



WWF Finland Report No 10
NOF Rapportserie Report No 1-1999

Fennoscandian Lesser White-fronted Goose conservation project Annual report 1998



Edited by
Petteri Tolvanen, Ingar Jostein Øien and Kalle Ruokolainen



Maaailman Luonnon Säätiön WWF
Suomen Rahaston raportteja Nro 10
WWF Finland Report No 10

Norsk Ornitologisk Forening (NOF)
NOF Rapportserie
Rapport Nr. 1-1999



Fennoscandian Lesser White-fronted Goose conservation project Annual report 1998

Edited by

Petteri Tolvanen
Ingar Jostein Øien
Kalle Ruokolainen



Helsinki-Klæbu
1999

- 5 Introduction**
Petteri Tolvanen, Juha Markkola, Tomas Aarvak and Ingar Jostein Øien
- 9 Occurrence of Lesser White-fronted Goose in north-east Bulgaria in February 1998**
Nikolai Petkov, Ingar Jostein Øien and Tomas Aarvak
- 11 Awareness campaign for the Lesser White-fronted Goose**
Irina Kostadinova, Ingar Jostein Øien and Tomas Aarvak
- 12 Surveys for Lesser White-fronted Goose and other geese in the Olonets and Sviricha regions, Western Russia in spring 1998**
Petro Pynnönen, Sami Timonen and Toni Eskelin
- 15 A spring staging area for Lesser White-fronted Geese recovered in Matsalu, Estonia**
Petteri Tolvanen
- 18 The spring migration of the Lesser White-fronted Goose at Bothnian Bay in 1998**
Sami Timonen
- 21 The management plan for the coastal meadows of Säärenperä**
Sami Timonen and Marika Niemelä
- 22 Monitoring and catching of staging Lesser White-fronted Geese at the Valdak Marshes in 1998**
Tomas Aarvak and Ingar Jostein Øien
- 27 Two pieces of the spring migration puzzle of the Fennoscandian Lesser White-fronted Goose population in place**
Tomas Aarvak, Ingar Jostein Øien, Petteri Tolvanen and Juha Markkola
- 31 Monitoring Lesser White-fronted Geese in the Varangerfjord area in 1998**
Kalle Ruokolainen, Petteri Tolvanen and Riikka Kaartinen
- 35 Field work in Lapland in 1998**
Jarmo Pääläinen and Juha Markkola
- 37 Surveys and catching of Lesser White-fronted Geese at Taimyr Peninsula – preliminary results on autumn migration routes mapped by satellite telemetry**
Ingar Jostein Øien, Petteri Tolvanen, Tomas Aarvak, Konstantin E. Litvin and Juha Markkola
- 42 Monitoring the autumn staging of Lesser White-fronted Geese in north-western Kazakhstan, October 1998**
Petteri Tolvanen, Konstantin E. Litvin and Petri Lampila
- 47 The Finnish breeding and restocking project of the Lesser White-fronted Goose: results and the current situation in 1998**
Juha Markkola, Sami Timonen and Pekka Nieminen
- 51 Phylogeography and population genetic structure of the Lesser White-fronted Goose**
Minna Ruokonen and Jaakko Lumme
- 53 The Swedish reintroduction project of Lesser White-fronted Geese**
Lambart von Essen
- 56 SHORT NEWS & ERRATA**
Southern population of Lesser White-fronted Goose finally extinct in Norway?
New record of Lesser White-fronted Geese with brood in southern parts of Norway
Errata
- 47 APPENDICES**
A Co-operation partners and contacts of the Finnish and Norwegian Lesser White-fronted Goose projects in 1998
B Publications in 1998
C Annotated checklist of birds observations during Lesser White-fronted Goose expeditions to Taimyr in 1997 and 1998
D Annotated checklist of birds observations during the Lesser White-fronted Goose expedition to Kustanai Region, north-western Kazakhstan 4–16 October, 1998
E Monitoring instructions for Lesser White-fronted Goose surveys

Introduction

Petteri Tolvanen
Juha Markkola
Tomas Aarvak
Ingar Jostein Øien



Lesser White-fronted Goose
© Ingar Jostein Øien

The Lesser White-fronted Goose (*Anser erythropus*, later LWfG) is the most threatened arctic goose species of the Palearctic region, and the population trend seems to be declining throughout the range from Fennoscandia to easternmost Siberia. The recent estimate of the (mid-winter) world population is not more than 25,000-30,000 individuals (Lorentsen et al. 1999), not 55,000 as stated by Madsen et al. (1997). Roughly half of these belong to the eastern subpopulation, which breeds in Eastern Siberia (east of the Taimyr Peninsula) and winters mainly in China. In Fennoscandia, LWfG is on the verge of extinction, with only 30–50 breeding pairs remaining (von Essen et al. 1996).

The breeding success of LWfG is considered to be at a normal level in general, and as a result of ringing and satellite tracking efforts, hunting has proved to be the most important reason for the continuous decline. This was once again shown by the fate of the LWfG female tagged in Taimyr last summer: during the last stages of the editing work of this report, we got the message that this bird had been shot in Dagestan (see pp. 37–41 in this report). Still, the main problem of the LWfG conservation work is lack of knowledge of the most important staging and wintering areas south of north-western Kazakhstan, and therefore the main priorities are to localise and subsequently to implement conservation measures in the most important areas.

The endangered status of the LWfG is widely acknowledged, but still officially underestimated, probably by accident and confusion. In "Birds in Europe: their conservation status" published by *BirdLife International* (Tucker & Heath 1994) the LWfG is listed in SPEC (Species of European Conservation Concern) category 1 'globally threatened'. The status is, however, defined as 'vulnerable', though according to the criteria (Tucker & Heath 1994, pp. 28–29) the status should preferably be defined as 'endangered': the size of the European LWfG population is apparently less than 2,500 pairs (probably in the magnitude of 500–1,000 pairs), and the rate of the population decline has surely been at least 'moderate' (i.e. >20% decline in one third of the population or more) between 1970–1990. In fact, the registered decline e.g. in Finnish staging areas, in the period 1970–1990, was from c. 200 birds to c. 50, i.e. a 75 % decrease (Markkola et al. 1998). The counts from the Evros Delta in Greece are not more encouraging: in 1973, 480 individuals was the maximum count (Handrinos & Goutner 1990), while nowadays, less than 100 individuals are found (Lampila 1998), i.e. a decline of c. 80 %. In the 1996 IUCN Red List of Threatened Animals, LWfG is listed as vulnerable by criterion A1 (an observed, estimated, inferred or suspected reduction of at least 20% over the last 10 years or three generations). In EU Birds Directive, LWfG is listed in the Annex I. According to the directive, the species mentioned in Annex I "shall be the subject of special conservation measures concerning their habitat in order to ensure their survival and reproduction in their area of distribution".

The too optimistic population estimate also has regional and local consequences. In the IBA (Important Bird Areas) criteria of *BirdLife International*, the threshold value for defining a globally important staging area is 430 individuals for the LWfG (BirdLife International 1995). Because the threshold value is 1% of the world population, this figure of 430 birds is deduced from a world population estimate of 43,000 LWfG, which is nearly twice the most reliable current estimate. In Europe the background figures for the threshold of 30-78 individuals for an European standard of IBA's are 1,000-2,600 pairs, which indicates an autumn population in the magnitude of at least 3,000-7,800 individuals. Also this is a mistake and the correct threshold value should be c. 20 individuals (Pessa 1995). If the LWfG world population is split in 'western' and 'eastern' populations, the threshold values of both subpopulations should in fact be even lower.

The Finnish and Norwegian LWfG working groups have carried out the majority of the research and conservation work of the natural LWfG population in Fennoscandia, while the Swedish LWfG project has concentrated on the reintroduction programme using Barnacle Geese (*Branta leucopsis*) as foster parents. In the 1990's, the Finnish and Norwegian groups, together with colleagues from e.g. Russia and Kazakhstan, have put increasingly more effort in the research and conservation of the main population breeding in Central Siberia and wintering somewhere around the Caspian and the Black Sea. At the same time, the Finnish and Norwegian groups have united their efforts, and now – for the first time – our annual reports are published jointly. In Russia and the former Soviet Union, the Goose and Swan Study Group of Eastern Europe and North Asia has been the main co-operation partner.

The international LWfG working group was established in 1995 as part of the Goose Specialist Group of *Wetlands International*, and the international Action Plan for the conservation of LWfG (Madsen 1996) was published the following year. The international working group co-ordinates the conservation and research work of the national projects, and makes priorities for the future conservation efforts by compiling an Urgent Action Plan annually, based on the international Action Plan and the most recent knowledge.

In this annual report, the main results of the LWfG monitoring and conservation work in 1998 by the Norwegian and Finnish projects are presented, including e.g. a satellite tagging effort at the Taimyr Peninsula (Central Siberia) and preliminary results of the follow-up of these birds, results of the surveys and monitoring of staging areas in Fennoscandia, Estonia,



Photo. An adult male Lesser White-fronted Goose, caught during the moult period in the Kurluska area on Southern Taimyr in. Three adult Lesser White-fronts were equipped with satellite transmitters in the Kurluska area in July-August 1998. © Petteri Tolvanen, Taimyr, July 1998

References

- BirdLife International 1995:** IBA Criteria – Categories and thresholds.
- Handrinos, G. I. & Goutner, V. 1990:** On the occurrence of the Lesser White-fronted Goose *Anser erythropus* in Greece. – *Journal für Ornithologie* 131: 160–165.
- von Essen, L., Markkola, J., Aarvak, T. & Øien, I.J. 1996:** The Lesser White-fronted Goose in Fennoscandia - past and present distribution. Poster abstract. In Birkan, M., van Vessem, J., Havet, P., Madsen, J., Trolliet, B. & Moser, M. (eds.): Proc. of the Anatidae 2000 Conference, Strasbourg, France, 5–9 Dec. 1994. – *Gibier faune Sauvage, Game and Wildlife* 13:1313–1314.
- Lampila, P. 1998:** Monitoring of wintering Lesser White-fronted Geese *Anser erythropus* in north-eastern Greece, 8 January – 8 April 1997. In Tolvanen, P., Ruokolainen, K., Markkola, J., & Karvonen, R. (eds.): Finnish Lesser White-fronted Goose conservation project. Annual report 1997. – WWF Finland Report No 9: 7–8.
- Lorentsen, S.-H., Øien, I.J., Aarvak, T., von Essen, L., Farago, S., Markkola, J., Morozov, V., Syroechkovski Jr., E.E. & Tolvanen, P. 1999:** Lesser White-fronted Goose *Anser erythropus*. In: Madsen, J., Fox, T. & Cracknell, J. (eds.): Review of goose populations wintering in the Western Palearctic. – Wetlands International, Cambridge, UK. (In press).
- Madsen, J. (compiler) 1996:** International action plan for the Lesser White-fronted Goose (*Anser erythropus*). In Heredia, B., Rose, L. & Painter, M. (eds.): Globally threatened birds in Europe. Action plans. – Council of Europe Publishing, BirdLife International.
- Madsen, J., Reed, A. & Andreev, A. 1997:** Status and trends of geese (*Anser* sp., *Branta* sp.) in the world. (Cited in WWF Arctic Bulletin 3/1997, p. 14)
- Markkola, J., Bianki, V. & Zimin, V. 1998:** The Lesser White-fronted Goose (*Anser erythropus*). In Kotiranta, H., Uotila, P. Sulkava, S. & Peltonen, S.-L. (eds.): Red Data Book of East Fennoscandia. – Ministry of the Environment, Finnish Environment Institute & Finnish Museum of Natural History. Helsinki. 351 pp.
- Pessa, J. 1995:** IBA-hanke Pohjois-Pohjanmaalla. (The IBA Project in Northern Ostrobothnia. In Finnish, with English summary) – *Aureola* 20(3–4): 128–142.
- Tucker, G. & Heath, M.F. 1994:** Birds in Europe: their conservation status. – BirdLife Conservation Series no. 3. BirdLife International. Cambridge.

Authors' addresses

– PT: WWF Finland, Lintulahdenkatu 10, FIN-00500 Helsinki, FINLAND, e-mail: tolvanen@sll.fi

– JM: North Ostrobothnia Regional Environment Centre, P.O. Box 124, FIN-90101 Oulu, FINLAND, e-mail: juha.markkola@vyh.fi

– TA & IJØ: Norwegian Ornithological Society (NOF), Seminarplassen 5, N-7060 Klæbu, NORWAY, e-mail: norornis@online.no

Occurrence of Lesser White-fronted Geese in north-east Bulgaria in February 1998

Nikolai Petkov¹, Ingar Jostein Øien² & Tomas Aarvak²

¹ Bulgarian Society for the Protection of Birds (BSPB), P.O. Box 50, BG-1111 Sofia, BULGARIA, e-mail: bspb_hq@main.infotel.bg

² Norwegian Ornithological Society (NOF), Seminarplassen 5, N-7060 Klæbu, NORWAY, e-mail: norornis@online.no

1. Introduction

The Black Sea Coast in Northern Bulgaria is an important wintering ground for arctic geese. White-fronted Geese (*Anser albifrons*) gather in huge numbers, in some years up to 150–200,000 individuals, while Red-breasted Geese (*Branta ruficollis*) may be present with even 80% of the world population (Dereliev 1997). Lesser White-fronted Geese (*A. erythropus*, later LWfG) have been more or less regularly recorded in the country (for an overview of the records in Bulgaria see Aarvak et al. 1997). Most of the records during the last decade are from the Shabla and Durankulak Lake area in north-east coastal Bulgaria, due to the active monitoring conducted in the area by the staff and volunteers of the Bulgarian Society for the Protection of Birds (BSPB). In October 1996 the BSPB and the Norwegian Ornithological Society (NOF) organised a survey for LWfG in various regions of Bulgaria. During this trip the species was recorded along the Danube River in Northwest Bulgaria and in Dobrudzha near the Durankulak Lake (see Aarvak et al. 1997). Even though LWfG may occur in other regions of the country, the area of the two lakes remains the site of greatest goose concentrations in Bulgaria and is thus the most suitable site to look for the species.

In February 1998 the Wetlands International Goose Specialist Group meeting was organised by BSPB in Kavarna, Northern Black Sea Coast. The fact that the event was organised close to the Shabla and Durankulak lakes and because of the peak numbers of geese in the area at that time, it was agreed to conduct a second BSPB-NOF survey for the species in the area. The authors were joined by members of the BSPB Varna branch (Dimitar Georgiev, Stoyan Nikolov and Sergei Dereliev) and WWF Finland (Petteri Tolvanen and Juha Markkola) during parts of the survey.

2. Material, methods and schedule of the survey

The survey team was accommodated in the town of Shabla. For transportation a Lada Niva 4x4WD car was used. For identification of geese, telescopes 80 mm 20–60 X and 60mm 15–45 X were used. The survey was carried out between 10 February and 12 February in the area of Shabla Lake and the crop fields around Shabla – Tulenovo – Kamen Bryag – Kavarna Area. The survey was planned to start from 9 February but bad weather conditions and technical problems with the car postponed field survey by one day. Observations were done mainly when the geese were grazing in the fields, and only on 11 February Lake Shabla was visited in the morning. Prior to the survey the weather conditions were quite harsh and a big snow storm crossed Bulgaria, covering some areas of the country with more than 1.5 m of snow. The weather along the coast was mild compared to the rest of the country. From the start of the survey, the daytime temperature was around 0°C until the last day when it raised to 5–10°C. Most of the time the sky was 90–100% clear. The flocks of White-fronted Geese were concentrated in the Shabla Lake area while Red-breasted Geese were confined to the Durankulak Lake area.

3. Results

During the Goose Specialist Group meeting in Kavarna an excursion to the Shabla and Durankulak lakes was arranged on 9 February. Lake Shabla was visited at about 8:00 a.m., when tens of thousands of White-fronted Geese and Red-breasted Geese were observed when they were taking off from the lake to the grazing fields. Three adult



Photo. A flock of White-fronted Geese taking off at the Lake Shabla in north-eastern Bulgaria. Among this flock, three Lesser White-fronted Geese were identified. © Petteri Tolvanen, Bulgaria, February 1998

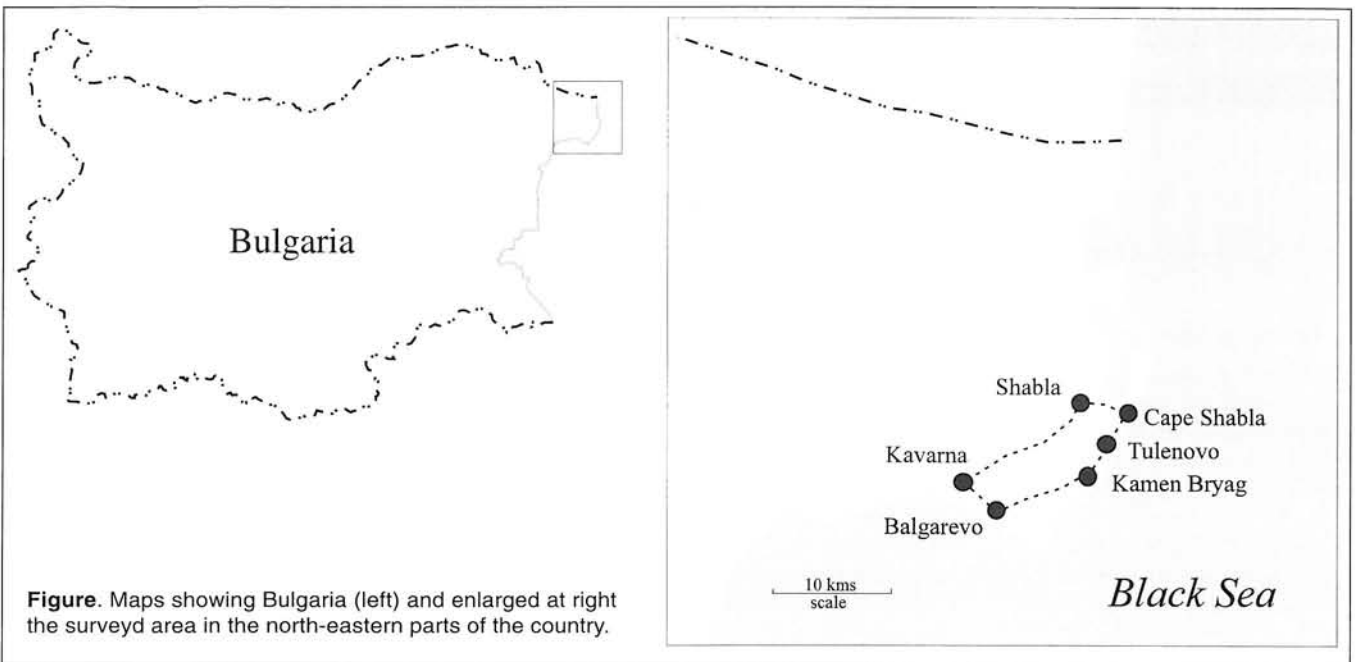


Figure. Maps showing Bulgaria (left) and enlarged at right the survey area in the north-eastern parts of the country.

LWfG was identified in a mixed goose flock. In the afternoon a mixed flock consisting of some tens of thousands of geese was located on an old maize field near the Village Sveti Nikola. One adult LWfG was seen in this flock.

The following day the survey started about 9:30 a.m., when the first big flock (15,000 geese of which 30–40% Red-breasted Geese) was found on a crop field 1–2 km from the village of Tulenovo. About 4,000 geese out of the flock were carefully checked but no LWfG were found. In the crop fields near the Kamen Bryag Village a new flock of 3,000–4,000 geese (50% Red-breasted Geese) was found. By 12:00 a.m., the flock increased to 6,000–7,000 geese due to arrival of smaller flocks. The distance between the geese and observers was eventually only 300 m. One adult LWfG was spotted in this flock and the good light conditions and short distance made it possible to see even the yellow eye-ring. By 1:30 p.m. about 9,000 Red-breasts and another 3,500 White-fronts had joined the flock. A sudden appearance of a raptor scared the geese which alighted for a moment, but most of them soon landed again. Following this regrouping of the flock another two LWfG were found. The haze from the warm air made the observation difficult and after a short break we returned to the same flock at 3:30 p.m. There were about 18,000 geese by that time. The flock was observed until 5:30 p.m., when the geese were scared by a Common Buzzard (*Buteo buteo*), but no other LWfG were found.

On the second day of the survey we visited Shabla Lake at about 8:00 a.m., when several hunters were just leaving the area and had already scared the goose flocks off to the grazing fields. Following this visit we started to search for grazing geese in the fields between the villages of Tulenovo, Kamen Bryag and Kavarna Town. In one of the crop fields we found a flock of 10,000–50,000 White-fronts mixed with some hundreds of Red-breasts. Only 3,000–4,000 geese were checked for LWfG before they suddenly took off. The birds were very alert and difficult to approach because it was a hunting day (Saturday, Sunday and Wednesday are hunting days in January). At about 3:00 p.m., near Tulenovo, a big flock of c. 40,000 geese was found concentrated beside a temporary pond formed by the melted snow in a crop field. About 25% of the birds were Red-breasts. We stayed in the area until dawn at 5:40 p.m. Only 2,000 White-fronts could be checked carefully and one adult LWfG was found among them. Most of the geese remained in this field to roost.

The next day we had to leave for Sofia and could spend only few hours to search for geese. At about 8:00 a.m. we found a flock of 3,000–4,000 geese some kilometres from Shabla Town, but they alighted when only some hundreds of them were identified at species

Table 1. Proportions of LWfG in the goose flocks checked in Dobrudzha in February 1998.

Total flock size	no. of <i>Anser</i> geese checked	no. of LWfG	% LWfG	Age
some tens of 1000s	c. 2,500	3	0.12	
some tens of 1000s	c. 2,000	1	0.05	
10,000-50,000	c. 3,500	0	0	
30,000	2,000	1	0.05	ad
18,000	c. 3,500	3	0.09	
15,000	4,000	0	0	
40,000	2,000	1	0.05	ad
–	2,500	1	0.04	juv

level. At the same time the BSPB Varna participants visited a field in the vicinity of Tulenovo where a big flock was found the day before. About 2,500 White-fronts were checked there and one juvenile LWfG was found among them.

4. Discussion

The low number of LWfG recorded annually in Bulgaria is probably due to the lack of observation effort on grazing geese. The regular monitoring of the wintering geese in the area of the two lakes carried out by the BSPB Varna branch is concentrated on counting numbers. The geese are usually counted at their roosting places in the lakes early in the morning during take-off. Observations and studies are rarely carried out in the grazing fields (except for the Red-breasted Goose). The LWfG seen are mainly spotted by chance. The lack of specific funding and proper vehicles make it difficult to organise regular monitoring of LWfG in the Dobrudzha Area. Due to the two successive surveys in 1996 and 1998, BSPB participants gained significant experience of field identification and monitoring of LWfG, which will facilitate surveying of the species on a more regular base in the future.

As a rule LWfG always occur mixed in the flocks of White-fronted Geese and occasionally with Red-breasted Geese in this area. The occurrence of LWfG in the flocks of White-fronted Geese, which is a common quarry in Bulgaria, addresses the main problem of illegal shooting of the species due to identification problems. The LWfG is officially protected in Bulgaria by the "Law for Protection of Nature" and there is a fine for illegal shooting or capturing of the species. A step forward was the updating of the fines list by the Ministry of Environment and Waters in 1998, and at present the fine that should be paid for any injury done to the species is 500–1000 DEM.

Hopefully the institutions responsible for hunting control will implement the law strictly. Hunters' organisations are every year lobbying to prolong the hunting season till the end of March but there is now hope that the raising of the fines is a signal that the new hunting law will not allow a prolonged hunting season for geese.

The survey proved that the region of Dobrudzha and the Shabla and Durankulak lakes are regular stop-overs or wintering sites for LWfG. During the survey 10 LWfG were seen when c. 22,000 *Anser*-geese were carefully checked (0.045%, cf. Table 1). Extrapolated from the whole number of the White-fronts that were present in the region of the two lakes at that time (c. 150,000–200,000 after Dereliev 1998), we assess c. 100 LWfG to occur in the area.

References

- Aarvak, T., Øien, I. J., Syroechkovski Jr, E. E. & Kostadinova, I. 1997: The Lesser White-fronted Goose Monitoring Programme. Annual Report 1997. – Klæbu, Norwegian Ornithological Society. NOF Rapportserie, Report No. 5-1997.
- Dereliev, S. 1997: Research of the wintering population of the wild geese in the region of Shabla and Durankulak lakes during the period 1996–1997. BSPB. Sofia. Unpublished report.
- Dereliev, S. 1998: Research of the wintering population of the wild geese in the region of Shabla and Durankulak lakes during the period 1997–1998. BSPB. Sofia. Unpublished report.

Awareness campaign for the Lesser White-fronted Goose

Irina Kostadinova¹, Ingar Jostein Øien² & Tomas Aarvak²

¹ Bulgarian Society for the Protection of Birds (BSPB), P.O. Box 50, BG-1111 Sofia, BULGARIA, e-mail: bspb_hq@main.infotel.bg

² Norwegian Ornithological Society (NOF), Seminarplassen 5, N-7060 Klæbu, NORWAY, e-mail: norornis@online.no

1. Introduction

The Lesser White-fronted Goose (*Anser erythropus*, later LWfG) is currently subject to a comprehensive effort to save it from extinction. One basic need is to increase the knowledge and raise awareness on this species' situation among management authorities, and especially among hunters in the countries hosting staging or wintering populations of the species. One way to achieve this is by producing information material on the ecology, occurrence and identification of LWfG, like posters and stickers to be distributed in villages, among groups of hunters and in local/regional administration offices. Raised awareness among hunters, and a shift of the hunting pressure away from the LWfG to a sustainable hunting of the more numerous goose species, e.g. Greylag Goose (*A. anser*) and White-fronted Goose (*A. albifrons*) are the main goals of the campaign.

2. Activities and time schedule

In 1998 the Norwegian Ornithological Society (NOF) and the Bulgarian Society for the Protection of Birds (BSPB) started the preparation work on the production of information material (poster/sticker). The printed material describes the ecology, occurrence and identification of LWfG and will be prepared in the languages of seven key countries where the LWfG is threatened by hunting – Kazakhstan, Azerbaijan, Ukraine, Bulgaria, Hungary, Romania and Russia. A brochure is planned to be produced in 1999. These printed materials will be distributed among hunters and local people in key staging areas. In addition,

Photo. The Bulgarian version of the sticker which will be used in the awareness campaign. © Georgi Pchelarov (painting) / Krasimir Kostadinov (design).

an English version of the information material is made for general information and international promotion of the LWfG conservation work.

The project is composed of three major activities:

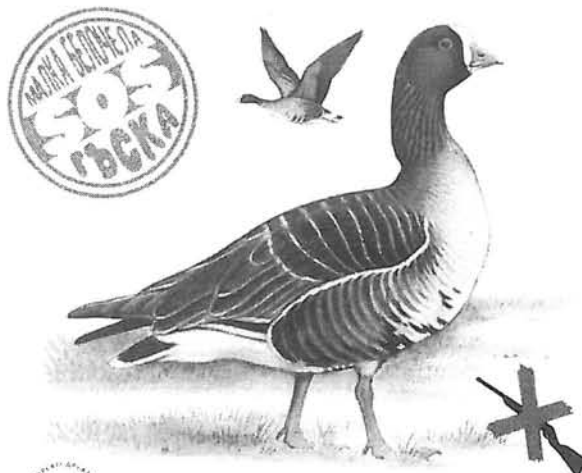
- Preparation of information material.
- Distribution of information material and meeting with authorities.
- Research during the distribution of material. Parallel with the distribution of the information material, research on the distribution, behaviour and area use of LWfG in these areas will be carried out in order to provide basic knowledge to the management authorities for future conservation efforts. Buffer zones around roosting lakes as well as a delayed onset of the hunting in the morning are needed in order to prevent the huge loss of LWfG while leaving the roosting sites.

This will be carried out in close co-operation with national co-operation partners as well as regional and local management authorities in the staging and wintering areas. During 1999 the material will be spread according to the plan.

3. Acknowledgements

BirdLife International partner organisations from Bulgaria (BSPB), Romania (ROS), Ukraine (UTOP), Norway (NOF) and Hungary (MME) as well as the Goose and Swan Study group of Eastern Europe and Central Asia have actively contributed to the preparation of both the poster and the sticker in the different versions. Valuable help has also been provided by the BirdLife International Secretariat, European Division.

СВЕТОВНО ЗАСТРАШЕНИ ВИДОВЕ



1111 София, п.к.50, тел.: 02/72 26 40
9000 Варна, п.к.492, тел.: 052/30 25 26



Surveys for Lesser White-fronted Geese and other geese in the Olonets and Sviricha regions, Western Russia in spring 1998

Petro Pynnönen¹, Sami Timonen² & Toni Eskelin³

¹ Kilonkallio 10 F 52, FIN-02610 Espoo, FINLAND

² Kosteperäkatu 2 B 12 K, FIN-90100 Oulu, FINLAND

³ Tuulihaukantie 1 A 7, FIN-90250 Oulu, FINLAND

1. Introduction

The aim of the study was to search Lesser White-fronted Geese (*Anser erythropus*, later LWfG) and assess the impact of spring hunting to geese. The study area is situated in Russian Karelia, on the eastern side of Lake Ladoga (61° N, 33° E) (Figure 1). The area is known to be an important congregatory area for both subspecies of Bean Geese (*A. f. fabalis* and *A. f. rossicus*) and for White-fronted Geese (*A. albifrons*). The observations of LWfG in the area are scanty (Kellomäki et al. 1997).

In spring 1998, two field surveys were carried out by Finns: 26 April – 5 May by Toni Eskelin, Alekski Lehikoinen, Petro Pynnönen and Sami Timonen and 2–7 May by Heikki Kokkonen, Kirsti Krogerus, Eero Peltonen, Jouni Riihimäki and Pekka Ruokonen.

2. Goose observations

2.1. First survey

Numbers of geese and species composition were surveyed in two field areas, near Olonets town in Karelia and near the Svir Delta in Leningradskii region (oblast) (see Figure 1). The number of geese was c. 12,000 on the fields of Olonets and c. 26,000 on the fields of Svir Delta, Sviricha region. Composition of species was estimated by identifying random samples of flying and roosting geese. The number of geese in the samples was 4,882 (12.85% of all geese). In the samples, 54% of the geese were White-fronted Geese and 46% were Bean Geese. The proportion of Bean Geese on the fields of Olonets was much higher than in the Svir Delta (Table 1). According to the samples, there were 5,800 White-fronted Geese and 6,200 Bean Geese on fields of Olonets and the Svir Delta hosted 17,000 White-fronted Geese and 9,000 Bean Geese.

Other geese observed during the survey were: 1–2 Pink-footed Geese (*A. brachyrhynchus*), 4–7 Greylag Geese (*A. anser*), 1 Canada Goose (*Branta canadensis*), 8–14 Barnacle Geese (*B. leucopsis*) and 2 Red-breasted Geese (*B. ruficollis*). No LWfG were seen.

The most favoured feeding habitats for geese were stubble fields and in some places abandoned fields. Lake Ladoga was still totally frozen during the observation period, and therefore importance of the lake as a roosting area remained unclear. However, at least in the Sviricha region there were direct indications of geese using it for roosting.

Table 1. Goose species composition in the samples in Olonets and Sviricha regions on 26 April – 1 May.

Date	Location	White-fronted Goose (<i>Anser albifrons</i>)		Bean Goose (<i>Anser fabalis</i>)	
		Number	%	Number	%
27 April	Olonets W, feeding	257	51.5	242	48.5
28 April	Olonets W, flying	77	43.0	102	57.0
29 April	Sviricha, feeding	448	74.9	150	25.1
30 April	Sviricha, feeding	425	81.9	94	18.1
30 April	Sviricha, flying	255	39.7	387	60.3
1 May	Olonets N, flying	536	34.6	1014	65.4
1 May	Olonets W, flying	644	72.0	251	28.0
Total	Olonets	1514	48.5	1609	51.5
Total	Sviricha	1128	64.1	631	35.9
Grand Total	Olonets & Sviricha	2642	54.1	2240	45.9

2.2. Second survey

Numbers of geese were counted in Olonets on 3 and 5 May and the Sviricha region was visited on 4 May. The weather was not suitable for field work in the morning of 6 May. Species composition was estimated by identifying as many geese as possible at species level. Numbers of geese had declined drastically compared to the first survey on 26 April – 2 May probably because of very warm weather in the end of April, which might have driven most of the geese northwards. Especially the numbers of Bean Geese were much lower than during the first survey. Most of the Bean Geese were identified to belong to tundra subspecies (*A. f. rossicus*).

On the fields of Olonets, there were c. 1,400 Bean Geese and c. 5,800 White-fronted Geese. In the Svir Delta there were no geese staging, but 1,000 White-fronted Geese were seen migrating inland. Other geese seen during the survey were 1–2 Pink-footed Geese, 1 Greylag Goose, 15–20 Barnacle Geese and one probable White-fronted x Barnacle Goose hybrid. Also during this survey, no LWfG were seen.

3. Hunting in the area

In both areas, spring hunting of geese is allowed on 1–10 May, and hunting is very intensive. For example in this spring in Olonets region, 500 permissions were given to Russian hunters and 70 to Finnish tourist hunters. With one permission a hunter is allowed to shoot two geese, one Capercaillie and 4–6 ducks. Geese are hunted mostly during late evening when they fly to roost to Lake Ladoga. Many injured geese were seen after the hunting had started.

4. Suggestions for future

The regions of Olonets and Sviricha are important staging grounds for both subspecies of Bean Goose and White-fronted Goose. Spring hunting should be stopped in these areas. Hunting in spring is considered generally to be more deleterious than autumn hunting to goose populations because hunting concentrates on breeding adult birds, which are important for maintaining viable populations. The danger of killing spring staging LWfG by accident remains, because some birds have been observed staging in the area (Kellomäki et al. 1998).

According to current knowledge it seems that at the end of April and beginning of May the surveyed areas are not important staging places for LWfG. However, these areas should be surveyed to some extent also in the future in the search of LWfG, because they are vast and some of them poorly known.

References

- Kellomäki, E., Pessa, J. & Ripatti, N. 1997: Spring hunting of geese continues in Western Russia. In Tolvanen, P., Ruokolainen, K., Markkola, J. & Karvonen, R. (eds.). Finnish Lesser White-fronted Goose conservation project. Annual report 1997. – WWF Finland Report No 9: 9–11.

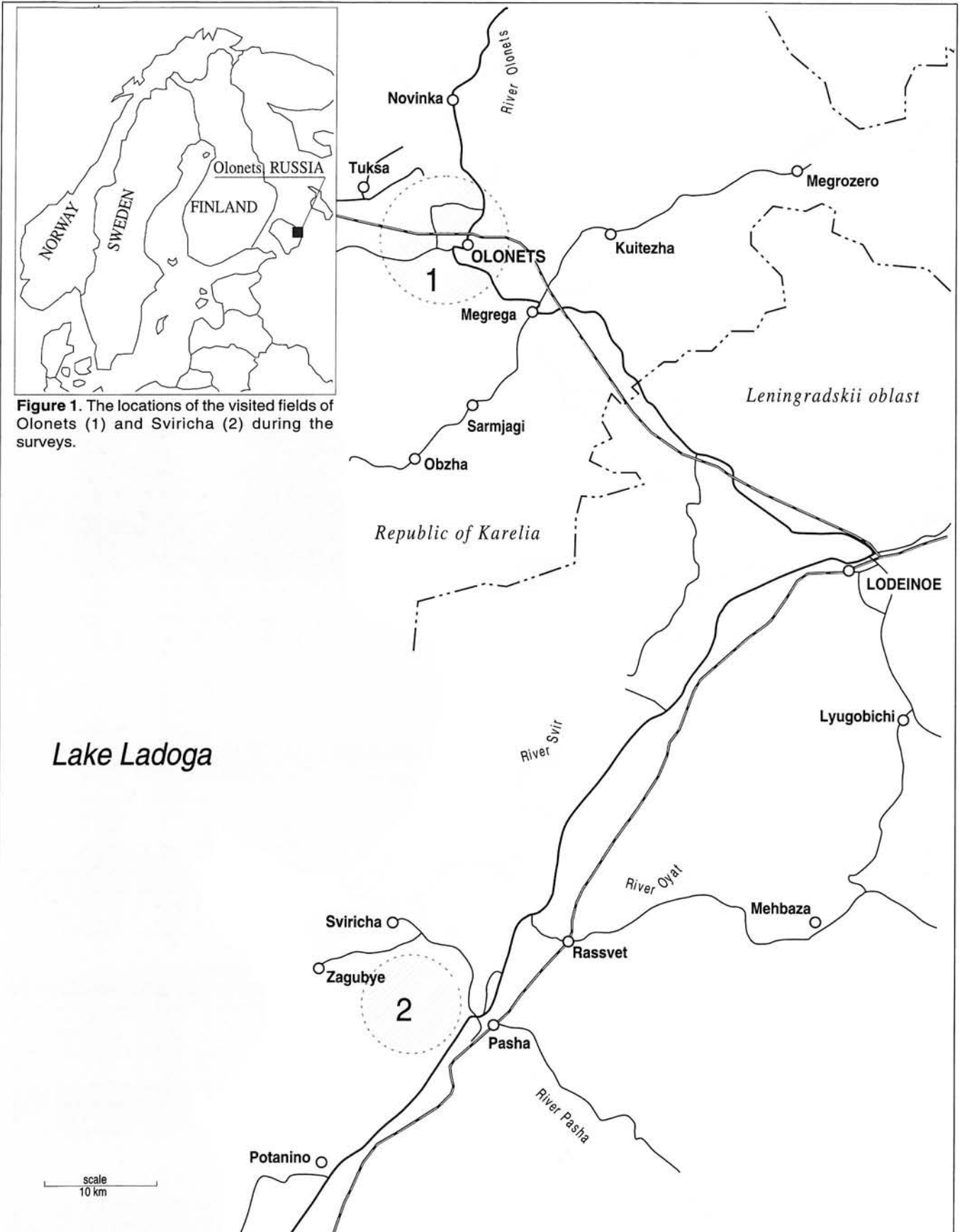


Figure 1. The locations of the visited fields of Olonets (1) and Sviricha (2) during the surveys.

NEXT PAGE, Figure 2. In April 1998, the Finnish LWfG project made this information brochure for the customs on the eastern border of Finland about the spring hunting of geese in Russian Karelia, about the legislation concerning the import of geese hunting bags to Finland, and about the LWfG conservation and identification. In Finland, both Lesser White-fronted Geese and White-fronted Geese are fully protected, and the import of these species without a special permission is forbidden. In the 1990's, Finnish tourist hunters have participated the spring hunting of geese in Russian Karelia. The spring hunting of geese is forbidden in Finland. Photo in the brochure, showing shot adult White-fronted and Lesser White-fronted Geese © Petteri Tolvanen, NW Kazakhstan, October 1996.

Rauhoitettujen lintujen maahantuonti ilman ympäristökeskuksen lupaa kielletty

Suomen luonnonsuojelulaki
45§ Rauhoitettujen lajien kauppa

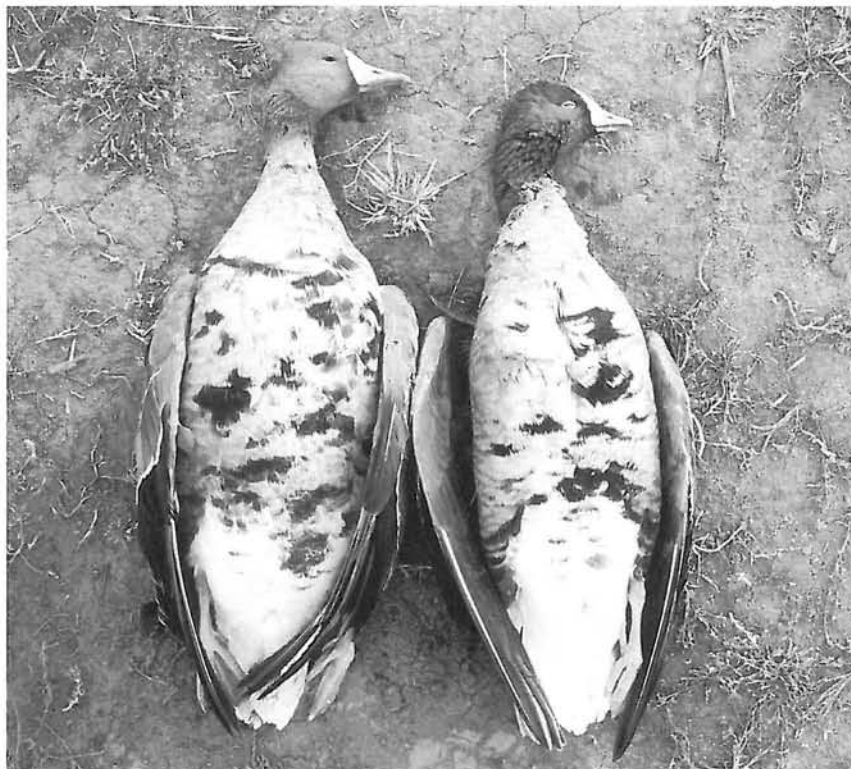
Muihin kuin 44 §:ssä tarkoitettuihin lajeihin kuuluvan rauhoitetun eläin- tai kasvilajin yksilön, sen osan tai johdannaisen maahantuonti, maastavienti, myyminen ja vaihtaminen sekä tarjoaminen myytäväksi tai vaihdettavaksi ilman alueellisen ympäristökeskuksen lupaa on kielletty.

