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Fennoscandian Lesser White-fronted Goose conservation project Annual report 2000

Edited by
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Photo. A pair of Lesser White-fronted Geese on their breeding grounds in northern Finnish Lapland. © Petteri Tolvanen, June 1993

Introduction

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The Lesser White-fronted Goose (Anser erythropus, subsequently referred to as LWfG) is a globally threatened species (Tucker & Heath 1994), and the most recent estimate of the mid-winter world population is approximately 25,000–30,000 individuals (Lorentsen et al. 1999). However, recent studies have shown that the population is genetically divided in two parts, a western and an eastern population with a geographic divide in the Taimyr Peninsula area in northern central Siberia (Ruokonen et al. MS, Ruokonen & Lumme 2000). In addition, the Fennoscandian subpopulation, that presently numbers 30–50 pairs in the Nordic countries (Norway, Finland, Sweden) (von Essen et al. 1996, Øien et al. 1996) and an unknown number of breeding pairs on the Kola Peninsula, shows evidence of being a distinct unit within the western population, with little or no female exchange with other breeding populations (Ruokonen et al. MS, Ruokonen & Lumme 2000). This has consequences both for the research priorities and for the management and conservation of the species since the populations of LWfG as management units in reality are smaller than formerly believed. For example the '1% of a population' criteria that has been applied as a threshold value for defining a staging or wintering area as a BirdLife International Important Bird Area (IBA) for LWfG (Heath & Evans 2000) would turn out differently when these populations are used as units compared with the present situation, where the criteria is used on the total world population. Tolvanen et al. (1999) argued that the threshold value for Europe should be c. 20 birds and not the current 30–78 that is based on unrealistic autumn population of 3,000–7,800 individuals. Since the Fennoscandian population at present numbers only 30–50 pairs breeding in the Nordic countries, all staging areas that are regularly used even by some very few of these birds should have the status as IBAs, and should be protected. Further, this line of thinking also apply for the breeding areas in Fennoscandia, all areas where LWfG is proved to breed apply to the BirdLife IBA criteria, and should be included in the IBA list.

Through the research, mainly carried out by the Fennoscandian LWfG conservation project jointly run by the Norwegian Ornithological Society and WWF Finland, it has been found that factors outside the breeding season are the main reasons for the negative population trend throughout the distribution area of LWfG. Based on ring recoveries and satellite tracking data, it has become evident that the high hunting pressure alone is sufficient to explain the continuos decline of the LWfG populations. Spring hunting of adult birds in the staging and breeding areas, which is still very common throughout the breeding range of LWfG in Russia, exert particularly harmful effects on the populations. In China, where the LWfG leave the wintering grounds as late as in early April, the illegal winter hunting is particularly harmful to the eastern population (Markkola et al. 2000). In the autumn 2000, the police caught eight poachers at the East Dongting Lake. By late October, when these poachers were arrested, they had already killed 667 LWfG, which represents as much as 5–10% of the Chinese

wintering population (Lei 2001, p. 48 in this report). There is an urgent need to improve the safeguard of LWfG at the East Dongting Lake Nature Reserve.

The extremely endangered Fennoscandian population is also experiencing a high mortality rate, but the monitoring of staging LWfG at the Valdak Marshes in Norway shows that the number of staging birds has been stable at this site in the period 1993–2000 (Aarvak & Øien 2001, pp. 17–22 in this report).This indicates that the reproductive rate could possibly counteract the high mortality rate for this subpopulation (but see also Lampila 2001, pp. 45–47 in this report), or that there is a net immigration to the Nordic countries. However, at the spring staging area on the Finnish Bothnian Bay coast the population trend has been continuously negative during the last decades (see Markkola 2001, pp. 12–16 in this report). The connection between the spring staging areas in Estonia, Finland and Norway are fairly well known (Aarvak et al. 1999, Markkola 2001, pp. 12–16 in this report and Pynnönen & Tolvanen 2001, pp. 10–11 in this report), as also the autumn migration route that turns south-west through Germany and Hungary (for monitoring results from Hungary see Tar 2001, pp. 34–36 in this report) to Greece (Lorentsen et al. 1998). However, where and when the different populations travel eastwards after the Kanin Peninsula in autumn through the Ob River Valley and northern Kazakstan is not known. The monitoring conducted in northern Kazakstan gives valuable data on staging patterns, age and species ratios (see Tolvanen et al. 2001, pp. 30–33 in this report), but can not at present distinguish between LWfG from the different breeding areas due to very few LWfG with individually colour leg rings or neckbands.

The worrying population status and negative population trend has led to different initiatives in trying to save the LWfG from extinction in the Nordic countries. Besides the work on monitoring the population development, mapping of migration routes, management of LWfG habitats and addressing the causes for the negative trend in the wild population, two projects have dealt with restocking and reintroduction of LWfG in Fennoscandia (Markkola et al. 1999, von Essen 1996). In Finland, restocking of LWfG was stopped after a meeting held in Helsinki in March 1998 (Markkola et al. 1999). The Swedish reintroduction project (see von Essen 1996, von Essen et al. 2000 for details) decided to discontinue the introduction of LWfG to Swedish Lapland after White-fronted Goose (Anser albifrons) genes were documented in the Finnish captive stock. This was due to the fact that the Finnish LWfG captive stock mostly originates from the Swedish captive stock. The situation is worrying since a reintroduced population that migrates to western Europe has been established in Swedish Lapland. The risk of swamping with the wild population is present, and this could have irreversible harmful effects. There is therefore an urgent need that this situation will be dealt seriously with by both Swedish, Norwegian and Finnish nature management authorities.

According to definitions given by IUCN, 1) reintroduction of an organism is the intentional movement of an organism into part of its native range from which it has disappeared or become extirpated in historic times as a result of human activities or natural catastrophe and 2) translocation of an organism is the intentional or accidental dispersal by human agency of a living organism outside its historically known native range. Since LWfG at least in historical time has not wintered naturally in western Europe, the Swedish project has been partly a translocation project. How this on the long view affects the LWfG populations or the other naturally occurring goose species is impossible to foretell. IUCN Species Survival Commission has also outlined guidelines for reintroduction (see Kleiman et al. 1994 and internet http://www.iucn.org/themes/ssc/pubs/policy/ for further details). Meffe & Carroll (1994) list a number of qualitative guidelines for genetically based conservation practices. Among them:

– Management of wild populations should be consistent with the history of their genetic patterns and processes. For example, historically isolated populations should remain isolated unless other concerns dictate that gene flow must occur. Gene flow among historically connected populations should continue at historical rates, even if that calls for assisted movement of individuals

– Avoid artificial selection in captivity. This is best done by keeping breeding populations in captivity for as few generations as possible, and also by simulating wild conditions as nearly as possible

– Avoid possible outbreeding depression caused by breeding distantly related populations if other choices are available

– Avoid inadvertent introductions of exotic alleles into wild or captive populations

– Maintenance of genetic diversity in captive stocks is no substitute for genetic diversity in the wild. Technological mastery over the genome should not be used as an excuse to overexploit or destroy species or populations in the wild

Our knowledge about the effect of reintroducing captive bred individuals is at present limited and considerable caution should be taken if such actions should be carried out in the future. Some of the arguments against restarting a reintroduction scheme for LWfG in the Nordic countries at present are:

– there is still a viable reproducing population in the Nordic countries that conservation

Photo. Public awareness work and education of hunters is a very important part of the conservation of the Lesser White-fronted Goose. Petteri Tolvanen teaching a local hunter in Kazakstan how to separate White-fronted Goose and Lesser White-fronted Goose. © Ingar Jostein Øien, October 1999

efforts should be focused at

– the use of Barnacle Geese as foster parents may increases the risk of hybridisation in the second generation

– diseases that are a potential threat to the wild population may be transferred from farmed to wild LWfG

– reintroductions or translocations may have unforeseen effects like transfer of pathogens from areas where LWfG is not naturally occurring

– difficulties in identifying possible alien genes in captive stocks

– planners of reintroduction schemes can rarely foresee the effects on behaviour, energetics, ecology etc. of reintroduced or translocated birds

These insecure factors that follow the reintroduction and translocation projects that have been carried out in Finland and Sweden indicates that further actions based on the principles that has been used in these projects is putting the still existing wild population of LWfG in the Nordic countries at risk.

The recommendations of the Fennoscandian LWfG conservation project to the nature management authorities is therefore clearly that all possible effort should jointly be focused on the still existing wild populations of the LWfG. Research and management should focus on solving the factors that causes the negative population trend. With the present reproductive rate of (the Fennoscandian) LWfG, a relax in the hunting pressure could stabilise or even lead to increasing population. Especially the mortality rate of adult LWfG is crucial for the population trend, as shown by Lampila (2001, pp. 45–47 in this report). A practical recommendation for the hunters in areas where the White-fronted Goose is a quarry species could be to shift the hunting pressure to juvenile white-fronted geese irrespective of the species – although LWfG as a species should be strictly protected everywhere. This is because the hunters can not identify the white-fronted geese at species level in practice.

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Lambart von Essen, the founder and long-time leader of the Swedish LWfG project, passed away on 27 July, 2000. We will remember Lambart as the Grand Old Man of LWfG conservation work; see p. 49 in this report.

Photo. Lesser White-fronted Goose pullus, caught and ringed during a catching effort in the Kurluska region, southern Taimyr.
© Petteri Tolvanen, July 1998

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Monitoring of Lesser White-fronted Geese in western Estonia in spring 2000

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1. Introduction

A spring staging area of Lesser White-fronted Geese (Anser erythropus, subsequently referred to as LWfG) was revealed in western Estonia in 1996–1998 (Tolvanen 1999). In April-May 1998, 32 LWfG were seen in the area without systematic searching (Tolvanen 1999). A monitoring programme for LWfG was established in the area in 1999 by the Finnish WWF LWfG project, in co-operation with Estonian ornithologists, and the spring of 2000 was the second consecutive year of the monitoring. The LWfG staging in western Estonia are mainly birds from the Fennoscandian breeding population, and the same birds are staging later during the spring migration at the Finnish Bothnian Bay coast and at the Valdak Marshes in northern Norway (cf. Aarvak et al. 1999, 2000).

2. Methods and weather conditions

The monitoring covered the period 20 April – 7 May, 2000. In addition to observations by the survey team, observations were received also from Finnish birdwatchers frequently visiting the area.

The aims of the LWfG monitoring in Estonia are:

– to reveal the numbers and age ratio of LWfG staging in the area

– to localise the most important feeding and roosting areas for LWfG and to assess possible threats for LWfG in the area during the staging period

– to collect data for the research on the migration routes of the Fennoscandian wild LWfG population, especially by recording and indentifying the individual belly patches of adult LWfG

The methods in the field work were following those of the previous years, and all the sites known to be visited by LWfG (Tolvanen 1999, Tolvanen et al. 2000) were surveyed (Figure 1). The spring 2000 was warm in general, and from 15 April until the beginning of May unusually warm and dry weather prevailed.

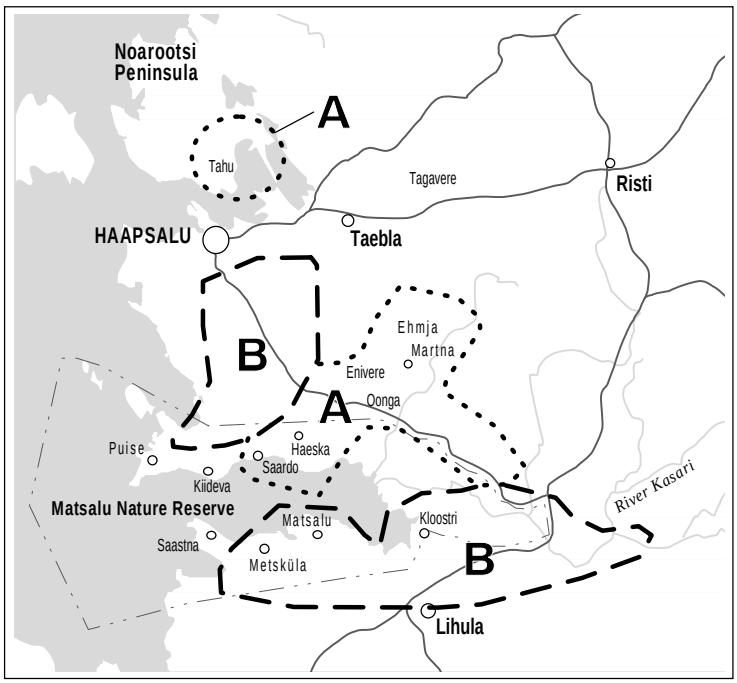

Figure 1. Map of the surveyed area. A = surveyed daily or almost daily, B = surveyed twice a week. The Audru fields (not on the map) were surveyed only on 1–2 May.

Photo. A still video image of two adult Lesser White-fronted Geese on the Tahu Meadow, Estonia. The birds are indentified individually from the belly patches. © Heikki Holmström & Risto Karvonen, April 2000

3. Results

A total of 35 LWfG were observed during the monitoring period. Of these, 33 were identified as adults, and two as 2nd calendar-year birds. LWfG were observed at three different sites (Table 1, Figure 1), the coastal meadows of Noarootsi, Tahu being the most important staging area this year. The first individuals, a flock of eight adult birds was seen at the 'traditional' site on the fields at Ridala, Haeska, by Finnish birdwatchers as early as on 18 April, i.e. before the monitoring was started. This was, surprisingly, also the only LWfG observation in Haeska during the whole spring, despite day-to-day checking of the site. On 21 April, a flock of 22 adult and two 2nd calendar-year LWfG was found at the coastal meadows of Noarootsi, Tahu, and the flock stayed at this site at least until 4 May. In addition, a flock of three adult individuals was observed outside the regular monitoring area, on the Audru fields close to Pärnu on 1 May.

At Tahu, the LWfG seemed to spend virtually all the time at the coastal meadows, and they were not seen to leave the Tahu Bay at all e.g. to feed on the fields. The flock spent most of the time on the western coast of the Tahu Bay, but occasionally the birds also visited the meadows of the southern parts of the Võnnussaare Cape on the eastern side of the bay. At Tahu, all of the 24 individuals were recorded on digital video for analysis of the individual belly patch patterns, and according to a preliminary comparison with the material from the Bothian Bay coast staging area in May 2000, at least 10 of the individuals recorded at Tahu were identified also on

Photo. Lesser White-fronted Geese and Greylag Geese roosting on the Tahu Meadow, Estonia in the spring 2000. © Ivar Ojaste

Table 1. Summary of Lesser White-fronted Goose observations in western Estonia in April–May 2000. For abbreviations of the observers, see acknowledgements; ad = adult, 2cy = 2nd calendar-year, ind. = individual.

Date	Place	No of individuals	Observer(s)
18 April	Ridala, Haeska Fields	8 (ad)	P. Komi, V. Pajulehto
21 April – 4 May	Noarootsi, Tahu coastal meadows	22 (ad) + 2 (2cy)	IO, RK, HH, PP, JLC, JP etc.
1 May	Pärnu, Audru fields	3 (ad)	AL

the Bothnian Bay coast (see Markkola 2001, pp. 12-16 in this report). The belly patches of the individuals seen in Haeska and on the Audru fields were not recorded.

4. Discussion

The total number of LWfG observed in the area was lower as compared to the previous year; 35 individuals in 2000 vs. 43–51 individuals in 1999 (Tolvanen et al. 2000). In 1998, 32 individuals were observed in the area without systematic searching (Tolvanen 1999). A remarkable difference from the previous two years was that only less than 25% of the individuals were observed in Haeska, which was clearly the most important Estonian staging site for LWfG in 1998–1999, and instead, more than 70% of the observed individuals spent at least 14 days at the Tahu meadows, – a site revealed as a staging place for LWfG in May 1999 (Tolvanen et al. 2000).

The Tahu coastal meadows are protected as a nature reserve, but human access to the meadows is not restricted by the management regulations. However, virtually no disturbance for the geese was observed at this site during the monitoring period. The spring migration movements of LWfG observed at the staging areas in Estonia, Finland and Norway will be analysed in detail for the next annual report of the Fennoscandian LWfG conservation project, but a preliminary analysis of the material from Estonia and Finland in spring 2000, indicates that the main migration pattern was similar to the results from 1999 (see Aarvak et al. 2000).

5. Acknowledgements

Nine persons participated in the monitoring work: José Luis Copete (JLC) 30 April–7 May, Heikki Holmström (HH) 20–29 April, Risto Karvonen (RK) 20–29 April, Aivar Leito (AL) 1-3 May, Ivar Ojaste (IO) 21 April–6 May, Jyrki Pynnönen (JP) 30 April–7 May, Petro Pynnönen (PP) 29 April–7 May, Maire Toming (MT) 3–4 May and Sirje Vaaro (SV) 1–3 May. Thanks are due to all these field workers and observers.

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Spring staging of Lesser White-fronted Geese on the Finnish Bothnian Bay coast in 2000

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1. Introduction

The earliest information available on Lesse White-fronted Goose (Anser erythropus, subsequently referred to as LWfG) migrating along the Bothnian Bay date back to 1892, when 'huge numbers' of LWfG were passing the isle of Hailuoto (Sandman 1892) off the town of Oulu. Merikallio (1910) estimated the total number of migrating LWfG to be ca 10,000 individuals in spring. According to the local hunters, the numbers were even higher in autumn. At least the flocks were larger but this may have resulted from a longer staging period (Virkkula 1926).

A drastic decline in the LWfG population has been registered both in breeding and staging places in Finland throughout the 20th century. Published data on the occurrence of the LWfG exist from the southern part of the Bothnian Bay (Pori and Turku region). Around 1970, the LWfG had disappeared as a regular migration-time visitor in this region (Soikkeli 1973). From the beginning of the 1970's the surroundings of Oulu, the isle of Hailuoto (Karlö), the meadows of Säärenperä and the Bay of Liminganlahti have been the only LWfG spring staging areas in Finland. The maximum numbers of birds seen at the same place during one day were ca 200 in the 1960's, ca 70 in the 1970's, ca 50 in the 1980's and ca 30 in the 1990's. In the late 1970's and the early 1980's the total number of staging birds near Oulu was estimated to be 100–150 (Markkola & Bianki 1997).

A regular monitoring programme was established by the WWF Finland LWfG working group in 1985. The spring monitoring in the year 2000 is thus the 16th consecutive year. The main aim of the monitoring program is to count the number of migrating LWfG on the Bothnian Bay coast, where the observation work is considerably easier than in the remote, partly unknown breeding areas. In addition, we try to collect biological data relevant for conservation of the LWfG such as age distribution (proportion of adults and 2nd calendar-year birds), disturbing factors, habitat use, etc.

2. The study area

In the Nordic countries, only two major spring staging areas are still regularly used by LWfG, the other one being situated at the Porsangen Fjord, Finnmark, Norway (see Aarvak & Øien 2001. pp 17–22 in this report). The staging grounds at the Bothnian Bay consists of three different but close situated meadow areas: Hailuoto, Säärenperä and the Bay of Liminganlahti. The standard monitoring activities includes counting and video recording of individuals as well as behavioural and ecological studies that were implemented in 2000.

The staging meadows in the south-eastern corner of the isle of Hailuoto (see Figure 1), covering altogether more than 200 ha, have been monitored every spring throughout the period 1985–1999. This is the place where LWfG stage most regularly and where they are most resident with no regular flights between feeding grounds and roosts. The central part of the meadows of Hailuoto, the Tömppä meadow, is a large and unite coastal meadow, and here a permanent observation hide since10 years has provided good view. Since the 1980's, the Tömppä meadow and the meadow of the neighbouring isle of Isomatala have been managed by mowing. This has improved the conditions for the staging LWfG, breeding Southern Dunlins (Calidris alpina schinzii) and other birds as well as for many rare plant species, like the Arctic Salt-grass (Puccinellia phryganodes) (Markkola & Merilä 1998). The expanding reed belts and willow bushes have been reduced successfully.

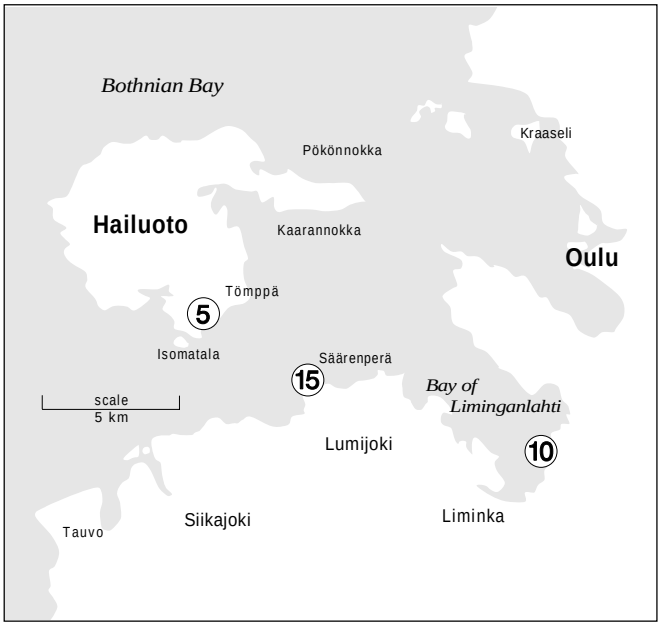

Figure 1. Spring staging places of Lesser White-fronted Geese on the Bothnian Bay Coast, Finland. The figures are the numbers of individuals seen in each place in 2000.

