361 OPPDRAGSMELDING

A survey of waterfowl and seal on the coast of the southern Barents Sea in March 1994

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The Joint Norwegian - Russian Commission
on Environmental Cooperation
The Seabird Expert Group
Report no. 6: 1994/95

NINA•NIKU

NINA Norsk institutt for naturforskning

NORWEGIAN - RUSSIAN ENVIRONMENTAL COOPERATION THE SEABIRD EXPERT GROUP

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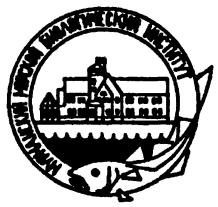

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Abstract

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The Murman coast, including northern Kola, and the coast of eastern Finnmark were surveyed for wintering waterfowl in March 1994, as part of the Russian-Norwegian agreement of environmental co-operation. On the Russian side, the survey was carried out from helicopter, while in Finnmark the counts were made from land and boat. The main object of the survey was to census the marine sea-ducks, but other waterfowl seabirds and seals were also covered. The method involved both direct assessment by eye, and photographic coverage. The most abundant species was the Common Eider, of which more than 62 000 were counted. The secondmost common species was the Steller's Eider, with a total of more than 22 000 birds. This is of high international importance, as the world population of this species may be less than 100 000 birds. Slightly more than 5 000 King Eiders were counted. This number was lower than expected, when compared to the much higher winter numbers on the northern Norwegian coast. Approximately 6 000 Long-tailed Ducks were counted, and the distribution of this species was very uneven. Very few birds of other sea-duck species were seen. Some Cormorants, Shags, and Black Guillemots were recorded, but in low numbers. Large flocks of Guillemots and Kittiwakes were present, but these seemed to have just arrived for the breeding-season, thus not belonging to the mid-winter fauna of this coast. The most abundant seal species were the Harp Seal and the Grey Seal, while only a few Common Seal and Bearded Seal were seen. The surveyed area has international importance for Steller's Eider, possibly containing as much as one fourth of the world population in late winter.

Key words: Waterfowl - seal - winter - Barents Sea - Steller's Eider.

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Referat

Nygård, T., Jordhøy, P., Kondakov, A. & Krasnov, Y. 1995. En undersøkelse av vannfugl og sel langs kysten av det sørlige Barentshavet i mars 1994. - NINA Oppdragsmelding 361: 1-24.

Bestandene av overvintrende vannfugl langs Murmankysten, inklusive den nordlige kysten av Kola, og Varangerfjorden i Finnmark ble undersøkt i mars 1994, som et prosjekt under den russisk-norske avtalen om miljøvernsamarbeid. På russisk side ble undersøkelsen utført fra helikopter, mens i Finnmark ble den utført fra land og båt. Hovedformålet var å kartlegge bestanden av overvintrende marine ender, men også andre sjøfugler og sel ble talt. Antallet fugler i flokkene ble estimert fra helikopteret, og de største flokkene ble fotografert og kontrolltalt på bilder senere. Den mest tallrike arten var ærfugl, med mer enn 62 000 individer. Nest tallrikest var stelleranda, med mer enn 22 000 talt. Dette er av stor internasjonal betydning, da den totale verdensbestanden kan være under 100 000 individer. Noe over 5 000 praktærfugler ble funnet. Dette var lavere enn forventet, tatt i betraktning de store vinterforekomstene i Nord-Norge. Ca 6 000 havelle ble talt, og disse var ujevnt fordelt. Svært få individer av andre arter av marine ender ble funnet. Noen få individer av skarv og teist ble påvist. Store flokker av lomvi og krykkje ble sett i nærheten av hekkeplassene. Disse var trolig tidlig ankomne hekkefugler, og hører antagelig ikke med til midtvintersbestandene på denne kyststrekningen. De tallrikeste selartene var grønlandssel og havert. Bare noen få individer av steinkobbe og storkobbe ble sett. Den undersøkte kyststrekningen har internasjonal betydning for stellerand. Våre data indikerer at opptil en fjerdedel av verdensbestanden kan være til stede på senvinteren.

Emneord: vannfugl - sel - vinter - Barentshavet - stellerand.

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Preface

This study was made possible through a grant from the Directorate for Nature management in Trondheim, as part of the Russian-Norwegian agreement of environmental co-operation. A special thank to Kirill Galaktionov, who organised the practical details in Murmansk. In a miraculous way he was able to cut through the red tape in the Russian government, giving us the privilege of access to the remote areas that for decades have been closed to foreigners. Thanks to Murmansk Marine Biological Institute (MMBI) and Professor Matishov, who put the comfortable accommodation at the institute at our disposal, and in this way showed that the agreement of co-operation between NINA and MMBI was more than words on paper. A special thank to Dr Vladimir Chernook, as a member of the technical and scientific staff at Polar Institute for Fisheries and Oceanography (PINRO) in Murmansk, who was very competent and helpful, demonstrating that Russian still in technology is well up to standards. The county governor of Finnmark organised the counts in Eastern Finnmark. The enthusiasm of Gunnar Henriksen never fails, and his co-worker Bjørn Frantzen's long experience with arctic bird fauna, and their personal contacts with Russian ornithologists have been very valuable to the successful completion of this project. Per Jordhøy, Andrej Kondakov, Yuriy Krasnov, and Torgeir Nygård were the observers. Krasnov and Nygård were responsible for counting the birds, Per Jordhøy was the main photographer, while Andrej Kondakov searched for seals. Vladimir Chernook was responsible for the on-board technical and computing facilities. The captain of the helicopter was Victor Nesterenko,whose navigational skills wew of crucial value. We also wish to thank the rest of the crow. **Figure 11** shows the team in front of the MI-8 helicopter.

Innhold

1 Introduction

The available information about wintering seabirds on the coast of the Kola peninsula in winter is anecdotal and old (Isakov 1970, Kockanov 1979). The need for data on numbers and distribution of the marine ducks in this part of the Barents Sea has been obvious, acknowledging the increasing threats of current and proposed oil-activities in the area, and the plans for opening a northern sea-route.

The Kola peninsula and the coast of Finnmark are the main wintering areas of King and Steller's Eider in Europe (Nygård et al.1988), and hence of great conservational and scientific value. The western population of the Steller's Eider is of particular concern. These ducks are very social, may form large flocks of up to 2 000 birds, and stay in very shallow waters. They are therefore very vulnerable to oil-spills. It is of utmost importance to survey the occurrence and numbers of these birds, so that protective measures can be taken in case of oil accidents.

Reports of serious declines of the Steller's Eider *Polysticta stelleri* in the North American breeding and wintering-grounds have led to serious concern about the population status of this species. The wintering population of Steller's Eiders in the Gulf of Alaska has suffered an estimated decline from c. 200 000, to less than 65 000, possibly closer to 30 000 in 1991 (Kertell 1991). The East Siberian breeding-population has earlier been estimated to be c. 500 000 birds (Uspenski 1972), to 400 000 or less (Palmer 1976). Recent estimates are much lower, between 30 000 and 100 000 (Kertell 1991), but the two first estimates were based on few data. Steller's Eider has disappeared from much of its breeding-range in Northern America, such as the Yukon-Kuskokwim Delta, Alaska (Kertell 1991). This led to the duck being considered for listing as an endangered species (Harrison 1991). The conclusion of an official U.S. Fish and Wildlife Service appraisal was to award the species Category 1 threatened status, which is the stage before a species is listed as threatened (U.S. Dep. of Interior 1992).

It has long been known that a small population of Steller's Eider winters in Varangerfjorden in eastern Finnmark (Collett 1894). Haftorn (1971) mentions flocks of up to 400 individuals in the harbour of Vadsø (70°22'N, 31°06'E) on the Varanger Peninsula, northern Norway, but made no estimate of total numbers. Recent counts (Frantzen 1985, Frantzen & Henriksen 1992) have revealed that up to 12 500 Steller's Eider stay in the Varangerfjord in winter (**Figure 1**). Nygård et al. (1988) in an account of the wintering marine ducks in Norwegian waters, found that Varangerfjorden is the only wintering area of importance in Norway for the species. Only scattered small flocks and single individuals have been found elsewhere.

Until recently, Varangerfjorden was the only known important wintering-ground for the species in Atlantic waters. Increased efforts in the midwinter counts co-ordinated by the International Waterfowl and Wetlands Research Bureau (IWRB) and the Nordic Collegium for Wildlife Research (NKV) have shown that the Baltic Sea also holds significant numbers of wintering Steller's Eiders (Nygård et al. in press).

A proposal for a joint project under the Norwegian-Russian agreement for environmental co-operation was submitted in 1992, and funds for carrying out the project were made available in early winter 1994. The project was organised as a joint effort between staff from NINA and MMBI. NINA supplied the optical equipment (telescopes, binoculars, cameras with data backs), census forms, film and field computers. MMBI organised logistics, involving helicopter transport, on-board navigational instruments and video recorders, in addition to ground transport, food, lodging and the necessary permissions from the Russian authorities and military service. NINA was responsible for data-base software, data management, mapping, and color slides intergration.

Figure 1. Steller's Eiders at Vadsø harbour. - Stellerender i Vadsø havn. Photo: T. Nygård.

2 The area

The easternmost starting-point was at Savikha bay (68'12 N, 39°07'E), 20 km NW of the town of Gremikha, on 19 March 1994. This coastal stretch is very rugged, with low cliffs ending rather precipitously in the sea (**Figure 2**). The littoral zone is quite narrow, and the sea depths rather quickly reach 100-200 meters. However, the coastline is very indented, with many small bays in-between, and numerous small islands also create local favourable conditions, as they form shelter from the winter-storms. Several rivers enter the sea from the Kola mainland, some of them forming rather extensive estuaries, like at the mouth of Voronya river. In the sheltered bays, beaches of fine sand are formed (**Figure 3**). Except for the Ivanovskaja and Teriberskaja inlets, there are no fjords on this stretch. The Kildin island is a prominent landscape-feature on this coast, with its spectacular cliffs.