Suomessa rauhoitettuja ovat muut hanhet paitsi kanadan-, meri- ja metsähanhi

Rajanylittäjällä, joka haluaa tuoda maahan Suomessa luonnonsuojelulain nojalla rauhoitetun linnun, on oltava tuontia varten alueellisen ympäristökeskuksen lupa. Ilman kyseistä lupaa maahantuonti on kielletty. Venäjän länsiosissa tavattavista hanhilajeista seuraavat ovat Suomessa rauhoitettuja:

- kiljuhanhi
- tundranhanhi
- lyhytnokkahanhi
- valkoposkihanhi
- sepelhanhi
- punakaulahanhi

Kiljuhanhi ja punakaulahanhi ovat maailmanlaajuisesti uhanalaisia lajeja, jotka on rauhoitettu myös Venäjällä. Suomen luonnonsuojelulain kannalta ei kuitenkaan ole merkitystä sillä, ovatko lajit rauhoitettuja Venäjällä vai eivät.



Tundranhanhi vasemmalla, kiljuhanhi oikealla – huomaa lajien samankaltaisuus! Muista hanhista nämä kaksi lajia erottaa mustien vatsalaikkujen ja valkean otsakilven avulla. Kiljuhanhi puolestaan eroaa tundranhanhesta mm. seuraavien tumtemerkkien perusteella: sillä on keltainen silmä rengas, tummempi pää, pienempi nokka ja sen valkoinen otsakilpi ulottuu ylemmäs otsan päälle. Kumpaakaan lajia ei saa tuoda Suomeen ilman ympäristökeskuksen lupaa!

Riistalajien maahantuonti Venäjältä

Metsästyslain tarkoittamien riistaeläinten maahantuontia koskevat seuraavat säännökset:

Venäjää varten tarvittava tuontilupa maa- ja metsätalousministeriöstä

- Lupaa anotaan kirjallisesti, vapaamuotoinen anomus esim. vesilintujen tuonnille, jossa näkyvät luvan hakijan henkilö- ja yhteystiedot.
- Lupa maksaa 300 mk, ja se on voimassa vuoden, useammallakin rajanylityskerralla.
- Seurueelle saa ryhmäluvan.
- Luvassa ei määritellä sallittua lihamäärää, vaan tulli tulkitsee asian rajatarkastusta koskevan lausuman mukaan (ks. alla).
- Venäjältä saa tuoda Suomeen riistalintujen, jäniksen ja karhun lihaa (riistalintu on tässä yhteydessä sama kuin Suomen metsästyslaissa määritelty riistalintu).
- Tuotaessa nahkoja on muokkaamo, jossa nahat käsitellään mainittava tuontiluvassa. Muokkaamon on oltava eläinjätepäättökseen mukaisesti hyväksytty. Hyväksynnän antaa kunnan tai kaupungin eläinlääkäri.

Rajatarkastusta koskeva seuraava maa- ja metsätalousministeriön päätös:

- Kolmansista maista (mm. Venäjä) saa tuoda ilman eläinlääkärin rajatarkastusta:
 - metsästysretkellä saaliiksi saadun ison riistaeläimen ruhon tai muutaman pienen riistaeläimen ruhot, niiden lihan tai kyseistä lihasta valmistetut lihavalmisteet, jotka on tarkoitettu omaan käyttöön

Lisätietoja:

- Maa- ja metsätalousministeriö
- Anna-Majja Grönlund, puh. (09) 160 2298
- Tarja Lehtonen, puh. (09) 160 2783

Aunuksen kevätmetsästys Uhka Pohjolan kiljuhanhille

Pohjoismaiden uhanalaisin lintu

Kiljuhanhi, joka tämän vuosisadan alkuvuosikymmeniin asti oli Tunturi-Lapin tyyppilajeja, on nykyisin Pohjolan uhanalaisin pesimälintu. Pohjoismainen kanta horjuu sukupuuton partaalla enää noin 30–50 parin voimin. Suomen Lapista ei ole enää kahteen vuoteen löydetty yhtään pesintää. Kuitenkin syksyllä 1997 tavattiin Ruijan Varanginvuonolla kaksi Suomessa kesällä 1995 rengastettua kiljuhanhea, joten "Suomen kantaa" olevia lintuja pesi myös kesällä 1997 jossakin Suomen tai Pohjois-Norjan tunturiseudulla.

Hailuodon ja Liminganlahden laajat rantaniityt Perämerellä ovat Suomen ainoa alue, jossa kiljuhanhia vielä vuosittain tavataan. Alueella on viime vuosina lepäillyt vain noin 30 yksilöä, kun vielä kymmenen vuotta sitten vuosittaiset yksilömäärät hipoivat sataa. 1900-luvun alkuvuosikymmeniä Einar Merikallio arvioi Hailuodon kautta Lappiin muuttavan kiljuhanhikannan olevan 10.000 yksilöä keväällä. Kiljuhanhi oli tuolloin mm. Hailuodossa myös säännöllinen syysvieras, mutta nykyisin niitä nähdään syysmuutolla vain satunnaisesti. Tämä saattaa johtua osittain muuttoreittien muuttumisesta, mutta osasyynä on todistettua myös se, että rajoittamaton vesilintujen metsästys Hailuodon viimeisillä kiljuhanhityillä estää syyslepäilyn. Satunnaisena harhailijana kiljuhanhia voi periaatteessa tavata missä tahansa osassa Suomea.

Kiljuhanhen kohtalo metsästäjien käsissä

Metsästys on viime vuosina tehdyissä laajoissa tutkimuksissa varmistunut tärkeämmäksi – ja yksinäinkin riittäväksi – syyksi siihen, että kiljuhanhi on maailmanlaajuisesti uhanalainen. Keskeisenä tavoitteena kiljuhanhen suojelussa on lajin rauhoittaminen kaikkialla esiintymisalueella. Se ei kuitenkaan vielä riitä. Suurimpia ongelmia kiljuhanhen suojelussa on nimittäin se, että kiljuhan-

hi on erittäin vaikea erottaa varsinkin idempänä hyvin runsaslukuksena esiintyvistä tundranhanhista, joiden parvissa kiljuhanhet Venäjän Karjalassakin useimmin esiintyvät.

Vielä tärkeämpää kuin lajin rauhoittaminen lainsäädännöllisesti on se, että laji itse ja sen uhanalaisuus tunnetaan mahdollisimman laajalti. Siksi erityisesti metsästäjille annettava valistus on yhä tärkeämmällä sijalla kiljuhan suojelutyössä. Tehokkainta kiljuhanhen suojelun kannalta olisi rauhoittaa kokonaan sekä tundra- että kiljuhanhi, kuten Suomessa on tehty. Tämä ei käytännössä koskaan toteutunut suurimmalla osalla esiintymisalueelta, onhan tundranhanhi mm. suuressa osassa Venäjää ja entistä Neuvostoliittoa elintärkeä saalislaji vesilintujen ja hanhien metsästäjille. Silti mm. Itä-Unkarissa tundranhanhi on nykyisin rauhoitettu kiljuhan suojelun vuoksi.

EU tukee kiljuhanhen suojelua

Vuosina 1997–1999 valtaosa Suomessa tehtävästä kiljuhanhityöstä voidaan toteuttaa EU:n Life/Nature-rahaston tukemassa kiljuhanhi-Life-projektissa, jonka osapuolia ovat Metsähallituksen Ylä-Lapin luonnonhoitoalue, WWF Suomen Rahasto, Pohjois-Pohjanmaan, Hämeen, Lapin ja Länsi-Suomen ympäristökeskukset sekä Metsästäjien Keskusjärjestö MKJ.

Vuonna 1983 perustettu Suomen kiljuhanhityöryhmä toimii ympäristöministeriön valtuuttamana asiantuntijana kiljuhanhen suojelutyössä. Sillä on myös vahva edustus kansainvälisessä kiljuhanhityöryhmässä. Viime vuosina kiljuhanhen suojelu on kansainvälistynyt nopeasti.



Julkaisija: Suomen kiljuhanhi-Life-projekti
Suomen kiljuhanhityöryhmä
c/o WWF Suomen rahasto
Lintulahdenkatu 10, 00500 HELSINKI
puh. (09) 774 0100





Photo. A flock of Lesser White-fronted Geese grazing on a field at Haeska (Matsalu, Estonia). When feeding on the fields, the Lesser White-fronted Geese were not very shy and they were easily observed from a car. This differs from the behaviour of Lesser White-fronted Geese at the spring staging areas in the Oulu region in Finland. © Olli-Pekka Pietiläinen, April 1998.

A spring staging area for Lesser White-fronted Geese recovered in Matsalu, Estonia

Petteri Tolvanen

WWF Finland, Lintulahdenkatu 10, FIN-00500 Helsinki, FINLAND, e-mail: tolvanen@sl.fi

1. Introduction

The Matsalu Laht (Matsalu Bay) in Western Estonia is well-known as a very important staging area for many species of waterfowl and waders. The Matsalu Nature Reserve was established in 1957, and since 1975 it has been protected under the Ramsar convention. Until 1998, Matsalu was the only Ramsar site in Estonia, but now 11 more sites have received the international Ramsar status.

In the beginning of this century, the Lesser White-fronted Goose (*Anser erythropus*, later LWfG) was a common breeding bird in northern Fennoscandian mountain regions, and a major migration route (at least in spring) passed via the north-western parts of Estonia (Norderhaug & Norderhaug 1984). The crash of the Fennoscandian LWfG population during the first part of this century surely affected also the numbers of LWfG migrating through Estonia. Until the 1960's, LWfG was a scarce but regular visitor in Estonia during the spring and autumn migration (Leibak et al. 1994). In the years 1957–1967, 346 individuals of LWfG were recorded in the Matsalu Nature Reserve according to Kumari and Jõgi (1972).

2. Observations of LWfG in Estonia in the 1970's–1990's

In the 1970's no confirmed observations were made (Leibak et al. 1994). Since 1985, single individuals and small groups have been observed in Western Estonia mainly in the flocks of Barnacle Geese (*Branta leucopsis*), and three of these LWfG wore Swedish colour rings (Table 1). Thus, it has been thought that all these LWfG seen

in Western Estonia originated from the Swedish reintroduction programme (Leibak et al. 1994). In the 1990's, three autumn observations have been made, including a flock of 44 individuals at Tali-Kaunsaare (Saarde khk.) (khk. = kihelkond, parish in English) in the south-western corner of Estonia.

In the 1990's, after Estonia became an independent state, also Finnish ornithologists have observed very actively in Estonia, and in addition to two observations by M. Leivo already accepted by the rarities committee, two observations of LWfG have been made until 1998 (Pettay 1998).

3. Observations of LWfG at Haeska in the period 1996–1998

During the last three years, several spring observations of (confirmed or probable) LWfG have been made by Finnish observers at Haeska (in the municipality of Ridala), on the northern side of the Matsalu Bay (Figure 1). First, 10 May 1996, Mauri Leivo saw a flock of c. 10–15 probable LWfG roosting on a islet on the Matsalu Bay, c. 2 km south-east of the Haeska birdwatching tower (M.Leivo, pers. comm.). Next year, 21 April, he saw two unringed adult LWfG in the same area, feeding in a mixed flock with White-fronted (*Anser albifrons*) and Greylag Geese (*A. anser*) on the fields along the road north of the birdwatching tower (M.Leivo, pers. comm.). This was the first confirmed observation of a possibly wild LWfG in the Matsalu Nature Reserve for almost 30 years.

In spring 1998, gratifyingly at least 32 LWfG were observed at

Table 1. The following observations of LWfG have been accepted by the Estonian Rarities Committee (RC) (E. Leibak and V. Lilleleht, pers. comm.). Now, LWfG is excluded from the list of RC species and Estonian RC will check only observations made until 1997 (incl.) (V. Lilleleht, pers. comm.).

Date	Observation and observers	Reference
14–15 May 1985	1 ind. with colour rings (Swedish reintroduction project) at Kaevatsi laid, Pühalepa khk., Hiiumaa (A. Leito)	Lilleleht and Leibak (1991)
29 April–4 May 1986	1 ind. with colour rings (Swedish reintroduction project) at Vilsandi, Kihelkonna khk., Saaremaa (A. Leito)	Lilleleht and Leibak (1991)
11 May 1988	2 ind. (a pair) with 12 pairs of Greylags and a pair of Barnacle Geese at Matsalu, Karuse khk., Läänemaa (V. Paakspuu)	Lilleleht and Leibak (1991)
11 May 1988	1 ind. flying with a Greylag Goose at Keemu, Karuse khk., Läänemaa (V. Paakspuu)	Lilleleht and Leibak (1991)
14–15 April 1990	4 ind. with Bean, White-fronted and Greylag Geese near Penijõe, Lihula – Kirbla khk., Läänemaa (V. Paakspuu, T. Paakspuu)	Pehlak and Lilleleht (1998)
21 April 1990	2 ind. Kloostri, Kirbla khk., Läänemaa (Valdur Paakspuu)	Pehlak and Talivee (1997)
28 April 1990	1 ad. with colour rings (Swedish reintroduction project) at Liustemäe, Karuse khk., Läänemaa (A. Leito)	Pehlak and Lilleleht (1998)
17–21 Sept. 1990	1 ind. at Ilmatsalu fish pond with Mute Swans, Tartu-Maarja khk., Tartumaa (E. Tammur, U. Sellis, A. Leito, A. Kietzer)	V. Lilleleht, in litt.
23 May 1996	1 ad migrating NE in a flock of Barnacle Geese at Osmussaar, Noarootsi khk., Läänemaa (M. Leivo)	Pettay (1998)
21 April 1997	2 ad with White-fronts and Barnacle Geese at Haeska, Martna khk., Läänemaa (M. Leivo)	Pettay (1998)
20 May 1997	1 ind. with 1500 Barnacle Geese at Toomalõuka, Salme khk., Saaremaa (L. Luigujõe, R. Kuresoo etc.)	Pehlak and Lilleleht (1998)
11 October 1997	44 ind. with 3000 White-fronts at Tali-Kaunsaare, Saarde khk., Pärnumaa (E. Vilbaste, K. Kübar)	V. Lilleleht, in litt.
12 October 1997	9 ind. with 3000 White-fronts at Pihke, Saarde khk., Pärnumaa (E. Vilbaste, K. Kübar, A. Sakala) – Possibly same individuals as in 11 October at Tali-Kaunsaare.	V. Lilleleht, in litt.
16 May 1996	1 adult at Karala, Lümanda, Saaremaa (J. Lehtinen, J. Valkeeniemi)	V. Lilleleht, in litt.
24 May 1997	1 adult migrating N at Kabli, Häädemeeste, Pärnumaa (J. Lehtinen, J. Valkeeniemi)	V. Lilleleht, in litt.

Haeska during the period 26 April – 15 May (Table 2). The first ones (at least 21, but possibly up to c. 30 ind.) were found by a group of Finnish birders nearby the birdwatching tower of Haeska. They were feeding on the Haeska coastal meadow mixed with a flock of 300 White-fronts. On the following day, 27 April, there showed up to be at least 31 ind., now 29 of them were in a pure flock with only one White-front. In the morning of 27 April they were feeding on a field along the road to the birdwatching tower, and all of them were checked by telescopes: none of the geese had leg rings or neck collars.

At 1 May, a new adult colour-ringed LWfG, paired with (a possibly) new unringed adult, arrived flying and joined a flock of 8 unringed ind. (H. Vilppula, pers. comm.). The code of the colour-ring was read by telescope, and this LWfG showed up to be one of the LWfG that were ringed and tagged with satellite transmitters in the breeding areas in Norway in 1995 (see Aarvak et al. 1995, Lorentsen et al. 1998). Later in May 1998, this same bird revealed a formerly unconfirmed migration route from Haeska to Hailuoto and further to Valdak Marshes (see another article in this report, pp. 27–30). In 11 May, still at least 12 individuals remained in the area, and the last observation was 15 May.

The observers paid only little attention on the ageing of the LWfG, and the age structure of the population staging at Haeska in spring 1998 remains unsolved. At least most of the 31 individuals seemed to be adults on 27 April, but a few of them had only weak belly markings (O.-P. Pietiläinen, pers. comm.).

4. LWfG biotopes and their conservation at Haeska

All the sites of LWfG observations shown in Table 2 and Figure 1, except the fields at Oonga, are included in the Matsalu Nature Reserve. On several occasions LWfG have been seen taking off and flying northwards from the coastal meadows of Haeska, and thus it seems obvious that LWfG also use other adjacent field areas, at least a part of them outside the Matsalu Reserve. More surveys are needed to localise the most important feeding places.

In most cases, LWfG was observed at the coastal meadows of Haeska. Here, they seem to utilise a relatively restricted area, mainly south-east and east of the birdwatching tower. Most of the time, the LWfG have been seen on the low-growth coastal meadows, but occasionally they have been observed grazing in the marginal parts of the reedbeds (M. Bruun, pers. comm.), i.e. in places with restricted visibility. This is not typical for LWfG in other similar staging areas, and could indicate that this is a staging place which is safe from hunters.

The coastal meadows of Haeska are included in the highest

priority class in the management plan of the coastal meadows of the Matsalu Nature Reserve, and the meadows have been managed by grazing ever since they have lifted up from the sea (Leibak & Lutsar 1996). Nowadays, the grazing on the meadows is much less intensive than in former times, and two-three times more intensive grazing would be needed to prevent the over-growing. According to Leibak and Lutsar (1996), some 53,000 EEK (c. 3900 USD) would be needed annually for the management.

At the field sites along the road to Haeska, LWfG have been observed feeding both in separate flocks and in mixed in flocks with other goose species. Here, the LWfG have been observed also very near roads and settlements, and they have been relatively confiding even to humans; this might be another indication of a traditionally safe staging place for geese. It is not yet known, what crop species are cultivated on the most important feeding fields.

At night, the LWfG seem to roost on the small islets on the Matsalu Bay south and south-east of the birdwatching tower. For example in the evening of 26 April, 1998, the LWfG flock moved c. 3 km south-east of the coastal meadow and landed on a sand bank on the Matsalu Bay (O.-P. Pietiläinen, pers. comm.).

5. Discussion

According to the recent observations, it is probable that the Haeska area, including the coastal meadows, the islets on the Matsalu Bay and the adjacent cultivated field areas, is an important spring stop-over of the Fennoscandian LWfG population. It is possible that the real number of LWfG staging at Haeska in April–May 1998 was even considerably higher than 32 individuals, because the individuals were not identified by the belly patches (for method, see Øien et al. 1996). For example at the Valdak Marshes in spring 1997, the highest daily count was 32 individuals, but based on the individual belly markings, a total of 59 different individuals was estimated (Aarvak et al. 1997).

More research is still needed to confirm, that the birds staging at Haeska are from the same part of the Fennoscandian population that annually stage on the coast of the Bothnian Bay (Hailuoto–Siikajoki–Lumijoki–Liminka) in mid-May. The timing of the peak numbers at Haeska in spring 1998, however, is evidently pointing towards that – and for one colour-ringed LWfG the migration route via Haeska and Hailuoto to Porsanger Fjord is already confirmed. For the same reasons, in addition to the fact that none of the LWfG at Haeska wore Swedish colour-rings, these birds are obviously of wild origin.

In the international Action Plan for LWfG (Madsen 1996), Estonia is not even mentioned as a country where the Action Plan should be implemented. Clearly, Estonia should be included in the



Photo. The coastal meadows south-east of the Haeska birdwatching tower: the site of most of the Lesser White-fronted Goose observations in spring 1998. © Hannu Kettunen, May 1998.

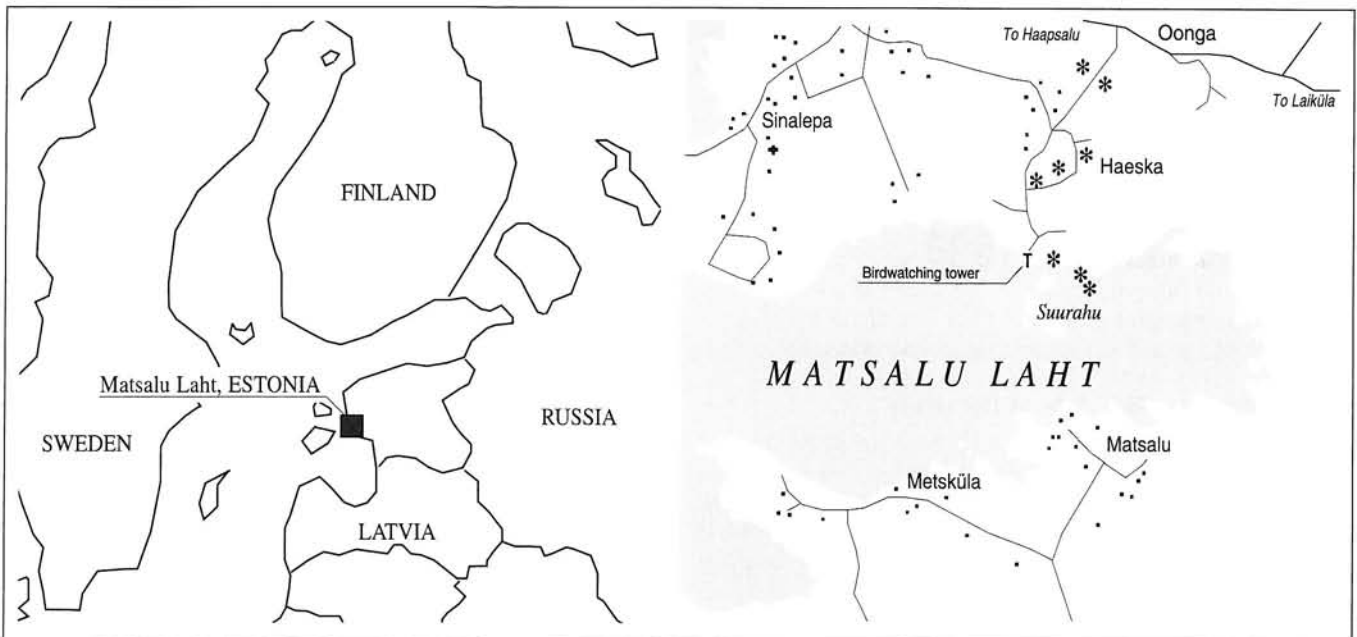


Figure 1. Map of the LWfG observation sites at Haeska in spring 1998 (marked with *).

Table 2. Observations of LWfG at Haeska (Ridala, Estonia) in spring 1998. Abbreviations of the observers: E. Ilvonen (EI), H. Kettunen (HK), S. Knuutila (SK), T. Pettay (TP), O-P. Pietiläinen (OPP), J. Normaja (JN), M. Rekilä (MR), J. Seppälä (JS), I. Teräspuro (IT), E. Veijalainen (EV), H. Viilppula (HV).

Date	Place and habitat	No. of ind.	Comments	Observers
26 April	Coastal meadow, c. 500 m E of the birdwatching tower	21	Possibly even 30 individuals	SK, OPP, JS, EV
27 April	Fields c. 2 km N of the birdwatching tower; later moved c. 500 m E to another field	31	29 in a single flock with 1 White-front, Another flock of 2 LWfG nearby	SK, OPP, JS, EV
1 May	Coastal meadow, c. 1 km ESE of the birdwatching tower	10	Including 1 colour-ringed ad	HV
2 May	Coastal meadow, c. 1 km ESE of the birdwatching tower	31	In a single flock; flocks of 23+2+4 ind. seen by another observer (probably the same birds)	MR, IT, HV
3 May	c. 1 km SE of the birdwatching tower	2	Adults, swimming with Barnacle Geese	MR, IT
9 May	Fields along the Haapsalu–Laiküla road at Oonga, c. 6 km NE of the birdwatching tower, outside the Matsalu Reserve	2	At least 2 ind. in a mixed flock of White-fronts, Greylag and Bean Geese (<i>A. fabalis</i>); probable LWfG were also seen flying N along the road to Haeska	TP etc.
11 May	Islet c. 1 km SE of the birdwatching tower	12	Groups of 1+2+2 individuals flying N–NE (towards the fields), a group of 7 ind. roosting on the islet	HK etc.
15 May	Coastal meadow, c. 500 m E of the birdwatching tower	1	In a mixed flock of White-fronts and Barnacle Geese	JN, EI

next review of the Action Plan, and annual (at least spring) population monitoring in Matsalu should be given high priority.

6. Acknowledgements

Detailed information of the field observations was received from Mika Bruun, Hannu Kettunen, Seppo Knuuttila, Mauri Leivo, Jyrki Normaja, Olli-Pekka Pietiläinen, Timo Pettay, Matti Rekilä and Hannu Vilppula. Sami Timonen collected the main part of the 1998 observations by arranging an inquiry in the Finnish birdnet. Special thanks to Erik Leibak, Vilju Lilleleht, Timo Pettay and Aune Veersalu for helping to find Estonian literature. Mauri Leivo, Timo Pettay and Vilju Lilleleht made helpful comments on the manuscript and Pekka Paaer helped in the translation of some Estonian texts.

References

Aarvak, T., Øien, I.J., Lorentsen, S.-H. & Brøseth, H. 1995: The Lesser White-fronted Goose monitoring programme. Annual Report 1995. – Klæbu, Norwegian Ornithological Society. NOF Rapportserie. Report No. 4–1995.

Kumari, E. & Jõgi, A. 1972: Passage of Geese through the Baltic area. – In: Kumari, E. (ed.) 1972: Gusi v SSSR : trudy mezvedomstvennogo sovescanija, Estonija, maj 1970 g. (Geese in the USSR : proceedings of a conference, Estonia, May 1970). (in Russian, with English summaries) – Tartu. 179 pp.

Leibak, E. & Lutsar, L. 1996: Eesti ranna- ja luhaniiud. Estonian coastal and floodplain meadows. – Estonian Fund for Nature and WWF Denmark. Kirjameeste Kirjastus, Tallinn. 247 pp.

Leibak, E., Lilleleht, V. & Veromann, H. (eds.) 1994: Birds of Estonia. – Estonian Academy Publishers, Tallinn. 288 pp.

Lilleleht, V. & Leibak, E. 1991: Rarities in Estonia till 1989 (in Estonian). – *Hirundo* 9:11–26.

Lorentsen, S.-H., Øien, I.J., Aarvak, T. 1998: Migration of Fennoscandian Lesser White-fronted Goose *Anser erythropus* mapped by satellite telemetry. – *Biological Conservation* 84:47–52.

Madsen, J. (compiler) 1996: International action plan for the Lesser White-fronted Goose (*Anser erythropus*). – In: Heredia, B., Rose, L. & Painter, M. (ed.) 1996: Globally threatened birds in Europe. Action plans. Pp. 67–78. Council of Europe Publishing, BirdLife International.

Norderhaug, A. & Norderhaug, M. 1984: Status of the Lesser White-fronted Goose, *Anser erythropus*, in Fennoscandia. – *Swedish Wildlife Res.* 13: 171–185.

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.

Pehlak, H. & Lilleleht, V. 1998: Haruldased linnud Lääne-Eestis. Rare birds in the West-Estonia. – *Linnurada* 1/1998: 26–33.

Pehlak, H. & Talivee, U. 1997: Haruldased linnud Lääne-Eestis. Rare birds in the West-Estonia. – *Linnurada* 1/1997: 36–44.

Pettay, T. (ed.) 1998: Lintuhavaintoja Virosta 1990–1997. (Bird observations in Estonia, 1990–1997. In Finnish.) – Viron Lintuseura – Estonian Birding Society ry, Helsinki.

The spring migration of the Lesser White-fronted Goose at Bothnian Bay in 1998

Sami Timonen

Kosteperäkatu 2 B 12 K, FIN-90100 Oulu, FINLAND

1. Introduction and aims of the study

The Bothnian Bay coast has traditionally been the most important place for staging Lesser White-fronted Geese (*Anser erythropus*, later LWfG) during spring migration in Finland. When the drastic decline in the populations of the LWfG occurred just before and after World War II and deepened further in the 1960's, the Bothnian Bay coastline remained as the core spring migration staging area. The maximum number of migrants at the turn of the 1970's and 80's was estimated at 100–150 individuals (Markkola et al. 1998), and in the 1990's numbers decreased to 30–70 individuals. Autumn migrants have disappeared almost completely, which is thought to be due mainly to the intensification of hunting.

The LWfG project of WWF Finland has monitored the numbers of LWfG at the Bothnian Bay staging area since 1985. Apart from numbers of geese, additional data concerning behaviour, diet selection and age distribution has been obtained. Three separate study sites have been monitored since 1985 and a fourth site was monitored for the first time in 1997 and again this year. The year 1998 was the fourth consecutive year when the LWfG working group tried to catch migrating geese for colour-ringing and satellite tagging.

This article summarises the main results of LWfG monitoring in spring 1998 in the Bothnian Bay.

2. Study area

In 1998 the LWfG monitoring was concentrated in four main survey areas: Tömpä coastal meadow in the municipality of Hailuoto, Säärenperä coastal meadow in the municipality of Siikajoki, Sannanlahti–Pitkänokka area on the coast of the Bay of Liminganlahti and the isle of Kraaseli in the municipality of Haukipudas (see

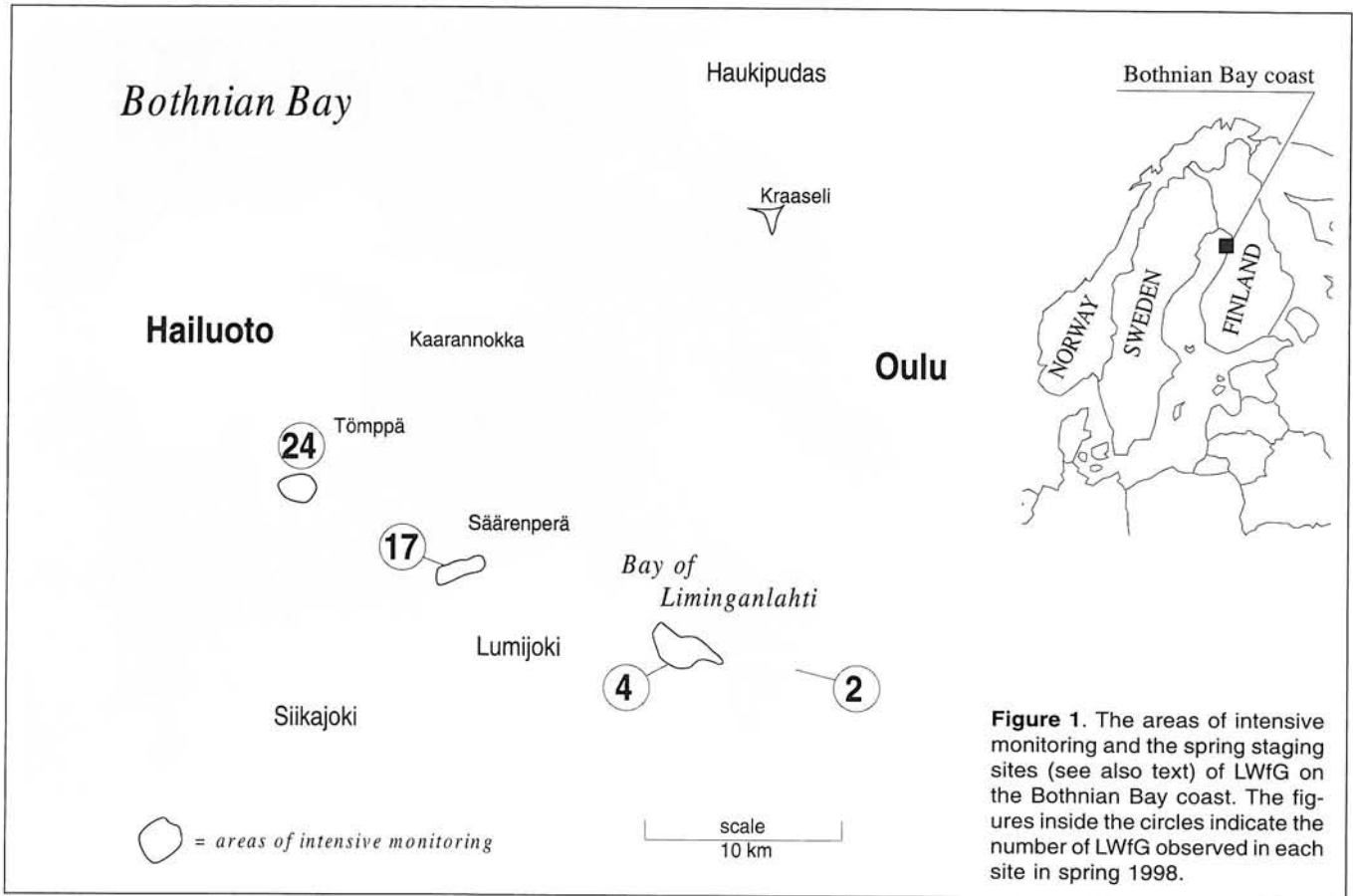
Figure 1).

Säärenperä and Tömpä are situated quite near to each other (approx. 10 km apart), so the geese can easily switch their foraging places between these two areas. Tömpä meadow is the largest area, approx. 1 km², Säärenperä meadows cover about 30 hectares whilst the meadow areas of Pitkänokka and Kraaseli are a bit smaller in area than Säärenperä. A more detailed description of the study areas is found in Markkola et al. (1997). In addition, there have been several observations of LWfG in most years from the bird observatory of Tauvo in the municipality of Siikajoki. In 1998 the observatory had a regular observation period on 17–31 May.

All the four staging areas belong to Natura 2000 conservation area network which was agreed by the Finnish government in the autumn 1998. Human disturbance in these areas is quite low during the spring LWfG migration period. In recent years all the sites except Kraaseli have been managed by mowing and grazing to prevent them from becoming overgrown by reeds, bushes and grasses. These measures have benefited LWfG by maintaining and creating more favourable meadow habitat with short vegetation.

3. Methods – hide observation and walk counts

The continuous observation of the geese from hides was conducted only at the most important staging site, Tömpä meadows in Hailuoto. Also in Säärenperä, hides were used for eight days after it was noticed that LWfG started to stage continuously in the largest meadow. The distance between the birds and the observation point in Tömpä varied at the beginning of observation period from 100 metres to one kilometre but in the end geese approached the hide to within 30–60 metres. This made it possible to identify individual



birds (by looking at leg rings and/or belly patterns). In Säärenperä the observation distance was less than 100 metres, also enabling individual recognition reasonably well.

At the Bay of Liminganlahti, in Säärenperä and on Kraaseli, the meadows were checked by walking around each site twice a day, great care being taken to try and avoid disturbance to the geese.

Altogether 14 persons participated in the observation work. Daily censuses were conducted in Tömppä (4–20 May), Säärenperä (5–20 May) and at the Bay of Liminganlahti (6–20 May), whereas on Kraaseli there were only eight observation days (11–15 May and 18–20 May). The observation period ended 1–2 days after the last day that LWfG were seen in the area (20 May).

The observation data gathered included numbers of adult pairs, broods and age distribution. The movements of geese were observed with the accuracy of one minute. When birds were at close distance, the belly patches were drawn or photographed for individual recognition. The behaviour of the geese was investigated quantitatively by grouping behavioural acts into different behavioural categories and by employing time-budgets.

4. Catching attempts

In Tömppä catching attempts have so far been unsuccessful. The aim of catching is to tag geese with satellite transmitters so that they may reveal new potential breeding or moulting sites in Finnish or Norwegian Lapland.

Three cannon nets were placed in position on 4 May. The sizes of the nets were the same as in previous years i.e. 3,200, 2,000 and 400 m². Unfortunately no geese were caught as they were foraging too far from the nets. On 14 May the smallest cannon net was moved to the mainland and positioned on Säärenperä meadow. However, the LWfG flock present prior to this did not land on the meadow after the net was put in place. It seems probable that the birds were aware of the net and scared of the site.

5. Weather conditions

The weather was quite warm at the beginning of May with spring

proceeding quickly. Later the weather became colder and the average temperature of May (6.2 °C) was 1.3 °C below the 30-year average. The snow-melt on the meadow areas and shore waters was however about normal. The prevailing winds during the migration period were from a southerly or south-easterly direction.

6. Number of LWfG in different observation sites

The daily numbers and the total sum of LWfG in different observation sites are shown in Table 1. Also the number of goosedays and the cumulative sum of individuals is shown.

6.1. Tömppä

The best place was expectedly the Tömppä meadow on the island of Hailuoto. A minimum sum of 24 LWfG staged here on 8–19 May. The peak migration occurred on 15–17 May when the daily counts were 11–13 birds. After the peak the birds left the area very abruptly. Only two individuals were 2nd calendar-year birds.

The most interesting observation was a colour-ringed individual found in Tömppä on 11 May. The bird was ringed and satellite tagged during moult on 27 July in 1995 in the core breeding area in Finnmark, Norway. The bird left Tömppä meadow on 17 May at 7:00 a.m. and 12 hours later it was located at the Valdak Marshes in Northern Norway. The average speed of migration was approx. 50 kilometres per hour (for more details of its history, see pp. 27–30 in this report).

6.2. Säärenperä

For the first time since 1988, LWfG were resting and foraging for several days in good numbers on the meadow area in Säärenperä. LWfG were present here from 10–17 May. The peak migration time was 1–2 days earlier than on Hailuoto, but the abrupt disappearance was similarly observed at this site.

The total sum of geese in Säärenperä was 17 individuals. Three birds out of 13 properly observed individuals were 2nd calendar-year birds. Based on the investigation of belly patches most birds

Table 1. The daily numbers of Lesser White-fronted Geese in 1998 in three main observation sites and the cumulative sum of different individuals seen in these places. The final cumulative sum of different individuals per place are shown in the last column. On the last line is presented the daily sum of LWfG seen altogether in these observation points.

Area / date of	May 5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	Total	
Hailuoto, Tömpä																									
Daily number	-	-	-	5	-	9	5	5	4	4	11	12	12	8	6	-	-	-	-	-	-	-	-	-	-
Cumulative sum	-	-	-	5	-	9	9	9	12	15	22	24	24	24	24	-	-	-	-	-	-	-	-	-	24 individuals
Siikajoki, Säärenperä																									
Daily number	-	-	-	-	-	2	2	2	9	13	15	10	11	-	-	-	-	-	-	-	-	-	-	-	-
Cumulative sum	-	-	-	-	-	2	4	6	9	13	15	15	17	-	-	-	-	-	-	-	-	-	-	-	17 individuals
Bay of Liminganlahti																									
Daily number	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	4	-	-	4	4	-	
Cumulative sum	-	-	-	-	-	-	-	2	2	2	2	2	2	2	2	2	2	2	6	6	6	6	6	6	6 individuals
Daily sum of all places	-	-	-	5	-	11	7	7	13	17	26	22	23	8	6	-	-	-	4	-	-	4	4	-	

were different individuals from those on Hailuoto.

6.3. Liminganlahti and Kraaseli

During the regular observation period no LWfG were confirmed in Sannanlahti–Pitkänokka area at the Bay of Liminganlahti. On 12 May two adult LWfG were seen in Temmesjokisuu flying towards Lumijoki. After the regular observation period there were four adult LWfG at the Bay of Liminganlahti, from where they left 27 May. The total sum of the Bay of Liminganlahti was six LWfG. On the isle of Kraaseli and from Tauvo Bird Observatory no LWfG were observed.

6.4. Additional observations

The first LWfG individual in spring 1998 was seen in Parhalahti, in the municipality of Pyhäjoki on 22 April in migration flight. After Pyhäjoki it was seen again in Sannanlahti, in the municipality of Lumijoki, 60 km north of Pyhäjoki. The average flight speed of this individual was approx. 65 kilometres per hour.

7. Timing of migration and numbers

The total sum of migrating LWfG in spring 1998 was about 45 birds. This is the highest count since 1994. The interpretation of the variation of the numbers from different years in the 1990's is ambiguous. The relatively high number of birds in spring 1998 could in part be due to prevailing south-easterly winds during the observation period. This could have resulted in more geese from the larger Norwegian subpopulation migrating via Hailuoto. There has not been any previous confirmed observations of individuals between Valda Marshes (Norway) and Bothnian Bay. On the other hand, no serious attempts to compare individuals have been made until this year. Of the 11 pairs studied, seven were observed both in Finland and Norway this spring (see also pp. 27–30 in this report).

Could the rise in numbers be due to successful breeding and/or decreased mortality of LWfG? The exceptional high numbers of LWfG were recorded this spring also in the Valda Marshes. In this year the minimum number of young birds at Bothnian Bay was only five individuals (11 % of the total sum of LWfG). The proportion of young birds at Valda was about the same as in Bothnian Bay: five individuals, which represents 9.5% of the total sum. The gosling production of the last year (see Aarvak & Øien 1999, pp. 22–27 in this report) does not explain the increase, because the rise in numbers is due to adult birds. The 'new' birds must be recruits from previous years (1995 and 1996 were good gosling years in the Norwegian subpopulation according to data from Valda; cf. Aarvak & Øien 1999, pp. 22–27 in this report). The coming years will show what is the real trend in numbers of staging LWfG.

