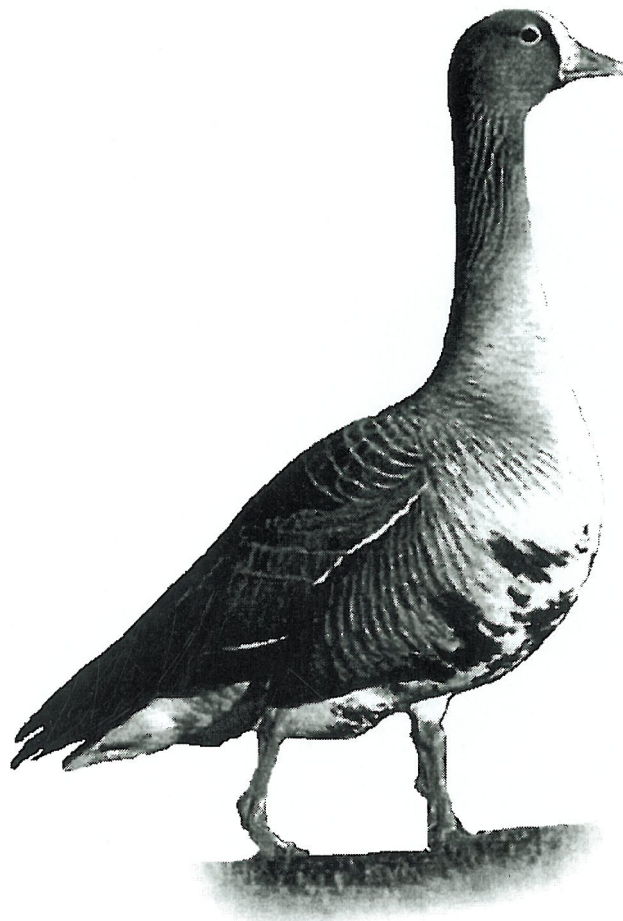


Tomas Aarvak, Ingar Jostein Øien,
Eugeny E. Syroechkovski Jr. & Irina Kostadinova

The Lesser White-fronted Goose Monitoring Programme

Annual Report 1997



Norwegian Ornithological Society



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**NORSK ORNITOLOGISK FORENING (NOF)
KLÆBU 1997**

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PREFACE

This report describes the activities on the Lesser White-fronted Goose Monitoring Programme run by the Norwegian Ornithological Society (NOF) in the period October 1996 - November 1997. The satellite telemetry part has been carried out in co-operation with Svein-Håkon Lorentsen from the Norwegian Institute for Nature Research (NINA) and MME - BirdLife Hungary.

Many people have been involved in the project during the period. Special thanks are due to Torkjell Morset at Statskog, Mountain Service in Lakselv for his outstanding logistic- and personal assistance during the fieldwork. We would also like to thank Barb Lamprecht Håland and Andreas Tveteraas at Stabbursnes Naturhus og Museum for various help and good co-operation. We are further indebted to lieutenant colonel Lyng, captain Sulland and captain Pettersen at the Porsangmoen division of the Norwegian Army for loan of equipment, and to Lieutenant Morten Blom at Banak Air Force Station for various help. We also appreciate the help of Gunder Gabrielsen at Gabriel Electro for assistance with the electric fire system of the cannon nets.

The information assembled on the Lesser White-fronted Goose in this report could not have been presented without the involvement of a lot of enthusiastic persons. We appreciate the help and good co-operation from all the co-operation partners and contacts listed in Appendix 1. We would especially like to mention Theodoros Naziridis and Yannis Tsougrakis, which supplied us with information about observations of marked Lesser White-fronted Geese in Greece.

Field surveys has been carried out in a several countries and many persons have been involved, which we are in great debt to: Petar Iankov, Nikolai Petkov, Hristo Hristov and Sergey Dereliev (Bulgaria), Eugen Petrescu and Edmund Ballon (Romania), Aki Arkiomaa, Juha Markkola (Finland), Alexander I. Artiukhov, Alexander V. Astapenko, Victor V. Ranov and Mihail Karbainov (Russia).

Thanks are also due to Johan Mooij (Germany) which introduced us to the impressive goose publication of Alphéraky (1905).

Financial support is provided by: Department of Environmental Affairs - Office of the County Governor of Finnmark, the Directorate for Nature Management, Norway, Porsanger Municipality - Finnmark and Fylkeslegat Wessel og frues Fond and Varekrigsforsikringsfondet at Tromsø Museum. The satellite telemetry studies on the Fennoscandian breeding population and the following up work is funded by the Norwegian Ministry of Environment via the Norwegian State Pollution Control - Eastern Europe Secretariat through a program for environmental collaboration between Hungary and Norway. The satellite-telemetry work carried out in Taimyr, Russia is founded by Världsnaturfonden (WWF-Sweden), the Directorate for Nature Management, Norway (Norwegian/Russian Environmental co-operation) and Naturvårdsverket, Sweden. Economical support to this project was also provided by the Lesser White-fronted Goose Group of WWF Finland.

Trondheim, December 1997

Tomas Aarvak

Ingar Jostein Øien

Eugeny E. Syroechkovski Jr.

Irina Kostadinova

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- I. Poster of the goose species of Bulgaria, produced for Italian hunters
- II. Co-operation partners and contacts

ABSTRACT

This report contains the results from the work on the Norwegian Lesser White-fronted Goose Monitoring Programme run by the Norwegian Ornithological Society (NOF) in the period October 1996 to November 1997. The satellite telemetry was conducted in co-operation with the Norwegian Institute for Nature Research (NINA) and MME/BirdLife Hungary. Other important co-operation partners in the report period has been the Geese and Swans Study Group of Eastern Europe and North Asia, the Bulgarian Society for the Protection of Birds (BSPB) and WWF Finland - Lesser White-fronted Goose Group.

Monitoring of the staging area Valdak, in the Porsangen Fjord in Finnmark County, Norway, was conducted, both in the pre-breeding period and during the post-moulting period in the autumn. In spring a minimum of 59 individuals were staging (26 pairs and 7 immatures), as estimated by a method of individual identification by differences in patterns of belly patches. In autumn a total of 57 individuals staged at the marshes (25 adults/2y-birds and 32 juveniles). The population development has been negative, with a yearly decrease of 5.2% since 1993. Estimates of yearly mortality gave 16.5% for the adults and 78,2% for the juveniles. The adult mortality rate was within the range of mortality rates described for other goose species, whereas the juvenile mortality rate was found to be extremely high. The latter is considered to greatly influence the overall population development.

WWF- Finland monitored the Skjåholmen Island in the Varangerfjord in Eastern Finnmark, and a total of 30 (18 ad./subad and 12 juveniles) were observed during the autumn staging. During a short visit in spring by NOF only one pair was observed, but faeces and footprints indicated approx. 5 staging pairs.

A review of the status of the Lesser White-fronted Goose on Taimyr is given. It concludes that the breeding range has decreased with approximately 80% since the early 1980s, and that the numbers have decreased by 90-93%. The current population is assessed to be 1000-2000 breeding pairs and 3000-4000 non-breeders. None of the present areas utilised by Lesser White-fronted Geese have any formal protection. Conservation measures are urgently needed.

The satellite transmitter study continued in 1997. Four individuals were equipped with satellite transmitters in Finnmark, Norway, three on the Taimyr Peninsula, Russia and three on the Yamal Peninsula, Russia. Three of the individuals caught in Norway had functioning transmitters. These birds strayed around in the breeding areas in Finnmark before they left for the Kanin Peninsula in early July. One spent the summer here and disappeared when it started the autumn migration towards the Ural Mountains. One individual migrated further to Taimyr where the signals ceased. The remaining individual spent the summer on the Kolgujev Island, before migrating south-westwards. It staged shortly on the coast of the Malozemel'skaya Tundra, to the north of St. Petersburg and to the north of Warsaw in Poland before it reached the wintering quarters north of the City Wroclaw in Poland. Only one of the six satellite transmitters mounted on Lesser White-fronted Geese caught in Siberia (Yamal and Taimyr) this year functioned properly. This individual which was caught on the Yamal Peninsula followed the eastern route to Kazakhstan, where the signals ceased.

A summary of the surveys in the breeding areas on Taimyr, Russia is presented in the report. We also sum up the present knowledge on the status of Lesser White-fronted Goose in Russia (Taimyr Peninsula), Bulgaria, Romania and Greece based on work conducted by NOF and WWF-Finland in the report period, and we provide population reviews for countries not previously described (Armenia, Estonia, Latvia, Lithuania and China).

SAMMENDRAG

Denne rapporten inneholder resultatene fra NOFs Prosjekt Dverggås i perioden oktober 1996 til november 1997. Satellittsender telemetrien har blitt gjennomført i samarbeid med Norsk Institutt for Naturforskning (NINA) and MME/BirdLife Hungary. Andre viktige samarbeidspartnere i rapporteringsperioden har vært Geese and Swans Study Group of Eastern Europe and North Asia, Bulgarian Society for the Protection of Birds (BSPB) og WWF Finland Lesser White-fronted Goose Group.

Overvåking ble gjennomført på rasteplassen Valdakmyra ved Porsangen i Finnmark fylke, både vår og høst. På våren ble totalt 59 individer registrert (26 par og 7 ungfugler), estimert ved hjelp av det karakteristiske bukflekkmønsteret hos hvert enkelt individ. På høsten ble 57 individer registrert, fordelt på 25 voksne/fjorårsfugler og 32 årsunger. Utviklingen i dverggåsbestanden ble estimert på bakgrunn av tall fra våren i årene 1993 til 1997. Det ble påvist en årlig nedgang på 5,2%. Dødligheten til voksne individer var på 16,5% per år, mens den for ungfugler ble estimert til 78,2%. Raten for de voksne individene ligger innenfor det som er kjent hos andre gåsearter, mens raten for ungfuglene er svært høy. Det er antatt at sistnevnte har stor betydning for den generelle bestandsutviklingen.

WWF Finland gjennomførte også i 1997 overvåking av høsttrekket på Skjåholmen i Varangerfjorden i Øst-Finnmark. Totalt ble 30 dverggjess observert. Aldersfordelingen var 18 voksne/fjorårsfugler og 12 årsunger. Under ett kort besøk i begynnelsen av juni ble ett dverggås par observert, men spor tegn indikerte at ca. 5 par hadde rastet her.

Taimyrhalvøya i Sibir representerer kjerneområdet for verdens gjenværende dverggåsbestand. En oppsummering av kjent informasjon sammen med resultatene fra årets undersøkelser viser at utbredelsesområdet for hekkende dverggjess har krympet med 80% siden tidlig på 1980-tallet. Antallet hekkende dverggjess er tilsvarende redusert med 90-93%. Den totale bestanden på Taimyrhalvøya estimeres her til å bestå av 1000-2000 hekkende par og 3000-4000 ikkehekkende individer. Ingen av hekkeområdene er vernet. Bevaringstiltak er høyst påkrevet for sikre restene populasjonen i dette kjerneområdet for arten.

Undersøkelsene vha. satellitt-telemetri ble videreført i 1997. Fire individer ble fanget og påmontert satellittsendere på Valdakmyra i Finnmark i mai. En sender fungerte dessverre ikke. De tre andre individene gikk ikke til hekking. De dro fra rasteplassen på Valdak og inn til hekkeområdene hvor de i noen uker fartet rundt på vidda. I begynnelsen av juli forlot de Finnmark og trakk til Kaninhalvøya i Russland. Ett individ trakk herfra til Taimyr, hvor signalene forsvant. Signalene fra neste individ forsvant rett etter at fuglen hadde begynt trekket sørøstover mot Uralfjellene. Det siste individet dro rett til øya Kolgujev etter et kort opphold på Kanin. Her tilbrakte den sommeren før den trakk sørvestover. Rasteplasser ble påvist nord for St. Petersburg, nord for Warszawa i Polen, før den stoppet nord for den polske byen Wrocław. Her var den fortsatt ved utgangen av november. Denne sommeren ble også satellittsendere påmontert tre individer på Yamalhalvøya og tre individer på Taimyrhalvøya i Sibir, Russland. Av disse viste det seg at bare en sender fungerte. Dverggåsa som hadde en fungerende sender ble fanget på Yamalhalvøya. Den trakk på høsten til Kazakhstan hvor signalene stoppet.

Gjennom det internasjonale samarbeidet har flere land blitt undersøkt innenfor rapporteringsperioden. Undersøkelsene er utførlig beskrevet i rapporten. Disse landene er: Bulgaria, Romania og Hellas. Ett sammendrag av undersøkelsene på Taimyrhalvøya i forbindelse med fangst av dverggjess er også beskrevet. Noen land har ikke tidligere blitt beskrevet skikkelig, og her presenterer vi en gjennomgang av kjent litteratur om dverggjess fra landene Armenia, Estland, Latvia, Litauen og Kina.

1. INTRODUCTION

The Lesser White-fronted Goose *Anser erythropus* is now more threatened than ever. A review of the wintering populations of the Lesser White-fronted Goose (Lorentsen et al. MS) concludes that the rapid population decline still continues. This fact implies that the Lesser White-fronted Goose is rapidly facing extinction, probably within a time scale of 10-15 years. The world population of Lesser White-fronted Geese has traditionally been divided in three breeding meta-populations; the Fennoscandian, the Central Russian and the Far Eastern. The core population (Central Russian) with an estimated 110 000 individuals in Taimyr (Martynov 1983, cited in Vinogradov 1990), was based on data extrapolated from questionnaires. This estimate was considered to be too high by Rogacheva (1992) and Øien & Aarvak (1993) (see also section 3.2 in this report). Later Morozov (1995) estimated the total Russian population to 30 000-50 000 individuals. Even this estimate is now thought to be too high, and it has not been confirmed by winter counts in recent years. Based on field observation and questionnaire data, we give a population estimate for the core breeding range of the Lesser White-fronted Goose in Taimyr of 1000-2000 breeding pairs and about 3000-4000 non-breeders in this report.

In Fennoscandia the population was estimated to be more than 10 000 individuals in the first half of the century (Norderhaug & Norderhaug 1984). From the 1950s until the early 1980s, the population declined by 90-95 %, and the range by at least 50 %. In the period 1980-1996, the decline continued and at present the population counts only about 1 % of its former size. This represents approximately 30-50 breeding pairs.

In 1996 the Norwegian Directorate for Nature Management published an *Action Plan* for the management of the Norwegian goose species (Direktoratet for naturforvaltning 1996). This plan discusses the present knowledge and outlines the main goals and means in the management of the goose species in Norway. It will be an important incentive to the

work in the forthcoming years. The main goals for the Lesser White-fronted Goose outlined in the plan are:

- The Lesser White-fronted Goose shall be managed as a particularly vulnerable species which need to be managed with special thoughtfulness. The considerations for the species' continued survival in Norway require special attention and particular actions both on the species and the habitat level.
- Norway should actively work to reach the goals set by the International Action Plan for the Lesser White-fronted Goose.
- It is important to protect both existing and former staging, breeding and moulting areas for the geese.

Internationally, an *Action plan* for the Lesser White-fronted Goose was published by the Council of Europe (Madsen 1996). The first International workshop on the situation for the Lesser White-fronted Goose was accomplished in Strasbourg in 1995 (Anatidae 2000). Since then, international meetings has been accomplished in Poland 1995 (Wetlands International), and England in 1996 (Wetlands International). In addition to these meetings, the Lesser White-fronted Goose was one of the main subjects during the conference on Protected Areas in the Barents Region in 1995 (Strøm & Prokosch 1996). This conference gathered management authorities and conservation experts from the Russian Federation, Norway and Finland representing both governmental institutions and non-governmental organisations. Of particular interest in the context of research and protection of Lesser White-fronted Goose is the *Memorandum of Understanding* achieved during the conference, which has the following main statements:

- (1) realise the urgency of protecting the endangered Lesser White-fronted Goose, and in this context:
 - (a) acknowledge and support the Lesser White-

fronted Goose Urgent Action Plan recently produced by the Wetlands International Goose Research Group to protect the species. In particular, by: *evaluating and initiating immediate protection measures in areas identified as important wintering and staging sites; *continuing, in parallel, research work in order to identify more key areas for the species;

(b) support the idea to join forces of the governmental authorities of the Archangelsk Oblast and the Nenets Autonomous District, the All-Russian Research Institute for Nature Protection and specialists from Norway, Finland and the Netherlands as well as other countries and WWF. Studies should be increased to evaluate the importance of the Kanin Peninsula for waterfowl with special focus on the Lesser White-fronted Goose.

(c) recommend that joint field work start during the migration and breeding season in 1996;

(d) acknowledge the important studies on wildfowl performed in recent years by Krivenko, Vinogradov and Avdanin on the Kanin Peninsula and support of the All-Russian Research Institute for Nature Protection and their recommendation to set up a protected area on the Kanin Peninsula between the Torna and the Mesna rivers.

The detailed *Urgent Action Plan* from 1995 (see Aarvak et al. 1996) was updated on the workshop held at the Wetlands International Goose Specialist Group Meeting in England in December 1996. An important conclusion and recommendation from the meeting was: *The workshop recommends that the most urgent and effective conservation measure to be implemented is the creation of shooting-free zones in key staging, wintering and breeding areas of Lesser White-fronted Geese.*

Accumulation of new data has taken place so quickly that both the *Urgent Action Plan* and the more comprehensive *International Action Plan* for the Lesser White-fronted Goose should be updated soon. In an updated *International Action Plan*, the whole

distribution area should be implemented, comprising the whole Palearctic Region including the Far East breeding areas in Yakutia and Anadyr and the wintering areas in China. This will be facilitated by the newly established *Conservation Project of Lesser White-fronted Goose in East Asia* by the *Japanese Association for Wild Geese Protection (JAWGP)*.

Through the work of the Lesser White-fronted Goose Monitoring Programme, several of these actions have been implemented, and are described in this report. In 1998, the project will continue the work on implementing the actions in the *International Action Plan*, the *Urgent Action Plan* as well as reaching the goals in the *National Action Plan* of the Norwegian Directorate for Nature Management.



Exploitation of Lesser White-fronted Geese has been a tradition in Finnmark since long ago. Rock carvings of a man with a hunted goose at Alta, Finnmark. Probably this refer to the traditional way of hunting flightless Lesser White-fronted Geese in the mountain areas of Finnmark. Still some illegal shooting of Lesser White-fronted Geese occur in Norway, but the main threat to the Fennoscandian population is hunting along the migration routes and in the wintering areas. Photo: Ingar J. Øien.

2. MONITORING IN NORWAY

Several staging areas existed in Norway until the 1950s, but at present only two areas seems to be important for the small remaining population in the northernmost areas of Fennoscandia. The traditional staging area at Valdak is situated in the Porsangen Fjord in Western Finnmark, and the other, Skjåholmen, which was rediscovered as a staging area in 1994, is situated in the Varangerfjord in Eastern Finnmark (Figure 1). Both areas are utilised as the last staging area before the onset of breeding and as the first staging area after the moulting period. In this respect, these areas are very important.

The reproductive success of the geese is very dependent on the degree of fat storage in females which is gained at the pre-breeding staging grounds just before the onset of egg-laying. This fat storage is of

physiological high importance because of the high costs of egg-production, and the high energetic expenditure of incubation. During migration between the wintering and staging areas and the breeding grounds, the geese can not afford to possess too large fat-reserves, because above a certain threshold, this will increase the energetic expenditures relatively more than the advantage of carrying large energy-stores. Geese breeding in the Arctic arrives at the breeding grounds before the snow has disappeared and the vegetation has started to grow (Cook et al. 1995, Tombre 1995). Thus, they have to rely on already accumulated fat-stores. The last staging area before the breeding grounds is where the females build up the majority of their energy stores for egg laying and incubation, and it is shown that the breeding success is closely related to the condition of the

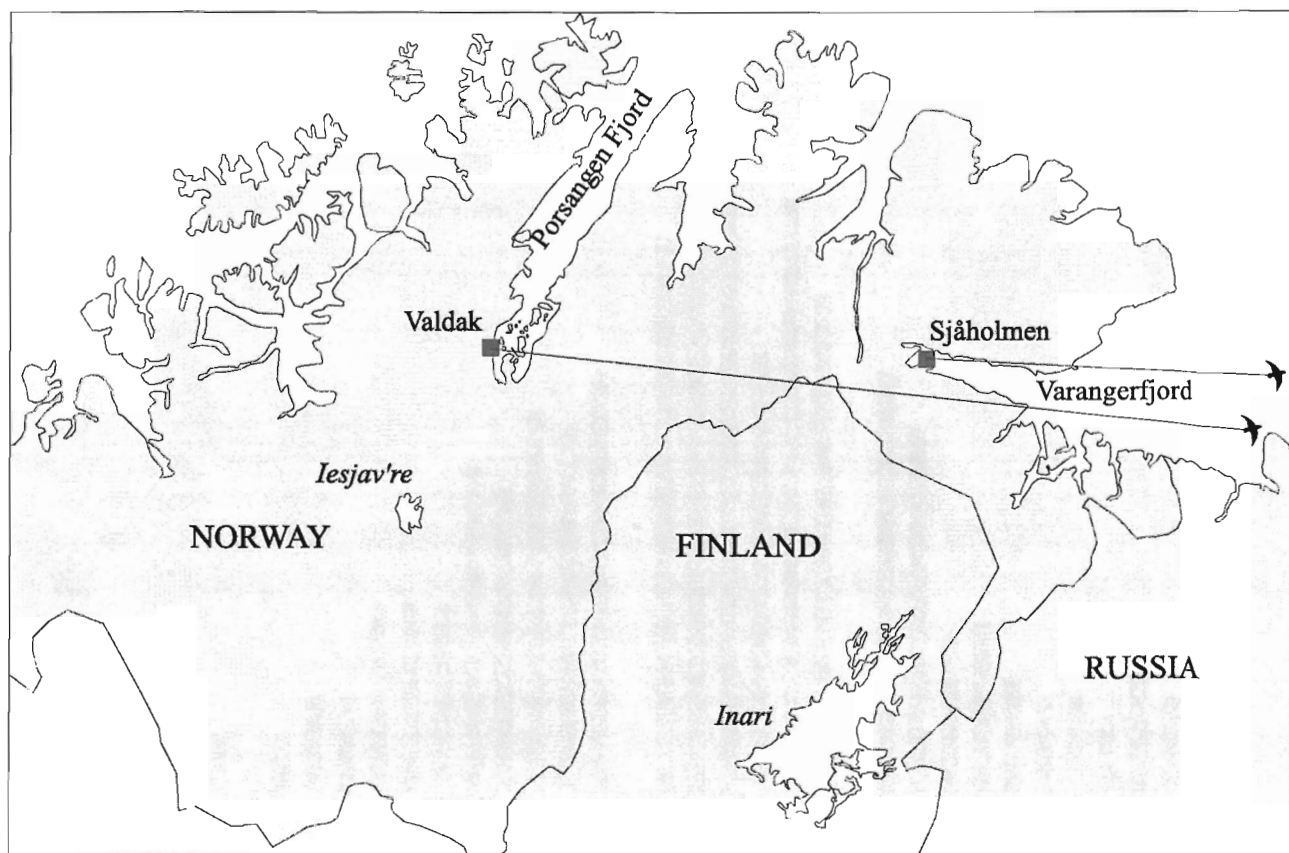


Figure 1 . Map showing the location of the two important pre-breeding and post-moulting staging sites in Norway; the Valdak Marshes in Porsangen Fjord in Western Finnmark and Skjåholmen Island in the Varangerfjord in Eastern Finnmark. The autumn migration routes eastwards is indicated.

individual birds when they arrive at the breeding grounds.

It is vital for the breeding success of the Lesser White-fronted Goose that the spring staging areas at Valdak and Skjåholmen provides good feeding opportunities and protection from predation and disturbance.

These two staging areas support geese from two separate breeding areas. The geese utilising Valdak breeds in Western and Central Finnmark, while the geese which utilise Skjåholmen and the surrounding coastal areas in the Varangerfjord breeds in Eastern Finnmark and Northern Finland (Lorentsen et al. in press, own data).