The western Murman Coast is somewhat different. It is separated from Kola Peninsula by the Kola Fjord. Here we find the dominating human settlements on this part of Russia; the cities of Murmansk and Severomorsk, with a joint population of c. 500 000. The area seems to be burdened by extensive pollution. This is the home base of the northern Russian submarine fleet and a busy port, serving a large fraction of the Russian merchant fleet and fisheries industry. The coast between Murmansk and the Norwegian border has several long, deep fjords, the Ura bay and Zapadnaja bay being the largest. The Rybachiy Peninsula is nearly separated from the mainland by the wide Motovskiy inlet. Close to the Norwegian border is the Pechenga bay.

Moving westward, the coast of Sør-Varanger on the Norwegian side is very similar to the western Murman coast; with steep cliffs and a ragged outline. Jarfjorden, Bøkfjorden, Kjølfjord-Neidenfjord-Munkfjord and Bugøyfjorden are the main water-bodies. On the north side of the wide Varangerfjord, the coastline is different. It is rather straight, unbroken and exposed, with wide bays and more extensive shallow areas, all the way to Vardø; the easternmost point in Norway.

An outline of the area and the flight routes are shown on **Figure 4.** The total distance covered during the survey was c. 500 km.

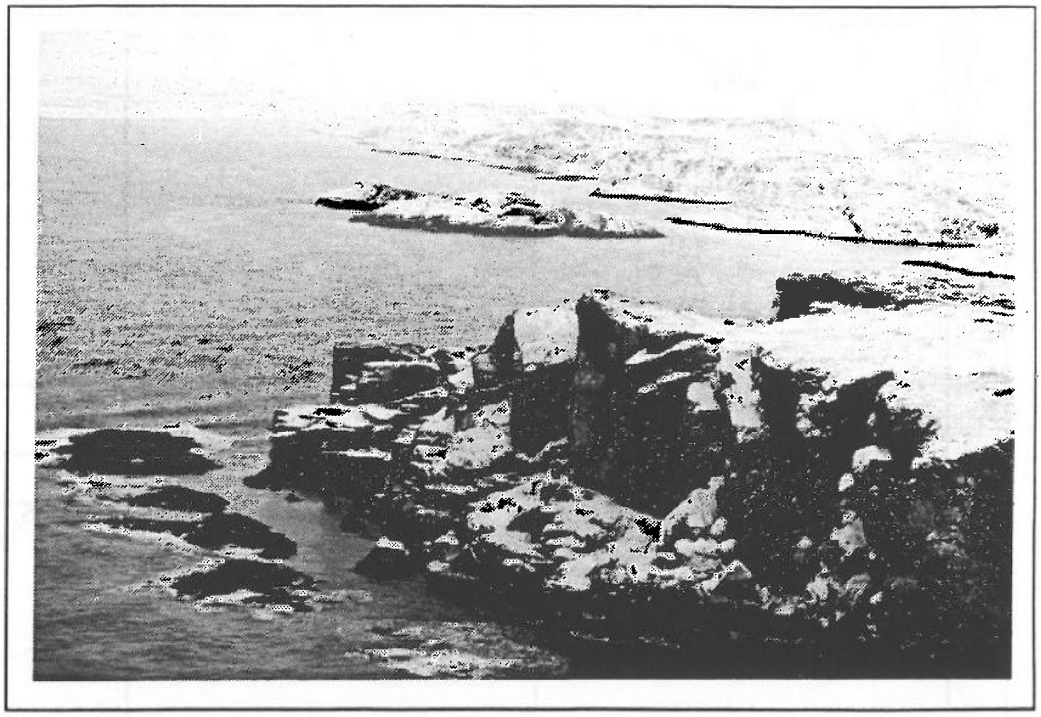

Figure 2. The Kittiwakes were back at their breeding-cliffs on Kola on 20 March 1994. - Krykkjene var allerede kommet tilbake på hekkeplassene på Kola 20 mars 1994. Photo: P. Jordhøy.

Figure 3. A sandy beach among the rocky shores of the north Kola coast. - Sandstrand innimellom den nordlige Kolakystens klippestrender. Photo: P. Jordhøy

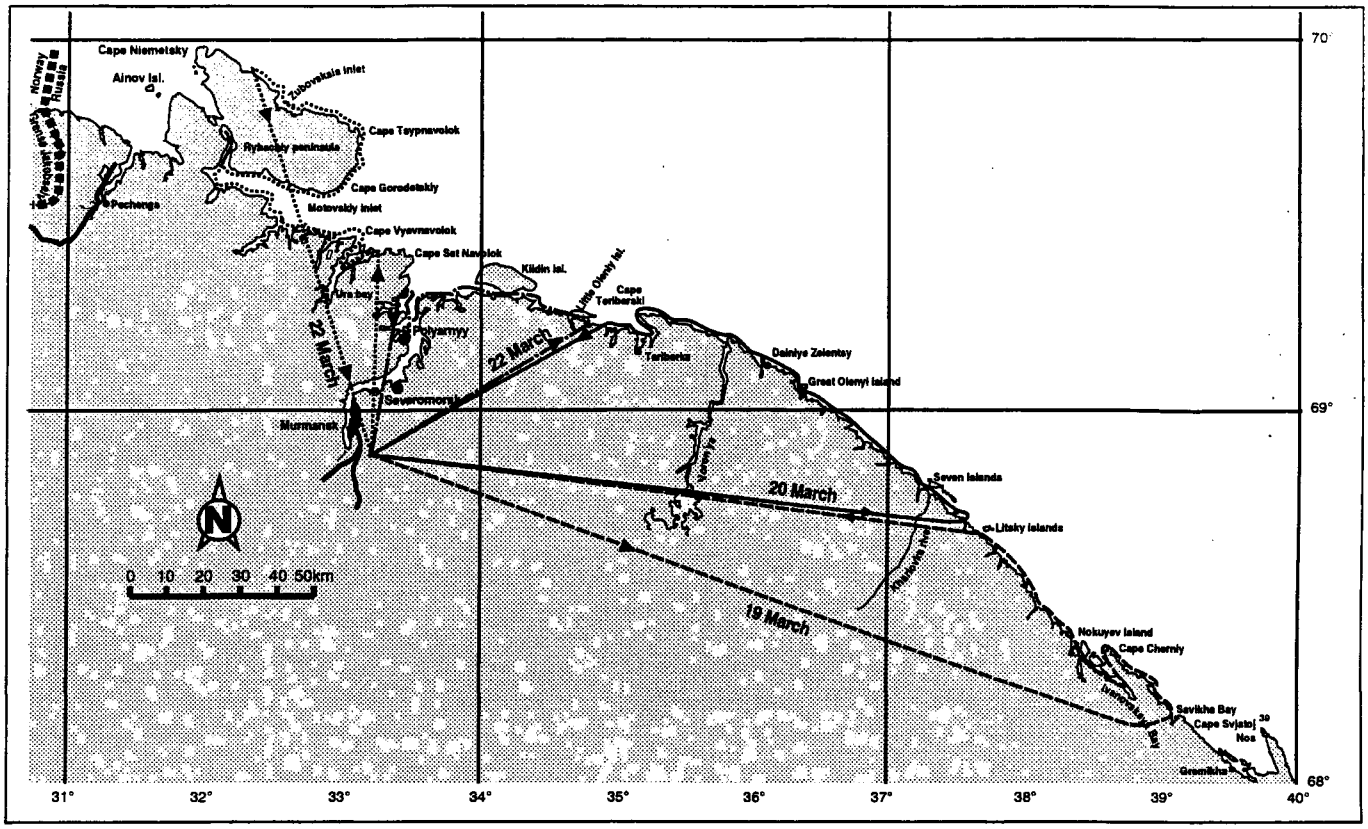

Figure 4. An outline of the area that was covered during the helicopter survey 19-22 March 1994. - En oversikt over området som ble dekt under helikopertundersøkelsen i mars 1994.

3 Methods and material

The start of the survey had to wait until the day-length permitted observation and counting. At these high latitudes it means late February/early March. It was agreed to perform the counts from helicopter, as fixed-wing aircrafts move too fast for accurate counting and photography. The use of ships was also judged as very difficult, due to the rough seas and rugged rocky coastline in this area, making it very difficult to sail close enough to the shore. The hovering ability of helicopters is essential for accurate counting and good photographic documentation. It also permits landing on selected points for accurate ground-based counts. The technique has been successfully employed by personnel from NINA on winter-counts on the coast of Norway (Follestad et al. 1988).

The survey on Kola Peninsula was accomplished 19-22 March 1994, when the team was able to survey the coast west of Gremikha bay (68°10'N, 39°10'E°), to Rybachi Peninsula (69°50'N, 32°30'E), including the mouth of the Kola bay. The survey was carried out from a helicopter of the type MI-8, which was specially equipped for scientific work ("flying laboratory"). Some of the technical specification are: Maximum take-off mass: 13 000 kg, maximum flying-speed: 230 km/h, duration of flight up to 5 hrs, with a range up to 1050 km. On-board processing of data in real time was done by portable computers. The aircraft was also equipped with a GPS (Global Positioning System) navigator, video-equipment, and computerised automated systems for combining navigational data and field observations. The survey route was logged in detail (**Figure 5**), and the position and time were transferred to a computer file. Communication between on-board personnel was possible through an internal communication system. The flights departed from a helicopter-base in Murmansk and returned to Murmansk each evening for maintenance and refuelling.

The bird counts were performed independently by the two observers in the cockpit, one entered the observations on data sheets, while the other recorded his observations on the sound-track of the helicopter's video system. In addition, the largest flocks were photographed through the open door of the helicopter. The photographer was wearing a survival-suit to avoid chilling. Cameras were fitted with a data-back to identify every single frame.