The length of the migration period, 20 days, was the longest in the history of the monitoring (undertaken since 1985). The 'migration period' was lengthened by the late flock of five birds at the Bay of Liminganlahti five days after all other birds had already left. The average staying time of an individual was 3.4 days. The peak

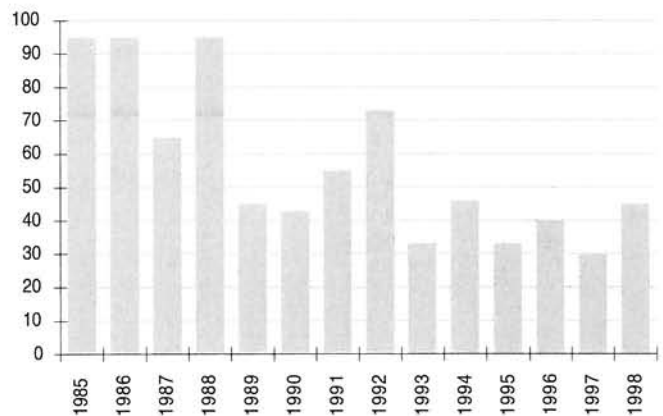


Figure 2. Total number of LWfG in 1985–1998 in the Bothnian Bay spring staging areas.

migration count was on 15–17 May when 20–26 birds were present at Säärenperä and on Hailuoto.

8. Future work in the Bothnian Bay area

The monitoring of the LWfG should be continued at least in Tömpä and Säärenperä with the same established survey effort. The interplay with traditionally known and recently found Estonian staging sites should be investigated in more detail. For this the individual comparison of staging geese between different staging sites in all three countries (Finland, Norway and Estonia) should be assessed. The individual recognition of birds should be as precise as possible. To aid this video equipment is going to be used in Bothnian Bay next spring. In Norway this technique was used in 1998 (see Aarvak & Øien 1999, pp. 22–27 in this report).

References

- Aarvak, T. & Øien, I. J. 1999: Monitoring and catching of staging Lesser White-fronted Geese at the Valda Marshes in 1998. In Tolvanen, P., Øien, I. J. & Ruokolainen, K. (eds.): Fennoscandian Lesser White-fronted Goose conservation project. Annual report 1998. – WWF Finland Report 10 & Norwegian Ornithological Society, NOF Rapportserie Report no. 1-1999: 22–27.
- Markkola, J., Bianki, V. & Zimin, V. 1998: Anser erythropus. In Kotiranta, H., Uotila, P., Sulkava, S. & Peltonen, S.-L. (eds.) 1998: Red Data Book of East Fennoscandia. – Ministry of the Environment, Finnish Environment Institute & Finnish Museum of Natural History. Helsinki.
- Markkola, J., Ohtonen, A. & Karvonen, R. 1997: Spring staging areas of the Lesser White-fronted Goose *Anser erythropus* on Bothnian Bay coast: features of spring migration in 1997. In Tolvanen, P., Ruokolainen, K., Markkola, J. & Karvonen, R. (eds.): Finnish Lesser White-fronted Goose conservation project. Annual report 1997. – WWF Finland Report No 9: 24–26.



The management plan for the coastal Meadows of Säärenperä

Photo. Four Lesser White-fronted Geese in the Säärenperä Meadow in spring 1998. © Ari Lehtinen, May 1998

The management plan for Säärenperä area in the municipality of Siikajoki has been under preparation during the year 1998. Säärenperä is situated on the land upheaval coast c. 50 km SW of the town of Oulu (see Figure 1 on page 19). Its topography is very flat and low-lying. Extensive sea-shore meadows, willow thickets and deciduous forests form the central elements of the scenery. The open sea-shore with its meadows and mudflats is 600–1,300 m wide.

The aim of the plan is to secure valuable nature types and species of the area. Coastal meadows, natural forests as a part of primary succession series and wooded pastures are nature types which need special care and protection and are included in directives of the EU. Typical dominant species of vegetation belts at Säärenperä are *Eleocharis uniglumis*, *Agrostis stolonifera*, *Carex mackenziei*, *Juncus gerardii*, *Calamagrostis stricta*, *Festuca rubra* and *Agrostis gigantea*. In 1998 five threatened plant species which are of special conservation concern were found at Säärenperä: *Alisma wahlenbergii*, *Ranunculus confervoides*, *Primula nutans*, *Stellaria crassifolia* and *Ranunculus reptabundus*.

The most common breeding wader and wildfowl species in the Säärenperä area are Redshank (*Tringa totanus*), Lapwing (*Vanellus vanellus*), Curlew (*Numenius arquata*), Shoveler (*Anas clypeata*), Red-Breasted Merganser (*Mergus serrator*), Arctic Tern (*Sterna paradisaea*), Common Tern (*Sterna hirundo*) and Common Gull (*Larus canus*). The most common passerine species are Sedge Warbler (*Acrocephalus schoenobaenus*), Reed Bunting (*Emberiza schoeniclus*) and Willow Warbler (*Phylloscopus trochilus*). The most 'valuable' breeding bird species of conservation concern are the endangered 'southern' Dunlin (*Calidris alpina* ssp. *schinzii*) (1 pair) and Black-Tailed Godwit (*Limosa limosa*) (2 pairs). Other rare breeders in the area or in the adjacent forests include Little (Dendrocopos minor) and Three-toed Woodpecker (*Picoides tridactylus*) and Red-Backed Shrike (*Lanius collurio*).

Säärenperä's importance as a congregatory and migration staging area is very important. Under the BirdLife International's Important Bird Area-criteria Säärenperä is an internationally important area for Whooper Swans (*Cygnus cygnus*) (maximum counts over 500 individuals in spring) and Goosander (*Mergus merganser*). Säärenperä is an European-wide important staging area for Whooper Swan, Bean Goose (*Anser fabalis*), Teal (*Anas crecca*), Pintail (*Anas acuta*) and Goosander.

The most endangered bird species occurring in the area is Lesser White-fronted Goose (*Anser erythropus*, later LWfG). The recommendations for the management of Säärenperä area with a special reference to LWfG are as follows:

1) Secure continuous management of the meadows mainly by grazing to prevent overgrowing of vegetation. The same measures benefit also Dunlin, Black-Tailed Godwit and many other wader species.

2) Implement a general prohibition of human activities in the most regularly used staging meadow area during LWfG spring migration period (c. 5–25 May). The prohibition is also useful for research and monitoring of migrating LWfG population. Before breeding it is important for staging LWfG to improve their fat storages for egg production. LWfG is an extremely shy species, so even small disturbance could be harmful.

3) Implement a general hunting ban and establish sufficiently large hunting free zones. During previous decades autumn staging of LWfG has been a common phenomenon on Bothnian Bay coast. Nowadays staging individuals in autumn are extremely rare. It is quite clear that the main reason is very high hunting pressure in the favoured staging sites.

At Säärenperä the traditional way to utilize coastal meadows and other grasslands until 1950's and 1960's was haymaking. Nowadays, there are two large sea shore pastures in the area and their total area is c. 100 hectares. Maintenance of pastures have been financed by supplementary protection scheme support.

The new recommended biotope management measures in the area include:

a) clearing of the shrubs and trees excluding *Hippophae rhamnoides* and *Myrica gale*.

b) restoring the ditches to original condition. Ditches are harmful to water balance and they increase over growing.

c) establish new haymaking areas which are grazed in late summer. This prevents in some extent damages the moving cattle creates to breeding birds.

Fishing and hunting, bird-watching, recreation and education are all resolved under the demands of endangered species. The final management plan is going to be agreed in co-operation between regional environmental officers and local land owners.

Sami Timonen & Marika Niemelä

Monitoring and catching of staging Lesser White-fronted Geese at the Valdak Marshes in 1998

Tomas Aarvak & Ingar Jostein Øien

Norwegian Ornithological Society (NOF), Seminarplassen 5, N-7060 Klæbu, NORWAY, e-mail: norornis@online.no

1. Introduction

Several staging areas for Lesser White-fronted Geese (*Anser erythropus*, later LWfG) existed in Norway until the 1950's, but at present only two areas seem 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 Fiord in Western Finnmark (Figure 1), and the other, Skjåholmen, which was rediscovered as a staging area in 1994, is situated in the Varangerfjord in Eastern Finnmark. Both places are utilised as the last staging areas before the onset of breeding and as the first staging area after the moulting period. These two staging areas support geese from two separate breeding areas. The LWfG utilising Valdak breed in Western and Central Finnmark, while the LWfG which utilise Skjåholmen and the surrounding coastal areas in the Varangerfjord breed in Eastern Finnmark and Northern Finland (Lorentsen et al. 1999, own data).

The Fennoscandian LWfG project run by WWF Finland and NOF has monitored the two staging areas annually since 1995 (Skjåholmen) and 1990 (Valdak) respectively. This article gives a summary of the activities of NOF's Lesser White-fronted Goose Monitoring Programme which was carried out at the Valdak Marshes in Norway during the period May–September 1998. For results of the monitoring at Skjåholmen see Ruokolainen et al. (1999, pp. 31–35 in this report).

2. Study area

The Valdak Marshes (70°09' N, 24°54' E) is a part of the Stabbursnes Nature Reserve, which is a Ramsar site and a BirdLife International Important Bird Area (Norwegian IBA 010, Grimmet & Jones 1989).

The Valdak Marshes is one of the largest salt and brackish

marshes in Northern Norway. The innermost parts of these marshes consist of peat bogs and birch forest (Figure 1). The salt marshes comprises several arctic plant communities. The arctic grass *Puccinellia phryganodes* dominates the salt-marsh vegetation and Valdak has probably the largest population of this species in Norway (Elven & Johansen 1982). The area has a typical zoning with *Puccinellia phryganodes* closest to the seashore. This zone is followed by a taller species *Carex subspathacea*, and further inwards *Carex hirta* and *Festuca rubra*. The outermost parts of the marshes are scattered with small ponds and pools of brackish water, and the vegetation is also here in clear zones with *Hippurietum tetraphylla* in the outermost pools, followed by *Carex mackenziei* and *Potamogeton filiformis*. In the Valdak Bay, the zoning is influenced by an inflow of fresh water from the Valdak Brook, which alter the community somewhat, with a higher density of *Eleocharis uniglumis* close to the seashore. Right outside the Valdak Marshes, the Porsangen Fiord uncover huge intertidal flats.

During spring staging the LWfG feed almost exclusively on *Puccinellia phryganodes*. However, in very late springs this species is covered with ice and snow when the first pairs of LWfG arrive. The only available food is then *Hippurietum tetraphylla* which hardly has started to grow in the melt ponds. As the snow and ice melts and protracts from the salt marsh, the LWfG continues to feed on *Hippuris tetraphylla* until a sudden shift back to *Puccinellia phryganodes* can be observed in late May – early June. In autumn the LWfG feed on a variety of plant species; early in the staging period mostly on *Festuca rubra*, but later on they also utilise *Puccinellia phryganodes*, *Eleocharis uniglumis*, *Agrostis stolonifera*, *Juncus gerardi* and *Elymus arenarius* (Aarvak et al. 1996).

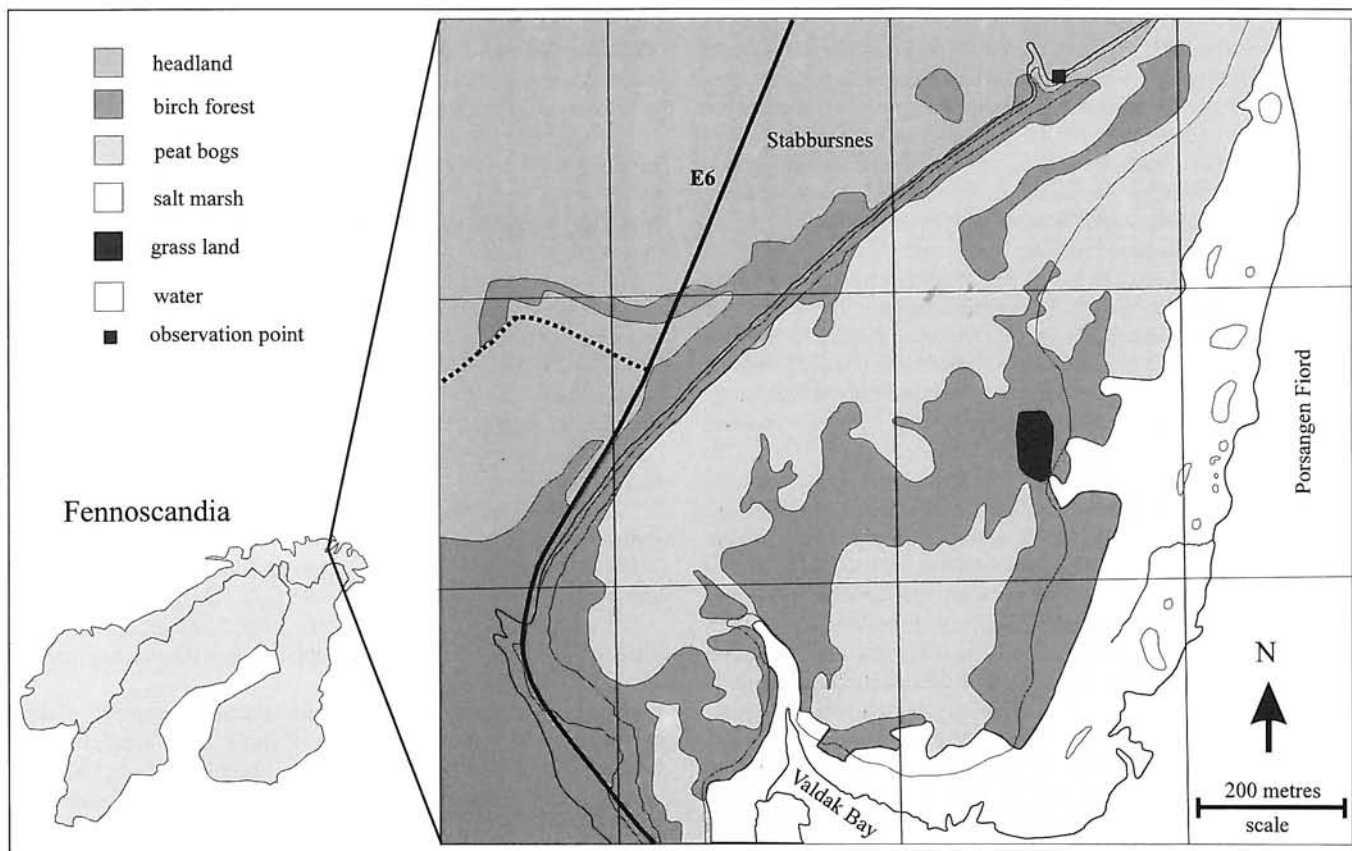


Figure 1. Map of the Valdak Marshes in Northern Norway.

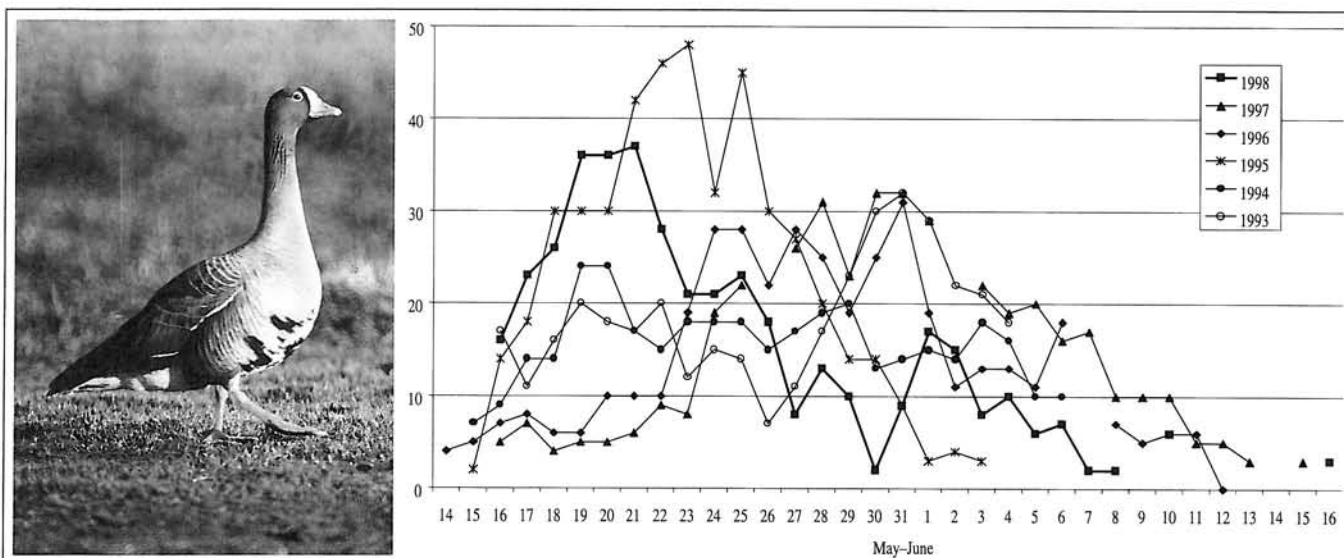


Figure 2. Maximum daily numbers of Lesser White-fronted Geese observed at the Valdak Marshes during spring staging in 1993–1998. **Photo.** An adult male Lesser White-fronted Goose at the Valdak Marshes. © Ingar Jostein Øien, May 1995

Table 1. Numbers of Lesser White-fronted Geese at the Valdak Marshes in springs 1993–1998. The table shows the max. numbers at the best day, distribution of adult pairs, subadult pairs, single subadults and immatures and total number of individuals each spring.

Year	Max on one day	no. of ad pairs	no. of subad pairs	no. of imm	no. of single subad	% imm./single subad	Total no. of ind.
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
1998	37	33	5	5	3	9.5 %	84

3. Methods

Stabbursnes is a headland made up of glacialfluvial depositions, and constitutes a natural watching point with a height of approx. 25 metres above the wet mires and the salt marshes of Valdak. During the studies, we were sitting close to the edge of the headland, just beneath the rim, to ensure that our silhouettes could not be seen from beneath. Under such circumstances, we can easily study the foraging birds from a distance of 250–500 metres without any disturbance to the birds by a telescope (20–60 x magnification).

In 1998 we developed a new method, by utilising a video-camera (Sony Handycam) to film the geese through the telescope. This method increased the possibilities for accurate individual identification and age determination of the staging geese significantly (for further details see Aarvak et al. 1999, pp. 27–30 in this report). Using this method we are able to distinguish subadult pairs from adult pairs, and to more securely separate single subadults from immatures. Subadults are here birds in their third calendar-year, while immatures are in their second calendar-year (see Øien et al. 1999 for details on ageing).

The aim of the spring monitoring (14 May – 8 June) was to follow the progress of migration and to assess the total number of staging LWfG in the area. As in former years the individuals were identified by the individual uniqueness of their belly patches. A thorough description of the method is given by Øien et al. (1996). We monitored the number of staging individuals and staging time for the pairs (turnover rates). In addition, we registered daily activity of individuals and flocks, food preferences, tolerance of disturbance, habitat use, flying activity and migratory movements.

During autumn (20 August – 3 September) emphasis was put on carrying out counts of families and social groups in order to obtain estimates on brood size, productivity and proportion of juveniles in the population. Also during the autumn staging the flocks and individual pairs with goslings were recorded by video camera.

Table 2. Overview of mean staging time of pairs of Lesser White-fronted Geese at the Valdak Marshes in springs 1993–1998 estimated by the belly patch method (see Øien et al. 1996).

Year	1993	1994	1995	1996	1997	1998
Mean	5.6	6.9	7.4	8.4	6.6	5.7
no. of pairs	28	19	23	22	19	32

Since 1995, a number of LWfG has been caught both in Norway, Finland and Russia to map the migration routes by use of satellite telemetry. Some individuals have also been colour ringed, which has added further knowledge to the results obtained by the satellite telemetry (see Aarvak et al. 1999, pp. 27–30 in this report). In 1998 we wanted to catch more geese for colour-ringing. A cannon net sized of 300 m² was mounted at the marshes on 18 May. During the autumn monitoring another catching attempt was carried out with the help from WWF Finland LWfG group. Totally four nets covering an area of 6070 m² were mounted.

4. Results

4.1. Spring staging

The first LWfG arrived during midday and afternoon in small flocks on 15 May (totally 16 individuals). Thereafter the numbers increased, reaching a peak of 37 individuals on 21 May. Then the numbers started to decline quite fast as in 1995 (Figure 2). One pair was still present at the end of the monitoring period on 8 June. Three pairs and three single individuals were observed as late as on 10 and 16 June respectively (T. Morset, pers. comm.). Totally 33 adult pairs, 5 subadult pairs (third calendar-year), three single subadults and 5 immatures (second calendar-year) were registered (Table 1). The number of immatures/single subadults was at the same level as the immatures in the years 1993–1997. This is based on the assumption that we are able to determine the age correctly (see Øien et al. 1999). In earlier years, the subadult pairs have not been separated from the adult pairs. For maximum daily numbers of LWfG and the total numbers estimated from identification of belly patches in the same period cf. Figure 3.

In 1998 the mean staging period for the adult LWfG pairs was 5.7 days, when the pairs already present at the arrival of the field workers and those still remaining at the departure were omitted (Table 2). We have not tested for differences between years since we cannot recognise the pairs from one year to another. Thus, we do not know how their staging time change between years, resulting in an auto-correlation between years which probably would influence the result. We have data for more than one year only for one individual LWfG. This is a male which was caught and colour-ringed (col-



Photo. A pair of Lesser White-fronted Geese feeding on *Puccinellia phryganodes* grass. © Ingar Jostein Øien, Valdak Marshes, May 1995

Table 3. Autumn age ratio and annual brood sizes of Lesser White-fronted Geese in the years 1981, 1987, 1992 and 1994–1998, based on counts during autumn migration at the Valdak Marshes (see also Table 5 for distribution of broods and number of pairs with broods).

Year	n ad	n juv	n total	% juv	n flocks	Mean brood ¹	Mean brood ²	Mean brood ³
1981	10	18	28	64.3	1		3.6	
1987	10	18	28	64.3	1		3.6	
1992	24	34	58	58.6	?		2.8	
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
1998	29	31	60	51.6	1–3	2.8	2.4	0.9

¹ Counts of pairs with broods in autumn.

² Number of juveniles divided by number of adult pairs in autumn.

³ Number of juveniles in autumn divided by number of pairs in spring.

* Assumed that the observations are from three independent flocks.

our ring code red-black-yellow) during moult in Finnmark in 1995, and which also staged at Valdak in 1998. It was paired with an unringed female, and they staged at Valdak for ten days, in the period 17–26 May (see Aarvak et al. 1999, pp. 27–30 in this report). In 1997 and 1996 this male staged in the area 6 and 10 days respectively (see Aarvak et al. 1996, 1997).

4.2. Autumn staging

The year 1998 was the fourth consecutive year of continuous monitoring during the LWfG autumn staging period at the Valdak Marshes. A total of 60 individuals staged there during a period of at least two weeks (see Table 3 and 4). The first LWfG were heard at 8:00 p.m. on 17 August. The last observation was at 3:05 a.m. on 2 September, when 20–40 LWfG left the area.

Also in previous years all autumn observations are from the period 17 August to 10 September (1981–1996, see Table 4). This yields a range of 25 days. However, continuous observation effort

Table 4. Overview of the autumn staging period at the Valdak Marshes in the years 1981, 1987, 1992 and 1994–1998 (all observations from the period 17 August to 10 September).

Year	Observation dates (extremes)		Occasional	Time span in days
	First	Last		
1981			17 Aug	(1)
1987			20 Aug	(1)
1992	18 Aug	20 Aug		(3)
1994	17 Aug	10 Sep		25
1995	19 Aug	06 Sep		19
1996	22 Aug	05 Sep		15
1997	20 Aug	03 Sep		15
1998	17 Aug	02 Sep		17

has been limited to the period from 20 August to the first few days of September in the years 1995 to 1998, and we expect that the actual staging period could start earlier and in some years it might end later than stated in the table.

The LWfG mostly utilise the area during late evening, night and early morning. They only rarely stay at the marshes during daytime. As experienced in the years 1995–1997 the LWfG behave quite differently compared with the spring staging period, spending more time being alert and showing a restless behaviour. The absence of the LWfG during daytime could partly be caused by disturbance from local people picking cloudberry *Rubus chamaemorus*. As a result, the geese spend the daytime on the adjacent small islands in the innermost part of the Porsangen Fjord.

The LWfG have also been observed at the islets Kråkolman at the boundary of Stabbursnes Nature Reserve (in 1996) and the northwest point of the peninsula Oldereidnesset (in 1997).

4.3. Breeding success

A total of 29 adults and 31 (52%) juveniles were registered during the autumn monitoring period. Eleven pairs brought goslings, yielding a mean brood size of 2.8 (Table 3 and 5). On the Skjåholmen Island, only three pairs with young were seen, having a mean brood

Table 5. Distribution of brood sizes (post-moult) at the staging areas of Valdak Marshes (VM) in 1994–1998 and Skjåholmen Island (SI) in 1995–1998 and in the breeding grounds in 1994 and 1995. No data exists from the breeding areas in Norway in 1996 and 1997 (see also Table 3).

Year/Area	Brood allocation						Mean size	SD	no. of broods
	1	2	3	4	5	6			
1994									
Breeding area	3	1	1				2.00	1.41	5
Staging area VM		1	2	4			*2.43	0.79	7
1995									
Breeding area	1	1	3	1	2		3.25	1.39	8
Staging area SI		2					2.0	0	2
Staging area VM		4	3	2	6	2	3.94	1.43	17
1996									
Staging area SI					1		5.0	–	1
Staging area VM		1	3	4	1		2.56	0.88	9
1997									
Staging area SI		2	1				2.33	0.58	3
Staging area VM			2	1		5	4.00	1.41	8
1998									
Staging area SI			3				2.0	0	3
Staging area VM		2	4	2	1	1	2.82	1.60	11

*One flock of 32 individuals (16 goslings) has been omitted, because the distribution of brood sizes is unknown (see also Table 3).

size of 2.0 (see Ruokolainen et al. 1999, pp. 31–35 in this report).

Also present at Valdak during autumn was a male with colour ring code Green-White, caught on 29 May (see section 4.4.). During autumn it was together with a female and the pair had produced one gosling.

Breeding success is monitored during the post breeding period at the Valdak Marshes, which represents the first staging area before the onset of autumn migration. The observations of brood sizes may explain the variation in the breeding success between years. Mean brood size observed at the Valdak Marshes in the years 1994–1998 is as high as 3.3 (sd=1.4, n=52), although it varies significantly between years (Aarvak et al. 1997). It is thus probable that the production is generally high, when based only on the individuals seen on post moult.

Estimates on brood size can be derived in different ways. Probably the best estimate is based on number of juveniles compared to the number of pairs observed (potential breeders) in the pre-breeding period (Mean brood³, cf. Table 3) (Aarvak et al. 1997), which yields an estimate for 1998 of 0.9 goslings per potential breeding pair. The estimated 0.9 goslings fledged per potential breeding pair yield a ratio of 27.0% juveniles in the autumn/winter population based on the number of juveniles produced during summer in relation to all birds present at Valdak the previous spring. For the years 1994, 1995, 1996 and 1997 the corresponding proportions are 37.1%, 52.8%, 29.1% and 35.2% respectively, while the mean for all years is 36.2% (sd=10.2).

Many studies on arctic breeding geese like Barnacle Goose (*Branta leucopsis*), Brent Goose (*B. bernicla*), White-fronted Goose (*Anser albifrons*) and Tundra Bean Goose (*A. 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 proportion of juveniles 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).

Table 6. Biometrics of the Lesser White-fronted Geese caught at the Valdak Marshes in 1998. Length measurements are given in millimetres. Only one value is given for tarsus and wing lengths, irrespective of right or left. All colour rings are read from the top; b=black, g=green, y=yellow, w=white, ¹=right leg and ²=left leg.

Data	Bird 1	Bird 2	Bird 3
Ring number	CA18543	CA18544	CA18545
Colour ring code	y-w ¹	y-b ¹	g-w ²
Sex	M	F	M
Age	adult	adult	adult
Wing length	361	354	412
Tarsus length	64.7	63.4	67.8
Weight (grams)	1600	1450	2075
Bill	34.14	30.48	34.92
Head + bill	86.80	84.83	89.90
White blaze length	28.57	32.46	34.21
Catching date	29 May	29 May	29 May

4.4. Catching

In order to optimise the location of the net, three days were spent observing the staging geese before one cannon-net was mounted at the marshes. On 29 May the cannons were fired at 2:30 p.m., when two pairs were inside the catching zone of the net. Unfortunately one female escaped before the net landed, but the three others were successfully caught. Colour and metal rings were attached and the geese were released at 5:00 p.m. Subsequently, the net was mounted again and the marshes were left at 6:00 p.m. Results of the ringing and biometric data are given in Table 6. No further catching attempts were carried out, and the net was dismantled on 7 June.

In the autumn the nets were mounted on 23 August. One shot was fired on 31 August, but three of the cannons did not work properly. No geese were caught, and the nets were dismantled on 2 September.

5. Discussion

We have previously shown that the spring population numbers utilising the Valdak Marshes decreased by 5% annually in the period 1992–1996/7, as estimated by Monte Carlo Simulation (Øien et al. 1996, Aarvak et al. 1997). In 1998 the number of adult pairs was the highest recorded since the monitoring started in 1990. We registered seven more adult pairs than in 1997, which represent an increase of 27%. We believe that this increase is related to the very high production in 1995, when the estimated production per potential breeding pair was as high as 2.7 (about twice the number of goslings produced compared with the four other years of autumn monitoring).



Photo. Lesser White-fronted Geese caught by cannon net at the Valdak Marshes. © Ingar Jostein Øien, May 1997

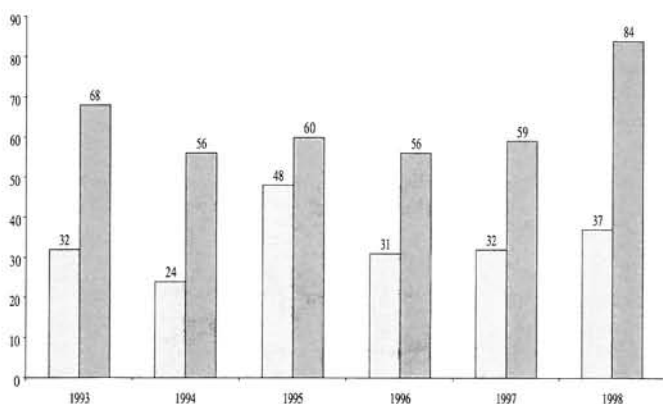


Figure 3. Maximum daily numbers of Lesser White-fronted Geese (light bars) and total numbers estimated from identification of belly patches at the Valdak Marshes in the years 1993–1998.

When we add the subadult pairs observed in 1998, which in previous years would have been defined as adult pairs, the increase in potential breeding pairs from 1997 to 1998 is as high as 46%.

The number of juveniles registered during autumn 1998 was normal compared to the other years, as only 33% of the adult pairs present during spring having successfully produced goslings (29% if we include the subadult pairs).

Aarvak et al. (1997) reported an annual mortality rate of 78.2% (sd=9.9) for the immatures and 16.5% for the adults. These quite crude estimates of mortality reveal that the mortality of adults in general is relatively high, whereas the mortality of immatures is very high. Ebbinge (1991) estimates and describes a decrease in mortality rates for several goose species wintering in Western Europe after regulations and ban of hunting occurred during the 1970's. He reports mortality rates of 25% to 31% in the period before the regulations, and 9–27% afterwards, while 5–6% represents the annual rate of natural mortality for these species. The decrease in mortality rates facilitated the recovery of all goose populations traditionally wintering in Western Europe. The high mortality rates found for the LWfG are probably directly related to the high hunting pressure along the migration routes and in the wintering areas. The number of ringed geese are small, and until autumn 1998, totally 21 adults and 6 juvenile LWfG have been caught in the moulting and staging areas in Finland and Norway. The 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 an immature mortality rate of 50% based on reported kills (Lahti & Markkola 1995, Aarvak & Øien 1995, own data). 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 too low estimate. Ebbinge (1991) describes estimated non-return rates of rings as high as 75–80%, for White-fronted Geese in The Netherlands. Of the adults, two have been reported shot, one in north-western Russia (Lorentsen et al. 1998) and one in Dagestan (Øien et al. 1999, pp. 37–41 in this report).

Schmutz et al. (1997) conducted a sensitivity analysis on Emperor Geese (*Anser canagicus*) breeding in Alaska. This population experienced a huge decline sometime between the mid-1960's and mid-1980's, and has been low since then. To promote recovery of this arctic breeding population, managers needed to know how perturbations of survival and / or reproduction would affect the population. They found that the variation in adult survival rates consistently had the highest relative effects on population growth, whereas variation in parameters related to reproductive success had the lowest. These results generally agreed with other recent studies on comparatively long living waterfowl species: Harlequin Duck (*Histrionicus histrionicus*) and Snow Goose (*Anser caerulescens*).

Also the Black Brant (*B. bernicla nigricans*) population in Alaska has experienced a huge decline. Ward et al. (1997) estimated mean monthly survival of Black Brant adults from resightings of leg-ringed

birds, and found the lowest monthly survival rate during late spring migration (15 April – 1 May), the period of greatest subsistence harvest on the breeding grounds, while they found the highest rates during winter. They concluded that subsistence harvest during spring migration is likely to be the most important factor affecting the population size.

Studies conducted on the Fennoscandian breeding LWfG population indicate that the mortality rate is very high for the immatures during their first winter. The mortality rate of adults is also high compared with other goose species wintering in Western Europe. Measures to lower the mortality should be implemented. The sensitivity analysis of Schmutz et al. (1997) on the Emperor Goose could probably be transferred to the situation for the LWfG population. A reduction of the mortality rate of adults, especially during spring, could have a greater impact on the population development than any other fixed effort.

7. Acknowledgements

Many persons 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 Stabburnes Naturhus og Museum for various help and good co-operation. We are further indebted to Lieutenant Colonel Lyng, Captain Svenningsen and Lieutenant Olsen 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. Kjetil Solbakken assisted in the field during the autumn staging period, and Morten Ekker provided valuable help both during the development of the video/telescope technique as well as during the catching. From Finland Jouko Alhainen, Heikki Holmström, Matti Koistinen, Joska Laine, Ari Leinonen, Pirjo Leppäniemi, Juha Markkola, Petteri Markkola, Kristiina Niittyvuopio, Jarmo Pääläinen, Petteri Polojärvi, Minna Ruokonen and David Showler contributed during the autumn monitoring period. The funders of this work is acknowledged in the introduction chapter.

8. References

- Aarvak, T. & Øien, I. J. 1995: Ringing recovery of Lesser White-fronted Goose *Anser erythropus* from Southern Russia. (In Norwegian with English summary). – *Vår Fuglefauna* 18:112–113.
- Aarvak, T., Øien, I. J. & Nagy, S. 1996: The Lesser White-fronted Goose monitoring programme. Annual report 1996. Klæbu, Norwegian Ornithological Society. NOF Rapportserie. Report No. 7-1996.
- Aarvak, T., Øien I. J., Syroechkovski Jr., E. E. & Kostadinova, I. 1997: The Lesser White-fronted Goose monitoring programme. Annual Report 1997. Klæbu, Norwegian Ornithological Society. NOF Rapportserie. Report No. 5-1997.
- Ebbinge, B. S. 1989: A multifactorial explanation for variation in the breeding performance of Brent Geese *Branta bernicla*. – *Ibis* 131:196–204.
- Ebbinge, B. S. 1991: The impact of hunting on mortality rates and spatial distribution of geese, wintering in the Western Palearctic. – *Ardea* 79:197–209.
- Elven, R. & Johansen, V. 1982: Seashore in Finnmark. Flora, vegetation and botanical protection values. Institute of biology and geology, University of Tromsø, report T-541 (In Norwegian with English summary).
- Fox, A. D. & Gitay, H. 1989: Breeding success in Greenland Barnacle Geese *Branta leucopsis* wintering on Islay, Scotland. – *Ardea* 79:359–364.
- Grimmet, R. F. A. & Jones, T. A. 1989: Important bird areas in Europe. International Council for Bird Preservation, Techn. Publ. No. 9., Cambridge, U.K.

- Lahti, K. & Markkola, J. 1995:** Ringing recovery of a Finnish Lesser White-fronted Goose from the Russian areas. – IWRB Goose Research Group Bulletin, No. 6:27–28.
- Lorentsen, S.-H., Øien, I. J., Aarvak, T. 1998:** Migration of Fennoscandian Lesser White-fronted Goose *Anser erythropus* mapped by satellite telemetry. – *Biological Conservation* 84:47–52.
- Lorentsen, S.-H., Øien, I. J., Aarvak, T., von Essen, L., Farago, S., Markkola, J., Morozov, V., Syroechkovski Jr., E. E. & Tolvanen, P. 1999:** Lesser White-fronted Goose *Anser erythropus*. In: Madsen, J., Fox, T. & Cracknell, J. (eds.): Review of goose populations wintering in the Western Palearctic. – Wetlands International, Cambridge, UK. In press.
- Schmutz, J. A., Rockwell, R. F. & Petersen, M. R. 1997:** Relative effects of survival and reproduction on the population dynamics of emperor geese. – *Journal of Wildlife Management* 61:191–201.
- 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 norvegica*, Series C, Cinclus 19:69–76.
- Øien, I. J., Tolvanen, P., Aarvak, T., Litvin, K. E. & Markkola, J. 1999:** Surveys and catching of Lesser White-fronted Geese at Taimyr Peninsula 1998 – preliminary results on autumn migration routes mapped by means of satellite telemetry. In: Tolvanen, P., Øien, I.J. & Ruokolainen, K. (eds.): Fennoscandian Lesser White-fronted Goose conservation project. Annual report 1998. – WWF Finland Report 10 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-1999: 37–41.
- Øien, I. J., Tolvanen, P., Aarvak, T. & Markkola, J. 1999:** Occurrence and identification of Lesser White-fronted Goose in flocks of White-fronted Goose. – *Alula* 1/1999. In press.
- Ward, D. H., Rexstad, E. A., Sedinger, J. S., Lindberg, M. S. & Dawe, N. K. 1997:** Seasonal and annual survival of adult Pacific Brant. – *Journal of Wildlife Management* 61:773–781.

Two pieces of the spring migration puzzle of the Fennoscandian Lesser White-fronted Goose population in place

Tomas Aarvak¹, Ingar Jostein Øien¹, Petteri Tolvanen² & Juha Markkola³

¹ Norwegian Ornithological Society (NOF), Seminarplassen 5, N-7060 Klæbu, NORWAY, e-mail: norornis@online.no

² WWF Finland, Lintulahdenkatu 10, FIN-00500 Helsinki, FINLAND, e-mail: tolvanen@sl.fi

³ North Ostrobothnia Regional Environment Centre, P.O. Box 124, FIN-90101 Oulu, FINLAND, e-mail: juha.markkola@vyh.fi

1. Introduction

Until the last few years very little has been known about numbers and distribution of the Lesser White-fronted Goose (*Anser erythropus*, later LWfG). Based on the work conducted in Fennoscandia by using satellite transmitters (see Lorentsen et al. 1998), a picture of the migration routes and stopover sites has started to emerge. The autumn migration route has been described by Lorentsen et al. (1998) (see also Øien et al. 1999, pp. 37–41 in this report), but very little is known about the spring migration routes.

Norderhaug and Norderhaug (1984) summarised the spring migration pattern in Fennoscandia (Figure 1), while Nankinov (1992) gave a more general description for the whole distribution range, divided in different populations and migratory flyways. The latter erroneously wrote that the Fennoscandian population mainly winters in Western Europe. This was based on information on vagrant individuals or smaller flocks of LWfG in flocks of other species. Norderhaug and Norderhaug (1984) concluded that the LWfG arrive to the Finnish south coast after crossing the Gulf of Finland, then follow the west coast northwards, pass the gulf of Bothnia (Oulu Region) in the first half of May, and continue further along the Torne River and Muoniojoki River. They agreed also with Hortling (1929) who had the opinion that smaller numbers also migrated through inland Finland, and others north-eastwards to the White Sea.

After the 1970's, only three significant staging areas during the spring migration are known in Fennoscandia. These are the Valdak Marshes and the Skjåholmen Island in Finnmark, Norway and the Eastern Bothnian Bay Coast in Finland (for further description of these sites – see also Aarvak & Øien 1999, pp. 22–27, Ruokolainen et al. 1999, pp. 31–35, and Timonen 1999, pp. 18–20 in this report). Several staging areas have also been presumed to exist in the Baltic Republics, but no definite knowledge has been available until 1998 (see Tolvanen 1999, pp. 15–18 in this report).

Except for the staging areas described above, there is only one other staging area in north-western Europe where migrating LWfG have been observed in recent years. In the flood plain of the Pripyat'

River in Belarus, large numbers of geese pass by in March and April. In 1995, five flocks of altogether 119 LWfG were observed near Turon in the period of 19 March – 20 April. All flocks had an eastern direction, which indicates that these birds could possibly be of Russian origin (Kozulin & Mongin in letter to S.-H. Lorentsen in 1995).

In the following sections we report of the connection between the staging areas in Estonia, Finland and Norway.