The Lesser White-fronted Goose projects of WWF-Finland and NOF have monitored the two staging areas annually since 1995 (Skjåholmen) and 1990 (Valdak) respectively. The results of the monitoring work in 1997 are reported in section 2.1 (Valdak) and for the period 1995-97 in section 2.2 (Skjåholmen).

2.1 STAGING GROUND AT VALDAK, FINNMARK

The Valdak Marshes (70°09'N 24°54'E) are situated in the Porsangen Fjord in Finnmark (Figure 1). A general description of the area is given earlier by Aarvak et al. (1995, 1996) and Øien et al. (1996). The staging geese were monitored during spring staging in the period 15 May to 20 June and during autumn staging in the period 23 August to 4 September. The aim was to determine the progress of migration and the total number of geese staging in the area. As in former years the individuals were identified by the individual uniqueness of belly patches (see Øien et al. 1996). In addition, daily activity of individuals, food preferences, tolerance of disturbance, habitat use, flying activity, migratory movements and behavioural aspects have been registered.

2.1.1 Spring staging

The first Lesser White-fronted Geese were seen on the 15 May (five individuals). Thereafter the numbers

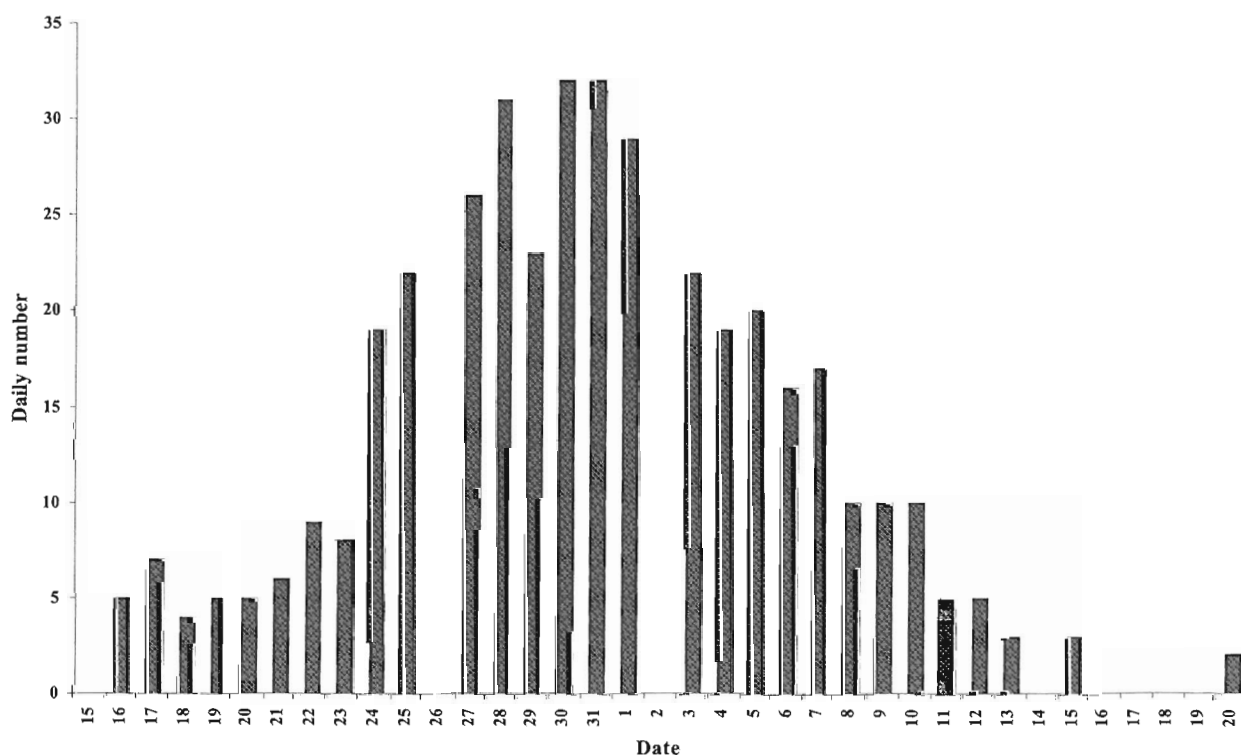


Figure 2 . Maximum daily numbers of Lesser White-fronted Geese observed at the Valdak Marshes in the period 16 May-20 June 1997.

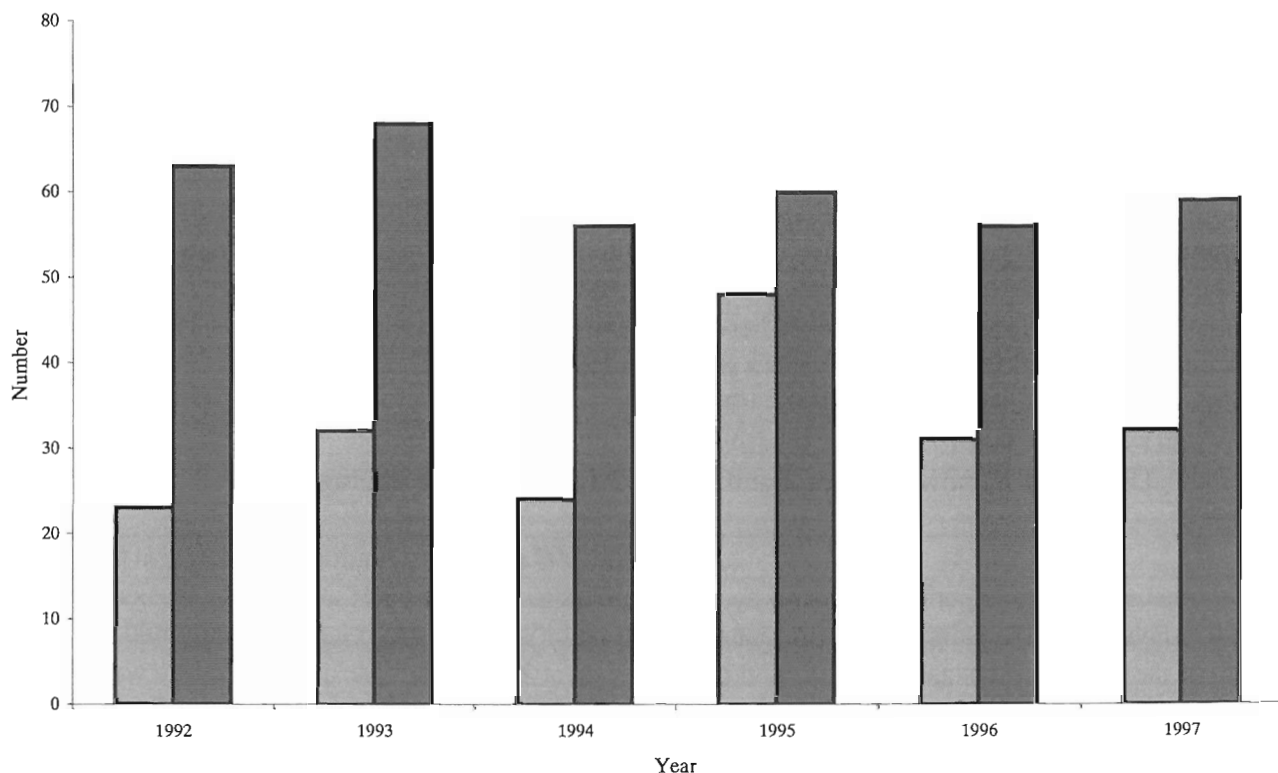


Figure 3 . Maximum daily numbers of Lesser White-fronted Geese (left bars) and the total numbers estimated from drawings of belly patches (right bars) observed at the Valdak Marshes in the years 1992-1997.

Table 1 . Overview of numbers of Lesser White-fronted Geese at the Valdak Marshes in the years 1992-97. The table shows the maximum number of staging geese on the best day, distribution of adults in pairs and immatures, and total number of staging individuals each year.

Year	Maximum on one day	Number of pairs	Number of immatures	Proportion immatures	Total number of individuals
1992	23	25	13	20.6 %	63
1993	32	32	4	5.9 %	68
1994	24	26	4	7.1 %	56
1995	48	> 25	> 10	> 16.7 %	> 60
1996	31	23	10	17.9 %	56
1997	32	26	7	11.9%	59

Table 2 . Overview of mean staging time of Lesser White-fronted Geese at the Valdak Marshes in the years 1993-1997 as estimated from the belly patch method (see Øien et al. 1996). n= number of pairs.

Year	1993	1994	1995	1996	1997	\bar{x} 1993-1997
Mean	5.6	6.9	7.4	8.4	6.6	6.9
n	28	19	23	22	19	111

increased, reaching a peak of 32 individuals at 30 May. Then the numbers started to decline quite fast, and unlike former years the staging period was prolonged, and the last geese were seen as late as 20 June (Figure 2). Totally 26 pairs were counted together with seven immatures (second calendar year). The number of immatures was normal as compared with the years 1993-1996. The total number of geese staging in the area fluctuates somewhat between years, but a Monte Carlo Simulation reveals a yearly decrease of staging pairs in the period 1993-1997 by 5.2% (data from the years 1993-1996 from Øien et al. 1996). This trend is, however, not significant ($p=0.20$).

In 1997 the mean staging period for the goose pairs were 6.6 days, when the pairs already present at the arrival of the field workers and those still left at the departure of the field workers as well as the pairs caught for satellite telemetry were omitted (Table 2). In the table, mean staging time in the period 1993-1997 is presented. The variation between years was

not significant ($F=2.02$, $df=4$, $p=0.096$, Oneway Anova, LSD-test). The overall mean staging time per pair in these years was 6.9 days ($n=111$) (Table 2).

Among the staging geese was a male caught during moult in Finnmark in 1995 (with colour ring code: Red-Black-Yellow). This male was paired with a previously unknown female, and the pair staged in the area for ten days, in the period 17 -26 May (see also section 4.3).

2.1.2 Autumn staging

In 1997 a total of 57 individuals staged at the Valdak Marshes in a period of at least two weeks. The first Lesser White-fronted Geese (eight individuals) were seen at 20 August. The last observation was 2³⁵ a.m. on 3 September, when sounds of flying Lesser White-fronted Geese were heard. This last night was the first night in the last part of the observation period with calm weather without clouds or wind.



Pair of Lesser White-fronted Goose at the staging ground at the Valdak Marshes in May. The male (at the right) is scanning for predators, while the female is grazing. Photo: Ingar J. Øien.

Also in previous years all autumn observations are from the period 17 August to 10 September (1981-1996, see Table 3). This yields a range of 25 days. However, continuously observation effort has been limited to the period 24 August to the first few days of September in the years 1995 to 1997, and it is expected that the actual staging period may start earlier and end later.

The geese mostly utilise the area during late evening, night and early morning. They only rarely stage at the marshes during daytime. As experienced in 1995 and 1996 the geese behave quite different compared to the spring staging period, spending more time being alert and showing a restless behaviour. The absence of geese during daytime is probably caused by disturbance from local people picking cloudberries *Rubus chamaemorus*. As a result, the geese spend the daytime on the adjacent small islands in the innermost part of the Porsangen Fjord. On 26 August a brief survey was carried out in this area, and one pair of Lesser White-fronted Goose was seen on the small Island Stuurra Saiva. Here we also found faeces of both Lesser White-fronted Goose and Greylag Goose *Anser anser*. In total 15 Greylag Geese were seen in this area.

Lesser White-fronted Geese has also been observed at the small islands Kråkholman at the boundary of Stabbursnes Nature Reserve (in 1996) and the Northwest point of the Peninsula Oldereidneset (in 1997).

Interestingly, no geese with colour rings were seen in the flock during autumn staging, which is due to the fact that non-breeders or failed breeders start the migration earlier (see section 4.3).

2.1.3 Breeding success

1997 was the third year running where continuous monitoring during the autumn staging was accomplished at the Valdak Marshes. The work was carried through in the period 24 August to 4 September. Counts of families and social groups were conducted in order to obtain an estimate on brood size, productivity, and proportion of juveniles in the population.

A total of 25 adults and 32 (56%) juveniles were seen. Eight pairs brought goslings, yielding a mean brood size of 4.0 (Table 4 & 5). On the Skjåholmen Island, a minimum of four pairs with goslings were seen, having a mean brood size of 3.0.



Pair of Lesser White-fronted Goose at the staging ground at the Valdak Marshes during the spring staging period in May (the male is at the right). Photo: Ingar J. Øien.

Table 3 . Overview of the staging period during autumn at the Valdak Marshes in the years 1981 to 1997 (all observations from the period 17 August to 10 September).

Year	Observation dates (extremes)			Time span in days
	First	Last	Occasional	
1981			17.08	(1)
1987			20.08	(1)
1992	18.08	20.08		(3)
1994	17.08	10.09		25
1995	19.08	06.09		19
1996	22.08	05.09		15
1997	20.08	03.09		15



Two Lesser White-fronted Geese (on the water) together with three Bean Geese of the subspecies *rossicus* at the Valdak Marshes in May. Both the *fabalis* and the *rossicus* subspecies occur mixed together with the Lesser White-fronted Geese here in this period. Photo: Ingar J. Øien.

Table 4. Distribution of broods (post-moult) on the staging area Valdak Marshes (VM) in 1994-97, the staging area Skjåholmen Island (SI) 1995-97 and in the breeding areas (areas C & D) in 1994, area (A & C) in 1995. The breeding area codes are not decoded in this publication. No data exists from the breeding areas in Norway in 1996 and 1997. See also Table 5.

Area	Brood allocation						Mean brood size	SD	n broods	Year
	1	2	3	4	5	6				
Breeding area	3		1	1			2.0	1.41	5	1994
Staging area VM	1	2	4				*2.43	0.79	7	1994
Breeding area	1	1	3	1	2		3.25	1.39	8	1995
Staging area SI			2				2.0	0	2	1995
Staging area VM		4	3	2	6	2	3.94	1.43	17	1995
Staging area SI					1		5.0	-	1	1996
Staging area VM	1	3	4	1			2.56	0.88	9	1996
Staging area SI		2	1		1		3.0	1.73	4	1997
Staging area VM		2	1		5		4.0	1.41	8	1997

* One flock of 32 individuals (16 goslings) has been omitted, because the distribution of broods are unknown (see also Table 5).

Table 5. Autumn age ratio and yearly brood sizes of Lesser White-fronted Geese in the years 1981-1997, based on counts during autumn migration at the Valdak Marshes (see also Table 4 for the distribution of broods and number of pairs with broods).

Year	n adults	n immatures	n total	% immatures	n flocks	Mean brood ¹	Mean brood ²	Mean brood ³
1981	10	18	28	64.3	1		3.6	
1982-86	no data exists							
1987	10	18	28	64.3	1		3.6	
1988-91	no data exists							
1992	24	34	58	58.6	?		2.8	
1993	no data exists							
1994	31	33	64	*51.6	3	2.4	2.2	1.3
1995	61	67	128	52.3	3	3.9	2.2	2.7
1996	16	23	39	59.0	1	2.6	2.9	1.0
1997	25	32	57	56.1	1	4.0	2.6	1.2

¹ Counts of pairs with broods in autumn.
² Number of immatures divided by number of adults (pairs) in autumn.
³ Number of immatures in autumn divided by number of pairs in spring
* Assumed that the observations are from three independent flocks.

To reiterate some of the discussion and conclusions from Aarvak et al. (1996): Counts made post breeding takes no account of chick mortality after hatching, during moult and until they appear on the staging areas before autumn migration. Unfortunately no information exists from the breeding areas on the clutch size, making an estimate of chick mortality impossible. However, the autumn staging observations of brood sizes may give an understanding of the variation in breeding success between years, when the same methodology is used every year. Mean brood size observed at the Valdak Marshes in the years 1994 to 1997 is as high as 3.4 (sd=1.4, n=41), although it varies significantly from year to year (F=6.96, df=3, p=0.008, Oneway Anova, LSD-test). It is thus likely to assume that the production is generally high, when based only on the individuals seen post-moult. In Table 5, three different estimates on brood size is given. The probably best estimate is based on number of juveniles compared to the number of pairs observed (potential breeders) in the pre-breeding period (Mean brood³), which yields an estimate for 1997 of 1.23 goslings per potential breeding pair (Table 5).

The estimated 1.23 goslings fledged per potential breeding pair yield a ratio of 38.1% juveniles in the autumn population. For the years 1994, 1995 and 1996 we obtain an estimated proportion of 38.8%, 57.3% and 33.3% respectively, with a mean for all years of 41.9% (sd=10.6). Many studies on arctic breeding geese like Barnacle Goose *Branta leucopsis*, Brent Goose *Branta bernicla*, White-fronted Goose *Anser albifrons* and Tundra Bean Goose *Anser fabalis rossicus* use the age composition (first-winter individuals and adults) during mid winter counts as a measure of the breeding success of the preceding breeding season (e.g. Ebbinge 1991). These studies show that the age composition varies between 0 and 60% for the Brent Goose, 5-30% for the Barnacle Goose and 2-50% for the White-fronted Goose (Ebbinge 1989, Ebbinge 1991, Fox & Gitay 1989).

If these estimates reflects the breeding success, the variation in breeding success of the Lesser White-fronted Goose as seen on the Valdak Marshes is quite small. A likely explanation could be that the time-

series is too short to reflect the actual variation in reproductive success. The small observed variation in brood size may on the other hand mirror the real variation in reproductive success. The principal factors determining the highly variable reproductive success in the Brent Goose at Taimyr seems to be caused by the physical condition of the individuals when they arrive at the breeding areas and the predation pressure by Arctic foxes *Alopex lagopus*. Also wind conditions during migration seems to play an important role in some years (Ebbinge 1989). A principal difference in the ecology of the Brent Goose breeding on Taimyr and the Lesser White-fronted Goose breeding in Finnmark is the availability of food resources close to and in the breeding areas when the geese arrive in spring. It is shown for the Brent Goose that much of its energetic stores is accumulated in the staging area in the Wadden Sea area, probably with a refuelling in the White Sea area. The spring staging areas of the Lesser White-fronted Goose are unknown, but the Valdak Marshes, which is situated close to the breeding areas, provides good feeding opportunities (own data), which could diminish the energetic bottleneck of migration.

For the White-fronted Goose *A. a. albifrons* and Tundra Bean Geese *A. f. rossicus* wintering in Zeeland (The Netherlands) it was in a long-term study shown that the White-fronted Goose had a higher reproductive success in terms of both brood size and percentage first-year birds, a higher variation in these parameters, and showing a three year cyclic variation with two good and one poor year. A cyclic variation was not found in the Bean Goose and this was thought to be related to a more southern breeding range for this species, thus being less vulnerable to predation from Arctic fox.

2.1.4 Mortality

Mortality rates are difficult to obtain as very few Lesser White-fronted Geese have been ringed. However, assuming that the individuals utilising the Valdak Marshes during spring and autumn staging makes a closed breeding population or that immigration and emigration rates are negligible, estimates can be derived since quite exact numbers on the age composition can be gained.

A juvenile mortality rate can be estimated by the difference between the number of juveniles in the autumn one year and the following spring for the years 1994-1997 as based on counts on the Valdak Marshes. This give an estimated mean mortality of 78.2% (sd=9.9) for the juveniles. This is assumed to be related to the high hunting pressure along the migration routes and in the wintering areas. Totally six goslings have been ringed in the moulting period, and three of them have been reported shot in the same year as they were ringed. This yields a juvenile death rate of 50% based on reported kills (Lahti & Markkola 1995, Aarvak & Øien 1995, J. Markkola pers. comm.). However, probably not all recoveries are reported. Taking into account that the most important migration routes and wintering areas are situated in Russia and Western Asia, it is likely that this figure represents a to low estimate. Ebbinge (1991) describes estimated non-return rates of rings as high as 75-80%, for the White-fronted Goose in The Netherlands, and an increase of such a rate from 50.9% to 66.8% in another study (Henny 1967).

An adult mortality rate can be calculated for the years 1993-1997 by the formula given by Ebbinge (1982) $m = 1 + i(j-1)$, where m =mean annual mortality rate, j =mean proportion of first-year birds, i =infinite rate of increase. Assumed that the estimated decrease of the population of 5.2% (by Monte Carlo Simulation, see section 2.1.1) is real, the estimated annual mortality rate for adults is 0.165 ($i=0.948$, $j=0.118$), i.e. 16.5% per year.

Another way to estimate the mean annual mortality rate with the same spring numbers of geese is given by the formula $m = \sum[(S_y - S_{y+1})/S_y]/n_y$, where S_y =number of adults and first-year birds and S_{y+1} =number of adults in the following spring and n_y =number of years. This yields an estimated mean annual mortality rate for the adults of 0.162 (sd=0.085, $n=4$), i.e. 16.2% per year in the period 1993-1996. Further we assume that the individuals entering their second winter have the same mortality rate as older individuals. As for the young, very few adults have been ringed. Based on the nine adults ringed in 1994 and 1995 only one has been reported shot in the course of the following year of ringing. However, circumstantial evidence suggest that some

of the ringed individuals were shot during early migration in Russia (see section 4.3.1).

These quite crude estimates of mortality indicate that the mortality of adults in general is relatively low, whereas the mortality of immatures is very high. Ebbinge (1991) estimates and describes the decrease in mortality rates for several goose species wintering in Western Europe after regulations and hunting bans occurred during the 1970s. He reports mortality rates of 25% to 31% in the first period, and 9-27% in the second, where 5-6% represents the annual natural mortality rate for these species. Summing up, it seems that the very high mortality rate of juveniles greatly influences the general population development.

2.1.5 Protection

The Valdak Marshes was protected as a part of Stabburnes Nature Reserve in 1983, with prohibition of human activity in the period 1 May to 30 June. Hunting of red fox *Vulpes vulpes* and grey seal *Halichoerus grypus* is allowed in the period 1 October to 31 March. The Norwegian Ornithological Society made a request to the regional environmental authorities in Finnmark in 1995 on introducing restrictions on human traffic in the area in the period 15 August to 15 September. However, the area has yet no formal protection in this period.

The current restriction on human movement is respected by local people, and no violation of this has been documented since 1991. However, no such restriction exists during autumn in the period when the Lesser White-fronted Geese utilise the area, resulting in a redistribution, where the geese are forced to use the areas where they are vulnerable to hunting and less profitable food. As is generally known, few hunters are able to distinguish the different species of geese especially in the period of the day when they have the greatest probability of getting a hunting bag; during dusk or dawn. Hunting of Greylag Geese occur on the adjacent small islands in the Porsangen Fjord, and all possible measures to avoid illegal or accidental shooting of Lesser White-fronted Geese should be taken.

Accidental bagging of Lesser White-fronted Goose occur in Finnmark County and this was documented in 1994, when a hunter shot a juvenile Lesser White-fronted Goose in a mountain area during a hunt of Willow Grouse *Lagopus lagopus*.

2.2 STAGING AREAS IN THE VARANGERFJORD, FINNMARK

2.2.1 Skjåholmen

The Island Skjåholmen is situated in the bottom of the Varangerfjord in Finnmark County (70°08'N 28°45'E), and is at present one of two remaining important autumn staging places for the Lesser White-fronted Goose population in Northern Fennoscandia. Skjåholmen is utilised particularly by Lesser White-fronted Geese breeding in the eastern part of Finnmark and in Northern Finnish Lapland. This island is quite small approximately 3.5 km long and 500 meters at its broadest, with a constriction on the middle being only 180 meters.

Skjåholmen was rediscovered as a staging area for Lesser White-fronted Geese in August-September 1994, when an adult male tagged with a satellite transmitter in Northern Finnish Lapland was located (and later found dead) here (Lahti & Markkola 1995, Aarvak & Øien 1994, Aarvak et al. 1996). Also in August-September 1995 a male Lesser White-fronted Goose, tagged with a satellite transmitter in Northern Finnish Lapland was located by satellite plots (and later also observed) here. However, Skjåholmen was known as a spring staging area at least back to the 1970s. Johansson (1974) reported the Lesser White-fronted Goose to occur regularly during spring from the middle of May. In 1973 two individuals were observed 31 May and 1 June.