The frame number produced by the data-back was communicated to one of the observers via the internal communication system, who entered it on the data sheet in parallel with his observations. Our experience from similar surveys from helicopter along the coast of Norway, led us to believe that the birds would be found in aggregations of more or less regularly spaced out flocks (Follestad et al. 1988). However, the birds were more evenly distributed than expected. This affected the photographic interpreta

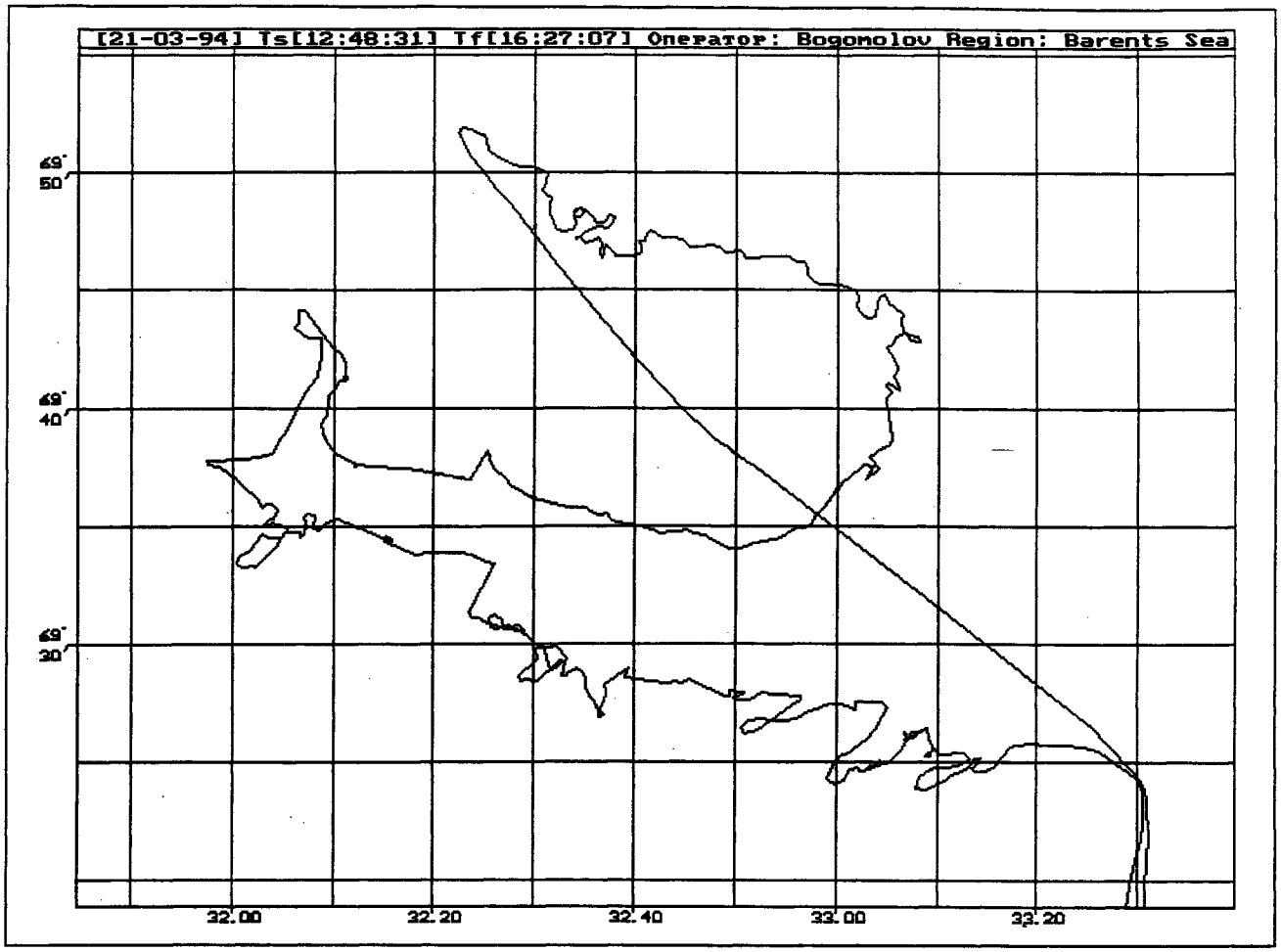

Figure 5. The flight route of 21 March 1994, as generated by a computer coupled to the GPS navigation-system.
- Flyruta 21 mars 1994, generert av en PC koplet til GPS-navigatoren om bord.

tions, as the flocks need to be accurately delimited when comparing result from eye-counts and counts in the laboratory directly on the colour transparencies. Due to this fact, most of the small flocks (up to fifty individuals) were not suited for photographic treatment. This method was therefore employed mostly for the bigger flocks. The colour slides taken from the air were studied under a microscope, to determine the accurate numbers of the biggest flocks, and the sex and age-composition. These data were used to correct the estimates on the number of birds in the flocks made from the helicopter.

The weather was very good during the survey, with temperaures ranging from -15 to -5 °C, very little wind, and bright sun. The main problem was glare from reflected sunlight from the sea surface, but this could often be circumvented by approaching the flocks from different angles.

On 7 March 1994, surveys were performed both on the north side and the south side of the Varanger fjord, funded and co-ordinated by the County governor of Finnmark. The counts on the southern side of the fjord were made from boat (the coastal safety-vessel 'Redningsskøyta'), while those on the northern side were made from the shore by means of binoculars and telescope. The counts of the north side are part of the Norwegian national scheme for monitoring of seabirds (Nygård 1994), and part of the international monitoring program under the auspices of International Wetland and Waterfowl Research Bureau (IWRB) (Rose and Taylor 1993). The weather was not good, a strong wind was blowing, resulting in large waves and reduced visibility. It is therefore likely that many birds were overlooked, especially in the outer, exposed areas.

The surveyed sites are shown in **Figure 6.** The actual field records were subdivided in several hundred smaller sites, but for mapping and reporting purposes these were aggregated to longer stretches, between 10 and 20 km long. The survey on 21 March was done solely by Russian observers, as Norwegian staff were denied admittance to these heavily militarised areas on the Murman coast. No permission at all was given to survey the area between the northern tip of Rybachiy Peninsula and the Norwegian border, due to a large naval operation in that area at the same time. For economic reasons, we were not able to survey the area east of Gremikha towards the mouth of the White Sea.

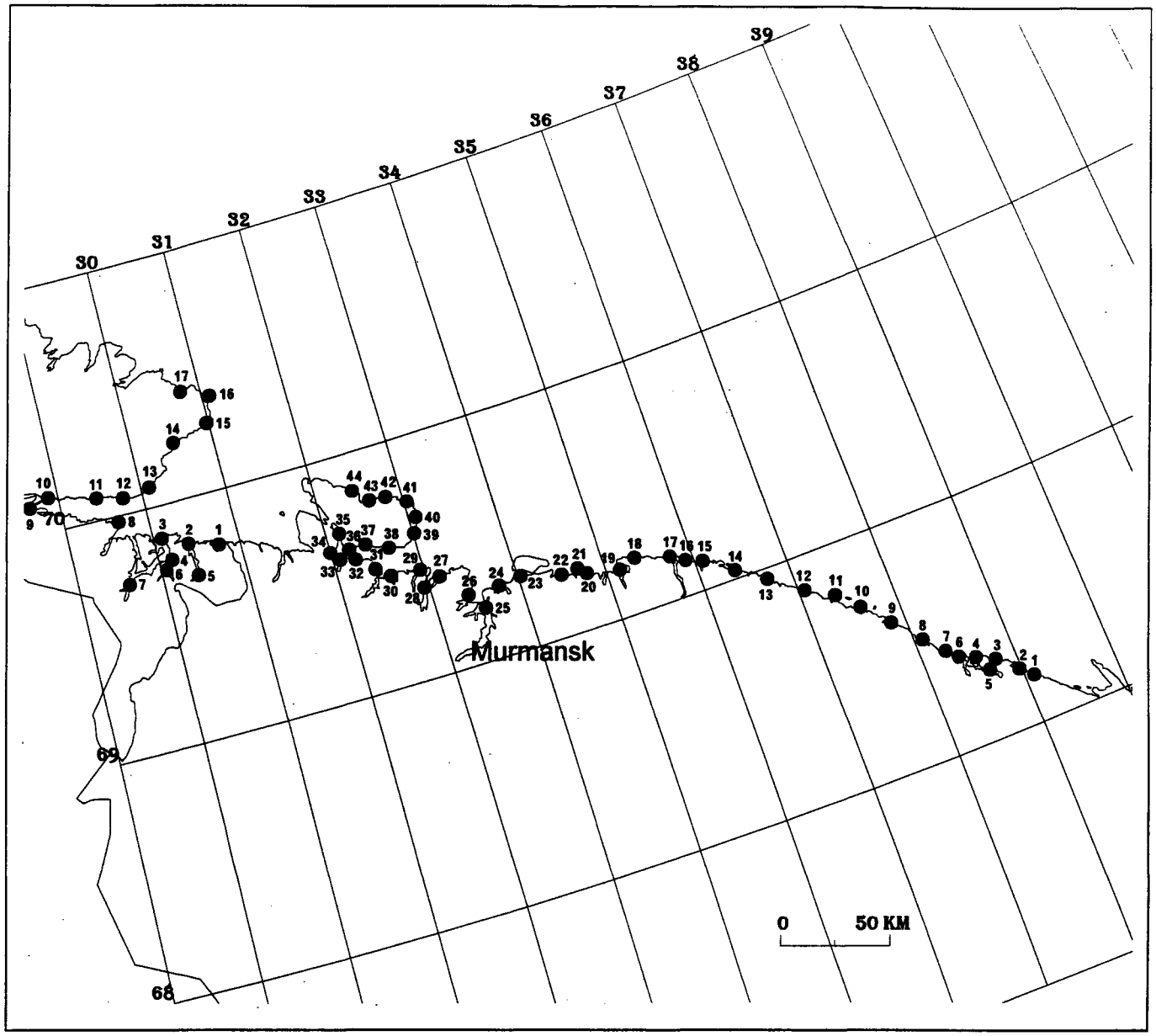

Figure 6. The division of the coast into sites for mapping purposes. The site is assigned to a natural midpoint of the stretch covered. - Inndelingen av den undersøkte kyststrekningen i lokaliteter til karttegningsfomål. Det er valgt et naturlig midtpunkt på hver strekning.