2. Observations of a colour ringed LWfG during spring migration in 1998

Until autumn 1998, altogether 21 adult and 6 juvenile LWfG have been caught in the moulting and staging areas in Finland and Norway (see also Aarvak & Øien 1998 and Aarvak & Øien 1999, pp. 22–27 in this report). Out of these, eight individuals have been equipped with satellite transmitters. However, none of the transmitters endured long enough to reveal the spring migration route, and at least some of the satellite tracked birds have been shot. One of the males caught during moult in Finnmark in 1995 and equipped with a satellite transmitter (see Lorentsen et al. 1998) has been re-sighted at several occasions after the transmitter fell off (Aarvak et al. 1998).

In spring 1998, the male (colour combination Red-Black-Yellow) was first observed at Haeska on the northern shore of the Matsalu Bay, in Ridala municipality, Estonia on 1 May. The male arrived flying together with a unringed female and joined a flock of eight unringed individuals (see Tolvanen 1999, pp. 15–18 in this report). The next observation of this male was at Hailuoto where he was observed at 9:19 a.m. on 11 May. On 17 May, the male left at 5:12 a.m. (UTC) together with four other LWfG and arrived at the Valdak Marshes at 8:00 p.m. (UTC) together with 13 conspecifics. The distance between Hailuoto and Valdak is approx. 600 km, and if they had moved directly their minimum flight speed would have been 40 km/h. It is quite likely that they had spent some time around the Bothnian Bay Coast before they left since the flock was larger at arrival to the Valdak Marshes, and because they arrived from

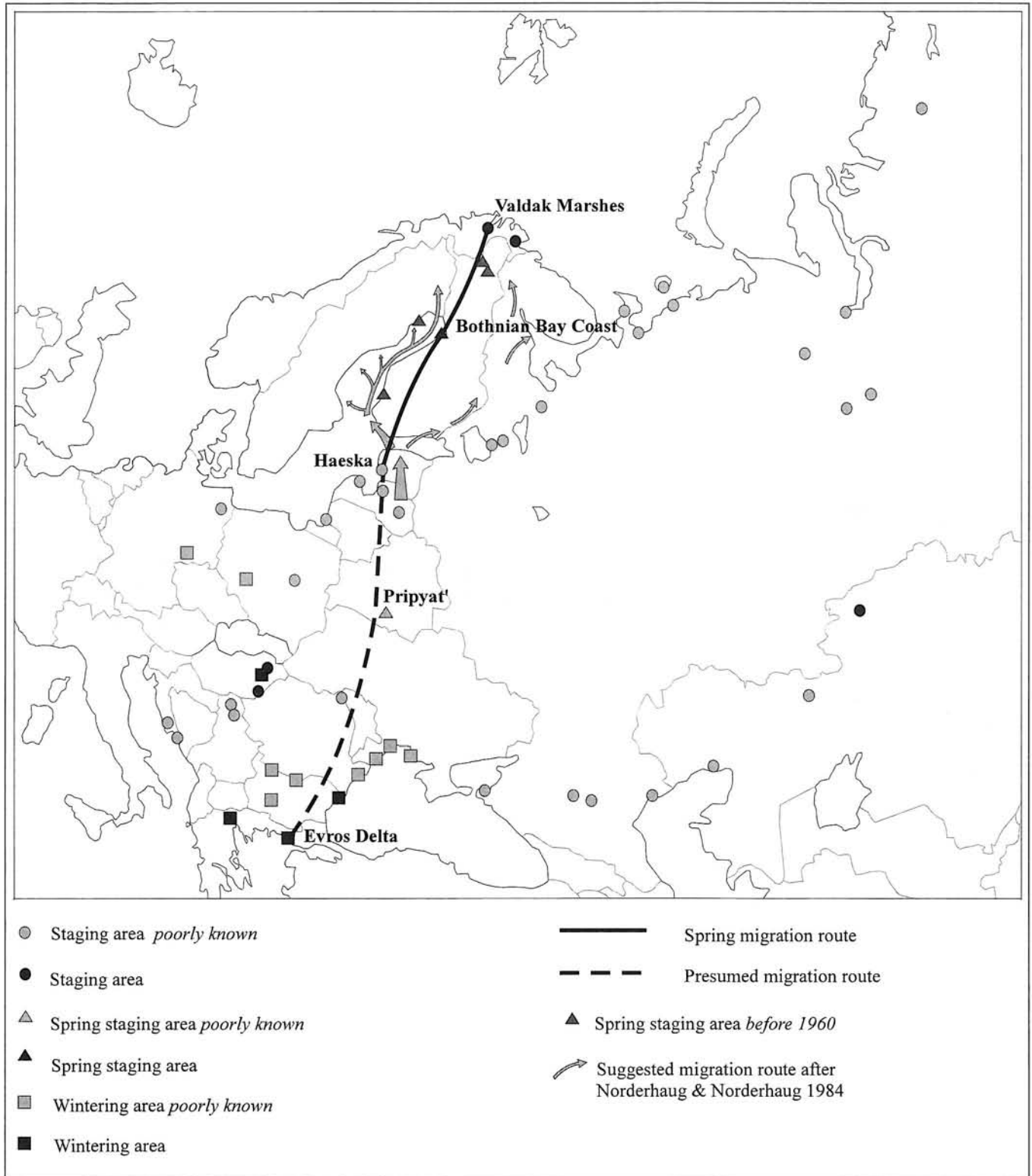


Figure 1. The spring migration route for LWfG between the staging areas in Estonia, Finland and Norway and the proposed migration route from the wintering areas in Greece. Known staging areas and earlier proposed spring migration routes are also shown.

considerable altitude excluding the possibility that the other geese had joined them in the Porsangen Fiord area. The only previously published record of flight speed of the LWfG is from Vaasa in Finland where a flock of 29 individuals was found to have a speed of 80–85 km/h over a distance of 35 km (Bäck 1959) (but see Timonen 1999, pp. 18–20 in this report for another example).

Until 1998, the connection between the Valdak Marshes and the Bothnian Bay Coast staging areas has been subject for considerable speculation, but it has not been confirmed. The observation of the colour-ringed individual, however, indicates that this is the last lapse of the spring migration route (Figure 1). This male has also, after it was tracked to the Evros Delta in the winter 1995/1996 (Lorentsen

et al. 1998), been re-sighted at several occasions both in Greece and Norway (Table 1).

3. Comparison of the photo and video material from Hailuoto and Valdak

Øien et al. (1996) described how the unique pattern of belly patches is used in the population monitoring at the Valdak Marshes. In 1998, a new method was introduced to facilitate the monitoring work, create an archive of images of individual LWfG, improve the age determination and reveal movements and life history of individuals. This was achieved by filming the geese with a video camera (Sony



Photo. Spring staging Lesser White-fronted Geese at the Valdak Marshes in Northern Norway. © Ingar Jostein Øien, May 1995

Handycam) mounted on a Swarovski AT 80 HD telescope with 20–60 x zoom ocular. This combination enabled us to obtain video tape of the geese from much longer distances than it would otherwise be possible with normal photographic equipment. After a few days during the spring staging period at the Valdak Marshes, it became evident that the maximum total magnification of this combination of equipment was as large as 1500x, with the best quality reached at 300–400x.

In September 1998 the video material and belly patch drawings from the Valdak Marshes in spring 1998 were compared for the first time with photos and belly patch drawings made during spring 1998 on the Bothnian Bay Coast in Finland. From the Bothnian Bay Coast, slides of sufficient quality existed for eleven pairs. Of these, seven pairs could be positively identified to be *also present* at the Valdak Marshes after they left the Bothnian Bay Coast. In addition, one pair was *probably present* at both places while three pairs present at the Bothnian Bay Coast did for sure *not stage* at the Valdak Marshes. If this sample is representative, it implies that roughly 3/4 of the geese staging at the Bothnian Bay Coast migrate further to the Valdak Marshes (but see also Timonen 1999, pp. 18–20 in this report). This assumption is also supported by the appearance of the colour-ringed individual (see also Aarvak & Øien 1999, pp. 22–27, Timonen 1999, pp. 18–20 in this report) in both areas in spring 1998.

4. Discussion

In 1998 we have shown that the LWfG utilising the staging areas in Estonia, Finland and Norway are mainly the same individuals. This necessitates very careful considerations when estimating the size of the Fennoscandian breeding population. It has earlier been presumed that the geese utilising the staging areas of Eastern Bothnian Bay Coast and the Valdak Marshes were breeding in separate areas. However, due to the policy of employing minimum numbers when estimating the breeding population, these new findings do not alter the earlier estimates significantly. The estimate of c. 30–50 pairs in Fennoscandia can be retained.

The distance between the Valdak Marshes and Hailuoto (Eastern

Bothnian Bay Coast), and Hailuoto and Matsalu Bay in Estonia are approximately 600 and 700 km respectively. If Norderhaug and Norderhaug (1984) were correct when writing that the migration route follows the eastern coastline of Finland, this would increase the distance with approx. 100 km. This distance of 800 km, equals also the distance between the Pripyat' area in Belarus and Matsalu Bay in Estonia. Following this, the geese must at least have one stop-over between the Evros Delta in Greece and Matsalu Bay in Estonia which amounts to approx. 2,000 km.

It is quite probable that the current spring migration proceeds along a relatively narrow corridor, where the variation in the use of staging areas is greater in longitude than in latitude. Earlier descriptions of the pattern of staging areas (e.g. Norderhaug & Norderhaug 1984, Nankinov 1992) probably reflect a situation with a much larger population where parts of it have to utilise additional areas when the preferred staging areas are saturated. This implies that the individuals are associated with specific staging areas, whereas a population approach could indicate that the use of staging areas is more flexible. It is also quite likely that the choice of wintering areas is even more variable depending upon the weather conditions. The traditional use of the same staging areas is probably related to the fact that the goose family keep together during migration and winter so that the young are able to learn the migratory habits of their parents (see Alerstam 1990).

In 1999, the new monitoring method (with a combination of video camera and telescope) will also be employed at the staging sites in the Bothnian Bay. This will hopefully improve our understanding of the population dynamics and how the geese utilise the different staging areas. It will also allow us to make better estimates of the total population size and the geographical distribution of the breeding pairs.

The monitoring work conducted in Norway and Finland should be extended with corresponding work in the Baltic's, especially in the Matsalu area in Estonia. The Pripyat' River Valley in Belarus is probably also a key area in the network of spring staging areas for the LWfG. Extensive surveys should be carried out there as soon as possible to map the LWfG occurrence, habitat utilisation and numbers

Table 1. Sequential locations (as based on satellite telemetry) and observations of the Red-Black-Yellow colour ringed Lesser White-fronted Goose (after Lorentsen et al. 1998 and own data) in the period 27 July 1995 – 26 May 1998. (* = Observers were directed to the locality after satellite locations were received).

Area	State	Date	Year	Comments
Breeding and moulting area	Norway	- to c. 15-22 August	1995	Caught 27 July
Valdak	Norway	c. 15-22 to 29 August	1995	Also observed
Kanin Peninsula	Russia	c. 30 August to 14 September	1995	
Galenbecker See	Germany	c. 20 September to 28 September	1995	Also observed*
Hortobágy	Hungary	29-30 September to 5-11 November	1995	
Lake Kerkiní and Evros Delta	Greece	c. 5-11 November to c. mid-February	1996	Also observed*
End of satellite tracking				
Valdak	Norway	24 May to 2 June	1996	Observed
Valdak	Norway	24 August to 2 September	1996	Observed
Lake Kerkiní	Greece	7 to 29 November	1996	Observed
Valdak	Norway	17 to 22 May	1997	Observed
Matsalu Bay	Estonia	1 May	1998	Observed
Hailuoto	Finland	c.12 to 17 May	1998	Observed
Valdak	Norway	17 to 26 May	1998	Observed

so that necessary conservation measures can be implemented. This is urgently needed since our knowledge about the population dynamics and trends of LWfG is still very fragmented.

5. Acknowledgements

We greatly appreciate the monitoring work conducted on the Bothnian Bay Coast, especially the pictures taken by Ari Lehtinen in Säärenperä, and Jouko Alhainen, Risto Karvonen and Seppo Haapala who took the pictures at Hailuoto. Thanks also to Hannu Vilppula who informed us about the observation of the colour ringed individual in Estonia in May 1998. Morten Ekker provided valuable help during the development of the video/telescope technique. We also appreciate the help of Stabbursnes Nature-house and Museum for providing office and video monitoring facilities.

6. References

- Aarvak, T. & Øien, I. J. 1998: Ringing of Lesser White-fronted Geese *Anser erythropus* in Norway and Russia in 1997, and some Internet-links for information about geese. (In Norwegian with English summary) – *Ringmerkaren* 10:155–159.
- Aarvak, T. & Øien, I. J. 1999: Monitoring and catching of staging Lesser White-fronted Geese at the Valdak Marshes in 1998. In: Tolvanen, P., Øien, I. J. & Ruokolainen, K. (eds.): *Fennoscandian Lesser White-fronted Goose conservation project. Annual report 1998*. – WWF Finland Report 10 & Norwegian Ornithological Society, NOF Rapportserie Report no. 1-1999: 22–27.
- Aarvak, T., Øien, I. J., & Nagy, S. 1998: Migration routes and wintering areas of Lesser White-fronted Geese mapped by satellite telemetry. – *Klæbu*, Norwegian Ornithological Society, NOF Rapportserie. Report No. 4-1998. 37 pp.
- Alerstam, T. 1990: *Bird migration*. – Cambridge University Press, UK.
- Bäck, R. 1959: Bird observations from Södra Österbotten 1958–1959. (In Swedish). – *Ornis Fennica* 36:110–111.
- Hortling, L. 1929: *Ornithological handbook*. Helsingfors. 1142 pp. (In Swedish).
- Kozulin, A.V. & Mongin, E. E. 1996: Spring geese migration in the Pripyat' River flood-plain in 1995. (In Russian with English summary). – *Casarca* 6:302–203.
- Lorentsen, S.-H., Øien, I. J., Aarvak, T. 1998: Migration of Fennoscandian Lesser White-fronted Goose *Anser erythropus* mapped by satellite telemetry. – *Biological Conservation* 84:47–52.
- Nankinov, D. 1992: Lesser White-fronted Goose (*Anser erythropus*) migration routes, wintering sites and conservation in Western Eurasia. – *Gibier Faune Sauvage* 9:257–268.
- Norderhaug, A. & Norderhaug, M. 1984: Status of the Lesser White-fronted Goose, *Anser erythropus*, in Fennoscandia. – *Swedish Wildlife Research* 13:171–185.
- Ruokolainen, K., Tolvanen, P. & Kaartinen, R. 1999: Monitoring Lesser White-fronted Geese in the Varangerfjord area in 1998. In: Tolvanen, P., Øien, I. J. & Ruokolainen, K. (eds.): *Fennoscandian Lesser White-fronted Goose conservation project. Annual report 1998*. – WWF Finland Report 10 & Norwegian Ornithological Society, NOF Rapportserie Report no. 1-1999: 31–35.
- Timonen, S. 1999: The spring migration of the Lesser White-fronted Goose at Bothnian Bay in 1998. In: Tolvanen, P., Øien, I. J. & Ruokolainen, K. (eds.): *Fennoscandian Lesser White-fronted Goose conservation project. Annual report 1998*. – WWF Finland Report 10 & Norwegian Ornithological Society, NOF Rapportserie Report no. 1-1999: 18–20.
- Tolvanen, P. 1999: A spring staging area for Lesser White-fronted Geese recovered in Matsalu, Estonia. In Tolvanen, P., Øien, I. J. & Ruokolainen, K. (eds.): *Fennoscandian Lesser White-fronted Goose conservation project. Annual report 1998*. – WWF Finland Report 10 & Norwegian Ornithological Society, NOF Rapportserie Report no. 1-1999: 15–18.
- 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 norvegica Series C, Cinclus* 19:69–76.
- Øien, I. J., Tolvanen, P., Aarvak, T., Litvin, K. E. & Markkola, J. 1999: Surveys and catching of Lesser White-fronted Geese at Taimyr Peninsula 1998 – preliminary results on autumn migration routes mapped by means of satellite telemetry. In: Tolvanen, P., Øien, I. J. & Ruokolainen, K. (eds.): *Fennoscandian Lesser White-fronted Goose conservation project. Annual report 1998*. – WWF Finland Report 10 & Norwegian Ornithological Society, NOF Rapportserie Report no. 1-1999: 37–41.

Monitoring Lesser White-fronted Geese in the Varangerfjord area in 1998

Kalle Ruokolainen¹, Petteri Tolvanen² & Riikka Kaartinen³

¹ Kasurilanmäentie 55, FIN-71800 Siilinjärvi, FINLAND, e-mail: Kalle.Ruokolainen.mpnet@mpmol.fi

² WWF Finland, Lintulahdenkatu 10, FIN-00500 Helsinki, FINLAND, e-mail: tolvanen@sll.fi

³ Töölönkatu 44-48 f 96, FIN-00250 Helsinki, Finland

1. Introduction

The island Skjåholmen in the bottom of Varangerfjord in Finnmark County, Norway with the adjacent coastal meadow areas at the cape Veines and on the bay Varangerbotn on the mainland, is known to be an important stop-over for Lesser White-fronted Geese (*Anser erythropus*, later LWfG) during their autumn migration (Tolvanen et al. 1998). In addition, LWfG are known to occasionally utilise some other places, especially pastures on the shores of the Varangerfjord and on the shores and deltas of the rivers Tana and Neiden. LWfG staging in the Varangerfjord area are thought to belong to the part of the Fennoscandian population that breeds in the eastern parts of Finnmark and the northernmost parts of Finland.

The Finnish (WWF) LWfG project has monitored the autumn staging of LWfG at Skjåholmen annually since 1995, but very little is known about the importance of Skjåholmen during the spring migration in late May and early June. On 7 June, 1996, the Norwegian (NOF) LWfG project visited the island, and a similar visit was also made on 2 June, 1997. During the 1996 visit, one adult pair of LWfG was seen, and based on droppings and footprints, it was estimated that about five pairs had visited the island earlier that spring (Aarvak et al. 1997). Also in the beginning of June 1997, one adult pair of LWfG was seen on Skjåholmen (Aarvak et al. 1997).

2. Methods, schedule, study area and weather conditions

In 1998, the Finnish LWfG project monitored the migration of geese on Skjåholmen and the surrounding areas for about two weeks in the end of May. In addition, LWfG observations made by the local

ornithologist Håkon Heggland were received to complete the picture of spring migration. The annual monitoring of the autumn migration on Skjåholmen was also conducted by the Finnish LWfG project, covering the period 18 August – 1 September.

During the spring monitoring, only half of the time was spent on Skjåholmen, and more effort was put for searching LWfG on the scattered potential staging places on the mainland, whereas during the autumn monitoring, the coastal meadow areas on the mainland were checked only occasionally, and most of the time was spent on Skjåholmen using the established monitoring methods with a hiding tent in the western part of the island (see Tolvanen et al. 1998). The schedule of the monitoring work and the observers are shown in Table 1.

In spring, the weather was rather cold with northern winds, cloudy skies and many snow showers. The night temperature varied from –2 to +2°C. The daytime temperature hardly rose from the night values. The wind was at least moderate most of the time. During the showers and on 25–26 May the wind reached its maximum speed of approximately seven Beauforts. On 23–24 May the stormy eastern wind caused an eruption of pelagic birds to the waters of Skjåholmen in the bottom of the fjord. During the whole autumn monitoring period, easterly winds prevailed, bringing exceptional amounts of pelagic birds to the bottom of Varangerfjord. No night frosts occurred during the autumn monitoring period.

3. Results of the spring monitoring

Geese were observed at the River Neiden Delta, Skjåholmen, Ekkerøy, Skallelv, Sandfjorden, River Tana Delta (on Høyholmen),



Photo. A pair of Lesser White-fronted Geese feeding on the fields of Skallelv, Varangerfjord in May 1998. © Kalle Ruokolainen



Figure 1. Map of the monitoring area.

Table 1. Schedule of the LWfG monitoring in the Varangerfjord area in 1998 (see also Map). Abbreviations of the observers: Riikka Kaartinen (RK), Jyrki Pynnönen (JP), Juhani Rissanen (JR), Kalle Ruokolainen (KR), Petteri Tolvanen (PT), Markku Ukkonen (MU).

Date	Schedule	Observers
<i>Spring 1998</i>		
18 May	The group arrived to Norway, visited the delta of River Neiden (Näättämö) and the fields of Vestre Jakobselv (Annijoki) and Karielv.	KR, JR, MU
19 May	LWfG were searched on Ekkerøy and the fields surrounding it. Arrival on Skjåholmen at 4:00 p.m.	KR, JR, MU
20–26 May	Monitoring on Skjåholmen. Departure from Skjåholmen at 5:00 p.m. on 26 May.	KR, JR, MU
27 May	Checking the coastline from Vestre Jakobselv to Hamningberg via Vardø (Vuoreijja).	KR, JR, MU
28 May	Checking the coastline from Vestre Jakobselv to Veines. The delta of River Neiden and some peat bog areas beside the road E6 were also checked for LWfG.	KR, JR, MU
29 May	Checking the shores of River Tana (Teno) from Tanabru down to the delta, Høyholmen area, and up to the border of Finland at Utsjoki Village.	KR, JR, MU
<i>Autumn 1998</i>		
18 August	Arrival on Skjåholmen.	JP, RK
19–22 August	Monitoring on Skjåholmen.	JP, RK
23 August	Departure from Skjåholmen, monitoring staging areas on the mainland: the southern coast of Varangerfjord from Varangerbotn to Bugøynes, the delta of Tana River.	JP, RK
24 August	Monitoring the staging areas on the mainland: coastal meadows at Varangerbotn. Arrival back to Skjåholmen.	JP, RK, PT
25–31 August	Monitoring on Skjåholmen.	JP, RK, PT
1 September	Departure from Skjåholmen.	JP, RK, PT

Sirma and specially at the fields of Vestre Jakobselv and Karielv. The species observed were Bean Goose (*Anser fabalis*), Pink-footed Goose (*A. brachyrhynchus*), LWfG, Greylag Goose (*A. anser*) and Canada Goose (*Branta canadensis*). The most numerous species was Bean Goose with c. 50 individuals. The second most common was Greylag Goose with at least 18 individuals. Other Anser-species were scarce, and only one, very small and dark North American subspecies of Canada Goose was recorded.

LWfG were seen at five places. It was not possible to estimate the real number of different individuals observed, because the

individuals were not identified by the pattern of the belly patches in most cases. All LWfG observations are listed in Table 2. None of the LWfG observed during the monitoring had leg rings or neck bands.

4. Results of the autumn monitoring

The first LWfG were observed on 18 August, and the last observation was on 31 August. The detailed daily observations are shown in detail in Table 3. The total number of LWfG was between 17–22 individuals (Table 4). Compared with the years 1995 and 1997, the total number was remarkably lower (see Tolvanen et al. 1998). This could be due

Table 2. Lesser White-fronted Geese observed in the study area during the monitoring period (18–30 May, 1998), including independent observations made by Håkon Hegglund and Petteri Polojärvi.

Date	Observations of Lesser White-fronted Geese
22 May	4 ad (2 males and 2 females) on Ekkerøy ponds, Vadsø (H. Hegglund, in litt.)
24 May	5 ad (2 males and 2 females + 1 ad) on Ekkerøy ponds, Vadsø (H. Hegglund, in litt.)
27 May	2 ad (male and female) on the fields of Skallelv, Vadsø, near the E75 road. The pair was feeding on the field very close to the road E75. The birds behaved like a pre-breeding pair: female was actively feeding and male watching
27 May	2 ad (male and female) on the fields at Sirma ¹ , Tana (on the Norwegian side of the Tana River) (P. Polojärvi, pers. comm.)
29 May	2 ad (male and female) on Høyholmen, Tana, on the delta of River Tana. The pair was feeding until the observers arrived. Unfortunately, the birds were scared and they started to walk. Soon the birds took off, flew westwards and disappeared behind the Tananes on the other side of the River Tana.
30 May	1 individual on Ekkerøy, Vadsø (H. Hegglund, in litt.)
22 June	2 ad in Nesseby, seemed to be a pair. After having been flushed accidentally by the observer, they flew to Skjåholmen where they probably landed. (H. Hegglund, in litt.)

¹ Also on 31 May, 1996, an adult pair of LWfG with 3 Pink-footed Geese was seen at the same site on the Sirma fields (Annika Forsten, pers. comm.).

Table 3. Observations of Lesser White-fronted Geese and human activity on Skjåholmen, 18–31 August, 1998. cy = calendar year.

Date	ad	juv	prob.	ad/ 2nd cy	Total 2nd no. of LWfG	Notes on the observations — Human activity
18 Aug				5	5	A flock of 5 ad/subad LWfG took off from the western point of Skjåholmen, flew south and landed at Veines.
19 Aug					0	No geese were seen. (The hiding tent was erected.) — A couple of people on Skjåholmen for c. 7 hours, obviously they were not hunters.
20 Aug					0	No geese were seen.
21 Aug				5	5	A flock of 5 LWfG and 3 Greylags took off from the western point of Skjåholmen, flew south and landed on sea near Veines. The LWfG were probably the same individuals as on August 18.
22 Aug					0	No geese were seen.
23 Aug					0	(Monitoring the staging areas on the mainland.) No geese were seen.
24 Aug					0	(Arriving back to Skjåholmen.) No geese were seen. — One person picking cloudberries in the eastern part of the island at noon. Later in the afternoon, a boat driving along the northern shore of the island and later coming back to Nesseby.
25 Aug	6	2			8	At 6:00 a.m., a flock of 4 LWfG was seen when they took off from northern shore of the island and disappeared to west. A new family of 2 ad + 2 juv was seen on the meadow near the hiding tent at 8:10 a.m., and after that the family spent the whole day on Skjåholmen. At 7:10 p.m. a flock of 4 ad was observed for a while at the western point of Skjåholmen. — From noon to late afternoon a man reseaching the eastern part Skjåholmen with a hoe, possibly a geologist or lichenologist.
26 Aug	5	4			9	The first 6 LWfG were seen at 8:45 a.m.: one ad pair without juveniles and a family of 2 ad + 2 juv. After a while the geese became restless and took off, and there showed up to be 9 individuals in the flock. Five of them (a family of 2 ad + 2 juv and 1 ad) landed on a rock near the hiding tent. The other four birds apparently landed behind a hillock in the western part of the island. The loose flock of 5 birds (a family of 2 ad + 2 juv and 1 ad) remained for several hours in the vicinity of the hiding tent. Sometimes when the single ad bird went too close to the family, the male chased it away. In the afternoon, the family took off and landed somewhere in southwestern part of Skjåholmen. Later, at 7:15 p.m. four individuals were seen grazing in the western point of the island.
27 Aug	5	4			9	The first individuals were seen at 5:55 p.m., when a family of 2 ad + 2 juv was seen grazing near the hiding tent. After a while, a flock of 22 Bean Geese (<i>A. fabalis</i>) and a group of 4 ad LWfG was discovered grazing and resting nearby. At 6:10 p.m. all the geese took off and flew to east. At the same time, a flock of 8 Greylags and 1 ad LWfG were seen grazing on a hillock in the western part of the island. At 6:40 p.m. a flock of 2 ad pairs of LWfG (without juveniles) and a new family of 2 ad + 2 juv LWfG was discovered near the hiding tent. At 7:20 p.m. all the geese got frightened by something and took off, apparently landing in the western part of the island.
28 Aug	5				5	In the morning, one ad LWfG was seen in a flock of 8 Greylags eating berries on a hillock in the western part of the island. At 10:20 a.m. a flock of 4 ad LWfG took off from the southern side of the western point of Skjåholmen, flew along northern shore and then returned back to the western point. At noon, 5 ad LWfG were observed from the eastern part of the island when they took off from the western part, flew south and landed at Veines (on the mainland south of Skjåholmen). At 4:00 p.m., 4 ad LWfG were seen for a while, grazing with Greylags on a hillock in the western part of Skjåholmen. — A military helicopter flew over the island in the afternoon.
29 Aug	6	2	1		9	At 12:45 p.m., a flock of 9 LWfG came into sight behind a hillock: one family of 2 ad + 2 juv, 2 ad pairs and one unpaired apparently 2-cy bird. The birds were resting and grazing until 5:35 p.m., when they took off and apparently landed at the western point of the island.
30 Aug				1	1	An apparently 2-cy LWfG seen at 6:50 a.m. with 6 Greylags. They took off at 7:20 a.m. scared by a White-tailed Eagle (<i>Haliaeetus albicilla</i>). The same flock was seen at 10:45 a.m. at the western point.
31 Aug	2	2			4	At 11:00 a.m., a family of 2 ad + 2 juv LWfG was seen at the western point of Skjåholmen. — At 12:15 p.m., a group of six men came walking to the opposite shore (on the mainland) and made a campfire. After 5 minutes the geese took off and apparently landed on the southwestern part of Skjåholmen. At 7:00 p.m. the monitoring was finished and the hiding tent was struck.
1 Sep					0	No geese were seen. — Several military fighters flew over Skjåholmen.

to poor breeding success in the eastern parts of Finnmark and in Northern Finland: it is known that failed breeders can leave Fennoscandia already in mid-summer and fly to moult e.g. on the Kanin Peninsula (Aarvak et al. 1997).

The peak numbers of staging geese occurred between 26–29 August, with less than 50 % of the total number present on any single day. Five adult pairs were recorded (minimum number), but only three of these pairs had goslings. The mean brood size of the pairs that bred successfully was 2.0 juveniles / pair. None of the (properly

seen) LWfG had leg rings or neck bands; this was the first autumn since that the adult female “Enni”, with the green neck band 02, who was ringed in Northern Finnish Lapland in July 1995 was not observed.

5. Human activity and disturbance of geese on Skjåholmen

In May the human activity at Skjåholmen was low during the



Photo. A part of a flock of Lesser White-fronted Geese feeding on *Empetrum* berries on Skjåholmen. In this situation, all the geese were on the alert for a helicopter flying over the mainland. Air traffic causes disturbance for staging Lesser White-fronted Geese e.g. on Skjåholmen and at the Valdak Marshes. © Petteri Tolvanen, August 1997

observation period. One family was seen on 21 May walking near the shoreline, probably searching for gulls eggs which is allowed to harvest for private consume in Finnmark. In the next weekend six trippers spent the night in two tents on the island. They also kept a fire.

In autumn the (mostly military) air traffic in the Varangerfjord area was somewhat more intensive than in the monitoring periods in 1995-97, possibly causing some disturbance for staging LWfG. The human activity on the island was approximately at the same level as the years 1995-97. Detailed observations of human activity and possible disturbance to the staging geese during the autumn monitoring are shown in Table 3.

6. Discussion

Despite being one of the three remaining important staging areas for the Fennoscandian LWfG, the island Skjåholmen is still unprotected,

and there are no restrictions for human activities like e.g. hunting, picking berries and hiking on the island during the staging periods of LWfG. Fortunately, the human disturbance on the island was relatively low this year, with only a couple of humans (and no hunters) seen on the island during the monitoring periods.

In light of the observations in May-June, Skjåholmen seems not to be an important staging area for LWfG in the spring time as in autumn, but because of the short and unfavourable observation period, more data is needed before we can conclude. In order to keep the disturbance for the breeding avifauna on the island at minimal level, it might be more secure to observe geese on Skjåholmen in May and June by telescopes from the mainland, and make short visits to Skjåholmen only if needed. When staying on the mainland it is also possible to monitor other areas like the Neiden Delta, Høyholmen, Vestre Jakobselv, Ekkerøy, Skallelv and Sirma.

In conclusion, it has turned out that significant numbers of LWfG

Table 4. The composition of the flocks and the total numbers of Lesser White-fronted Goose on Skjåholmen, 18–31 August, 1998.

Flock no.	Seen first time	ad	juv	prob. 2nd c.y.	ad/ 2nd c.y.	Total no. of LWfG	Comments
1	18 Aug				5	5	Belly patches not seen, could include the same individuals as the following flocks
2	25 Aug	2	2			4	Identified by belly patches
3	25 Aug	2				2	(New?) pair, identified by belly patches
4	25 Aug	2				2	(New?) pair, identified by belly patches
5	27 Aug	2	2			4	New family, identified by belly patches
6	29 Aug	2	2			4	New family, identified by belly patches
7	29 Aug			1		1	New individual, identified by belly patches
Total (min)		10	6	1		17	Minimum total number, assuming that all the birds in flock number 1 could be the same birds as in the flocks 3, 4 and 7.
Total (max)		10	6	1	5	22	Maximum total number, assuming that none of the birds in flock number 1 could be the same birds as in the flocks 3, 4 and 7.

rest and forage annually on Skjåholmen before the departure to the winter quarters, and to some amount also during spring time before breeding. This clearly indicates that Skjåholmen is an important stop-over for LWfG and thus needs protection during the staging periods (c. 15 May – 15 June and c. 15 August – 15 September).

7. Acknowledgements

Special thanks to Leif Dørmänen, Torleif Dørmänen, Heikki Karhu, Leena and Jens Pedersen for help in transportation and accommodation.

References

- Aarvæk, T., Øien, I. J., Syroechkovski Jr, E. E. & Kostadinova, I. 1997: The Lesser White-fronted Goose Monitoring Programme. Annual report 1997. – Klæbu, Norwegian Ornithological Society. NOF Rapportserie, Report No. 5-1997.
- Tolvanen, P., Pynnönen, J. & Ruokolainen, K. 1998: Monitoring of Lesser White-fronted Goose *Anser erythropus* on Skjåholmen (Varangerfjord, Finnmark, Norway) in 1995–1997. In Tolvanen, P., Ruokolainen, K., Markkola, J. & Karvonen, R. (eds.): Finnish Lesser White-fronted Goose conservation project. Annual Report 1997. – WWF Finland Report No 9: 30–32.

Field work in Lapland in 1998

Jarmo Pääläinen & Juha Markkola

North Ostrobothnia Regional Environment Centre, PO BOX 124, FIN-90101 OULU, FINLAND, e-mail: jarmo.paalainen@vyh.fi, juha.markkola@vyh.fi

1. Introduction

As a part of the Lesser White-fronted Goose Life/Nature project, large-scale inventories of breeding areas of the Lesser White-fronted Goose (*Anser erythropus*, later LWfG) in Finland were carried out between 28 May and 16 August. The field work started early in comparison to previous years as survey teams tried to be in the field prior to the arrival of LWfG on their breeding grounds. The surveys were undertaken by 24 teams formed by 35 different persons (some participating in more than one field trip), equivalent to about 86 working man-weeks. The inventory covered approximately 4,000 square kilometres within which potentially suitable breeding localities (lakes and pond clusters) were targeted for survey. Approximately 60 % of the work was completed before 20 June and 40 % after 20 July. The areas were left undisturbed by surveyors in the interim period as at this time geese are extremely difficult to find as they have young and are very sensitive to disturbance.

2. Weather conditions

Extremely tough field conditions were experienced during the first few weeks of the survey because of the late summer. This was due to exceptionally thick snow cover in the winter and cold temperatures in May and June. In most inventory areas the temperatures were 0.5°C in May and up to 2°C in June, below the average of last full 30 years period (1961–1990). Snow melt was delayed, and flood conditions and heavy rain hampered fieldwork.

3. Methods

All teams were supplied with a general concept of the inventory and survey methodology. A new model for feather identification was prepared for the survey teams: silhouette copies of LWfG wing and tail feathers and typical coverts were made in the scale 1:1. If goose

feathers were found in the field, the teams could compare the feathers to the formula and identify the species concerned – in practice this meant LWfG and Bean Goose (*Anser fabalis*) needed be considered as these are the only two *Anser* species regularly occurring, and the only two that breed in the survey area.

4. Observations in Finland

During the summer one flock of nine LWfG (probably moulting / migrating non-breeders) and one pair in a suitable breeding habitat was observed in Mountain Lapland. In addition, one pair was seen during the pre-nesting period near the village of Ivalo. Much Lapland avifauna data, including some information from local people about the former occurrence of the LWfG, was collected. Numbers of Bean Geese and Whooper Swans (*Cygnus cygnus*) were only a third of that compared to 1997 in some areas. It seemed that some birds stayed further south because of the adverse weather conditions and it was obvious that some pairs did not attempt to breed at all. Other goose species observed during the surveys were: small flocks of Barnacle (*Branta leucopsis*), Brent (*B. bernicla*) and Canada Geese (*B. canadensis*) and one 2nd calendar-year White-fronted Goose (*Anser albifrons*).

5. Observations in Norway

Some 1,000 square kilometres were surveyed in Finnmark, Norway and some promising observations were made near the Norwegian-Finnish border. The teams found one pair of LWfG in suitable breeding habitat, two alarming individuals (probably both males) and also observed a migrating pair feeding in the spring. The weather conditions in Norway were just as harsh as in Finland and this was reflected in the low number of broods (only three) observed at Varangerfjord in autumn (see Ruokolainen et al. 1999, pp 31–35 in



Photo. Some feathers of adult LWfG, from left to right: outermost tail feather, biggest (outermost) tertial, a greater covert (upper wing), (upper) covert of the 4th primary (counted from outside in towards body) and 10th (second innermost) primary. Scale 62% of the natural size. – In the field work on the breeding grounds, moulted feathers of geese are often found, and e.g. in Fennoscandia the separation of the feathers of LWfG and Bean Goose is not always straightforward. For the field season 1998, the Finnish LWfG project produced a guide for the identification of moulted feathers: all wing and tail feathers and most typical wing coverts of an adult LWfG were copied in natural size for the field survey teams. Copies of this guide are available from the authors of this article.
© Kalle Ruokolainen

this report. Varangerfjord is a traditional autumn migration stop-over for pairs of LWfG that have offspring from that year. It would therefore appear that most pairs failed to rear any young in the traditional Norwegian fell breeding areas in 1998. In Western Finnmark only one out of 38 potential breeding pairs could be to have successfully raised offspring (see Aarvak & Øien 1999, pp. 22–27 in this report).

6. Observations in Sweden

One area in Swedish Lapland, where footprints of a LWfG brood were seen in July 1996, was also examined by two survey teams. The first team in June found one alarming unringed male which behaved as if breeding: it tried e.g. to attack a Red Fox (*Vulpes vulpes*), and the bird stayed in the same pond area for the whole observation week. The fact that the bird had no rings and that the locality was situated far from the Swedish reintroduction area but not so far from the still remaining breeding localities in Norway, points towards an individual of a wild, natural origin. If this were the case, it would constitute the first observation of a potentially breeding wild LWfG in Sweden for many years. The second team, however found only some droppings in the area, but no LWfG or signs of their having bred. This suggests that the bird was probably only a non-breeder and continued to another place to moult.

7. Threats for LWfG

The number of Reindeer (*Rangifer tarandus*) seems to be stable, but very high from year to year in Finnish Lapland. Possible nest trampling and nest predation by Reindeers – as shown in North American Caribous (*Rangifer caribu*) – could be a threat to breeding geese. Other possible predators, for example Golden Eagle (*Aquila chrysaetos*) and White-Tailed Eagle (*Haliaeetus albicilla*), were also recorded. The teams observed less Red Foxes than last year, which

indicates that the LWfG-Life-Project winter cull (109 foxes shot) may have had an impact on the fox population. Also all movements of hikers and other people in field according to the guest books in cabins were registered. The teams collected data on the abundance of voles *Clethrionomys* and *Microtus spp.* and Norway Lemmings (*Lemmus lemmus*), which can be used as an indirect indication of predation pressure on LWfG, during poor vole/lemming years predation on geese increases.

8. Offering additional food for geese

It is known that a good nutritional status of female LWfG improves egg and thus gosling production. In Lapland additional food (1,500 kg of barley) was offered in nine different marsh land areas, river deltas or lake shores, where LWfG had been seen in previous years or where they stage during migration. The barley was transported by snow-scooters to these localities in early May. The feeding stations were observed for two weeks. Bean Geese were seen, often in abundance, feeding on the barley, but no LWfG were observed.

References

- Aarvak, T. & Øien, I. J. 1999: Monitoring and catching of staging Lesser White-fronted Geese at the Valdak Marshes in 1998. In Tolvanen, P., Øien, I. J. & Ruokolainen, K. (eds.): Fennoscandian Lesser White-fronted Goose conservation project. Annual report 1998. – WWF Finland Report 10 & Norwegian Ornithological Society, NOF Rapportserie Report no. 1-1999: 22–27.
- Ruokolainen, K., Tolvanen, P. & Kaartinen, R. 1999: Monitoring Lesser White-fronted Geese in the Varangerfjord area in 1998. In Tolvanen, P., Øien, I. J. & Ruokolainen, K. (eds.): Fennoscandian Lesser White-fronted Goose conservation project. Annual report 1998. – WWF Finland Report 10 & Norwegian Ornithological Society, NOF Rapportserie Report no. 1-1999: 31–35.