2.2.1.1 Spring staging

Skjåholmen was visited by the Norwegian Lesser White-fronted Goose Monitoring Programme (NOF) on 7 June, 1996. One pair of Lesser White-fronted Goose was staging on the island and it was estimated that approximately five pairs had visited the island

during that spring, based on footprints and faeces in the coastal meadows. A similar visit was made in 1997, when also one pair was seen on 2 June. These short visits were made to uncover to what extent the island was used by Lesser White-fronted Geese during spring migration. Considering the limited current knowledge, it is necessary to establish a more extensive and persistent monitoring in spring to increase knowledge on the staging number of Lesser White-fronted Geese and the temporal and spatial use of the Skjåholmen as a spring staging ground. On the background of several observations of Lesser White-fronted Geese in the outer parts of Varangerfjord in 1997 (see section 2.2.2), it is important to investigate the importance of the Varangerfjord area in general as a staging ground.

2.2.1.2 Autumn staging

The island has been monitored during autumn migration by WWF-Finland, Lesser White-fronted Goose Project in the years 1995 to 1997 (Tolvanen et al. 1997).

During the migration studies, a hiding tent was used for observation in the western part of the island; one observer was in the hiding tent while the other observer simultaneously watched the geese in the eastern part of the island. Disturbance of the geese were avoided in the western part of the island during daytime because the observers did not move outside the tent. This seemed to be the most effective way to observe the geese in the area. In 1997 communication with walkie-talkies between the observer in the hiding tent and the observer in the eastern part of the island made the monitoring more efficient (Tolvanen et al. 1997).

The monitoring work revealed that good numbers of Lesser White-fronted Geese utilise the island regularly during autumn staging. However, due to a relatively big blind area, the total numbers of geese staging were difficult to calculate. Estimated minimum numbers are given in Table 6 (from Tolvanen et al. 1997). This shows that 2-7 pairs with young stage at the island before continuing the migration eastwards to the Kanin Peninsula in autumn (see section 4). In 1995 only four pairs staged on the island post-



Inspection of the staging ground for Lesser White-fronted Geese at Skjåholmen by the Norwegian Ornithological Society, the Norwegian Directorate for Nature Management and the Office of the County Governor of Finnmark (environmental department). Photo: Morten Ekker.



Faeces of Lesser White-fronted Goose (left) and of Greylag Goose (right) at Skjåholmen. From the size difference of the faeces, it is possible to separate this species. Skjåholmen, June 1997. Photo: Ingar J. Øien.

moulting, but this year, very few individuals also staged at the Valdak Marshes in the same period. That was probably due to the unfavourable breeding conditions in 1995, which lead to a general low production. Only some few pairs bred successfully, and even the successful breeders produced small clutches. The knowledge on the behaviour of failed breeders and non-breeders are quite fragmentary, but it seems that at least the non-breeders start the migration already in early July to moulting places in Northern Russia (see chapter 4.3). Whether the non-breeders and failed breeders utilise Skjåholmen as a pre-migratory staging ground is unknown.

The staging period for the geese in autumn may seem limited to the period 20 August to 4 September (Table 7). This is, however, due to the time available for monitoring by the Finnish Lesser White-fronted Goose Project. At the Valdak Marshes, the staging period for the Lesser White-fronted Geese is within the period 17 August to 10 September, but also here, staging geese is expected to show up both before

and after, dependent on the phenology in the mountain areas which determine the progress of breeding. Daily observations of Lesser White-fronted Geese at Skjåholmen in the period 20-30 August are presented in Table 8.

2.2.1.3 Protection

Even if Skjåholmen already is stated as one of the very few remaining staging places for the globally threatened Lesser White-fronted Goose in Fennoscandia, landing, hiking, gathering of gulls eggs and cloud berries and even hunting is still allowed at Skjåholmen during the staging periods of the Lesser White-fronted Goose.

As stated by Tolvanen et al. (1997): In order to protect the Lesser White-fronted Goose, hunting and unnecessary landing on Skjåholmen should be prohibited during the spring and autumn staging periods (i.e. 10.5-15.6 and 15.8-15.9). Also, the possibility to protect Skjåholmen as an extension of the Nes-seby Nature Reserve should be considered.

Table 6. Estimated (minimum) numbers of Lesser White-fronted Geese at Skjåholmen during autumn staging in 1995-1997 (data from Tolvanen et al. 1997).

Year	Total	Number of ad/subad	Number of juveniles
1995	50	c. 15	c. 18
1996	13	8	5
1997	30	18	12

Table 7. Overview of the staging period during autumn at Skjåholmen in the years 1995 to 1997 (All observations from the period 20 August to 4 September) (data as estimated from Tolvanen et al. 1997).

Year	Observation dates (extremes)		Time span in days
	First	Last	
1995	23.08	04.09	13
1996	25.08	02.09	9
1997	20.08	30.08	11

2.2.2 Other staging areas in the Varangerfjord

Skjåholmen is the most important staging place in the Varangerfjord region, but Lesser White-fronted Geese also utilise the coastal meadows in other areas in the Varangerfjord. Formerly another area was used by larger amounts of geese, but this area was destroyed when it was cultivated in the early 1980s.

Five areas in the Varangerfjord in addition to Skjåholmen were known to hold Lesser White-fronted Geese in 1997 (Table 9). Of these, Storelvosen is known from the 1950s, when Taylor (1953) saw at least 50 individuals flying low above the water and landing on the shore of the outlet of the river. Taylor

stated that many geese arrives at Storelvosen every year in the middle of May. All these areas are situated on the northern side of the fjord. Ekkerøy has one record dating back to 1971, when two and seven individuals were seen in July (Vaughan 1975). The coastal meadows between Ekkerøy and Storelvosen is protected as a Nature Reserve since 1991.

In addition it is also known that Lesser White-fronted Geese utilise the coastal meadows in Varangerbotn and at Veines (Tolvanen 1997), but exact numbers and dates are not available at present. In 1985 five individuals were observed in Varangerbotn on 14 June (Østlyngen 1996).

Table 8. Daily observations of Lesser White-fronted Geese at Skjåholmen during post-moult staging in the period 20 August-30 August 1997 (all data from Tolvanen et al. 1997).

Date	Number				Comments
	Ad.	Ad./2y	Juv.	Total	
20.08	2	2		4	Female ringed and neck-banded in Northern Finland in 1995.
21.08					Voice observation of a flock flying over the tent.
22.08	4	6	4	14	All birds without rings, one of the two ad. pairs had no juv.
23.08	4		4	8	Two pairs with two juv. One new family and the family seen 20.08.
24.08	7	10	7	24	The flock of 10 seen very briefly, flying northwards.
26.08	5	8	7	20	The family seen 20.08 was also present.
27.08	5	8	7	20	Probably the same flock as 26.08.
28.08	5	8	7	20	Probably the same flock as 26.08 and 27.08.
29.08	6	8	7	21	The family seen 20.08 was also present
30.08		8		8	Probably the same birds as seen at 26.08-29.08.

Table 9. Localities in Varangerfjord with number of observed Lesser White-fronted Geese in 1997.

Locality	Date	Number	Comments
Kiberg, Vardø	26.10-16.11	1 (imm.)	
Vadsø	02.06	7	
Skallelv, Vadsø	29-30.05	3	Perhaps same as seen at Storelvosen-Ekkerøy the same day
	13-14.06	1	
	19.06	1	
	21.06	5	
Storelvosen-Ekkerøy	24.06	2	
	29.05	4	
	30.05	3	
	10.06	1	

3. BREEDING AREAS

3.1 Background

The Lesser White-fronted Goose has been one of the least studied goose species in the Palearctic Region, thereby creating a urgent need for research and information when it was realised that the world population had declined severely and that the knowledge about its ecology was very scarce. Some attention was given in the early 1970s when the first signals came of the negative population trend, but only work conducted in recent years has revealed a population decline even more serious than first believed. The present situation with low numbers of breeding pairs scattered over vast territories create problems when research is conducted to understand the basic ecology of the Lesser White-fronted Goose and the reasons for the negative population trend. Breeding, staging and wintering areas are difficult to locate because of the huge range occupied by this species, and their few numbers often makes them hard to find in remote patchy areas. This is explicitly

when mixing with larger flocks of White-fronted Geese, from which it is hard to distinguish.

Breeding Lesser White-fronted Geese are generally found in areas of forest tundra or forest edges from the Fennoscandian mountain areas eastwards to the Pechora Delta - Ural/Yamal area, Taimyr, Yakutia and to Anadyr in the Far East. A recent population estimate given by Lorentsen et al. (MS) for the breeding areas is 2750-4600 pairs for the whole breeding range. However, due to quite poor knowledge about location of breeding areas, breeding densities, and yearly breeding success, this estimate is not very accurate. Therefore research in the known and potential breeding areas is urgently needed. In this section we have made a summary of the present knowledge on the status of the species from the core breeding area which makes the stronghold of today's Lesser White-fronted Goose population; the Taimyr Peninsula.



Typical breeding habitat for Lesser White-fronted Geese in Fennoscandian mountain areas; water courses edged with rich Salix vegetation. Photo: Georg Bangjord.

3.2 TAIMYR, RUSSIA

According to general reviews of the status of the Lesser White-fronted Goose in Russia (Vinogradov 1990, Morozov 1995), the biggest part of the species breeding range in the 1960-80s was located on the Taimyr Peninsula. A review on the status of the species in this area is given by Rogacheva (1988, 1992). In 1996, the analyses of all existing data on biology, distribution, population estimates and trends of the Lesser White-fronted Goose in Taimyr was published (Syroechkovski, Jr. 1996). Taking into account that this paper was published in Russian and that a lot of new data was collected during the expedition in 1997, we have decided to publish an updated review of breeding status of the species in Taimyr.

Until recently the Lesser White-fronted Goose has never been subject of specific studies in Taimyr although incidental data on the species' distribution was collected during general fauna investigations in the 1960-1980s (A.V. Krechmar, A.A. Romanov, A.A. Vinokurov, I.I. Chupin and collaborators of the Scientific Institute of Agriculture of the Extreme North pers. comm.). During the work in Taimyr in 1988-94 (International Arctic Expedition of Russian Academy of Sciences) some material was collected as well (see e.g. Prokosch & Hötcker 1995).

Expeditions for Lesser White-fronted Goose investigations were organised in 1995 and in 1997. In 1995 the work was carried out in collaboration with A.I. Artiukhov, V.G. Babenko, E.G. Lappo and others (INTAS project). The 1997 expedition was a joint project between the Geese and Swans Study Group of Eastern Europe and North Asia and the Lesser White-fronted Goose projects of WWF-Finland and the Norwegian Ornithological Society.

A lot of help was given by local people of Taimyr, mostly hunters and fishermen, who provided us with a lot of information about observations of geese.

Though the Lesser White-fronted Geese are commonly confused with White-fronted Geese (Morozov 1995), questionnaire data may still, when sorted properly, give a certain information on the species distribution in the regions, where White-

fronted Geese does not nest now. The native population of the Taimyr tundra, as a rule, knows this species and has local names for it. Nganassans call the Lesser White-fronted Goose «sioene». Dolgans from the settlement Ust'-Avam call it «altan karak», which means copper eye. A.I. Artiukhov informed, that both the Russian and the native population from the settlements at the River Kheta also call the Lesser White-fronted Goose «baragulka». Hunters reports on the Lesser White-fronted Goose bag during the spring game hunting are rather reliable because hunted Lesser White-fronted Geese clearly differ from the other geese.

3.2.1 Breeding distribution

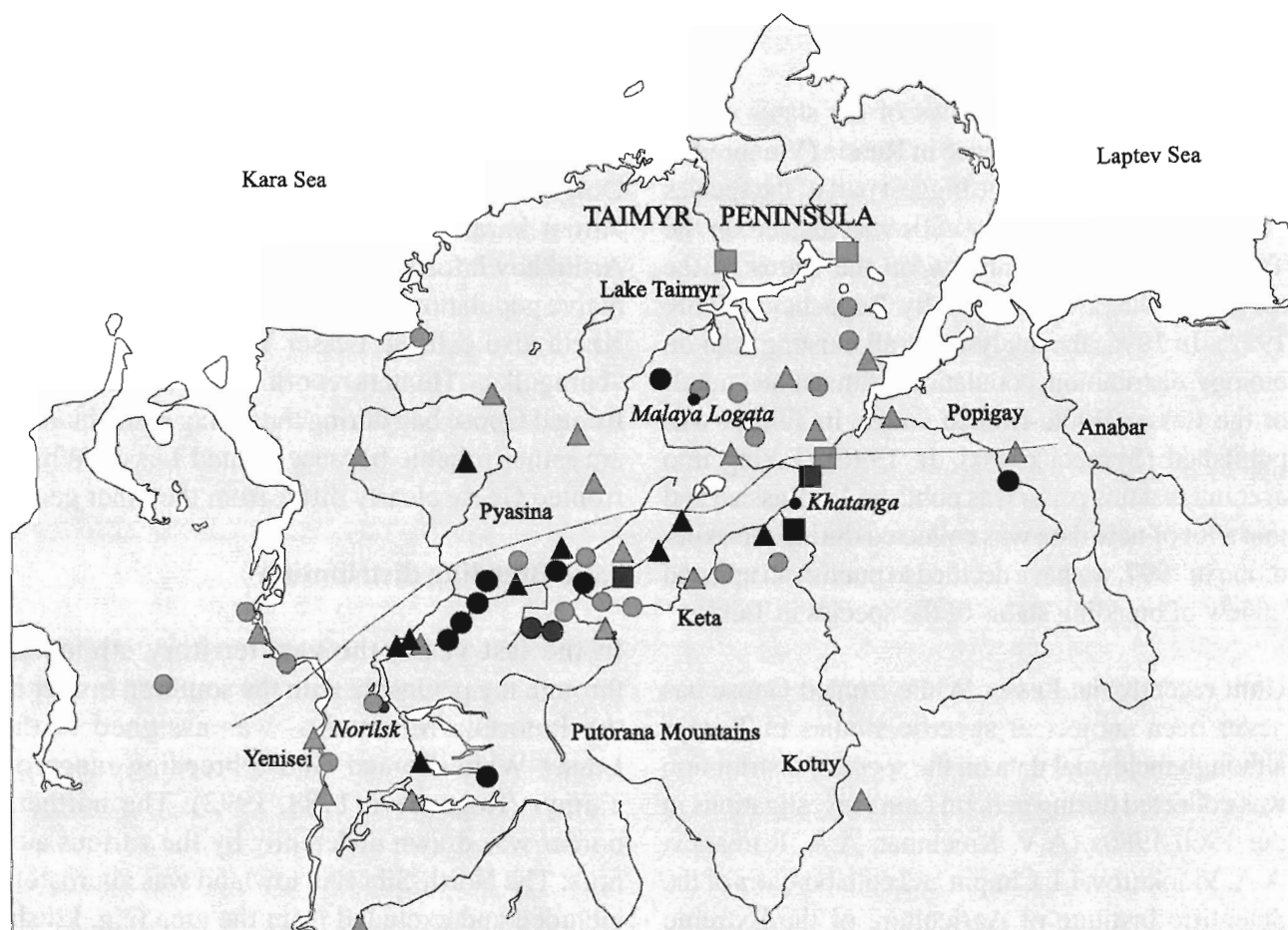
In the last years, the vast territory stretching through the peninsula with the southern border in the Putorana Mountains, was assigned to the Lesser White-fronted Goose breeding range on Taimyr (Rogacheva 1988, 1992). The northern border was drawn differently by the various authors: The North-Siberian lowland was alternately included and excluded from the area (e.g. Ptushenko 1952, Vinogradov 1990, Morozov 1995).

A review of the breeding records and observations of the last years in Taimyr are presented on the map (Figure 4). Points of investigations, where Lesser White-fronted Geese were not found are also shown on the map to give a better idea on the species distribution and the extent of ornithological investigations. In the following we will consider the distribution of the species in different natural regions of Taimyr Autonomous District (see also Figure 5 for locality names).

3.2.1.1 Putorana Mountains

The Lesser White-fronted Goose occurs in the valleys of some lakes in the western part of the Putorana Mountains (Krechmar 1966 cited in Syroechkovski Jr. 1996, Romanov 1996b). It does not inhabit the central parts of the plateau (Zyryanov & Pavlov 1984, Romanov 1996a).

A high density of nesting Lesser White-fronted Goose in the Kotuy River Valley (eastern boarder of Putorana) was previously supposed by Martynov (1984),



	Breeding	Non-breeding
Before the 1960s	■	■
In the period 1960 to 1989	▲	▲
After 1990	●	●

Figure 4. Map showing the known nest findings and observations of Lesser White-fronted Geese during the last years in Taimyr, Russia. Dotted line shows approximately border of the forest tundra.

but is not supported by any concrete findings. Volkov (1984), O.A. Chernikov (pers. comm.) and Khatanga hunters we have contacted, have not found breeding individuals in the middle Kotuy.

At Lake Kutaramakan (Romanov 1996b), nesting has been observed annually during the period of 1980-1990, and the Lesser White-fronted Goose numbers some dozens of pairs.

Potential breeding regions at Lake Kheta have not been examined by ornithologists since the 1960s. In our opinion, it is hardly probable that they are important because of increased disturbance and

destruction of the open woodland vegetation due to the effect of pollution from the Norilsk metallurgical works. In more southern areas around Khantayka Lake basin, breeding of the species is never proved. The habitat in some parts of the area are suitable and according to questionnaire data, Lesser White-fronted Geese can be observed on spring migration and in summer time.

3.2.1.2 Forest-tundra of the North-Siberian Lowland

Obviously, all this territory was previously inhabited by the Lesser White-fronted Goose. Due to uneven

ornithological investigation, the forest-tundra (open woodland) area at the Pyasina River mouth possess most of the Lesser White-fronted Goose nesting records in the past (Krechmar 1966 cited in Syroechkovski Jr. 1996). At the beginning of this century broods of Lesser White-fronted Geese were found in the upper reaches of the Dudinka River (Tugarinov 1941). According to the questionnaire data of a great number of inhabitants from the settlements Ust'-Avam, Khatanga, Katyryk, Volochanka etc., the Lesser White-fronted Goose previously inhabited the whole open woodland within the basin of the Kheta and Dudypta rivers. Middendorff (1869) found the Lesser White-fronted Goose on Boganida in the middle of the last century. In the early 1980s, this species was still common at this river (unpublished notebooks of V.F. Dorogov). Scalon (1937) considered the Lesser White-fronted Geese to be rather common at the beginning of the 1930s in the lower reaches of the Kotuy River and in the Khatanga Region. They nested there at a later time too (data of Torgashev cited by Ptushenko 1952). Martynov (1984) supposed that in the open woodlands in the Khatanga area, the Lesser White-fronted Goose reaches maximum breeding density for the whole Taimyr (2 broods per km²) (Martynov & Volkov 1984). In our opinion, the Lesser White-fronted Goose only occur in some river valleys and lake basins. The statement that the Lesser White-fronted Goose densely inhabit considerable areas is undoubtedly invalid.

At present the range of the Lesser White-fronted Goose is greatly reduced in the forest-tundra. Evidently this species has disappeared completely in this subzone at the Lower Yenisey. It is not occurring at the Pyasina River Delta which is evident from the regular visits by researchers from the Scientific Institute of Agriculture of the Far North during the last 20 years (V.A. Kuksov pers. comm.). The species does not breed along the rather populated Dudypta River downstream from the tributary Avam, or along the Avam River. According to our observations in 1995 and questionnaire data, the Lesser White-fronted Goose continues nesting in the forest-tundra part of a basin of the Dudypta River, along its tributary Kystyktakh River, and (to a lesser extent) along the tributaries of the Avam River. A few pairs of the

Lesser White-fronted Goose nest rather sparsely at the tributaries rarely visited by people. According to the questionnaire data they are more typical in some places at the foothills of Putorana Plateau and in the region of ancient Avam-Tagenar portage and the adjacent Volochanka River basin emptying into the Kheta River. Areas upstream the Volochanka River are reported to have the highest breeding density of the species.

I. Stepanov informed us about breeding of Lesser White-fronted Goose in the 1980s on one of the islands of the Lake Sobachye in the north-western foothills of the Putorana Plateau. In the last years, the Kheta basin has been investigated, but not as detailed as the Dudypta River basin. Artiukhov (1996) did not find any trace of breeding along the valleys of the rivers Boganida and Kheta in 1995 and 1997. However, according to stories told by local people, there are many small spots where breeding of Lesser White-fronted Geese were recorded in the last 5-10 years. In one of these areas, the Kurluska Lake, the Russian-Norwegian-Finnish expedition recorded about 10 broods of the species in August 1997 (see chapter 4.2.2.2). Questioning of one hunter revealed that broods are regularly met along the small rivers flowing from Kurluska Lake to the Kheta River. In August 1996 he recorded about 20 broods of the species by going downstream with a small boat.

Further east along the Kheta River, Lesser White-fronted Geese are regularly observed in small numbers on migration. Some few birds were shot out of a mixed flock of White-fronted and Lesser White-fronted Geese in the beginning of August 1997, 15 km downstream from the Boyarka River mouth. According to questionnaire data, the Lesser White-fronted Goose breeding grounds still retained in the 1980s and in the beginning of 1990s in the Putorana foothills in the region of the Kheta River mouth and in the basins of the rivers Boyarka, Bolshaya Romanikha and Maymecha closer to the Putorana foothills. Residents of the Katyryk settlement informed us that broods of the Lesser White-fronted Goose occurred at the left-bank of the Kheta, along its tributary Bolshaya Rassomash'ya River. Nesting of the Lesser White-fronted Goose has not since long been proved in the vicinity of the Khatanga



Typical breeding habitat and moulting area for Lesser White-fronted Geese in the Forest- tundra landscape near the Kurluska Lake area, Taimyr. Note the rich Salix vegetation at the shore-line. August 1997. Photo: Ingar J. Øien.



Air view of breeding habitat and moulting area for Lesser White-fronted Geese near Kurluska Lake in the Forest Tundra of Taimyr. August 1997. Photo: Ingar J. Øien.

settlement, in the basin of Khatanga River or in the lower reaches of the Kotuy River (I. Chupin, A. Volkov, M. Soloviev, A. Voronin pers. comm., own observations). However, the most likely breeding areas for Lesser White-fronted Geese in the regions of the Putorana and Anabarskoe Plateau foothills, has never been surveyed by ornithologists. According to questionnaire data by geologists, a few birds were seen during the summer 1992 along the Sabyda River.

Babenko (1996) did not find any traces of Lesser White-fronted Goose inhabiting the Lower Popigay River and the basin of its tributary (the Fomich River) in 1995. According to the data of questioning, the species occurs at the Popigay Depression in small numbers during migration, and it is also known to breed in some few locations. Three-four broods were recorded during the 1990s in the surroundings of the Popigay settlement. A few broods were also observed at the lower reaches of the Anabarka River by relatives of the hunter I. Katyginski in the early 1990s.

3.2.1.3 Southern tundra

Apparently, the Lesser White-fronted Goose formerly inhabited the greatest part of the southern tundra of the Taimyr Peninsula, although with lesser density than in forest-tundra. Presently, the Dudypta and Malaya Balakhnya River basins are the only regions of the southern tundras of Taimyr for which we possess information on the species' breeding.

In the Dudypta basin, our observations in 1995 and questionnaire data has shown that the breeding grounds of the Lesser White-fronted Goose are located along the tributaries — the rivers Ugarnaya, Batayka, and at the Dudypta itself upstream from its tributary Avam River. Observations in the southern tundras of Western Taimyr has shown, that the Lesser White-fronted Goose is not breeding there at present.

There has been no ornithological publications on the southern tundras of the Western Taimyr in the last decades. In the 1950-1960s, Krechmar (1966 cited in Syroechkovski Jr. 1996) believed that the Lesser White-fronted Goose breeds southward as far as the Dudypta River mouth. We do not exclude the possi-

bility of some pairs breeding in the tundra regions in the basin of the Agapa River, which is rarely visited by humans. However, additional research is needed to verify this. The areas east of the Gydan Peninsula has not been surveyed by ornithologists, and the status of the Lesser White-fronted Goose in this area is not clear yet. Helicopter-pilots from the town Dudinka informed us that they found moulting adults and young Lesser White-fronted Geese in the southern tundras of the Upper Messoyakha.