4 Results

4.1 Birds

The total numbers of the main waterfowl species is shown in **Table 1. Tables 2-6** give the numbers of the most important species of the surveyed areas. Common Eider *Somateria mollissima* was the most numerous bird, with a total of more than 62 000 birds. On the Russian side alone there were more than 53 000 Common Eiders counted from the helicopter. It was also the most numerous on the Norwegian side, slightly outnumbering the Steller's Eider *Polysticta stelleri*, with a total of close to 9 000 birds. The distribution of Common Eiders is shown on **Figure 7**. The species is quite evenly distributed along the Kola coast. The abundance is lowest in the inner parts of the Varangerfjord.

Second most abundant was the Steller's Eider, with a total of more than 22 000 (**Figure 8**). The birds were quite evenly distributed along the shore, the majority of the flocks being found in sheltered bays on the otherwise exposed outer coast. There were relatively few birds from the mouth of Kola bay to Kutovaja bay on the Murman coast, likewise on the south side of the Varangerfjord, and the difference between the south and the north side in numbers is striking. Here, like on the Kola coast, the Steller's Eider seems

Table 1. Total number of waterfowl counted during the census 7-23 March 1994, on the Murman Coast, Russia and East Finnmark Coast, Norway. - Totalt antall vannfugl registrert på Murmankysten og på Øst-Finnmarkkysten 7-23 mars 1994.

Date Dato	Sites Lokaliteter	Common Eider Ærfugl	King Eider Praktærfugl	Steller's Eider Stellerand	Long-tailed Duck Havelle	Mallard Stokkand	Common Scoter Svartand	Velvet Scoter Sjøorre
7 March	1-17 (Finnmark)	8 974	1 781	6 392	1 557	132	26	94
19 March	1-9 (N. Kola)	14 627	108	3 125	222	0	0	0
20 March	10-19 (N. Kola)	19 000	1 330	6 009	667	2	0	0
21 March	27-44 (W. Murman)	9 908	1 158	4 488	2 986	0	0	0
22 March	20-26 (N. Kola and Kola Bay)	9 701	1 010	2 063	504	0	0	0
Total		62 210	5 387	22 077	5 936	134	26	94

Date Dato	Sites Lokaliteter	Scaup Bergand	Red-breasted Merganser Siland	Goosander Laksand	Duck sp. And ubest	Great Cormorant Storskarv	Shag Toppskarv
7 March	1-17 (Finnmark)	862	50	35	0	41	42
19 March	1-9 N. (N. Kola)	0	0	0	0	0	0
20 March	10-19 (N. Kola)	640	11	10	1	8	0
21 March	27-44 (W. Murman)	0	7	0	2	44	0
22 March	20-26 (N. Kola and Kola Bay)	49	11	3	0	12	0
Total		1,551	79	48	3	105	42

Date Dato.	Sites Lokaliteter	Cormorant sp. Skarv ubest.	Black Guillemot Teist	Guillemot sp. (Uria sp.) Lomvi ubest.	Razorbill Alke	Puffin Fratercula arctica Lunde	Little Auk Alkekonge
7 March	1-17 (Finnmark)	2	64	0	2	0	239
19 March	1-9 (N. Kola)	6	5	0	0	0	0
20 March	10-19 (N. Kola)	6	11	2 000	0	19	0
21 March	27-44 (W. Murman)	0	1	1 500	0	7	0
22 March	20-26 (N. Kola and Kola Bay)	25	2	0	0		0
Total		37	83	3 500	2	26	239

Table 2. Numbers of the main seaduck species from Savikha Bay to Vostochnaja Litsa, March 19, 1994. - Antallet av de viktigste marine endene på strekningen fra Savikha-bukta til Vostochnaja Litsa 19 mars 1994.

Site no. Lok. nr.	Site name Lokalitetsnavn.	Common Eider Ærfugl	King Eider Praktærfugl	Steller's Eider Stellerand	Long-tailed Duck Havelle
1	Savikha Bay	1 377	19	0	12
2	Fadejevkaja Bay	1 845	31	30	13
3	Cape Fadejeva - Cape Chernij	2 330	0	240	0
4	Cape Chernij - mouth of Ivanovskaja Bay	2 080	20	290	4
5	Ivanovskaja Bay	640	11	650	40
6	Nokujev Island and bay south of Nokujev	2 795	0	410	4
7	Varzina Bay - Cape Sidorov	1 605	2	365	105
8	Cape Sidorov - 38°E	840	16	265	0
9	38°E - Vostochnaja Litsa	1 115	11	875	44
Total		14 627	108	3 125	222

Table 3. Numbers of the main seaduck species from Vostochnaja Litsa to south of Teriberka 20 March 1994. - Antallet av de viktigste marine endene på strekningen fra Vostochnaja Litsa til sør for Teriberka, 20 mars 1994.

Site no. Lok. nr.	Site name Lokalitetsnavn	Common Eider Ærfugl	King Eider Praktærfugl	Steller's Eider Stellerand	Long-tailed Duck Havelle
10	Vostochnaja Litsa - Kharlovka River	2 745	149	780	71
11	Seven Islands	1 220	80	55	122
12	Kharlovka River - Rynda River	2 236	100	883	31
13	Rynda River - Triaschina Inlet	1 050	20	335	42
14	Triaschina Inlet - Great Oleniy Island - Porchnikha Inlet	2 750	205	1 450	108
15	Porchnikha Inlet - Dalniye Zelentsy	1 413	70	755	23
16	Yarenishnaija inlet - Voronii Ludki	1 801	164	810	45
17	Voroniya estuary - Zelentskiy Island	2 085	157	306	119
18	Zelentskiy Island - Cape Teriberskiy	1 125	214	380	17
19	Teriberka Bay - West of Dolgaja Inlet	2 575	171	255	89
Total		19 000	1 330	6 009	667

Table 4. Numbers of the main seaduck species from Malyy Oleniy Island to mouth of Kola bay 22 March 1994. - Antallet av de viktigste marine endene på strekningen fra øya Malyy Oleniy til munningen av Kolafjorden, 22 mars 1994.

Site no. Lok. nr.	Site name Lokalitetsnavn	Common Eider Ærfugl	King Eider Praktærfugl	Steller's Eider Stellerand	Long-tailed Duck Havelle
20	S of Little Oleniy island	1 096	48	407	42
21	Little Oleiniy Island	620	188	255	12
22	W of Little Oleniy - Cape Chevraiy	1 470	353	943	162
23	S side of Kildin Sound	1 077	169	340	186
24	Cape Cherniy - Cape Letinskiy	2 338	190	106	31
25	Mouth of Kola Bay, E side	2 135	22	2	42
26	Mouth of Kola Bay, W side	965	40	10	29
Total		9 701	1 010	2 063	504

Table 5. Numbers of the main seaduck species from Port Vladimir to Cape Skorbeyevsky, N Rybachiy Peninsula 21 March 1994. - Antallet av de viktigste marine endene på strekningen fra Port Vladimir til Kapp Skorbejevsky, Fiskerhalvøya, 21 mars 1994.

Site no. Lok. nr.	Site name Lokalitetsnavn	Common Eider Ærfugl	King Eider Praktærfugl	Steller's Eider Stellerand	Long-tailed Duck Havelle
27	Eretik Island - Port Vladimir	100	10	0	8
28	Ura Bay	464	43	58	9
29	Cape Vievnavolok - Ara Bay	263	79	27	10
30	W of Ara Bay - Malaya Lopatka	920	115	118	74
31	Kuvchin Island - Cape Pikshujev	1 044	220	171	169
32	Kuvchin Island - Magilniy Island	449	114	202	354
33	Magilniy Island - Titovka Bay	367	19	150	169
34	Kutovaja Bay	702	101	105	727
35	Great Ozerko	440	226	623	235
36	Cape Motca	297	26	0	144
37	Eina Inlet	143	15	143	157
38	Cape Eina - Cape Gorodetskiy	653	26	175	182
39	Cape Gorodetsky - Cape Borgoutinskij	1 082	79	128	192
40	Cape Borgoutinskij - Cape Tsypnavolok	551	54	555	125
41	Laush inlet - Cape Lognovolok	761	17	558	181
42	Cape Lognovlolok- Cape Lazarus	546	0	410	73
43	Zubovskaja bay	867	14	918	88
44	Cape Maynovolok - Cape Great Skorbeyevsky	259	0	147	89
Total		9 908	1 158	4 488	2 986

Table 6. Waterfowl numbers from the Russian-Norwegian border to Seglodden (25.38 N, 30.20 E) 7 March 1994. - Vannfugl på strekningen fra Grense Jakobselv til Seglodden (25.38 N, 30.20 E), 7 Mars 1994.