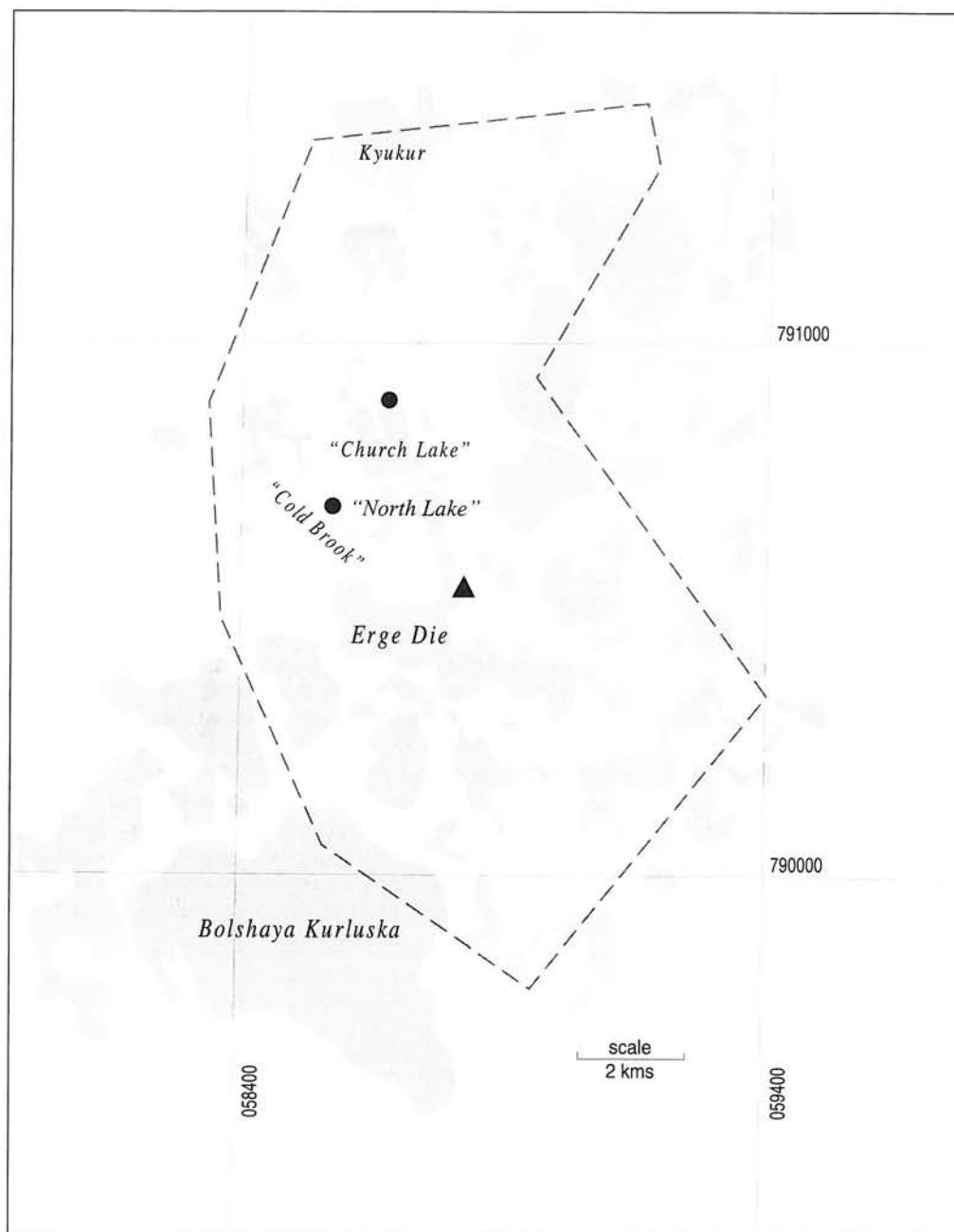


Figure 2. Map of the survey area in July–August, 1998. The grids shown in the map are in the Russian uniform coordinate system (zone no 15, longitude origin 93° E). The degree co-ordinates of the base camp (black triangle) are: N 71°12'15", E 95°27'12".

August and transported back to Khatanga.

This year, the spring was cold and the summer unusually late in Southern Taimyr. The big rivers were ice-covered until early July. Due to the cold spring, the onset of the breeding of LWfG was delayed approx. two weeks compared to the previous year in the same area: the first moult feathers were not found until the last week of July. Possibly for the same reason, the density of LWfG in the area and their brood sizes seemed to be lower than in 1997. Only two pairs of LWfG were seen during 2.5 weeks of field work. In addition to these pairs, tracks of two more pairs were registered (at least one with goslings). Only one of the observed pairs had bred successfully. The brood comprised three goslings which is well below the mean of 4.6 in 1995 (Aarvak et al. 1997) and 4.8 in 1997 (Markkola & Arkiomaa 1997). The first pair of LWfG was

shores of lakes and rivers. The area has numerous lakes, belonging to a complex drainage system around the Kurluska lakes. Along the lake shores, dense thickets provide good hiding places for LWfG.

3. Itinerary and field surveys

After arrival in Khatanga on 17 July, two days were spent on organisation, arranging of equipment and supplies. From Khatanga, helicopter flights were organised with the kind help of the head of the Taimyrskii Zapovednik, Dr. Yuri Mikhailovich Karbainov. On 19 July we got helicopter (MI 8) transport from Khatanga to Kurluska where the team of eight field workers (R. Karvonen, K. Litvin, J. Markkola, S. Osipov, P. Pynnönen, J. Sandvik, P. Tolvanen and I. J. Øien) was left. A field camp was established at the shore of Lake Erge Die on arrival (see Figure 2). The weather conditions during the expedition were quite varying, but the daytime temperature was generally high throughout the period (mean c.18° C), and only in August the night-time temperature dropped below zero. Except from two days of heavy rainfall (200 mm) on 23–25 July, field surveys were carried out continuously in search for broods of LWfG within the study area. The area was surveyed in the period 20 July to 5 August and covered an area of c. 120 square kilometres (Figure 2). After the field work, the team was picked up by helicopter on 5

seen on 30 July in the Church Lake. On 3 August the second pair was found in the Cold Brook (see Figure 2).

4. Catching

At Church Lake, the pair was localised grazing together with three goslings from a vantage point on 30 July at 1:20 a.m. A catching effort was implemented immediately and the brood was surrounded by the catching team. The female was subsequently chased into a fence trap together with the goslings by a rubber boat. However, in the mouth of the corral of nets, they turned around and returned to the water. The female was eventually caught with a hoop net on the water from the rubber boat. The male which never was in the fence trap, was also caught by rubber boat and hoop net on the water, shortly after. The catching attempt lasted until 10:00 a.m.

The other successful catching attempt was carried out on 3 August in a small brook (Cold Brook) some kilometres south-west of Church Lake. This brook partly flows through dense forest. This pair was first observed in a curve of the meandering brook, several kilometres from the nearest water basin - the North Lake, and a catching attempt was carried out by surrounding the pair with a fence trap. The first attempt was unsuccessful, but the pair was later localised downstream from this place. The female was caught by a hoop net while diving



Photo. A typical aerial view of the forest tundra landscape with numerous lakes and rivers in the Kurluska area, near the open tundra border on Southern Taimyr. The c. 10–12 m tall forest is formed by *Larix gmelinii*. On the lake and river shores, *Salix* species and *Alnus viridis* ssp. *fruticosa* are forming rough thickets that are important hiding places for Lesser White-fronted Goose broods. © Petteri Tolvanen, Southern Taimyr, August 1998

Table 1. Biometrics of Lesser White-fronted Geese caught in 1998 in the Kurluska area on the Taimyr Peninsula (Russia). Length measurements are given in millimetres. All colour rings are read from above; g=green, lb=light blue, r=red, y=yellow, ¹=right leg and ²=left leg. All satellite transmitter Id's are Microwave PTT's. The neck collar used is black with white characters.

Data	Bird1	Bird2	Bird3	Bird4
Ring number (Moskva)	CS 001461 ¹	CS 001462 ¹	CS 001463 ¹	CS 001464 ¹
Satellite transmitter Id.	10864	01355	no transmitter	01107
Colour ring code	y-g ²	g-y ²	r-lb ²	lb-y ²
Neck-collar No		A2		
Sex	Female	Male	Female?	Female
Age	adult	adult	Juvenile	adult
Longest moult feather from sheet				8.1
Tarsus breadth	10.4 x 6.51	11.1 x 6.91		10.7 x 6.01
Tarsus length (minimum)	60,31 / 62.62	62,61 / 61.62		61,21 / 61.52
Tarsus length (maximum)	74,11 / 75.82	71,51 / 73.62		76,01 / 74.62
Weight (grams)	1450	1625	680	1475
Bill	34.7	32.7		31.7
Head + bill	87.9	83.2		87.7
White blaze length	23.1	27.3		25.3
Tail	101	102		104
Catching date	30 July	30 July	30 July	3 August

to escape the catching team. The male slipped away into the thickets. For biometrics and ringing data, see Table 1.

5. Preliminary results of the migratory movements

After the satellite tagged birds had finished their moult (and the juveniles were able to fly) in the middle of September, they moved 60-100 km north-westwards on the Taimyr Peninsula. Here they staged about a week in a tributary of the Dudypta River north-west of the Putorana Mountains, in the same gathering area that one of the Norwegian satellite transmitter tagged birds used during the summer 1997 (cf. Aarvak et al. 1997). The signals from one of the three transmitters ceased at this place (the female caught in the Cold Brook). Subsequently, the remaining two birds (the pair from the

Church Lake) had a short stopover on the western side of the Putorana Mountains (still on the Taimyr Peninsula) before the first major migration lapse from this area in a south-west direction to the Surgut area in the middle Ob River. The Khanty-Mansiysk area in the middle Ob River is known from the end of last century as an important stopover site for migrating LWfG (Nankinov 1992), but no information exists from this area in this century.

In this area, the birds spent one week in the end of September before they continued to north-western Kazakhstan. They were expected to utilise the staging area in the Kustanay Region, which was revealed by satellite tracking of an adult male LWfG tagged in Finnish Lapland in the summer 1995 (Tolvanen & Pynnönen 1998). Also in 1997, an adult female LWfG, tagged by a Finnish-Russian team on the Yamal Peninsula, spent about one month staging in the



Photo. The "Cold Brook" in the north-western part of the Kurluska area, the site of the second successful catching attempt. This brook is flowing through relatively dense *Larix* forests, and it is edged by dense *Salix* and *Alnus* bushes – an unexpected LWfG habitat for the Fennoscandian field workers, but probably a typical breeding / moulting habitat in the main part of the Lesser White-fronted Geese breeding range. © Petteri Tolvanen, Southern Taimyr, August 1998

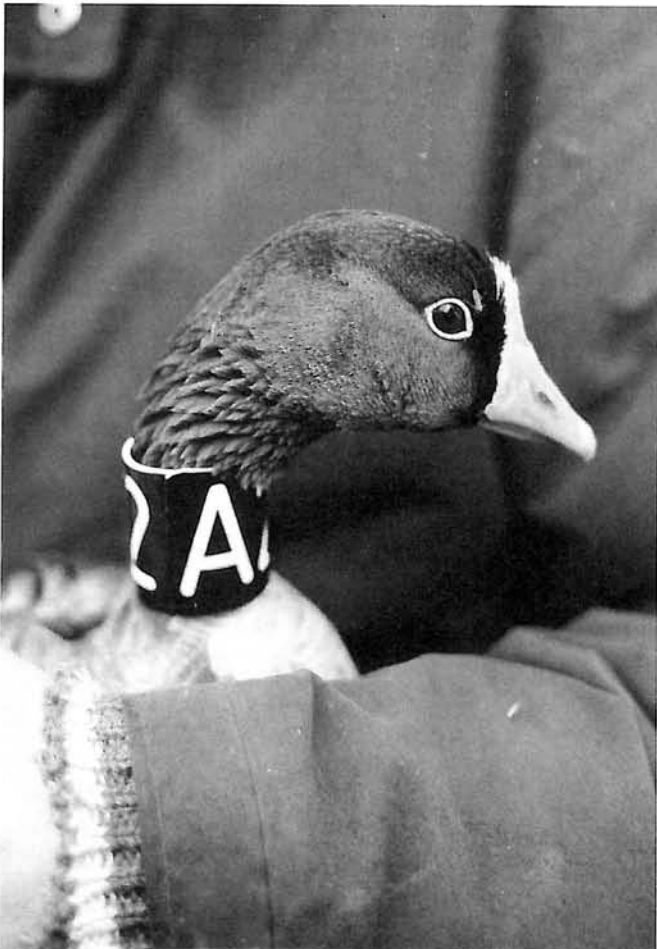


Photo. Adult male Lesser White-fronted Goose caught at the "Church Lake" on 30 July. This individual was equipped with a satellite transmitter and a black neck collar, and it was tracked to a formerly unknown staging area east of Lake Tengiz in north-western Kazakhstan. © Ingar Jostein Øien, Southern Taimyr, July 1998

Kustanai Region (Karvonen & Markkola 1998). However, both of the Taimyr birds chose a somewhat more easterly migration route, and made a stopover in the Astana (formerly Tselinograd) Region. Here, the birds spent about one month in another known staging area near the Kurgaldzhino Lakes (Vinogradov 1990).

For unknown reasons, the pair separated during October. In the beginning of November, the male was still located in Kazakhstan apparently slowly moving towards west, while the female started to move south-westwards already in the end of October. The last signal from the male was received on 8 November, when the bird was c. 110 km west of Lake Tengiz. The female flew from Lake Tengiz via the northern parts of the Aral Sea (with a short stopover there) to the western coast of the Caspian Sea, where it was located in the beginning of November. It seemed that the migration route for this bird would go further along the western coast of the Caspian Sea, and end up in Azerbaijan, Iran or Iraq (cf. Lorentsen et al. 1998, Lorentsen et al. 1999). However, no signals were received after 10 November. In December the transmitter and rings of the female were returned by mail to Moscow. The bird had been shot by a hunter in Dagestan in November, possibly in the area of the last locations, which is a further confirmation of the high mortality caused by (in this case illegal) hunting.

6. Acknowledgements

We are indebted to Evgeny E. Syroechkovski jr. for making a major part of the numerous arrangements of the expedition both in Moscow and in Khatanga, and to Dr. Yuri M. Karbainov, head of the



Photo. Risto Karvonen (left) making notes and Petro Pynnönen observing during a midnight survey trip in the Kurluska area. Mainly due to the mosquitoes, the surveys were carried out mostly at nighttime, but even then repellent was essential... © Petteri Tolvanen, Southern Taimyr, July 1998

Taimyrskiy Zapovednik, for all the help in Khatanga, including the excellent arrangements of the helicopter transportation to Kurluska and back and the accommodation in Khatanga. Special thanks to the great field team, of which in addition to the authors was made up of Risto Karvonen, Sergey Osipov, Petro Pynnönen and Jostein Sandvik. Thanks are also due to the whole family Litvin-Gurtovaya for all help and hospitality in Moscow.

References

- Aarvak, T., Øien, I. J., Syroechkovski Jr. E. E. & Kostadinova, I. 1997:** The Lesser White-fronted Goose monitoring programme. Annual report 1997. – Klæbu, Norwegian Ornithological Society. NOF Rapportserie. Report No. 5-1997.
- Markkola, J. & Arkiomaa, A. 1998:** Tagging efforts in Siberia: Taimyr, summer 1997. In Tolvanen, P., Ruokolainen, K., Markkola, J. & Karvonen, R. (eds.): Finnish Lesser White-fronted Goose conservation project. Annual Report 1997. – WWF-Finland Report No. 9: 27–29.
- Karvonen, R. & Markkola, J. 1998:** Satellite follow-up of the Yamal Lesser White-fronted Goose Sibyako (the mother). In Tolvanen, P., Ruokolainen, K., Markkola, J. & Karvonen, R. (eds.): Finnish Lesser White-fronted Goose conservation project. Annual Report 1997. – WWF-Finland Report No. 9: 36–37.
- Lorentsen, S.-H., Øien, I. J., Aarvak, T. 1998:** Migration of Fennoscandian Lesser White-fronted Goose *Anser erythropus* mapped by satellite telemetry. – *Biological Conservation* 84:47–52.
- Lorentsen, S.-H., Øien, I. J., Aarvak, T., von Essen, L., Farago, S., Markkola, J., Morozov, V., Syroechkovski Jr., E. E. & Tolvanen, P. 1999:** Lesser White-fronted Goose *Anser erythropus*. In Madsen, J., Fox, T. & Cracknell, J. (eds): Review of goose populations wintering in the Western Palearctic. – Wetlands International, Cambridge, UK. In press.
- Nankinov, D. 1992:** Lesser White-fronted Goose (*Anser erythropus*) migration routes, wintering sites and conservation in Western Eurasia. – *Gibier Faune Sauvage* 9:257–268.
- Rogacheva, E. V. 1992:** The Birds of Central Siberia. – Husum Druck- und Verlagsgesellschaft, Husum. 737 pp.
- Syroechkovski Jr., E. E. 1996:** Present status of the Lesser White-fronted Goose (*Anser erythropus*) populations in Taimyr and some peculiarities of the system of species migrations in the Western Palearctic. (In Russian with English summary). – *Bulletin of Goose Study Group of Eastern Europe and North Asia (Casarca)* 2:71–112.
- Tolvanen, P. & Pynnönen, P. 1998:** Monitoring the autumn migration of Lesser White-fronted Goose *Anser erythropus* and other geese in NW Kazahstan in October 1996. In Tolvanen, P., Ruokolainen, K., Markkola, J. & Karvonen, R. (eds.): Finnish Lesser White-fronted Goose conservation project. Annual Report 1997. – WWF Finland Report No 9:19–20.
- Vinogradov, V. G. 1990:** *Anser erythropus* in the USSR. In Matthews, G. V. T. (ed.): *Managing Waterfowl Populations*. Proc. IWRB Symp., Astrakhan 1989. IWRB Spec. Publ. 12, Slimbridge, UK: 199–203.

Monitoring the autumn staging of Lesser White-fronted Geese in north-western Kazakhstan, October 1998

Petteri Tolvanen¹, Konstantin E. Litvin² & Petri Lampila³

¹ WWF Finland, Lintulahdenkatu 10, FIN-00500 Helsinki, FINLAND, e-mail: tolvanen@sil.fi

² Russian Academy of Sciences – Bird Ringing Centre, Leninski pr. 86-310 Moscow 117313 RUSSIA, e-mail: ring@bird.msk.ru

³ Kalervontie 1 A 29, FIN-90570 Oulu, Finland, e-mail: plampila@mail.student oulu.fi

1. Introduction

The third international Lesser White-fronted Goose (*Anser erythropus*, later LWfG) expedition to the Kustanai Region, north-western Kazakhstan, was arranged in October 1998 by the Finnish LWfG Life project. For more information of the previous expeditions to this very important staging area for LWfG and Red-breasted Geese (*Branta ruficollis*), see Tolvanen and Pynnönen (1998) and Markkola et al. (1998).

The aim of the 1998 expedition was to monitor numbers of staging and migrating LWfG, to study the breeding success of LWfG (and White-fronted Geese) in the summer 1998, to calibrate the field work methods with colleagues from Kazakhstan and Norway, and to clear out the possibilities and threats to the conservation of LWfG in the area. Four Finnish and one Russian ornithologist (Toni Eskelin, Petri Lampila, Petro Pynnönen and Petteri Tolvanen from WWF Finland and Konstantin Litvin from the Goose and Swan Study Group of Eastern Europe and North Asia, Russia) participated, but due to various unexpected problems, the participants from Norway and Kazakhstan were not able to join the field work.

2. Methods

Methods used were based on the "Field instructions for monitoring LWfG" (see Appendix E). The same counting and sampling methods were used during the first LWfG expedition to the area in October 1996 (see Tolvanen & Pynnönen 1998). Numbers of geese on roosting lakes were counted early in the mornings during the mass departure from the roosting lakes to the feeding grounds. The species and age proportions were surveyed during day time by taking random samples from the flocks which were returning back to the roost.

The field survey was carried out during 5–16 October, and the lakes were checked from south to north to avoid counting the same birds twice. The local hunting inspection authorities (the Forest, Fish and Hunting Committee of the Kustanai Region) arranged the transportation, and facilitated access to the best lakes. In this autumn some of the formerly discovered roosting lakes were dried out after an exceptionally hot and dry summer. The roosting lakes visited were: Kulykol, Ayke, Batpakkol, Koybagar, Biesoygan, Tyuntyugur, Bozshakol, Lebyazhye and Rechnoe (Figure 1). The survey dates are listed in Table 1.

The weather was extraordinary cold during the first half of the expedition, but changed to much warmer during the second half. In the first period, we registered temperatures as low as -11°C , hard

winds and light snowfall. Most of the staging geese, at least in the northern parts of the survey area, left the area during this cold period.

3. Results and discussion

The total number of geese observed during the expedition was c. 293,000 ind., based on the morning counts. This figure is very similar to the figure of the previous corresponding expedition in October 1996 (c. 280,000 ind.) (Tolvanen & Pynnönen 1998). The random sampling of the species proportion resulted in a total sample data of 11,000 individuals, i.e. c. 3.8% of the total. In addition to the species shown in Table 2, four Bean Geese (*Anser fabalis*) and one Brent Goose (*B. bernicla*) were observed.

There was a considerable difference in the proportions of the goose species between of two separate observation points at Lake Kulykol (Table 3). The highest estimate for LWfG (based on the data from observation point 2) is most probably an overestimate, and according to subjective impressions in the field, figures between the minimum and mean estimates seems to be closer to the real number. Anyhow, the proportion of LWfG was relatively high at Lake Kulykol (minimum 3.8%, mean 7.0%), while at other lakes the proportion of LWfG was much lower (mean 1.0%), indicating that Lake Kulykol is preferred by LWfG over the other surveyed roosting lakes. In general, the observations from 1996 and 1998 confirm the exclusive importance of Lake Kulykol as a staging area for LWfG and Red-breasted Geese.

Because of the relatively small amount of well-observed flocks at Lake Biesoygan, samples were exceptionally taken also from more distant flocks at this lake. In such cases we revealed the ratio between

Table 1. The roosting lakes visited during the expedition, their coordinates and the time schedule.

Name of the lake, date of survey	N		E	
	deg	min	deg	min
Lake Kulykol, 5–7 October	51	20	61	50
Lake Ayke, 7–8 October	50	59	61	36
Lake Batpakkol, 8–9 October	51	25	62	39
Lake Koybagar, 10–11 October	52	33	65	37
Lake Biesoygan, 11–12 October	52	34	66	01
Lake Tyuntyugur, 12–13 October	52	43	65	53
Lake Bozshakol, 13–14 October	53	08	65	57
Lake Lebyazhye, 14–15 October	53	58	65	53
Lake Rechnoe, 15–16 October	54	07	65	46

Table 2. The sample sizes and species ratios. For Lake Kulykol, see also Table 3, and for Lake Biesoygan, see Table 4.

Lake	n in samples	A. albifrons		A. erythropus		A. anser		B. ruficollis	
		Mean %	SD ¹	Mean %	SD	Mean %	SD	Mean %	SD
Kulykol (mean)	7850	57.03		7.00		10.06		25.90	
Batpakkol	630	70.95	27.8	0.32	1.0	18.41	23.9	10.16	21.9
Koybagar	990	46.77	39.6	0.40	1.6	37.07	40.8	15.76	32.8
Biesoygan	2300	68.40		1.28		5.12	17.2	25.20	33.0
Other places ²	not sampled	63.64	34.2	1.00	3.7	18.04	30.2	17.29	29.0

¹ The standard deviations of these percent figures are relatively high, because in the samples of 30 individuals the proportion of each species (even LWfG) is randomly varying between 0–100%; applies also to the tables 3 and 4.

² Includes lakes Karakol, Ayke, Tyuntyugur and Bozshakol and various field places along the road. For these places, where adequate species ratio sample data was not possible to collect, the mean per cents of the combined data collected at lakes Ayke, Batpakkol, Koybagar and Biesoygan was used, except for the lakes Lebyazhye and Rechnoe, where no LWfG were observed.



Figure 1. Map of the survey area.

the other species without identifying the white-fronted species at species level (Table 4). Afterwards, these two data sets were combined, and the estimates for White-fronted Goose and LWfG were calculated using the combined per cent of all white-fronted species and the proportion ratio from data set 1.

The minimum estimate of the total number of LWfG observed during the expedition, c. 7,300 individuals (Table 5) is quite near the corresponding estimate from October 1996, while the mean estimate is c. 4,500 ind. higher than in October 1996 (Tolvanen & Pynnönen 1998). As shown in Table 3, there can be reasonable variation in the species ratio between different observation points at the same lake, even when using the same method and the same

sampling effort when sampling huge concentrations of geese. The estimates should therefore not be interpreted too strictly. However, the numbers of LWfG in October 1996 and October 1998 were of the same order of magnitude.

It can be concluded, that the total number of geese and the species proportion observed during the 1998 expedition (Table 5) are relatively close to similar data from 1996 (Tolvanen & Pynnönen 1998). Suggesting that during the last two years the number of birds was stable, this shows that the methods used are quite reliable. We can confirm now, that the minimum numbers of LWfG using this area as an autumn staging place is not less than 7,000 individuals, and that this area is currently the most important known staging



Photo. The southern shore of the Lake Koybagar. Almost all of the important roosting lakes for geese in north-western Kazakhstan are filled with fresh water and surrounded by reedbeds. A new threat to the roosting lakes in Kazakhstan is renting of the lakes for private people for fishing. Lake Koybagar is already rented, and this has caused increased disturbance for geese. © Petteri Tolvanen, Kazakhstan, October 1998

Table 3. Results of species ratio sampling of at Lake Kulykol. Two observation points were used.

Individuals in samples	Observation point 1		Observation point 2		Combined
	2660		5190		7850
Samples	Mean %	SD	Mean %	SD	Mean %
<i>A. albifrons</i>	57.89	36.5	56.17	35.1	57.03
<i>A. erythropus</i>	3.82	8.2	10.17	17.8	7.00
<i>A. anser</i>	13.79	29.7	6.34	15.0	10.01
<i>B. ruficollis</i>	24.51	34.0	27.28	35.0	25.90
Respective estimated numbers	Based on data from observation point 1 (minimum estimate)		Based on data from observation point 2 (maximum estimate)		Based on mean %
<i>A. albifrons</i>	92,700		89,900		91,300
<i>A. erythropus</i>	6,110		16,300		11,200
<i>A. anser</i>	22,100		10,200		16,100
<i>B. ruficollis</i>	39,300		43,700		41,500
Total	160,000		160,000		160,000

area of the western LWfG population.

The age ratio of LWfG and White-fronted Geese was studied by random sampling of the flying flocks (Table 6). The results indicate a very successful breeding year for LWfG (c. 43 % juv. birds), but a much lower juvenile production for White-fronted Goose. In October 1996, the proportion of juvenile LWfG was much lower (c. 33 %) (Tolvanen & Pynnönen 1998). The mean brood size of LWfG (or White-fronted Geese) was not estimated, due to problems in distinguishing families in the mixed flocks.

4. Conservation status

LWfG is still not protected in Kazakhstan. Compared with the situation in the area in 1996, several changes have taken place in the hunting regulations. In autumn 1998, the price of a hunting licence, valid only for one day was about 2000 KTE (c. 25 USD using the exchange rate in October 1998) and with one licence a hunter was

allowed to shoot only one goose, while two years earlier the licence was much cheaper, it was valid during the whole hunting season, and the hunter was allowed to shoot four geese per day. Thus the (legal) hunting has become much more expensive for hunters, which has resulted in increased illegal hunting, and it will probably also lead to a decrease in the incoming licence payments. At the same time, the total hunting pressure on geese in the area has decreased, but this is mainly due to the difficult economical situation (high prices for fuel and ammunition). In Kazakhstan, each region have their own regional hunting regulation system. The new system (described above) has been put into practise also in the Kokchetav Region east of the Kustanay region, but the old system is still in use e.g. in the Aktyubinsk Region in the south.

None of the surveyed roosting lakes or feeding areas is included in nature reserves. However, the local hunting inspection of the Kustanai Region has established c. 500 m broad hunting free zones around most of these lakes by local administrative regulations, and

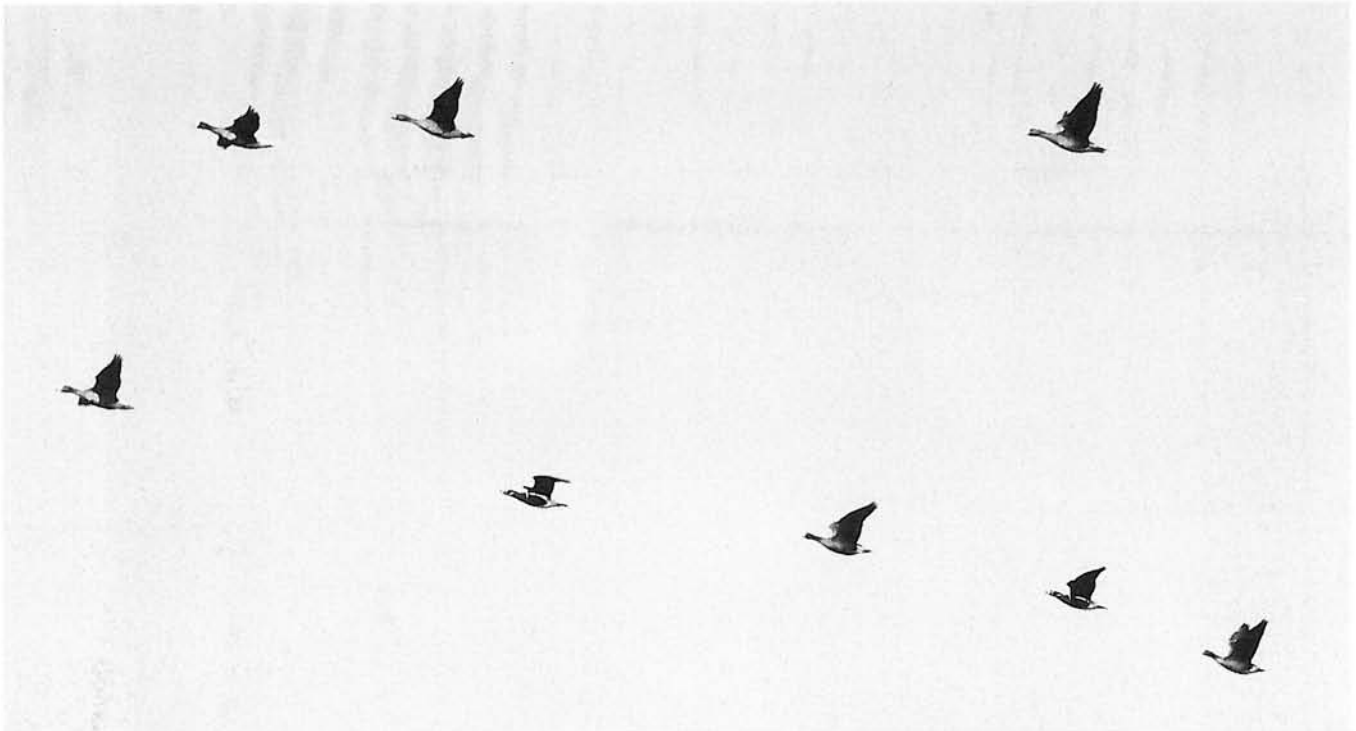


Photo. A mixed flock of White-fronted, Lesser White-fronted and Red-breasted Geese flying at the Lake Kulykol. Upper row from left to right: White-front ad, White-front 1cy, White-front ad. Lower row from left to right: White-front ad, Red-breasted, Lesser White-front ad, Red-breasted, Lesser White-front ad. Abbreviations: ad = adult (here: older than 1cy), 1cy = first calendar-year. The identification of White-fronted and Lesser White-fronted Geese is problematic. Compared with the White-front, LWfG has relatively shorter neck and bill, narrower wings and more uniformly dark brown head and upper neck. © Petteri Tolvanen, Kazakhstan, October 1998

Table 4. Results of species ratio sampling of at Lake Biesoygan.

Species	Data set 1 white-fronted geese identified at species level			Data set 2 white-fronted geese not identified at species level			Combined	
	n	Mean %	SD	n	Mean %	SD	Mean %	SD
	A. albifrons	1070	74.31	28.9				
A. erythropus	24	1.67	5.2					
A. albifrons/erythropus				327	46.45	41.5	69.68	34.2
A. anser	62	19.72	28.2	79	8.11	27.6	5.12	17.2
B. ruficollis	284	75.97	26.7	461	45.44	41.8	25.20	33.0
Total	1440			867				

Table 5. Estimates of numbers of the four most numerous geese species on the surveyed roosting lakes, based on the data shown in Table 1. In lakes of group B, the species ratio was not possible to estimate by the sampling method, mainly due to the long distance to the geese. The "other places" in group B includes several observation points along the road, mainly feeding flocks on the fields.

Species	A. albifrons	A. erythropus	A. anser	B. ruficollis	Total
A. Sampled lakes					
Kulykol ¹	91,300–92,700	6,110–11,200	16,100–22,100	39,300–41,500	160,000
Batpakkol	6,250	28	1,620	890	8,800
Koybagar	6,270	54	4,970	2,110	13,400
Biesoygan	23,400	440	1,750	8,620	34,200
B. Other places					
Lake Ayke	31,900	500	9,000	8,700	50,000
LakeTyuntyugur	160	2	50	40	250
Lake Bozshakol	7,500	120	2,100	2,000	11,700
Lake Lebyazhye	200		3,500	35	3,735
Lake Rechnoe	10		2,000		2,000
Other places	5,600	90	1,600	1,500	8,800
Total	172,600–174,200	7,300–12,400	42,700–48,700	63,200–65,400	293,000

¹ Minimum and mean estimates shown here. See also Table 3.

on these lakes it is also forbidden to disturb the roosting geese by boats. These local protection regulations seem to work well (especially at Lake Kulykol) and these regulations should be maintained and the completion should be controlled more effectively. New hunting free zones should be established also in other regions. At the moment, the main problem for the protection of the roosting

lakes is, that the hunting inspection does not have enough resources to control all the lakes, and the administrative position of the hunting inspection is unstable. As a clear indication of this, heavy illegal hunting was recorded at the Lake Batpakkol, which is situated far away from the main roads.

A new threat to the roosting lakes in the Kustanai Region (and

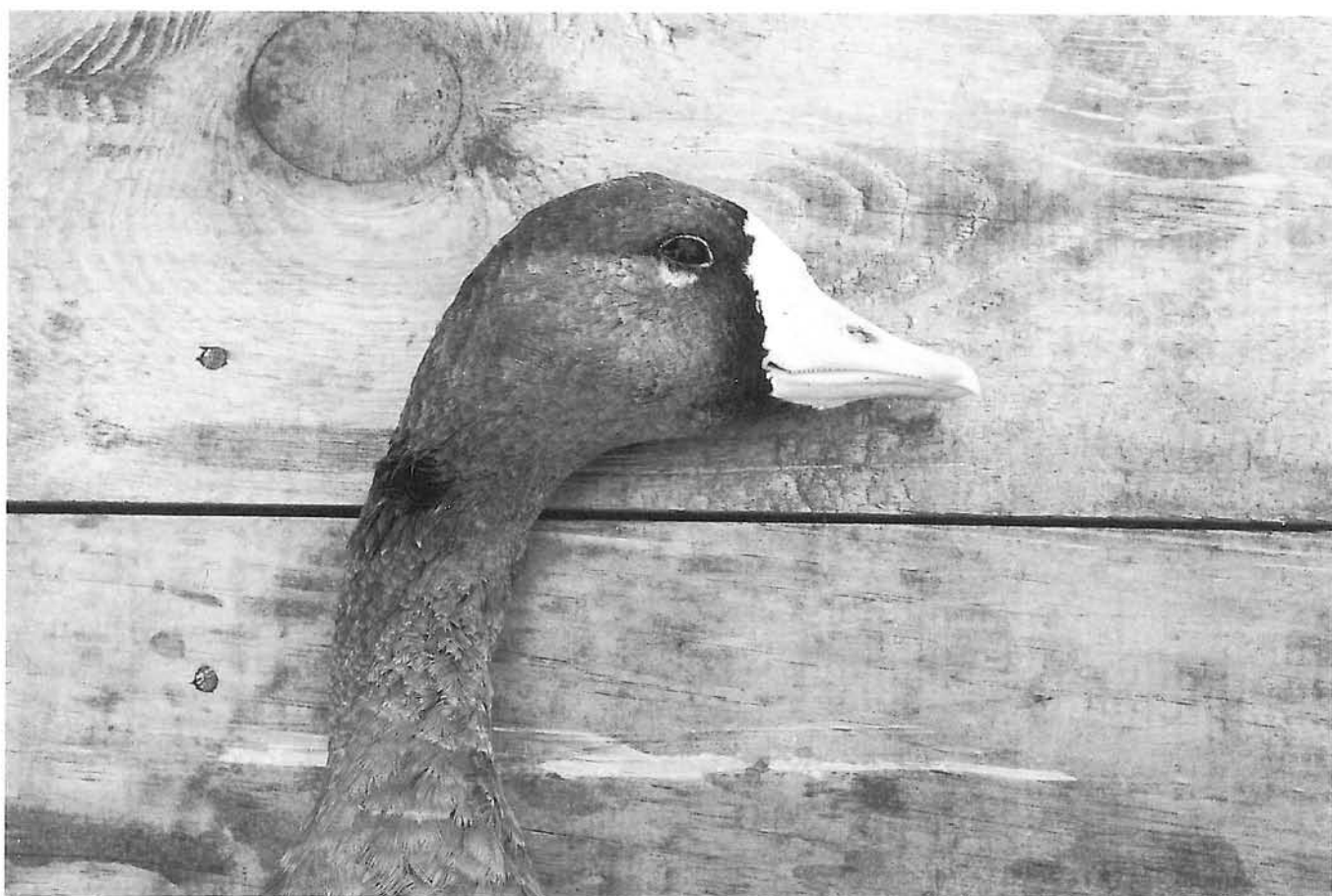


Photo. Some White-fronted Geese have a bright yellow eye-ring, and can be easily mixed with Lesser White-fronts. The overall colouration of head and upper neck of this adult White-front, shot in north-western Kazakhstan, is exceptionally dark. Such dark-headed individuals with a yellow eye-ring can be even more difficult to identify in the field. The long bill and relatively longer neck are the best identification features of such White-fronts. © Petteri Tolvanen, Kazakhstan, October 1998

Table 6. The age ratio of LWfG and White-fronted Geese in age ratio samples. The data for LWfG was collected at Lake Kulykol and for White-fronted Geese from Lake Biesoygan.

Species	n	ad %	juv %
<i>Anser albifrons</i>	588	79,4	20,6
<i>A. erythropus</i>	691	56,7	43,3

probably also elsewhere in Kazakhstan) is renting of the lakes for private people for fishing. Of the lakes visited by this expedition, Lake Koybagar is already rented, and this has caused more disturbance for geese on the lake, compared with the situation in October 1996. Another relatively new threat for geese in the area is the increasing hunting tourism.

Most of the lakes in the southern parts of Kustanai Region will dry up after certain periods (Tatyana Bragina, pers. comm.) due to the arid steppe climate, and therefore conservation of certain lakes as constant nature reserves is not necessarily the best way to protect LWfG and other waterfowl from hunting.

In the coming years, clearly the most effective way to protect LWfG and other waterfowl in the area would be to provide the local hunting inspection with adequate resources. For example in 1998, the local hunting inspectors have not been able to arrange inspection trips due to the lack of money for salaries and even for fuel.

5. Acknowledgements

The hunting inspection staff in the regional Forest, Fish and Hunting Committee of the Kustanai Region has been doing extremely good work in the conservation of LWfG in the Kustanai Region since 1996 despite the difficult economical situation. Special thanks to Viktor Semenov and Hamid Moldybaev for their enthusiasm and for the expert guidance and maintenance in the field. Thanks also to Tatyana and Evgeny Bragin for all their help and hospitality.

References

- Markkola, J., Pynnönen, P., Tolvanen, P., Veersalu, A. & Yerohov, S. 1998:** The second international Lesser White-fronted Goose *Anser erythropus* expedition in NW Kazakstan in May 1997. In Tolvanen, P., Ruokolainen, K., Markkola, J. & Karvonen R. (eds.): Finnish Lesser White-fronted Goose conservation project. Annual report 1997. – WWF Finland Report 9:21–22.
- Tolvanen, P. & Pynnönen, P. 1998:** Monitoring the autumn migration of Lesser White-fronted Goose *Anser erythropus* and other geese in NW Kazakstan in October 1996. In Tolvanen, P., Ruokolainen, K., Markkola, J. & Karvonen R. (eds.): Finnish Lesser White-fronted Goose conservation project. Annual report 1997. – WWF Finland Report 9: 19–20.

The Finnish breeding and restocking project of the Lesser White-fronted Goose: results and the current situation in 1998

Juha Markkola¹, Sami Timonen² & Pekka Nieminen³

¹ North Ostrobothnia Regional Environment Centre, P. O. BOX 124, FIN-90101 Oulu, FINLAND, e-mail: Juha.Markkola@vyh.fi

² North Ostrobothnia Regional Environment Centre, P. O. BOX 124, FIN-90101 Oulu, FINLAND, e-mail: Sami.Timonen@vyh.fi

³ FIN-90480 Hailuoto, FINLAND, e-mail: peka@hailuoto.oulu.net

1. Introduction

Unlike the Swedish reintroduction programme (see article on pp. 53–55 in this report), the Finnish restocking programme which started in winter 1985–1986 has been aiming to restock the endangered natural Lesser White-fronted Goose (*Anser erythropus*, later LWfG) population, and no semi-captive foster parents (e.g. Barnacle Geese) have been used to change the traditional migration route. Before the satellite tagging and colour-ringing project concerning the wild Fennoscandian population it was also thought that released LWfG with their blue neck collars and colour leg-rings following wild LWfG could reveal the stop-over sites and wintering quarters of the wild population. Results were presented in the international LWfG conference in Helsinki in March 1998, that also led to practical recommendations given by the meeting and confirmed by the Finnish LWfG working group and the Finnish Ministry of the Environment.

