kalø
DK-8410 Rønde
Denmark
Tel: +45 89 20 17 00
Fax: +45 89 20 15 15

Department of Landscape Ecology
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NERI technical reports

2001

Nr. 345: Important summer concentrations of seaducks in West Greenland. An input to oil spill sensitivity mapping. By Boertmann, D. & Mosbech, A. 48 pp. (elektronisk)

Nr. 346: The Greenland Ramsar sites. A status report. By Egevang, C. & Boertmann, D. 96 pp., 100,00 DKK.

Nr. 347: Nationale og internationale miljøindikatorsystemer. Metodeovervejelser. Af Christensen, N. & Møller, F. 161 s., 150,00 kr.

Nr. 348: Adfærdsmodel for persontrafik. Modelkoncept. ALTRANS. Af Rich, J.H. & Christensen, L. 153 s., 100,00 kr.

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Nr. 351: PSSD – Planning System for Sustainable Development. A Methodical Report. By Hansen, H.S (ed.) 110 pp. (electronic)

Nr. 352: Naturkvalitet på stenrev. Hvilke indikatorer kan vi bruge? Af Dahl, K. et al. 128 s., 140,00 kr.

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Nr. 357: The Danish Air Quality Monitoring Programme. Annual report for 1999. By Kemp, K. & Palmgren, F. 74 pp. (electronic)

Nr. 358: Partikelfiltre på tunge køretøjer i Danmark. Luftkvalitets- og sundhedsvurdering. Af Palmgren, F. et al. (Foreløbig elektronisk udgave)

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Nr. 364: Vingeindsamling fra jagtsæsonen 2000/2001 i Danmark. Wing Survey from the 2000/2001 Hunting Season in Denmark. Af Clausager, I. 53 s., 45,00 kr.

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The three Ramsar sites of Disko Island in West Greenland were surveyed for breeding and staging waterbirds in July 2001. Two of the areas (no. 1 and 2) held a high diversity of waterbirds and proved to be of international importance for the Greenland white-fronted goose, while the third (no. 3) held very few waterbirds and hardly meet any of the specific waterbird criteria of the Ramsar convention.

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