Site no. Lok. nr.	Site name Lokalitetsnavn	Common Eider Ærfugl	King Eider Praktærfugl	Steller's Eider Stellerand	Long-tailed Duck Havelle	Velvet Scoter Sjøorre	Common Scoter Svartand	Mallard Stokkand	Red-breasted Merganser Siland	Goosander Laksand
1	Russia/Norway border-E Jarfjord Grense Jakobselv-Ø Jarfjord munning	1 413	307	225	322	70				
2	E Jarfjord-Bøkfjord light Ø Jarfjord Munning - Bøkfjord fyr	787	265	159	167					
3	Bøkfjord light-Reinøysund Bøkfjord fyr-Reinøysund	565	137	85	147					
4	Reinøysund	100	7		111				5	
5	Jarfjord	71		6	85			8	7	
6	Kirkenes-Jakobsnes	14	65		100			28	10	2
7	Neidenfjorden	127	58		232			50		
8	Bugøynes			22						
9	Nyelv-Karlebotn	179	112	191	29	12		12		21
10	Varangerbotn-Klubben	155	4	106	14	12		2		16
11	Klubben-Vadsø	386		460	1			15	13	
12	Vadsø harbour-Vadsø havn	187	123	1 559	175			16		
13	Vadsø-Skallneset	1 115	2	1 124	45					
14	Skallneset-Laukvikneset	425	270	700	13		26		4	
15	Laukviknes-Smelror	624	5	604	18					
16	Vardø	258	142	142	46			1		3
17	Smelror-Seglodden	2 568	284	1 009	52				2	
Total		8 974	1 781	6 392	1 557	94	26	132	41	42

Site no. Lok. nr.	Site name Lokalitetsnavn	Duck sp. And ubest	Little auk Alkekonge	Black Guillemot Teist	Razorbill Alke	Shag Toppskarv	Great Cormorant Storskarv	Cormorant indet Ubest. skarv	Calidris maritima Fjæreplytt
1	Russia/Norway border-E Jarfjord Grense Jakobselv-Ø Jarfjord munning	359	61	18		19	8		
2	E Jarfjord-Bøkfjord light Ø Jarfjord Munning-Bøkfjord fyr	220	20	2	1	2	3		
3	Bøkfjord light-Reinøysund Bøkfjord fyr-Reinøysund	140	158	11		14	2		
4	Reinøysund			1					
5	Jarfjord			1					
6	Kirkenes-Jakobsnes			1					
7	Neidenfjorden								
8	Bugøynes								
9	Nyelv-Karlebotn	110		2					1
10	Varangerbotn-Klubben	33		23			29		59
11	Klubben-Vadsø				1			1	
12	Vadsø harbour. Vadsø havn							1	
13	Vadsø-Skallneset						2		4
14	Skallneset-Laukvikneset			2			6		118
15	Laukviknes-Smelror								
16	Vardø			2					
17	Smelror-Seglodden			1					
Total		862	239	64	2	35	50	2	182

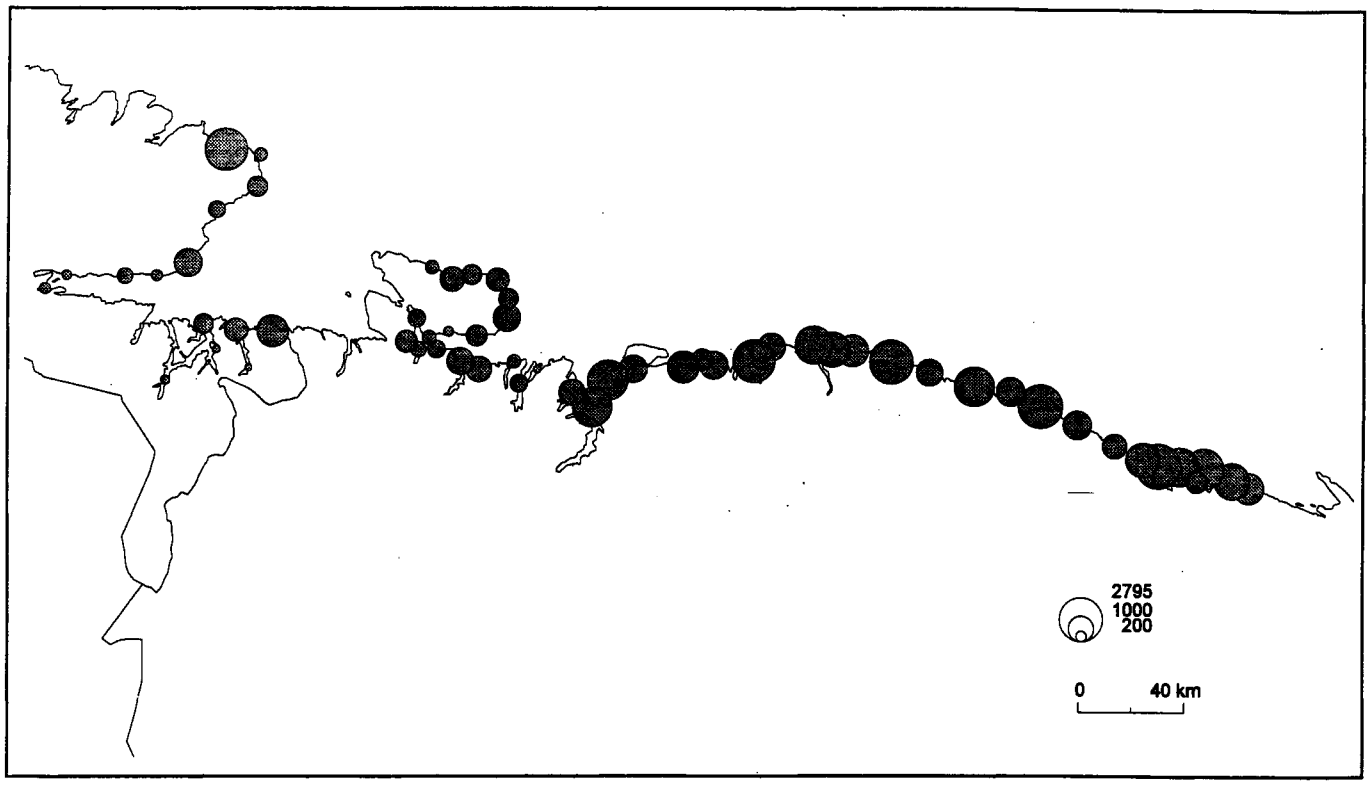

Figure 7. The distribution of Common Eider in the surveyed area in March 1994. - Fordelingen av ærfugl i det undersøkte området i mars 1994.

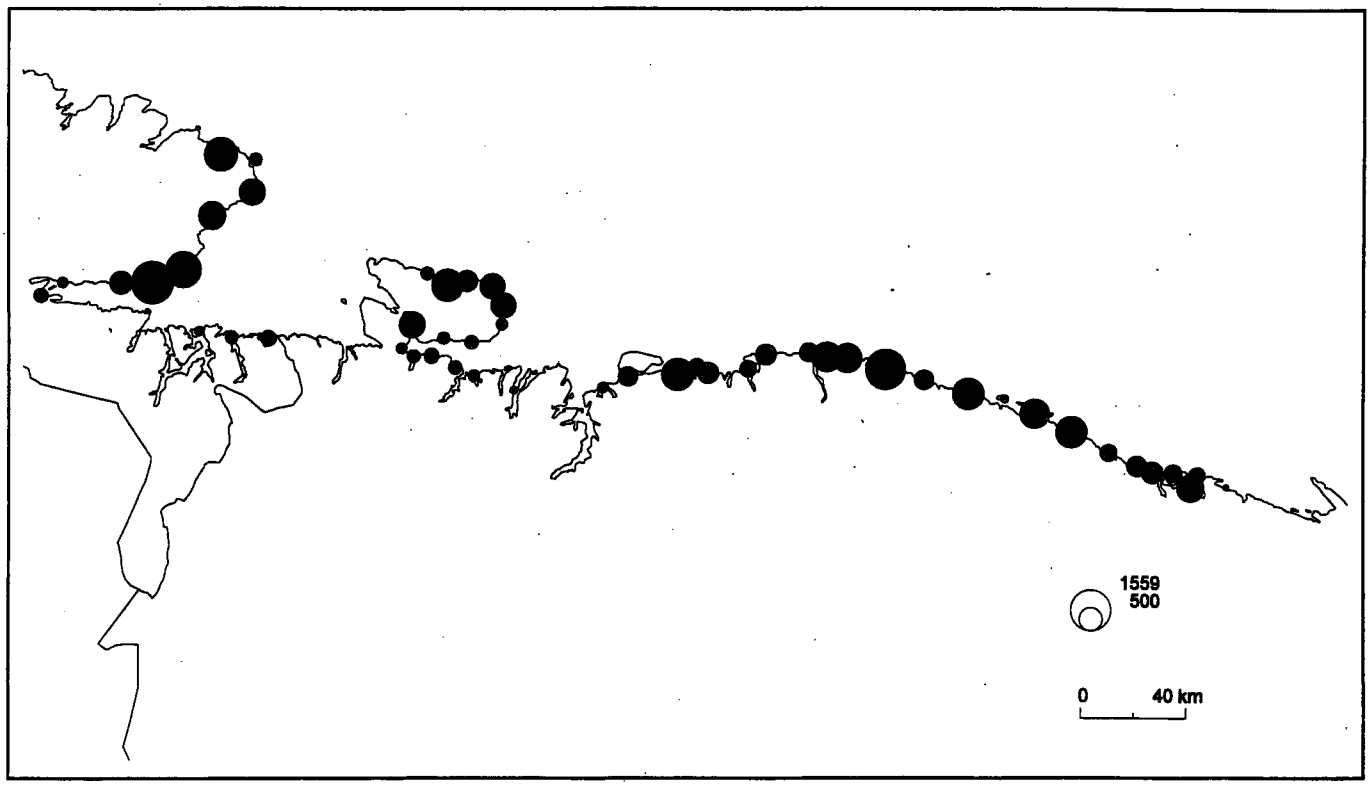

Figure 8. The distribution of Steller's Eider in the surveyed area in March 1994. - Fordelingen av stellerand i det undersøkte området i mars 1994.

to prefer the outer areas to the deeper fjords. On the Russian side, close to 16 000 Steller's Eiders were counted, on the Norwegian side a total of c. 6 400. In the fixed monitoring areas, the number was well below the average value for the period 1980-93, and one of the lowest numbers ever recorded (Nygård et al. in press).