The Säärenperä area (Figure 1) in the municipalities of Siikajoki and Lumijoki is situated on the mainland, ca 10 km south-east of the Tömppä meadow of Hailuoto. The coastal meadows of Säärenperä are narrower than on Hailuoto. Besides, the western cape, which is the most important, largest and most uniform part and the traditional location of an observation hide, the geese can be staging also along a 5 km long shoreline. A coastal meadow pasture was established at Säärenperä in the beginning of the 1990's. New pastures were established in 1998 around the bay south-west of the Säärenperä western cape, and in 2000 they were unexpectedly preferred by the LWfG instead of the traditional places thus causing difficulties in the monitoring work. The third regular staging place is situated ca 14 km south-east of Säärenperä and 20 km south-east of Hailuoto on the south-western shores of the Bay of Liminganlahti in the municipality of Lumijoki. (Figure 1). Huge reed belts covering many square kilometres occupied a major part of the shore meadows during latest decades, but considerably large, low-growing meadows still remain between the reeds and the mud-flats. During and after the Liminganlahti Life-Nature project, 200–300 hectares have been managed by mowing and grazing in or near the traditional LWfG areas and at present the appearance of vegetation is more suitable for the LWfG than 10 years ago. Despite this, the LWfG staging at the Liminganlahti area in 2000 did not stay in this part, but in the inner part of the bay, 6 km more east, where they rarely have been observed the last 25 years (see chapter 4). In Lumijoki, the geese earlier visited also the near-by grass-stubble (mostly *Phleum pratense*) –fields early in the morning and late in the evening, but roosted on the shore and also spent the main part of the daytime there. In 2000 LWfG only visited hay fields at Säärenperä.

3. Methods

On Hailuoto, the monitoring from the hide was continuos during the

Table 1. The daily numbers of Lesser White-fronted Geese in 2000 in the three main sites on the Bothnian Bay coast and the cumulative sum of staging individuals. The number of goose days (the sum of daily numbers) and the final (cumulative) sum of different individuals in each place are presented in the last column, the daily sum and the cumulative sum of all individuals on the last two lines.

Area / date of May	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
Hailuoto, Tömppä																	
Daily number	–	–	1	1	0	0	0	0	0	4	4	4	4	0	–	–	18 'goosedays'
Cumulative sum	–	–	1	1	1	1	1	1	1	5	5	5	5	5	–	–	5 individuals
Siikajoki, Säärenperä																	
Daily number	–	–	0	0	5	13	9	9	13	13	11	0	0	0	–	–	73 'goosedays'
Cumulative sum	–	–	0	0	5	13	13	13	13	13	15	15	15	15	–	–	15 individuals
Bay of Liminganlahti																	
Daily number	–	–	0	0	0	10			10		10	10	0	0	–	–	40 'goosedays'
Cumulative sum	–	–	0	0	0	10	10	10	10	10	10	10	10	10	–	–	10 individuals
Daily sum of all places	–	–	1	1	5	23	9	9	23	13	25	14	4	0	–	–	131 'goosedays'
Cumulative sum, all places	–	–	1	1	6	24	24	24	24	24	26	26	26	26	–	–	26 individuals

period 7–19 May. At Säärenperä the LWfG only occasionally visited the vicinity of a new hide on the western cape and used meadows 2–4 km more to the south-west. On 7–9 and 12 May the whole area was surveyed daily, but on 11 May only the western cape, the fields and the western bay were surveyed, and on 13–15 May only the fields and the western bay. On 16 May only the hay fields were surveyed in early morning and late evening.

The Bay of Liminganlahti was not visited every day, but after a flock of 10 LWfG was found there on 10 and again on 13 May it was incorporated into the regular survey, and was surveyed on 7, 9, 10, 13 and 14–19 May. At Liminganlahti, the observation work is a combination of watching from bird towers and round walks and sometimes using hiding tents. Because the shore line is nearly 20 km long, the work was synchronised with the annual waterfowl counts and studies on the Southern Dunlin (Calidris alpina schinzii) conducted by the Regional Environment Centre of North Ostrobothnia.

The geese were identified individually according to their individual belly-patches (see Aarvak et al. 2000) but this was mostly implemented by recording the geese on video. Behavioural patterns were not studied this year. As in 1999, the LWfG were filmed using Sony MV 10 digital video camera with optical magnification up to 16x through a Leica Apo-Televid telescope with 32x magnification. In good conditions, the geese can be recorded from a distance of some hundred metres.

For the habitat use studies, the places where LWfG grazed (mainly on the shore) were marked on 1:10 000 aerial photos. At the bottom of the Bay of Liminganlahti the grazing places were only classified according to the vegetation zone, but at the Säärenperä western Bay, the places were studied more detailed after the LWfG had left the area. For Hailuoto, detailed research has already been implemented concerning the diet and habitat use of the LWfG (see Niemelä & Markkola 1998). When comparing the habitat use, the time used in a habitat was weighted (multiplied) by the number of individuals, the units thus being 'goose hours'. When quantifying the habitat use there is a problem in pooling data from places under continuous monitoring from the hides and places that are visited by round walks only. Eleven observers participated in the work, three on Hailuoto, two at Säärenperä and Liminganlahti, one at Säärenperä and five assisting occasionally.

4. Results

4.1. Weather conditions and phenology

The winter 1999–2000 was exceptionally snowy in the Bothnian Bay region. In spring the snow cover was ca 80 cm (20–40 cm more than average). In addition, the snow was exceptionally wet and the temperatures that were quite warm in mid and late April (on Hailuoto the average temperature in April was 1.5°C, the average 1960–1990 was 0.2°C, see Ilmatieteen laitos 2000a) caused heavy flooding along the coast. Because of weak sea ice formation, flooding, strong winds and relatively warm weather, the coastal waters opened already on 3 May. The weather was generally warm in May 2000, but this was mostly due to the warm days after the migration period of the LWfG (Ilmatieteen laitos 2000b). On 1–6 May the weather was variable and partly cold, on 7–10 May the highest daily temperature increased to 11–14°C with no night frosts, but on 11–16 May a northern air flow predominated with low daily temperatures (mean 1.5–5°C), night frosts and slight snowing. On 17–18 May the temperature rose quickly up to 22°C.

4.2. Timing of migration and numbers

The first LWfG, an adult unringed individual, was seen near Virkkula guiding centre at Liminganlahti (Janne Aalto etc.) and later in the fields of Murto, Tyrnävä (Jouni Meski) and 1 km more east near the farm of Kuusela (Sami Timonen) already 21 April. This individual stayed in the area at least until 27 April (Jari Peltomäki), and is not included in the total sum later.

In the regular staging places and during the normal migration period, the first LWfG was present on Hailuoto already on 7 May, when the monitoring began. After two days it disappeared, and the next 5 LWfG arrived at Säärenperä on 9 May. The next day another eight LWfG arrived, and the whole flock stayed until 14 May, when two pairs moved to Hailuoto after a disturbance caused by a White-tailed Eagle (Haliaëtus albicilla). One additional LWfG was afterwards found in the video material of 12–13 May, but in the field, the next two (and last) new individuals were found 15 May. The 'extra' LWfG could be one of these two.

At the bottom of the Bay of Liminganlahti an additional flock of 10 LWfG was found 10 May. On 11–12 May the Liminganlahti Bay was not surveyed, but on 13 May the flock was seen again, and was also observed on 15–16 May. This flock was seen for the last time 16 May at 9:30 a.m. On 16 May Säärenperä was not surveyed (except for the fields). The next day, when the observer arrived from Liminganlahti, also Säärenperä was empty. The LWfG left Hailuoto on 17 May in the morning. Observation efforts were finished on 19 May.

In Table 1 the daily numbers of LWfG in different sites are presented, as well as the cumulative sum of staging individuals which totalled 26 LWfG. The confirmed sum of goose days (days x individuals present) in these places was 18, 73 and 40 respectively, but would probably have been 70 at Liminganlahti, if the area had been surveyed daily. The observed staging time was ca 5 days, but because the Liminganlahti flock was surely also present 11–12 and 14 May, the real average staging time was ca 6 days. Extremes were the two pairs that moved from Säärenperä to Hailuoto and staged 9–10 days and the last two individuals, that staged only one day.

Photo. A view of western part of the Säärenperä coastal meadow. © Juha Markkola, 1998.

Table 2. Vegetation of 10 sample plots of 1m^2 with high density of Lesser White-fronted Goose droppings at Säärenperä, 17 May 2000. The total cover of the (previous year) vegetation is described in per cent and the dominant species are listed. * = pygmy, ** = new sprouts eaten

Sq #	Tot cover %	Bare soil	The most important species	The second most important species	The third most important species
1	40	roosty soil 60 %	Calamagrostis stricta	Agrostis stolonifera	Phragmites australis *
2	40	roosty soil 60 %	Calamagrostis stricta		
3	50	50%, trampled holes 30 %	Agrostis stolonifera	Triglochin maritimum	
4	30	70	Agrostis stolonifera	Phragmites australis * 5%	
5	15	85	Agrostis stolonifera	Eleocharis (uniglumis)	Phragmites australis * 2%
6	10	90	Agrostis stolonifera	Scoenoplectus tabernaemontani	
7	10	90	Agrostis stolonifera	Scoenoplectus tabernaemontani	Eleocharis (uniglumis)
8	15	85	Eleocharis (uniglumis)	Scoenoplectus tabernaemontani	Triglochin maritimum**
9	40	60	Agrostis stolonifera		
10	30	70	Agrostis stolonifera	Eleocharis (uniglumis)	Phragmites australis * 5%

4.3. Age structure

All the 26 individuals were identified as adults.

4.4. Comparison of individuals in Estonia and Finland

The comparison analysis of individuals (identified by the individual belly patch pattern) in Estonia, Finland and Norway is not yet completed (see Pynnönen & Tolvanen 2001, pp. 10–11 in this report). At the Bothnian Bay, 5 individuals on Hailuoto and 14 at Säärenperä were identified individually. Of these, 4 were the same between Hailuoto and Säärenperä, the total number of LWfG individually registered at the Bothnian Bay thus being 15. Out of all the LWfG visiting the area in spring 2000, one individual at Säärenperä and the whole flock of 10 LWfG at Liminganlahti could not be identified. In Estonia, 24 LWfG were registered. Out of the birds recorded on the Bothnian Bay coast, 10 individuals (four pairs, one single male and one single female) were also identified in Estonia. The single female probably divorced with its male before arriving at the Bothnian Bay coast, where it was recorded with a new male not registered in Estonia. Five out of the 15 individuals individually identified in Finland were for sure not seen in Estonia.

4.5. Habitat use

On the Bothnian Bay coast, the LWfG prefer natural coastal meadows more than other geese. E.g. Bean Geese (Anser fabalis) staging in the Oulu region often leave the night roost at the Bay of Liminganlahti early in the morning and graze on the fields until late evening. In some years the LWfG use only littoral areas and meadows for feeding, and shore line, mudflats or stony islet for night roosting. This is the case especially in the most uniform and large meadow areas (see chapter 2).

At Säärenperä, the LWfG unexpectedly also grazed on fields some mornings and evenings this spring. The vegetation here was Phleum pratense-dominated hay stubble field, and the field was situated ca 1.1 km from the shore and only 250–300 m from the nearest farm house and ca 400 m from a village road. The LWfG arrived at the fields very early in the morning and left the fields at 6:15–7:50 a.m.; according to earlier experience at Liminganlahti Bay, the LWfG usually arrive at the fields between 03:30 and 05:30 (Markkola et al. 1993). In the evening, the arrival time of the LWfG at the fields was 18:20:–21:07, and the geese left the fields again at

22:40. These observations don't agree with the earlier observations from Liminganlahti, where LWfG grazed on the fields most commonly in the evenings at 19:00–22.30.

On the shore, the transition flight from the grazing meadows to the night roost took place at 21:59 (on 14 May a flock of 10 LWfG) and at 23:16 (on 15 May a flock of 9 LWfG). The departure from the roost in the morning was not seen, but the LWfG visited the shoreline also in daytime e.g. after a disturbance. This phenomenon has been observed also in previous years. According to the field data from Säärenperä, the LWfG used 23% of the observed time grazing on the fields, 60% grazing on the coastal meadows and 17% in the night roost on mudflats or stony islets. Taking into account the fact that the LWfG were most effectively observed when grazing on the fields and not at all during the night, we can conclude that the proportion of field habitat use was only 9–10% of the total at Säärenperä. Taking into account also the figures of Liminganlahti and Hailuoto, it can be concluded that in 2000 the LWfG used 5.5% of their time on the fields and 94.5% at the coastal meadows or the sea shore.

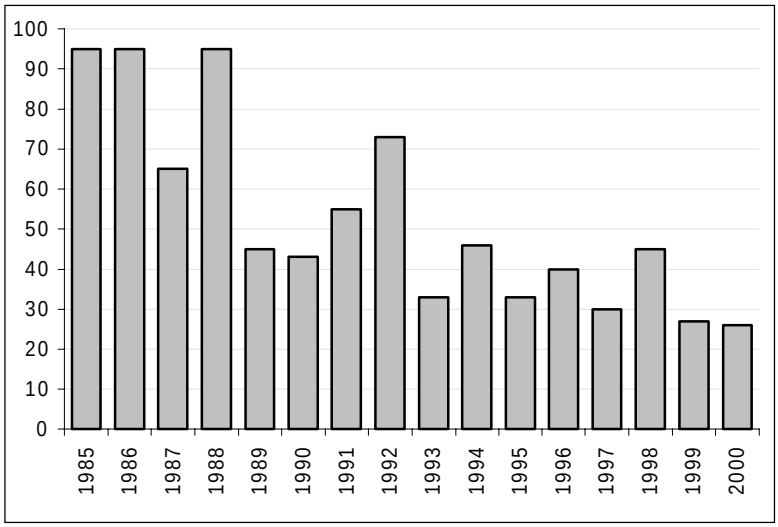

Figure 2. Lesser White-fronted Geese counted in the Oulu region in the springs 1985–2000.

At the bottom of the Bay of Liminganlahti, where LWfG have not been regularly seen in 1985–2000, the most important vegetation zones between birch woodlands and willow bushes and the sea are ca 1000 m broad extensive reed *Phragmites australis* beds, and outside the reed beds, a 200–700 m broad zone predominated by *Eleocharis palustris* and *Scoenoplectus tabernaemontani*, locally by *Carex mackenziei* and some other species. In May, the plant sprouts of the previous year in this zone are pushed down by the ice and the scenery resembles an open mudflat almost without vegetation, where new green sprouts are few. At the bottom of Liminganlahti the most typical low-growth grass meadows suitable for LWfG are missing. However, a flock of 10 adult LWfG staged here during 10–16 May, and all the staging/grazing habitats belonged to the *Eleocharis palustris* – *Schoenoplectus* – vegetation type.

At Säärenperä, the LWfG mostly stayed along the shore of the western bay, where coastal meadows are 200–450 m broad. Earlier the shore was more or less over-grown by reeds and rush *Schoenoplectus tabernaemontani*, but after the area was included in supplementary protection scheme supported by the EU in 1998, the area has again become open and seems to be preferred by the LWfG. Most of the feeding places here were situated 50–300 metres from the shoreline. The upper parts of the meadow were dominated by *Calamagrostis stricta* and *Carex* spp (C. nigra, paleacea, halophila). Roughly 50% of the ground surface was trampled open by cattle. In the lower (outer) part the surface consisted of depressions and low (5 cm) tussocks. In the depressions the vegetation cover was 50–80 % consisting of *Agrostis stolonifera*, *Eleocharis* (mostly uniglumis), reduced "pygmy" reed (Phragmites australis) and fallen sprouts of the rush *Schoenoplectus tabernaemontani*. On the tussocks ca 50 cm high reed was present also and *Calamagrostis stricta*, *Festuca rubra* and *Juncus gerardii* predominated. Ten sample plots with a lot of LWfG droppings were studied more detailed (Table 2).

The first LWfG on Hailuoto on 7–8 May was partly staying in the typical grazing places of the LWfG, but joined temporarily local Greylag Geese and accompanied them even when visiting small reedy ponds ca one kilometre from the shore. Later the two LWfG pairs on Hailuoto mostly grazed in the central parts of the vast Tömppä meadow consisting mainly of *Festuca rubra - Juncus gerardii - Calamagrostis stricta* meadows – as in the previous years.

4.6 Lesser White-fronted Geese and accompanying species

In 2000, the LWfG were mainly in pure groups – as in earlier years. When grazing in the littoral zone, the LWfG did not mix with other geese except for the first single one (see the previous chapter) though Greylag, Pink-footed (Anser brachyrhynchus) and Bean Geese (A.fabalis fabalis and A.f. rossicus) were present. However, on the fields of Säärenperä the LWfG commonly fed together with a flock of up to 35 Pink-footed and 20 Bean Geese, but formed sub-groups of their own among other geese and also left the fields in a pure species-specific flock for the roost.

5. Discussion

The total number of LWfG observed on the Bothnian Bay coast in spring 2000 was 26 individuals, which is paralleling the lowest ever counts in 1997 and 1999 (Figure 2). A decline in the total number was observed in also Estonia, where 43–51 LWfG were seen in 1999 (Tolvanen et al. 2000), but only 35 individuals in 2000 (Pynnönen & Tolvanen 2001, pp. 10–11 in this report). The year 2000 was the second consecutive year when no 2nd calendar-year LWfG were seen. This is in line with the poor breeding result of Fennoscandian LWfG in the summer 1999 (Aarvak & Øien 2000, Tolvanen et al. 2000). However, at the Valdak Marshes the percentage of 2cy individuals in spring 2000 was at a normal level (see Aarvak & Øien 2001, pp. 17–22 in this report). In 2000, a higher proportion (10 out of 15 recorded individuals) of the LWfG seen at the Bothnian Bay coast was registered also in Estonia as compared to the previous spring (4 out of 13) (Timonen 2000).

The migration period lasted 11 days, like in 1999, but began two days earlier than in 1999. The first arrival date, 7 May, was typical as well as the departure when there was a change to warmer weather.

A special feature of the year 2000 was the low number of LWfG on Hailuoto and the staging of a 10 individual flock at the Bay of Liminganlahti. This is contradictory to the common pattern that LWfG prefer the meadows of Hailuoto especially if the sea is free of ice and the development of vegetation is advanced (Markkola et al. 1993) – like in 2000. LWfG grazing on fields has earlier been observed only when the shore meadows are covered by ice and snow very late – contrary to the situation in 2000! Also, the Liminganlahti flock unexpectedly staged on the *Eleocharis-Schoenoplectus* zone at the bottom of the bay, although open short-growth meadows were available in the traditional areas on the western shore of the bay (Lumijoki). One explanation for this untypical behaviour could be the fact that the available feeding and staging habitats in the area offer an unlimited amount of good quality feeding places for the very few LWfG, and any of the available habitats are good enough for the LWfG, which choose the area, where they happen to arrive first.

The staging places of LWfG on Hailuoto, at the Bay of Liminganlahti and in Säärenperä should be officially protected according to national and international program and conventions of which the most recent one is the Natura 2000 programme of the EU. Despite this, the conservation status is not sufficient even for the threatened LWfG: hunting is still allowed in the traditional LWfG autumn staging places on Hailuoto and partly at Liminganlahti. At

Säärenperä, the situation is paradoxically better, because the jointly owned land (the common area) organisation of Siikajoki rejected the tender about making an agreement of conservation made by the Northern Ostrobothnia Enivronment Centre (NOREC), and NOREC had to begin the expropriation process in October 2000. After the area has been expropriated to the state, the hunting ban can be established. This will hopefully take place in 2001.

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Errata

In the previous corresponding article about LWfG spring staging at the Bothnian Bay coast (Timonen 2000, p. 23), there is a mistake in the sentence 'the main fields used by the LWfG ...' – the word 'fields' should be replaced by 'meadows', since LWfG were not recorded to visit fields at all that year. In table 1 (p. 22) the name of the last row was wrong. It should be 'Cumulative sum of all places' instead of 'Daily sum of all places'.

Monitoring of staging Lesser White-fronted Geese at the Valdak Marshes, Norway, in 2000

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1. Introduction

Several staging areas for Lesser White-fronted Geese (Anser erythropus, subsequently referred to as 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 Fjord in western Finnmark, and the other, Skjåholmen island, 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 area 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 that utilise Skjåholmen and the surrounding coastal areas in the Varangerfjord breed in eastern Finnmark and northern Finland (Lorentsen et al. 1999, own unpublished data). However, it is likely that the two groups meet during the migration and wintering period, since they utilise the same staging areas during autumn migration (Lorentsen et al. 1998).

The Fennoscandian LWfG project run by WWF Finland and NOF has monitored the two staging areas annually since 1995 (Skjåholmen) and 1990 (Valdak) respectively. The results of the monitoring work from spring through autumn 2000 at the Valdak Marshes are reported in this article. The article reiterates all results presented in earlier yearly reports (see Aarvak et al. 1996, 1997, Aarvak & Øien 1999, 2000) from the monitoring and research work, but more comprehensive discussions are omitted. This summary is restricted to short comments on the results from 2000. For results of the monitoring work at Skjåholmen (see Kaartinen 2001, pp. 22–23 in this report).

2. Study area and methods

The Valdak Marshes (N 70°09', E 24°54') is part of the Stabbursnes Nature Reserve, which is a Ramsar site and a BirdLife International *Important Bird Area* (Norwegian IBA 012, Lislevand et al. 2000). It is one of the largest salt and brackish marshes in northern Norway (Elven & Johansen 1982), and represents an extremely important feeding area for the LWfG in Fennoscandia. For diet preferences, see Aarvak et al. (1996).

Valdak is demarcated inwards from the fjord by Stabbursnes, which is a headland made up of glacifluvial depositions. It constitutes a natural watching point with a height of approximately 25 metres above the wet mires and the salt-marshes of Valdak. During the studies, the observers sit close to the edge of the headland. Under such circumstances, the foraging birds can easily be studied at a distance of 250–500 metres by use of a telescope (20–60 X magnification) without any disturbance to the birds.

From 1998 on we have used a video-camera (Sony Handycam) to film the geese through the telescope. This method increased significantly the accuracy of individual identification and age determination of the staging geese (Aarvak et al. 1999). Individuals older than 2nd calendar year birds, but with similar behaviour and with 'non-adult appearance', often having weaker belly patches than adults, are defined here as subadults. These individuals are presumably mostly 3rd calendar-year birds, while 2nd calendar-year birds can be accurately aged by their juvenile wing (for further details on ageing see Øien et al. 1999).

Photo. Male Lesser White-fronted Goose at the Valdak Marshes in May 1999. © Ingar Jostein Øien

The aim of the spring monitoring of the spring staging (14 May – 6 June) was to follow the progress of migration and register the total number of staging LWfG in the area. As in former years, the individuals were identified by the individual uniqueness of the 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), and in addition, we carried out behavioural studies on dominance and on daily activity of individuals and flocks, food preferences, tolerance to- and level of disturbance, habitat use and migratory movements.