2. The breeding farms and the origin of the captive population

Breeding of LWfG in captivity has been carried out by WWF Finland in two farms in Finland: since 1986 on the isle of Hailuoto on the western coast and since 1989 at Hämeenkoski, Southern Finland.

The origin of the farm stock is as follows: the first four adult birds came to Hailuoto from the Swedish LWfG farm (Öster-Malma), and in 1988 11 birds from the farm of Mr. Berg, Sweden. None of these "grandparents" were alive in 1998. The birds are of Central European captive origin (UK, The Netherlands, Sweden; von Essen 1996), but the real wild origin (sub-population) of most of the birds is not known. However, some of these birds are known to be descended from a brood caught in Swedish Lapland (Lambart von Essen, pers. comm.)

The origin of the birds in the Hämeenkoski farm is more complicated. In 1989, the LWfG farm of Hämeenkoski was established by moving 18 juvenile birds from Hailuoto. In 1990, four birds again came from Hailuoto, all of them being young birds of the same year. In 1993, first two and later nine geese were moved from Sweden and still 12 more from Öster-Malma. In 1995, nine adults and one 2nd calendar-year bird were bought from Germany. In 1997, eleven geese were bought from Germany, eight from Denmark and two from Belgium.

3. Breeding and production

In captivity (like probably also in the wild), LWfG normally start breeding at the age of two years (3rd calendar-year). The youngest egg-layer has been a one-year old (2nd calendar-year bird) female. The oldest breeders have been c. 10 years old. One female can lay up to 10 eggs per year (normally 5–6). About 50 % of the eggs have

been developed to fledglings. Normally c. 10 % of all laid eggs are unfertilised, but among young females this figure can raise up to 50 %.

In the Hailuoto farm, there was earlier serious problems with Mycobacteriosis, and many old birds died. The epidemic broke out during the winter 1991–1992. One case of Mycobacteriosis was diagnosed also in Hämeenkoski farm. The Hailuoto farm was under quarantine for years and the production could not be used for restocking. The spreading of the disease was attempted to stop by:

1) isolating the old birds from young. This meant that eggs were incubated in an incubator and the goslings grew up without their parents.

2) sterilisation of the farm by changing the upper soil layer, heating the soil with steam via pipes and alkalifying the soil (Mycobacteria prefer low pH).

One serious problem was the missing reliable diagnostic method for Mycobacteriosis. The problem was studied intensively by the Veterinary Organisation of the State and the University of Helsinki where an examination work was made by Mika Aho led by professor Eeva-Liisa Hintikka. The spreading of the disease was stopped and no cases of Mycobacteriosis were diagnosed after 1997, when an old bird born in 1983 died. The temporal distribution of diagnosed cases was 1992 (two), 1993 (three), 1994 (three), 1995 (four) and 1996 (four).

4. Restocking

Since 1989, a total of 143 LWfG have been released in Northern Finnish Lapland (mean 16 individuals/year) (Table 1). The restocking areas were situated quite near the breeding places of the remaining wild LWfG population, and the released geese were expected to join and follow the wild birds. In the last two years the releasing area has been another one in a strictly protected nature reserve. Totally 123 of the released birds were juveniles, five 2nd calendar-year birds and 15 adults. The released groups were not complete families, but

Table 1. Lesser White-fronted Geese released in Finland 1989–1997. cy=calendar-year.

Year	ad	2nd cy	juv	Total
1989	2		3	5
1990	2		23	25
1991	2		22	24
1992	2		26	28
1993	2		15	17
1994	1	5	10	16
1995			6	6
1996	2		13	15
1997	2		5	7
Total	15	5	123	143

Table 2. Resightings and recoveries of released Lesser White-fronted Geese in the years in 1989–1997 (until March 1998). See also Table 3.

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	Total/Average
releasing date	3 July	3 July	6 July	15 July	12 July	13 July	18 July	12 July	14 July	11 July
no. released	5	25	24	28	17	16	6	15	7	143
resight./rec.	1	18	7	18	1	4	5	3	0	57
% res./rec.	20	72	29	64	6	25	83	20	0	40

Table 3. Observations of different age-classes and counted mortality rates of the released Finnish Lesser White-fronted Geese in 1989–1997. cy=calendar-year.

Age-class	alive (seen)	mortality rate
1st cy	48	0,8
2nd cy	8	0,5
3rd cy	4	0,5
4th cy	2	
5th cy	0	
Average		0,65

usually one family with a number of more or less adopted additional goslings.

5. Spatial and temporal distribution of resightings and recoveries

The major part of the observations of the released birds has been made along the migration route to Western Europe (Figure 1). Probably the released geese have followed Bean Geese (*A. fabalis*)



Photo. Adult female Lesser White-fronted Goose with goslings at the Hailuoto farm. © Juha Markkola

Table 4. Causes of death in Lesser White-fronted Geese released in the Finnish project 1989–1997 and in the Swedish project until 1988 (von Essen 1989). * = a probable case.

Cause of death	Finnish	Swedish	Total
Outside the releasing area			
Goshawk	–	1	1
Mink	–	1	1
Electric wire	–	2	2
Dog	2	–	2
Shot	7	1	8
Unknown	1	5	6
Total	10	10	20
In the releasing area			
Golden Eagle*	4		
White-tailed Eagle*	1		
Unknown disease	1		
Red Fox*	10		
Total	16		

and migrated with them to western Europe to winter.

Altogether c. 170 resightings of the restocked LWfG with blue neck bands is reported, of which 50 % in Finland. Of all reintroduced individuals, c. 40 % have been recorded at least once outside the releasing area, annual variation being 0–83 % (Table 2). The majority of the records have been made during the first autumn migration (Table 3).

Four birds have been reported shot in the Kola Peninsula (Figure 1). In October and during the winter months, restocked LWfG have been observed in Southern Sweden, Denmark, The Netherlands, Belgium, Great Britain and even in Spain.

Only eight or nine restocked individuals have been recorded back in Finnish Lapland during the subsequent summers, and only one (a non-breeding adult female in 1993) has returned to the restocking area. No breeding of the restocked birds has been confirmed in Finland. During the last years, the number of resightings has decreased: e.g. 50 resightings in 1992 (record year), compared to 25 in 1993 and 12 in 1995.

6. Survival and mortality of the released geese

The oldest released LWfG resighted (2 ind.) have been on their 4th calendar-year (Table 3). Also the other age classes except the first-year ones have been seen quite seldom: eight 2nd calendar-year birds and four 3rd calendar-year birds. Based on these figures it can be estimated that the mean annual mortality rate is as high as 65 %.

7. The situation in Lesser White-fronted Goose farms in 1998

At the end of 1998, there were 31 LWfG individuals in the Hailuoto farm. Twenty-five of them were adults, seven second calendar-year birds and six birds fledged this year. Of the last group five were normally incubated and one was hatched in an incubator. Five females laid altogether 26 eggs. Three females started to incubate of altogether 18 eggs. The most common time period of losses was the beginning of incubating, while in previous years there have been more unfertilised eggs. In the Hämeenkoski farm, 23 juveniles fledged.

A new “carousel fence system” was built on Hailuoto in 1998. It is a movable circular fence, where individual pairs have sector-shaped departments of their own, isolated from other pairs by partition walls. It was tested in the summer 1998: one female of an adult pair laid eggs there and altogether 10 geese (2 adult pairs and 6 juveniles) spent the summer in different departments. The new fence prevents the losses by predators effectively, it is easy to move to another location and the geese do not get familiar with humans as easily as before.

In the Hämeenkoski farm, the number of LWfG was more than twice the number in Hailuoto. At the end of the year there were altogether 76 birds, of which 51 adults, three 2nd calendar-year birds and 22 first-year individuals. Altogether 23 juveniles fledged from six nests. One of the fledglings died and the other losses included seven dead birds. The deaths were caused by complications under stress and two collision accidents. In Hämeenkoski the proportion of fertilized eggs of the actively incubated eggs was 63.5 %.

No geese were released to nature in 1998. This is in accordance with the new recommendations announced after the international LWfG meeting in spring 1998 in Helsinki (see discussion).

8. Discussion

One of the main reasons for the very limited results of the Finnish restocking programme is that the birds have been much too tame and confiding with humans, and many of them have probably been killed. During the first winter, the mortality rate of

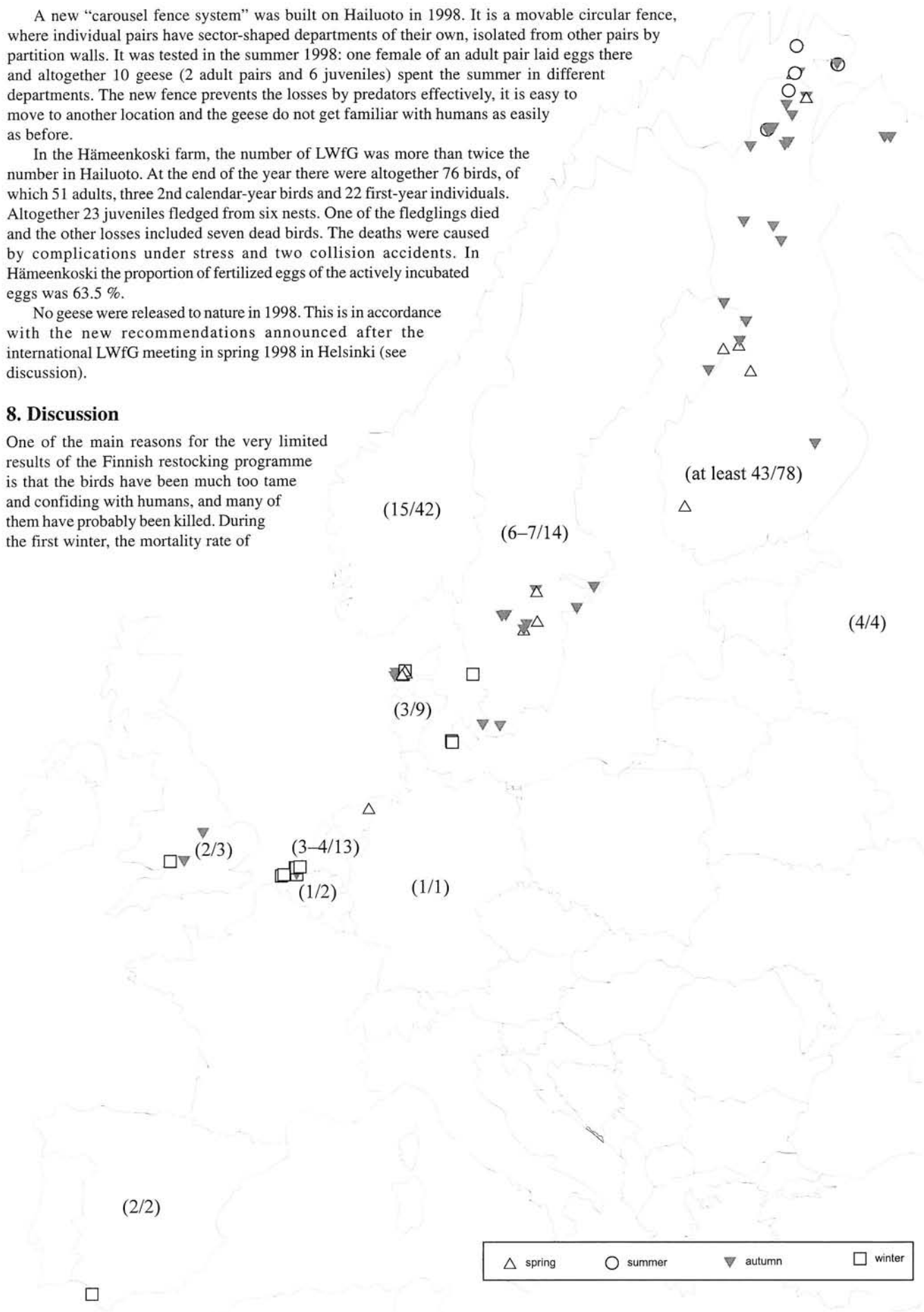


Figure 1. Spatial distribution of resightings and recoveries of released LWfG of the Finnish restocking project in 1989–1997. Some overlapping symbols are combined. The figures are showing the total numbers of different individuals / number of observations in each county.



Photo. In 1998, Lesser White-fronted Geese of Swedish reintroduction origin were observed at several places in Southern Finland. This individual was photographed on the island of Ruissalo near Turku in south-western Finland. © Henry Lehto, May 1998

the restocked birds seems to have been as high as 70–80 %. This may be an over-estimate due to loss of neck bands. Anyhow, the mortality rate has been much higher than in the Swedish project (1984–1991 c. 23% according to von Essen 1996). The oldest resighted released Finnish bird has been on its 4th calendar-year, whereas the oldest Swedish birds are more than 10 years old. For the wild Fennoscandian LWfG population, juvenile mortality rate of c. 80% has been estimated (Aarvak et al. 1997).

Birds have e.g. appeared in the yards and once one individual landed in a kennel and was killed by dogs! To improve the results, the captive population should have been much more effectively isolated from human contacts and breeding pairs should have been kept in “private fences” during the breeding season.

Outside the releasing area, the most common documented cause of death has been shooting. Of the confirmed death cases in the Finnish project seven of all 10 cases outside the releasing area were due to shooting (Table 4). There seems to be a clear difference compared with Sweden, where until 1988 only one goose was confirmed shot of all 10 death cases. This may indicate a “cultural” difference between Finnish and Swedish hunters. The figures in Table 4 also indicate that the released birds are quite vulnerable to natural predators like the Red Fox (*Vulpes vulpes*).

One explanation for few returning observations might be the fact that the birds are not imprinted enough to the releasing area. To improve the imprinting to the releasing area, the juveniles should have been released with their own parents (until now breeding pairs have been spared and goslings from different broods have been adopted to only one adult pair) and earlier to make them stay longer in the surroundings of the releasing area. On the other hand an earlier releasing time could make them still more vulnerable to e.g. Red Fox.

The international LWfG meeting held in Helsinki on 26–27 March, 1998 evaluated the Finnish restocking project compared with the Swedish reintroduction project and concluded that the Swedish one had a more clear strategy and much better results. Even if the results of restocking in Finland are bad, the breeding farms have offered a good chance to collect data for e.g. ageing of goslings in field, ethological studies, studies on time-table of moulting and identification of moult feathers.

As a consequence of the bad results of the restocking project in Finland, new results obtained from DNA studies of captive LWfG population (see von Essen 1999, pp. 53–55 in this report) and

discussions by the international LWfG meeting held in Helsinki 26–27 March 1998, the LWfG working group of WWF Finland and the Ministry of the Environment announced a declaration of a new direction in farming and restocking of the LWfG in Finland. This was discussed further in a meeting 28–29 November:

1. Because it was noticed that Scandinavian captive birds represent genetic mixture of western and eastern haplotypes, it is considered necessary to stop the restocking to the using birds of the present captive origin, and try to replace the present captive population with new wild birds which represent western haplotype birds.

2. Because conservation of the global wild population of the LWfG is the core of the activities and needs resources, the new farm stock should be held as a reserve for the future. If the recovery of the wild western population fails in spite of all efforts, reintroduction could begin again. In this “stand-by” position the captive population should be held on a moderate level of some tens of geese (to limit the costs) paying special attention to maintaining the genetic variation of the new material. The present captive population could be held for some time in captivity for demonstrative purposes, i.e. using them to increase knowledge of goose identification among hunters and all kind of public awareness.

References

- Aarvak, T., Øien I. J., Syroechkovski Jr., E. E. & Kostadinova, I. 1997: The Lesser White-fronted Goose monitoring programme. Annual Report 1997. Klæbu, Norwegian Ornithological Society. NOF Rapportserie. Report No. 5-1997.
- von Essen, L. 1989: The present status of the Lesser White-fronted Goose, *Anser erythropus*, in Sweden and the result of a reintroduction scheme. Unpublished report.
- von Essen, L. 1996: Reintroduction of LWfG (*Anser erythropus*) in Swedish Lapland (1981–1991). – *Gibier Faune Sauvage, Game Wildlife* 13:1169–1180.
- von Essen, L. 1999: The Swedish reintroduction project of Lesser White-fronted Geese. In Tolvanen, P., Øien, I. J. & Ruokolainen, K. (eds.): Fennoscandian Lesser White-fronted Goose conservation project. Annual report 1998. – WWF Finland Report 10 & Norwegian Ornithological Society, NOF Rapportserie Report no. 1-1999: 53–55.
- Larsson, K. 1993: Projekt fjällgås, en utvärdering. – Unpublished report, WWF Sweden.

Phylogeography and population genetic structure of the Lesser White-fronted Goose

Minna Ruokonen & Jaakko Lumme

Department of Biology, University of Oulu, P.O. Box 3000, Fin-90401 Oulu, FINLAND, email: minna.ruokonen@csc.fi, jaakko.lumme@oulu.fi

1. Introduction

Parallel to the ecological work, the population genetic structure of the Lesser White-fronted Goose (*Anser erythropus*, later LWfG) has been studied. Together with the ecological data, it hopefully provides information that can be utilized in the planning of conservation priorities and strategies. Special focus is on the Fennoscandian breeding population.

2. Samples and methodological outlines

Genetic material from three breeding areas (Fennoscandia, Yamal, Taimyr), one staging area (Kazakhstan) and one wintering population (China) have been sampled during the field work conducted by Finnish, Norwegian, Russian and Chinese LWfG groups. The Chinese wintering birds probably represents breeding LWfG in Taimyr and eastwards from Taimyr. From satellite telemetry results it is known that individuals sampled in Kazakhstan breed in Fennoscandia, Yamal and Taimyr (Tolvanen & Pynnönen 1998, Karvonen & Markkola 1998, Lorentsen et al. 1998, Øien et al. 1999, pp. 37–41 in this report). In addition, old feathers have been collected from Finnish and Norwegian museums to be able to deduce the genetic composition of the Fennoscandian LWfG's before the population decline started. As a genetic marker we use the hypervariable control region of the mitochondrial DNA (mtDNA).

3. Phylogeography and population genetic structure of the LWfG

Altogether eight mitochondrial haplotypes have been detected so far. The haplotypes cluster into two main groups (western and eastern)

with an estimated divergence time of 150,000 years. This implies that two LWfG populations existed in separate (at least partially) isolated refugia during the last Ice Age. According to Ploeger (1968), the possible regular breeding grounds during the last glacial for LWfG existed in Russia, Western Siberia and Middle Siberia. As the ice retreated, the contemporary breeding areas were colonized by individuals from the two postulated refugia. The present distribution of the haplotypes reflects the colonization history of the species. The Western haplotype is prevalent in breeding areas west from Taimyr and the Eastern haplotype is the most common one in Taimyr and eastwards (Figure 1). Yamal and Taimyr represent a contact zone in which a mixture of the western and eastern haplotypes exist. When both the haplotype frequencies and their genealogical relationships are considered, significant differentiation among the populations is detected between Fennoscandia and Kazakhstan versus China (AMOVA $F=0.26$, $P=0.000$). However, the recent colonization of the present breeding areas within the last 10,000 years is inadequate for the genetic differentiation through mutations. Therefore, the contemporary differences in haplotype frequencies among the populations might be more informative when the present spatial structuring of the matriline is considered. In this case, significant differentiation exists in population pairwise comparisons between Fennoscandia and all the other breeding populations including the eastern breeding populations represented by China (AMOVA $F=0.17$, $P=0.000$). In Fennoscandian Lapland, almost all the individuals (92%) share the same mitochondrial haplotype (Figure 1). This is the case with historical samples as well, and implies that Fennoscandian Lapland was colonized by a few individuals and the genetic uniformity is not due to the recent population bottleneck. It suggests strongly that the Fennoscandian breeding LWfG should be



Photo. An adult Lesser White-fronted Goose in a wintering flock of White-fronted Geese on a rice field near the Izunuma Marsh in the Miyagi Prefecture, Japan. Nowadays, only some LWfG winters in Japan. In general, however, the "eastern population" of LWfG, wintering mainly in China, seems to be somewhat more numerous than the "western population" that is migrating via north-western Kazakhstan to the still unknown wintering areas. © Keiichi Kasahara

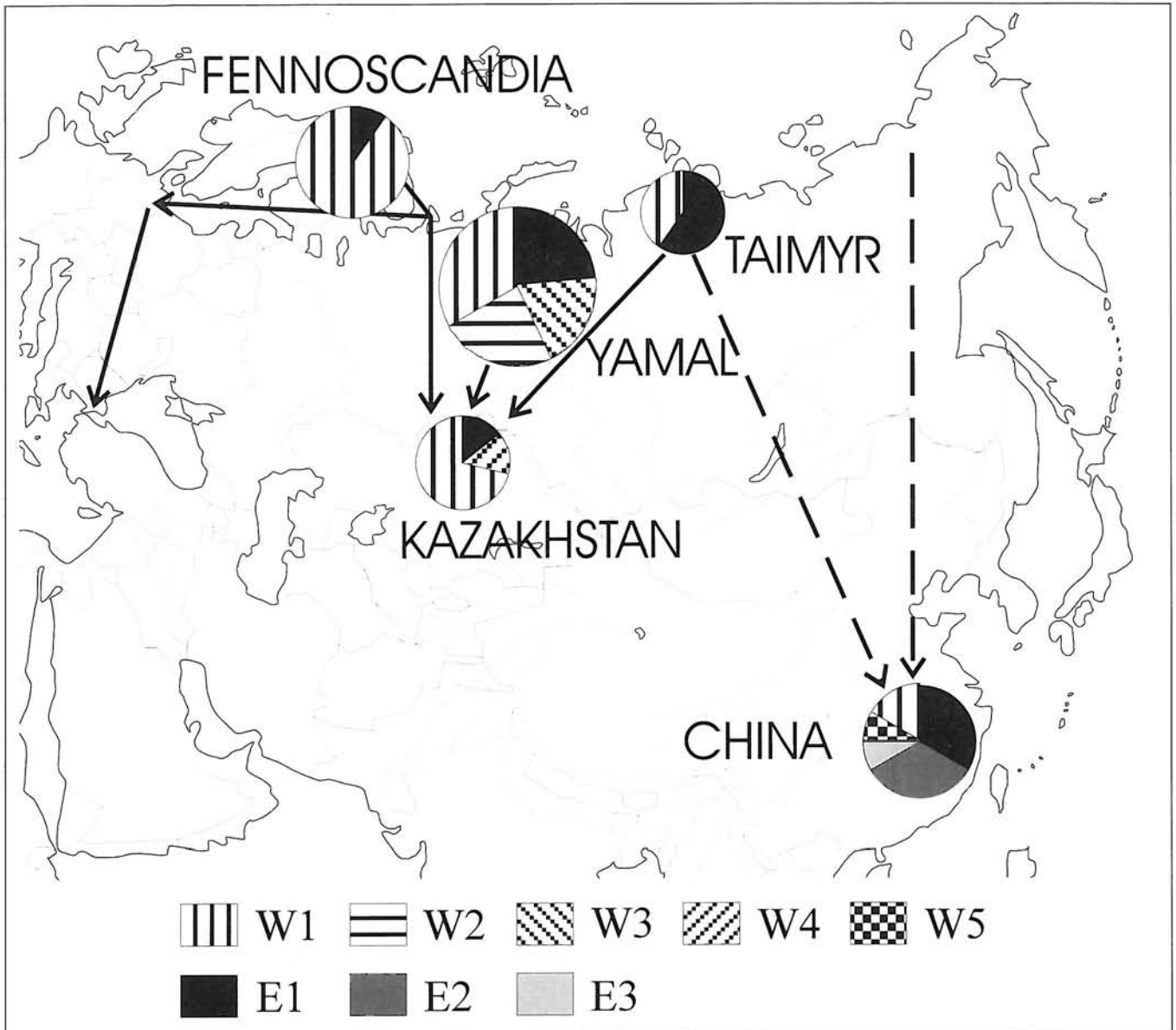


Figure 1. Mitochondrial haplotype frequencies from three breeding areas (Fennoscandia, Yamal, Taimyr), one staging area (Kazakhstan) and one wintering area (China) of Lesser White-fronted Geese. Solid arrows indicate known migration routes, dashed arrows show probable migratory flyways. W, western haplotype, E, eastern haplotype.

considered as an independent management unit and conserved as a demographically autonomous population (Avisé 1995).

4. Captive population

We have carried out a preliminary study on the genetic background of the captive LWfG population in Finland because the origin of the stock is not known. So far, the results indicate that the captive population is a mixture of western and eastern haplotypes and thus it might not be appropriate for restocking purposes in Fennoscandian Lapland. Final conclusions await for more information both from the captive stock and the wild population.

5. Acknowledgements

Thanks to everybody for everything. Special thanks to Kalle Ruokolainen for help in preparing the map.

References

Avisé, J. 1995: Mitochondrial DNA polymorphism and a connection between genetics and demography of relevance to conservation. – *Conservation Biology* 9: 686–690.
 Karvonen, R. & Markkola, J. 1998: Satellite follow-up of the Yamal Lesser White-fronted goose Sibyako (the Mother). In

Tolvanen, P., Ruokolainen, K., Markkola, J. & Karvonen, R. (eds.). Finnish Lesser White-fronted Goose conservation project. Annual Report 1997. – WWF Finland Report 9: 36–37.
 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.
 Ploeger, P. L. 1968: Geographical differentiation in arctic Anatidae as a result of isolation during the last glacial. *Ardea* 56: 1–159.
 Tolvanen, P. & Pynnönen, P. 1998: Monitoring the autumn migration of Lesser White-fronted Goose *Anser erythropus* and other geese in NW Kazakstan in October 1996. In Tolvanen, P., Ruokolainen, K., Markkola, J. & Karvonen, R. (eds.): Finnish Lesser White-fronted Goose conservation project. Annual Report 1997. – WWF Finland Report 9: 19–20.
 Øien, I. J., Tolvanen, P., Aarvak, T., Litvin, K. E. & Markkola, J. 1999: Surveys and catching of Lesser White-fronted Geese at Taimyr Peninsula – preliminary results on autumn migration routes mapped by means of satellite telemetry. In Tolvanen, P., Øien, I. J. & Ruokolainen, K. (eds.): Fennoscandian Lesser White-fronted Goose conservation project. Annual report 1998. – WWF Finland Report 10 & Norwegian Ornithological Society, NOF Rapportserie Report no. 1-1999: 37–41.

lings from Lapland to The Netherlands. This is of course favourable as they have gained experience in guiding their broods to good localities which provide food and safety.

3. Results of the reintroduction

From 1981 to 1998, 301 LWfG (275 goslings and 26 yearlings), about 20 per year, have been released at the same site in Lapland. In the first years all the goslings were not imprinted on the parents and the survival rate was not so good. There was also a break in reintroductions in 1992 and 1993, and in 1994 30 geese were released at another site and most of the geese disappeared. In the last four years, however, the survival rate of the released goslings has been high (Table 1).

The current size of the population at the release site in spring is approx. 50 birds. Up to 1997 at least 29 breeding attempts have been observed of which 22 were successful. A total of 64 young have fledged (mean 2.9 juv/brood). Thus, it has been confirmed that an important goal of the project has been achieved – a new population of LWfG is now breeding in Sweden and it is migrating to The Netherlands to winter. The method of using Barnacle Geese as guiding foster parents has worked out well and the assumption that the LWfG would return in the spring to the area where they had learned to fly in previous year, has also been proved (von Essen 1996).

4. Activities and results in 1998

4.1. Captive breeding and releasing

Ten pairs of LWfG produced 56 eggs, but only 30 (54%) were fertile. The number of breeding Barnacle Geese in the ponds at Öster-Malma was six and five of them were used to incubate the LWfG eggs. Altogether 30 fertile eggs hatched. One brood was depredated by Raven (*Corvus corax*) and difficulties with catching the broods diminished the accessible broods finally to three. The total number of goslings raised was 18 (broods of 7, 6 and 5). One pair of Barnacles was used for the fifth time in succession and one female for the fourth.

The release of the broods in Swedish Lapland was carried out on 7 July, and they were released at the same spot as in earlier years. Also seven 2nd calendar-year LWfG were released there. We had received them from the Nordic Ark Trust, which is sponsoring the project. The day after the release an adult White-tailed Eagle was seen sitting at the site where the geese were released. There were also Golden Eagles (*Aquila chrysaetos*), Red Foxes (*Vulpes vulpes*), Minks (*Mustela vison*) and other predators in the area, so the geese really have to be on the alert. In the autumn, however, all the three broods with 13 out of the 18 juveniles were seen in Southern Sweden.

4.2. Migration

In winter 97/98 a total of 61 LWfG were counted in The Netherlands, which is the highest number so far. At Anjum, a frequented staging site in Northern Friesland, 35 geese were sighted. In a new winter locality at Petten in Noord-Holland there were 22 LWfG (Cottaar & Brouwer 1998) and at Strijen in Zuid-Holland 13 LWfG. One of them was the well-known 'Limping Lotta', at that time eight years of age (von Essen et al. 1993).

In spring 15 LWfG had a stop-over in the Öster-Malma area. Among them there was a brood consisting of two ringed parents and four of their yearlings. In the summer 1997 I saw this brood in Lapland and I was surprised that both parents were only two years old. They spent all the winter at Petten and on 15 April they had a break on their return to Lapland. We also saw them back at the breeding area on 14 June. Thus, these two LWfG, released in the

Figure 1. Migration route of the introduced population of Lesser White-fronted Goose.



area in 1995, bred successfully at two years of age, guided their goslings to the winter quarters to where they had been learned to migrate by their foster parents, and also guided their own offspring back to the home area in Lapland. – Wonderful!

In the second part of May about 20 LWfG were sighted at Båtsjaur, a very good and frequented staging site in spring, about 50 km east of the release area.

During autumn the town park and the surroundings of Hudiksvall have for many years been an appreciated staging site for the geese. Some of them, especially those who have been unsuccessful in breeding also go there for moulting. In last autumn there were 17 LWfG. A fairly new autumn staging locality is the Svensksund Bay, 15 km east of Norrköping. In this autumn there were at least 27 LWfG resting there for some weeks. The first report on LWfG which arrived to The Netherlands was on 24 October when eight adults were seen at Anjum. In this group Limping Lotta was the only geese which was ringed. At Petten the first ten LWfG were reported on 15 November.

4.3. Breeding season

The spring and the beginning of the summer was extremely cold and late in the breeding area this year. No leaves and no green ground vegetation could be seen until in the end of June, and ice covered the lakes longer than usual. During our inventory work in the middle



Photo. Lesser White-fronted Geese of the Swedish reintroduction origin wintering in the Netherlands. The birds are usually seen with White-fronted (like here) and Barnacle Geese. © Anders Bylin

Table 1. Survival of LWfG released as goslings at Svaipa in Swedish Lapland

Released Year	Number	Resightings and indications															
		Southern Sweden		Netherlands 1st winter		Lapland 2nd summer		Netherlands 2nd winter		Lapland 3rd summer		Netherlands 3rd winter		Lapland 4th summer		Netherlands 4th winter	
1995	20	18	90%	13	65%	12	60%	11	55%	9	45%	9	45%	9	45%		
1996	21	21	100%	18	86%	15	71%	14	67%	12	57%						
1997	22	21	95%	21	95%	14	64%										
1998	18	13	72%														
Total	81	73	90%														

Notes: 1. The goslings are released at the age of about six weeks, 2. Sightings are reported up to 30 November, 1998, 3. The figures are minimum numbers.

of June we counted c. 50 LWfG in the area. There were 33 ringed birds and at least 15 unringed. This was the highest number in this area since we started the project in 1981. Pairs and groups of geese were seen every day, and Limping Lotta and her unringed mate was there. She is now nine years old.

However, we did not find any breeding birds this year. In 1994 we found five, 1995 three, 1996 six and in 1997 three breeding pairs. The reason must have been the bad weather and lack of favourable nutrition. On one occasion I saw a couple of geese picking the old berries of *Empetrum nigrum*. Perhaps some geese had laid eggs in the beginning of June, but have had their nests depredated by Red Fox using the ice for entering the small island. Similar was the situation also in another late spring in 1995.

When we returned to the area on 7 July to release new goose families we did not find any of the 50 geese we had seen in the middle of June. They must have moved to the moulting sites and on 7 July eleven of them were seen at Hudiksvall. Ten geese were reported to have been at Rana in Nordland County in Norway already on 16 June. On 8 August eight of these were back in Sweden at Söderhamn and in September and October they were observed at Hjälstaviken, 40 km SW of Uppsala.

4.4. LWfG population in Sweden outside the reintroduction area

In some years during the reintroduction period, local surveys were carried out to investigate where the LWfG were still breeding. In 1988 a survey was undertaken in order to estimate the total number of breeding pairs in Swedish Lapland. The investigation was based on a general appeal to report observations and on local inventories. Based on these observations it can be estimated that the number of breeding LWfG pairs was >10 around 1990, which were scattered primarily in Northern Lapland (von Essen 1991). The number has drastically decreased and the last reliable observation of breeding was reported in 1989. In spite of continued surveys, only a few birds were reported.

Five interesting localities were searched by expedition teams in 1998. At one site a Finnish team saw a single LWfG on 23 June possibly indicating breeding. A later control of the area gave no evidence on breeding. Also at another favourable area a single goose was sighted in the beginning of August. Disturbance by sportfishing at that area was reported. In two other areas in Northern Lapland no LWfG were found. In Southern Lapland one area was thoroughly

investigated. In 1989 one brood was seen there and in 1994 and 1997 some feathers and droppings were found. This summer, however, no fresh traces were found.

On the basis of the results from surveys conducted during the past decade it must be stated that the LWfG is no longer breeding annually bird in Sweden outside the reintroduction area.

4.5. Continuing of the release programme

The opinion of the working group of the project is that a continuation of the captive breeding and releasing of goose families is necessary for at least a few more years to strengthen and expand the population in the release area. They must withstand the circumstances of the poor breeding seasons (bad weather and depredation). Another reason is that during a hard winter in The Netherlands the geese could migrate further south to France, where hunting of geese is allowed in February. This was the case in February 1997 when two broods disappeared. The reintroduced LWfG population is still small and therefore vulnerable.

References

- Cottaar, F. & Brouwer, R. 1998: New wintering area for Lesser White-fronted Goose in the Netherlands. (In Dutch with English summary) – *Dutch Birding* 20:111–113
- von Essen, L. 1982a: An effort to reintroduce the Lesser White-fronted Goose *Anser erythropus* into the Scandinavian Mountains. – *Aquila* 89: 103–105.
- von Essen, L. 1982b: Försöksverksamhet med uppfödning och utplantering av sädgås. – *Vår Fågelvärld Suppl.* 9 (1982):105–108.
- von Essen, L. 1991: A note on the Lesser White-fronted Goose *Anser erythropus* in Sweden and the result of a re-introduction scheme. – *Ardea* 79:305–306.
- von Essen, L., Ouweneel, G. L. & van den Berq, A. B. 1993: Origin of colour-ringed Lesser White-fronted Goose at Strijen. (In Dutch with English summary). – *Dutch Birding* 15: 220–224.
- von Essen, L. 1996: Reintroduction of Lesser White-fronted Goose (*Anser erythropus*) in Swedish Lapland (1981–1991). – *Gibier Faune Sauvage, Game Wildl.* 13:1169–1180.

Southern population of Lesser White-fronted Goose finally extinct in Norway?

Separated from the core breeding area, in Finnmark, a relict of the mountainous breeding population of Lesser White-fronts has been left in Nordland County in Norway until the 1990's. The last information on probable breeding in this area were in 1991 and 1992, when 1–3 pairs may have bred here.

The area has been visited annually throughout the 1990's, and usually Lesser White-fronts have been observed, – or moult feathers or faeces has been found, without any signs of breeding. The observations has, however, become more and more sporadic. Both in 1997 and in 1998, the Rana branch of the Norwegian Ornithological Society in Nordland surveyed the area for breeding Lesser White-fronts in the traditional breeding grounds in the mountainous areas on the Norwegian/Swedish border.

In 1998 B. Sætermo, K. Sivertsen and J.T. Kristensen spent three days in the

area, checking the lake shores in the traditional breeding area on both the Norwegian and Swedish side of the border. For the first time, no traces of Lesser White-fronts could be found. In 1997, faeces were found both on the Swedish and the Norwegian side of the border. Until 1992, the geese observed in this area surely were from the original wild population. During the last years, however, lowland observations of Swedish re-introduced birds in Nordland County may raise a question about the origin of the geese which has used this area during the 1990's.

Ingar Jostein Øien & Tomas Aarvak

New record of Lesser White-fronted Geese with brood in southern parts of Norway

Until 1998, only three breeding records existed south of Nordland County in Norway, which until 1991 has been the southern limit of the Norwegian breeding population (see the previous short news). The southernmost breeding records are from Fokstumyra in Oppland County,

where five goslings were produced both in 1962 and 1963 (Barth 1964). In 1998 one pair with three goslings was observed feeding on the southern shore of Lake Savalen close to Sinktrøvangen in Hedmark County on 27 September. The brood was grazing in the grass vegetation close to the lake shore. The observers could not see whether the birds were colour-ringed or not, because the grass covered the legs. The geese were, however, quite tame, and the observer studied them from a distance of only 20 metres. This area is situated 65 kilometres west of Fokstumyra. It is quite likely that they have bred in the mountain areas of Dovrefjell which at present represent the only intact alpine mountain-ecosystem in Western Europe, with natural populations of Reindeer (*Rangifer tarandus*), Arctic fox (*Alopex lagopus*) and Wolverine (*Gulo gulo*).

Tomas Aarvak & Ingar Jostein Øien

Barth, E. K. 1964: Supplement til Fokstumyras fuglefauna. – *Sterna* 6:49–74.

Errata

Corrections to the following article: Karvonen, R. & Alhainen, J. 1998: Tagging efforts in Siberia: Yamal, summer 1997. In Tolvanen, P., Ruokolainen, K., Markkola J. & Karvonen, R. (eds.): Finnish Lesser White-fronted Goose conservation project. Annual report 1997. – WWF Finland Report 9: 24–26.

The named article has some errors in geographical names and contains incorrect data on numbers of Lesser White-fronted Goose. These mistakes appeared because authors used my personal communications without my agreement and not discussing with me the content. Unfortunately I was not able to look at the paper before publishing.

My corrections are following:

1) Russian participants Alexandr Sharikov and Yaroslav Nescorodov are not from the University of Moscow, but from the Moscow Pedagogical State University.

2) The geographical name "Polyarny Ural" is not valid. Correct name is Polar Ural.

3) The geographical name "Skusja" river occurring everywhere in the text is incorrect. Correct name is "Shchuchya" river.

4) The phrase on the pg 24 ..."Laborowaja, a bigger Nenets town,..." is better to change to ..."Laborovaya, a small Nenets village,..."

5) On the pg 26, the third paragraph from the top have been written... "in the Skusja river delta area." We have never visited Shchuchya river delta located more than 90 km to the south from our study area. All events described in this part of the text took place at the mouth of the Khe-Yakha river.

6) In the fourth paragraph from the top on the pg 26 authors informed that a total of 90 adult LWfG were observed before the arrival of the Finnish part of the expedition. In fact 108 adults Lesser White-fronted Goose had been counted by Russians before the Finnish participants arrived.

7) In the chapter 9 "Discussion", based on supposedly my personal communication, authors said that in 1996 there were c. 175 LWfG in the area and only 90 individuals were observed in 1997. These numbers are incorrect. I informed the Finnish participants about only approximate number. In fact, 108 (not 90) adults were counted in June within 200 km². It should be remembered that this territory is only the part of the explored area. In June 1996 we counted 105 adult within the same part of the study area (200 km²) (Morozov & Kalyakin 1997) and 175 adults were counted within all investigated territory, totally 1000 km²

8) The assumption that the population of Lesser White-fronted Goose in Shchuchya river basin is endangered to go extinct made by Finnish participants in the chapter 9 "Discussion" is not realistic. It is based not on the sound analysis of facts but on the incorrect interpretation of oral communications, lack of knowledge of the Russian literature and the emotional impressions obtained within the short-time visit in Yamal in 1997.

Morozov, V. V. , Kalyakin V. N. 1997: Lesser White-fronted Goose (*Anser erythropus*) in southern Yamal: retrospective analysis of population changes. (In Russian with English summary) – *Casarca* 3:175–191.