The distribution of King Eider is shown in **Figure 9**. The numbers recorded was well below that of the two other Eider species, with a grand total of c. 5 300 birds recorded. On the Russian side, there were approximately 3 500 birds. Their numbers seemed to increase towards the west. This tendency seems to hold as one crosses the border to Norway. Compared to the Common and Steller's Eider, the King Eider has a tendency to stay further from the coast, and in more exposed areas.

The Long-tailed Duck *Clangula hyemalis* distribution is given in **Figure 10**. The distribution is very uneven, with a marked concentration in the Motovskiy bay and off western Rybachiy Peninsula. Very few were observed on the north Kola coast. Contrary to most other species, the abundance was higher on the south side of the Varangerfjord than on the northern side.

Very few other species of sea-ducks were recorded, most of them in the Varanger Fjord (**Table 6**). Here, 132 Mallards *Anas platyrhynchos* and 94 Velvet Scoters *Melanitta fusca* were observed, and 41 and 42 of Red-breasted Merganser *Mergus serrator* and Goosander *Mergus merganser,* respectively. 26 Common Scoters *Melanitta nigra* were also seen. The diversity of waterfowl species in these parts of the North Atlantic is therefore much lower than in more southern parts.

On the Murman and Kola coasts, very few duck species other than the Eiders and Long-tailed Duck were observed. 64 Red-breasted Mergansers, two Mallards and three Scaup *Aythya marila* were seen.

In the whole area, few Cormorants were seen (c 160), about half of them identified as Great Cormorants *Phalacrocorax carbo.*

Only 83 Black Guillemots *Cepphus grylle* were seen, but these are easily overlooked when they rest on land on a dark background. There were more Guillemots observed in Varanger than on Kola, but this may be attributed to the different observation methods. Many Guillemots (*Uria* sp.) were seen in the vicinity of their breeding-cliffs on north Kola, like at the Gavrilov and Karlov islands (c. 2 000), and off the steep cliffs at the south-eastern tip of Rybachiy peninsula (c. 1 500). Two Razorbills *Alca torda* were seen in the Varangerfjord. The Puffin *Fratercula arctica* had not yet returned to its breeding colonies, as only 26 were seen.

The Little Auk *Alle alle* was only found in Finnmark, all in the outer sites in south Varanger area. As the weather was stormy, the actual number must have been much larger.

Flocks consisting of several hundreds of Purple Sandpiper *Calidris maritima* were seen all along the Kola and Murman coast, and altogether there may have been several thousands of them. However, they were impossible to count properly, as the flocks were very mobile. They could only be observed when flying, and they completely blend in with the background colour when sitting on the shore.

Large flocks of Kittiwakes *Rissa tridactyla* were seen at some distance off the Kola coast on 19 and 20 March. The number may well have been over 10 000, but is was impossible to assess them properly.

Of the gulls, Herring Gull *Larus argentatus* was the most abundant, followed by the Great Black-backed Gull *Larus marinus.* 15 Glaucous Gulls *Larus hyperboreus* were noted, the majority were sub-adults.

4.2 Seals

The survey was not designed for seal observations, but as one of us was a seal researcher (Kondakov), the opportunity to observe also the seals was taken. The seal observations are summarised in **Table 7**. Only observations from the Murman and Kola coasts are given here, as the survey in Varanger did not include seals. The most numerous species was the Harp Seal *Phoca groenlandica.* and the Grey Seal *Halichoerus grypus.* Harp seal flocks of different sizes (10-60) were seen all the way from Teriberka to Rybachiy Peninsula, with the highest number off Cape Gorodtesky on Rybachiy Peninsula. Accurate estimation of numbers, however, is impossible when the species is swimming and often submerging in open waters.

They Grey Seal was more easily observed, as it was found resting in groups on cliffs and skerries in certain areas. A minimum of 250 individuals were counted, with the largest flock on Bolshoy Litsky island, holding 60 individuals. The flock size ranged between 20 and 60.

The least common species were the Common Seal *Phoca vitulina* (eight individuals) and the Bearded Seal *Erignathus barbatus* (seven individuals). Most of the observations of these two species were made in the eastern part of the surveyed area.

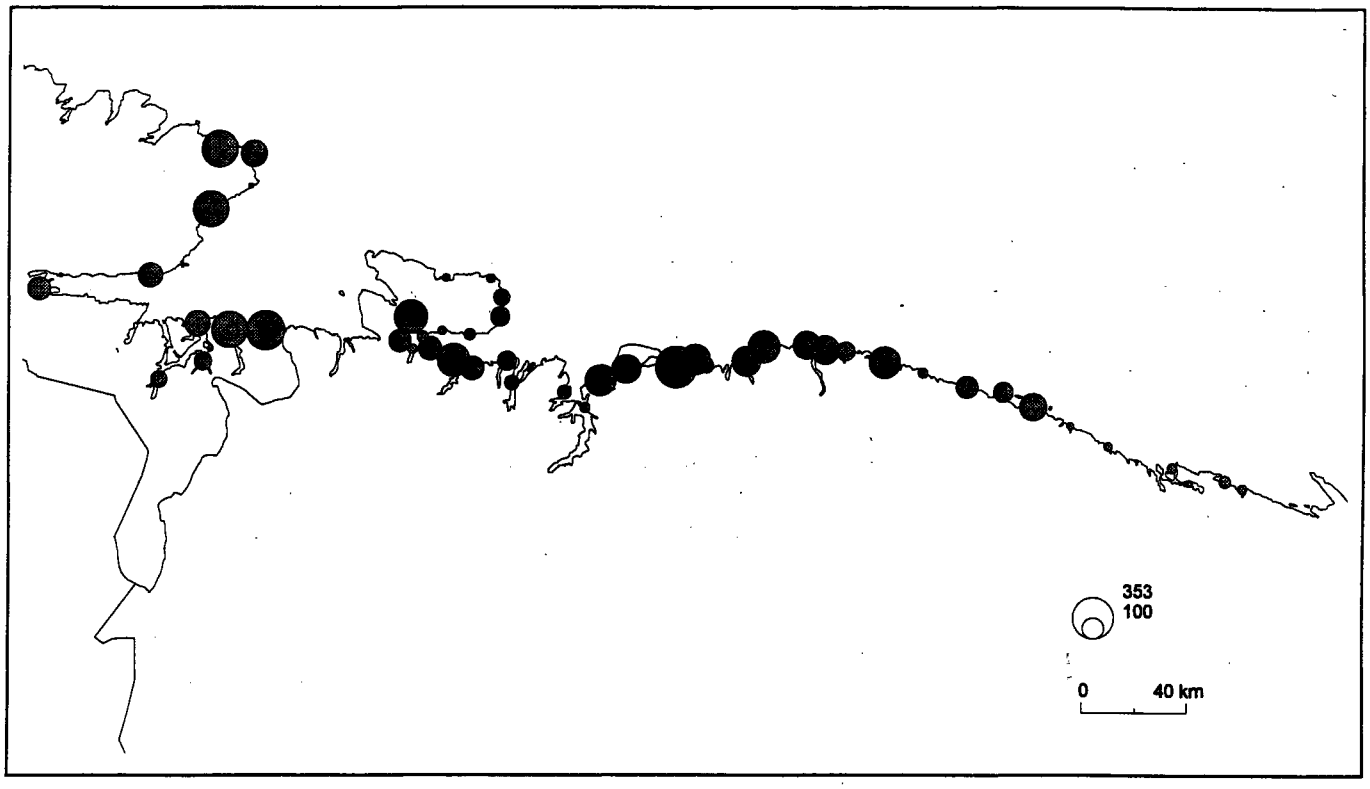

Figure 9. The distribution of King Eider in the surveyed area in March 1994. - Fordelingen av praktærfugl i det undersøkte området i mars 1994.