During autumn (18 August – 5 September) emphasis is put on carrying out counts of families and social groups in order to obtain estimates on brood size, productivity and proportion of immatures

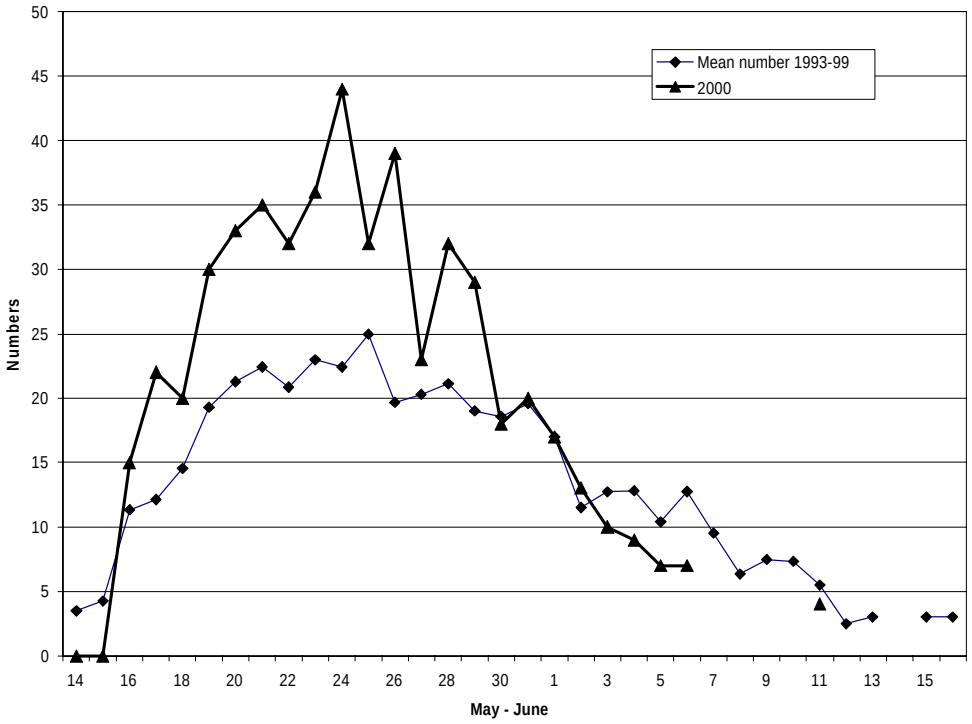

Figure 1. Maximum daily numbers of Lesser White-fronted Geese observed in the period 14 May – 6 June 2000. Means of the daily maximum numbers for the years 1993–1999 is also presented to give an overview of the staging phenology.

Table 1. Overview of numbers of Lesser White-fronted Geese at the Valdak Marshes in the years 1993–2000. The table shows the maximum number of staging geese at the best day, distribution of adult pairs, subadult pairs, single subadults, single adults and immatures (see text for details on age definitions), as well as total number of staging individuals each spring.

Year	Max on one day	no. of. ad pairs	no. of subad pairs	no. of imm	no. of single subadults	no. of single adults	Proportion of imm./single subads	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	–	21.4 %	84
1999	35	22	3	7[1]	–	1	25.9 %[2]	58
2000	44	25	2	6[3]	3	–	23.8 %[4]	63

[1] Not including two immatures in pair with adults which is included in the "no. of ad. pairs" column.
[2] Also including two immatures in pair with adults which is included in the "no. of ad. pairs" column.
[3] Not including two immatures in pair with subadults which is included in the "no. of subad. pairs" column.
[4] Including two immatures in pair with subadults which is included in the "no. of subad. pairs" column. Three subadults are included in the adult pairs column, and not in the subad pair column.

in the population. Also during the autumn, the staging flocks with goslings were recorded by video-camera.

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. In addition some individuals have also been colour ringed. This has added further knowledge to the results obtained by the satellite telemetry (see Aarvak et al. 1999, 2000). In both spring and autumn 2000, time was spent in catching more geese for colour ringing. In spring we used a small cannon-net covering an area of 180 m^2 (15 x 12 m). The size is optimal for catching during spring staging when individual pairs defend feeding territories and only one or two pairs can be caught at the same time (in one shot). In autumn we used a new and larger cannon-net covering an area of 1350m^2 (50 x 27 m).

3. Results

3.1. Spring staging

The first LWfG (14 individuals) arrived on 16 May. Thereafter the numbers increased fast, reaching a peak of 44 individuals on 24 May. Thereafter the numbers decreased slowly (Figure 1). Three pairs and one immature (2nd calendar-year) bird were still present at the end of the monitoring period on 6 June. Two adults and two immatures (2 cy) were also seen on 11 June (T. Anderssen pers comm.) (Figure 1). Totally 63 individuals were staging at the Valdak Marshes in 2000 (Figure 2), distributed as 25 adult pairs (also including 2 pairs with one adult and one subadult), 2 subadult pairs with mixed age (one subadult and one 2cy), 3 single subadults and 6 immatures (Table 1). The proportion of immatures seen (12.7 %) was close to the overall mean immature percentage (11.1 %) for the years 1993–1999. In Table 1, percentages of immatures and subadults are given. However, these percentages are not directly comparable between the periods 1993-1997 and 1998-2000, since subadults were registered as adults before 1998. The comparable percentages for 1998, 1999 and 2000 are 6.0, 12.1, and 12.7 respectively.

In 2000 the mean staging period for adult LWfG pairs was 9.5 days (n=24, Figure 3), when the pairs already present at our arrival and those still left at our departure were omitted. The observed mean staging time this year is the highest so far registered. We have, however, not tested for differences between years since we have very little data on individual pairs and how their staging time change between years. We have data for more than one year of only one individual (see Aarvak & Øien 1999). In 2000 only one colour ringed LWfG was seen. This female, that was caught at Valdak 27.05.1997 (ring no 376981, cf. Aarvak et al. (1997) for details), staged for 11 days at the Valdak Marshes.

Photo. View to the south of the spring and autumn staging area for Lesser White-fronted Geese at the Valdak Marshes (from the observation point at the Stabbursnes Headland). © Ingar Jostein Øien

3.2. Autumn staging

The year 2000 was the sixth consecutive year of continuous monitoring of the LWfG autumn staging at the Valdak Marshes. A total of only ten individuals staged there during a period of three weeks (see Tables 2 and 3). These ten LWfG comprised three pairs without young and one pair with two young. This is the lowest number of LWfG ever registered during autumn staging since the regular autumn monitoring started in 1995. For the Fennoscandian LWfG population a drop in numbers may be expected in the coming years, since the production was poor in 1999 and seemed to be extremely low in 2000. Young LWfG were neither registered in the Varangerfjord area, and observations during late autumn in Hungary (Tar 2001, pp. 34-36 in this report) support the impression of an unsuccesful breeding season in Fennoscandia.

Also in previous years (1981–1999, see Table 3) all autumn observations are from the period 16 August to 10 September. This yields a range of 26 days. However, continuous observation effort has been limited to the period from 20 August to the first few days of September in most years, and we expect that the actual staging period could start earlier and in some years it might end later than indicated in the table.

During autumn staging 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 1995-1999 the LWfG behave quite differently as compared to the spring staging period, spending more time being alert and showing a restless behaviour. Daytime is spent on the adjacent small islands in the innermost part of the Porsangen Fjord.

In the autumn 2000, the geese utilised the marshes to a variable extent during day and night in the period 18 August to 4 September. They were observed both in early morning, midday and late evening, but without any noticeable system. The light conditions rendered it impossible to observe during night time (22:00 – 03:30). The geese were first

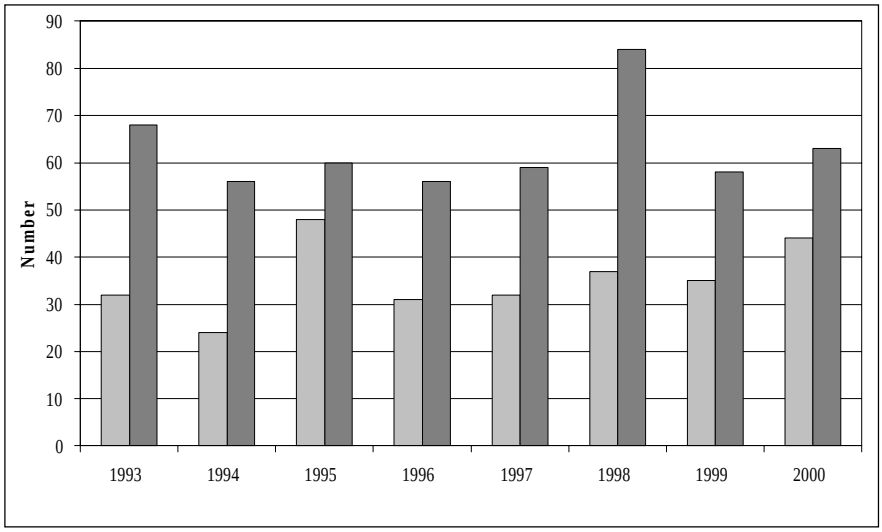

Figure 2. Maximum daily numbers of Lesser White-fronted Geese (light bars) and the total numbers estimated from drawings of belly patches (dark bars) observed at the Valdak Marshes in the years 1993–2000.

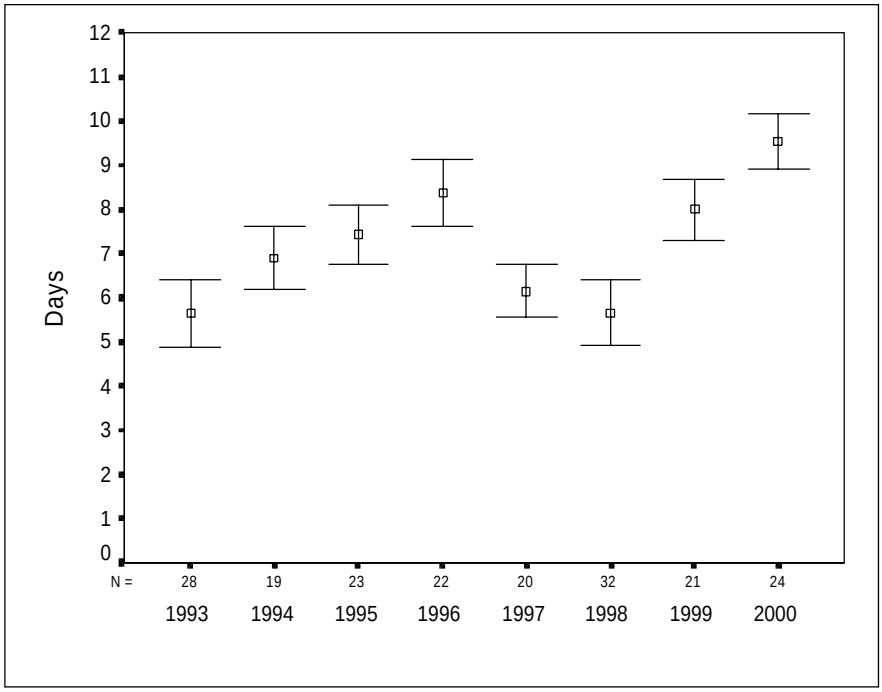

Figure 3. Overview of mean staging time of Lesser White-fronted Geese pairs at the Valdak Marshes in the years 1993–2000.

Table 2. Autumn age ratio and annual brood sizes of Lesser White-fronted Geese in the years 1981–2000, based on counts during autumn staging at the Valdak Marshes (see also Table 4 for distribution of broods and number of pairs with broods). No data exist from the years 1982–1986, 1988–1991 and 1993.

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	3–1	2.8	2.4	0.9
1999	26	17	43	39.5	6	2.8	1.3	0.8
2000	8	2	10	20.0	1	(2)	(0.7)	(0.04)

[1] Counts of pairs with broods in autumn.
[2] Number of juveniles divided by number of adults (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.

Table 3. Overview of the autumn staging period at the Valdak Marshes in the years 1981–2000 (all observations are from the period 16 August to 10 September).

Year	Observation dates (extremes) First	Last	Occasional	Time span in days
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
1999	16 Aug	03 Sep		19
2000	18 Aug	04 Sep		18

Table 4. Distribution of brood sizes (post-moult) at the staging areas of Valdak Marshes (VM) in 1994–2000, Skjåholmen Island (SI) in the period 1995–2000 and in the breeding grounds in 1994 and 1995. No data exists from the breeding areas in Norway in the years 1996 to 2000 (see also Table 2).

Year/Area	Brood allocation 1	2	3	4	5	6	Mean size	SD	no. of broods
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	1	2.82	1.60	11
1999									
Staging area SI		1					2.00	–	1
Staging area VM	1	1	2	2			2.83	1.12	6
2000									
Staging area SI									0
Staging area VM		1					(2.0)	–	1

*One flock of 32 individuals (16 goslings) has been omitted, because the distribution of brood sizes is unknown (see also table 2).

observed 18 August in the evening. On 21 August the geese were absent, and were not seen again until the morning 31 August. They were then seen daily until they were caught on 4 September (see chapter 3.4). The geese were observed during the twilight hours after they were released at 18:50, but were absent the day after and were not observed afterwards. It is quite likely that they where staying on the islands in the inner parts of the Porsangen Fjord during the period they where absent from the Valdak Marshes. On two occasions the geese were observed when they left the marshes, heading for the islands out of sight from the observation point. On one of these occasions, two fighter planes flushed them.

3.3. Breeding success

Breeding success is monitored during the post breeding period at the Valdak Marshes, which represent the first staging area before the onset of autumn migration.

A total of eight adults and two (20 %) juveniles were registered during the autumn monitoring period in the year 2000. Only one pair brought goslings (brood size 2) (Tables 2 and 4). On the Skjåholmen Island, no young were seen (see Kaartinen 2001, pp. 22-23 in this report). The mean brood size observed at the Valdak Marshes in the years 1994 - 2000 is 3.2 (sd=1.4, n=59), although it fluctuates significantly between years (Aarvak et al. 1997).

Estimates on brood size can be derived in different ways. The probably best estimate is based on the number of juveniles compared to the number of pairs observed (potential breeders) in the pre-breeding period (mean brood3 - cf. Aarvak et al. 1997), which yields an estimate for 2000 of 0.04 goslings per potential breeding pair. The estimated 0.04 goslings fledged per potential breeding pair yield a ratio of 3.2% 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, 1997, 1998 and 1999 we obtain an estimated proportion of 37.1%, 52.8%, 29.1%, 35.2% , 27.0% and 29.3% respectively, with a mean for all years of 30.5% (sd=14.9, n=7).

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). Until 1999, the juvenile proportion in the Fennoscandian LWfG population during autumn seemed to be relatively stable. However, with the extremely low production seen this year, the LWfG could fit the pattern seen in other arctic goose species where the proportion of juveniles fluctuates heavily between 0 and 60% for Brent Goose, 5 to 30% for Barnacle Goose and 2 to 50% for White-fronted Goose (Ebbinge 1989, Ebbinge 1991, Fox & Gitay 1989).

3.4. Catching

Altogether 14 Lesser White-fronted Geese were caught by cannon-net at the Valdak Marshes in 2000. Two adult pairs where caught in the same shot during spring staging while all the ten LWfG present during autumn were caught in one shot (see Table 5 for details). Blood samples were taken from all the birds for genetic analyses. All individuals were colour ringed, and seven of them were identified in the Hortobágy area in Hungary in late autumn and winter 2000 (see Tar 2001, pp. 34-36 in this report).

4. Discussion

We have earlier shown that the spring population numbers utilising the Valdak Marshes decreased by 5% annually in the period 1992-1997, as estimated by Monte Carlo Simulation (Øien et al. 1996, Aarvak et al. 1997). In 2000 the number of (adult and subadult) pairs was close to the overall mean for the years 1993-1999. A Monte Carlo simulation based on total numbers during the spring staging period for the years (1993-2000) shows no negative trend (+ 0.84% annually) for this population (p=0.49, n=8).

Photo. Tomas Aarvak with the result of a successful cannon-net shot on 4 September 2000, when all the 10 Lesser White-fronted Geese that where staging at the Valdak Marshes during autumn 2000 were caught for colour-ringing. © Ingar Jostein Øien

The number of juveniles registered during autumn 2000 was very low, and only one out of the 25 pairs present during spring was registered to have successfully produced goslings. This is in line with the observations from Skjåholmen in eastern Finnmark (see Kaartinen 2001, pp. 22-23 in this report), indicating an almost totally failed breeding season. We must go back to 1995 to find a very good breeding season for the LWfG in Fennoscandia. However, for the overall population development, gosling production does not have as significant impact as do adult mortality (see Lampila 2001, pp. 45-47 in this report). As discussed by Aarvak & Øien (1999), it is of vital importance that conservation measures are undertaken to reduce the adult mortality rate for the LWfG population in Fennoscandia. Small changes would most certainly have a large impact on the population development.The size of this population is at present so low, that it cannot stand several consecutive years of extremely low production. It is therefore important to identify the factors that may limit production. But, above all, it is of crucial importance that all necessary protection measures are carried out immediately to secure the core breeding area in Norway from disturbance and habitat destruction. This is especially important since it is the last regularly used breeding area in Fennoscandia, and it may possess up to 80% of the breeding birds that utilise Valdak as a staging ground (cf. Øien et al. 2001, pp. 24-25 in this report).

Table 5. Ringing results of Lesser White-fronted Goose at the Valdak Marshes in 2000. Age is given in calendar years and weight in grams. Additional data on biometrics are available in the project database.

Ring No.	J. No.	Date	Age	Weight (gr)
CA18546	1/00	25 May	3cy+	1930
CA18547	2/00	25 May	3cy+	1880
CA18548	3/00	25 May	3cy+	1820
CA18549	4/00	25 May	3cy+	1830
CA26539	5/00	04 Sep	1cy	1870
CA18550	6/00	04 Sep	3cy	1970
CA26540	7/00	04 Sep	3cy	2230
CA26541	8/00	04 Sep	1cy	1490
CA26542	9/00	04 Sep	3cy+	2020
CA26543	10/00	04 Sep	3cy+	1810
CA26544	11/00	04 Sep	3cy	1760
CA26545	12/00	04 Sep	3cy	1880
CA26546	13/00	04 Sep	3cy	1950
CA26547	14/00	04 Sep	3cy+	1760

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Monitoring on the Lesser White-fronted Goose staging grounds in the Varangerfjord area in autumn 2000

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1. Introduction

In addition to the previously known staging area of the highly endangered Fennoscandian population of Lesser White-fronted Goose (Anser erythropus, subsequently referred to as LWfG) at the Valdak Marshes in the Porsangen Fjord, Finnmark, Norway (see e.g. Aarvak & Øien 2001, pp. 17–22 in this report), another important staging area was revealed in the mid 1990's at the bottom of Varangerfjord in Finnmark, Norway by satellite tracking of LWfG breeding in northernmost Finnish Lapland (Tolvanen et al. 1998). Since 1995, the area has been monitored annually by the LWfG working group of WWF Finland; for results from the previous years and description of the area, see Tolvanen et al. (1998), Ruokolainen et al. (1999), and Tolvanen (2000).

The Skjåholmen Island is the most important single staging place for LWfG in the Varangerfjord area, but the surrounding coastal meadow areas of Veines and Varangerbotn in the bottom of Varangerfjord are also significant. In addition to these places, LWfG are also known to stage in other areas in eastern Finnmark as well, particularly on the fields along the northern shore of the Varangerfjord and along the Tana River, as well as at the deltas of the rivers Tana and Neiden. During spring migration, the importance of the Skjåholmen island seems to be less distinct as compared to the autumn staging period. The LWfG observations have been more scattered in the area from the middle parts of the Tana river valley on the border between Norway and Finland to the eastern parts of the northern coast of the Varangerfjord (Ruokolainen et al. 1999, Tolvanen 2000). The Skjåholmen Island was identified as a staging site in August 1994, when a satellite transmitter tagged LWfG male was located there. In the autumn 1995, another LWfG male, satellite transmitter tagged in Finland, was located at the same spot, and this colour ringed individual was also seen on Skjåholmen on 24 August, 1995 (Tolvanen et al. 1998). Since August 1995, the monitoring has been carried out every autumn by standard methods. The 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 (Ruokolainen et al. 1999).

Photo. Typical feeding habitat of Lesser White-fronted Geese at the coastal meadows of Veines, Varangerfjord.
© Petteri Tolvanen, August 2000

2. Methods and weather conditions

The monitoring was carried out by the established methods described by Tolvanen et al. (1998). In the year 2000, the monitoring on Skjåholmen covered the period 15–28 August. A hiding tent was used to minimize the disturbance for the geese. On the mainland, the shoreline of Varangerfjord from Nesseby to Varangerbotn and further south-east to Veines was surveyed on 28 August. The weather was exceptionally warm, the average day temperatures varied between +9ºC and +15ºC, but occasionally the temperature increased up to +20ºC. The field team consisted of four persons: Riikka Kaartinen, Jyrki Pynnönen, Petteri Polojärvi and Petteri Tolvanen, of which the latter two participated only part of the time.

3. Results

No LWfG were observed during the monitoring period. Human activity on Skjåholmen was low. People were seen visiting the island only twice.

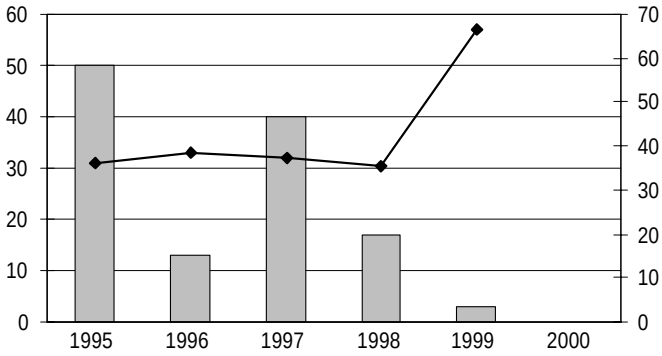

Figure 1. Total numbers (minimum estimates) of Lesser White-fronted Geese staging in the study area during the autumn monitoring period in 1995–2000 (bars, scale on the left side) and respective juvenile percentage (line, scale on the right side).