The south tundras of the Eastern Taimyr are poorly studied. There are no information on currently breeding birds on the coasts of Khatanga Gulf (M. Solo-



Border of the Taimyr Nature Reserve at the Logata River close to the moulting place of non-breeding Lesser White-fronted Geese, slightly upstream from its tributary Malaya Logata River, Taimyr. July 1997. Photo: Ingar J. Øien.



Moulting place for non-breeding Lesser White-fronted Geese in the tundra at the Logata River, upstream from its tributary Malaya Logata River. July 1997 Taimyr. Photo: Ingar J. Øien.



Forest- tundra landscape from Taimyr. Breeding area of Lesser White-fronted Geese. Kurluska lake area August 1997. Photo: Ingar J. Øien.

view, I. Chupin, pers. comm., own questionnaire data). The areas further east, closer to the Yakutian border are also not properly studied. The tundras of Novaya River has been visited by many ornithologists (A. Gavrilov, I. Chupin, A. Volkov etc.) but none of them were able to give any information about breeding Lesser White-fronted Geese. Several hunters from Khatanga and Novorybnaya settlements have told about Lesser White-fronted geese met in the late 1980s and the early 1990s along the Malaya Balakhnya River. Most of these observations were moulting birds, but also some few were breeding individuals.

3.2.1.4 Typical tundras

We have collected interview data about Lesser White-fronted Geese breeding near nests of birds of prey and moulting in the lower reaches of Bolshaya Balakhnya River and its tributary Gusikha. In the 1960s B. Borzhonov (pers. comm.) found many moulting flocks and some breeding pairs there. Observations made in these areas in the 1970s and the 1980s did not show any presence of the species (B.N. Pavlov, I.I. Chupin, pers. comm.). However, they did not visit the areas from where we have questionnaire data. Current existence of this tundra breeding population of Lesser White-fronted Geese should be checked in coming years.

Data of Lesser White-fronted Goose breeding in the typical tundras of Taimyr are scarce: breeding was confirmed in 1968 in the Upper Mokoritto River in Western Taimyr (Kokorev 1989) and in 1994 at the lake Syrutaturku in the Taimyr Biosphere reserve (A. Voronin pers. comm.). Kokorev (1989) supposed the possibility of Lesser White-fronted Goose breeding at the Middle Pura River. According to the questionnaire data gathered by a game specialist from Khatanga; K. Babashkin, a noticeable quantity of Lesser White-fronted Geese occurs annually, and may breed at the mouth of the Bolshaya Balakhnya River. The Lesser White-fronted Goose does usually not breed annually in the typical tundras of Taimyr. Evidently the typical tundras of the Taimyr makes the border of the breeding area where the birds do not breed annually, and only in some isolated spots.

3.2.1.5 Breeding range in the 1990s

We can conclude that the breeding range of the Lesser White-fronted Goose in Taimyr at present only consists of several small areas in the Dudypta and Kheta basins. Several isolated breeding points still exists in the lake valleys of the Western Putorana Mountains. Probably some breeding areas may be located in the Eastern Taimyr. In vast areas of typical and southern tundras, isolated breeding places may be found in some years. Anyway, the range of the Lesser White-fronted Goose in Taimyr has decreased considerably. It makes at present only about 8 % of the potential range drawn for the species in the 1950s and the 1960s, and 20 % of the range supposed 15-20 years ago according to our estimates. Future studies are needed to clarify the limits of the breeding range, especially in the Eastern Taimyr forest-tundras. At present, the potential breeding range of the species drawn by us makes about 32 500 km².

3.2.2 Remarks on Breeding Biology

3.2.2.1 Phenology

Data on phenology of the Lesser White-fronted Goose breeding on Taimyr are fragmentary. Krechmar (1966 cited in Syroechkovski Jr. 1996) observed a Lesser White-fronted Goose clutch hatching at Lake Kheta in July 1964. In 1960, after an early spring, the same author found clutches the day before hatching in late July. According to his opinion, 10 - 15 July can be considered as a normal time for egg hatching in the open woodland of the Western Taimyr. In 1995, the spring was long and we found goslings at the age of 2-5 days on 18, 19, 20 and 29 July at the Lower Dudypta River. Goslings at the age of some few days were observed on Boganida River on 5 July (Middendorff 1854) and on the Upper Dudinka River on 7 July (Tugarinov 1941). Alpheraky (1905) wrote that on the Boganida a young bird in down was taken by Middendorff as early as 23 June, and on 29 July another was captured, in which the primary and secondary wing-feathers and scapulars had only just begun to appear. V. Sotnikov informed that he found a Lesser White-fronted Goose brood with small goslings in the basin of the Batayka

River (a tributary of the Dudypa River) about 20 July. Romanov (1996) informed that hatching of the Lesser White-fronted Goose at the Lake Kutarmakan was about 5-10 July. The latest finding of goslings (at the age of some few days) was in 9 August 1994 in the most northern breeding region of the species in the Taimyr, Taimyr Reserve (A. Voronin pers. comm.). As a summary, it seems that hatching occurs in the first third of July in years with early and normal spring, and this period may be moved on up to the end of July in years with long spring and cool summer. Apparently hatching occurs slightly earlier south of the open woodlands and in the Putorana, than at the edge of open woodlands and in the tundras of the Dudypa basin.

As the incubation period is 25-29 days it may be considered that incubation starts in the middle of July (Witherby et al. 1939). The earliest clutches known was fully laid at about 5-7 June, and the latest ones; one month later, between 5 and 10 July. The onset of egg-laying is approximately one week prior to these dates.

By comparison with the White-fronted Goose inhabiting the same regions of Taimyr, breeding of the Lesser White-fronted Goose occurs in a somewhat longer period (Krechmar 1966 cited in Syroechkovski Jr. 1996, own observations).

3.2.2.2 Clutch and broods

According to description of the for us known ten nests, the average clutch size is 5.3 eggs. Five clutches contained five eggs, two clutches six eggs, one clutch had four eggs and one had seven eggs. The eggs of one clutch collected by V.V. Leonovich and stored in the Zoological Museum, Moscow State University has the following measurements (mm): 71.6 x 47.4; 70.3 x 48.1; 72.7 x 48.8; 73.7 x 49.4; 73.1 x 49.1; 73.4 x 49.7. The average broods size (n=7), observed by us in 1995, was 4.6 goslings at the age of up to ten days. There were five goslings in four broods, four goslings in two broods, one in one brood, and seven in one brood. A.N. Voronin found a brood of five goslings in 1994. According to the data of questioning, the brood size ranges from three to seven goslings.

3.2.2.3 Breeding habitat

Data on the breeding habitat of the Lesser White-fronted Goose is limited. Judging by available materials, the species may breed within a rather extensive range of habitats. Lesser White-fronted Goose nests were found at the coasts of big lakes and on the small island of a shallow lake in open woodland at the mouth of the Pyasina River (Krechmar 1966 cited in Syroechkovski Jr. 1996). This author mentioned a bog with bushes at a lake, a peninsula covered by mixed undershrub, and an island with a colony of Arctic Tern *Sterna paradisaea*, Taimyr Herring Gull *Larus argentatus taimyrensis* (synonymous *Larus heuglini*, see Prokosch & Hötker 1995 for comments on systematics) and several species of ducks. V. Sotnikov found a Lesser White-fronted Goose nest at June 1991 east of Lake Sykhyr-Kiuel' (the Banty River) at the right bank of the Lower Dudypa River. It was located on the small rise of a relief in a depression between two rivers, in tussock tundra almost without bushes. Some years before, another nest was found in a similar habitat, but with even less bushes. We have only few questionnaire data from Eastern Taimyr about breeding of Lesser White-fronted Geese on the steep banks of rivers as it is described as typically for Southern Yamal and the rivers More-Yu and Chernaya in Bolshezemelskaya tundra (Danilov et al. 1984, Mineev 1987). There are some few observations by local people about breeding of Lesser White-fronted Goose close to the nests of birds of prey, as described for breeding Lesser White-fronted Geese at Southern Yamal (V. Morozov pers. comm.).

Nest composition shows no difference from that of the other geese in the tundras of Taimyr. Usually it is a considerable amount of down with a mixture of the fragments of dry plants from the vicinity of the nest. The nest may be located both under the shelter of small bushes of arctic birch or willow, and openly, so that plants do not cover an incubating bird (Krechmar 1966 cited in Syroechkovski Jr. 1996). When leaving the nest, the female covers the eggs with down.

We have several descriptions of habitats, where the broods were found: One brood was found at a for-

mer river-bed of width 3-10 m and of a length about 200 m at the Kystyktakh River, slightly upstream in the Medvezhiy Yar Valley. Dense and tall willow bushes covered one side of the bank, and a low ridge with bushes and larch woodland (where the nest was situated), were located on the other side of the bank. There was several hundred metres up to the river. O.P. Krashevskiy found a brood at the same place in 1990.

A.V. Voronin found a brood with young gosling together with one brood of White-fronted Goose in the immediate vicinity of the Lake Syrutaturku in the Taimyr reserve. The birds kept on a small moraine lake in the vicinity of the vast bogged depression. In middle July 1995, two broods were met on the small island of the Ugarnaya River (Dudypta River basin). In the same area, young with adults were recorded on a lake adjacent to low-lying terrain with a great number of small lakes. Two broods with downy young were found at the bogged mouth of a tiny brook at the northeastern coast of the Lake Kutaramakan in the Putorana Mountains. The adjoining coast was covered with dense bushes where the broods were hidden (Romanov 1996b). In the other cases, the Lesser White-fronted Goose broods were found at the rivers where they have much higher possibility of being detected. Several broods with grown goslings are commonly aggregated in groups. Romanov (1996b) found groups consisting of up to 25 young birds. It is likely that these aggregations are formed by birds hatched close to each other. This is presumably connected with the Lesser White-fronted Goose's tendency to nest in small groups. Krechmar (1966 cited in Syroechkovski Jr. 1996) and a great number of natives of the Dudypta River, which found the Lesser White-fronted Goose nests, noted this fact. V.V. Morozov report the same tendency for Lesser White-fronted Geese at the foothills of Polar Ural.

Summing up the preceding: the Lesser White-fronted Goose prefers two types of habitats within the Taimyr Autonomous District: the plains in the northern open woodland and in southern tundras with dissected relief and abundance of small lakes; some deforested lake depressions in the Putorana Mountains.

3.2.2.4 Moul

Breeding adults, like in other geese, moult together with their broods in the vicinity of the breeding sites. Non-breeders and failed breeders often join in separate flocks and move from the breeding sites.

3.2.2.5 Moulting areas of breeding birds

In the Dudypta Basin and along several tributaries of Kheta, broods moult at the middle of small rivers and ox-bow lakes not far from nesting areas. At Kurluska they stay at the bays and stream mouths on the lakes. They have been observed near various types of coasts from open tundra areas to heavily forested places, but always near to low shores in order to rush to the shore and be able to disappear in the surrounding *Salix* vegetation when threats appear on the water. In Putorana the moulting Lesser White-fronted Geese occurred commonly on the lakes (Kretchmar 1966 cited in Syroechkovski Jr. 1996, Romanov 1996b). According to questionnaire data, broods with moulting adults are often found near the cliffs with breeding birds of prey (Peregrine *Falco peregrinus*, Rough-legged Buzzard *Buteo lagopus*) together with Red-breasted Geese and White-fronted Geese in the tundra areas of East Taimyr. This situation is similar to Southern Yamal (V. Morozov pers. comm.).

3.2.2.6 Moulting areas of non-breeders

Non-breeding birds may follow two strategies during the moulting period. They either aggregate in specific flocks numbering several dozens to several hundred individuals, or they moult in mixed flocks with White-fronted and Bean Geese.

Non-breeders and birds that possibly lost their clutches, migrate for moulting like many other goose species (Salomonsen 1968) at a distance up to 200 km northward from the main breeding sites. Krechmar (1966 cited in Syroechkovski Jr. 1996) observed movements of flocks to the north in the pre-moulting period in late June at Pyasina forest-tundra.

The tendency to migrate northwards for moulting is

known in Lesser White-fronts at Novaya Zemlya (V.N. Kaliakin pers. comm.). In Swedish Lesser White-fronted Geese, movements up to 600 km were recorded in non-breeding birds in order to moult (P. Tolvanen pers. comm.). Several decades ago, flocks of moulting Lesser White-fronted Geese were observed in a great number of places in the northern part of the North-Siberian lowland.

V.V. Leonovich found them in a basin of the Tareya River (Krechmar 1966 cited in Syroechkovski Jr. 1996), Sdobnikov (1959) at the Taimyr Lake and B.A. Borzhonov on the Verkhnyaya Taimyra River (Pavlov pers. comm.). The collaborators of the Scientific Institute of Agriculture of the Extreme North saw them in a basin of the Bikada River (O. Krashevsky pers. comm.). Moulting aggregation of Lesser White-fronted Geese are no longer found in these places. During the last decade, a big moulting aggregation has been observed regularly only at the Logata River, 10-20 km upstream from the mouth of the Malaya Logata River, its tributary in the Taimyr reserve (Chupin pers. comm.). At the time of our visit on August 4 1989, about 500 birds were there. About 20% of these birds were already able to fly. Six birds caught by us for ringing were in the middle and the last stages of moulting. According to reliable data of questioning, analogous, or even greater moulting aggregations are known in the Upper Bolshaya Balkhnya River. Unverified data of questioning of the local people from the settlements Ust'-Avam and Khatanga indicate that flocks of moulting birds numbering up to 100 individuals are possible at the upper reaches of the rivers Gorbitya, Zakharova Rassokha (a tributary of the Novaya River) and Massonov.

From our observation at the Logata River and questionnaire data, moulting flocks of the Lesser White-fronted Goose keep at the small rivers, in the regions with developed meanders. Wide parts of the flooded areas and fluvial terraces above the floodplains where the tundra has great abundance of sedges and herbs alternating with a rich occurrence of willow bushes at a height up to one meter are the preferred habitat of the Lesser White-fronted Goose. In case of danger the birds hide there. Alarmed Lesser White-fronted Geese, in contrast to other goose species, do not rush to water, but on the contrary, approaches the river banks

and hides there. Due to this behaviour, they are very difficult to discover and count by boat, plane or helicopter.

3.2.2.7 Timing of moult

At the lake Kutaramakan the beginning of the breeding birds moulting was noted about 5 August in 1990. In the lower reaches of the Ugarnaya River, a mature bird with brood could not fly by 1 August. Non-flying young and moulting adult birds were found on 4 August in the Khatanga area (Ptushenko 1952). Apparently the non-breeding Lesser White-fronted Geese began to moult 10-15 days earlier. Torgashev observed «birds with all their oar feather fallen out at 19 July, and flying birds by 4 August, apparently of the single ones» (Ptushenko 1952).

Compared to the White-fronted Goose and Bean Goose, the Lesser White-fronted Goose began to moult slightly later on Taimyr.

3.2.3 Population estimates and hunting pressure

Population estimates by Martynov (1984) of 110 000 birds for Taimyr could possibly be correct for the 1970s. We have yet not enough data for any good extrapolation, so we give an estimation based on data of questioning of 138 hunters who represent all main potential parts of the breeding range of the species in Taimyr. We assess the Lesser White-fronted Goose population in Taimyr to consist of approximately 1000-2000 breeding pairs and 3000-4000 moulting non-breeding adults in addition. The total numbers for Taimyr at the beginning of the 1990s could reach 5000-8000 adult birds or 8000-12 000 birds after the breeding season. Most of the breeding birds are concentrated in the Dudypta, Volochanka and middle Kheta River basins. The importance of hunting pressure for the decline of the species numbers in Russia has been discussed time and again (Morozov 1988, 1995). Recent observations show a similar pressure on Lesser White-fronted Goose migrating through Kazakhstan (V. Morozov, S. Yerokhov, P. Tolvanen pers. comm.) and wintering in the Balkan countries (T. Michev pers. comm.). During our work, we have questioned the hunters about the quantity of the Lesser White-fronted Geese shot during spring migration, the time of most intensive hunting in the region. We

interviewed 138 rather active hunters, mostly living in forest-tundra and southern tundras, spending about one week hunting in spring. About 70% has shot Lesser White-fronted Geese at least once during the last ten years, and 20% hunts it almost annually. Most of the Lesser White-fronted Geese is hunted in the basin of the Dudypta and Volochanka rivers, at the lower Yenisey and in the vicinities of Norilsk. The hunters note that in the last years the Lesser White-fronted Goose occurs more rarely in the bag in almost all regions of Taimyr excluding the Dudypta and Volochanka basin. The total number of Lesser White-fronted Geese shot in Taimyr annually is estimated to approximately 200-300 birds. In some years it could be higher, like in 1997, when the migration of Bean and White-fronted Geese in several forest-tundra areas was scarce due to peculiarities of weather conditions. This year at least 100 birds were shot only around the Volochanka settlement.

3.2.4 Conclusions

1. The breeding range of the Lesser White-fronted Goose in Taimyr have decreased about 92% in comparison with

the potential range of the 1950-1960s and about 80% in comparison with the late 1970s - early 1980s.

2. According to our estimates, the population numbers of the Lesser White-fronted Goose in Taimyr makes no more than 7-10% of the numbers 15 years ago estimated by Martynov (1984).

3. None of the recently known areas where Lesser White-fronts are breeding or staging in Taimyr have any status of protection. Hunting pressure remains strong in many areas. The majority of local people and administration is not aware of the problem and do not recognise the Lesser White-fronted Goose as a threatened species. Urgent conservation measures are needed.

4. Though observations on the species were intensified during the last years, very little is still known about distribution, numbers and trends of the species in Taimyr. Further research should be organised to estimate how many Lesser White-fronted Geese are still left on Taimyr and to clarify the trend of the local populations.



Hunting is probably the most important mortality factor for the Lesser White-fronted Goose. The problem is highest in Russia and in the former Soviet-republics, and also in the Taimyr area the extent of Lesser White-fronted Goose hunting is considerable. This picture shows one shot adult Lesser White-fronted Goose (right) and one juvenile (left). Lake Kulykul, Kazakhstan 1996. Photo: Petteri Tolvanen.

4. MIGRATION ROUTES AND SATELLITE TELEMETRY

4.1 BACKGROUND

Since 1987, the Norwegian Ornithological Society (NOF) has run the Lesser White-fronted Goose Monitoring Programme. The first years were spent on mapping breeding and staging areas as well as studies on the reasons for the population decline in Norway. These studies revealed that the main causes had to be sought along the migration routes and in the wintering areas. The core problem was, and partly still is, that the staging and wintering grounds for the species are virtually unknown. Due to the steady and alarming decrease in the Fennoscandian breeding population of Lesser White-fronted Goose, actions were needed to locate the staging and the wintering grounds. In 1993 NOF started the planning of a project to locate the staging grounds along the migration routes and wintering grounds for the Fennoscandian population.

The overall goal of this project is to turn the negative population trend for the Lesser White-fronted Goose through establishment of protected sites and implementation of management plans and conservation efforts. This can only be carried out through a joint effort from the countries managing breeding populations (Russia, Norway and Finland), and the countries managing staging and wintering populations (Germany, Poland, Hungary, Greece, Romania, Bulgaria, Kazakhstan, Azerbaijan and China). Cooperation with Eastern European countries and the former Soviet republics is a prerequisite by the fact that they manage most of the few known staging sites for the species which are important for the Fennoscandian population.

A pilot study was set up in the border areas between Norway and Finland in 1994 by WWF-Finland, where a pair with one gosling was caught during the moulting period. The male was tagged with a satellite transmitter, and was tracked to the Island Skjåholmen in the Varangerfjord (Finnmark County, Norway).

Here it was found dead, probably after being preyed upon by a White-tailed Eagle *Haliaeetus albicilla* (Lahti & Markkola 1995, Aarvak & Øien 1994). The gosling was later reported shot on 19 November 1994 in Kurchanskiy, one of the many lagoon areas at the Azov Sea coast, near the city of Krasnodar in Southern Russia (Lahti & Markkola 1995, Aarvak & Øien 1995).

In 1995 four individuals were caught in Finnmark; one pair during spring staging at the Valdak Marshes and two individuals during moult in a breeding area. After commenced moult all individuals returned to the staging area at the Valdak Marshes, where they spent approximately two weeks before they all flew directly to the Kanin Peninsula, Northwest Russia. From here the individuals divided into two groups and followed two separate routes. Two individuals followed a south-western route to East Germany, where one individual disappeared (probably shot). The remaining bird went to Hungary, Northern Greece and eventually ended up in the border areas of the Evros Delta between Greece and Turkey (Lorentsen et al. 1998). This individual was observed at the staging ground in Finnmark the following spring and autumn, and later during the winter in Lake Kerkini (see section 5.6). The other two satellite-tagged individuals went eastwards from the Kanin Peninsula and one bird was shot on the west side of the Ural Mountains. The last individual disappeared (probably shot) in the Ob Valley on the eastern side of the Ural Mountains (Lorentsen et al. 1998, see also Aarvak et al. 1996). Also in Finland WWF-Finland had caught a male Lesser White-fronted Goose and equipped it with a satellite transmitter. This individual also went to the Kanin Peninsula. From there it followed the eastern route and went all the way to Northern Kazakhstan (Kustanai District) before it disappeared. Two of the goslings belonging to this male were reported shot in the same area (J. Markkola pers. comm.). By this, two autumn migration routes were detected, and the

wintering area for the birds following the western route was located. However, the eastern route, which is probably the most important for the Lesser White-fronted Goose in general, could not be traced all the way to the wintering areas, which are believed to be located in the southern areas of the Caspian Sea, notably in Azerbaijan. In 1996 new attempts were carried out to catch more Lesser White-fronted Geese with the intention to confirm the discoveries from 1995 and reveal both the wintering areas for the eastern migration route as well as the spring migration routes. However, neither NOF nor WWF-Finland managed to catch any geese this year (Aarvak et al. 1996).

By the work conducted on the Fennoscandian population it has been revealed that the Fennoscandian and the Russian populations of Lesser White-fronted Geese stage together during autumn migration and probably also in the wintering quarters. Here the Lesser White-fronted Geese make couples, and the Fennoscandian and the Russian populations should therefore not be regarded as separate populations. Securing of the Taimyr breeding birds will not only be an important part of the work on reversing the negative population trend for the Fennoscandian breeding population, but will also be of great value for the Russian population. Hopefully, in the long run, this will contribute to a recovering of the Fennoscandian breeding population. On this background, a joint effort between NOFs Lesser White-fronted Goose Monitoring Programme, WWF-Finland-Lesser White-fronted Goose Study Group and the Geese Study Group of Eastern Europe and North Asia on revealing the migration routes and the wintering area for the Taimyr breeding Lesser White-fronted Geese was conducted. The following sections describe the catching efforts in Norway and Russia in 1997 and present the preliminary results of these efforts.

4.2 CATCHING

Catching of highly mobile species as geese is not easy. Use of cannon-nets has proved to be the only reliable method for goose catching out of the moulting period. However, also this method has limitations. The equipment is not easy to move when first arran-

ged, and it can therefore best be utilised when the spatial movements of the individuals can be accurately predicted. In 1996 catching attempts were carried out both in Norway and in Hungary, but for various causes no geese were caught (see Aarvak et al. 1996). Another catching effort was carried out in spring 1997 at the Valdak Marshes (see section 4.2.1). This area is quite small and therefore, as long as the spring proceeds normally, it is suitable for use of cannon-nets. However, in large areas where the movements of the geese are more unpredictable, the only alternative is to catch the geese during the moulting period.