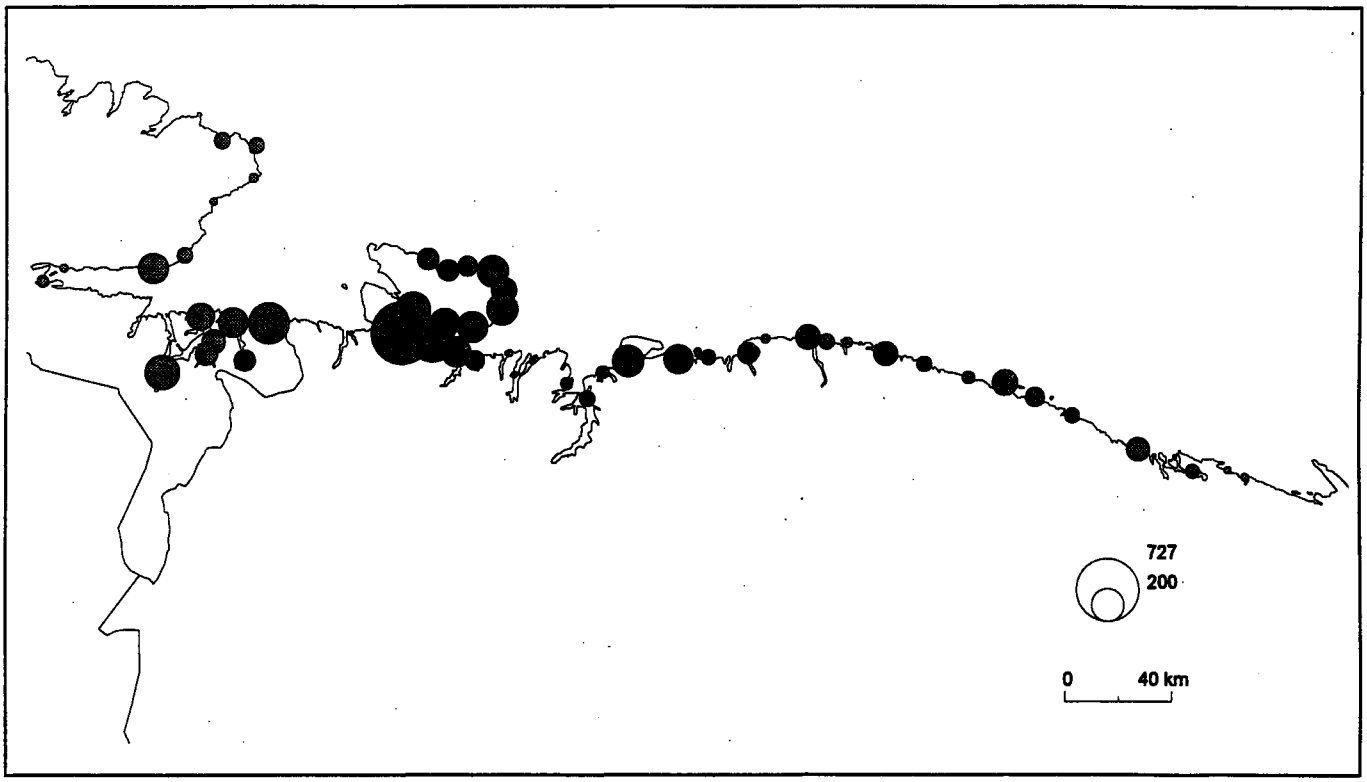

Figure 10. The distribution of Long-tailed Duck in the surveyed area in March 1994. - Fordelingen av havelle i det undersøkte området i mars 1994.

Table 7. Observations of seals during the survey on the Murman Coast 19-22 March 1994. - Selobservasjoner på Murmankysten 19-22. mars 1994.

Loc. no. Lok. no.	Date Dato	Site name. Lokalitetsnavn.	Common Seal Steinkobbe	Grey Seal Havert	Harp Seal Grønlandssel	Bearded Seal Storkobbe
5	19.03	Ivanovskaya inlet	7			2
6	19.03	North of Nokuev Island	1			
10	20.03	Great Litsky Island		60		
12	20.03	Zolotaya river				2
12	20.03	Shubinskie Ludki		40		
17	20.03	Voronyia river				1
18	20.03	Near Cape Teriberskiy			10	
19	20.03	Teriberka inlet			10	1
23	20.03	Kildin Salma			10	
22	22.03	Tipunkovi islands		30		
23	22.03	Near Cape Zelenetska		50		
25	22.03	South of Cape Letinskiy			60	
25	22.03	Kola inlet				1
31	21.03	Islet near Cape Pikshuev		30		
39	21.03	East of Cape Gorodetskiy			several flocks	
41	21.03	Laush inlet			flocks	
41	21.03	W Laush inlet			flocks	
41	21.03	W Laush inlet-Cape Lognovolok			flocks	
43	21.03	W Zubovskaya islands		50	flocks	
44	21.03	Cape Maynovolok			2	
Total			8	260	Several hundreds Flere hundre	7

5 Discussion

5.1 The method

Performing censuses from air has its clear limitations, due to the speed of travel and distance to the birds, and the noise factor. The counting is usually done by tens, so there is an obvious error-margin. Most of the birds will not be looked at individually, and hence some birds will inevitably be assigned to the wrong species. Some birds of odd species can be overlooked, as the method gives no room for fine plumage studies. Nevertheless, we believe that the survey was fairly comprehensive, and gives a realistic picture of the bird fauna of this geographic area at this particular time of the year. The error margins are wider than in most other studies, as shown in **Table 8**, where the counts of the two observers from the helicopter on 20 March are compared. The data indicate that observer no. 2, who was liberated from paper and pencil, as he entered his observations directly onto the sound-track of a video-tape, had better time to look for the more shy or more cryptic species, like the Long-tailed Duck. Therefore, in combining the data for a common data-set, observer no. 1's data was used for the large flocks of Eider's, as he was able to correct his estimates in relation to the photos taken. Observer no. 2's data was largely used for the less common species and for the Long-tailed Duck.

In 1992, Tatjana Paneva and Alexander Koryakin from Khandalaksha surveyed part of the area; c. 15 km in both directions of Dalnyie Zelentsy (Koryakin & Paneva, pers. comm.). A comparison between their counts and the helicopter counts of the same stretch in 1994 is given in **Table 9.** It is evident that the comparison between two years is of limited value, due to the normal variation between years. Nevertheless, it is interesting to note that the number of Steller's Eider between years agree quite well.

Table 8. A comparison between the number of the main species of ducks seen by the two observers on 20 March 1994 from the helicopter. - En sammenligning mellom antallet av de viktigste artene ender sett av hovedobservatørene 20. mars 1994 fra helikopteret.

	Common Eider Ærfugl	King Eider Praktærfugl	Steller's Eider Stellerand	Long-tailed Duck Havelle
Observer 1 - Observatør 1	19 000	1 330	6 009	319
Observer 2 - Observatør 2	16 507	1 092	8 154	598

Table 9. A comparison between ground (1992) and helicopter counts (1994) of the area between Porchnikha bay and the Voroniya estuary. - En sammenligning mellom tellinger fra land (1992) og helikopter (1994) på strekningen mellom Porchnikha-bukta og Voronyas munning.

Species - Art.	1992	1994
Common Eider - Ærfugl	2 353	5 064
King Eider - Praktærfugl	1 386	371
Steller's Eider - Stellerand	2 488	2 105
Long-tailed Duck - Havelle	294	106
Red-breasted Merganser - Siland	70	2
Goosander - Laksand	14	
Velvet Scoter - Sjøorre	1	
Total - Totalt	6 606	7 623

5.2 The bird fauna

Isakov (1970) estimated the total number of Eiders along the Murman coasts and the White Sea in the winter of 1967 and 1968. Ground counts on 24 and 22 sites were performed, and 4 and 8 days of aerial surveys were conducted, respectively. The counts were classified as "very good". A total of 105 000 Eider duck spp. were counted, and he states that "The majority of the wintering birds are *Somateria molissima*". It was, however, impossible to determine the proportion of King Eiders *Somateria spectabilis* and Steller's Eiders in the flocks (Eider females could not be identified to species from the aeroplane). Only a few Steller's Eiders were found. His rough estimate of Eider ducks seems to be supported by this survey. The numbers must be seen in relation to the numbers elsewhere in NW Europe. The Norwegian coast holds c. half a million Common Eider (Nygård et al. 1988) , the NW Europe total being c. 3 million (Rose & Scott 1994).

Very little has been published regarding the distribution and numbers of the King Eider. The aerial survey of 1967 and -68 did not attempt to discriminate between the different eider duck species. Nygård et al. estimated that c. 80 000 King Eiders winter in northern Norway. Therefore, it seems that the bulk of the King Eider population, which is a breeding bird of the high tundra, in general moves further west than the Steller's Eider.

Karpovitch & Kester (1970), in a brief account on the ice-free waters of the White Sea, describe it as a wintering area of the Common Eider (resident local breeders) and King Eider, but do not mention the Steller's Eider. The White Sea and its mouth has much ice-cover during the months December-May, but there are certain ice-free areas (polynias) all winter. There are some late winter/spring reports on Steller's Eiders from the mouth of the White Sea; 27 March 1968: 1 050 individuals, March 1971: 1 180 individuals, 26 February 1977: 480 individuals (Kochanov 1979). In the ice-free straits off Velikovo Island in the Kandalaksha Gulf, 5 Steller's Eiders were staying in the winter of 1979-80 (Koryakin & Kondratyev 1983).

Some winter-data from the small harbour of Dalnije Zelentsy, a research station of marine biology 36°E on the Kola peninsula were available: In the spring 1965-66 30 and 180 individuals were seen. In 1971, 520 Steller's Eider were seen in March. In the winter of 1974, 500 were seen in the Dalnije Zelentsy bay (Kockanov 1979). A flock of c. 120 birds were seen in the mouth of the bay on October 6 1992 (T. Nygård, pers. obs.), indicating earlier arrival here than in Varanger. In 1992, a coastal stretch of c. 20 km in the Dalnije Zelentsy area was surveyed in the end of February/beginning of March. 2 488 individuals of Steller's Eiders were counted (**Table 9**), of which 1 048 adult males. (A. Koryakin and T.D. Paneva, pers. comm). This is of comparable magnitude of the 1994 figures, and indicates, in line with the other anecdotal data, that the north Kola Coast is a regular wintering-area for the Steller's Eider, and that the number of Steller's Eider wintering on the Kola

peninsula has always been high, and larger than previously thought (Nygård et al. 1988).

Varangerfjorden has been censused as part of the international midwinter counts since 1980, the numbers of birds found here have varied between 4 147 and 12 557 in years with complete counts. Only scattered flocks have been observed elsewhere. Following the coastline westward, Vardø seems to be the normal limit of the Steller's Eider's winter range, although some larger flocks have been recorded as far west as Tanafjorden, Berlevåg and Kongsfjorden (29°30'E), where 450 birds were seen on 25 March 1991. (Frantzen & Henriksen 1992). The vast majority of the birds are found on the northern side of Varangerfjorden. On the southern side, 391 birds were counted in March 1992 (Henriksen 1992), and in this study in March 1994, 497 were counted there. This was certainly a minimum number, as the weather was poor, and not all the bays of the fjord were counted. For detailed accounts of the occurrence of the Steller's Eider in Finnmark, see Frantzen (1985), Frantzen & Henriksen (1992) and Henriksen (1992).