4. Discussion

The autumn 2000 was the first during the monitoring period 1995–2000, when no LWfG were observed in the area (Figure 1). An explanation for this could be the exceptionally warm weather, possibly delaying the start of the migration from the breeding grounds. An alternative explanation, supported by the simultaneous observations at the Valdak Marshes (see Aarvak & Øien 2001, pp. 17–22 in this report) could be a failed breeding season; an early transition of the unsuccessful breeders and non-breeding birds in mid-summer from the Fennoscandian mountains to moulting areas on the Kanin Peninsula or other parts of arctic Russia has been documented by satellite tracking (Aarvak et al. 1997).

5. Acknowledgements

Transportation to Skjåholmen and back were taken care by Einar Roska from Nesseby. Many thanks to him. The monitoring was funded by the Forest and Park Service.

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Photo. During the field surveys in the core breeding area for Lesser White-fronted Geese in Norway in 1990 and 1994, pairs of Lesser White-fronted Goose were located by watching the wetland areas by binoculars and telescope from the surrounding hills. © Geir Rudolfsen

Status of the core breeding area for Lesser White-fronted Geese in Norway

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1. Introduction

The Lesser White-fronted Goose (Anser erythropus, subsequently referred to as LWfG) is one out of only two breeding bird species in Norway that possess status of a globally threatened species (Direktoratet for naturforvaltning 1999). Among these two, the LWfG is in a special position, because Norway at present holds virtually all of the breeding pairs in the Fennoscandian population outside the very poorly known Kola Peninsula (i.e. no recent breeding records in Sweden in the 1990's, nor in Finland since 1995 despite comprehensive surveying efforts). At present the Fennoscandian breeding population numbers between 30 and 40 pairs. Thus Norway and Russia are the only two countries in the world possessing significant numbers of breeding LWfG. The Fennoscandian population is genetically distinct from the main populations breeding in Russia (Ruokonen & Lumme 1999). This implies that the Norwegian Nature management authorities have a particularly strong responsibility to execute a proper management of this species both on the staging and breeding areas within Norway.

2. The core breeding area

A wetland system in the mountain plateau in Finnmark county, Norway constitute the core breeding area for Lesser White-fronted Geese in Fennoscandia. Exact localisation is not given here because of conservation reasons.

Two inventories has been carried out in the start of the breeding period, at the time when the first clutches are laid. Bangjord & Broen (1990a) carried out the first inventory in this area during 8–13 June 1990, and a second inventory was accomplished in the period 6–11 July 1994 by Aarvak & Brøseth (1994). Bangjord and Broen (1990 a,b) observed between 6 and 15 pairs of LWfG in 1990, while Aarvak and Brøseth (1994) found only 4–5 pairs in the same area in 1994. No effort was spent in locating nests, but one was found in 1994. In addition, both survey teams made several observations of unidentified "grey geese" (Anser spp.). The area was also surveyed in the moulting period in 1995. The aim was then to catch adults to study the migration routes by means of satellite telemetry (Lorentsen et al. 1998). Eight broods were then located in the area (cf Aarvak & Øien 2001, pp. 17–22 in this report).

Studies on flight directions on staging LWfG at the Valdak Marshes during spring staging indicate that this area may hold up to 80% of the Lesser White-fronted Geese staging at the Valdak Marshes (Bangjord & Broen 1990b, Øien & Aarvak 1993). This gives this area a key role in the conservation work for LWfG. Traditionally, a strong hunting pressure along the migration routes and in the wintering grounds is thought to explain the catastrophic drop in the Fennoscandian LWfG population, and, at present preventing the population from recovering. However, negative factors in the breeding areas is also likely to be of significance.

3. Threats to the area

Aarvak and Brøseth (1994) report on extensive traces of human activity in the area. Tracks from 4WD terrain vehicles were abundant in the area as well as from snowmobiles, and the registrations indicate a heavy human pressure in the area throughout spring and summer. This information has been available to the County Governor of Finnmark and the Norwegian Directorate for Nature Management since 1994. Recently, a private company was granted permission to develop tourism in this area by the municipality, but the decision was later changed by the appellate administrative body. This incidence has, however, further stressed the importance of securing legal protection of this area.

The LWfG is particularly shy and elusive in the breeding period, and only minor disturbance may have severe negative effects on the reproductive success. In 2000, LWfG in Finnmark seems to have experienced a catastrophically low reproduction. During autumn monitoring at the Valdak Marshes in August–September, only two goslings were recorded (Aarvak & Øien 2001, pp. 17–22 in this report) and at the other known staging areas in Varangerfjord, no LWfG were recorded during the monitoring period in August 2000 (Kaartinen 2001, pp. 22–23 in this report). Likewise, only adult LWfG were observed on migration in Hungary in October 2000 (Tar 2001 pp. 34–36 in this report). Since the number of potentially breeding pairs observed at Valdak in May 2000 was at the same level as the preceding five years, the reason for the failed breeding season must be sought in the breeding areas. The population is at present at such a low level that incidental happenings, like e.g. short-term stay in the area by tourists or others may have fatal consequences for the population and could eventually lead to population extinction within a very short time period. It is therefore an urgent need to implement particular protective measures and regulation of the current activities in this area to minimise the disturbance to the breeding LWfG.

In the Action Plan for LWfG published by the Norwegian Directorate for Nature Management in 1996 (Direktoratet for naturforvaltning 1996), it is clearly stated that it is necessary to consider specific conservation actions in the core breeding areas for LWfG. In addition, the international Action Plan for LWfG published by the Council of Europe in 1996 (Madsen 1996) pinpointed the need for implementation of all necessary actions to secure the core breeding areas in Norway. It is indisputable that the condition of this area is crucial for the survival of the LWfG population in Fennoscandia. So far, however, no steps has been taken in this direction by the responsible Nature management authorities, and we express our deepest concern about the future for the Fennoscandian LWfG population if not all necessary protective measures for this area are taken immediately.

Photo. According to with observations of migratory flight directions, up to 80% of the Lesser White-fronted Geese staging at the Valdak Marshes is supposed to breed in the core breeding area. © Ingar Jostein Øien

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Field survey at the Lesser White-fronted Goose moulting area on Kolguev Island, north-west Russia, August 2000

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1. Introduction

The migration routes, staging areas and wintering grounds of the Lesser White-fronted Goose (Anser erythropus, later referred to as LWfG) are generally poorly known (Madsen et al. 1999), but in the last half of the 1990's, considerable knowledge on this subject has been achieved by the use of satellite telemetry (e.g. Lorentsen et al. 1998, Øien et al.1999a). Prior to 1997, no moulting area for the Fennoscandian population was known east of the Kanin Peninsula in north-west Russia. In 1997, however, a non-breeding male LWfG who was caught and equipped with a satellite transmitter at the Valdak Marshes in Finnmark, north Norway, migrated to the Kolguev Island, north-west Russia, revealing a new moulting area for the species. The satellite transmitter tagged bird left the breeding areas in Finnmark in the first half of July, and in the middle of July it was located on the Kolguev Island. Here it staged about one month until it was located in the western part of the Sengeiskiy Strait, on the north coast of the Malozemel'skaya Tundra, where it stayed until the end of September. After a short stop-over at the south-east coast of the Kanin Peninsula the next signals revealed another movement to the areas to the north of St. Petersburg (Aarvak et al. 1997, Aarvak & Øien submitted manuscript).

The Kolguev Island is a low lying island situated in the south-eastern part of the Barents Sea (Figure 1). The island is known to be an important breeding, moulting and staging area for several populations of geese and ducks. Bean Geese (Anser fabalis) and White-fronted Geese (A. albifrons) are both common breeders on the island, and the island constitute one of the most important moulting grounds for the two species in the region (Rogacheva et al. 1995, M. Gavrilo unpubl. data). The Kolguev Island is also a important breeding area for the Barnacle Goose (Branta leucopsis), and the breeding population have been increasing in numbers during the last decades (Syroechkovski 1995, Volkov & Chupin 1995, Pokrovskaya & Gavrilo 1998). The breeding status of the Brent Goose (B. bernicla) is at present uncertain (Mehlum & Pokrovskaya 2000). No confirmed breeding records are known. The species formerly used to moult in large numbers in the coastal areas of the island, but at present it is supposed to occur only in the migration periods, at least in the spring time, when it may be observed in large numbers (Trevor-Battye 1895, Tolmachev 1928, Rogacheva et al. 1995).

In August 2000 we conducted a short-termed field survey on the Kolguev Island in the area used by the satellite transmitter tagged LWfG in 1997. The aim of the survey was to reveal potential use of the area by LWfG. The survey was carried out as a part of a more comprehensive study on the occurrence and distribution of seabirds and wildfowl in the Pechora Sea region (Strøm et al. 2000, Strøm et al. in prep.). The staging area in the western part of the Sengeiskiy

Photo. The survey area on Kolguev Island where the satellite transmitter tagged non-breeding male Lesser White-fronted Goose moulted in July-August 1997. The area is characterised by low lying, flat tundra, dissected by ponds and small river valleys with slow flowing streams.

Photo. Aerial view of the southern part of the Sengeiskiy Strait, on the northern coast of the Malozemel'skaya Tundra, where the non-breeding male Lesser White-fronted Goose staged until the end of September 1997. © Hallvard Strøm, August 2000

Table 1. Number of geese by species observed on survey routes 1–3 on Kolguev Island, 30 August 2000. Unkn. = unknown

Species/	Survey route 1			Survey route 2			Survey route 3			Total
Age group	Ad.	Juv.	Unkn.	Ad.	Juv.	Unkn.	Ad.	Juv.	Unkn.	
Bean Goose (Anser fabalis)			43			62			139	244
White-fronted Goose (A. albifrons)	95	89	559			452	16	12	135	1358
Barnacle Goose (Branta leucopsis)	11	6	620			328			1430	2395
Anser spp.			248			179			278	705

Strait, on the northern coast of the Malozemel'skaya Tundra, was surveyed by helicopter on 29 and 31 August.

2. Methods

The area used by the satellite transmitter tagged LWfG is situated in the southern part of the island, about eight kilometres north-west of the small village Bugrino and about six kilometres from the coast of the island (Figure 2). The study area is characterised by low lying, flat tundra, dissected by ponds and small river valleys with slow flowing streams. The area belong to a subzone of the East-European variant of the southern hypoarctic tundra zone as described by Safronova et al. (1999), and is characterised by shrub (dwarf birch and willows) and tussock tundra with palsa mires.

The field work was accomplished during two days, from 29 to 31 August 2000. A camp was established in the centre of the positions received from the satellite transmitter tagged goose while it was moulting in the area in 1997. On 30 August we made three simultaneous excursions in westerly, northerly and easterly directions from the camp. Two of the excursion routes were tracked by use of a Garmin hand held GPS receiver (survey route 1 and 3, see Figure 2). In addition to the excursion on 30 August, we also made a short walk in southerly direction in the evening of 29 August (Figure 2). All three observers used binoculars (10 x 40/10 x 50), in addition to a telescope (only one of the observers). The observers walked slowly through the landscape, and noted all species occurring in the surveyed area with no fixed transect width. The weather conditions during the stay was cloudy and rainy, with some fog. The temperature varied between +5.8°C and +13.5°C.

3. Results and discussion

Altogether 30 hours were spent on observations, and the survey routes were 57 kilometres altogether. No LWfG were registered in the surveyed area. Three species of geese were registered, and a total of about 4700 individuals were observed (Table 1). However, as the three parallel excursions on 30 August were made at the same time, some groups of birds may have been registered by more than one observer, and thus contributing to a slight overestimate. Out of the 4700 birds observed during the survey, about 3900 birds were observed while flying, and about 800 while feeding on the ground.

The Barnacle Goose was the most abundant species, together with the White-fronted Goose. The high number of Barnacle Geese was, however, mainly due to a large group totalling 1250 birds that passed over survey route 3 on 30 August. Most of the Barnacle Goose flocks ranged from 5–50 individuals. A minimum of two family groups (adults + juveniles) were observed. The White-fronted goose was observed more often in family groups; altogether 37 groups were observed with an average of two adults and three juveniles. The number of family groups is a minimum, as we often were unable to distinguish between age groups due to long distance, bad weather conditions or lack of time. Most of the family groups were identified

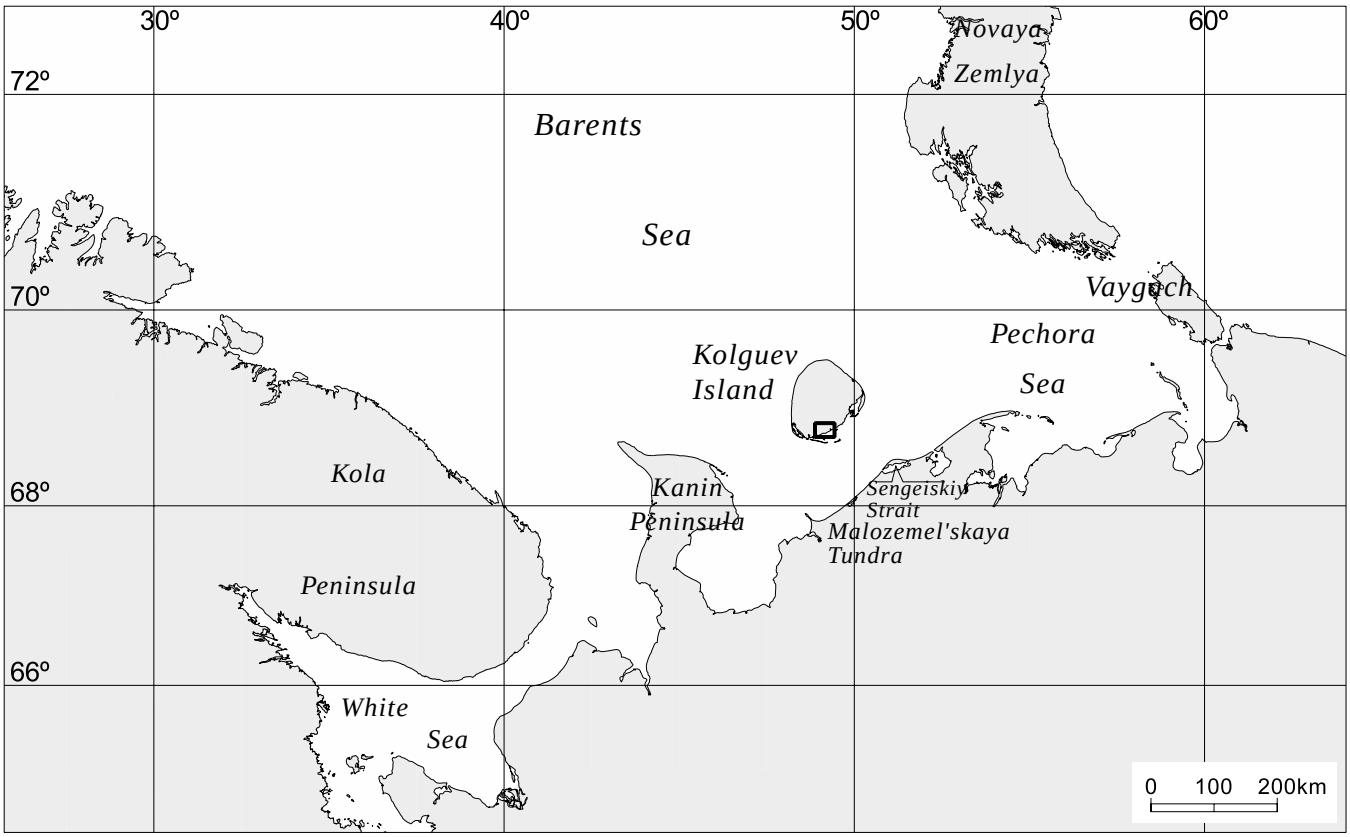

Figure 1. The south-eastern Barents Sea with the surveyed areas indicated.

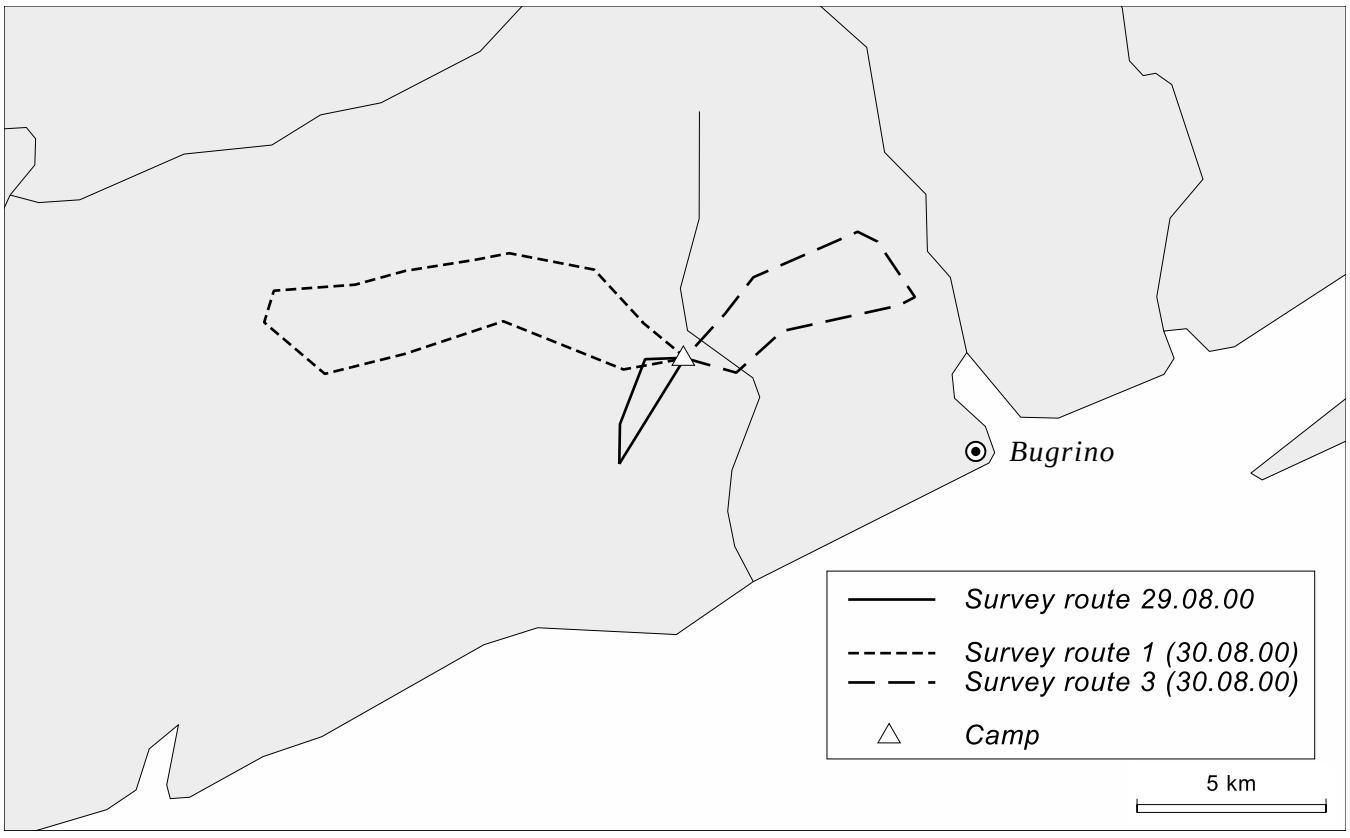

Figure 2. Map of the surveyed area on the Kolguev Island.

while the birds were feeding on the ground, less often while flying.

Most of the groups seemed to be moving only on a local scale between different foraging areas on the tundra, as we could see groups of birds take off and land again, and continue to forage. Some large groups of Barnacle Geese and White-fronted Geese observed in the morning on August 30, might have been birds that had left the roosting sites and were spreading over the tundra to forage. Between 11 a.m. and 3 p.m. we observed a movement from the inner part of the tundra towards the coast, with some groups of geese flying at high altitude towards southwest, probably leaving the area.

Some local movements were obviously caused by local hunters that were hunting geese close to the small village Bugrino. The hunters were operating both from the village and from small cabins situated on the tundra in the vicinity of the village. At least three active hunters were observed along survey route 3 on 30 August. One of them used "Decoy geese" (dummies) to attract the geese. Shots were heard regularly all day on 30 August in the area around Bugrino.

LWfG and White-fronted Geese are very difficult to separate in the field, even under optimal light conditions (Øien et al. 1999b). The weather conditions during our stay was not favourable, with cloudy, rainy and partly foggy weather. This fact probably affected our chances of identifying LWfG significantly. This, and the fact that we had very limited time available, makes it necessary to emphasise that our survey should be looked at as a preliminary investigation of the area. A more comprehensive survey is needed to assess the importance of the surveyed area for moulting LWfG.

Several flocks of "grey" geese (Anser spp.) in the range of 50–100 individuals were observed when we flew over the staging area in the Sengeiskiy Strait on our way from Narjan-Mar to Kolguev and back on 29 and 31 August. However, due to the similarity between the species in question, the high altitude and speed of the helicopter, it was not possible to identify the observed geese to species.

5. Acknowledgements

We are indebted to the staff at the Nenetski Zapovednik, and especially Sergey V. Mukhartov and Andrei Glotov, for help with the logistic and excellent arrangements of the helicopter transportation from Narjan-Mar to Kolguev and back. We would also like to thank Morten Ekker (Directorate for Nature Management, Norway) for support during all phases of the project, and Dag Vongraven for commenting on the manuscript. The Figures were made by Anne Estoppey, Norwegian Polar Institute. The field survey was financed by the Norwegian-Russian Working Group on Biodiversity under the Norwegian-Russian Commission for Environmental Cooperation, and the Norwegian Polar Institute.

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Conservation work for the wetlands and monitoring the autumn staging of Lesser White-fronted Goose in the Kustanay region, north-west Kazakstan, in 2000

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1. Introduction

As a result of the research activities of the Fennoscandian Lesser White-fronted Goose (Anser erythropus, subsequently referred to as LWfG) project, the lake area of the forest steppe and steppe zone of north-western Kazakstan, especially in the Kustanay region (oblast), is proved to be an extremely important staging area for LWfG and other arctic geese (cf. Tolvanen & Pynnönen 1998, Markkola et al. 1998, Tolvanen et al. 1999, 2000). Hundreds of thousands of arctic geese pass through the area in spring and autumn. In autumn the arctic geese, i.e. White-fronted Goose (Anser albifrons), Red-breasted Goose (Branta ruficollis) and LWfG, are staging in the area for several weeks from late September to late October.