As discussed by Aarvak et al. (1995) the different goose species react different when a danger appears. Pink-footed Geese *Anser brachyrhynchus* and Bean Geese will retire on land and assemble on hillocks, while Barnacle Geese and Greylag Geese will take refuge on water. In these species it is quite easy to catch large numbers of individuals. The Greenland White-fronted Goose *Anser albifrons flavirostris* is more difficult to catch because the flocks are small and scattered over a wide area (Fox & Stroud 1981). Lesser White-fronted Geese will try to escape over land and hide in the *Salix* vegetation and are thus very difficult to catch. In Norway the breeding and moulting areas are situated in areas with relatively sparse vegetation as compared to the breeding and moulting areas in the forest-tundra areas of the Taimyr Peninsula. This makes a significant difference in the possibility to discover the geese from long distances and thereby carry out catching attempts in a more controlled way.

Through international cooperation between NOF, WWF-Finland and the Geese Study Group of Eastern Europe and North Asia, an expedition to the Taimyr Peninsula was organised in July and August 1997 in order to catch moulting Lesser White-fronted Geese (see section 4.2.2).

4.2.1 Valdak Marshes, Norway

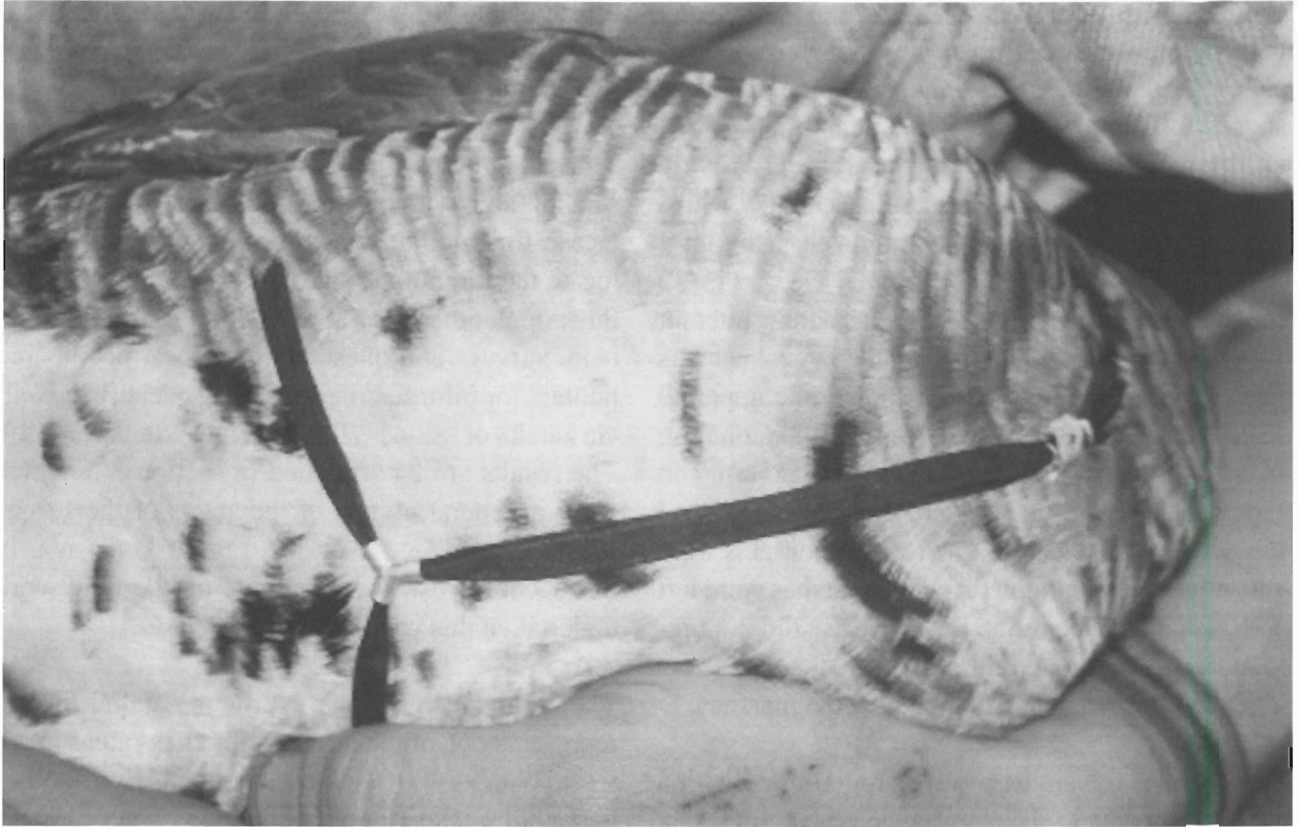
In order to optimise the localisation of the nets, one week was spent observing the staging geese before two cannon-nets were mounted at the Valdak Marshes. The nets covering an area of 72 and 300m² respectively, were mounted 23 May. On 25 May the



Male Lesser White-fronted Goose with a satellite transmitter, caught by cannon-net at the staging ground at the Valdak Marshes in May 1997. Photo: Ingar J. Øien.



Flying male Lesser White-fronted Goose with a satellite transmitter on the back. Valdak Marshes, May 1997. Photo: Ingar J. Øien.



The satellite transmitter is attached as a backpack with harness of tubular Teflon tape. The silver junctions on the belly is made with a certain angle and has a rubber lining inside in order to minimise abrasion. Valdak Marshes, May 1997. Photo: Ingar J. Øien.



Released male Lesser White-fronted Goose with a satellite transmitter on the back. Valdak Marshes, May 1997. Photo: Ingar J. Øien.

cannons were fired 19⁰⁵, when one pair was inside the catchment zone of the net. Unfortunately the female escaped before the net landed, but the male was successfully caught. Colour and metal rings as well as the satellite transmitter (see Table 10) were attached and the male was released 20⁰⁰. Subsequently, the largest net was mounted again until 22¹⁰. The first Lesser White-fronted Geese (15-20 individuals) returned 23⁵⁵. The next catching attempt was made 27 May at 12¹⁰, when the largest net was fired again. Altogether two pairs and one unpaired male were caught in this shot. Ringing and mounting of satellite transmitters, as well as data gathering on biometrics (see Table 10) were finished at 16⁰⁰, and the geese were released. The two cannon-nets were subsequently dismantled and the marshes were left 17⁰⁰. The presence of the field workers did not prevent the first geese to return to the marshes 15³⁰. By 21¹⁵, 26 individuals were grazing at the marshes.

The satellite transmitters were programmed with a varying duty cycle. The duty cycle was optimised in order to make the batteries last one year, and to send frequently during the supposed migration periods (every third day) and at longer intervals during the

breeding and wintering periods (every tenth day).

4.2.2 Taimyr Peninsula, Russia

The main purpose of the work on the Taimyr Peninsula this summer was to catch Lesser White-fronted Geese for satellite transmitter tagging in order to locate the migration routes and wintering areas for this population. In addition, effort was put into general surveys and questioning of local people and hunters for information on geese, specially the «altan karak» or «sione» (Lesser White-fronted Goose). The results are incorporated in section 3.2, which gives a general review of the status of the Lesser White-fronted Goose on the Taimyr Peninsula. In this section we will concentrate on the field work undertaken this year.

The Taimyr Peninsula in Northern Central Siberia represents one of the largest wilderness areas in the world with its 400 000 km². It contains Eurasias largest wild reindeer population and is a very important breeding area for many arctic wetland birds. Taimyr is also the most important breeding area for the Lesser White-fronted Goose.

Table 10. Biometrics on Lesser White-fronted Geese caught in 1997 at the Valdak Marshes (Norway) and in the Kurluska area on the Taimyr Peninsula (Russia). Measurements are given in millimetres and grams. Only one value is given for tarsus length and wing length, irrespective of right or left. All colour rings are read from above; b=black, bl=blue, g=green, lb=light blue, r=red, y=yellow, w=white, ¹=right leg and ²=left leg. Primaries are measured from pin (*) to the tip. Six digits satellite transmitter Id's are Microwave PTT's whereas 4/97 is a Toyocom PPT. The neck collars are black with white characters. Age is given in calendar years.

Data	Individuals									
Ring number	376979	376980	376981	376982	376983	376984	374107	CA26538	CA26537	CA26536
Satellite transmitter Id.	24676	25931		25930		24675	10863		10867	4/97
Colour ring code	w-y-r ¹	y-g-r ¹	w-b-r ¹	r-w-r ¹	r-bl-y ¹	r-g-w ¹	r-y ²	lb-r-w ²	w-lb ²	lb ²
Neck-collar No								97		
Sex	M	M	F	M	F	M			M?	M?
Age	3+	2	3+	3+	3+	3+	Pull.	Pull.	Pull.	Pull.
Wing length	401	381	384	410	379	405	275	263	310	287
Longest primary pen* (third)							107	100	134	101
Second primary pen*								92	118	91
Tarsus length	71.7	64.4	64.0	70.1	60.9	68.7	64.3	62.3	67.6	71.5
Weight	2000	2030	1850	1740	1800	1870	1250	1150	1450	1500
Bill	32.0	32.3	32.4	37.0	32.0	34.1	26.7	27.3	32.7	30.0
Head + bill	86.9	84.7	85.6	91.0	82.4	91.5	76.5	78.7	83.8	83.2
White blaze length	29.2	32.6	30.8	24.3	26.4	35.1				
Tail							85	85	94	94
Catching date	25.05	27.05	27.05	27.05	27.05	27.05	05.08	06.08	06.08	06.08
Locality	Valdak	Valdak	Valdak	Valdak	Valdak	Valdak	Taimyr	Taimyr	Taimyr	Taimyr
Pair No.	8	single	6	6	17	17				

In recent years several expeditions have visited this area through the Environmental Agreement of the governments of the Federal Republic of Germany and the Soviet Union (later, Russian Federation). The first expedition was arranged in 1989 and was the first extensive opportunity for western scientists to visit these areas (Prokosch & Hötter 1995). This led to a permanent partnership between the Taimyrskii Zapovednik and the Schleswig-Holstein Wadden Sea National Park, which afterwards has facilitated other biological investigations.

In 1997 an international expedition was organised with participants from NOF, WWF-Finland and the Geese Study Group of Eastern Europe and North Asia in the period 18 July to 13 August. The knowledge about the breeding distribution and numbers of the Lesser White-fronted Goose is quite fragmentary on the Taimyr Peninsula, and most of the known breeding records was out of date. The most recent observation of moulting Lesser White-fronted Geese was from 1989, when approximately 500 individuals were seen 10-20 km upstream from the mouth of the Malaya Logata River. Six individuals from this flock were caught and ringed (Prokosch & Hötter

1995). This area is situated on the tundra and is utilised by non-breeding, moulting geese. However, also a few breeding records were known from this area (see section 3.2). In order to increase the probability of successful catching of Lesser White-fronted Geese, this area was chosen instead of trying to find scattered breeding pairs in the vast forest-tundra areas. From the town Khatanga, helicopter flights were organised with the help of the head of the Taimyrskii Zapovednik, Dr. Yuri Mikhailovich Karbainov.

4.2.2.1 Itinerary

After arrival in Khatanga 18 July, the days were spent on organisation, arranging of equipment and collecting of questionnaire data from local hunters and fishermen. On 22 August the helicopter left for the tundra and the field station at Malaya Logata River. This area is situated inside the Taimyrskii Zapovednik which was established in 1979 and covers an area of 1 781 928 ha. Approximately 150 km² was surveyed in the period 22 July-30 July. Due to the uncertainty on whether moulting geese were present in the area, the helicopter was scheduled to return 27 July for



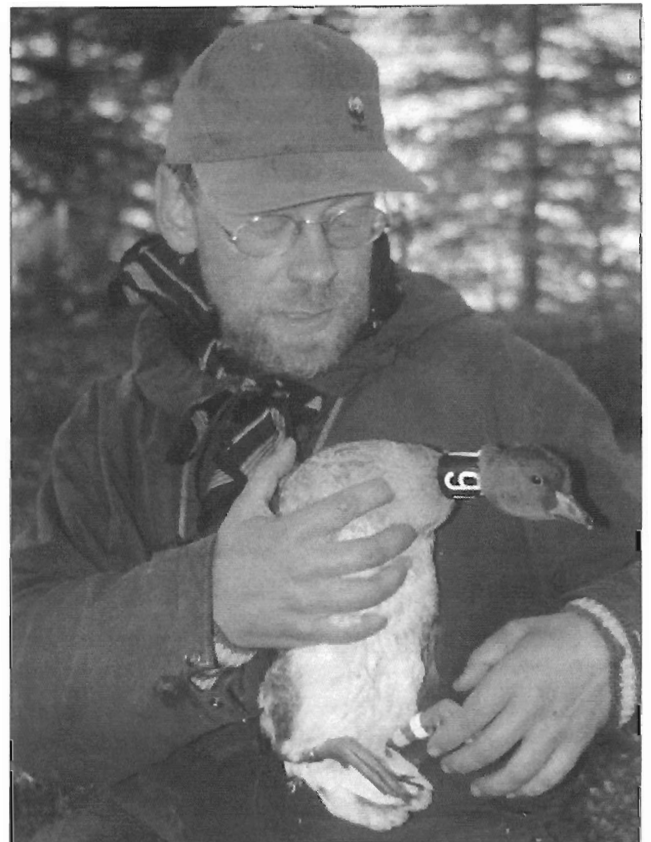
Figure 5. Map of the Taimyr Peninsula showing the rivers and areas mentioned in this section and in section 3.2).



Juvenile Lesser White-fronted Goose caught for ringing and satellite telemetry at the breeding/moulting area near the Kurluska Lake in the Forest Tundra of Taimyr. August 1997. Photo: Ingar J. Øien.

transportation further to the breeding areas in the forest-tundra. The helicopter arrived on 30 July and even when another potential area for moulting flocks of Lesser White-fronted Geese was uncovered further east on the tundra due to questionnaire data, we assessed the probability of finding moulting families in two different areas in the forest-tundra near the Kurluska Lakes and the Keta River to be better. The team of two Norwegians, two Finns and two Russians working at Malaya Logata was supplemented with two Russians and one Dolgan and divided into two groups in order to visit both areas in the forest-tundra. Even though it would be more difficult to catch geese with smaller teams, this would increase the probability of finding Lesser White-fronted Geese.

On 30 July we got helicopter transport from Malaya Logata to Kurluska where one team was left. The second team was placed by the Keta River near the mouth of the Bolchaya Romanika River. This team was supposed to be picked up by two boats arriving from Khatanga, but the boats never appeared, and the team was stuck at this place from 30 July to 6 August, when a boat on its way to Khatanga passed by coincidence. The team was transported to the



Juvenile Lesser White-fronted Goose caught for ringing and neck-banding at the breeding/moulting area near the Kurluska Lake in the Forest Tundra of Taimyr. The Goose is held by Juha Markkola from WWF-Finland. August 1997. Photo: Ingar J. Øien.

Village Katyryc, where one local Dolgan agreed to provide transport upstream to the areas where Lesser White-fronted Geese had been observed recently. Both teams were eventually picked up by helicopter on 8 August and transported back to Khatanga.

4.2.2.2. Results

In the area of Malaya Logata, no Lesser White-fronted Geese were found. Approximately 150 km² was surveyed, including all lakes and ponds to the south of the field station, the first ten km stretch of the Malaya Logata River upstream, the Logata River some km upstream, and downstream to the Kubala River, where also the surrounding lakes were surveyed. The water level in the rivers was, however, extremely low, which limited our possibility to reach the more remote areas by boat. The non-breeding Lesser White-fronted Geese had probably moved to alternative moulting areas this summer due to the unfavourable water conditions. Some broods of Red-breasted Geese and quite many broods of White-fronted Geese were seen (see Table 11). Mean observed brood size for these two species was 2.6

(sd=0.54, n=5) and 2.25 (sd=0.5, n=4) respectively, but for some broods we were not able to determine the total number of goslings (see Table 11). Because the helicopter was delayed for a few days, some time was spent on catching other birds near the Malaya Logata Field Station (see Table 12). Two pairs of Red-breasted Geese with two goslings each were located close to the field station. In order to test the catching equipment, a catching effort was carried out with a corral of nets. The four adults had not yet started the moulting and escaped. The goslings were captured, but two of them were unfortunately too small for ringing. General ringing results are given in Table 12.

Bolsjoi Kurluska, Malaya Kurluska and the smaller lakes in north and south of these were surveyed in the period 30 July to 8 August. The first Lesser White-fronted Geese were seen on 2 August in the northern part of Malaya Kurluska. However, when the lake was visited the day after no geese could be found. Only some old footprints and faeces were found. When a second field camp was established at the shore of Lake Ozero Erge Die on 2 August (see

Table 11. Observations of Red-breasted Goose and White-fronted Goose in the Malaya Logata area (with numbers and distribution of broods), Taimyr Peninsula 1997.

Date	<i>Anser albifrons</i>	<i>Branta ruficollis</i>	Locality	Observers	Comments
23.07	1 pair + 3 pull. 1 pair + x pull.	1 pair + 2 pull.	Usotari Stream	AA, JM	
24.07	1 moulting	5 ad. (flying) 1 ad. (moulting) 5 ad. (moulting)	Logata River	IJØ, JM	
25.07	1 pair (moulting) 2 pair (flying)	1 pair 1 pair (flying)	Malaya Logata Kubala River	All AA, TAA	
	1 pair + >1 pull. 1 pair + 2-3 pull. 1 pair + >2 pull. 7 (flying)	1 pair 5 ad. (flying) 1 pair (flying)	Logata River Kubala River	All IJØ, JM	
27.07	9 ad. + > 2 pull.. 1 pair + 3 pull. 1 pair + 2 pull. 1 pair + 2 pull.	1 pair + 3 pull. + 1 ad.	Logata River	AA, IJØ, JM All	
			Near Logata River	AA, IJØ, JM	These three broods on one lake
29.07		1 pair + 2 pull. 1 pair + 2 pull.	Usotari Stream	All	2 pull. ringed

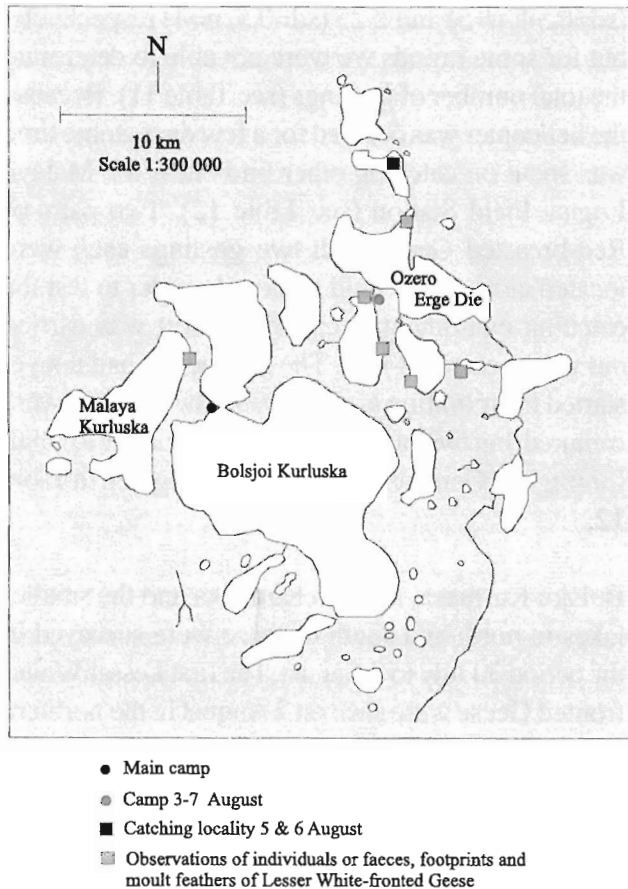


Figure 6. Map of the Kurluska area, Taimyr, with localisation of camps, catching site and sites with footprints, faeces, moult feathers and observations of Lesser White-fronted Geese in 1997.

Figure 6), Lesser White-fronted Geese could on several occasions be heard during night-time close to the camp. In one of the lakes to the south of Lake Ozero Erge Die, a lot of moult feathers, footprints and faeces were found on the eastern side on 3 August. On 4 August 11 Lesser White-fronted Geese were seen in the northern part of Lake Ozero Erge Die (see Figure 6). A catching effort was carried out on the two broods in this flock, but shortly before they reached the corral of nets, they turned around and disappeared in the forest. The day after was one gosling caught on the nearest lake to the north of Lake Ozero Erge Die by landing net from the rubber boat (for biometrics see Table 10). A continued effort was carried out the following day on this new flock which consisted of four adults and 11 goslings. Three

goslings were caught, two of them from the boat and one on the shore. Three out of the four goslings caught were equipped with satellite transmitters (see Table 10). A continued survey for more Lesser White-fronted Geese were carried out 7 August in the easternmost lake. Some footprints and moult feathers were found in the south-western end. In the canal leading eastwards from this lake 15 individuals were observed, and the catching equipment was mounted. Unfortunately, the helicopter arrived two days too early, and this catching effort had to be stopped. The team was subsequently transported back to Khatanga.

During the helicopter flight from the Kurluska area downstream the Keta River, a short stop was made 12-15 km upstream from the tributary Bajarka River at 20⁵⁰, 30 July. Here a flock of 25 Bean Geese was observed on the river. The flock comprised four broods with mean brood size of 4.25 (s.d. = 0.5). In a small pond some 10 km upstream from the tributary Bolchaya Romanika River, one unidentified goose pair with young and three adults were seen from the helicopter. This pond was later visited by boat on 7 August, but then no geese were observed. The surroundings of the junction of the Bolchaya Romanika and the Keta rivers were surveyed without results. The Keta River was travelled by boat from the Katyryc Village up approximately 30-40 km past the tributary Bolchaya Romanika. Also some of the smallest tributaries were checked. In one of the surveyed tributaries, a local man had observed six Lesser White-fronted Geese in early July, of which two were shot. It was told that the Lesser White-fronted Goose occurred quite regularly along the small rivers in this area, and that local hunters preferred shooting Lesser White-fronted Geese rather than Bean Geese because of their better taste. As compared to observations of goose broods from earlier years when the field workers followed the rivers downstream passively, our method of using boats with noisy engines probably reduced the probability of seeing geese. Because this group was stuck at the mouth of the Bolchaya Romanika River until 6 August, very little time was available for surveys and catching efforts upstream the Keta River. In addition this group had problems with the supplies of petrol, and the availability of functioning outboard engines were limited.

Table 12. Ringing results from the International Lesser White-fronted Goose Expedition, Taimyr 1997, Russia. M=male, X=unkown, age is given in calendar years. ₁=right leg.

Species	Ring-number	Sex	Age	Ringing locality	Coordinates	Date
<i>Anser erythropus</i>	374107 ₁	X	Pull.	Kurluska	71°13'N 95°25'E	05.08.97
<i>Anser erythropus</i>	CA26536 ₁	M?	Pull.	Kurluska	71°13'N 95°25'E	06.08.97
<i>Anser erythropus</i>	CA26537 ₁	M?	Pull.	Kurluska	71°13'N 95°25'E	06.08.97
<i>Anser erythropus</i>	CA26538 ₁	X	Pull.	Kurluska	71°13'N 95°25'E	06.08.97
<i>Branta ruficollis</i>	325041	X	Pull.	Malaya Logata	73°23'N 98°19'E	29.07.97
<i>Branta ruficollis</i>	325042	X	Pull.	Malaya Logata	73°23'N 98°19'E	29.07.97
<i>Buteo lagopus</i>	CA12217	X	Pull.	Malaya Logata	73°23'N 98°19'E	29.07.97
<i>Buteo lagopus</i>	CA12218	X	Pull.	Malaya Logata	73°23'N 98°19'E	29.07.97
<i>Buteo lagopus</i>	CA12219	X	Pull.	Malaya Logata	73°23'N 98°19'E	29.07.97
<i>Buteo lagopus</i>	CA12220	X	Pull.	Malaya Logata	73°23'N 98°19'E	29.07.97
<i>Calidris temminckii</i>	E81818	X	Pull.	Malaya Logata	73°23'N 98°19'E	28.07.97
<i>Phalaropus fulicarius</i>	8537407	M	2Y+	Malaya Logata	73°24'N 98°22'E	29.07.97
<i>Phalaropus fulicarius</i>	8537408	X	Pull.	Malaya Logata	73°24'N 98°22'E	29.07.97
<i>Phalaropus fulicarius</i>	8537409	X	1Y	Malaya Logata	73°23'N 98°19'E	29.07.97



Air view of moulting area for non-breeding Lesser White-fronted Geese in typical tundra area at the Logata River, Taimyr. July 1997. Photo: Ingar J. Øien.