Vladimir Morozov

Russian Research Institute of Nature Protection, VILR, Znamenskoye-Sadki, 113628 Moscow, M-628, Russia

Co-operation partners and contacts of the Finnish and Norwegian Lesser White-fronted Goose projects in 1998

BirdLife International

Zoltan Walizcky

Wetlands International

Jesper Madsen
Bart Ebbing

WWF Arctic Programme

Peter Prokosch

Belarus

Alexey K. Tishechkin

Institute of Zoology, Belarus Academy of Science

Bulgaria

Christo Bojinov
Sergey Deleriev, Dimitir Georgiev,
Petar Iankov, Irina Kostadinova, Nikolai Petkov

Ministry of Environment and Waters, Bulgaria, National Nature Protection Service
Bulgarian Society for the Protection of Birds (BSPB)

The peoples republic of China

Lei Gang

Eastern Dongting Lake Strict Nature Reserve

Croatia

Jelena Kralj
Jasminca Radovic

Institute of Ornithology
Dept. of Nature Conservation, Ministry of Civil Engineering and Nature

Czech Republic

Peter Burg
Marcel Honza
Jan Hora

Jihocesce Muzeum
Institute of Agriculture and Natural Sciences
Czech Ornithological Society

Estonia

Jaanus Elts
Eerik Leibak
Aivar Leito
Vilju Lilleleht
Aleksi Lotman

Estonian Ornithological Society
Estonian Fund for Nature
Institute of Environment Protection
Institute of Zoology and Botany, Tartu
Matsalu Nature Reserve

Finland

Risto Anunti
Jari Peltomäki, Ulla Peltomäki
Timo Asanti
Eero Helle, Einari Väyrynen
Pertti Rassi, Matti Osara, Esko Jaakkola
Pertti Saurola

Bongariliitto / Lintutiedotus ry
Employment Offices in Finland
Enontekiön Lento
Finnature
Finnish Environment Agency
Finnish Game and Fisheries Research Institute
Finnish Ministry of the Environment
Finnish Museum of Natural History, Ringing Centre
Luonto-Liitto ry
Pohjois-Pohjanmaan lintutieteellinen yhdistys
The Frontier Guard of Finland
University of Oulu, Department of Biology
University of Oulu, Department of Biology
Vuotson Lentopalvelu
WWF Finland, Arctic fox team

Jaakko Lumme, Minna Ruokonen
Annamari Markkola, Marika Niemelä
Jouni Asteljoki
Asko Kaikusalo

Germany

Edwin Donath
Stefan Krüger

Max-Planck-Institute of Colloid and Interface Research
Galenbecker Ornithological Station

Greece

G.I. Handrinos
Hans Jerrentrup
Stella Kladara, Kostas Pistolas
Theodoros Naziridiz

Hellenic Republic ministry of Agriculture
Society for protection of Nature and Ecocodevelopment
World Wildlife Fund, Greece
Hellenic Ornithological Society

Hungary

Sandor Farago
Zsolte Kalota's, Gabor Magyor
Ga'bor Kova'cs, Janos Tar
Scabolcs Nagy
Michael Vegh

Dept. of Wildlife Management, University of Forestry & Wood Science
Hungarian Nature Conservation Authority
Hortobagy National Park
Hungarian Ornithological and Nature Conservation Society (MME)
Hungarian Ministry of Environment

APPENDIX A

Japan Shigeki Iwabuchi Masayuki Kurechi	Japan Association for wild Geese Protection, Sendai Science Museum Japanese Association for Wild Geese Protection NTT Nippon Telegraph and Telephone Corporation
Kazakhstan Talgat Kerteshev, Marat Musanbajev E. Mejramov Valeri Prima Amankul Bekenov, Sergej Yerohov Mihail Zhukov Bek-Bulat Eleushev, Grigori Mordvintsev, Serikbek Daukejev Tatyana Bragina, Evgeny Bragin Oleg Sosunov, Valeri Zhulij Viktor Semenov, Hamid Moldybaev	Department of Protected areas Environmental Agency of Akmola Region Environmental Agency of Northern Kazakhstan Region Institute of Zoology, Academy of Sciences Kustanai State Committee for Forestry, Fishery and Hunting Ministry of Ecology and Bioresources of the Republic of Kazakhstan Naurzum National Reserve, Dokuchaevka State Committee for Forestry, Fishery and Hunting State Inspection of Wildlife Protection of Kustanay oblast
Latvia Edmunds Razinskis	Latvian Ornithological Society
Lithuania Vytautas Jusys Gedas Vaitkus	Ventes Ragas Ornithological Station Institutas Ecologijias
Norway Christina Bjørkli Morten Ekker Barb L. Håland Karl-Otto Jacobsen Svein-Håkon Lorentsen Torkjell Morset Steinar Schanche	Porsanger Municipality Directorate for Nature Management Stabbursnes Nature house & Museum County Governor of Troms Norwegian Institute for Nature Research NINA Statskog Mountain service, Lakselv County Governor of Finnmark
Poland Przemek Chylarecki Jerzy Dyczkowski Jan Lontkowski	Gdansk Ornithological Station Institute of Zoology, Polish Academy of Sciences Institute of natural history, Wroclaw University
Romania Edmund Ballon Janos Bottond-Kiss Dan Munteanu Eugen Petrescu	Pro-Delta Society Danube Delta Institute Romanian Ornithological Society Romanian Ornithological Society, Tulcea Office
Russia Konstantin E. Litvin Victor Nikiforov Aleksander Ulitin Yuri Karpainov Ernest Ivanter Nikolai Lapsen, Roustam Sagitov Vladimir Zimin Eugeniy Syroechkovski Jr. Eugeniy Syroechkovski Sr., Yelena Rogacheva Vitali Bianki Mihail Fesenko, Aleksander Shirlin Boris Nikitin Oleg Zukov Elena Lebedeva Valentin Ilyashenko Vladimir Morozov	Academy of Science of Karelian State Bird Ringing Centre, Russian Academy of Science WWF Russian Programme Office Russian Association of Hunters and Fishermen Taimyr Nature Reserve, Russia Ecological Counsellor of Mr. Katanandov, the Prime Minister of the Republic of Karelia Carelian Scientific Centre, Russian Academy of sciences Carelian Scientific Centre, Russian Academy of Sciences Geese and Swans Study Group of Eastern Europe and Northern Asia Institute for Ecology & Evolution, Russian Academy of Science Kandalaksha Nature Reserve Karelian Committee of Russian State Committee for Environmental Protection Olenets Raion Committee Olonets Regional Committee for Nature Conservation Russian Bird Conservation Union (RBCU) Russian State Committee for Environmental protection, Dept. of Biological Resources State Committee of Environment Protection, Russian Institute for Nature Conservation
Slovenia Peter Trantelj	Bird watching and Bird study Association of Slovenia
Slovakia Pavol Kanuch, Jan Kownan, Alexander Kurty	Slovakian Ornithological Society
Sweden Anders Bylin Lambart von Essen Ola Jennersten	Tovetorp Zoologiska forskningstation Svenska Jägareförbundet WWF Sweden
Turkey Murat Yazar	Society for the Protection of Nature

Ukraine

Igor Gorban, Olexandr Mykytyuk UTOP Ukraine Ornithological Society
 Igor Shilsky Museum of Natural History

Staff and activists of the LWfG project of Norwegian Ornithological Society (NOF), the LWfG group of WWF Finland and the Lesser White-fronted Goose Life-Nature project of Finland

Lesser White-fronted Goose project of Norwegian Ornithological Society (NOF) in 1998

Tomas Aarvak
 Ingar Jostein Øien

Lesser White-fronted working group of WWF Finland in 1998

Esko Aikio
 Jouko Alhainen
 Aki Arkiomaa (chairman of the group)
 Pentti Alho
 Seppo Haapala
 Elja Herva
 Heikki Holmström
 Toni Eskelin
 Pertti Kalinainen
 Antti Karlin
 Risto Karvonen
 Erkki Kellomäki
 Matti Koistinen
 Petri Lampila
 Ari Lavinto
 Ilkka Lehmus
 Ari Leinonen
 Pirjo Leppäniemi
 Juha Markkola
 Matti Mela
 Eino Merilä
 Marika Niemelä
 Pekka Nieminen
 Arvo Ohtonen
 Jorma Pessa
 Petteri Polojärvi
 Jyrki Pynnönen
 Petro Pynnönen
 Jarmo Pääläinen
 Pertti Rassi
 Kalle Ruokolainen
 Minna Ruokonen
 Sirpa Seppänen
 Juhani Toivanen
 Sami Timonen
 Petteri Tolvanen (secretary of the group)
 Matti Tynjälä
 Pentti Vikberg

Partners of the LWfG Life project Finland in 1998

Forest and Park Service, Northern Lapland District for Wilderness Management, Nature Conservation
 Pirjo Leppäniemi
 Kristiina Niittyvuopio
 Petteri Polojärvi
 Joska Laine
 Kari Kyrö
 Eero Sujala
 Uula-Antti Paltto
 Esko Tainio
 Arto Ahlakorpi
 Edvard Aikio
 Matti Tervo
 Martti Kyrö

Esa Vuomajoki
 Paavo Laakso
 Juha Sihvo
 Olli Osmonen

Forest and Park Service, Nature Conservation
 Lassi Karivalo
 Petro Pynnönen

Häme Regional Environment Centre
 Erkki Kellomäki
 Kirsti Krogerus
 Pekka Ruokonen
 Natalia Ripatti
 Petri Heinonen
 Ari Lehtinen
 Mari Nieminen
 Jouni Riihimäki

North Ostrobothnia Regional Environment Centre
 Juha Markkola
 Tupuna Kovanen
 Jorma Pessa
 Jarmo Pääläinen
 Seppo Haapala
 Ari Leinonen
 Sami Timonen
 Mika Kastell

Lapland Regional Environment Centre
 Pekka Ränä
 Heikki Ruokanen
 Samuli Näkkälä
 Jouko Pappila

West Finland Regional Environment Centre
 Tuukka Pahtamaa

WWF Finland
 Jari Luukkonen
 Marja Pirinen
 Tuuli Äikäs
 Sirpa Pellinen
 Petteri Tolvanen
 Heikki Holmström
 Risto Karvonen

Hunters' Central Organisation MKJ
 Pentti Vikberg

Volunteers in the Finnish project in 1998

Janne Aalto
 Pirkka Aalto
 Riikka Kaartinen
 Tuula Kellomäki
 Alekski Lehikoinen
 Petteri Lehikoinen
 Mariko Lindgren
 Maiju Pasanen
 Birgit Petrow
 Antti Ripatti
 Edvard Ripatti
 Juhani Rissanen
 Dave Showler (Great Britain)
 Arnoud Soetens (The Netherlands)
 Juha Toivanen
 Markku Ukkonen
 Daan Vanwerven (The Netherlands)
 Aarne Vattulainen
 Aune Veersalu (Estonia)

APPENDIX B

Publications in 1998

Annual reports of the year 1997

FINLAND: Tolvanen, P., Ruokolainen, K., Markkola, J., & Karvonen, R. 1998 (eds.): Finnish Lesser White-fronted Goose conservation project. Annual report 1997. WWF Finland Report No 9. 58 pp.

Articles

- Eskelin, T. & Tolvanen, P. 1998: Annotated checklist of bird observations of the expedition to the Kanin Peninsula, 26 August - 12 September, 1996. pp. 50-51. Appendix B.
- Karvonen, R. & Alhainen, J. 1998: Tagging efforts in Siberia: Yamal, summer 1997. pp 24-26.
- Karvonen, R. & Markkola, J. 1998: Satellite follow-up of the Yamal Lesser White-fronted Goose Sibyako (The Mother). pp 36-37.
- Kellomäki, E. & Ripatti, N. 1998: Official negotiations between Finland, Russia and Kazakhstan in conservation of the Lesser White-fronted Goose. pp 38-40.
- Kellomäki, E. & Ripatti, N. 1998: What should the Finnish authorities do for the conservation of the Lesser White-fronted Goose in future. pp 45-46.
- Kellomäki, E., Pessa, J. & Ripatti, N. 1998: Spring hunting of geese continues in western Russia. pp 9-11.
- Lampila, P. 1998: Monitoring of wintering Lesser White-fronted Geese *Anser erythropus* in northeastern Greece, 8 January - 8 April 1997. pp 7-8.
- Markkola, J. 1998: Field work in Lapland in 1997. pg 23.
- Markkola, J. & Arkiomaa, A. 1998: Tagging efforts in Siberia: Taimyr, summer 1997. pp 27-29.
- Markkola, J., Ohtonen, A. & Karvonen, R. 1998: Spring staging areas of the Lesser White-fronted Goose *Anser erythropus* on Bothnian Bay coast: features of spring migration in 1997. pp 12-17.
- Markkola, J., Pynnönen, P., Tolvanen, P., Veersalu, A. & Yerohov, S. 1998: The second international Lesser White-fronted Goose *Anser erythropus* expedition in NW Kazakstan in May 1997. pp 21-22.
- Niemelä, M. & Markkola, J. 1998: Diet selection of the Lesser White-fronted Goose *Anser erythropus* in the spring staging area of Tömpä seashore meadow, Hailuoto, Finland. pp 5-6.
- Pynnönen, J., Tolvanen, P. & Ruokolainen, K. 1998: Annotated checklist of bird species observed on Skjåholmen (Varangerfjord, Norway) in 1995-1997. pp 47-49. Appendix A.
- Pynnönen, P. & Tolvanen, P. 1998: Annotated checklist of bird observations of the expeditions to NW Kazakstan, 2-10 October 1996 and 1-18 May 1998. pp 52-54. Appendix C.
- Tolvanen, P. 1998: Lesser White-fronted Goose expedition to the Kanin Peninsula in 26 August - 12 September, 1996, and the establishment of the Shoininsky Reserve. pp 33-35.
- Tolvanen, P. & Markkola, J. 1998: Introduction. pp 5-6.
- Tolvanen, P. & Markkola, J. 1998: The current situation in the Finnish Lesser White-fronted Goose restocking project. pp 41-42.
- Tolvanen, P. & Pynnönen, P. 1998: Monitoring the autumn migration of Lesser White-fronted Goose *Anser erythropus* and other geese in NW Kazakstan in October 1996. pp 19-20.
- Tolvanen, P., Pynnönen, P. & Ruokolainen, K. 1998: Monitoring of Lesser White-fronted Goose *Anser erythropus* on Skjåholmen (Varangerfjord, Finnmark, Norway) in 1995-1997. pp 30-32.

NORWAY: Aarvak, T., Øien, I.J., Syroechkovski, E.E. jr., Kostadinova, I. 1997: The Lesser White-fronted Goose Monitoring Programme. Annual Report. Norwegian Ornithological Society. Report No. 5-1997. 60 pp + 2 appendices.

Contents

- Abstract
- 1. Introduction pp 1-2.
- 2. Monitoring in Norway. pp 3-4.
 - 2.1 Staging ground at Valdak, Finnmark. pp 4-12.
 - 2.2 Staging areas in the Varangerfjord, Finnmark. pp 12-15.
- 3. Breeding areas
 - 3.1 Background. pp 16.
 - 3.2 Taimyr, Russia. pp 17-27.
- 4. Migration routes and the satellite telemetry
 - 4.1 Background. pp 28-29.
 - 4.2 Catching. pp 29-37.
 - 4.3 Preliminary results of satellite telemetry. pp 38-40.
 - 4.4 Hunting mortality. pg 40.
- 5. Staging and wintering grounds
 - 5.1 Background. pg 41.
 - 5.2 Russia. pp 41-42.
 - 5.3 Bulgaria. pp 43-48.
 - 5.4 Romania. pp 48-49.
 - 5.5 Hungary. pg 50.
 - 5.6 Greece. pg 49.
 - 5.7 Armenia. pg 50.
 - 5.8 China. pp 51-53.
 - 5.9 The Baltic states. pp 53-54.
- 6. Media coverage and information. pg 55.
- 7. References. pp 56-60.
- Appendices
 - I Poster of goose species of Bulgaria, produced for Italian hunters
 - II Co-operation partners and contacts

Publications

- Aarvak, T. & Øien, I.J. 1997: Survey of Lesser White-fronted Goose in Bulgaria 1996. (In Bulgarian). - *Za ptizite* 2:8.
- Aarvak, T. & Øien, I.J. 1998: Ringing of Lesser White-fronted Geese *Anser erythropus* in Norway and Russia in 1997, and some Internet-links for information about geese (In Norwegian with English summary) - *Ringmerkaren* 10:155-159.
- Arkiomaa, A. & Tolvanen, P. 1998: Kiljuhanhi esiintyy keväällä Venäjän Karjalassa. (Lesser White-fronted Goose occurs in Russian Carelia during spring migration, in Finnish with Swedish summary). - *Jahti* 34(2): 14-16.
- Directorate for nature management, Norway 1998: Don't shoot the Lesser White-fronted Goose (In Norwegian). 3pp in "Skitt jakt" - an information booklet distributed to all hunters in Norway.
- Hanhimot 1998: Kiljuhanhi elää ja projekti työllistää Ylä-Lapissa. (Lesser White-fronted Goose lives and the project employes in Northern Lapland, in Finnish). - *Latvus (Ylä-Lapin luonnonhoitoalueen henkilöstölehti)* 2/1997 (5.11.1997). 2 pp.
- 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.
- Markkola, J. 1998: Merihanhen ja kiljuhanhen tunnistaminen. (Identification of the Greylag Goose and the Lesser White-fronted Goose, in Finnish). - *Metsästäjä* 47(4): 52.
- Markkola, J. 1998: Skillnaden mellan grågås och fjällgås. (Identification of the Greylag Goose and the Lesser White-fronted Goose, in Swedish). - *Jägaren* 47(4): 52.
- Markkola, J. 1998: Mihin kiljuhanhemme menevät? (Where do our Lesser White-fronted Geese go?). - *Eläinmaailma* 20(9): 10-13.
- Markkola, J. & Leppäniemi, P. 1998: Kiljuhanhi - Pohjolan uhanalaisin lintulaji. (The Lesser White-fronted Goose - the most endangered bird species in Nordic countries). - *Lapin Kansa* 24.4.1998.
- Niemelä, M. 1998: Kiljuhanhen ravinnon valinta ja lepäilyalueen kasvillisuus Perämeren rannikolla Hailuodossa. (Diet selection of the LWfG and the vegetation of a staging area, in Finnish). - *Pro Gradu*. University of Oulu. Department of Biology. 75 pp.
- Muheim, R. 1998: Mit Satelliten den Zugvögel auf der Spur. Kontakte ins All. (In German) - *Ornis* 2/98:11-15.
- Pahtamaa, T. 1998: Kiljuhanhen kurimus. (Whirlpool of the Lesser White-fronted Goose, in Finnish). Siipipeili. Vuosijulkaisu 1997-1998.
- Pynnönen, P. 1998: Kiljuhanhia, hyttysiä ja tutkijoita Taimyriällä. (Lesser White-fronted Goose, mosquitos and scientists in Taimyr, in Finnish). - *Puistoväki* 4/1889: 12.
- Tolvanen, P. 1998: Occurrence and conservation of Lesser White-fronted Goose (*Anser erythropus*) in the White Sea region. - Proceedings of the RECMAB workshop "Studies on Arctic Birds Migration in the region of the northern Baltic and White Sea", 2-4 April, 1998. Finnish Environment Institute, Helsinki, Finland.
- Øien, I.J. & Aarvak, T. 1997: Secrets of the Lesser White-fronted Goose. - *World Birdwatch* 19: 9-12.
- Øien, I.J. & Aarvak, T. 1997: The first stopover secured for the Lesser White-fronted Goose. Shoininski Nature Reserve is a reality (In Norwegian with English summary). - *Vår Fuglefauna* 20:86-87.
- Øien, I.J. & Aarvak, T. 1998: Satellite-telemetry provides new knowledge about the Lesser White-fronted Goose (In Norwegian with English summary) - *Vår Fuglefauna* 21:88-89.
- Øien, I.J. & Aarvak, T. 1998: The Lesser White-fronted Goose in the North Calotte Region. (In Norwegian with English summary) - Nordkalottens Rapportserie, Rapport nr. 49, pp- 14-28.

Project brochures etc.

- Conservation of the LWfG in Kazakhstan (in Kazach and Russian language). Häme Regional Environment Centre, Hunters' Central Organisation, BirdLife-Finland, Bulgarian Bird Conservation Union, Markprint.
- Poster of the Finnish LWfG project in Wetlands International Goose Specialist Meeting. Kavarna, Bulgaria, February 1998.
- Importing of protected birds is forbidden without permission of Finnish Environment Agency. 2 pp. LWfG-Life-Project.
- The future of the Lesser White-fronted Goose in Finland. A Seminar poster 26.-28.3.1998. LWfG-Life-Project.
- Poster of the Finnish LWfG-Project in the new Nature Center in Virkkula, Liminganlahti.

Project inside reports, memorandums and manuscripts

- Aalto P. & Aalto J. 1998: Lintulaskennat Enontekiöllä (Enontekiö area) 1998. 6 pp, 10 maps.
- Aikio E. & Veersalu A. 1998: Inventointi Utsjoella (Utsjoki area) 1998. 8 pp. LWfG-Life-Project.
- Eskelin, T., Lehtikainen, A., Pynnönen, P. & Timonen, S. 1998: Kiljuhanhitutkimusmatka Venäjän Aunukseen ja Syvärille. (A LWfG expedition to Olonets and Sviriza in Russia, in Finnish). 26.4.-2.5.1998. LWfG-Life-Project. 4 pp.
- Holmström H. 1998: Raportti Kiljuhanhien maastoetsinnöistä ydinalueella (The Core area) 6-16.6.1998. 6 pp, 2 maps. LWfG-Life-Project.
- Holmström H. & Timonen S. 1998: Rostujavrin retki (Rostujavri area) 28.7-3.8.1998, 5 pp, 2 maps. WWF-Finland
- Karvonen R. 1998: Ydinalue (The Core area) 1998, 6-16.6, 13pp, 4 maps. LWfG-Life-Project.
- Karvonen, R., Leinonen, A., Markkola, J. & Pääläinen, J. 1998: Kiljuhanhen sulkien tunnistuskuvasto. (Formula for the identification of the feathers of the LWfG, in Finnish). 8 pp (size A3). LWfG-Life-Project.
- Kellomäki E. & Kellomäki T. 1998: Kiljuhanhi-inventoinnit Utsjoella (Utsjoki area) 1998. 4 pp, 2 maps. LWfG-Life-Project, Hämeen ympäristökeskus.
- Krogerus K. & Nieminen M. 1998: Inventointimatka Isonkivennokan maastoon (Isonkivennokka area) 28.7-9.8.1998, 10 pp, 2 maps. LWfG-Life-Project, Hämeen ympäristökeskus.
- Kälviäinen, V. 1997: Lesser White-fronted Goose in Evros Delta, Greece. 14 pp. Training report. University of Oulu. Department of Biology.
- Laine, J. 1998: Ydinalue (The Core area) 98. 3 pp, 2 maps. LWfG-Life-Project, Metsähallitus, Ylä-Lappi.
- Laine, J. 1998: Inventointi 23-25.6.1998. 2 pp, 1 map. LWfG-Life-Project, Metsähallitus, Ylä-Lappi.
- Laine, J. 1998: Inventointi 3-8.8.1998. 2 pp, 4 maps. LWfG-Life-Project, Metsähallitus, Ylä-Lappi.
- Laine, J. 1998: Inventointi 12-14.8.1998. 2 pp, 2 maps. LWfG-Life-Project, Metsähallitus, Ylä-Lappi.
- Leinonen A., Koistinen M. & Pääläinen J. 1998: Matkaraportti Salvasjärvi-Puussasjärvi (Salvasjärvi-Puussasjärvi area) 28.5-19.6.1998. 21 pp, 6 maps. LWfG-Life-Project, Pohjois-Pohjanmaan ympäristökeskus.
- Polojärvi P. 1998: Hanhien ruokinta ja tarkkailu Ylä-Lapissa (Feeding and monitoring geese in Northern Lapland). 7 pp, 4 photos, 5 maps. LWfG-Life-Project. Metsähallitus, Ylä-Lappi.
- Polojärvi P. 1998: Kiljuhanhiretki ydinalueelle (The Core area) 5.-16.6.1998. 9 pp, 16 photos, 3 maps. LWfG-Life-Project, Metsähallitus, Ylä-Lappi.
- Polojärvi P. 1998: Maastoretki Vätsäriin (Vätsäri area) 6.-10.7.1998. 4 pp, 8 photos, 2 maps. LWfG-Life-Project. Metsähallitus, Ylä-Lappi.
- Polojärvi P. 1998: Kiljuhanhien inventointiretki Jullamojärvelle, Ruoptuojanjängälle ja Kiesvaaranjängälle (Jullamojärvi-Ruoptuojanjängä-Kiesvaaranjängä area) 22-27.6.1998. 8 pp, 10 photos, 3 maps. LWfG-Life-Project. Metsähallitus, Ylä-Lappi.
- Polojärvi P. 1998: Kiljuhanhi- ja naaliretki Kaldoaiviin (Kaldoaivi area) 13-17.7.1998. 7 pp, 4 photos, 3 maps. LWfG-Life-Project. Metsähallitus, Ylä-Lappi.
- Polojärvi P. 1998: Kiljuhanhiretki Seälsejärvelle (Seälsejärvi area) 3-8.8.1998. 8 pp, 6 photos, 4 maps. LWfG-Life-Project. Metsähallitus, Ylä-Lappi.

APPENDIX B

- Polojärvi P. 1998: Kiljuhanhiretki Savustlammille (Savustlampi area) 11-14.8.1998. 6 pp, 4 photos, 1 map. LWfG-Life-Project. Metsähallitus, Ylä-Lappi.
- Pynnönen, P., Eskelin, T., Lehtikoinen, A. and Timonen, S. 1998: Field expedition for surveying numbers of Lesser White-fronted Goose in Olonets and Sviriza regions, Western Russia in 26.4.-2.5. 1998. Anser erythropus-Life project. 2 pp. LWfG-Life-Project.
- Pääläinen J., Koistinen M. & Leinonen A. 1998: Kiljuhanhien inventointi 1998: Kaktasavari-Jeägelvarri-Vudnjosskaidi (Muotka area) 20-26.7.1998, 6 pp, 1 map. LWfG-Life-Project. Pohjois-Pohjanmaan ympäristökeskus.
- Pääläinen J., Koistinen M. & Leinonen A. 1998: Kiljuhanhien inventointi 1998, Ravdojavri-Tsuoggajohka-Suolojavri-Soahkkemohkejavrrik (Kaamasmukka area) 27.7-2.8.1998. 7 pp, 1 map. LWfG-Life-Project. Pohjois-Pohjanmaan ympäristökeskus.
- Pääläinen J., Koistinen M. & Leinonen A. 1998: Kiljuhanhien inventointi 1998, Terstojänkä (Terstojänkä area) 2-9.8.1998. 5 pp, 1 map. LWfG-Life-Project. Pohjois-Pohjanmaan ympäristökeskus.
- Pääläinen J. & Leinonen A. 1998: Kiljuhanhien inventointi 1998, Reppenelva-Ai'dneluob'bal-Cappes Skaidi (South Varanger area) 10-16.8.1998. 6 pp, 1 map.
- Pääläinen J., Koistinen M. & Leinonen A. 1998: Porsangerin vuono, Valdak, Kiljuhanhien syyspöyrynti (A tagging effort at Porsangerfjord) 17.8-2.9.1998. 37 pp, 1 map.
- Ripatti A., Ripatti N. & Ripatti E. 1998: Kiljuhanhipaikkojen retki Vuognolvarrin alueella (Vuognolvarri area) -98. 3 pp, 1 map. LWfG-Life-Project-1998, Hämeen ympäristökeskus, WWF Suomen rahasto.
- Ruokanen H., Pappila J. & Näkkälä S. 1998: Life-Kiljuhanhiprojektin inventoinnit Pöyrisjärven alueella (Pöyrisjärvi area) 1998. 18 pp, 9 photos, 2 maps. Lapin Ympäristökeskus/YTY.
- Ruokolainen, K., Ukkonen, M. & Rissanen, J. 1998: Monitoring of geese on the Varanger area in the end of May 1998. Anser erythropus-Life project. 8 pp.
- Seppänen S. 1998: Raportti LWfG-Life-Projectin maastotöistä kesä (Vätsäri area) 1998. 17 pp, 9 photos, 6 maps.
- Toivanen J. & Toivanen J. 1998: Pöyrisjärven ympäristö (Pöyrisjärvi area). 2 pp, 1 map. LWfG-Life-Project. WWF-Finland.
- Tolvanen P. & Lindgren M. 1998: Lesser White-Fronted Goose survey in the Rostujavri area, June 20-26, 1998. 3 pp, 3 maps.
- Yerohov, S., Karpov, F., Kashin, S., Postavnoi, G. & Moldibaev, H. 1997: Monitoring Lesser White-fronted Geese in Northern Kazakhstan during the fall migration of the year 1997. Finnish summary 5 pp. LWfG-Life-Project.
- Yerohov, S., Karpov, F. & Moldibaev, H. 1998: Kiljuhanhen lukumäärän seuranta kevätmuuttoaikana Pohjois-Kazakhstanissa vuonna 1998. (The number of LWfG during spring migration in Northern Kazakhstan year 1998, translated from Russian to Finnish by Natalia Ripatti). LWfG-Life-Project. 4 pp.

Annotated checklist of birds observations during Lesser White-fronted Goose expeditions to Taimyr in 1997 and 1998

Petro Pynnönen, Juha Markkola, Petteri Tolvanen, Tomas Aarvak & Ingar Jostein Øien

This checklist is a short summary of the bird observations made by the Lesser White-fronted Goose expeditions to Southern and Central Taimyr Peninsula in 1997 and 1998. In July-August 1997, the expedition (Tomas Aarvak, Aki Arkiomaa, Aleksandr Artyuhov, Aleksandr Astapenko, Juha Markkola, Eugeny E. Syroechkovski jr. and Ingar Jostein Øien) travelled via Khatanga and visited two areas on Taimyr: the Malaya Logata area in the typical tundra zone and the Kurluska area in the forest tundra zone. In 1998, the expedition (Risto Karvonen, Konstantin Litvin, Juha Markkola, Sergei Osipov, Petro Pynnönen, Jostein Sandvik, Petteri Tolvanen and Ingar Jostein Øien) worked only in the Kurluska area, and travelled via Khatanga.

During the 1998 expedition, all bird observations were put up in notebooks, and the number of individuals observed is mentioned after every species. Some individuals may have been registered twice, but in general the numbers reflect the real amount of each species in the surveyed areas. In addition, the breeding certainty of each species was estimated in 1998 using the following classification:

- I = confirmed, nest with eggs or young or brood observed
- II = most probable, alarming adults or adults carrying food
- III = probable, a pair in suitable breeding habitat etc.
- IV = possible, individual in breeding time in suitable habitat
- V = not breeding, individual, which most probably is not breeding
- 0 = not observed in the target area

1. The settlement of Khatanga (N 71° 59', E 102° 28')

Forest tundra zone

1997	<i>Larus hyperboreus</i>	<i>Corvus corone orientalis</i>	5 ind.
18–21 July	8 ind.	1 ind.	
In the order of abundance.	<i>Larus heuglini</i>	<i>Gallinago gallinago / stenura</i>	<i>Motacilla citreola I</i>
	7 ind.	1 ind.	16 ind., many juveniles
<i>Motacilla flava</i>	<i>Larus canus</i>	<i>Turdus sp.</i>	<i>Oenanthe oenanthe I</i>
130 ind.	7 ind.	1 ind.	11 ind., juveniles
<i>Larus vegae birulai</i>	<i>Charadrius hiaticula</i>	1998	<i>Turdus pilaris III</i>
97 ind.	6 ind.	17–19 July & 5–8 August	4 ind.
<i>Anthus cervinus</i>	<i>Philomachus pugnax</i>	Not complete list.	<i>Turdus iliacus II</i>
90 ind.	4 ind.		1 ind.
<i>Sterna paradisaea</i>	<i>Carduelis hornemanni</i>	<i>Calidris minuta</i>	<i>Corvus corone I</i>
77 ind.	3 ind.	19 ind.	12 ind. of ssp. <i>cornix</i> , 10 ind. of ssp. <i>orientalis</i> , 3 hybrids
<i>Calidris temminckii</i>	<i>Gavia stellata</i>	<i>Calidris alba</i>	<i>Carduelis hornemanni I</i>
70 ind.	2 ind.	2 ind.	10 ind., also juveniles + c.40 ind. unidentified <i>C. hornemanni/flammea</i>
<i>Motacilla citreola</i>	<i>Buteo lagopus</i>	<i>Calidris melanotos</i>	<i>Emberiza pallasi</i>
65 ind.	2 ind.	1 ind. in flight	c. 5 singing males
<i>Carduelis flammea/hornemanni</i>	<i>Corvus corone ssp. cornix</i>	<i>Xenus cinereus I</i>	
44 ind.	2 ind.	3 ind., of which 2 juv.	
<i>Emberiza pusilla</i>	<i>Carduelis flammea</i>	<i>Actitis hypoleucos</i>	
30 ind.	2 ind.	voice of one ind.	
<i>Luscinia svecica</i>	<i>Tringa glareola</i>	<i>Stercorarius pomarinus</i>	
17 ind.	2 ind.	7 ind.	
<i>Corvus corax</i>	<i>Tringa erythropus</i>	<i>Larus canus</i>	
15 ind.	2 ind.	11 ind.	
<i>Phylloscopus trochilus</i>	<i>Pluvialis apricaria</i>	<i>Larus "heuglini"</i>	
13 ind.	2 ind.	2 subadults	
<i>Corvus corone ssp. orientalis</i>	<i>Emberiza pallasi</i>	<i>Larus vegae birulai</i>	
12 ind.	2 ind.	c.210 ind.	
<i>Stercorarius longicaudus</i>	<i>Parus sp.</i>	<i>Larus hyperboreus</i>	
11 ind.	2 ind.	c.40 ind.	
<i>Motacilla alba ssp. ocularis</i>	<i>Xenus cinereus</i>	<i>Asio flammeus III</i>	
10 ind.	1 ind.	1 ind.	
<i>Oenanthe oenanthe</i>	<i>Stercorarius parasiticus</i>	<i>Nyctea scandiaca</i>	
8 ind.	1 ind.	1 ind.	
	<i>Corvus corone cornix x</i>	<i>Delichon urbica II</i>	

APPENDIX C

2. Kurluska area, Central Taimyr (N 71° 13', E 95° 25')

A taiga-like forested lake area near the border of forest tundra and open tundra

<p>1998 19 July – 5 August</p> <p>The effort used to collect this data was c. 90 man-days. Summary of data from 1997 shown in Tables 1 and 2.</p> <p><i>Gavia stellata</i> II some tens, less numerous than <i>G. arctica</i></p> <p><i>Gavia arctica</i> I some tens, more numerous than <i>G. stellata</i></p> <p><i>Gavia adamsii</i> II 3 ind.</p> <p><i>Cygnus columbianus</i> 0 1 ind. from helicopter</p> <p><i>Anser erythropus</i> I two pairs of which one had 3 young</p> <p><i>Anas penelope</i> I 33 ind. + 9 broods</p> <p><i>Anas crecca</i> I 5 ind. + female with 2 young</p> <p><i>Anas acuta</i> I 19 ind. + female with 5 young</p> <p><i>Aythya fuligula</i> I 12 ind. + female with 3 young</p> <p><i>Aythya marila</i> II 29 ind.</p> <p><i>Clangula hyemalis</i> I 32 ind. + female with 6 young</p> <p><i>Melanitta nigra</i> I 65 ind. + three broods</p> <p><i>Melanitta fusca</i> I 46 ind. + female and nest with</p>	<p>6 eggs</p> <p><i>Mergus serrator</i> III 11 ind.</p> <p><i>Haliaeetus albicilla</i> II probably 2-3 breeding pairs + c. 9 observations of juv</p> <p><i>Buteo lagopus</i> II 17 ind.</p> <p><i>Falco columbarius</i> II 6 ind.</p> <p><i>Accipiter gentilis</i> IV one old corpse</p> <p><i>Lagopus lagopus</i> I 13 ind. + 2 broods</p> <p><i>Charadrius hiaticula</i> IV 1 ind.</p> <p><i>Pluvialis apricaria</i> IV voice of one ind.</p> <p><i>Calidris temminckii</i> I 4 ind., one eggshell near an alarming adult</p> <p><i>Philomachus pugnax</i> I 13 ind. + one fledgling</p> <p><i>Lymnocyptes minimus</i> IV 1 ind.</p> <p><i>Gallinago gallinago</i> IV 5 ind. + 3 unidentified <i>Gallinago</i>-species</p> <p><i>Limosa lapponica</i> I 23 ind., one nest was seen depredated by wolverine</p> <p><i>Tringa erythropus</i> II 10 ind.</p> <p><i>Tringa glareola</i> II 19 ind.</p> <p><i>Xenus cinereus</i> I</p>	<p>4 ind., which 2 very young juv</p> <p><i>Phalaropus lobatus</i> I a9 ind. + alarming male + voice of young</p> <p><i>Stercorarius pomarinus</i> V 3 ind.</p> <p><i>Stercorarius longicaudus</i> II 11 ind.</p> <p><i>Stercorarius parasiticus</i> V 1 ind.</p> <p><i>Larus vegae</i> I c. 90 ind., some incubating The local breeding Herring Gull type population differs clearly from the Lesser Black-backed Gulls of the (sub)species <i>L. (fuscus) heuglini</i>, and is thought to belong to the form <i>Larus vegae birulai</i>.</p> <p><i>Sterna paradisaea</i> I some tens + 2 young in 2 broods</p> <p><i>Asio flammeus</i> 0 1 ind. was seen from helicopter</p> <p><i>Nyctea scandiaca</i> 0 1 ind. was seen from helicopter</p> <p><i>Picoides tridactylus</i> I 1 voice + voice of young from nest</p> <p><i>Anthus cervinus</i> II 12 ind. + 1 migrating</p> <p><i>Motacilla flava</i> I 41 ind., some fledglings + 18 migrating</p> <p><i>Motacilla alba</i> II 5 resident + 2 migrating, <i>ssp. ocularis</i></p>	<p><i>Prunella montanella</i> I 33 ind., all seen individuals were juv.</p> <p><i>Luscinia svecica</i> I 82 ind., many juveniles</p> <p><i>Turdus naumanni</i> I 34 ind., one nest found</p> <p><i>Phylloscopus borealis</i> I c.280 ind., some juveniles</p> <p><i>Phylloscopus inornatus</i> I 1 voice + 1 adult feeding 1 young</p> <p><i>Phylloscopus trochilus</i> II 39 ind.</p> <p><i>Parus cinctus</i> I 39 ind.</p> <p><i>Perisoreus infaustus</i> III 25 ind.</p> <p><i>Corvus corone</i> III 3 ind., one of <i>ssp. orientalis</i>, two of <i>ssp. cornix</i></p> <p><i>Corvus corax</i> III 8 ind.</p> <p><i>Carduelis flammea</i> II 6 ind. + 12 <i>C. flammea/hornemanni</i></p> <p><i>Emberiza pusilla</i> I c.350 ind., many broods</p> <p><i>Emberiza pallasi</i> I c.70 ind., some broods + 2 migrating</p> <p>54 species</p>
--	---	---	---

Table 1. Semi-quantitative data of the birds in Kurluska area July–August 1997. Birds counted on 31 July, 2 and 4–8 August included. First column = order in abundance. x = counted only in line transect census.

No	Species	Ind.	No	Species	Ind.
1	<i>Phylloscopus borealis</i>	x	23	<i>Carduelis flammea</i>	3
2	<i>Emberiza pusilla</i>	x	24	<i>Turdus</i> sp.	3
3	<i>Gavia arctica</i>	36	25	<i>Clangula hyemalis</i>	3
4	<i>Sterna paradisaea</i>	29	26	<i>Melanitta nigra</i>	3
5	<i>Gavia stellata</i>	21	27	<i>Calidris temminckii</i>	3
6	<i>Larus vegae</i>	12	28	<i>Lagopus lagopus</i>	3
7	<i>Phalaropus lobatus</i>	11	29	<i>Falco columbarius</i>	2
8	<i>Mergus serrator</i>	10	30	<i>Anas acuta</i>	2
9	<i>Motacilla flava</i>	8	31	<i>Philomachus pugnax</i>	2
10	<i>Phylloscopus trochilus</i>	8	32	<i>Aythya fuligula</i>	2
11	<i>Anas penelope</i>	8	33	<i>Charadrius hiaticula</i>	2
12	<i>Luscinia svecica</i>	7	34	<i>Picoides tridactylus</i>	1
13	<i>Prunella montanella</i>	6	35	<i>Sterna hirundo</i>	1
14	<i>Tringa glareola</i>	6	36	<i>Fringilla montifringilla</i>	1
15	<i>Anser erythropus</i>	6	37	<i>Corvus corax</i>	1
16	<i>Parus cinctus</i>	6	38	<i>Anthus cervinus</i>	1
17	<i>Emberiza pallasi</i>	5	39	<i>Xenus cinereus</i>	1
18	<i>Turdus naumanni</i>	5	40	<i>Buteo lagopus</i>	1
19	<i>Anas crecca</i>	3	41	<i>Gallinago</i> sp.	1
20	<i>Haliaeetus albicilla</i>	3	42	<i>Motacilla alba</i>	1
21	<i>Perisoreus infaustus</i>	3	43	<i>Tringa erythropus</i>	1
22	<i>Stercorarius longicaudus</i>	3			

Photo. Adult female Pallas's Reed Bunting (*Emberiza pallasii*). © Petteri Tolvanen, Kurluska area, Taimyr, July 1998



Table 2. A line transect census (7 km) was made in the Bolshaya Kurluska area on 31 July, 1997. The main transect was 50 meters wide, and the supplementary transect included all individuals >25m to each side of the observer.