The list of the important wetlands of the region, not only important as staging places for arctic geese but also very important breeding areas for a rich wetland bird fauna, includes e.g. lakes Ayke, Kulykol, Djarsor-Urkash, Aksuat, Koybagar, Tyuntyugur-Zhanshura, Biesoygan, Bozshakol, Djaman, Syleti-Tenize, Shagly-Tenize, Shoshkaly, Lebyazhye (= Kamyshovye) and Neklyudovo (cf. Kovshar 2000, Tolvanen & Pynnönen 1998, Markkola et al. 1998, Tolvanen et al. 1999, 2000). The breeding bird fauna of the area includes rare or endangered species such as White-headed Duck (Oxyura leucocephala), Sociable Plover (Chettusia gregaria), Saker Falcon (Falco cherrug), Imperial Eagle (Aquila heliaca), Great Black-headed Gull (Larus ichthyaetus), and White and Dalmatian Pelicans (Pelecanus onocrotalus, P. crispus), and Central Asian endemics such as Black and White-winged Larks (Melanocorypha yeltoniensis, M. leucoptera).

The conservation status of these very important wetlands is, however, insufficient, and due to antropogenic pressure, the densities of many breeding bird species have decreased seriously. During the last decade, fishing industry on the lakes has been developing quickly, and cattle breeding on the lake shores is seriously disturbing birds in their feeding and nesting sites. Autumn hunting on geese has a major impact e.g. on the lakes Koybagar, Tyuntyugur-Zhanshura and Kulykol, and, according to ring recovery data, the mortality of LWfG is very high in the area due to hunting (unpublished data). As a consequence of the current poor socio-economical situation in the area after the collapse of the Soviet Union, the hunting pressure caused by local inhabitants has decreased especially at the more remote lakes, but at the same time growing hunting tourism from other parts of Kazakstan, Russia and western Europe has increased the total hunting pressure at some of the most important roosting

Photo. Adult Lesser White-fronted Goose shot by hunting tourists at Lake Kulykol, Kustanay region, north-west Kazakstan. Hunting has proved to be the most important single threat for the Lesser White-fronted Goose populations. © Petteri Tolvanen, October 1996

Photo. Jari Peltomäki and Victoria Kovshar at the Tersek forest protected area in the middle parts of the Kustanay region. The primeval Pine forests of the Naurzum Reserve (including the Tersek forsest) host e.g. tens of breeding pairs of several species of eagles.
© Petteri Tolvanen, October 2000

lakes for geese. Due to the economical situation, the hunting control is inadequate, illegal hunting is widespread and the official hunting quota are commonly exceeded by the hunting tourists. Thus, there is an urgent need to improve the conservation status of these internationally important wetlands.

2. The WWF Kustanay project in 2000

The first steps for the creation of a network of protected areas included large scale censuses of different groups of rare species. These were carried out under the state programme for waterfowl (1989–1993). International expeditions devoted to Slender-billed Curlew (Numenius tenuirostris) (1994-1997), LWfG and Red-breasted Geese (1996-1998) were carried out. In 1967-1996, some hunting free areas were created, but the control of these areas has been insufficient. After revealing the importance of the wetlands of north-western Kazakstan, the aim of WWF is to improve the conservation status of the area.

In 1999, WWF Sweden launched a project to establish a network of protected areas for waterfowl and other wetland birds in north-western Kazakstan (see Bragina 2000), and in 2000 WWF Finland joined the project, supported by the Finnish Ministry of Foreign Affairs. The WWF Kustanay project is aiming to provide scientifically justified recommendations on planning, creation, and improvement of the network of the protected areas, which would help to protect feeding and roosting sites and nesting habitats of waterfowl, waders and other wetland birds. As a result of the work conducted before the year 2000, location, size and boundaries of seven areas suggested to be protected have already been identified. They represent different vegetation types of the forest-steppe and steppe. Now the project intends to conduct additional work with the objective to link these territories into a single network, including nesting and feeding sites for migratory species, which is absolutely necessary, as more and more land is utilised by agriculture and other human activities.

In 1999–2000, the main results and outputs of the project included the following:

⇑ the incorporation of the Lake Sary-Kopa as a national zakaznik (ca 30,000 ha) under the responsibility of the Naurzum Zapovednik was probably the most important single achievement of the project this year. Lake Sary-Kopa is one of biggest lakes in the Kustanay region

⇑ six additional key wetlands were recommended as new protected areas by the WWF Kustanay project, and this proposal was supported in the meetings with the regional authorities

⇑ the passports (= a detailed description and proposal for a protected area) for Djarsor-Urkash crane zakaznik (6200 ha) and Lake Karakamysh (2000 ha) were prepared and passed for approval to the regional authorities

⇑ brief descriptions of the key wetland areas of the Kustanay region were prepared and passed to the Ministry of Nature Resources and local authorities

⇑ preliminary documents were prepared for the Steppe Turgay area, including important wetlands, as a World Heritage object

⇑ four meetings with the heads of the regional nature management authorities were held to promote and evaluate the project proposal

⇑ a meeting with the vice minister of Nature Resources and Environment of Kazakstan and the regional WWF co-ordinator for Central Asia was held in October 2000; an official co-operation agreement between WWF and the ministry was signed by the head of the Forest, Fish and Hunting Committee

⇑ a list of rare bird species and breeding wetland birds of the Kustanay region, and a short description of the Naurzum Zapovednik in English were produced

⇑ analysis of the existing data on the main areas of waterfowl concentrations in Northern Kazakstan was finalised

⇑ a field survey was carried out during the migratory period for Common and Demoiselle Cranes (Grus grus, Anthropoides virgo)

in August 2000

⇑ field surveys were carried out for monitoring of waterfowl birds in the North Kazakstan region in the end of May – middle of June and in August 2000

⇑ tests of water quality and description of vegetation of the key wetlands were carried out

⇑ proposals to increase the territory of the Naurzum National Nature Reserve by more than 100,000 ha, including wetlands, were prepared and approved by the local government

In addition to the protection of the most important wetlands, the project is also aiming to promote ecotourism in the area, as a sustainable alternative for the growing hunting tourism business in the area. The ecotourism business is still new in Kazakstan, and so far it has been concentrated mostly to the southern parts of the vast country. The wetlands, steppe and primeval Naurzum Pine forests of the Kustanay region offer a very attractive supplement for Kazakstan round trips. On the other hand, a big amount of work is needed to create the infrastructure needed for ecotourism activities in the area. The aim of the ecotourism part of the WWF Kustanay project is to produce a well justified account of the possibilities and infrastructure for ecotourism (especially birding tourism) in the area, including detailed and up-to-date species lists for different seasons, and suggestions for possible routes.

3. Field surveys of Lesser White-fronted Goose and other geese in September–October 2000

The WWF Kustanay project organised, in co-operation with the Fennoscandian LWfG conservation project, a field expedition in the Kustanay region in September–October, 2000. The expedition was particularly devoted to the assessment of ecotourism possibilities in the area during the autumn staging of the arctic geese. At the same time, a small scale LWfG monitoring effort was carried out, with special emphasis on the Lake Kulykol which is known as the most important single roosting lake for LWfG. The methods for counting geese and estimating species and age composition followed the "Field instructions for monitoring LWfG" (Tolvanen et al. 1999). As in earlier years, the geese were counted early in the morning during the mass departure from the roosting lake to the feeding grounds. The sites of the morning counts were selected to ensure that all flight departure sectors were covered. Data on species and age ratios were collected during daytime in random samples of the flocks returning back to rest and drink. For results of earlier surveys in the Kustanay region, see Tolvanen & Pynnönen (1998), Markkola et al. (1998), Tolvanen (1999) and Tolvanen et al. (2000).

3.1. Results and discussion

Lake Kulykol (51º20'N, 61º50'E) is at present the most important known roosting lake for LWfG during autumn staging in Kazakstan. An inventory of geese in the lake was carried out in the days 3-7 October (Table 1). The main aims were to monitor staging numbers of LWfG and other goose species, and to collect information about how the geese distribute on the lake, both in numbers and species composition. Lakes Shoshkaly, Lebyazhye (=Kamyshovoye), Bozshakol, Tyuntyugur, Koybagar and Batpakkol were surveyed during 26 September – 5 October (Table 2). In addition, Lake Djarsor-Urkash was visited on 4 October and northern parts of Lake Sary-Kopa on 6 October, but only insignificant numbers of geese were seen at these lakes.

3.1.1. Species counts. The results of the species counts are shown in Tables 1 and 2. In total, ca 127,000 geese were observed, which is approximately only half of the numbers counted in the area in the earlier autumn surveys in the area in the years 1996–1999 (Tolvanen & Pynnönen 1998, Tolvanen et al. 1999, 2000). Of these, ca 1.7% (ca 1,830 individuals out of 108,490 geese from the lakes where species proportions were sampled) was LWfG. The proportion of LWfG was the lowest recorded during the period 1996–1999. The number and proportion of Red-breasted Geese at Lake Koybagar on 1 October was remarkably high, but the total estimate for Red-breasted Geese during the whole survey was only 23,300 individuals, while in 1996–1999 the respective estimate varied between 44,000 – 88,000 individuals. In addition, a single Barnacle Goose (Branta leucopsis) was recorded at Lake Kulykol on 4 October; this is probably the first observation of the species in the region.

Photo. The Black Lark (Melanocorypha yeltoniensis), a typical breeding species of the WWF Kustanay project area, is endemic for the steppes of Central Asia. © Petteri Tolvanen, October 1999

The total amount of geese at Lake Kulykol was counted on two different days during the morning flight in order to validate the results and to obtain an idea of the staging pattern. On 4 October 40,300 geese were counted, while on the morning of 7 October only 26,800 were counted. Species proportions and age ratios were sampled on three consecutive days (4–6 October) and it turned out that also the species proportion in the sample data changed markedly between days (Table 1). The latter was probably due to a deviation in number of individuals of different species leaving the area. Therefore the species proportions will change. The stable percentage of White-fronted Geese and LWfG, the increase for Greylag Geese and decrease for Red-breasted Geese suggests that most of the geese that migrated further during the monitoring effort were Red-breasted Geese. The rainy night on 5 October made the fields wet and was probably the reason why the return flight of geese during

Table 1. Total number of geese at Lake Kulykol in October 2000, based on random sample data.

Date	Total no of geese	no. of ind. sampled	Anser albifrons		Anser erythropus		Anser anser		Branta ruficollis	
			%	estimate	%	estimate	%	estimate	%	estimate
4 Oct	40,300	2,190	21.0	8,450	3.5	1,420	43.9	17,700	31.6	12,730
5 Oct	*not counted*	2,880	22.7		1.8		58.4		17.2	
6 Oct	*not counted*	1,256	23.5		2.9		56.6		17.0	
7 Oct	26,800									

Table 2. Total number of geese at the surveyed lakes (excluding Lake Kulykol) in October 2000, based on random sample data and rough estimates (indicated by *).

Lake,date of survey	Co-ordinates N	E	Total no of geese	No of ind. sampled	Anser albifrons %	estimate	Anser erythropus %	estimate	Anser anser %	estimate	Branta ruficollis %	estimate
Shoshkaly, 26–27 Sep	53°41'	64°54'	2,100	–		*200		–		*1,900		–
Lebyazhye, 28 Sep	53°58'	65°55'	8,000	–		*2,500		*50		*5,000		*450
Bozshakol, 29 Sep	53°08'	65°57'	5,000	990	74.14	3,700	0.30	15	8.59	430	16.97	850
Tyuntyugur, 30 Sep	52°43'	65°53'	24,400	1,290	90,87	22,140	1,03	250	7,62	1,860	2,86	670
Koybagar, 1 Oct	52°35'	65°32'	27,800	1,470	49,66	13,800	0,34	95	5,17	1,440	44,83	12,460
Batpakkol, 4–5 Oct	51°25'	62°39'	>20,000	–		–		–		–		–
Total			87,300	3,750		42,340		410		10,630		14,400
Total, incl. Kulykol (see Table 1)		127,600			51,330		1,830		32,030		23,300	

daytime at this day was very scarce. Normally, the geese return to the lake at noon to drink and rest, but this was probably not necessary during the very wet conditions in the fields. It is also likely that the different species will respond differently to these conditions, but we do not possess data to be able to analyse this. Totally 1,400 LWfG were estimated to be present on the first survey day at Lake Kulykol. This is ca 3.5% of all the geese present and in accordance with earlier surveys. Contrary to earlier surveys, the Greylag Goose was the most abundant species in 2000 with 43.9% (Tolvanen & Pynnönen 1998, Markkola et al. 1998, Tolvanen 1999, Tolvanen et al. 2000). This could indicate that the main migration peak of the arctic species had not yet reached the area, despite the relatively cold weather in late September, but see below.

The total number of geese at Lake Kulykol was markedly lower than in October 1999 when 86,000 geese were roosting on the lake, and constitute only a small fraction as compared to October 1998 when 160,000 geese were present. In the time frame of a few years, this huge difference is probably due to variation in the timing of migration. In 2000, local hunters could tell that the mass migration of geese had already passed when our survey was carried out. The utilisation of lakes in northern Kazakstan is in general greatly influenced by the presence or absence of the lakes, which can dry out and fill up again due to climatic reasons in the course of less than ten years. This is especially the case for the most southern lakes in the transition zone between steppe and semi-desert.

3.1.2. Breeding success of LWfG. Brood size was estimated by actively searching for flying LWfG in flocks/aggregations were all birds observed simultaneous could be correctly aged. Mean brood size in 2000 was 2.2 immatures per pair (SD = 1.19, n = 14). This was not significantly lower than in 1999 (Z = -1.33, n = 36, p = .23) where mean brood size (Kustanay and Kurgaldzhino-Tengiz data pooled, cf. Tolvanen et al. 2000) was 3.0 (SD = 1.7, n = 22). The lack of significance is however, most likely an effect of low sample size since the variance is so large.

The mean group size of LWfG in these samples was 5.23 (sd 3.83, range 1-14, n = 22), whereas the mean group size in the species proportion-samples was 5.47 (sd = 4.66, n = 30). There was no significant difference in group size between species samples and samples obtained by actively searching for LWfG (t = -.197, df = 50, p = 0.85). Totally 84 adult and 31 immature LWfG were seen in the age ratio samples, implying a juvenile ratio of 27.0 % in the population at this stage of the annual cycle.

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The occurrence and protection of Lesser White-fronted Goose in Hortobágy, Hungary in the period 1996–2000

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1. Introduction

In 1997, the Hortobágy Society for the Protection of Birds and Nature started their Lesser White-fronted Goose (Anser erythropus, subsequently referred to as LWfG) research and protection program. The main activities of the Society are the survey of the populations of endangered Hungarian breeding species, e.g. Saker (Falco cherrug), Great Bustard (Otis tarda), Black-winged Stilt (Himantopus himantopus) and Avocet (Recurvirostra avocetta) the creation and maintenance of bird habitats and active protection of bird species.

The globally threatened population of LWfG is decreasing in Hungary, too. Since it is the region of Hortobágy where they linger for a long time during their migration, a protection program here can strongly contribute to the survival of the species. In spring their stay in Hortobágy is short and less regular, since they are in a hurry towards the breeding grounds, but during their autumn migration, they stay for about two months. This period, one sixth of the whole year is long enough for us to be able to, and to be obliged to take part in the protection of this species. Today, the presence of less than one hundred individuals is known during autumn migration, almost exclusively in Hortobágy. This species may rarely appear around Lake Fehér near Szeged, on Biharugra and Begécsi fish-ponds, in Kardoskút, around Fertõ Lake and in Sárrét in Transdanubia.

2. Objectives of the program

We regard as our most important goal (1) to monitor the movements of LWfG and explore their presence (especially their feeding places), as well as to study their feeding habits and behaviour. By the time they arrive, we have (2) to create freshly grown grazing fields on the usually extremely dry parts of the puszta which they like visiting, by inundating these areas. Thus, we can bind them to one place. We want to (3) explore the threatening factors, reshape hunters' ways of thinking, give educational lectures and publish public awareness leaflets.

Summarising our earlier data, we could see that generally, the first families arrive at the Hortobágy Fish-pond in the first half of September (Figure 1), where they gather in one of the inlets shallow enough. Usually, their number peaks in the second half of October, then it decreases slowly and they start mixing with White-fronted Geese, and it gets more and more difficult to find them in the flocks consisting of many thousand birds. Parallel to the decreasein temperature, they migrate on towards their wintering place together with flocks of White-fronted Geese (Anser albifrons). Usually they leave by the middle of November, but, when the weather is favourable, the departure may be postponed. Earlier, they were found on their feeding areas only rarely, we knew for certain that they go out to feed in early morning and late afternoon, and that they spend the night and the noon at the fish ponds, where they can be observed. The maximum number of LWfG has been decreasing in the Hortobágy area during the recent autumns (Figure 2).

3. Details of the protection programme

In 1997, we received financial support through tender for our LWfG protection work. A big problem is that in Hungary, activities connected to non-breeding species are rarely supported.

3.1. Inundation

In 1997, two weeks before the arrival of the birds, we inundated an area of 4 hectares with a motor pump 2 or 3 kilometres north of their resting place. We could receive permission to inundate the area only for one occasion, and the expenses of the pump were much higher than expected. The area was covered with water in a depth of about 20–25 centimetres, which was quickly absorbed by the dry soil and, after a few days, sprouting grass took over the area. The result of our work was that LWfG visited the area regularly to feed.

In 1998, we did not have to inundate the area, since the weather at the end of the summer was rainy.

In 1999 and 2000 we created and maintained the Dinnyés-lapos habitat: Since the four hectares described above proved to be too small, we planned to find a much larger area to serve the same purpose. Dinnyés-lapos is a natural wetland habitat of about 80 hectares, which is situated 3,5 kilometres north-west of the Hortobágy fish-ponds. By removing the canals and ensuring the water supply with flooding the area at the end of summer, we created suitable conditions for the birds by the beginning of September.

Dinnyés-lapos is an amorphous area, with varying depth of water (from 5 to 50 centimetres) with very shallow coastline, drying gradually. We kept the vegetation short in and around the water by grazing

Photo. The Lesser White-fronted Geese prefer drained fish-ponds in the Hortobágy area as night-roosts during autumn and spring migration through Hungary.
© Kalle Ruokolainen

activity of 300–400 cattle. Areas formed in this way are often used not only by the LWfG, but by other bird species as well. To facilitate observations here, we also erected a 5 metres high observation hide and placed it on the edge of a livestock farm situated there. This offers a good opportunity to count the birds, differentiate them according to age, and the identification of colour ringed birds (see Table 1) was simplest from this point.

3.2. Production of information material

Also as part of a tender, we gained support to publish a leaflet, which is already printed. The leaflet describes the status of LWfG, and advices to help hunters identify the species. The address of our society is also included for reporting LWfG observations. We are in continuous touch with hunters' societies and we educate hunters to be able to distinguish the different species. Several cases have proven that sometimes they are unable to tell Greylag Goose (Anser anser) from White-fronted Goose. A great improvement was, however, that from December 1998, more than 5000 hectares of fish-ponds received protection status, and thus the area of the Hortobágy National Park is now more than 80,000 hectares, within which the hunting of all goose species is prohibited on the lakes. So hunting may only occur on the agricultural unprotected areas, although, according to literature data and reports, no LWfG have been shot there since the 1980's.

3.3. Field work

The field work was organised and controlled by the author. We were continuously observing the birds from the time of their arrival. When it was possible, after following the flock flying to feed, we located their favourite places in the field. The birds went to feed 15 kilometres from their resting place at the farthest, usually always to agricultural areas and stubble-fields of wheat and maize. Besides wheat and maize stubble, we could occasionally find feeding birds on lucerne-fields. Although they appeared on rape fields too, but, interestingly, only after the first frosty days. They irregularly kept alternating between the closest grasslands and stubble-fields. We have not found any satisfactory explanation why they change their feeding areas from time to time. One of the reasons may be, however, that when they were disturbed on the feeding areas by birds of prey like Saker, Peregrine (Falco peregrinus) and White-tailed Eagle (Haliaetus

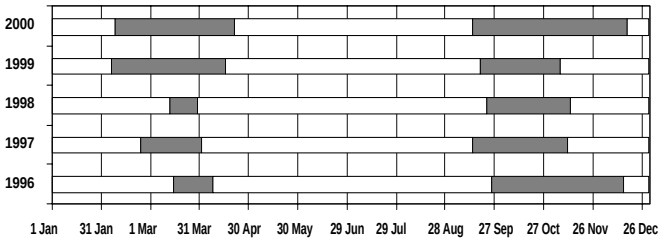

Figure 1. The duration of the migration of Lesser White-fronted Geese in the Hortobágy area in the years 1996–2000.

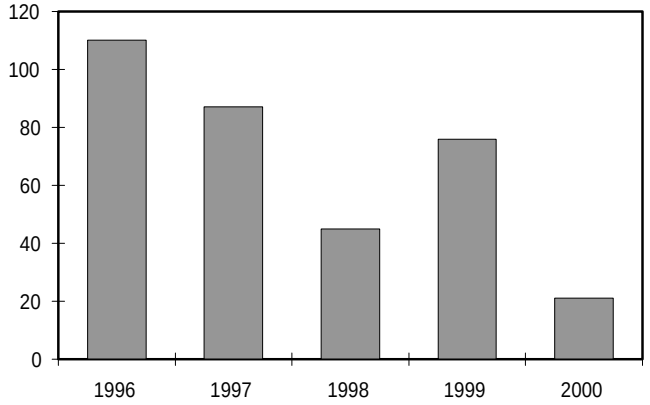

Figure 2. Maximum numbers of Lesser White-fronted Geese in the Hortobágy area in the autumns 1996–2000.