4.3 PRELIMINARY RESULTS OF THE SATELLITE TELEMETRY

4.3.1 Individual movements

Four individuals were equipped with satellite transmitters at the Valdak Marshes (Finnmark, Norway), and three individuals on the Taimyr Peninsula, (Northern Russia). The transmitter mounted on the 2Y male in Norway never sent any signals (see section 4.2.1), and the Toyocom PTT used on Taimyr erroneously transmitted continuously for two weeks before the battery was empty (J. Markkola pers. comm.). The remaining two juveniles equipped with transmitters on Taimyr never moved away from the catching site. Both individuals were probably dead before the onset of migration. The transmitters were still sending signals at the end of October.

Only three of the satellitetransmitter -tagged individuals started the autumn migration with functioning transmitters. None of these individuals were breeding this year, and they all left the Valdak Marshes and moved restlessly around in the breeding areas in Central Finnmark until the end of June.

The male with colour ring code «*red-green-white*» moved to the Kanin Peninsula in June/July. Here it moved around on the middle parts of the peninsula until 21 August. On 22 August this bird had migrated further south-east, following the same route as two of the satellite-tagged individuals from 1995 (see Lorienten et al. 1998), heading against the Ural Mountains until it disappeared north-west of the Settlement Sen'kina.

The male with colour ring code «*white-yellow-red*» migrated out of the breeding areas in Finnmark in June/July. It staged on the western part of the Kanin Peninsula close to the Torna Village in early July. The next bout of signals revealed that this individual had migrated further and was, surprisingly, located in the Pyasina River at the Taimyr Peninsula in middle July. The last signal from this bird was received in early August.

The individual with colour ring code «*red-white-red*» left the breeding areas in Finnmark in the first half of July. In the middle of July it was located on the

Kolgujev Island in Northwest Russia. Here it staged until about one month before it was located on the coast of the Malozemel'skaya Tundra where it was until the end of September. After a short stopover on the south-east coast of the Kanin Peninsula the next signals revealed another movement to the areas to the north of St. Petersburg. Also this turned out to be only a short stopover as it was located to the north-west of Warsaw in Poland already 7 October. From this locality it moved immediately further to the wetland areas around Zmigrod and Milicz, to the north of the City Wroclaw. This bird was still in this area in Southwest Poland in early December.

4.3.2 Discussion

The satellite transmitter tagged Lesser White-fronted Geese left the breeding areas in Finnmark and flew eastwards as in 1995. Two of them utilised the Kanin Peninsula, while one individual went somewhat further, - to the Kolgujev Island. As in 1995 the route diverged in a south-east and a south-west direction. Unfortunately the signals from the bird that moved in a south-east direction from Kanin Peninsula disappeared early on its route, before a possible crossing of the Ural Mountains. However, a Lesser White-fronted Goose caught and equipped with satellite transmitter on the Yamal Peninsula in 1997, followed the eastern route to Kazakhstan like one individual did in 1995 (J. Markkola pers. comm.). The individual following the south-western route revealed a new staging area to the north of St. Petersburg, and stopped in Poland (in 1995 two satellite tagged individuals following this route stopped in the former East Germany). The staging period seen so far for the bird staging in Poland exceeds clearly the short staging period seen in 1995 in Germany. The surprising migration of one individual from Kanin Peninsula eastwards to the Taimyr Peninsula cannot be ruled out as erroneous as judged by the accuracy of locations and the varying activity signals.

The results from 1995 together with this year's satellite transmitter tracking results indicates that the staging areas of the Lesser White-fronted Goose may vary greatly between years.

Mojj (1996) shows that the wintering populations of White-fronted Geese have a high degree of inter-

change, and that breeding birds from Taimyr are distributed over several wintering grounds. Our study suggests that also the intraregional choice of staging areas of the Lesser White-fronted Goose differ, at least between years. However, even though the number of satellite transmitter tagged individuals is small, the major migration routes seem to be relatively fixed. During recent years, attention has been paid to the factors influencing habitat choice and the reasons why geese move between different habitats both within areas and through the annual movements to and from the breeding and wintering areas. It has been proposed that the availability and profitability of suitable food influence both large and small-scale movements. Other hypotheses includes the effect of disturbance and predator avoidance strategies.

The influence of cold weather fronts obviously plays a major role in the choice of wintering areas as well as the length of the staging period. From Azerbaijan

it is known that during cold weather periods there is a further migration southwards (Paynter et al. 1996, own data), and all the known and suspected wintering areas are situated south of the zero isocline for December.

Also competition between congeners and other species has been thought to influence the observed movement patterns (see e.g. Madsen 1990). Our knowledge about the Lesser White-fronted Goose migration and its use of staging sites is still too fragmented to make precise hypotheses about the movement patterns, but substantial evidence suggests that current hunting regimes may influence the mortality patterns of the species, which most likely would influence the migratory strategies. The Lesser White-fronted Goose also regularly winters in mixed flocks with White-fronted Geese, and research should be conducted to evaluate the effect of competition between these species on the basis of food and energetic output.



Four Lesser White-fronted Geese on migration, mixed in a flock of White-fronted Geese. Identification of Lesser White-fronts in flocks of White-fronted Geese may also cause problems for people with extensive experience with Lesser White-fronted Geese. Kazakhstan 1996. Photo: Petteri Tolvanen.

Until recently the post-moult movements of non-breeders and unsuccessful breeders was virtually unknown. They were assumed to migrate out of the breeding areas earlier than the successful breeders, and possibly utilising the Valdak Marshes as a staging area during mid-summer. In 1995 nine moulting, non-breeding Lesser White-fronted Geese were seen 26 June in a breeding and moulting area in Finnmark. The three Norwegian Lesser White-fronted Geese equipped with functioning satellite transmitters in May 1997 did not breed successfully, and they all left the breeding areas in the late June/early July. Due to the long break between each transmission period, the geese could possibly have utilised the Valdak Marshes, but no such information was received.

4.4 HUNTING MORTALITY

Although being legally protected in almost all of the distribution areas, the satellite-transmitter study has demonstrated that hunting is probably the main threat to the Lesser White-fronted Goose. Partly because the Lesser White-fronted Geese keep together with White-fronted Geese in the wintering sites. The White-fronted Geese are legal game in most of Europe, and there are not many hunters with sufficient knowledge on bird identification to separate these two species. However, in most areas, the hunters would probably not care about the difference anyway. In Azerbaijan, which is the wintering site for probably most of the West-Siberian Lesser White-fronted Goose population, an uninhibited hunting is performed also inside the protected areas. In February

1996, NOF participated in a mapping of wetlands and waterbird populations in Azerbaijan. Inside the protected areas up to 31 shotgun shots were counted during a five-minute period. In this area approximately 1100 Lesser White-fronted Geese were staging at the time (Paynter et al. 1996, Aarvak et al. 1996).

Data on mortality due to hunting is fragmentary, but data from the Valdak Marshes on the appearance of immature birds in spring in relation to the number of juveniles staging at the same place last autumn suggests that at least the juveniles suffer a very high mortality during its first winter. Also reports of banded individuals indicate a high hunting mortality (see section 2.1.4). Even though the species is protected, substantial evidence both from the satellite telemetry study and information from hunters and ornithologists shows that each year, Lesser White-fronted Geese are shot illegally in most countries where Lesser White-fronted Geese occur, e.g. in Norway, Finland, the Netherlands, Germany, and especially in Russia where spring hunting still is a common activity in the northern areas. As an example is the dead juvenile Lesser White-fronted Goose found amongst White-fronted Geese in a Dutch game market on 18 December 1991 (von Essen et al. 1993). For the Fennoscandian population, a more comprehensive study on individually marked Lesser White-fronted Geese is needed and recommended in order to obtain trustworthy data on mortality. This is on the condition that a larger group can be caught at the staging grounds in the post-moulting period. Hopefully, such an effort will be carried out in 1998.

5. STAGING AND WINTERING GROUNDS

5.1. BACKGROUND

The populations breeding from Fennoscandia to Central Siberia (Taimyr) winters in the Caspian and Black Seas and as far west as Greece, but with the main wintering grounds probably in Azerbaijan (Lorentsen et al. MS). The more easterly breeding birds migrate south and east to winter in Central China and South-eastern Russia. There is some evidence to suggest that the division between western and eastern migrating birds is somewhere between the Pyasina and Kotuy rivers in Southern Taimyr (Rogacheva 1992) or in Central Taimyr (Syroechkovski 1996). However, the distribution and occurrence in each country is poorly known. This seems to be an effect of the mixing of flocks of Lesser White-fronted Goose and the much more common White-fronted Goose. It is also unknown where the flocks of Lesser White-fronted Geese disappear after the autumn staging period in Kazakhstan. One possibility is that they travel further to Azerbaijan and maybe to Iran and Iraq. Another possibility is that when the Lesser White-fronted Geese reach the northern shore of the Caspian Sea, they turn westwards through the Manych River Valley depression and winters at the north and north-western shore of the Black Sea.

In the BirdLife International Action Plan (Madsen 1996) it is stated that an important step to the conservation of the Lesser White-fronted Goose is to locate staging and wintering grounds for the species. In 1995-96 several countries were visited and surveyed in order to obtain new information about occurrence, distribution and status of the species. This surveys and the present status of the Lesser White-fronted Goose were described by Aarvak et al. (1996) for the following countries: Azerbaijan, Greece, Russia (Kanin Peninsula), Hungary and Kazakhstan.

A review of the status of the Lesser White-fronted Goose prepared in 1996 has not been published yet

(Lorentsen et al. MS). This review gives an updated status on the occurrence of the Lesser White-fronted Goose for the following countries: Norway, Finland, Sweden, Russia, Kazakhstan, Lithuania, Germany, Hungary, Azerbaijan, Iran, Iraq, Greece, Bulgaria and Romania. However, many of these countries have been poorly covered both formerly and recently, especially Iran, Iraq, Romania and Lithuania. In this report we sum up the present knowledge on the status of Lesser White-fronted Goose in Russia (Kanin Peninsula), Bulgaria, Romania and Greece based on the work of NOF and WWF-Finland conducted in the report period (see introduction chapter), as well as provide population reviews for countries not previously described (Armenia, Estonia, Latvia, Lithuania and China).

5.2 RUSSIA

5.2.1 Kanin Peninsula

This area was first described as a staging ground for Lesser White-fronted Geese in 1994 (Vinogradov 1995). The use of satellite transmitters on Fennoscandian geese has, however, revealed that this area is used as a gathering area for probably the whole Fennoscandian post-breeding population (Lorentsen et al. 1998, see also section 4.1). The Finnish Lesser White-fronted Goose Working Group (WWF-Finland) visited the area between 24 August and 12 September in 1996. On arrival they found only nine Lesser White-fronted Geese, but the numbers of staging geese increased throughout the period and when they left the area, approximately 100 individuals were present (Tolvanen 1996, Luukkonen & Tolvanen 1996). Two of the observed geese were marked individuals caught in Finnish Lapland in 1995: One adult female had a neck collar (green «02») and the other (a 2Y bird) had a colour leg ring (yellow-black-yellow) which was the offspring of a female caught in Finnish Lapland in 1995. This female was also observed on the Skjåholmen Island in the Varangerfjord in August 1995 and in August 1996 (Tolvanen

1996, but see also section 2.2.1). Vinogradov (1995) carried out studies during summer in 1994 at the Torna River mouth. Small groups of two to six Lesser White-fronted Geese were seen in flocks of up to 80 000 migrating geese in early June. Flocks of 150-250 Lesser White-fronted Geese were seen on 6 June (five flocks), 6 July and 7 August. He estimated the total number of Lesser White-fronted Geese migrating over the western side of the Kanin Peninsula to be no less than 1500. From the eastern coast of the peninsula, recent breeding records are known (Vinogradov 1995). According to older local hunters the Lesser White-fronted Goose was common here in the 1950s (Vinogradov 1995).

The main staging area is situated between the mouths of the rivers Mesna and Torna on the western coast of the Kanin Peninsula. This is a huge marshland (c. 50 km²) comprised of salt tolerant vegetation which is called *laidas*, and the dominating plant species are: *Puccinella phryganodes*, *Carex subspathacea*, *Calmagrostris* sp. and *Plantago* sp. The Lesser White-fronted Geese grazed mainly in the stands of *Hippuris tetraphylla*, *Puccinella phryganodes* and *Carex subspathacea*. Most of the Lesser White-

fronted Geese spent all day on the *laida* meadows, unlike the Bean Geese and White-fronted Geese which left the *laidas* in the morning to spend the day grazing on the surrounding *palsa* mires before returning in the evening (Tolvanen 1996).

Until recently, this area had no formal protection, and goose hunting was performed by locals from the village Shoina. Conservation measures were proposed in 1995 in order to protect a colony of 1000-2000 breeding pairs of Barnacle Goose. Based on the results from the satellite telemetry in 1995 and the expedition in 1996, which stated that Lesser White-fronted Geese occurs here in significant numbers, WWF International - Russian Programme started the work on the establishing a protected area at this site. By a decree given by the Governor of the Nenets Autonomous Okrug in agreement with Russian Federal law, the Shoininski State Nature Reserve was established 15 January 1997. This decree stated that regulations ensure conservation of the natural conditions of the habitats as well as protection of fauna and flora. Hopefully this will be an important step towards the goal: Saving the Lesser White-fronted Goose from extinction.



Air view of the *palsa* marshes on the Kanin Peninsula. Photo: Petteri Tolvanen.

5.3 BULGARIA

5.3.1 Occurrence and status

Bulgarian wetlands are of high importance for wintering geese as White-fronted Goose, Greylag Goose and Red-breasted Goose *Branta ruficollis*. The regular mid-winter counts show that the numbers of Red-breasted Geese have increased the last eight years and the Northern Bulgarian Black Sea coast is actually a main wintering place for this species.

The Lesser White-fronted Goose is more rarely observed in Bulgaria than the other three species of geese which regularly occur in the country. Since the beginning of the century until 1970 there were observations of Lesser White-fronted Geese in three regions of Bulgaria: Sofia Region, Shabla-Durankulak Region and Burgas Region. The majority of the old records is from the Sofia Region: 15.02.1889 - 34 individuals. (Christovich 1890); 22.03.1902 - 1 shot (Boev 1985); 21.04.1921 - 1 shot; 22.03.1922 - 1 shot; 15.03.1932 - 1 shot; 8.02.1952 - 1 wounded individual caught (the last observation recorded for this region). In Burgas Region 1-2 pairs were observed on 29-31.05.1951 (Mountfort & Ferguson-Lees 1961) in Burgasko Lake. There are some more publications which report Lesser White-fronted Geese visiting the region during spring and autumn migration from 19-22 November to 11-14 February

(the latest date is 29 March) (Prostov 1964), but numbers and exact places were not mentioned. Burgas Region includes three big lakes around the town of Burgas - Atanassovo Lake, Burgasko Lake and Mandra (described below).

Shabla-Durankulak Region: 17.11.1965 - 12 individuals; the species regularly occurs in the region during spring and autumn migration (Dontchev 1967).

After 1970 there are observations of solitary birds along the Black Sea Coast (mainly Shabla and Durankulak lakes, as well as Atanasovo Lake) (Michev et al. 1983) but there is no exact data available. Zuomer (1987) mentioned 1000 individuals of Lesser White-fronted Geese in flock of 90 000 White-fronted Geese in the Shabla-Durankulak Region, but this figure seems to be too optimistic. He also mentioned that the population of the species was declining.

Nankinov (1993) reports about 1000 wintering Lesser White-fronted Geese in the Danube flood plane. One individual was found shot near the Piasachnik Reservoir in 1996 (Southern Bulgaria) during the mid-winter count (Velinov & Ivanov 1996). Solitary individuals have been regularly observed in Shabla and Durankulak lakes for the last three winters (Georgiev & Dereliev 1995, Dereliev in litt., see Table 13). Lesser White-fronted Goose was mentioned as a wintering species in Mechka fish-ponds, along the

Table 13. Records of Lesser White-fronted Goose near the Shabla and Durankulak lakes (Georgiev & Dereliev 1995, Dereliev in litt.).

Date	Numbers	Flock composition	Locality	Reference
18.02.95	1 ind. probably imm.	1000 ind. A. albifrons	1 km. W from Shabla Lake	Georgiev & Dereliev 1995
01.04.95	1 ad.		N part of the Durankulak Lake	Georgiev & Dereliev 1995
13.04.95	1 ad.	29 ind. A. albifrons	Shabla Lake	Georgiev & Dereliev 1995
14.02.96	1 ad.	5-10 000 A. albifrons + B. ruficollis	W of Shabla Lake	Dereliev 1996
24.01.97	1 imm. female (shot)	A. albifrons	Durankulak Lake	Sergey Dereliev & Hristo Hristov
13.02.97	1 ad.	20 000 ind. A. albifrons,		
		50 ind. B. ruficollis	E of Shabla Town	Paul Mosimann 1997
16.02.97	2 ad. + 1 imm.	700 ind. A. albifrons	Near Gorun / Tjulenov Village	Lionel Maumary (pers. comm.)
17.02.97	1 ad.	A. albifrons + B. ruficollis	Durankulak Lake	Lionel Maumary (pers. comm.)
17.02.97	1 ad.	A. albifrons	Between Gorun & Tjulenov Village	Lionel Maumary (pers. comm.)
17.02.97	1 ad.	A. albifrons	Shabla Lake	Lionel Maumary (pers. comm.)
15.03.97	1 ad.	84 ind. A. albifrons	A 03 (near N part of Shabla Lake)	Dimitar Georgiev (project team)

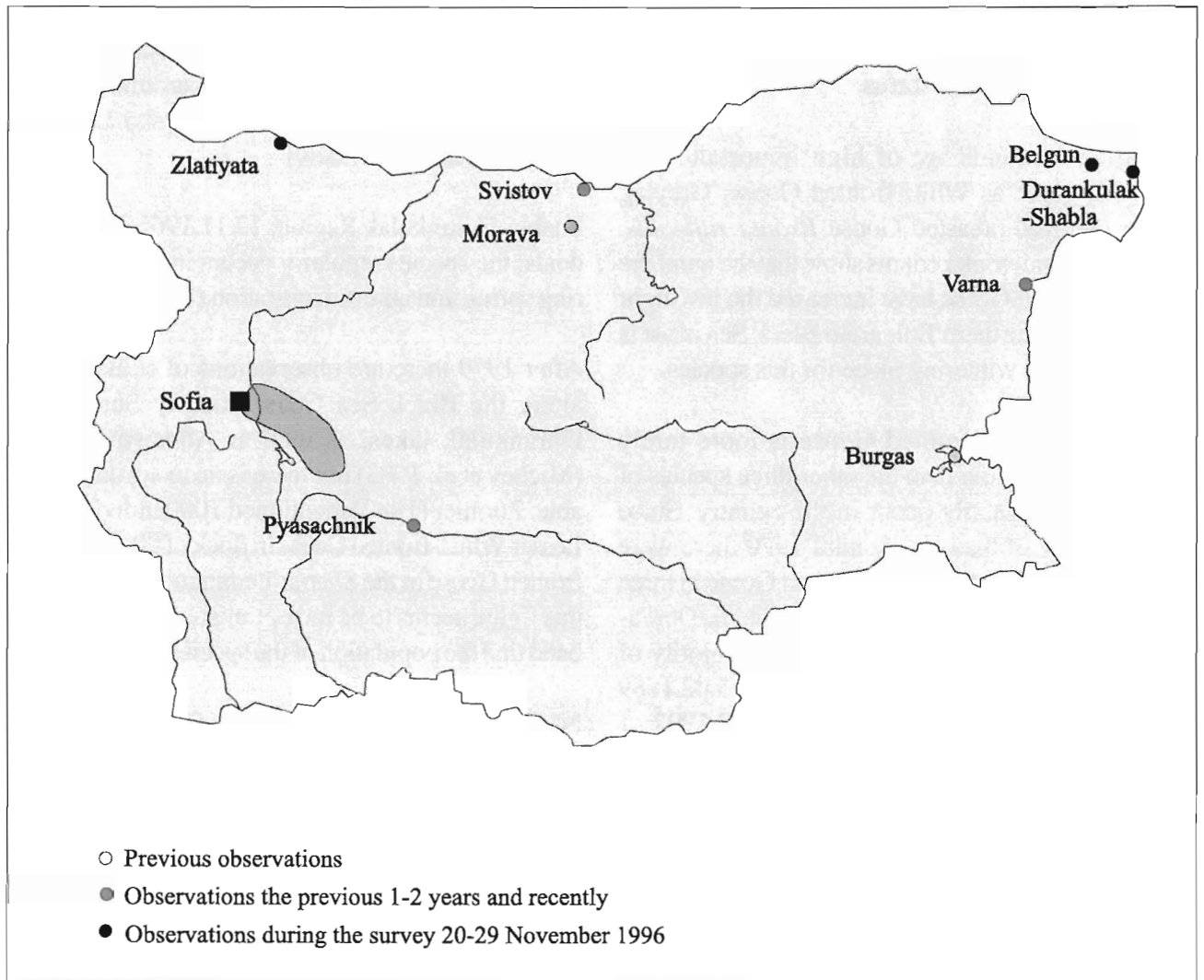


Figure 7 . Location of known wintering areas for the Lesser White-fronted Goose in Bulgaria.

Danube (Vasilev & Mitev 1997).

The review of the published data shows that the wintering and migratory population of Lesser White-fronted Goose is not well studied in Bulgaria. As a whole, data is fragmentary and in most cases only information of the presence of Lesser White-fronted Geese in Bulgaria during migration and winter is given. One of the reasons for this is probably the difficulties of field identification. Another reason is the study methodology. In previous years very few written reports of observed Lesser White-fronted Geese exists. On the other hand, after 1977 during the mid-winter counts, geese were counted early in the morning, when they leave the roosting sites. This method give small possibilities to identify Lesser White-fronted Geese, and even if some are identified

they can not be counted. Nevertheless, the Lesser White-fronted Goose is a regular wintering species in Bulgaria, but there is poor knowledge of its occurrence in winter. Figures of 1000 individuals seem to be far too exaggerated and not realistic.

5.3.2 Distribution

5.3.2.1 Sofia Region

The region includes the Sofia plain north and east of the city of Sofia and the hilly areas to the southeast. The most distant place is 57 km southeast from the city. Until the early 1950s the places where the Lesser White-fronted Goose was observed, were flooded meadows and marshes. In the 1950s and 1960s, the

meadows were drained and turned into arable land. Now this habitat type is completely destroyed and the sites are included in the regulation plan of the city of Sofia. Only a small part of the meadows, south of the “goose areas” are preserved at present (Important Bird Area (IBA) Dolni Bogrov-Kazichene). Close to one of the last observation places there are now two big reservoirs - Iskar and Topolnitsa. They were built in the 1950s and 1960s respectively.

5.3.2.2 Durankulak Lake

This is a natural firth with reedbeds (*Phragmites australis*, *Typha angustifolia*, *Typha latifolia*, *Shoenoplectus triqueter*) surrounded by arable land with winter wheat and artificial plantations of *Populus sp.*, *Fraxinus oxycarpa*, *Fraxinus ornus*, *Prunus machaleb*. The lake is located in Northeast Bulgaria, near the Romanian border on the Black Sea coast. There is a big variation of the water level caused by irrigation and household water consumption in summer. The lake is a Natural Monument (IBA No. BG-009, Grimmet & Jones 1989) and a Ramsar site. Hunting in the area is forbidden, but there is a considerable hunting pressure close to the lake, as well as illegal hunting within the area. These are very

important disturbing factors (Dereliev 1996). Hunting pressure includes both local hunters and international hunting tourism.