Species	Pairs in the main transect	Density pair /km ²	Pairs in the supplementary transect	Pairs total
<i>Phylloscopus borealis</i>	6	17.1	5	11
<i>Emberiza pusilla</i>	6	17.1	1	7
<i>Motcilla flava</i>	2	5.7	2	4
<i>Luscinia svecica</i>	2	5.7	0	2
<i>Phylloscopus trochilus</i>	2	5.7	1	3
<i>Prunella montanella</i>	1	2.9	0	1
<i>Sterna hirundo</i>	1	2.9	0	1
<i>Sterna paradisaea</i>	0	0.0	22	22
<i>Gavia arctica</i>	0	0.0	11	11
<i>Gavia stellata</i>	0	0.0	10	10
<i>Larus argentatus</i>	0	0.0	8	8
<i>Mergus serrator</i>	0	0.0	4	4
<i>Stercorarius longicaudus</i>	0	0.0	3	3
<i>Carduelis flammea</i>	0	0.0	3	3
<i>Turdus sp.</i>	0	0.0	3	3
<i>Clangula hyemalis</i>	0	0.0	2	2
<i>Anas penelope</i>	0	0.0	2	2
<i>Turdus naumanni</i>	0	0.0	1	1
<i>Phalaropus lobatus</i>	0	0.0	1	1
<i>Anthus cervinus</i>	0	0.0	1	1
<i>Lagopus lagopus</i>	0	0.0	1	1
<i>Charadrius hiaticula</i>	0	0.0	1	1
<i>Melanitta nigra</i>	0	0.0	1	1

3. Malaya Logata area (N 73° 24', E 98° 14') Typical tundra

Table 3. Semi-quantitative data of the birds observed in the period 22–30 July, 1997. Only observations from trips where all individuals were registered are included in the table. The species are shown in the order of abundance, x= counted only in line transect census.

Species	Ind.
<i>Calcarius lapponicus</i>	x
<i>Somateria spectabilis</i>	67
<i>Larus vegae</i>	41
<i>Clangula hyemalis</i>	35
<i>Stercorarius longicaudus</i>	32
<i>Buteo lagopus</i>	26
<i>Sterna paradisaea</i>	26
<i>Calidris melanotos</i>	24
<i>Anser albifrons</i>	23
<i>Pluvialis fulva</i>	19
<i>Larus hyperboreus</i>	19
<i>Gavia arctica</i>	17
<i>Calidris minuta</i>	12
<i>Anas acuta</i>	11
<i>Phalaropus lobatus</i>	10
<i>Calidris temminckii</i>	9
<i>Anthus cervinus</i>	9
<i>Phalaropus fulicarius</i>	7
<i>Philomachus pugnax</i>	7
<i>Branta ruficollis</i>	7
<i>Carduelis flammea/hornemanni</i>	5
<i>Calidris alpina</i>	5
<i>Stercorarius parasiticus</i>	5
<i>Falco peregrinus ssp. calidus</i>	4
<i>Gavia stellata</i>	3
<i>Lagopus lagopus</i>	2
<i>Eremophila alpestris</i>	2
<i>Motacilla alba</i>	2
<i>Aythya marila</i>	2
<i>Limosa lapponica</i>	2
<i>Emberiza pallasii</i>	1
<i>Carduelis hornemanni</i>	1
<i>Plectrophenax nivalis</i>	1
<i>Oenanthe oenanthe</i>	1
<i>Emberiza pusilla</i>	1
<i>Tringa erythropus</i>	1
<i>Gallinago gallinago</i>	1
<i>Luscinia svecica</i>	1
<i>Charadrius hiaticula</i>	1



Photo. White-billed Diver (*Gavia adamsii*) © Petteri Tolvanen, Kurluska area, Taimyr, July 1998

APPENDIX D

Annotated checklist of birds observations during the Lesser White-fronted Goose expedition to Kustanai Region, north-western Kazakhstan 4–16 October, 1998

Petro Pynnönen

Abbreviations

a = a flock (e.g. a100 = a flock of 100 ind.)
m = migrating
ind. = individual(s)
cy = calendar-year
ad = adult
juv = juvenile

Observers

Toni Eskelin, Petri Lampila, Konstantin Litvin, Petro Pynnönen and Petteri Tolvanen

Gavia arctica

4 October: 2 ad flying over Kustanai, 6 October: 1m at Lake Kulykol

Tachybaptus ruficollis – *Mergus merganser*

See also Table 1

Tachybaptus ruficollis

10 October: 1 ind. at Lake Koybagar

Phalacrocorax pygmeus

6 October: 1 ind. at Lake Kulykol

Pelecanus crispus

14 October: 2 subad between Bozshakol and Lebyashye

Cygnus columbianus

5–7 October: 3 ad 2 juv at Lake Kulykol, 12–13 October: 30 at Lake Tyuntyugur

Branta bernicla

9 October: 1 ad of race bernicla at Lake Batpakkol

Tadorna tadorna

5–7 October: 6 at Lake Kulykol, 9 October: 33 beside the road between Batpakkol and Dokuchaevka

Tadorna ferruginea

5–7 October: 45 ind. at Lake Kulykol, 7 October: 3 ind. at Lake Ayke, 12 October: 1 ind. at Lake Biesoygan

Oxyura leucocephala

9 October: 1 ad male at Lake Batpakkol

Netta rufina

6 October: 6 males at Lake Kulykol, 10–11 October: 50 ind. at Lake Koybagar

Anas querquedula

5–6 October: 5 ind. at Lake Kulykol, 9 October: 1 ind. at Lake Batpakkol

Aythya marila

9 October: 1 female at Lake Batpakkol, 11 October: 3 ind. at Lake Koybagar

Clangula hyemalis

11 October: 9 ind. at Lake Koybagar

Haliaeetus albicilla

c.75 ind.

Circus aeruginosus

5 ind.

Circus cyaneus

c. 135 ind.

Circus macrourus

12 October: 1 juv at Lake Biesoygan

Accipiter gentilis

6 ind.

Accipiter nisus

32 ind.

Buteo buteo

5 October: 2 ind. between Kustanai and Lake Kulykol

Buteo lagopus

c.220, 10 October: 80 ind. at Lake Koybagar

Aquila heliaca

5 ind.

Aquila clanga

5–6 October: 2 subad at Lake Kulykol, 8 October: 1 subad beside the road between Ayke and Batpakkol

Aquila chrysaetos

14 October: 1 2cy beside the road between Bozshakol and Lebyazhye, 1 2cy at Lake Lebyazhye

Falco tinnunculus

4 ind.

Falco columbarius

22 ind.

Falco peregrinus

9 October: 1 juv at Lake Batpakkol

Perdix perdix

16 October: a flock of 15 ind. between Rechnoe and Kustanai

Coturnix coturnix

7 October: 1 ind. between Kulykol and Ayke, 12 October: 5 ind. at Lake Tyuntyugur

Rallus aquaticus

9 October: 1 ad at Lake Batpakkol

Porzana porzana

9 October: 1 juv at Lake Batpakkol

Fulica atra

See Table 1

Anthropoides virgo

8 October: 1 ad beside the road between Ayke and Batpakkol

Grus grus

70 ind.

Charadrius morinellus

12 October: 1 juv at Lake Tyuntyugur

Pluvialis apricaria

5–6 October: 2 juv at Lake Kulykol

Pluvialis squatarola

83 ind.

Vanellus vanellus

90 ind.

Calidris alba

5–7 October: 2 ind. at Lake Kulykol, 8 October: 7 ind. at Lake Ayke

Calidris minuta

7 October: 1 ind. at Lake Kulykol

Calidris alpina

5–7 October: 30 ind. at Lake Kulykol, 8 October: 1 ind. at Lake Ayke

Philomachus pugnax

15 ind.

Lymnocyptes minimus

4 October: 1 ind. near Kustanai, 12 October: 1 ind. at Lake Tyuntyugur

Gallinago gallinago

c.120 ind.

Scolopax rusticola

8 October: 1 ind. at Lake Batpakkol

Numenius arquata

4 October: 2 ind. near Kustanai, 7–8 October: 2 ind. at Lake Ayke

Tringa erythropus

5–7 October: 5 ind. at Lake Kulykol

Stercorarius parasiticus

12–13 October: 1 juv at Lake Tyuntyugur

Larus ridibundus

thousands

Larus ichtyaetus

c.100 ind.

Larus genei

8 October: 12 m between Lake Ayke and Lake Batpakkol

Anthus trivialis

4 October 1 ind. near Kustanai, 9 October 1m at Lake Batpakkol

Anthus pratensis

c.50 ind.

Anthus cervinus

c.65 ind.

Motacilla flava

30 ind.

Motacilla alba

50 ind.

Prunella atrogularis

9 October: 4 ind. (+ *Prunella* sp. 6 ind.) at Lake Batpakkol, 12 October: 1 ind. at Lake Tyuntyugur

Eritacus rubecula

8 ind.

Luscinia svecica

10 ind.

Phoenicurus phoenicurus

13 ind.

Oenanthe oenanthe

11 ind.

Turdus pilaris

10 ind.

Turdus philomelos

c.160 ind.

Turdus iliacus

20 ind.

Turdus viscivorus

12 ind.

Acrocephalus schoenobaenus

9 October: 1 ind. at Lake Batpakkol

Phylloscopus collybita

36 ind.

Phylloscopus trochilus

7 ind.

Regulus regulus

4 ind.

Panurus biarmicus

11 October: voices of 2 ind. at Lake Koybagar

Aegithalos caudatus

5 October: 6 ind. between Kustanai and Kulykol

Parus montanus

4 October: 2 ind. near Kustanai

Parus ater

16 October: 3 ind. between Rechnoe and Kustanai

APPENDIX D

Parus caeruleus

14 October: voice of 1 ind. between Bozshakol and Lebzazhye, 16 October: 1 ind. at Lake Rechnoe and 1 ind. on the way to Kustanai

Parus cyaneus

16 October: 5 ind. at Lake Rechnoye

Parus major

c.50 ind.

Remiz pendulinus

33, of which 30 ind. at Lake Batpakkol

Lanius excubitor s. lat.

6 ind. seen from a car during expedition

Garrulus glandarius

14 October: a2 ind. between

Bozshakol and Lebyazhye

Pica pica

common

Corvus monedula

hundreds

Corvus frugilegus

tens of thousands

Corvus corone

hundreds, of *ssp. cornix*

Corvus corax

17 ind.

Sturnus vulgaris

tens of thousands

Passer domesticus

common

Passer montanus

common

Fringilla coelebs

hundreds

Fringilla montifringilla

some tens

Carduelis chloris

16 October: 1 ind. at lake Rechnoe

Carduelis carduelis

16 October: 5 ind. at Lake Rechnoe, and 10 ind. between Rechnoe and Kustanai

Carduelis spinus

20 ind.

Carduelis cannabina

11 October: 1 ind. at Lake Koybagar

Carduelis flavirostris

9 October: 1 ind. at Lake Batpakkol

Carpodacus erythrinus

9 October: 6 ind. at Lake Batpakkol

Calcarius lapponicus

12 ind.

Plectrophenax nivalis

14 October: a flock of 30 ind. at Lake Lebyazhye, 16 October: 2 voices at Lake Rechnoe

Emberiza citrinella

c.90 ind.

Emberiza rustica

9 October: 8 ind. (+ *E. rustica/pusilla/aureola* heard 4 times) at Lake Batpakkol, 11 October: *E. rustica/pusilla/aureola* 1 heard at Lake Koybagar

Emberiza schoeniclus

hundreds

Table 1. Numbers of wetland birds in Kustanai Region during the expedition, separated for each lake. The numbers of *Anser albifrons*, *A. erythropus*, *A. anser* and *Branta ruficollis* are based on the estimates derived from the sample data (see article on pp. 42–46). For these four species, the total number (column Total) includes also the column "elsewhere". n.e. = not estimated, due to small sample size. X = 1–9 ind., XX = 10–99 ind., XXX = 100–999 ind. etc.

	Kulykol	Ayke	Batpakkol	Koybagar	Biesoygan	Tyuntyugur	Bozshakol	Lebyazhye	Rechnoye	Total	+elsewhere
<i>Tachybates ruficollis</i>				1						XXX	6
<i>Podiceps cristatus</i>	120	3	10	XXX			2	40	15	XXX	6
<i>Podiceps griseigena</i>			2	2				1		5	
<i>Podiceps auritus</i>	1	1	1	20				2		25	1
<i>Podiceps nigricollis</i>		1	1	2						4	
<i>Phalacrocorax carbo</i>	10	130	10	50	5					205	10
<i>Phalacrocorax pygmeus</i>	1									1	
<i>Pelecanus crispus</i>											2
<i>Botaurus stellaris</i>	1		4	7	1					13	
<i>Egretta alba</i>	80		55	10	25			23		193	6
<i>Ardea cinerea</i>	10		10	5	40	X		10		80	
<i>Cygnus olor</i>	20	8	3	40						71	
<i>Cygnus columbianus</i>	5					30				35	
<i>Cygnus cygnus</i>	50		190	20		100		13		273	
<i>C. cygnus/ columbianus</i>						170				170	90
<i>Cygnus sp.</i>	110			50			40	18	40	258	18
<i>Anser albifrons</i>	91300–92700	n.e.	6250	6270	23400	165	6874	200	X	172600–174200	
<i>Anser erythropus</i>	6110–11200	n.e.	28	54	440	3	124			7300–12400	
<i>Anser anser</i>	16100–22100	n.e.	1620	4970	1750	40	1720	3500	2000	42700–48700	
<i>Anser fabalis</i>	2		1			1				4	
<i>Branta ruficollis</i>	39300–41600	n.e.	890	2110	8620	70	2900	35		63200–65400	
<i>Branta bernicla</i>			1								
<i>Tadorna tadorna</i>	6									6	33
<i>Tadorna ferruginea</i>	45	3			1					49	
<i>Anas penelope</i>	XX	X	XX	XX	XX	XX	X	20	2	XXX	+
<i>Anas strepera</i>	300	1	10	XX	XX					400	200
<i>Anas crecca</i>	XXX	2	XX	XXX	XXX	XXX	XXX	XX	10	XXXX	+
<i>Anas platyrhynchos</i>	>30000	+	XXX	XXX	+	XX	XX	XX	1	30000–40000	+
<i>Anas acuta</i>	XXXX	+	XX	XX	+			20	6	XXXX	+
<i>Anas querquedula</i>	5		1							6	
<i>Anas clypeata</i>	30		100	2	20			1		150	+
<i>Netta rufina</i>	6			50						56	
<i>Aythya ferina</i>	20	XX	XX	XX		3				XXX	
<i>Aythya fuligula</i>	30	XX	XX	XXX	+	XX	X	10		XXX	
<i>Aythya marila</i>			1	3						4	
<i>Clangula hyemalis</i>				9						9	
<i>Bucephala clangula</i>	50	XX	XX	XXX	+	XX	XX	20	1	XXX	
<i>Oxyura leucocephala</i>			1								
<i>Mergus albellus</i>	200		100	1000	XX	20		30	10	1500	
<i>Mergus serrator</i>	2		15	5		2				24	
<i>Mergus merganser</i>	2	1	10	4	30	8	6	20	2	83	
<i>Fulica atra</i>	40		10	XXX				10		XXX	30

Monitoring instructions for Lesser White-fronted Goose surveys

Petteri Tolvanen¹, Petro Pynnönen¹, Juha Markkola¹, Tomas Aarvak² & Ingar Jostein Øien²

¹ WWF Finland, Lintulahdenkatu 10, FIN-00500 Helsinki, Finland, e-mail: tolvanen@sll.fi

² Norwegian Ornithological Society (NOF), Seminarplassen 5, N-7060 Klæbu, Norway, e-mail: norornis@online.no

1. Introduction

This instruction is made especially for Lesser White-fronted Goose (*Anser erythropus*, later LWfG) surveys in the staging and wintering areas, where LWfG are often mixed with big numbers of other goose species.

The most important data to be collected during LWfG surveys are:

- exact locations of the most important LWfG areas and outlines of the important areas
- reliably counted estimates of the total number of geese in the area
- reliable estimates of the proportion of each goose species and of the age structure of the LWfG
- the hunting pressure
- diurnal rhythm of different goose species, especially LWfG compared to Greylag Goose
- habitat use and diet of LWfG

In addition, the following studies are of high importance:

- examination of the hunters' bags
- taking feather, tissue and blood samples of dead LWfG

Less important things to study but still useful to do, if there is sufficient time are:

- description of the feeding / roosting sites
- description of behaviour of LWfG

2. General instructions

Always locate your observation point - if possible, with a GPS - and mark it on a map. When using GPS, don't rely on the GPS's memory, but always write the co-ordinates also in your note book! Have always the best available **maps**, a **compass** and black-and-white working **copies of maps** with you to make notes. **NATO maps** in scale 1:1.000.000 are available of every area. If maps of larger scales are not available, **draw your own maps** of the most important landscape features with plots of the places with LWfG. A **dictating machine** is recommended especially in counts and behavioural studies! Always remember to note the **timing of dawn and dusk**.

Abbreviations; use these also in your own notes for making faster notes:

English	Scientific	Abbr.
Lesser White-fronted Goose	<i>Anser erythropus</i>	Aery
White-fronted Goose	<i>A. albifrons</i>	Aalb
Greylag Goose	<i>A. anser</i>	Aans
Unidentified Anser-geese	<i>Anser sp.</i>	Ans
Red-breasted Goose	<i>Branta ruficollis</i>	Bruf
Unidentified goose	<i>Anser sp. / Branta sp.</i>	AB
adult bird		ad
2nd calendar-year bird		2cy
juvenile bird		juv
full grown, age not known		fl

3. Counting Lesser White-fronted Geese and other goose species

3.1 Field work

3.1.1 Counting the total number of geese

This kind of data is collected in **every possible place where geese are present**. The actual observing places are pinpointed on maps (using GPS if possible).

Always count the **total number of geese** on morning/evening flights or in roosts or grazing places. Of flying birds, check the **flying directions** (N, NE, E, SE, S, SW, W, NW: if possible use also intermediate directions as NNE etc.; use a compass).

In mass roosting places (like e.g. at the roosting lakes in NW Kazakhstan) the estimation of the total number of geese roosting on a lake is most easily made by counting the **total number of geese departing from the roost** (at the dawn) **in the morning** using spotting scopes and binoculars. Departure starts normally much before sunrise.

When counting a big flock in flight, first count e.g. 100 individuals

accurately, then use this "measuring flock" to estimate a bigger "measuring flock" of e.g. 1,000 individuals (= 10 x 100 ind.), and then estimate the size of the whole flock. Take into account, that some parts of the flocks are much more dense than some other parts. Reliable estimation of flocks of thousands of geese requires long experience. To adjust your "measuring flock", count to 100 more than once with regular intervals, and calibrate your estimates with other (experienced) observers.

3.1.2 Species composition

When observing a small flock or there is possibility for extended observation, identify all individuals by (in this order): 1. species, 2. age, (3. sex)

Age classes of LWfG (and other geese)

The following age classes are normally relatively easy to identify in the field:

Autumn

ad (= +1cy)

1cy (= "juvenile"; without belly patches and blaze)

2cy could be sometimes possible to identify by very worn retained **juvenile type** wing coverts

(+2cy could be sometimes possible to identify by two generations of **adult type** wing coverts)

Spring

ad (= +2cy, older than 2. calendar-year)

2cy (juvenile coverts, weak (or no) belly patches, blaze may be incomplete)

(3cy could be sometimes possible to identify by very worn retained **juvenile type** wing coverts)

(+3cy could be sometimes possible to identify by two generations of **adult type** wing coverts)

Sexing of adult LWfG is usually possible only when comparing paired birds:

male: on the average distinctively larger, with steeper forehead and thicker neck

female: on the average smaller, the forehead more gentle (making the bill look longer)

Sampling big flocks on the ground

When observing large flocks on the ground (and there is not enough time to identify all individuals), take **random samples of e.g. 30 individuals of the flock covering evenly the whole flock**. Note, that LWfG can be concentrated in some (often marginal) parts of the flock. When taking a sample, patiently identify all the (e.g. 30) individuals next to each other, don't pick only the most easily visible watching birds! **Try to sample ca. 10% of each flock** (or at least 15 samples for statistical reasons).

Always mark the feeding places of the flocks in a map and/or mark the place with GPS.

Example from note book when sampling a big flock on the ground

October 10, Place x

GPS location N xx xx xx, E xx xx xx

temperature, wind speed and direction, cloudiness, visibility

- a flock of ca. 3,000 geese on a wheat field, using 30 ind. sample size

Sample 1:

Aalb ad: 2,2,4,1,1,

Aalb juv: 1,2,1,

Aalb fl: 1, 5,

Aery ad: 2,

Aery juv: 2,

Aery fl:
 Aans ad:
 Aans juv
 Aans fl: 1
 Bruf ad:
 Bruf juv:
 Bruf fl: 2,2,1,

Sample 2:
 Aalb ad: 1,1,2,1,2,1, 1,3,1,
 Aalb juv: 2,1,1,5,
 Aalb fl: 1,1,1,2,2,
 Aery ad:
 Aery juv:
 Aery fl:
 Aans ad:
 Aans juv
 Aans fl:
 Bruf ad:
 Bruf juv:
 Bruf fl:

etc..., altogether 10 samples of 30 ind.=300 ind.=10% of the flock of 3,000 ind.

Sampling in the flight

The best way (at least e.g. in NW Kazakhstan in autumn) to estimate the proportion of each species and the age structure of LWfG in the area is to take **random samples** of flying flocks, when they are returning little by little to the roosting lake, and often again departing to the feeding areas during the afternoon. During the morning flight when estimating the total number of geese, sampling is usually not possible due to the poor light conditions and the great number of geese.

However, if there is several (more than three) skilful persons with binoculars and telescopes observing the morning departure flight, one of them could take samples evenly during the whole morning flight period using the method described below to get better data of the diurnal rhythms of the different species (see 3.1.3). If sampling during the morning flight, use 5 min periods when booking the samples!

Flight sampling method:

- find the most frequently used flyway from the feeding grounds to the roost (or from the roost to the feeding grounds), and choose the observation point by the flyway (not necessary by the roosting lake)
- always use a telescope when taking samples
- take **samples of 30 individuals next to each other** (this has proven to be the most useful sample size, more than 30 ind. is too much to hold in mind), and **choose randomly the flock and the part of the flock** that you are sampling (e.g. when finished one sample, decide to take the next sample after 2 minutes on the left side the first flock in sight, 30 birds in the end of that flock)
- take **only properly seen individuals in the samples**; if you can't identify for sure **all of the 30 individuals** in the sample, **reject the whole sample**
- if you are aiming to sample the age structure of Lesser White-fronted (and White-fronted) Geese, take only such samples in which you can identify all White-fronted and LWfG also by age
- **book samples in 30 min** (or shorter) **periods**, and **keep the original samples separate** to calculate statistics of the data
- take samples **evenly during the whole return** (or departure) **flight period** to get non-biased material

Example from a note book when estimating species composition by sampling flying flocks:

October 10, Place x
 GPS location N xx xx xx, E xx xx xx
 temperature, wind speed and direction, cloudiness, visibility
 Starting time: 12:00
 - using 30 min periods

12:00:
 Sample 1 (S1): Aalb 20 ad 10 juv
 S2: Aalb 30 fl
 S3: Aalb 15 ad 5 juv, 3 fl, Bruf 5 fl, Aery 1ad 1juv
 S4: Bruf 28 fl, Aalb 2 fl

12:30:
 S5: Aalb 30 fl
 S6: Aalb 19 ad 6 juv, Bruf 6 fl, Aans 4 fl, Aery 1 ad

13:30:
 S7: Bruf 30 fl
 S8: Aery 2 ad 4 juv, Aalb 23 fl, Aans 1 fl

14:00:
 S9: Aalb 30 fl
 S10: Aalb 30 fl
 S11: Aalb 28 fl, Bruf 2 fl

etc..., continuing until the sunset / dark

Detect grouping of LWfG in flocks, report families (e.g. adult male, adult female + 4 juveniles) and groups of adults (1 ad male, 1 prob. ad. female, 1 2cy).

Searching for LWfG and describing their grouping: You can also specially search for LWfG even when not sampling all geese. Count the LWfG you can find and detect their grouping.

Always count the total number of daily seen (identified) LWfG!

3.1.3 Daily rhythm of different goose species

In areas, where the geese concentrate in roosting/feeding places, daily rhythmic of goose species is of high interest (to make recommendations for hunters). In the morning flights, pay much attention for the timing of departure of different goose species. Use **easily identifiable categories**: Aalb/Aery, Aans, Bruf and AB, and don't try to identify all the white-fronted geese at species level. The best opportunity to estimate the species composition is during the mid-day and afternoon, as the geese are returning to the roost little by little in good light conditions (see also 3.1.3. Species composition)

Count the geese (and gunshots heard) **in 5 min periods** (if not possible, use 15 min periods, but not longer). Don't forget to note the time of sunrise in your notebook. In the evening, arrival of geese often happens in dark, when identification or even counting is often not possible.

In spring, the diurnal behaviour pattern (mass departure from the roosting lakes very early in the morning and returning little by little to the roosting lakes during the mid-day and evening) of Lesser White-fronted, White-fronted and Red-breasted Geese seems to be (at least e.g. in NW Kazakhstan) less distinctive than in the autumn, and usually it is not possible to observe the morning flights.

Example from a field note book when observing mass morning flight:

October 10, Lake x
 GPS location N xx xx xx, E xx xx xx
 temperature +2C, wind speed and direction NW 2 m/s, cloudiness 2/8 of the sky, visibility excellent (>20km)
 - using recommended 5 min periods

05.50:
 AB 500 W, 1000 W, 450 NW, 20 W, 500 SE, 1000 W,
 Aalb/Aery 40 W, 80 W, 600 NW,
 Bruf 50 W, 200 NW,
 gunshots 1,2,1,

05.55:
 - from now on all to N-NW direction, if direction is not mentioned
 AB 2400, 300, 60, 700 SE,
 Aalb/Aery 400, 590, 120, 700,
 Bruf 300, 350, 120, 50,
 Aery 3 ad S, 2 ad 4 juv,
 gunshots 1,1,1,1,1,1,

06.00:
 - sunrise 06.05
 AB 1250, 50, 730, 1050,
 Aalb/Aery 550, 430, 200, 500,
 Bruf 900, 670, 30, 5, 40
 Aery 2 ad 1 juv, 1 ad, 1 ad SE,
 Aans 60, 200, 230,
 gunshots 1,1,1,1,2,1,1,



Photo. An adult pair of Lesser White-fronted Geese flying at the Valdak Marshes, Porsangen Fiord, Northern Norway. © Georg Bangjord

3.2 Processing the field data

The number of LWfG can be calculated from the total number of geese, when the ratio of Aery/total number geese in the samples is taken into account:

$$AE_{tot} = (AE_{sam} / AB_{sam}) \times AB_{tot}$$

where:

AE_{tot} = number of LWfG

AE_{sam} = n of LWfG in the samples

AB_{sam} = n of all geese in the samples

AB_{tot} = number of all geese in the area (e.g. number of all geese counted during the morning flight at that lake or estimated total number of geese feeding in the fields in the area)

Store up all the original sample data to assess the statistical precision of the estimate (standard deviation and variance etc.) later.

4. Hunting pressure

To estimate the mortality rate of LWfG, it is essential to calculate hunting pressure of geese in different areas. It is possible when the number of all geese shot in the area and the proportion of LWfG in hunters bags is known.

4.1 Make interviews with authorities responsible for hunting and with hunters. Make your own estimation of birds shot in the area.

4.2 Study the birds shot by hunters

Make notes of (in this order): number of geese, species composition, age-classes, sexes, biometrics. Note, that species composition can be safely determined only from complete bags.

Photograph all the shot LWfG, especially the heads and bellies.

Measure biometrics and take samples for DNA-analysis. If possible, try to measure at least all the LWfG. Measure wing-length, head+bill and tarsus as follows:

Wing-length: Use maximum method or (preferably) both maximum and minimum. Use a ruler with a stopper at the end. Put the carpal against the stopper. Use 1mm accuracy. Note that the wing-length of Greylag can be up to 450mm.

Maximum method: Put the carpal against the stopper, flatten the wing and straighten the primaries.

Minimum method: Put the carpal against the stopper and wing loosely on the ruler. Do not flatten or stretch the wing.

Bill to skull: If a slide calliper is available, measure the distance between the tip of the bill and the skull. Use 0.1 mm accuracy.

Bill to feathers: If a slide calliper is available, measure the distance between the tip of the bill and the outermost feathers on the base of the bill. Use 0.1 mm accuracy.

Head+bill: Use a **slide calliper** (or if not possible, a ruler with a stopper). Use 1mm accuracy. If using a ruler, put back of the skull against the

stopper and put bill on the ruler. Note that stopper have to be high enough to be accurate.

Length of the white blaze: Measure by a **slide calliper**, use 0.1 mm accuracy.

Length of tarsus: Use maximum method and a **slide calliper** (or if not possible, a ruler with a stopper). Bend both ends of tarsus to straight angle and put stopper against the upper end of tarsus. Use 0.1 mm accuracy.

Width of tarsus: If a slide calliper is available, measure the width of tarsus just under the heel articulation (maximum).

Length of tail: Use 1 mm accuracy.

Weight: Use a (Pesola) spring balance if possible, accuracy depends on the type of the balance.

Sex: Sexing of geese is possible by feeling the genital area with hands. Males do have a clear bulk in genital area, females don't. If one presses gently from the sides of cloaca, males usually display clear white penis. This sexing method is perhaps not reliable for first-calendar-year birds. Dead geese can also be sexed by slicing them open with a sharp knife and sexing them by the genitals.

For DNA-analysis one should get at least some part of the bird (blood or tissue sample, part of skin, feather bases etc...) of every specimen. Mark the sample individually with notes on biometrics. Samples with complete information must be posted to Minna Ruokonen, University of Oulu, Biologian laitos, FIN-90570 Oulu, Finland.

4.3 Count the frequency of gunshots (number of shots heard / 15 minutes) and, if possible, make notes of successful/unsuccessful shots.

4.4 Mark hunters on a map. Study especially their position in relation to borders of nature reserves.

5. Description of feeding sites

Implement this for Lesser White-fronted Geese and also for other species to study habitat and spatial overlap of goose species. Always pinpoint the place on a map - if possible with a GPS.

5.1 Identify the habitat where the individual birds are grazing

Concerning a larger flock (where it is impossible to go through the majority of individuals) identify the habitat in the middle of the flock. Use categories of Sutherland and Crockford (1993) to describe the habitat: winter wheat, maize stubble, plough, steppe, fallow, vines, beet or trees. Add new types if missing. Determine the natural vegetation in more details if possible by using the most abundant plant species.

To know **what is available** for the geese, find statistics of land use in study area (proportion of winter-wheat, vine, cotton etc. fields, meadows, natural steppes, salt-marshes, pastures) and if not available measure yourselves (e.g. proportion of every category along 10-20 km of the road side).

5.2 Estimate the distance between one individual or the middle point and the extreme sides of a flock to the nearest a) road b) (farm)house c) trees d) bushes

5.3 Take photographs of the habitats

5.4 Take field samples of unknown plant species

If droppings are collected, collect a reference sample of all potential diet plants.

5.5 Collect samples of droppings for later diet studies, if you can be quite sure of the goose species (Aery, Aalb, Aans, Bruf). Put every individual droppings in separate paper bags.

5.6 Determine the distance between the feeding site and roosts

6. Description of roosts

Always pinpoint the place on a map, if possible with a GPS.

6.1 Determine roost type

Fresh water lake, salt lake, coastal lagoon, bay of the sea, fishpond etc.

6.2 Describe the rough type of the watershed

in terms of oligo-/meso-/ eutrophy

6.3 If the roosting lake is surrounded by reedbeds (*Phragmites australis*), estimate the width of the reedbed

6.4 Describe the vegetation types surrounding the roost

6.5 Take photos

7. Behaviour of Lesser White-fronted Geese

Usually possible only in the (northern) staging areas, where there is relatively small numbers of geese, and the birds stay at a place for relatively long times. A hiding tent usually needed, and a dictating machine is useful.

7.1 Monitor the behaviour of LWfG

Describe what individual birds are doing at a moment by scanning a flock with spotting scope at regular times. See the table below for useful categories of behaviour. Repeat the scanning c. 10 times per flock (if using a dictating machine, wait 1 minute before a new scan). After completing 10 scannings wait for 5 minutes and repeat another 10 times.

- repeat this for the same flock during different times of the day
- do this for LWfG flocks of different sizes and LWfG accompanied by varying numbers of other geese.

Behavioural categories (examples):

Category	Abbreviation
not in sight	NS
feeding (standing)	Fs
feeding (walking)	Fw
watching	W
watching and walking	Ww
watching and lying	Wl
resting (lying)	Rl
resting (standing)	Rs
preening	P
fanning	FA
swimming	SW
shaking head	SH
flying	FL
struggling / attacking	ST
threatening	TH
copulating	CO
calling	CA
alarming	AL

7.2 Monitor behaviour of different individuals (adult males, adult females, juveniles, 2cy) using other individuals only as a background factor. After one view wait 15 seconds.

E.g. *an adult male with a flock of 3 adult pairs and a family of a female, a male and 3 goslings. 1. scanning: watching; 2. scanning: watching and walking; 3. scanning: feeding; 4. scanning: feeding etc...*

7.3 Conflicts between Lesser White-fronted Geese and others species

Which species were fighting and what was the result. E.g. Aery ad male attacked an ad male Aans, result: Aans won

7.4 Conflicts between Lesser White-fronted Geese

- try to identify the sex of fighters (only males?)
- draw belly patches of fighters or check which of the fighters had larger belly patches
- what was the result? which individual won? how many individuals were on the attackers' side and how many on the defenders' side

7.5 Grouping, family-bonds, pair-formation

Try to learn to know individuals and families (use belly patches etc.). Follow day by day if the family is still together or not. Try to observe pair-formation.

7.6 Describe behaviour and voices

Describe qualitatively behavioural features. E.g. *"shaking heads means lets take off..."*, *"after a fight the male stood very high promoting the belly patches..."* *"Short kiu-kiu-kiu is a take-off voice"* etc.

NOF Rapportserie — tidligere rapporter

1994

- 1-1994 Prosjekt dverggås. Årsrapport 1994
- 2-1994 Seabird Censuses on Novaya Zemlya 1994. Working Report
- 3-1994 Fauna at Troynoy and Influence of Polar Stations on Nature Reserve
- 4-1994 Ornithological Registrations in the Uboynaya Area

1995

- 1-1995 Tranebestandens utvikling og status i Norge
- 2-1995 Åkerrikxa i Norge 1995. Bestandsstatus og tiltaksplan
- 3-1995 Seabird Censuses on Novaya Zemlya 1995
- 4-1995 The Lesser White-fronted Goose Monitoring Programme
- 5-1995 Status for verneverdige våtmarker i Norge

1996

- 1-1996 Bestandsforhold og bruk av nøkkelbiotoper hos norske låvesvaler 1995
- 2-1996 Åkerrikxa i Rogaland 1995. Bestandsstatus og tiltaksplan
- 3-1996 Effekter av militære skytefelt på fuglelivet. En litteraturstudie
- 4-1996 Norsk Hekkefugltaksering. Årsrapport 1995
- 5-1996 Truete fuglearter i Norge
- 6-1996 Åkerrikxa i Norge 1996 — bestandsstatus og tiltaksplan
- 7-1996 The Lesser White-fronted Goose Monitoring Programme – Annual Report 1996
- 8-1996 Spetteundersøkelser ved Vinjefjorden

1997

- 1-1997 Seabird Censuses on Novaya Zemlya 1996
- 2-1997 Bestandsovervåking av spurvefugler ved hjelp av standardisert fangst
- 3-1997 Norsk Hekkefugltaksering. Årsrapport 1996
- 4-1997 Ornitologiske registreringer på Store Altsula, Nordkapp kommune
- 5-1997 The Lesser White-fronted Goose Monitoring Programme — Annual Report 1997
- 6-1997 Prosjekt Åkerrikse — årsrapport 1997
- 7-1997 Kartlegging av hvitryggspett i Trøndelag 1997
- 8-1997 Ornitologiske registreringer i den foreslåtte Roltdalen nasjonalpark
- 9-1997 Fugletakseringer i verneområder i Sør-Trøndelag 1996
- 10-1997 Fugletakseringer i verneområder i Sør-Trøndelag 1997

1998

- 1-1998 Norsk Hekkefugltaksering. Årsrapport for 1997
- 2-1998 Konsekvenser for fuglelivet ved bygging av 300 (420) kV-ledning Verdal-Fiborgtangen
- 3-1998 Konsekvenser av veibygging og hogst i Seterseterdalen i Hemne kommune, Sør-Trøndelag
- 4-1998 Migration routes and wintering areas of Lesser White-fronted Geese mapped by satellite telemetry

Maailman Luonnon Säätiön WWF
Suomen Rahaston Raportteja

WWF Finland Reports

Helle, E. ja Stenman, O. (toim.) 1990: Itämeren hyljekannat 1986-1990. - Maailman Luonnon Säätiön WWF Suomen Rahaston Raportteja Nro 1.

Itämeren hylkeiden suojelutyöryhmä 1990: Itämeren hylkeiden suojelun tehostaminen Suomessa. - Maailman Luonnon Säätiön WWF Suomen Rahaston Raportteja Nro 2.

Helle, E. och Stenman, O. (red.) 1990: Sälstammarna i Östersjön 1986-1990. - Maailman Luonnon Säätiön WWF Suomen Rahaston Raportteja Nro 3.

Arbetsgruppen för skydd av Östersjöns sjölar 1990: Förbättring av skyddet av Östersjöns sälar i Finland. - Maailman Luonnon Säätiön WWF Suomen Rahaston Raportteja Nro 4.

Sipilä, T. 1991: Saimaanhyljealueiden suojelutavoitteet. - Maailman Luonnon Säätiön WWF Suomen Rahaston Raportteja Nro 5.

Rassi, P. (toim.) 1993: Suomen kovakuoriaisten (Coleoptera) frekvenssipisteet 1.1.1960 - 1.1.1990. - Maailman Luonnon Säätiön WWF Suomen Rahaston Raportteja Nro 6.

Proceeding of the 9th international colloquium of the European invertebrate survey, Helsinki, 3 - 4 September 1993. Threatened species and bioindicators at the pan-European level 1995. - Maailman Luonnon Säätiön WWF Suomen Rahaston Raportteja Nro 7.

Liito-oravatyöryhmä 1996: Liito-orava Suomessa. - Maailman Luonnon Säätiön WWF Suomen Rahaston Raportteja Nro 8.

Tolvanen, P., Ruokolainen, K., Markkola, J. & Karvonen R. (eds.): Finnish Lesser White-fronted Goose conservation project. Annual report 1997. - WWF Finland Report No 9.

Tolvanen, P., Øien, I.J. & Ruokolainen, K. (eds.): Fennoscandian Lesser White-fronted Goose conservation project. Annual report 1998. - WWF Finland Report No 10.



THE LESSER WHITE-FRONTED BOOSE GROUP OF FINLAND IS HEADING TO KAZAKHSTAN TO FIND OUT THE SECRET WINTERING AREAS OF THE LESSER WHITE-FRONTED GOOSE. WE MEET THEM AT THE MOSCOW AIRPORT WAITING FOR ODDVAR NORMAL FROM NORWAY.

BUT WHERE IS ODDVAR! HE HAS GOT ALL OUR BEVERAGE SUPPLY !!!

HEY! LOOK AT THAT PLANE TO VLADIVOSTOK! THERE IS A GUY, WHO LOOKS JUST LIKE ODDVAR NORMAL!

HE IS ODDVAR!



THE GROUP ARRIVES KAZAKHSTAN

WELCOME COLLEAGUES! HOPE YOU ARE NOT THIRSTY! BY UNEXPECTED MISTAKE ALL VODKA DELIVERY TO OUR EXPEDITION HAS GONE TO VLADIVOSTOK.

SORRY BOYS! BUT OUR ADMINISTRATION SOLD OUR KLEINBUS TO... ..VLADIVOSTOK!

HOW DID YOU GUESS?

ACCORDING TO OUR SATELLITE DATA OUR GEESE SHOULD BE HERE, BUT THERE ARE NO LESSER WHITE-FRONTED GEESE AMONG THESE, STRANGE...

AT LEAST OUR MOTEL IS STILL IN ITS PLACE.

I AM TERRIBLY SORRY GENTLEMEN. OUR MOTEL IS FULLY BOOKED AND THERE IS NO ROOM AT THE RESTAURANT EITHER...

...INSIDE THE MOTEL...

GUYS! YOU NEVER GUESS WHAT HAS HAPPENED WITH OUR TENTS!

UUH GEE...

KIAK! KIAK! KIAK!

ODDVAR CALLS FROM VLADIVOSTOK!

HE SAYS HE IS COMING HOME WITH A KLEINBUS FILLED WITH VODKA AND HE HAS A LOCAL GOOSE-EXPERT WITH HIM,

...AND THE JOURNEY MAY TAKE SOME TIME... SEE YOU!