Applying estimates for the areas not covered, (west of Rybachi peninsula, east of Svjatoj Nos, the mouth of the White Sea, and several inlets and bays in the mouth of Kola bay, that were not accessible during the survey due to military restrictions), a reasonable estimate of Steller's Eider for Russia would be 20 000-25 000, maybe even higher. For the whole southern Barents Sea region, the number then rises to up to 30 000-40 000. Bjørn Bergflødt (pers. comm.) saw small flocks of Steller's Eiders in open water around Vaigach Island during a seal survey in February 1993, which indicates that the species may be found much further east in winter than previously thought. The Steller's Eider is the most Arctic of all the duck species, and may be found in any shallow arctic water free of ice. Places to search would be the rest of Kola east of Gremikha bay, Cape Kanin, W Kolgujev, and the Polynias of the White Sea. Additional efforts in these still large non-surveyed areas are necessary to bring us nearer to the true numbers of this rare and threatened species. There are reasons to believe that the wintering population of Steller's Eider is at its maximum in February/March, as the extent of the polar ice-cap is at its largest in March-April (Statistisk sentralbyrå et al. 1994). There are reasons to believe that the ducks are pushed to the south and west as the polar seas freeze over. In mild winters, they will perhaps stay further east. This theory, however, has not been investigated.

The bulk of the Long-tailed Duck populations breeding in Western Siberia undoubtedly migrate much further south to winter. Recent estimates indicate that more than 2 million birds winter in NW Europe, the Baltic Sea being very important (Rose & Scott 1994). Estimates of up to 5 million birds have been put forward, based on new data from boat transects and aerial surveys in the Baltic (Stefan Pihl, pers. comm.)

5.3 The origin of the birds

The breeding-grounds of the population of Steller's Eider wintering on the coasts of the Barents Sea are unknown. In the scientific literature there are no reports of this species as a breeding bird west of the Gulf of Khatanga. Recent reports indicate that this may not be the case, as the species recently has been found breeding on the western part of Taimyr (Rogacheva 1992, Yesou & Lappo 1992) These observations indicate that these Steller's Eiders stem from a hitherto unknown breeding population west of the Taimyr Peninsula (Nygård et al., in press).

5.4 The seals

The Harp Seal abundance on these coasts is very variable, as a poor food-situation may trigger mass migration of this species from the White Sea to the Kola and Finnmark coasts, and even further south. However, it is common in the coastal zone in early spring to see groups of Harp Seals, which actively feed after breeding season.

Moulting Grey Seals are congregated in special sites on islands and islets. Moulting haul-out sites were found on the Murman coast for the first time in March 1989 (Kondakov, 1990). The moult period lasts quite long in the Murman colonies (March-June). They are known to use some of the following moulting places in these areas; Seven Islands area; 30-50 animals; Shubinskie Ludki - 30-40; Aynov and Kiys islands; 100.

During our last investigation we found 4 new moulting haul-outs of Grey Seal on Murman: 1 - Tipunkovi Islands (30), 2 - islet near Zapadnaya Zelenetskaya inlet (50), 3 - Islet near Cape Pikshuev (30) and, 4 - in Zubovskaya Inlet (50). The total number was 260 animals, in 1991 - 231, in 1992 - 138 (Haug et al. 1994). Unfortunately, we don't have the numbers from Aynov and Kiys Island in 1994. In Russia, Grey and Common Seal are included in the Red data book of endangered species. The Common Seal was discovered in the Ivanovskaya Inlet in 1989, and in 1990 a breeding colony was found on the Murman coast (Kondakov 1992). The last investigation on the overwintering haul-out sites was conducted on 19 and 21 March 1993, giving a number of more then 100 seal, but in 1994, these haul-out sites were under ice. This may explain the low numbers in 1994. It is beyond the scope of this project to discuss in detail the relative significance of the seal observations made during this survey. We rather regard the observations presented here as a small contribution to the knowledge of an important part of this area's fauna, from a season where such data otherwise are difficult to get.

6 Conclusions

The survey has shown that the coast of the Southern Barents Sea from Varangerfjorden in eastern Finnmark to Gremikha on NE Kola is the wintering-ground for c. 100 000 sea-ducks. The most abundant species is the Common Eider. However, the species of greatest importance is the Steller's Eider, as the 22 000 birds that were found may constitute as much as one fourth of the world population. In light of the on-going oil-activities in the Barents sea, sea transport, and the plans for a northern sea-route, it is necessary that action-plans in case of oil-spills are made, and the necessary equipment made available. The habitat preference of the Steller's Eider is such that it will be at a very high risk in case of a major oil-spill in this area. Further surveys of still uncovered ice-free areas to the east and north are necessary to give the full picture of the wintering bird fauna in this very important area.

7 Summary

In this report we present the results from a survey of wintering waterfowl and seals on the coast of the southern Barents Sea, from the Varangerfjord in the west to Gremikha on NE Kola. The survey was performed as part of the agreement between Russia and Norway on environmental co-operation, and was carried out by participants from both nations. MMBI and NINA co-operated on the Russian side, with help from PINRO, while the County governor of Finmark arranged the survey on the Norwegian side. Murmansk was the base for the survey, with daily trips with the helicopter along the coast. The weather was very good during the survey.

The survey showed that close to 100 000 ducks were present in the surveyed area. The most numerous species was the Common Eider, numbering more than 62 000 birds. It was followed by the Steller's Eider, of which more than 22 000 birds were counted. Just over 5 000 King Eiders were counted, and close to 6 000 Long-tailed Duck. For the two latter species, the figures were lower than expected, judged by the much larger number found in northern Norway. Very few birds of other duck species were found. A small number of Cormorants and Black Guillemot were recorded, while a large number of Guillemots and Kittiwakes were seen. However, they are probably wintering elsewhere, but had already returned to their breeding-colonies. Large flocks of Purple Sandpiper were also seen, but they were difficult to quantify. Of the large gulls, the Herring Gull was the most abundant, followed by the Great Black-backed Gull, and a few Glaucous Gulls were also seen.

The occurrence of the high numbers of Steller's Eider eventually assigns a very high conservational value to this area on an international scale. The eastern part of the population, breeding east of Khatanga, has greatly diminished in numbers in later years. The present survey almost doubled the known western part of the population. It is now clear that the western population may be of the same magnitude as the eastern, and thast as much as one fourth of the world population may be present in the area in winter. It is therefore urgent that measures to protect this population are made, in case of a major oil-spill in this area.

The most numerous seal species were Harp Seal and Grey Seal. Only a small number of Common Seal and Bearded Seal were observed. The Harp Seal is not sedentary. In years of poor food-supply, mass migration of animals from the White Sea to the west may be triggered. These migrations may lead Harp Seals way south on the Norwegian Coast. The seal survey was not an integral part of the project, but was performed because one of the Russian researchers on board was a seal expert. Therefore this was a good opportunity to obtain data on seal distribution from an area and time of the year which this is normally very difficult.

8 Sammendrag

I denne rapporten dokumenteres resultatene fra en undersøkelse av overvintrende vannfugl og sel på kysten av det sørlige Barentshavet, fra Varangerfjorden i vest til Gremikha nordøst på Kolahalvøya. Undersøkelsen var et ledd i den russisk-norske samarbeidsavtalen om miljøvern, og ble utført av deltakere fra begge nasjoner. MMBI og NINA med hjelp av PINRO samarbeidet om del russiske delen, mens Fylkesmannen i Finnmark gjennomførte samtidige undersøkelser i Øst-Finnmark. Murmansk var utgangspunktet for kartleggingen på Murmankysten, som skjedde ved hjelp av helikopter under meget gode værforhold.

Undersøkelsen påviste at nesten 100 000 ender overvintrer i hele det undersøkte området. Den tallrikeste arten var ærfugl, med mer enn 62 000 individer. Deretter kom stellerand, med over 22 000 individer. Noe over 5 000 individer av praktærfugl ble påvist, og bortimot 6 000 haveller. For praktærfugl og havelle var tallene mindre enn ventet, tatt i betraktning av de relativt store forekomstene av disse artene i Nord-Norge. Ellers ble det funnet bare få individer av andre andearter. Et mindre antall skarver og teist ble talt, mens det ble sett store flokker av lomvi og krykkje. Disse overvintrer sannsynligvis annensteds, men var allerede kommet tilbake til hekkeplassene. Store flokker av fjæreplytt ble også påvist, men disse var vanskelig å tallfeste. Av de store måkefuglene var gråmåken den vanligste, fulgt av svartbaken, men det ble også sett en del polarmåke.

Det er knyttet meget stor internasjonal verneverdi til forekomsten av stellerand på denne kyststrekningen. Den østlige delen av bestanden, som hekker øst for Katanga og som overvintrer i Alaskabukta, har gått kraftig ned i antall de senere åra. Denne undersøkelsen har resultert i at den kjente vestlige delen av bestanden har blitt nesten fordoblet. Dette understøtter teorien om at det må hekke et langt større antall stellerender i Vest-Sibir enn tidligere antatt. Det viser seg nå at den vestlige delen av bestanden kan være like stor som den østlige, og at vi på denne undersøkelsen muligens kartla så mye som en fjerdedel av verdensbestanden. Det er derfor nødvendig at en vurderer tiltak for å beskytte denne bestanden i fall et større oljesøl skulle ramme disse områdene.

De tallrikeste artene av sel var grønlandssel og havert, mens det bare ble sett noen få individer av steinkobbe og storkobbe. Grønlandsselen er ikke stedegen, men i år med dårlig matgrunnlag i Kvitsjøen kan det utløses massevandringer vestover. Disse vandringene kan nå langt sørover på Norskekysten. Selundersøkensen var ingen hovedsak i prosjektet, men ble tatt med fordi vi hadde en selforsker ombord, og det var en god mulighet for å skaffe data om selutbredelse på en tid av året og i et område som er vanskelig tilgjengelig.

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Figure 11. The team in front of the MI-8 helicopter at the helicopter-base in Murmansk. - De som deltok i undersøkelsen samlet foran MI-8-helikopteret på helikopterbasen i Murmansk.

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