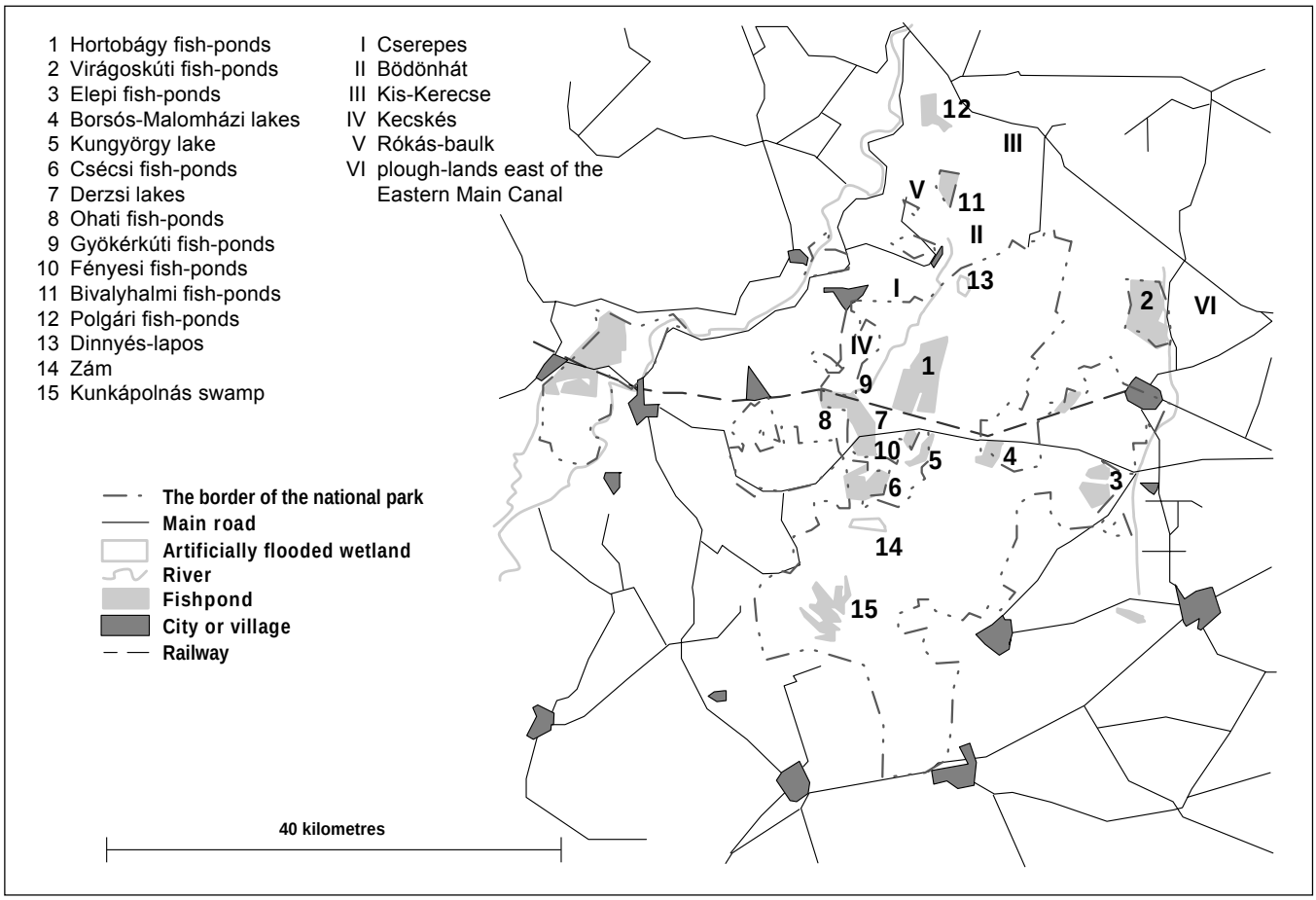

Figure 3. One of the drained fish ponds (strong reed bed around prevents easy observation)...

Table 1. Ringed Lesser White-fronted Geese observed in the Hortobágy area by identification of colour-ring codes. All observations by the author except [1] A. Szilágyi and [2] Szilágyi, Z. Ecsedi & J. Oláh. All birds are caught and ringed in Finnmark, northern Norway.

Date	Locality	Ring no.	Ringing date
12 Oct 1996	Cserepes-puszta	361552	31.07.1995
17[1], 20[2] Oct 1996	Virágoskúti-halastó	361551	27.07.1995
27, 29 Sept 1999	Cserepes-puszta	CA18544	29.05.1998
30 Sept, 2, 6, 12 Oct 1999	Dinnyés-lapos	CA18544	29.05.1998
18, 20, 23 Sept, 9,12 Oct 2000	Dinnyés-lapos	CA18546	25.05.2000
18, 20, 23, 26–28, 30 Sept, 2, 4, 9,12 Oct 2000	Dinnyés-lapos	CA26544	04.09.2000
18, 20, 23, 26-28 Sept, 2, 4, 9, 12 Oct 2000	Dinnyés-lapos	CA18550	04.09.2000
18, 20, 23, 26–28, 30 Sept, 2, 4, 9, 12 Oct 2000	Dinnyés-lapos	CA26547	04.09.2000
18, 20, 23, 26–28, 30 Sept, 2, 4, 12 Oct 2000	Dinnyés-lapos	CA26542	04.09.2000
25 Sept,12 Oct 2000	Dinnyés-lapos	CA18547	25.05.2000
26–28, 30 Sept, 2 Oct 2000	Dinnyés-lapos	CA18546	25.05.2000
25, 26–28, 30 Sept, 2, 12 Oct 2000	Dinnyés-lapos	CA18549	25.05.2000
22 Oct, 4 Nov 2000	Hortobágy-halastó	CA18550	04.09.2000
22 Oct, 4 Nov 2000	Hortobágy-halastó	CA26544	04.09.2000
22 Oct, 4 Nov 2000	Hortobágy-halastó	CA26542	04.09.2000
22 Oct, 4 Nov 2000	Hortobágy-halastó	CA26547	04.09.2000
16, 18 Dec 2000	Cserepes-puszta	CA18550	04.09.2000
16, 18 Dec 2000	Cserepes-puszta	CA26544	04.09.2000
16 Dec 2000	Cserepes-puszta	CA26542	04.09.2000
16 Dec 2000	Cserepes-puszta	CA26547	04.09.2000
18 Dec 2000	Kecskés-puszta	CA26542	04.09.2000
18 Dec 2000	Kecskés-puszta	CA26547	04.09.2000

albicilla), they flew back to the lake. Of the grasslands, they favoured feeding on the large areas grazed short by cattle or sheep, which can be found exclusively in protected areas. Still, they preferred cattle pastures to sheep pastures. In the afternoon, they often went to grazing fields situated only some hundred metres from the fish-ponds, which phenomenon was never observed in the morning.

On the basis of our data, the weather did not influence the birds in what distance they went out to feed, and, in the first half of their stay they fly in homogeneous flocks, and join Greylag Geese only occasionally. When – depending on the weather – the first White-fronted Goose flocks of some hundred birds arrive, they go to feed together, but rest and roost separately on the fish-ponds.

Then, after the appearance of many thousands of White-fronted Geese they mingle with that flock, and it becomes extremely difficult to assess the numbers and the departure time.

As a roosting place, they choose one of the drained fish-ponds of Hortobágy fish-ponds (see Figure 3), that has been protected for a long time. Thus, a very important factor is the lack of suitably drained ponds for the LWfG here. Then their stay at the Hortobágy fish-ponds is shorter, and they fly on to find other lakes with better conditions. In such cases, autumn inundations play a significant role. Out of the lakes protected for two years, they have used only the occasionally lake of Virágoskút fish-ponds (number 4) near Balmazújváros for a long time as a resting place. Although this area lacks a suitable roosting place that has been undisturbed for many years, it is expected to be created in some years. Besides Hortobágy and Virágoskút fish-ponds, occasionally they may be present in very small numbers anywhere.

We would like to involve in our program the whole area of Tisza lake, where we have been observing the migration of waterfowl since 1999.

4. Summary of the autumn migration in 2000

The first seven individuals appeared in Dinnyés-lapos on 18 September, of which four were colour-ringed. We observed 21 LWfG from 25 September until 16 October, all of them were adults. Besides these, 2 other adults were present on Pond 4. of Virágoskút fish-ponds. On 16 October, we could see them several times in a flock of White-fronted Geese present on Ohati, Bivalyhalmi and Virágoskúti fish-ponds. Then we could record families with 1–3 juveniles. Four colour-ringed individuals were observed several times in the area of Hortobágy- and Bivalyhalmi fish-ponds until 18 December. We estimated the number of LWfG migrating through Hortobágy to be around one hundred.

In 2000, we controlled intensively the following areas (Figure 3): 1. Hortobágy fish-ponds, 2. Virágoskúti fish-ponds, 3. Elepi fish-ponds, 4. Borsós-Malomházi lakes, 5. Kungyörgy lake, 6. Csécsi fish-ponds, 7. Derzsi lakes, 8. Ohati fish-ponds, 9. Gyökérkúti fish-ponds, 10. Fényesi fish-ponds, 11. Bivalyhalmi fish-ponds, 12. Polgári fish-ponds, 13. Dinnyés-lapos, 14. Zám, 15. Kunkápolnás swamp and feeding areas I Cserepes, II Bödönhát, III Kis-Kerecse, IV Kecskés, V Rókás-baulk and VI plough-lands east of the Eastern Main Canal.

On the basis of the accumulated data, 1–3 individuals may be observed from the second week of November outside Hortobágy. In higher numbers or at other times of the year it appears very rarely.

5. Conclutions

In Hortobágy, inside our observation network, we observe the present LWfG present every second or third day. Thus we are able to see when and where they are. We could explore their favourite places in the puszta, so less and less time is needed to find them, also because several observers have joined our program.

During the extremely dry autumn, we created a "goose pasture" with fresh grass for the LWfG, which they have used regularly. In 1998, however, no such place had to be created due to rainy weather.

When LWfG go to feed to unprotected areas together with other goose species, we call hunters' attention to this species and ask them for particular caution as compared to periods when LWfG are known to stay within the protected areas.

6. Acknowledgements

I would like to thank those who contributed to this paper with their records, listed below: Csaba Béke, Zoltán Ecsedi, Tamás Emri, András Gál, Péter Gyüre, Tibor Hadarics, Sándor Konyhás, Gábor Kovács, Dénes Laczik, Sándor Mogyorósi, László Musicz, Gyula Nagy, Tamás Nagy, János Oláh, Attila Pellinger, Attila Szilágyi, László Szondi, Attila Tar, János Tõgye, László Varga, András Vasas, Zsolt Végvári, Tamás Zalai, Tamás Zeke, Barna Zöld and also thanks for Hortobágy Society for the Protection of Birds and Nature and the Hortobágy National Park.

The genetic status of the captive Lesser White-fronted Geese used for breeding and reintroduction in Sweden and Finland

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1. Introduction

The main emphasis in the international conservation work on the Lesser White-fronted Goose (Anser erythropus, subsequently referred to as LWfG) has been on the protection and study of the wild population. However, in Sweden and Finland efforts have been made to maintain captive LWfG stocks for use in the reintroduction or restocking of wild populations. In this report we will review the known history, present status and some future aspects of the use of the captive stocks of LWfG. We also comment briefly on the results of the Swedish restocking programme and, finally, give an overview of a more comprehensive genetic study that has just been started.

2. The Swedish captive breeding population 1981–1991

At the beginning of the 1970's there were only a few captive LWfG in Sweden. The main captive collection, at Öster-Malma, consisted of seven individuals from northern Lapland. In order to establish a captive breeding population, additional geese were imported to Öster-Malma from different waterfowl collections during the years 1977–1979. In 1980 there were 34 LWfG and five pairs produced the first young within the captive-breeding project. In 1981, the captive population at Öster-Malma included 13 breeding pairs, and the first 11 birds were reintroduced to the wild. The breeding pairs were a mixture of geese with unknown origins and usually only the last link in the chain of transfers of these geese between different private breeders or commercial farms is known. We know that Jens Berg, at Eriksberg in southern Sweden, imported an unknown number of young from The Netherlands and that he also imported a smaller number of individuals from England. The breeding programme at Öster-Malma acquired about 40 subadults from Berg´s collection. Another private consignment of 10 one-year olds from Germany and four geese from England completed the initial captive-breeding population at Öster-Malma. The Dutch geese probably originated from the F.A.P. Kooy and Sons Waterfowl Breeding Farm. This farm may have obtained some of its original breeding stock from wild Fennoscandian LWfG populations and other individuals may have originated from migrating birds caught in Hungary. In 1987, the late Sir Peter Scott donated 30 eggs from The Wildfowl Trust, Slimbridge (England). These eggs gave rise to 16 adults (six females), which were included in the breeding programme in 1989. Thus, while a few of the geese used for breeding at Öster-Malma may have had a wild, Fennoscandian origin, the majority originated from farms on the European continent, or from a collection in England.

The numbers of breeding pairs and offspring at Öster-Malma have varied considerably over the years. There were 12 breeding pairs in 1982 and the number of pairs declined to four in 1986. There were eight to nine pairs between 1987 and 1992. The number of birds released per year declined from around 30 in 1982–1984 to around 15 in 1986–1991. During the period 1981–1991, 208 geese, in total, were released in Swedish Lapland. To increase the survival rate of the birds, the Swedish project used Barnacle Geese (Branta leucopsis) as foster-parents. The captive-bred LWfG individuals followed their foster parents to wintering grounds in The Netherlands, instead of using the traditional south-eastern migration route. The survival rate of the released birds is remarkably high – 82% reach The Netherlands and 60% of the birds released with foster-parents return to northern Sweden. The survival rate for these birds is significantly higher than the corresponding figures for birds that migrate on the south-eastern route. In contrast, experiments in which subadults were released without foster parents gave low rates of return, probably because the birds had not been imprinted on the area in which they were released.

3. Evaluation of the Swedish re-introduction programme

Kjell Larsson, at the request of WWF-Sweden, evaluated the Swedish breeding and reintroduction project in 1993 (Larsson 1993). He recommended that the number of young released per year should be doubled during the next five years in order to establish a sustainable population. In 1991, blood samples were collected from the entire captive breeding population at Öster-Malma. Multilocus DNA-fingerprinting was used to investigate the level of genetic similarity between individuals and to explore the possibility that close inbreeding might have caused the observed reduction in hatching success during the previous years (Tegelström & von Essen 1996). The study concluded that, in general, there was no immediate risk of close inbreeding in the captive population. However, the study identified three breeding pairs and an additional group of five individuals that showed a level of genetic relatedness similar to that expected for full-siblings. Until 1991, the young from the group of five closely related individuals made a significant contribution to the pool of released birds. The genes of these individuals are likely to have been over-represented among the reintroduced birds. If mating pairs between these closely related birds were established in the wild, there would be a significant risk of inbreeding and associated negative genetic effects. It was also evident that individuals imported from Germany and England were, in several cases, closely similar to each other, indicating that the importation of geese from different countries or farms is not necessarily a guarantee of a low degree of genetic relatedness. On the basis of these data and Kjell Larsson´s recommendations about population size, the number of breeding pairs was increased to 10–15. However, the number of young that were released remained low, as a result of increased predation by ravens, bacterial infection of eggs and problems with disturbance.

4. The establishment of the Finnish LWfG captive stock and its genetic composition: introgression of heterospecific mitochondrial DNA

In 1986, four adult LWfG were exported from Öster-Malma to Finland and used, together with 11 birds from Eriksberg, to establish a breeding population at Hailuoto, (Markkola et al. 1999). In 1993 there were 28 individuals in the Hailuoto stock and blood was sampled from 15 of these individuals and used for a genetic study (Ruokonen et al. 2001a). This study showed that four out of the 15 individuals had the mitochondrial DNA (mtDNA) typical for White-fronted Geese (Anser albifrons albifrons, Ruokonen et al. submitted manuscript). Among the 15 individuals studied, three had originated

Photo. Adult Lesser White-fronted Goose shot by hunting tourists at Lake Kulykol, Kustanay region, north-western Kazakstan. Blood, tissue or feather samples for DNA analysis have been taken of all handled individuals during the field work in Kazakstan, Russia and Fennoscandia. © Petteri Tolvanen, October 2000.

directly from Öster-Malma. One of the Öster-Malma individuals had the mtDNA characteristic for the White-fronted Goose and the two others had the LWfG species-specific mtDNA. Therefore, it is probable that the Swedish captive stocks of LWfG are also contaminated with genes from White-fronted Geese.

Intrageneric goose hybrids often are fully fertile (Gray 1958). It is theoretically possible that the hybridisation between LWfG and White-fronted Geese occurs, or has occurred, naturally and that the alien mtDNA among the Hailuoto LWfG has had a natural origin. However, no mtDNA haplotypes characteristic for White-fronted Geese were found in a sample of 81 wild LWfG that represented most of the species' geographic distribution (Ruokonen et al. 2001b). The most probable explanation for the presence of White-fronted Goose mtDNA among the captive Hailuoto geese is that hybridisation between the two species took place at some point during the history of captive breeding. The presence of alien mtDNA suggests that there will also have been introgression of nuclear alleles.

5. The captive breeding population since 1993

The intention since 1993 has been to increase the number of breeding pairs in order to be able to release a higher number of young. To achieve this goal, adult LWfGs have been acquired from various breeders and added to the Öster-Malma flock. No wild-collected birds have been added to the captive population. About 10 adults (three females) from Öster-Malma´s own breeding stock have been included in the programme together with seven individuals (three females) from Denmark (Otterup-Rasmussen) and a number of geese from the "Nordic Ark Trust". Among the adult geese at the Nordic Ark Trust, the majority originate from a private breeder in south-western Sweden (Räng) who keeps a few pairs of LWfG. This private breeder also has one adult goose and seven young represented in the post-1993 breeding stock at Öster-Malma. Among the five breeding pairs at the Nordic Ark Trust, there is one sibling-pair and one suspected sibling-pair. We have not yet had the opportunity of evaluating the genetic relationships between the geese at the Nordic Ark Trust and the Räng farm. However, among the 54 young from the Nordic Ark Trust that have been investigated so far, 11 (20%) may be the offspring from siblings and an additional 41 (75%) have one parent from the Räng farm. In 1997, two juveniles and 10 young were donated by the Nordic Ark Trust to Öster-Malma and some of these individuals were released in Swedish Lapland. In 1998, six juveniles were donated by the Nordic Ark Trust and subsequently released. Thus, a significant proportion of the released LWfG has consisted of birds donated by the Nordic Ark Trust. However, the survival rate of these subadults, which were released without foster parents, has been very low.

In 1999, an experiment was performed with thirty-two captive birds that were imprinted to an ultra-light plane. These birds migrated, following their mechanical foster-parent, from a place close to the Öster-Malma LWfG farm to the Lower Rhine area in Germany. Twelve of these birds returned to Sweden in the spring year 2000. These birds were recaptured and now are at the Öster-Malma farm. The birds in this experiment originated from Belgian goose farms and may have had a long history of captive management. So far, nothing is known about their genetic background and they have not been included in the Öster-Malma breeding programme.

There are 13 additional subadults at Öster-Malma that were donated in 2000 by the Nordic Ark Trust. We do not know the parentage of these 13 birds, but it is likely that there is a strong genetic component from the Räng farm. In addition to the birds at Öster-Malma, the Nordic Ark Trust and the Räng farm, there are also LWfG in collections elsewhere in Sweden. There are, for example, four birds at a Zoological Park in Skåne. There are also collections held by private breeders (unknown numbers of collections and birds).

Since 1981, a total of 348 LWfG has been released in Swedish Lapland. In the area where introductions have been made, there were at least 50 LWfG in 1999. A total of 32 breeding-attempts and 66 fledged young have been recorded at the release site, (L.von Essen, personal communication). There is now a possibility that individuals from this small re-introduced population may find other breeding grounds and start to exchange genes with other natural populations. If so, and if LWfG geese carrying genes from the White fronted Goose have already been introduced in Swedish Lapland, there is an obvious risk that the natural populations of LWfG will be contaminated with alien genes. No geese have been released since 1999, when the possibility that the captive-bred stock might contain introgressed genes from the White-fronted Geese became known.

6. The genetic status of the Swedish captive LWfG

In principle, when attempts are made to re-establish an extinct population or when individuals are released to reinforce existing populations, the released individuals should be as genetically similar as possible to the original population (Kleiman et al. 1994). The release of individuals where the species-specific genome has been contaminated with genes from another species is highly undesirable – if the aim of the reintroduction is to conserve the typical genetic variation for a particular species. Also, given that most newly founded populations are small, reduced genetic variation or inbreeding among the geese used for captive breeding may severely affect both the probability of a successful establishment and the likelihood of persistence of the populations.

Except for the few individuals that originated from northern Lapland, the birds used for breeding at Öster-Malma have unknown wild origins. The previous captive history of these birds is also unknown and may often involve high levels of inbreeding. However, the main question at present is whether the captive birds at Öster-Malma include individuals that have had a hybrid ancestry. The first immediate action to deal with this problem has already been taken, with a precautionary decision to temporarily stop the release of geese from Öster-Malma. The next step will be to investigate the genetic background of the geese used for captive breeding and other geese that may potentially be included in the restocking programme. If the release of captive-bred birds is to continue, we need to establish that the individuals included in the programme have known pedigrees and that they do not include DNA from White-fronted Geese.

An investigation of all Swedish captive LWfG will be performed before any more birds are released. Blood samples from about 115 Swedish captive LWfG were collected during the autumn of 2000. This material, together with the blood samples from the 1991 captives at Öster-Malma, will be investigated for the presence of mitochondrial DNA from White-fronted Geese and for genetic variation in nuclear microsatellite loci. Comparisons with natural LWfG populations can be made with the help of existing samples from about 70 individuals from throughout most of the species' geographic distribution. Comparisons of allele distributions at nuclear loci between the LWfG and the White-fronted Goose will be based on samples from about 50 individuals including both the European and the Greenland White-fronted Goose (A. albifrons albifrons and A. a. flavirostris).