5.3.2.3 Shabla lakes

Two lakes connected by an artificial canal and separated from the Black Sea by a sand stripe, both with indented shorelines covered with reedbeds (*Phragmites australis*, *Typha angustifolia*, *Typha latifolia*, *Carex riparia*). There is a hyper-saline lake (Shablenska tuzla) just south of this complex. The complex is located in Northeast Bulgaria, at a distance of five km northeast from the village Shabla. It is surrounded by arable land with winter wheat. The lake is a Protected Landscape (IBA No. BG-006, Grimmet & Jones 1989) and a Ramsar site. Hunting is forbidden in the area, but there is a very high hunting pressure close to the lake, which together with illegal hunting are very important disturbing factors (Dereliev 1996). Hunting pressure includes local hunters and international hunting tourism. The two lakes — Durankulak and Shabla are situated in Southern Dobrudza, where the biggest territories with winter wheat in Bulgaria is localised.



Field with new shots of winter wheat with remnants of maize from the summer crop near the Durankulak Lake, Northeast Bulgaria. This seems to be the best grazing grounds for goose flocks in the area. November 1997. Photo: Ingar J. Øien.



The survey team from BSPB and NOF at the Durankulak Lake, Northeast Bulgaria. November 1997. Photo: Ingar J. Øien.



Night roost for geese at the Durankulak Lake, Northeast Bulgaria. November 1997. Photo: Ingar J. Øien.

5.3.2.4 Atanasovo Lake

A hypersaline lake along the coastline. Most of the area is a complex of salpans with smaller settling pools for salt extraction (traditional primitive techniques for salt production). Smaller freshwater marshes, as well as a system of canals overgrown with marsh vegetation surround the lake. The banks of the salt basins are covered by *Salicornia europaea*. The banks of the freshwater basins are covered by *Typha latifolia*, *Typha angustifolia* and reedbeds of *Phragmites australis*. There are grasslands (*Artemisia campestris*, *Poa bulbosa*, *Lolium perenne*) and arable lands with winter wheat. The southern part of the lake reaches the suburbs of the town of Burgas. The lake is a Strict Reserve with a buffer zone (IBA No. BG-010, Grimmet & Jones 1989) and a Ramsar site. Illegal hunting is one of the problems affecting the geese during winter.

5.3.2.5 Burgasko Lake

A shallow brackish coastal lake - an open firth, connected to the Black Sea by a canal with a sluice. There is a belt of reeds (*Phragmites australis*, *Typha angustifolia* and *Typha latifolia*) along the northern, western and southern shores. It is located west of the town of Burgas, and its whole eastern part actually borders the industrial and residential districts of the town. A small part of the lake is a Protected Landscape. The lake is an IBA (No. BG-007, Grimmet & Jones 1989). The surrounding territories are exposed to high pollution and to construction of industrial buildings and residential districts. Hunting is a disturbance factor for geese during winter.

5.3.2.6 Metchka fish-ponds

Fish-ponds overgrown with reeds (*Phragmites australis*, *Thypha spp.*) situated close to the bank of the Danube River. They are surrounded by dry hills overgrown with acacia and steppe-like vegetation, as well as meadows with *Festuca pratensis* and *Poa sylvicola*. There is a flooded forest (*Fraxinus ornus*, *Tilia tomentosa*, *Ulmus minor* and *Acer campestre*) in the western part of the basins and a small river fully overgrown with shrubs, acacia and grass. The site is not protected, but is designated as IBA

(Kostadinova 1997). Human activities include fishery, cutting of reeds and hunting. It is unclear whether the hunting is a disturbing factor for geese.

5.3.2.7 Pyasachik

A fresh water reservoir surrounded by low hills, located in Southeast Bulgaria. There are forests of *Quercus cerris* and *Quercus pubescens*, as well as forestry plantations of *Pinus nigra* on the surrounding hills. There are some small territories with winter wheat around. The site is not protected, but is designated as IBA (Kostadinova 1997). Human activities include hunting, fishing and irrigation. A serious threat is the uncontrolled hunting of waterfowl.

5.3.2.8 Morava Region

Small fields with winter wheat in a hilly area of the Danube plane, 35-40 km south of the town of Svistov.

5.3.3 Survey in 1996

The BirdLife partners Norwegian Ornithological Society (NOF) and Bulgarian Society for the Protection of Birds (BSPB) carried out a survey on the Lesser White-fronted Goose in Bulgaria from 20 to 29 November 1996. The aim of the survey was to check all the sites where the species had been observed in the country and to account its occurrence there. The trip was made with a Nissan minibus and Mercedes jeep through the country (Figure 7). Geese (White-fronted and Lesser White-fronted Geese) were located at the roosting sites early in the mornings. When they took off for foraging they were counted and then followed to the fields where the flocks again were counted, and scanned specially for Lesser White-fronted Geese. Identification and counts were made by two telescopes 80mm (20-60x magnification) and 120mm (47x magnification). The weather was cold (about 1-5°C) in Northern Bulgaria, and cool (5-12°C) in Southern Bulgaria.

5.3.3.1 Results

All the sites were carefully checked, but Lesser White-fronted Geese were observed only at two places in Northern Bulgaria - Zlatiyata (Kozloduj Region) and

Durankulak Lake. Zlatiyata is a plain with arable lands 12 km west of the town of Kozloduj, along the Danube River bank. Considerable areas are planted with maize and beetroot, small areas are planted with winter wheat, but part of the lands are uncultivated. We were there on 20 and 21 November. Large numbers of geese gathered in the first evening on the Lake Lacul Bistretz on the Romanian side of the Danube River. A total of 7000-8000 individuals were estimated. There were hunters in the reservoir, who frightened the whole geese flock. The next day on the same place 3000-3500 White-fronted Geese were seen flying southwards on the Bulgarian side of the border. They landed in Zlatiya plain. In a winter wheat field three Lesser White-fronted Geese were found in a flock of 2100 White-fronted Geese, three Bean Geese *Anser fabalis* and one Greylag Goose. On 22 November we encountered three big flocks of geese, totally 41 000-48 200, in the farmland area along the Danube River, close to the town of Svistov. After careful checking of the flocks 122 Red-breasted, 50 Greylag and one Brent Goose were seen, but no Lesser White-fronted Geese. This area is located between Belene Islands (IBA No. BG-001, Grimmet & Jones 1989) and Svistov. Young volunteers from the local branch of BSPB in Svistov, joined us during our stay here. In the Morava Region (35 km south of Svistov) we did not find any geese. Probably some geese from the Danube (Svistov Region) come and feed in the area. In South Bulgaria we did not find any geese because of the warm weather. Goose flocks usually arrive here during cold periods in Northern Bulgaria.

On 27 November the lakes Shabla and Durankulak were visited to search for geese. Geese were found at Durankulak Lake and the day were spent searching for the geese feeding on the fields west from the Durankulak Lake. A flock of about 5000 White-fronted Geese was seen in the winter wheat field 3-4 km north of the Village Belgun. The geese were observed at a distance of 500-600 m. In the flock five (and one more later) Lesser White-fronted Geese as well as six Red-breasted Geese were seen.

Not more than 8-10 Lesser White-fronted Geese were found during the survey, even though all areas which were known to hold large numbers of White-fronted

Geese were visited. This could probably be attributed to the very warm weather in this period and that the larger flocks of geese had not arrived from the northern areas. Relying on the restlessness in the mixed flocks we could not identify all individuals on this background. The total numbers of Lesser White-fronted Geese in the country was estimated at 30-40 individuals. When we compiled our results with the monitoring results of the Shabla and Durankulak lakes, it was visible that these two lakes are regular wintering grounds for the Lesser White-fronted Goose.

5.4 ROMANIA

5.4.1 Introduction

The Dobrodja Region at the Romanian Black Sea coast is known to hold large number of geese during the migration periods and in winter. The White-fronted Goose is most numerous and normally reach numbers between 80 000 and 150 000 individuals during peak migration in the Razelm-Sinoie Lagoon complex (Munteanu et al. 1991). The Red-breasted Goose changed its wintering areas in the 1950s, and at present the whole world population winters in the areas between the Danube Delta and the Shabla-Durankulak lakes in Northeast Bulgaria. The Lesser White-fronted Goose occurs in very small numbers and is usually associated with White-fronted Geese. Records exist both in the migration periods as well as during winter. Highest number seen is 1000 individuals in Dobrodja in 1989 (Munteanu et al. 1991).

The Lesser White-fronted Goose has been legal quarry for many years, but in 1996 new legislation of game and game protection was adopted where the Romanian Parliament gave legal protection from hunting to more than 140 bird species, including the Lesser White-fronted Goose.

Due to the occurrence of very high numbers of White-fronted Geese in this region, a short survey was undertaken by NOF in 1996 in order to locate wintering Lesser White-fronted Geese in this region. This visit was carried out in co-operation with the Romanian Ornithological Society and the Bulgarian-Swiss Biodiversity Conservation Programme.

5.4.2 Survey in 1996

The farmland areas west of the Razelm-Sinoe lagoon complex were surveyed 1-2 December. Ten Red-breasted Geese and 250 White-fronted Geese were seen 1 December in a pond north of Lake Babadag. In the winter wheat fields to the south of Lake Nuntasi 26 000-30 000 geese were encountered, and approximately 65-70% was estimated to be Red-breasted Geese. A more precise count of a smaller mixed flock on the following day in the same area gave 1800 Red-breasted Geese and 1500 White-fronted Geese. A swift count of the proportions of adults and young Red-breasted Geese gave 51% young in a sample of 456 individuals. No Lesser White-fronted Geese were seen during this survey. On 3 December the Donau Delta was visited briefly by boat. Here, 50 Greylag Geese and 1600-1800 White-fronted Geese were seen, but no Lesser White-fronted Geese.

5.5 HUNGARY

The situation in Hungary was thoroughly described by Aarvak et al. 1996. Good news from Hungary in 1997 is that another six wetland areas has been designated as Ramsar sites in this year. Two of the already existing Ramsar sites has got extended boundaries for the protected area. Of the known sites utilised by Lesser White-fronted Geese (see Aarvak et al. 1996), the new designations affects the Biharugra Fishponds (new Ramsar Site) and Hortobágy (where the protected area at Lake Tisza has been doubled).

5.6 GREECE

A brief account of the occurrence of Lesser White-fronted Goose in Greece was given by Aarvak et al. (1996). The Lesser White-fronted Goose occurs mainly in Lake Kerkini in Northern Greece and in the Evros Delta at the Greek-Turkish border area. Older records indicate that the Lesser White-fronted Goose was fairly common, with the highest number registered in 1963; totally 1630 individuals (Handrinos 1991). Since the 1980s, the numbers have varied between 1 and 142 individuals (Lorentsen et al. MS).

During the winter 1995-96, a flock of 43 individuals was seen in Lake Kerkini on 12, 14 and 17 November (T. Naziridis pers. comm.). In this flock a male carrying satellite transmitter (caught in Finnmark, Norway in 1995) was observed (Lorentsen et al. 1998, see also section 4.3). The satellite transmitter signals revealed that the bird moved further to the Evros Delta in the end of November, where it stayed until the signals ceased because the transmitter fell off (Lorentsen et al. 1998). This individual was later seen at the Valdak Marshes in Finnmark, Norway in the period 24 May and 2 June 1996. The following autumn it was observed again at the Valdak Marshes between 24 August and 2 September (Aarvak et al. 1996). The next observation of this male was from Lake Kerkini where it was observed in a flock of 47-52 other Lesser White-fronted Geese in the period 7-29 November 1996 (Lorentsen et al. 1998). This male was also seen at the Valdak Marshes again in spring 1997 in the period 17 to 22 May.

On 5 January 1997 a pure flock of 21 Lesser White-fronted Geese was seen in the Drana Lagoon area of the Evros Delta. Approximately 25% were juveniles. None of the individuals were ringed (Y. Tsougraksi pers. comm.).

Counts conducted in the Evros Delta in the winter 1996/1997 by the Finns Petri Lampila and Ville Kälviäinen gave observations of mostly single birds or pairs (P. Tolvanen pers. comm.). On 21 February a pure flock of 63 Lesser White-fronted Geese came from south-east (from the Turkish side of the border) at 1640 and landed near Drana Lagoon. On the next day this flock had disappeared. A family consisting of 2 adults and 3 immatures observed 24 February possibly was part of this flock. One adult individual with green neck-collar was observed 10 February. This bird was probably one out of two females ringed in Finnish Lapland in 1995 and 1996 respectively (P. Tolvanen pers. comm.).

Based on these observations, many of the Lesser White-fronted Geese wintering in Greece evidently belong to the Fennoscandian breeding population. In addition to the demonstrated movement inside Greece from Lake Kerkini in early winter to the Evros

Delta in mid-winter, there are probably movements between the Greek and the Turkish side of the Evros Delta. Studies should be conducted to obtain more exact information about habitat utilisation and movements in Greece in order to implement management measures to secure this highly vulnerable wintering population of Lesser White-fronted Geese.

5.7 ARMENIA

5.7.1 Occurrence and status

Before 1900, the Lesser White-fronted Goose was very common as is evident from the writings of Alphéraky (1905): «Many times I saw them together on the River Mius, in the Armenian steppes between the River Sambek and the Don mouths, and I shall never forget their innumerable flocks covering, in late autumn, the sand-flats of the Mius Estuary,

and then flying to feed, partly to the neighbouring corn-fields, partly to the high grass of the steppe. I could never even approximately count the number of separate flocks appearing in autumn, in such continuous streams did they pass, one after another, whichever way I looked, filling the air with such loud cries that, even now, after many years, the ring of them still haunts my ears».

Today the Lesser White-fronted Goose is a rare migrant and winter visitor in Armenia, occurring in smaller numbers (Table 14). However, even small, these numbers are significant in an European context, and only a few countries (Azerbaijan, Kazakhstan and China) have records of significantly larger flocks. Considering the very unfavourable population trends and lack of knowledge about the wintering areas in Europe and Southwest Asia (see section 1), all sites with more than 20 individuals are very important.

Table 14 . Overview of records from Armenia in recent years (from Adamian & Klem 1997).

Date	Numbers	Flock composition	Locality
12.03.84	50		Armash
30.01.86	12		Armash
17.03.91	5		Armash
10.11.95	1		Armash
23.11.95	5		Armash
01.12.95	1		Armash
15.12.87	?		Near Apaga
19.11.95	2		Near Khorveerap Fortress
22.11.95	7		Near Pokr Vedi
23.11.95	19		Near Pokr Vedi
09.11.95	26	Including 5 imm.	Lake Sevan at Lichk
17.11.95	1		Near Norakert in the Vardenis Region
04.12.95	1		Near Norakert in the Vardenis Region

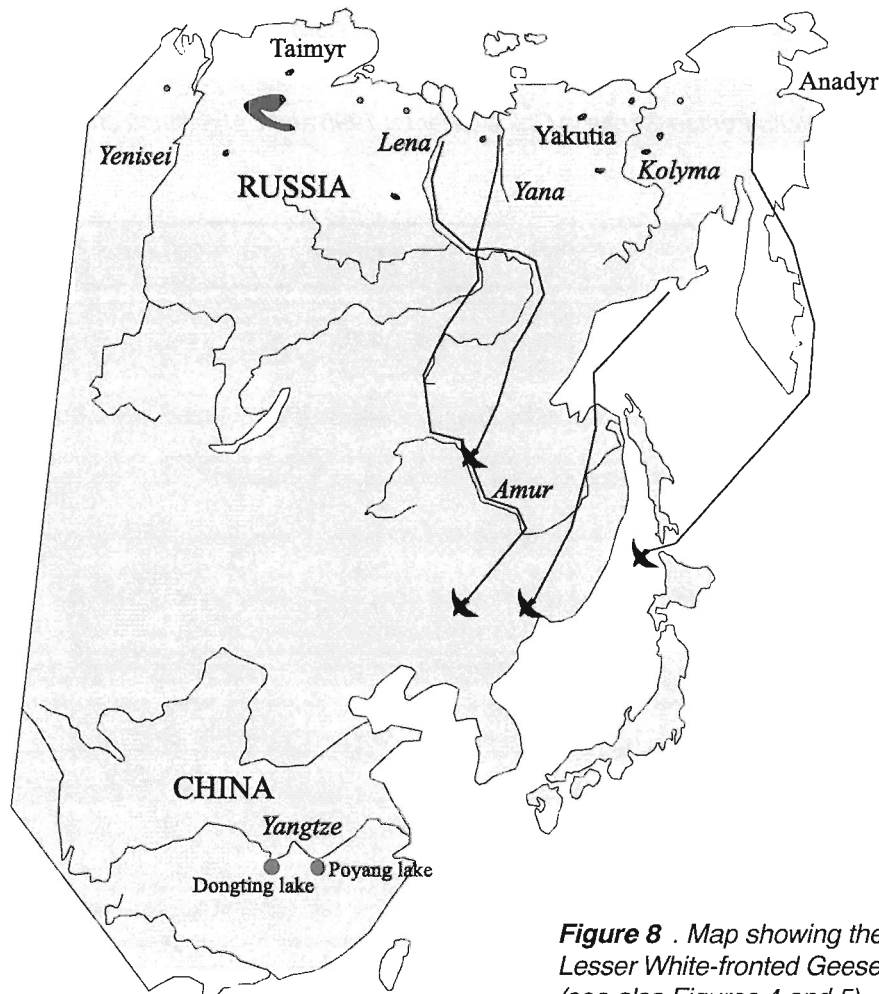
5.8 CHINA

5.8.1 Distribution

The Lesser White-fronted Goose winters from Manchuria in the south through Shantung, Honan, and Hupeh to the lower Yangtze, in Fukien (Haitan Tao), and Kwangtung. Irregular to Taiwan (De Schauensee 1984). The wintering populations in these areas are thought to originate from the breeding areas from Eastern Taimyr eastwards to Anadyr in Russia. The Lesser White-fronted Goose is found during winter in ten sites during the period November through February (Lu 1995), and with some records during spring migration (Table 15).

5.8.2 Migration

In spring a visible migration occurs in Eastern Russia from the Lena Delta along the Lena Valley southwards (Figure 8). Also Lesser White-fronted Geese from the Yana River probably crosses the watershed in the Verkhoyansk Mountains and follows the Lena Valley (Perfilyev 1978 cited in Vinogradov 1990). The majority probably depart south along the Aldan Valley or straight across the Stanovo Mountains, through the Amur Valley south-eastwards and further along the River Sungari, at least formerly. When rice began to be cultivated in the valley of Lake Khanka, most of the migrating birds changed to a more easterly route through the Ussuri Valley (Vakhreyev 1978



- Unknown status
- Breeding range

Figure 8 . Map showing the known breeding areas for Lesser White-fronted Geese from the Taimyr Peninsula (see also Figures 4 and 5), eastwards to Anadyr in Far Eastern Siberia. The supposed migration routes from the breeding areas to China, and the two most important known wintering sites in China are marked on the map (After Vinogradov 1990, Rakhilin 1972, Syroechkovski 1996, Degtyarev & Perfilyev 1996, Lu 1995, and own data).

cited in Vinogradov 1990).

The migration route from the Anadyr area passes across the Parapol Valley and apparently along the eastern coast of Kamchatka since it does not fly along the western coast (Gerasimov 1977 and Lobkov 1978 cited in Vinogradov 1990). It is possible that these birds then continues to Southern Sakhalin where marked migration has been observed in Aniv Bay and on Lake Troitskoye (Gisenko 1955 and Nechayev 1987 cited in Vinogradov 1990). Rakhilin (1972), however, states that the Lesser White-fronted Goose fly along the coastline of the Okhotsk Sea in Primorye, and along the basin of the Amur River and later cross Lake Khanka. Before 1900, Przewalski saw the Lesser White-fronted Goose in very large numbers passing Lake Khanka (Alphéraky 1905). No information was available on the timing of migration

when this was compiled. As is evident, very little is known about the migration to and from the breeding areas in Eastern Russia and the wintering areas in China.

5.8.3 Trends and numbers

During the 1930s the Lesser White-fronted Goose was considered to be the most abundant goose wintering on Yangtze River. However, the information about trends are very difficult to achieve due to lack of sources and also because of old counts suffering from severe identification problems. It is for the East Dongting Lake said by Chinese ornithologists that there were many more geese ten years ago (E. Virolainen pers. comm.). Overall the eastern populations have declined markedly in recent decades (IWRB Goose Research Group 1994). It seems as

Table 15. Numbers of Lesser White-fronted Geese in China (after Lu 1995 and E. Virolainen and E.E. Syroechkovski Jr. pers. comm.).

Site	Coordinates	Date	Number	Comments
E. Dongting Lake	29°10'N113°50'E	08.01.90	1200	
		20.01.91	675	
		13.12.91	46	
		12.01-04.02.96	2000+	
Haifeng Coast	33°00'N120°40'E	18.01.90	650	
Hannan Lakes	30°20'N113°50'E	20.01.90	360	
Heigangkou	34°00'N114°40'E	04.01.91	30	
		04.01.92	720	
		18.01.93	150	
Jiangsu Coast	33°40'N120°40'E	06.01.91	21	
		16.01.91	11	
		20.01.92	0	
		17.01.91	250	
Pangzhai	35°20'N114°20'E	19.11.91	203	
		12.01.93	159	
		00.01.88	14 000	In January
Poyang Lake	28°50'N116°10'E	16.01.90	5432	
		08.01.91	0	
		21.11.91	3100	
		00.02.97	13 700	In February
Qingdao Coast	36°10'N120°10'E	10.01.90	10	Mainly passage
		10.01.91	1000	
		18.01.92	0	
		01.02.93	0	
		11.01.90	53	
Sheyang Coast	33°40'N120°30'E	18.01.90	550	
		17.01.91	680	
		20.02.92	2650	
		23.12.92	1150	
Shijiu Lake	31°20'N118°40'E	March-April	3-5000	Staging area

the decline in the wintering populations in China is a result of over-exploitation by shooting in China (IWRB Goose Research Group 1994), but Ler et al. (1989 cited in Green 1992) believes that the numbers breeding in the far east of Siberia have declined, not only as a result of excess hunting in the wintering areas, but also due to economic development of the breeding habitat and intensification of agriculture in the wintering areas.

Jianjian Lu (1995) has made a summary of the occurrence and status of the Lesser White-fronted Goose in China, based on a number of Chinese publications. In the years 1990-93, a total of ten sites in China had records of Lesser White-fronted Geese. Of all the sites, only two had less than 50 birds recorded in the 1990s.

The largest concentration in the 1980s was 14 000 at Poyang Lake in January 1988 (del Hoyo et al. 1992). There have, however been some doubts cast over the reliability of the counts at Poyang Lake, because of possible confusion with White-fronted Geese (Perennou et al. 1994). In China the population is estimated to 1000-10 000 individuals (Perennou et al. 1994). A. Andreew states that there are probably 6000 wintering in this region (Perennou et al. 1994). In February 1997, 13 700 individuals were counted at Poyang Lake by Japanese researchers (Syroechkovski, Jr. pers. comm.). If the percentage of young individuals were between 40-60%, we obtain an estimate of 2740-4110 pairs, which forms the adult population. Of these a non-breeding part, depending partly on density dependent mechanisms (Ebbinge 1985), would be in the order of 50-70%, leaving a potential of 822-2055 breeding pairs.

It is clear that, even though the population is declining, quite good numbers of Lesser White-fronted Geese still winters in China, and that research is urgently needed to reveal in detail the distribution, numbers, migration routes and breeding areas of these birds.

5.8.4 Protection

The Lesser White-fronted Goose is not protected in China, and it is a common quarry. It is not listed in the Chinese Red Data Book (Lu 1995). It is only

protected to a limited degree in sites with a Nature Reserve status, or areas inaccessible to hunters.

East Dongting Lake, which is the most important wintering area situated in the Hunan province along the Yangtse River, is protected as a Nature Reserve. The total area of the reserve is 1900 km², where 70% of the area is suitable for wintering geese (pasture, reedcutting area, shallow water). After the 1850s about 50% of the original area disappeared due to human activities such as drainage, fishponds, farmland and siltation. Hunting is prohibited inside the Nature Reserve, but illegal hunting by poisoning seems to be quite common (E. Virolainen pers. comm.).