Because of the strictly maternal and clonal inheritance of mtDNA, an individual with a largely White-fronted goose nuclear genome may nevertheless have LWfG mtDNA. An investigation of mtDNA alone cannot, therefore, be used to identify birds that are contaminated with genes from another species. We propose to try and identify potential species-specific nuclear markers among microsatellite loci that show moderate levels of genetic variation. Ideally, we would like to be able to identify nuclear loci where LWfG and White-fronted Geese have different fixed alleles. At present there are PCR-amplification primers for 26 loci that can be used to characterise genetic variation in geese. So far, we have tested the primers for eight loci on a small sample of LWfG and White-fronted Geese. Four of these loci were identical between species, two loci were highly variable and may show interspecies differences and two loci may be fixed for different alleles. These results are preliminary and based on a very limited sample size. Nevertheless, they suggest that it may be possible to find nuclear DNA markers that can be used in the future evaluation and characterisation of our captive LWfG.

Apart from carrying out genetic investigations to assess whether the captive birds include individuals with a hybrid ancestry it is also essential to investigate the degree of relatedness between the birds in the breeding programme. Some of the captive birds may have a shared history and, in some cases, first-degree relatives have been included in the breeding programme. Such close inbreeding will minimise the level of genetic variation among the released geese. Some of the highly variable microsatellite loci that we have identified will be used to analyse the level of relatedness between the captive birds, especially those we suspect might be closely related. We will compare levels of relatedness in the breeding stock with those found in samples from the natural populations. We will also try to use the genetic markers together with the available documentation on the captive birds´ history to trace the ancestry of the geese at different farms. Hopefully we will be able to identify the origin, or origins, of the alien genes among the captive LWfG.

7. Acknowledgements

The collection of samples of Swedish geese would not have been possible without the efforts of Å. Andersson and P-A. Olsson. Most of the information about the origin and history of the Swedish captive stock was provided by the late L. von Essen. B. Österberg is acknowledged for help with information about the origin of some of the geese at Öster-Malma. We are grateful to H. C. Prentice for constructive comments on a previous draft of this report. The investigation of the genetic status of Swedish LWfG is supported by the Nilsson-Ehle Foundation, the Nessling Foundation, WWF-Sweden, The Swedish Environmental Protection Agency, and The Swedish Association for Hunting and Wildlife Management.

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Photo. Konstantin Litvin, Petri Lampila, Toni Eskelin and Petro Pynnönen counting the morning flight of geese at Lake Koybagar, Kustanay region, north-western Kazakstan. Several surveys of this staging area were included in the Finnish Lesser White-fronted Goose Life project. © Petteri Tolvanen, October 1998

The Finnish Lesser White-fronted Goose EU Life/Nature project 1997–2000

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1. Introduction

In the years 1997–1999, the major part of the Lesser White-fronted Goose (Anser erythropus, subsequently referred to as LWfG) conservation activities by Finnish partners – and a significant part of the international conservation work on the species – was carried out by the Finnish LWfG Life/Nature project supported by the European Union (EU) Life fund. The partners of the Life project were: Northern Lapland District for Wilderness Management (Metsähallitus, Ylä-Lapin luonnonhoitoalue), North Ostrobothnia Regional Environment Centre (Pohjois-Pohjanmaan ympäristökeskus), Häme Regional Environment Centre (Hämeen ympäristökeskus), Lapland Regional Environment Centre (Lapin ympäristökeskus), Hunters' Central Organisation (Metsästajäin keskusjärjestö) and WWF Finland. The LWfG working group of WWF Finland, established in 1983, was particularly active in the project and had the main responsibility of the field work.

2. Aims and organisation

The objectives and activities of the Life project were based on the experience of the Finnish WWF LWfG working group and international co-operation partners as well as on the international Action Plan for the LWfG (Madsen 1996). Although, according to the rules of Life funds, only 10% of the funding may be used outside the EU, the idea was not to restrict the scope of the project to a Finnish or a Fennoscandian scale. The strategic idea was to promote LWfG conservation especially along the migration routes and in the wintering quarters of the Fennoscandian population and the western part of the Russian breeding population. This was possible, because the of the advantageous ratio between the western and eastern exchange quotations. Thus the 10% of the resources spent outside EU could form significantly more than 10% of the results.

The objectives of the Life project included mostly already identified needs that had not been implemented earlier:

– to locate the migration routes and wintering quarters of the LWfG by satellite tracking and ringing

– to establish protected areas in LWfG staging and wintering places

– to target international conservation efforts to these key areas; e.g. to form hunting-free zones around roosting lakes

– to monitor and produce accurate estimates of LWfG sub-populations, especially the Fennoscandian highly endangered population

– to improve public awareness on the endangered status of the LWfG, especially among hunters

– to include all Finnish breeding and staging areas in the Natura 2000 network

– to stop the decline of the Western Palearctic population of the LWfG and turn it towards an increase and to enable a recovery of the Fennoscandian population of the LWfG

The project period was 1 February, 1997–30 September, 2000. Originally the year 1999 was supposed to be the last activity year,

but the delay in establishing a protected area at Säärenperä on the Bothnian Bay coast, allowed us to apply for a continuation of the project time. The Life project was led by a team consisting of representatives of partner organisations. The team carried through 15 project meetings and altogether 114 people participated in the work, ca 60 as volunteers and ca 30 as temporary employees. Most of the employment periods were short, 1–5 months, but four were lasting 18 months or more.

3. Results of the project

The results of the Life project are not always clearly distinguishable from the results of other international LWfG conservation work, and a significant part of them were gained in co-operation with international partners the LWfG project of the Norwegian Ornithological Society, the Goose and Swan Study Group of Eastern Europe and Northern Asia and the Wetlands International LWfG Task Force.

3.1. Revealing the migration routes of the LWfG from Western and Central Siberia to Kazakstan

During the expeditions to Yamal and Taimyr, altogether 12 moulting LWfG were tagged with satellite transmitters. Three individuals out of these gave good tracking results: one female LWfG tagged in Yamal in 1997 was followed 2400 km to the Kustanay region in north-west Kazakstan and finally as far south as 490 kilometres north of the Caspian Sea (Karvonen & Markkola 1998). The LWfG pair equipped with transmitters in southern Taimyr in 1998 migrated to the Astana region, ca 300 km east of Kustanay region. The female finally continued to the north-western coast of the Caspian Sea (Øien et al. 1999).

3.2. Confirming the western route between Greece, Hungary, Estonia, Norway and Finland

The connection between Estonia, Finland (Bothnian Bay) and Norway was confirmed in 1998–2000, when some individuals were identified in all of these countries during the spring migration by colour-rings and video-recording of individually recognisable belly patches. Some of the individuals using this migration route are known to stage in Hungary and winter in Greece (Aarvak et al. 1999, Aarvak et al. 2000).

3.3. Updated estimates of the LWfG populations for Nordic countries and Eurasia

In Finnish Lapland, surveys for breeding pairs covered an area of 2160 km2 of traditional and 3630 km2 of potential breeding places of LWfG. In addition, 1500 km2 in the adjacent parts of Norway was covered. No breeding pairs were located in the breeding grounds, but broods were seen every year at Varangerfjord autumn staging area, where LWfG of north-east Finnish Lapland and eastern Finnmark gather (Tolvanen 2000). According to these and a number of pre-breeding period observations, LWfG still breed in Finnish Lapland or in closely neighbouring parts of Norway and Sweden. Most of the breeders in Finland in 1990's (up to 15 pairs in 1991) belonged to the sub-population of north-east Finnish Lapland and eastern Finnmark. In 1997 this sub-population still produced at least 5 broods, and in 1997–1999 10–14, 6–8 and 6 pairs were seen at the staging areas, respectively. Because non-breeders and unsuccessful breeders move to Russia for moulting in early July and cannot be seen at Varangerfjord in autumn, the real size of this sub-population may still be 10–15 pairs. During the years of the Life project, the total LWfG population of Norway, Finland and Sweden was approximately 45 pairs. Thus, the Fennoscandian population is critically endangered but is still big enough to enable a recovery if the negative population development is reversed soon. During the Life project, new data on LWfG was received from the Kola Peninsula, which is most probably inhabited by individuals genetically identical to LWfG breeding in the more western parts of Fennoscandia (see Aikio et al. 2000). The number of LWfG breeding on the Kola Peninsula is not known, but it could even exceed the numbers of LWfG in the Nordic countries.

Along the westernmost migration route in autumn a maximum 29 LWfG was seen during the years of the Life project in the border areas between Germany and Poland (van den Bergh 2000), 45–90 in Hungary (Tar 2001, pp. 34–36 in this report), and ca 70 in north-eastern Greece (Lampila 1998). During spring migration, a maximum of 43–51 LWfG has been counted in Estonia (Tolvanen et al. 2000b). The LWfG using this route breed in the Nordic countries (mainly Norway) and possibly in western Russia.

In Russia, LWfG breed along a disconnected zone from Kola to The Far East. LWfG from the eastern main population migrate to China. Kazakstan is the junction of the migration routes of the western populations from Fennoscandia to central Siberia. In autumn 1998, 7,300–12,400 LWfG were estimated in the Kustanay region in north-west Kazakstan, but only 3,880 in 1999. More east, in the Astana area, 990 LWfG were estimated in 1999 (Tolvanen et al. 2000a). The western main population (Fennoscandia – central Siberia) thus enumerates ca 8,000–15,000 individuals.

During the Life project period also conservation and research of the eastern main population wintering in China proceeded well. The surveys of winter and spring 1999 yielded an estimate of16,000 LWfG in central China (Markkola et al. 2000). This, combined with population estimates for the western sub-population, suggests a global population estimate of 24,000 – 30,000 individuals.

3.4. Increased knowledge about population trends of the Lesser White-fronted Goose

A monitoring programme for the LWfG breeding in Fennoscandia and western and central Siberia (= the western flyway population) was prepared and implemented during the Life project period. The aim of the program is to produce reliable data of LWfG population patterns as well as total numbers and reproductive success in the different sub-populations and to evaluate the effectiveness of the Life project and other conservation efforts. The program suggests regular counts at nine localities: the Finnish Bothnian Bay coast, the traditional breeding area in Finnish Lapland, the Matsalu Bay in Estonia, Varangerfjord and Porsangerfjord in Norway, Evros delta and Lake Kerkini in Greece, Kustanay Oblast in north-west Kazakstan, Kanin Peninsula in NW Russia and the Hortobágy steppes and fishponds in Hungary. Regular monitoring was carried out in six different places during the Life project period. The new video recording technique (see Aarvak et al. 1999, Aarvak et al. 2000) made the registration of individuals more accurate than before in Estonia, Finland and Norway.

3.5. Establishing of a protected area at Säärenperä, Bothnian Bay coast

The Säärenperä area at the Bothnian Bay coast in Finland has been the second most important of the three still existing LWfG staging areas on the Bothnian Bay coast in the 1990's. The two others are located on the isle of Hailuoto and at the bay of Liminganlahti have already been protected as a part of the Liminganlahti Life project, although the rate of protection is still insufficient; e.g. hunting is still allowed in the staging places of LWfG on Hailuoto in autumn. During the Life project, a management plan was prepared for Säärenperä. The aim of the plan was to secure the valuable nature types and rare and endangered species of the area, and it has been applied when making agreements about conservation with the land owners. The plan also produced new information about habitats, flora and fauna of the area as well as about the traditional human use of the coastal meadows. The Säärenperä area provides well representative low-growth sea-shore meadows and primary succession forests, which are habitats of special conservation concern according to EU's Habitats Directive.

After a delay caused by the difficulties of the government of Finland to decide about the list of areas designated to the Natura

2000 network in Finland, North Ostrobothnia Regional Environment Centre (NOREC) could not start the negotiations about the purchase or lease of land with the land owners of the Säärenperä area early enough to be completed by the expiry date of the project, 30 September 2000. After a promising start, the jointly owned land (the common area) organisation of Siikajoki rejected the tender made by NOREC, who was forced to start an expropriation process that may last until summer 2001. The start meeting of the expropriation process was organised 17 October, and at the moment the ban of measures is in force. The protection measures of the area has already been practised, except the hunting ban, thanks to the ban of measures and legislation concerning Natura sites.

3.6. Revealing new staging places of the Lesser White-fronted Goose and improving their conservation

As a result of satellite telemetry and consecutive field surveys in the revealed places, knowledge about location and importance of different LWfG staging places and night roosts has been improved considerably during the Life project period. New important localities revealed were Lake Ayke (51º05'N, 61º34'E) in the south-western corner of Kustanay Oblast in north-west Kazakstan, and Lake Kubikol (50º53'N, 68º42'E) and Lake Baumanskoye (51º05'N, 68º55'E) in Astana Oblast in northern Kazakstan (Tolvanen et al. 2000a). The outstanding importance of the earlier revealed Lake Kulykol became clear in 1998: 85 percent of all LWfG staging in Kustanay region were concentrated at Kulykol, enumerating as many as 6,000 (Tolvanen et al. 1999). During the Life project period, Lake Kulykol and some other important LWfG roosting lakes were included in a proposal of protected wetlands in Kazakhstan. Hunting-free zones were expanded around Kulykol and some other important LWfG lakes during the Life project period.

3.7. Improving conservation of traditional breeding areas in Finland

The most important breeding area of the LWfG in Finland in 1990's hosting up to 15 breeding pairs in 1991 was designated to Natura 2000 network in 1998. During the Life project period no breeding was confirmed there, but a few pairs are still left in the area or adjacent parts of Norway. The area is situated far from roads and villages and the only human disturbance has been caused by sport fishing and planes carrying the fishermen to the wilderness. This disturbance force the LWfG broods away, and they often have to run hundreds of meters, sometimes kilometres over land, where they are vulnerable to attacks by predators like Red Fox. During the Life project period

Photo. Risto Karvonen searching for Lesser White-fronted Geese in the Kurluska area, southern Taimyr, Russia. Two surveys and catching attempts of Lesser White-fronted Geese on Taimyr were included in the Finnish Lesser White-fronted Goose Life project
© Petteri Tolvanen, July 1998

the brood rearing areas and other core areas of the LWfG were located and the Forest and Park Service will line them out of sport fishing areas.

The data collected since 1985 suggests that abundance of Red Foxes in the breeding grounds of the LWfG seriously limits the annual reproduction of the geese (Markkola et al. 1994). The Red Fox population of increased gradually in the 1980's and 1990's in the LWfG breeding areas. During the Life project period, reduction of the Red Fox population was carried out, and according to impressions of field workers, the number of Red Foxes seemed to decline in the years 1997–2000. The total hunting bag of period 1997–1999 was 276 Red Foxes. Limiting the Red Fox population could also provide advantages to the endangered Arctic Fox, too, because the Red Fox abundantly occupy Arctic Fox dens and even kill the pups.

3.8. Improved public awareness of the endangered status of the Lesser White-fronted Goose

The practical aim in improving public awareness of the Lesser White-fronted Goose was to reduce the additional mortality of the species caused by shooting by accident. The situation of the LWfG had been quite well-known among public in Finland already in the 1980's and 1990's, but during the Life project period the publicity rose to a higher level. An illustrated identification article was annually published in "Metsästäjä" and its correspondent in Swedish; "Jägare". The circulation of Metsästäjä is 290,000 copies and of Jägare; 18,000, respectively, and they reach all registered hunters in Finland.

In spring 1998 a new guiding centre for bird watchers and nature tourists was opened at the bay of Liminganlahti. The LWfG Life project got an opportunity to prepare a LWfG exhibition for the whole summer, and it was visited by approximately 30,000 people. In 1998, the Life project was represented at XIII International Sportmens' Fair in Riihimäki by the Hunters' Central Organisation. In winter 1999–2000 Life partners contributed the Forest and Park Service of Finland to prepare a LWfG exhibition as part of a nature guiding centre in Changsha, China. This was a part of a more extensive exhibition presenting nature conservation in Finland. The exhibition was hosted by the state forest service of China, which is responsible for the management of the most important LWfG winter quarter in the world, namely the East Dongting Lake. A large scale exhibition summarising the results of the Life project and other conservation work for the LWfG was inaugurated in November 1999 in Inari. In spring 2000 it was moved to the guiding centre of Liminganlahti, and later the exhibition posters will be circulated in Finland and abroad.

The Life project partners produced brochures both in Finnish and in English, that have been distributed to public e.g. in public information meetings with local people and hunters in Lapland. Press releases were distributed 15 times during the Life project period and news were printed in papers with circulation figures of some hundreds of thousands of copies. Press and public information meetings have been organised e.g. in Lapland, Oulu and Helsinki. Presentations were also given in the television in Kazakstan. LWfG news have been published e.g. in web sites of the Forest and Park service and North Ostrobothnia Regional Environment Centre and WWF Finland: http://www.metsa.fi/natural/projects/lwfg/index.htm (in English) and http://www.metsa.fi/luo/projektit/kiljuh/index.htm (in Finnish).

A brochure was produced for Kazakstan with the title "Hunters – Attention, Please!" in Kazakh and Russian languages. The brochure advises how to identify LWfG among other goose species. A volume of 10,000 copies was delivered in the beginning of the hunting season 1998 together with hunting licenses throughout Kazakstan by the State Committee for Forestry, Fishery and Hunting. In co-operation with the customs officers and the Environment Centre of Finland, a brochure concerning the ban to import bird species protected in Finland was distributed to customs stations on the Finnish-Russian border in 1998. It seemed that this activity and the contemporary press information sharply declined the number of Finnish hunters participating in spring hunting of geese in Russian Karelia. An identification article concerning the LWfG published in Alula magazine in 1999 was reprinted and distributed as a 8 pages brochure to co-operation partners from Estonia to China to improve the field workers' capability of identifying the LWfG among common White-fronted Geese. In autumn 1999, LWfG posters and stickers produced by The *Wetlands International (WI) LWfG Task Force*, the Norwegian Ornithological Society/BirdLife Norway and the Bulgarian Society for Protection of Birds /BirdLife Bulgaria for Kazakstan were distributed.

3.9. Conservation networking and international co-operation

During the Life project period the Finnish delegates have been active in the WI LWfG Task Force, an international network of people involved in LWfG conservation activities, since its establishment in 1995. The Task Force has 15 members, who represent countries covering the whole distribution area of the LWfG. During the Life project period the first representatives of China, Estonia, Japan and Kazakstan joined the group. The main mission of the group is to intensify and co-ordinate research and conservation work of the LWfG in order to enable a population recovery of the world population of the LWfG. An annual task is to discuss and update the LWfG Action Plan (Madsen 1996) which takes the form of an annual Urgent Action Plan. In addition to WI Task Force, the LWfG Life project has been co-operating with a great number of national or local LWfG conservation initiatives, especially in Finland, Norway, Sweden, Russia, Kazakstan and China. An international LWfG seminar was organised by LWfG Life project in Helsinki 26–28 March 1998 under the title 'The future of the Lesser White-fronted Goose in Finland'. The seminar was funded by the Life project, the Ministry of Environment of Finland and WWF Finland, and the participants represented six countries. As a conclusion of this seminar, the reintroduction of LWfG was stopped in Finland (Markkola et al. 1999).

During the Life project period, negotiations concerning protection the LWfG with environmental and hunting authorities, as well as volunteer organisations in countries holding breeding grounds, migration stop-over sites and wintering grounds of the LWfG have proceeded. These organisations included among many others, the Academy of Science and the State Committee of

Environment Protection and Association of Hunters and Fishermen of Russia, Karelian Academy of Science, the Ministry of Ecology and Bioresources and the Zoological Institute of the Academy of Science and different hunting inspection authorities of Kazakstan and the management authorities of Finnmark county (Fylkesmannens miljøvernavdeling) in Norway.

3.10. Official protection of the LWfG in new countries

During the Life project period, the LWfG was officially protected in Romania, Turkmenia and quite recently (July 2000) in Lithuania. The Life project promoted the process by distributing information and negotiating with different organisations and authorities in many countries.

3.11. Ecological and genetic knowledge about the Lesser White-fronted Goose

The LWfG Life project produced a lot of biological data that is applicable in the conservation work for the species. When catching LWfG for satellite telemetry and when investigating hunting bags, blood and feather samples has been collected for LWfG population structure studies. During the Life project period and partly based on data collected during the Life project period, three different examination works concerning the LWfG were completed, one about habitat selection of the LWfG during the breeding season in Lapland (Umeå, Sweden), one about diet selection of the LWfG in the spring staging area on the Bothnian Bay coast (Oulu) and one about population parameters and population development predictions (Oulu).

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Adult mortality as a key factor determining population growth in Lesser White-fronted Goose

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1. Introduction

A study of the life cycle of the Lesser White-fronted Goose (later referred to as LWfG) was accomplished at the University of Oulu during spring 2000 (Lampila 2000). The main purpose was to study if mortality rates at the different life stages of LWfG have different effect to the population growth. This could provide an opportunity to direct conservation measures where they are most effective.

2. Material and methods

To provide a basis for this work, a half-year life-cycle graph (spring-autumn) was made (Table 1). This is because most of the mortality of LWfG was already known to take place in the winter and also because most of the available suitable data was from spring or autumn.

Elasticity analysis, which is based on matrix calculation, was chosen as a tool for this work. This analysis has become a valuable tool in conservation biology because it renders possible to yield a mortality figure describing the population growth coefficient (λ) for every life stage of the studied organism. Elasticities measure the proportional changes in λ that result from a proportional change in a given parameter. For example, a change of 10% in the elasticity value 0.5 will cause 0.1 x 0.5 = 0.05 = 5% change in λ (Benton & Grant 1999, Caswell 1989). The estimated elasticities can then be used to ascertain whether a 10% reduction in adult mortality have the same effect on λ as a 10% increase in the juvenile production, and by that identify the stages of the life cycle that has the most marked effect on the population development.

A typical problem when studying rare and threatened species is the small data sets available, which is the case also in this study. The only sufficient data set was from the Bothnian Bay area in the period 1985-1999. One problem is that the data from this locality is restricted to spring figures. Therefore, the first winter survival probabilities and the breeding success had to be estimated on the basis of data from the Porsangen Fjord in Norway in the years 1993–1999 (Aarvak & Øien 2000) and also on the basis on autumn surveys in north-west Kazakstan (Tolvanen et al. 1997, 1999). The estimate of breeding success was taken from Aarvak & Øien (2000).