A recent review of waterbird research in China (Lu et al. 1994) draws the attention to the conservation needs of Chinese wetlands and the birds they support, and this will hopefully be a major incentive to the conservation effort in the future.

A provincial reserve was established in 1983 in the Poyang Lake. It became a National Nature Reserve in 1988 and an internationally recognised Ramsar site in 1992. The nine lakes of the reserve cover some 22 400 ha, about 4.1% of the total area of Poyang Lake. As in the East Dongting Lake, hunting by use of agricultural pesticides creates serious problems inside the reserve.

5.9 THE BALTIC REPUBLICS

The occurrence of the Lesser White-fronted Goose in Baltic States has previously only been described for Lithuania (Svazas 1996). From the satellite telemetry study conducted in 1995, there is some evidence that Fennoscandian Lesser White-fronted Geese migrating south-westwards from the Kanin Peninsula follows the Eastern Baltic Sea Coast. In this respect, it is important to gather information about the species' occurrence in the Baltic States. Here we present the observations from the Baltic States known to the Lesser White-fronted Goose Monitoring Programme, and hopefully this overview will encourage ornithologists in the Baltic States to gather more information about the species' occurrence.

5.9.1 Estonia

The Lesser White-fronted goose is an irregular migrant in Estonia. Until the 1960s, the Lesser White-fronted Goose occurred regularly in small numbers. Most records were from the western part of the country during spring migration, whereas the Lesser White-fronted Goose occurred both in the western and eastern part during autumn. The highest number seen was 346 individuals in the Matsalu Nature Reserve (Leibak et al. 1994).

No records were confirmed in the 1970s. Since 1985, single birds have been observed in Western Estonia, mainly in flocks of Barnacle Geese. Single observations of geese with Swedish colour leg rings has been reported since 1985. The seemingly re-establishment of Lesser White-fronted Goose migration through Estonia could be due to the Swedish re-introduction programme run since the early 1980s (Leibak et al. 1994, see von Essen 1996 about the re-introduction project).

5.9.2 Latvia

The species is at present a rare migrant in Latvia. Single individuals are seen during the migration periods. The largest flock reported formerly is from 22 September 1958 when 90 individuals was flying south-west along the Baltic Sea Coast, at the Village Ovisi at the Kurzeme Peninsula (Mihelsons et al. 1960). However, due to identification problems, Lesser White-fronted Geese could easily be over-

looked in flocks of other goose species. It is said that the majority of the geese present in Bog Ozolu (where two individuals were shot in 1996, see Table 16) are Lesser White-fronted Geese, but this has not been confirmed so far.

5.9.3 Lithuania

Very little is known, but Svazas (1996) states that large flocks of Lesser White-fronted Geese have been recorded in the wetlands around Nemunas River Delta in recent years, with highest number of 200-230 individuals. According to Nedzinskas (1990), the migratory passage of the Lesser White-fronted Goose takes place in March-April and late September-early October, when small flocks of 20-30 individuals have been recorded almost annually in the Zuvintas Reserve in the years 1966-1986. Svazas (1996) mention that the Lesser White-fronted Goose still is present in small numbers, but this has not been confirmed in recent years by field ornithologists in these areas. About 20 000-40 000 geese visit the country on passage both spring and autumn, and White-fronted Geese makes 10-30% of the total numbers. As for the other Baltic States, it is reasonable to assume that the Lesser White-fronted Goose could occur in small numbers and be overlooked in the flocks of White-fronted Geese. However, estimates of the present amount of the population which utilise the western migration route makes it unlikely that large numbers of 200-300 individuals could be observed.

Table 16. Records of Lesser White-fronted Geese in Latvia (M. Strazds & E. Racinskis pers. comm.).

Dates	Year	Number	Locality	Comments
9 October	1902	1	Gulf of Riga	Found in the market, prob. shot near at Jurmala.
5 May	1910	1	Dviete	Shot
25 October	1925	1	Riga	Obtained in the market
April	1927	3	Lake Babites	Shot
Autumn	1927	1	Lake Engures	Shot
20 September	1937	2	Lake Kaniera	Shot out of a flock
22 September	1958	90	Kurzeme Peninsula	(Mihelsons et al. 1960)
April	1980	1	Fishpond of Nagli	Seen in flock of other geese (J. Baumanis)
29 September	1984	100	Lake Kaniera	Two flocks of 40 and 60 ind. seen in flight
7 October	1985	2	Lake Murmastienes	Bergmanis & Avotins 1990
27 September	1989	3	Lake Engures	
20 October	1991	4	Riga	
1 May	1994	3	Coast near Berzciems	
4 October	1996	43	Bog Ozolu	Two ind. shot out of the flock. This flock was first seen 26 September.

6. MEDIA COVERAGE AND INFORMATION

In 1997 an ambulant exhibition about the Lesser White-fronted Goose and the general biodiversity of Finnmark was launched 7 October at Varanger Samiske Museum. This exhibition was produced by *Stabbursnes Naturhus og Museum* in co-operation with NOF, and will hopefully give both local people and tourists a possibility to learn about the biology of the Lesser White-fronted Goose and the threats it is facing both in Finnmark and abroad.

Through BirdLife International, a leaflet entitled «Rescue mission: for Europe's rarest birds» was distributed in December 1996 to raise money for the protection of Zino's Petrel, Lesser White-fronted Goose, Corncrake, Imperial Eagle and Lesser Kestrel.

An article has also been written which deals with the problem of identifying Lesser White-fronted Geese in flocks of White-fronted Geese (Øien et al. MS). The article is written in English, but the intention is also to translate it into Russian in order to distribute it to Russian speaking hunters and game wardens. It is well known that many Lesser White-

fronted Geese are shot each year both intentionally and because most hunters are unable to distinguish it from other goose species. A poster is under preparation as a supplement to give a general introduction to the population situation and biology of the Lesser White-fronted Goose as well as information about identification of huntable and protected goose species.

Other articles about the Lesser White-fronted Goose and the project are given in Table 17.

Also the Lesser White-fronted Goose working group of WWF Finland has been working intensively to raise public awareness on the situation of the species, with the most important work, an article about identification and information article, published in the Journal *Metsästäjä* (the journal of the Hunters' Central Organisation in Finland) and its correspondent in Swedish, the journal *Jägare*. The circulation of these two journals are 290 000 and 18 000 copies respectively (Markkola & Niittyvuopio 1997).

Table 17. Media coverage and articles on the project and the Lesser White-fronted Goose published in the report period (see also Aarvak et al. 1996).

- Anonymous 1997. Lesser Whitefronts racing to extinction. *Birding World* 10:120.
- Arkiomaa, A. 1997. As a prisoner of the nature of Siberia - with Lesser White-fronted Geese in Taimyr. *WWF Utiset* 4/97:4-5. (In Finnish).
- BirdLife International 1997. Bulgarian search for Lesser White-fronts. *BirdLife in Europe* 2 (1):3.
- BirdLife International 1997. Reserve for Lesser White-fronted Goose. *BirdLife in Europe* 2 (2):5.
- Friberg, U. 1997. Habitat selection of the Lesser White-fronted Goose *Anser erythropus*, during the breeding season in Northern Finland and Norway. 28pp. Thesis in Forest Zoecology. Institutionen för skoglig zoekologi. 1997:4. Sveriges Lantbrukuniversitet, Umeå.
- King, J. 1997. Lesser White-fronts: problems and solutions. *Birding World* 10:2.
- Lorentsen, S.-H. 1997. The globally threatened Lesser White-fronted Goose. *WWF Arctic bulletin* No.3.97:16-18.
- Lorentsen, S.-H., Øien, I.J., Aarvak, T. 1998. Migration of Fennoscandian Lesser White-fronted Geese *Anser erythropus* mapped by satellite telemetry. *Biological Conservation* 84:47-52.
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- Prokosch, P. 1997. Detected by satellite and protected within 16 months: Shoininski Reserve established on Kanin. *WWF Arctic Bulletin* No.1.97:16.
- Taskinen, J. 1997. The Lesser White-fronted Goose *Sibyako* migrating towards the Caspian Sea. *Linnut* 6/1997:11. (In Finnish).
- Thor-Ivar Guldberg 1997. Satellittjess sørget for vern i Russland. *Dagens miljø* (<http://login.eunet.no/~thorguld/>).
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- Øien, I.J. & Aarvak, T. 1997. Satellites track Russian Lesser White-fronts. *WWF Arctic bulletin* No.3.97:17.
- Øien, I.J., Aarvak, T., Lorentsen, S.-H. & Bangjord, G. 1996. Use of individual differences in belly patches in population monitoring of Lesser White-fronted Goose *Anser erythropus* at a staging ground. *Fauna norv. Ser. C, Cinclus* 19:69-76.

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APPENDIX I

Poster of the goose species of Bulgaria, produced for Italian hunters

Ogni inverno, da ottobre e febbraio, i laghi di Shabla e Durankulak ospitano centinaia di migliaia di oche selvatiche. Sono soprattutto quattro le specie svernanti, senza escludere la possibilità di svernamento da parte di individui appartenenti ad altre specie. Solo una di queste quattro specie (la più comune) e una specie cacciabile, mentre le altre tre sono specie minacciate e protette dalla Legge Nazionale sulla Conservazione della Natura, e alcune di esse fanno addirittura parte delle liste indicate dalle convenzioni internazionali per la protezione della fauna selvatica.

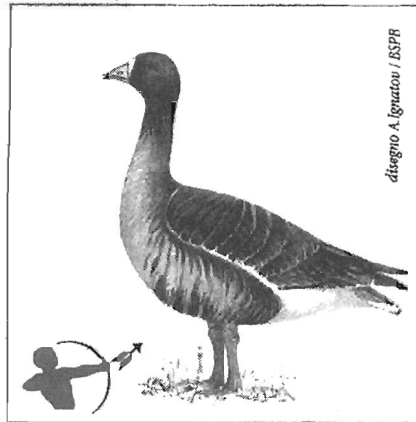


Oca selvatica

È la più grande delle quattro specie. Il corpo può raggiungere i 90 cm. di lunghezza, mentre l'apertura alare arriva fino a 180 cm. Ha un piumaggio grigio-brunastro e si può facilmente riconoscere in volo per la sua taglia, per le ali di un grigio chiaro e per la voce, assai simile a quella delle oche domestiche.

Sverna nei due laghi in piccole quantità, fino ad un massimo di 50 individui. È l'unica specie di oca che nidifica in Bulgaria. È protetta dalla Legge sulla Conservazione della Natura ed è stata inserita nel Libro Rosso delle Specie Minacciate in Bulgaria.

La caccia è vietata.

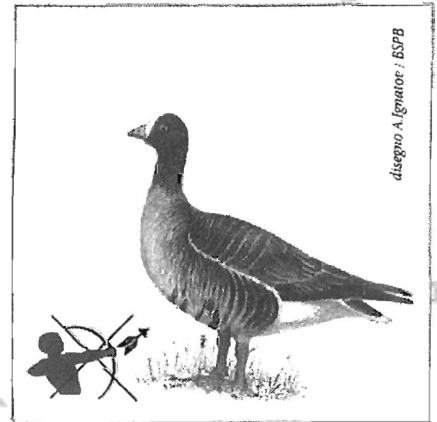


Oca lombardella

Un'oca di grandi dimensioni ma più piccola dell'Oca selvatica. Il corpo può essere lungo fino a 78 cm. e l'apertura alare raggiunge i 165 cm. Il piumaggio è grigio-brunastro, più scuro di quello dell'Oca selvatica. Ha una macchia bianca alla base del becco.

Nidifica nella tundra russa. Questa specie forma grandi aggregazioni nei due laghi, fino a 200 000 individui. Non è protetta dalla Legge Nazionale.

La caccia è autorizzata.



Oca lombardella minore

Una delle oche più piccole. La lunghezza del corpo raggiunge i 66 cm. e l'apertura alare i 135 cm. Il piumaggio è quasi identico a quello dell'Oca lombardella. È estremamente difficile distinguere le due specie in volo.

Nidifica in Scandinavia ed in Siberia. Il numero di individui svernanti in Bulgaria non è ancora ben conosciuto. È stata inserita nella lista delle "Specie Globalmente Minacciate" di BirdLife International e nel Libro Rosso delle Specie Minacciate in Bulgaria. È specie protetta dalla Legge Nazionale sulla Conservazione della Natura.

La caccia è vietata.

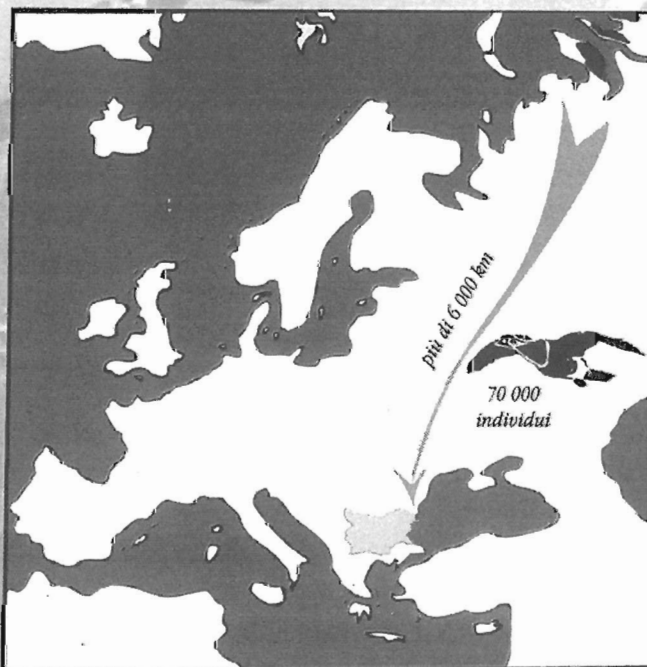
Oca collarosso

È la più piccola tra le quattro. La lunghezza del corpo raggiunge i 56 cm. e l'apertura alare i 135 cm. Ha un piumaggio rosso e nero molto caratteristico, alternato ad alcuni puntini e righe di colore bianco, che lo rende un uccello assai attraente. Nidifica nella tundra russa (nelle penisole di Jamal, Gidan e Taimir) e sverna prevalentemente in Dobrudja. I suoi principali luoghi di svernamento bulgari sono i laghi di Shabla e Durankulak. Percorre più di 6 000 km. per raggiungere la Bulgaria.

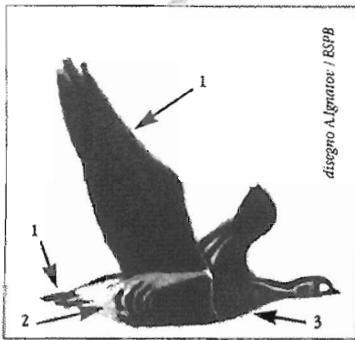
A livello mondiale, la popolazione di questa specie di oca è crollata a livelli critici. Si pensa che non ne sopravvivano più di poche decine di migliaia di esemplari, il che rende tale specie vulnerabile e minacciata di estinzione. Da ciò si capisce come mai numerose associazioni nazionali ed internazionali hanno così in grande considerazione questa specie. La protezione dei laghi di Shabla e Durankulak è di notevole importanza per la salvaguardia di questa oca.

È inclusa nella categoria "Specie Globalmente Minacciate" di BirdLife International, così come nel Libro Rosso delle Specie Minacciate in Bulgaria e nell'allegato 2 della Convenzione di Washington sul commercio di specie minacciate. È protetta dalla Legge Nazionale sulla Conservazione della Natura.

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Oca collarosso



disegno A. Ignatov / BSPB

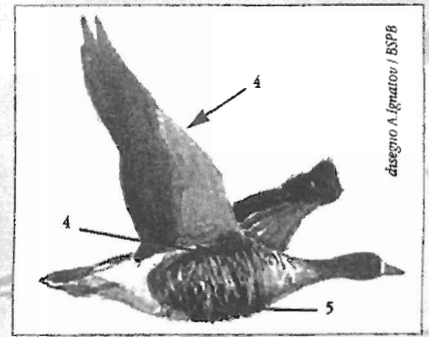


foto L. Andreev



foto L. Andreev

Oca lombardella



disegno A. Ignatov / BSPB

Per evitare di sparare all'Oca collarosso, specie gravemente minacciata, anzichè all'Oca Lombardella, di cui è concessa la caccia, ecco le principali caratteristiche che distinguono le due specie.

Di giorno, quando la luminosità è sufficiente ed il cielo è chiaro, è facile distinguere la collarosso dalla lombardella per la differenza di dimensioni e di colore. La collarosso è molto più piccola (1) il petto, le ali e la coda sono nere; (2) la pancia è bianca; (3) il collo rosso è facilmente visibile.

La lombardella, oltre ad essere più grande e con una colorazione più chiara, (4) ha il petto, la pancia ed il sottoala grigio-brunastro e (5) il petto presenta una punteggiatura nera irregolare.

I giovani di questa specie non hanno punti neri e il petto è più chiaro (sembra quasi bianco). Spesso la visibilità nei giorni di caccia non è abbastanza buona (giornate nebbiose o di pioggia) ed i colori non possono essere distinti. In questi momenti è meglio distinguere le specie dalla loro silhouette. In genere, se paragonata con la lombardella, la collarosso ha il corpo più piccolo, (6) il collo più corto, (7) le ali sono più strette.

Entrambe le specie emettono dei versi mentre sono in volo. In particolare la collarosso emette un bisillabico "chi - cuik", che è più flebile e con una tonalità più bassa della lombardella.

Una caratteristica tipica del comportamento di queste oche è che al mattino presto le collarosso si involano dai laghi dopo le lombardelle, ma talvolta formano degli stormi misti. E' meglio non sparare a tali stormi misti. Facciamo anche notare che la carne di collarosso ha un cattivo sapore !

Il modo migliore per distinguere le oche consiste nel fare uso di binocoli, così che possano essere evitati problemi di confusione. Non sollevate il vostro fucile prima di essere sicuri che si tratti di una lombardella e non di una collarosso !

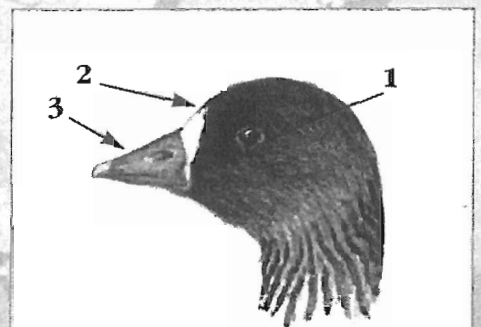
La situazione di un'altra specie di oca minacciata in Bulgaria, la lombardella minore, non è stata ancora chiarita. A tutt'oggi solo alcuni individui isolati sono stati notati nei pressi di Shabla e Durankulak. E' molto difficile distinguere una lombardella da una lombardella minore in volo (sia come taglia che come voce). Questo è il nostro suggerimento : sparate alle oche più grandi, non mirate a quelle più piccole dello stormo !

In ogni caso, se vi capita di uccidere una lombardella minore, per favore consegnate la sua testa alla persona responsabile dell'organizzazione della battuta di caccia dell'Associazione Venatoria di Shabla, Signor Pavlin Pavlov, o alla persona che vi ha rilasciato il permesso di caccia, insieme ad una nota scritta in cui si indichi la data, ora e localizzazione del sito in cui è stata uccisa. Questa informazione sarà molto utile per ulteriori studi sulla specie. Grazie mille per il vostro aiuto!

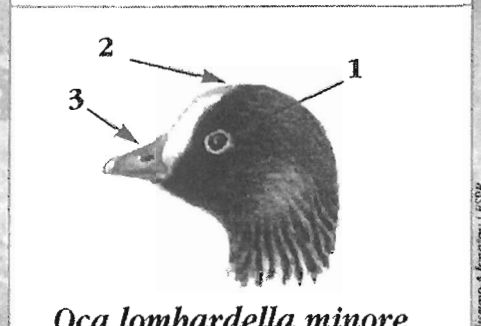
Avendole in mano, infatti, le due specie di lombardella si possono distinguere da :

1) Un anello giallo intorno all'occhio che la lombardella non possiede
2) Il punto bianco sulla testa della lombardella minore è più grande e arriva a toccare gli occhi, mentre nella lombardella è presente solo intorno al becco. I giovani di entrambe le specie non hanno questa macchia bianca, ma l'anello giallo è sempre presente nella lombardella minore

3) La minore ha un becco molto più corto (quasi triangolare); il collo e inoltre più corto ed il corpo più piccolo della lombardella.



Oca lombardella



Oca lombardella minore

APPENDIX II

Co-operation partners and contacts along the proposed migration routes and wintering areas.

BirdLife International

Zoltan Walizcky

Wetlands International

Jesper Madsen

Bart Ebbinge

WWF- International

Peter Prokosch

Belarus

Alexey K. Tishechkin

Institute of Zoology, Belarus Academy of Science

Bulgaria

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Bulgarian Society for the Protection of Birds (BSPB)

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Bulgarian Society for the Protection of Birds (BSPB)

Irina Kostadinova

Bulgarian Society for the Protection of Birds (BSPB)

Dimiter Georgiev

Bulgarian Society for the Protection of Birds (BSPB)

Sergey Deleriev

Bulgarian Society for the Protection of Birds (BSPB)

Czech Republic

Peter Burgr

Jihocesce Muzeum

Jan Hora

Czech Ornithological Society

Estland

Janus Elts

Estonian Ornithological Society.

Finland

Juha Markkola

World Wildlife Fund, Finland

Petteri Tolvanen

World Wildlife Fund, Finland

Germany

Stefan Krüger

Galenbecker Orn. St.

Dr. Edwin Donath

Max-Planck-Institute of Colloid and Interface Research

Greece

G.I. Handrinos

Hellenic Republic ministry of Agriculture

Hans Jerrentrup

Society for protection of Nature and Ecodevelopment

Stella Kladara

World Wildlife Fund, Greece

Theodoros Naziridiz

Hellenic Ornithological Society

Kostas Pistolas

World Wildlife Fund, Greece

Hungary

Sandor Farago	Dept. of Wildlife Management, University of Forestry & Wood Science
Zsolte Kalota's	Hungarian Nature Conservation Authority
Ga'bor Kova'cs	Hortobagy National Park
Scabolcs Nagy	Hungarian Ornithological and Nature Conservation Society (MME BirdLife Hungary)
Janos Tar	Hortobagy National Park
Gabor Magyar	Hungarian Nature Conservation Authority
Istvan Major	Hungarian Nature Conservation Authority
Lajos Varga	Hungarian Ornithological and Nature Conservation Society (MME)

Latvia

Maris Strazds	Latvian Ornithological Society
Edmunds Razinskis	Latvian Ornithological Society

Litauen

Gedas Vaitkus	Lithuanian Ornithological Society
Vytautas Jusys	Ventes Ragas Ornithological Station

Poland

Jerzy Dyrzkowski	Institute of Zoology, Polish Academy of Sciences
Jan Lontkowski	Institute of Natural History, Wroclaw University
Przemek Chylarecki	Gdansk Ornithological Station, Inst of Ecology, Polish Academy of Sciences

Romania

Eugen Petresku	Romanian Ornithological Society -Tulcea Office
Dan Munteanu	Romanian Ornithological Society
Edmund Ballon	Pro-Delta Society
Dr. Janos Bottond-Kiss	Danube Delta Institute

Russia

Vladimir Morozov	Russian Institute for Nature Conservation
Yeugeny Syroeckovski Jr.	Institute for Ecology & Evolution, Russian Academy of Science
Victor Nikiforov	World Wildlife Fund International - Russian Programme.

Slovakia

Pavol Kanuch	Slovakian Ornithological Society
--------------	----------------------------------

Sweden

Lambart von Essen	Svenska Jägareförbundet
Anders Bylin	Tovetorp Zoologiska forskningstation
Ola Jennersten	Världsnaturfonden

Turkey

Murat Yasar	Society for the Protection of Nature
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Ukraine

Igor Gorban	Ukraine Ornithological Society
Igor Shilsky	Museum of Natural History

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