3. Results

First-winter mortality was very high – only 24% of the juvenile LWfG survived to next spring. This was calculated by dividing the number of 2cy birds in spring with the number of 1cy birds in the previous autumn. The breeding success as measured at the Valdak Marshes, was quite high, with an estimate of 35.1% 1st calendar-year birds in the early autumn population (cf. Aarvak & Øien 1999 for details).

The mortality of the whole population can be calculated with many different formulas if the proportions of juvenile and adult

Photo. A juvenile and an adult Lesser White-fronted Goose shot by hunting tourists at Lake Kulykol, Kustanay region, north-western Kazakstan. © Petteri Tolvanen, October 1996

Table 1. Population matrix of the Lesser White-fronted Goose. 1cy = 1st calendar-year individuals, 2cy = 2nd calendar-year individuals etc. P_1 = the survival probability of a 1cy autumn bird to the spring, P_2 = the survival probability of the 2cy spring birds to the autumn etc; m_4 = breeding success of 3rd cy birds (measured as no. of female goslings produced per female) and m_6 = breeding success of 4th cy and older birds. All other probabilities = 0 (e.g. probability of the 1st cy autumn bird to stay as a 1st cy autumn bird and other similar impossible transitions).

	1cy autumn	2cy spring	2cy autumn	3cy spring	3cy autumn	ad spring	ad autumn
1cy autumn	0	0	0	$P_4 m_4$	0	$P_6 m_6$	0
2cy spring	P_1	0	0	0	0	0	0
2cy autumn	0	P_2	0	0	0	0	0
3cy spring	0	0	P_3	0	0	0	0
3cy autumn	0	0	0	P_4	0	0	0
ad spring	0	0	0	0	P_5	0	P_7
ad autumn	0	0	0	0	0	P_6	0

Table 2. Numbers of staging Lesser White-fronted Geese and the proportion of 2cy birds in the Bothnian Bay area 1985-1999. The number of 2cy individuals is derived from the proportion of 2cy individuals of all aged individuals (Timonen 2000, J. Markkola & the Finnish LWfG working group, unpublished data).

Year	No of individuals	No of aged ind.	2cy %	No of 2cy ind.
1985	95	82	9,5	11
1986	95	44	3,2	7
1987	65	24	1,8	5
1988	95	25	8,9	34
1989	45	44	9,8	10
1990	45	43	1,9	2
1991	55	26	8,0	17
1992	73	30	4,9	12
1993	33	25	6,8	9
1994	46	31	2,0	3
1995	33	33	1,0	1
1996	40	38	1,9	2
1997	30	30	5,0	5
1998	45	37	4,9	6
1999	27	?	0,0	0

birds are known from many years. A formula developed by Ebbinge (1991) was found to be the best for this kind of data:

$$\frac{100(N_t - Na_{t+1})}{N_t(Na_{t+1} / N_{t+1})},$$

where N_t is the total number of individuals in year t, Na_{t+1} is number of adults in year t+1 and N_{t+1} total number of individuals in year t+1.

The average total mortality during the years 1985–1999 in the Bothnian Bay material was 20.1%.

The adult mortality (or its maximum estimate) can be calculated as follows: $1 - Na_{t+1}/N_t$, (maximum number of adults surviving to year t+1 is the total number of individuals in year t). The average adult mortality during the years 1985–1999 in the Bothnian Bay data was 16 %. When both adult and total mortality is known, the rest of the mortality is mortality from 2cy spring to 3cy spring. It can be calculated with the following formula:

$$M_{tot} = m_{juv} * o_{juv} + m_{ad} * o_{ad} \Leftrightarrow m_{juv} = \frac{m_{tot} - m_{ad} * o_{ad}}{o_{juv}},$$

where M_{tot} = total mortality, m_{juv} = juvenile mortality, o_{juv} = proportion of juveniles in the data set, m_{ad} = adult mortality and o_{ad} = proportion of adults in the data set. In this data, set mortality from 2cy to 3cy spring was 51.5%.

Now we have at least some kind of estimate on all necessary parameters for the elasticity analysis. In this way we can form an average matrix which should describe the present state of the LWfG population. This matrix includes many possible errors, for example the higher mortality in the winter season in all age classes is mostly only an assumption.

The matrix in table 3 was processed with RAMAS Metapop software, which yielded $\lambda = 0{,}945$. This describes relatively well the trend of the LWfG population, because both between the years 1910–1999 (see Merikallio 1915 and this article) and 1985–1999 λ (simple logistic growth) has been c. 0,94.

Table 4 shows that elasticity values of the adult survivals turned out to be almost ten times higher than any other values. Differences between all other values are virtually equal if the very low breeding success value of 3cy birds is excluded.

If all other values in the average matrix are left unchanged but breeding success is tripled, λ rises to ca 0,99. The same result can be achieved also by increasing adult winter survival from 0,875 to 0,965 (+9,0%). If adult winter survival is increased by 8% and the first winter survival reduced by 8%, respectively, (according to the stable age structure of the model, there is about equal numbers of adults and 1cy birds in autumn), so even then λ will rise from 0.945 to 0,974 (+2,9%). This variation simulates the directing of hunting pressure to the juvenile birds.

4. Discussion

The results of the elasticity analysis show that adult mortality and changes in it are key factors for determining the population development in LWfG. Such information may be of significance in the conservation work of LWfG. Firstly, conservation efforts should concentrate on factors that improve (especially adult) survival through conservation measures like hunting restrictions and protection of wetlands that are used as staging sites during migration and winter. It could also be recommended to switch the hunting pressure to juvenile White-fronted geese irrespective to the species, although LWfG as a species is highly endangered and should be strictly protected everywhere. This would be particularly effective where LWfG occur in mixed flocks together with the extremely similar White-fronted Geese (Anser albifrons), and one or both of the species are hunted. The results also underlines the very harmful effect of spring hunting, because in spring a much higher proportion of the hunting bag is 'valuable' adults.

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Table 3. Average matrix of the Lesser White-fronted Goose population. See text for more details.

	1cy autumn	2cy spring	2cy autumn	3cy spring	3cy autumn	ad spring	ad autumn
1cy autumn	0	0	0	0,18	0	0,54	0
2cy spring	0,24	0	0	0	0	0	0
2cy autumn	0	0,85	0	0	0	0	0
3cy spring	0	0	0,6	0	0	0	0
3cy autumn	0	0	0	0,9	0	0	0
ad spring	0	0	0	0	0,7	0	0,875
ad autumn	0	0	0	0	0	0,96	0

Table 4. Elasticity matrix for table 3. $\lambda = 0{,}945$.

	1cy autumn	2cy spring	2cy autumn	3cy spring	3cy autumn	ad spring	ad autumn
1cy autumn	0	0	0	0,008	0	0,0293	0
2cy spring	0,0245	0	0	0	0	0	0
2cy autumn	0	0,0301	0	0	0	0	0
3cy spring	0	0	0,0245	0	0	0	0
3cy autumn	0	0	0	0,0293	0	0	0
ad spring	0	0	0	0	0,0238	0	0,3736
ad autumn	0	0	0	0	0	0,4587	0

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Photo. Adult pair of Lesser White-fronted Geese at the Valdak Marshes in May 1999. © Ingar Jostein Øien

SHORT NEWS

Conservation of Lesser White-fronted Goose at East Dongting Lake, China in 2000

There are huge differences in water level between the flooding season and the dry season at the Dongting Lake (Hunan Province, China), with a maximum difference of 18 meters. The lake is therefore called a 'spillway lake'. Normally, the flooding season begins in middle June and ends in late August when the migratory birds return. In the winter, the lake consists of 49,940 ha of open water, 20,300 ha of reedbeds and 36,400 ha of grassland. Such a diversified habitat provides the geese good feeding and roosting opportunities. According to our previous studies, the Lesser White-fronted Goose (Anser erythropus, subsequently referred to as LWfG), prefer some traditional sites every year, namely, Da Xiaoxi Lake, Chunfeng Lake, Cross Dike and the Piaowei mudland (cf. Lei 2000, Markkola et al. 2000). They choose the actual sites depending upon the disturbance level from hunting, fishing activities and sometimes from Water Buffaloes. These sites, except the Piaowei mudland (a main roosting site of LWfG), are regularly grazed by Water Buffaloes. The composition of the vegetation have been well studied by Ms. Zhao Shuqin and Mr. Chen (Peking University).

The year 2000 was a very bad year for LWfG in East Dongting Lake because of the exceptionally high water level in the autumn when the first LWfG arrived. The water level decreased two months later than normal, and this unexpected situation caused a serious problem to the LWfG right after the long distance migration. Some of them died because of food shortage. We dissected one dead White-fronted Goose (Anser albifrons) and its stomach was completely empty. Most of the LWfG follow Bean Geese (Anser fabalis) to the rice fields close to the lake for feeding. This is a very dangerous behaviour because there the birds are situated outside of the protected area and may easy be hunted by the local people. A considerable damage on the crop harvests was resulted from this grazing, which caused a lot of problems to the East Dongting Lake Nature Reserve staff in monitoring and guarding the LWfG. The farmers complained about this situation to the Nature Reserve. The Nature Reserve staff put great efforts in raising the awareness of goose protection in the surrounding area, but still mass killing happens. On 27 October 2000, eight hunters were arrested by the local police when they were hunting for the fourth time near Chunfeng Lake. About 200 LWfG, one White-fronted Goose, two Greylag Geese (Anser anser) and two Grey Herons (Ardea cinerea) were killed this time by the hunters. According to the hunters' deposition, 667 LWfG were killed so far. The hunters put the guns at a hiding place where one person kept watching inside, and the others went to the geese to disturb them. Some hunters even use motorcycles to chase the geese and try to make the geese land near the shooting site. They shoot the geese at a distance of 70–120 meters. According to the Chinese Wildlife Conservation Law, the hunters will be sentenced to prison for at least three years for this incidence. We measured population age structure of the shot LWfG, and the juvenile ratio seems to be very high this year: up to 61%!

These observations show that:

1) Chunfeng Lake is a very important site for LWfG;

2) the LWfG prefer Chunfeng Lake in the early wintering season, and this once again confirmed our former study results: the geese use the eastern side of the lake more in the early winter, and prefer the western side (Da Xiaoxi Lake) in late October. This is because the elevation of Chunfeng Lake is relative higher (= 28–30m) than the other sites (e.g. Da Xiaoxi Lake = 25–26 m), and therefore there is food available earlier there than on the other side.

Many conservationists believe that the water level will be very similar to this year after the Three Gorges Dam in the Yangtse River starts functioning in the year 2003. To cope with this potential risk, the Nature Reserve agency has asked the local government for their attention and alternative measures. A proposal to establish a monitoring station at Chunfeng Lake has been approved and the construction work will be finished by the end of year 2001. Meanwhile, it is planned to start various campaigns to raise public awareness, and encourage local people to adjust their crops in the autumn.

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Lesser White fronted Goose protected in Lithuania

At last the Lesser White fronted Goose (Anser erythropus, subsequently referred to as LWfG) is protected in Lithuania since 20 July 2000 (Order of the Minister of Environment No. 306). It was included in the 4th category of the Red Data Book of Lithuania. Indeterminate, insufficiently studied species are included in this category. Due to lack of information on the occurrence of LWfG in Lithuania it is not possible to place these species in the higher category (1–3).

As LWfG is listed in the Red Data Book of Lithuania, respective penalty rate is applied for killed birds. According to the Decision of the Government of the Republic of Lithuania No. 233 of 24 of February 1998, a sum of 300 Litas (4 Lt = 1 USD) must be paid for one killed bird of the species included in the 4th category of the Red Data Book.

LWfG was not recorded in Lithuania during the year 2000, but no special efforts to search for the species were directed.

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SHORT NEWS

Lambart von Essen in memoriam

The Grand Old Man of Lesser White-fronted Goose conservation work, Lambart von Essen, passed away 27 July, 2000.

Many of the readers of the Fennoscandian Lesser White-fronted Goose (subsequently referred to as LWfG) annual reports know Lambart as the 'father' of active LWfG conservation work. Already in the early 1980's his reputation had reached Finland. In 1983, when a group of ornithologists and nature enthusiasts in the Oulu region made an initiative of LWfG protection work to be established in Finland, they first contacted – not the Finnish conservation authorities or organisations – but Lambart von Essen. Lambart wisely conveyed the message to WWF Finland, which suggested that a working group could be established in the WWF organisation – as it happened in 1983 – and this group is still going strong.

Lambart was a connection between the 'good old days' when the Svaipa mountain lakes were crowded by 'Fjällgäss' and another Swedish veteran concerning LWfG, Per Olof Swanberg made his unforgettable photos of LWfG, and the new generation to whom the LWfG has always been a rare and threatened species.

Bo Toresson, chairman of the Swedish Association for Hunting and Wildlife Management, who made a memory speech about Lambart, listed three main projects in Lambart's public life: the Öster-Malma Game Management School and its improvement, the sustainable forestry and its practice in the forest belonging to Öster-Malma school and conservation and reintroduction of the LWfG.

Before the LWfG reintroduction project Lambart had successfully used Canada Geese as foster parents for Bean Goose goslings in an attempt to expand the reduced breeding distribution area of Bean Geese in Sweden. The idea of 'alien' foster parents was developed with Eric Fabricius, a famous ethologist, who also participated in one of the first meetings of the Nordic LWfG network. In addition to developing a method to breed LWfG in captivity and to reintroduce the species to areas where it had disappeared, Lambart was interested in the whole scope of the LWfG conservation. In the 1980's it was him who had the largest network of contacts to the breeding, staging and wintering areas of the LWfG from northern Russia to the Caspian Sea region and the Balkans. He personally visited e.g. the Azov Sea and Turkey, and until the end he was very eager to hear the latest news about the results of satellite telemetry and the expeditions to Kazakstan, Siberia and China.

When the Nordic network of LWfG was established in Trondheim in 1988, Lambart was a central person. The habit of organising the Nordic meeting every year in Sweden, Norway or Finland gave many of us an opportunity to visit Öster-Malma Jaktvårdskola. There we could even hear Lambart singing traditional Swedish songs when we were having dinner and tasting good wines in the incredible castle milieu of Öster-Malma.

Lambart had a noble name, but we could joke together e.g. at Karl XII's expense when waiting a train to Stockholm from the Norwegian-Swedish boundary near Åre, in a 'Karelinian' restaurant, in the mountains were the Swedish(-Finnish) army was freezing to death when withdrawing from the failed siege of Trondheim. We agreed that Karl XII destroyed the Great Power position of Sweden, but, said Lambart, if Sweden still was a great power, we could give more money to LWfG conservation! Lambart may have been a strict school director, but among LWfG workers he was a warm, democratic person with a good sense of humour and a person who really appreciated other people's work and opinions – and also showed that.

In the1990's Lambart continued his work at Öster-Malma and visited annually his beloved mountain areas when releasing LWfG and their Barnacle Goose foster parents. He participated the Wetlands International LWfG Task Force meeting for the last time in January 2000 in Belgium. In the last years Lambart got worried when DNA studies revealed that the LWfG farm stocks in Sweden and Finland does not represent well the original Fennoscandian population. However, Lambart showed that breeding of LWfG in captivity is possible and also that migration routes can be changed if needed. His effort has by no mean been waisted, because this knowledge is available also in the future if the conservation of the wild LWfG Fennoscandian population fails. We, the active LWfG workers today that continues the LWfG conservation work that Lambart started will always remember Lambart!

Photo. Lambart von Essen searching for Lesser White-fronted Geese at the Shabla Lake in Bulgaria, February 1998.
© Ingar Jostein Øien

Some important events in Lambart's life

– born in Stockholm 26 April 1920
– high school diploma in 1940 in Stockholm
– reserve officer in artillery in 1943
– studies and forest officer degree at Skogshögskolan (Royal College of Forestry) 1943–1947
– marriage with Amelie Tham in 1947, three children, Elisabeth, Helene and Hans
– director of Öster-Malma game management school 1950–1985
– leader of the Bean Goose and the LWfG Project of the Swedish Association for Hunting and Wildlife management and WWF Sweden 1976–2000
– chairman of the Nature Conservation Association of Sörmland 1978–1987
– honorary doctor degree in Forestry at the Swedish University of Agricultural Sciences, Uppsala (SLU, Sveriges Lantbruksuniversitet) in 1981
– the price of A.W. Bergsten in 1982
– a gold medal by the Swedish kennel Club in 1983
– the Order of Golden Ark by Prince Bernhard (The Netherlands) in 1987
– a member of the project committee of WWF Sweden 1978–1990
– Erik Rosenberg price in 1996
– a member of the Wetlands International LWfG Task Force 1994–2000
– Milieu price of ICA-kuriren in 1997

Juha Markkola

APPENDIX A

Co-operation partners and contacts

BirdLife International
Colin Bibby

EU Commission
Seppo Vuolanto

Wetlands International
Bart S. Ebbinge

WWF Arctic Programme
Peter Prokosch

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The Peoples Republic of China	
Board of Forestry, Province of Hu Nan, China	Gui Xiao-jie
Eastern Dongting Lake Strict Nature Reserve	Lei Gang
Poyang Lake Strict Nature Reserve	Mr. Zhao, Mr. Yi
Shanghai Normal University	Jianjian Lu, He Wenshem
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Hortobagy National Park	Gabor Kova'cs, Janos Tar
MME/BirdLife Hungary	György Szimuly
Hungarian Nature Conservation Authority	Gabor Magyor
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Japanese Association for Wild Geese Protection	Masayuki Kurechi
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APPENDIX A

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Romanian Ornithological Society	Dan Munteanu
Danube Delta Institute	Janos Bottond-Kiss
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Russian Academy of Science	
Academy of Science of Karelian State	
Finnish-Russian Nature Conservation Committee	
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Carelian Scientific Centre, Russian Academy of sciences	
Institute for Ecology & Evolution, Russian Academy of Science	Eugeny E. Syroechkovski Jr.
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WWF Russian Programme Office	Victor Nikiforov
Sweden	
Swedish University of Agricultural Sciences	Åke Andersson
Tovetorp Zoologiska forskningstation	Anders Bylin
Swedish Hunters Society	Lambart von Essen †
WWF Sweden	Ola Jennersten, Lennart Gladh
Swedish Ornithological Society (SOF)	Björn Welander
Swedish Environmental Protection Agency	Susanna Löfgren

APPENDIX B

Publications from the Fennoscandian Lesser White-fronted Goose conservation project in the report period

Jacobsen, K. 2000: Effekt av dominans på kondisjonsoppbygging hos dverggås *Anser erythropus* før hekking. – Hovedoppgave, Høgskolen i Telemark. 23 pp. (In Norwegian)

Markkola, J. 2000: Kiljuhanhi-Life-projekti. – Lapin Kansa 22.3.2000 (in Finnish)

Pääläinen, J. 2000: Oma eläin. In: Jeronen, E., Welling, M. & Kantola, L. (eds.) 2000: Ekosysteemit ja ihminen. Ideoita ympäristökasvatukseen. – Pohjois-Pohjanmaan ympäristökeskus. (in Finnish)

Markkola, J. & Timonen, S. 2000: Kiljuhanhen suojelu Suomessa. Conservation of the Lesser White-fronted Goose *Anser erythropus* population in Finland. – Final activity report of the Finnish Lesser White-fronted Goose Life project. Metsähalllitus, Ylä-Lapin luonnonhoitoalue. Ivalo. 70 pgs (in Finnish, with English summary)

Øien, I.J. & Aarvak, T. 2000: Steppene i Nord-Kasakstan – rikt, men farlig gåseland. – Vår Fuglefauna 23:179-181. (in Norwegian)

Tolvanen, P. 2000: Kiljuhanhien kevätlevähdyspaikka löytyi Viron Matsalusta. – WWF Uutiset kevät 2000: 16-17. (In Finnish)

Tolvanen, P. & Leito, A. 2000: Väike laukhani – ohustatuim meie hanedest. (Lesser White-fronted Goose – the most endangered goose in Palearctic. – Linnurada 2000: 2-23. (in Estonian, with English abstract)

Tolvanen, P., Øien, I.J. & Ruokolainen, K. (eds) 2000: Fennoscandian Lesser White-fronted Goose conservation project. Annual Report 1999. – WWF Finland Report 12 & Norwegian Ornithological Society, NOF Rapportserie Report no. 1-2000. Including the following articles:

– Introduction
– Lesser White-fronted Goose survey at East Dongting and Poyang lakes in China, February 1999
– Status of Lesser White-fronted Goose in China
– Monitoring of Lesser White-fronted Geese in western Estonia in 1999
– The spring migration of the Lesser White-fronted Goose at the Bothnian Bay in 1999
– Monitoring of staging Lesser White-fronted Geese at the Valdak Marshes in 1999
– Monitoring Lesser White-fronted Geese in the Varangerfjord area and eastern Finnmark in 1999.
– Spring migration of Lesser White-fronted Geese in north-western Europe - an analysis from individual markings
– Field surveys in possible breeding areas of Lesser White-fronted Goose in Lapland and Finnmark
– Surveys for Lesser White-fronted Goose in the Bolshezemelskaya Tundra, European Russia, in 1999
– New breeding and moulting area of Lesser White-fronted Goose revealed in Indigirka, Yakutia.
– The status of Lesser White-fronted Goose in the Kola Peninsula, north-western Russia
– Monitoring the autumn staging of Lesser White-fronted Geese in north-western Kazakstan, October 1999
– Establishment of a network of protected areas for waterfowl and other wetland birds in north-western Kazakstan
– Occurrence of the Lesser White-fronted Goose in Spain, up to 1999
– The Swedish project on re-establishment of the Lesser White-fronted Goose in Swedish Lapland – a summary for 1999
– Genetic composition of the captive Lesser White-fronted Goose population
– Lesser White-fronted Goose exhibition
– Lesser White-fronted Goose protected in Turkmenia.
– New information about wintering Lesser White-fronted Geese in Uzbekistan.
– Status of the awareness campaign for the Lesser White-fronted Goose
– New Lesser White-fronted Goose data from Lithuania.
– Observations of Lesser White-fronted Geese in central Europe in autumn 1999
– New wintering area for Lesser White-fronted Geese in Crimea Peninsula, Ukraine.
– Annotated checklist of bird observations during the Lesser White-fronted Goose surveys in Kazakstan, October 1999