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Fennoscandian Lesser White-fronted Goose conservation project Report 2001–2003

Edited by
Tomas Aarvak and Sami Timonen

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Fennoscandian Lesser White-fronted Goose conservation project – Report 2001–2003

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Helsinki–Klæbu
2004

CONTENTS

Photo. A flock of Lesser White-fronted Geese in flight at Lake Kulykol, north-western Kazakstan. © Petteri Tolvanen, October 2002

Introduction

Petteri Tolvanen, Tomas Aarvak, Ingar J. Øien & Sami Timonen

The Lesser White-fronted Goose (*Anser erythropus*, subsequently referred to as LWfG) is the most threatened arctic goose species of the Palearctic region, and the populations throughout the range from Fennoscandia to easternmost Siberia are still declining (Lorentsen et al. 1999). At the Valdak Marshes (Finnmark, Norway), the most important staging area in the Nordic countries, the spring staging population has decreased by approximately one third since 1990 (Aarvak & Øien 2004, pp 19-24 in this report). The other traditionally important spring staging area of the Fennoscandian population, the Bothnian Bay coast in Finland, has experienced a decrease by more than 85% since 1990 and this site hosted less than 10 individuals in spring 2003 (Markkola & Luukkonen 2004, pp. 14-18 in this report). Part of the decrease at the Bothnian Bay coast may be due to the changing migration pattern of the LWfG: it seems that more individuals than earlier simply pass the Bothnian Bay coast and continue straight to Lapland after a staging period in western Estonia. A possible explanation for this could be that springs have become earlier and enabled an earlier arrival of the LWfG in the staging and breeding areas in Lapland.

The current estimate for the Fennoscandian population (excluding the Russian Kola Peninsula) is 20-30 breeding pairs. This estimate is updated and based on a statistically significant negative population trend in Fennoscandia since the year 1990. At the time of the previous corresponding estimate (see Aarvak et al. 2001, Aarvak & Øien 2001), the population trend in the 1990's was not statistically significant. The population has had the same negative trend during the whole period, but after adding the years 2001 – 2003 to the matrix, the population decline is now significant. The most important threat for all LWfG populations is the high mortality due to hunting and poaching. Also, loss of habitats on the staging and wintering grounds and disturbance are serious threats for the species all over the distribution range.

The present report documents the results of the work conducted by the Fennoscandian Lesser White-fronted Goose conservation project, jointly run by the Norwegian Ornithological Society and WWF Finland, during the last three years (2001–2003). The report also presents important data and news from other parts of the LWfG breeding, migration and wintering range, and an overview of the situation of the Swedish reintroduced LWfG population.

Photo. A spell of exceptionally cold weather and snowstorm interrupted the catching and satellite transmitter tagging effort of Lesser White-fronted Geese at Lake Kulykol, north-western Kazakstan in mid-October 2002. © Petteri Tolvanen, October 2002

Photo. Aki Arkiomaa, chair of the Finnish of Lesser White-fronted Geese conservation project until 2003, speaking about the importance of volunteer work in the conservation of Lesser White-fronted Geese in the WWF Kostanay project seminar. © Jari Peltomäki, Kostanay, Kazakstan, October 2002

Priorities in the conservation work

The priorities in the LWfG conservation work are defined in the international Action Plan for the species, published by European Commission and BirdLife International (Madsen 1996; available also in internet at: *http://europa.eu.int/comm/environment/nature/directive/birdactionplan/ansererythropys.htm*). According to the Action Plan, highest priority is given to the conservation of the remaining wild populations, and to reduce the threats these populations are facing. Many of the key sites for the species still remain unknown, and thus locating and assessing the key areas are given the very highest priority in the Action Plan. These actions (for the part of the western half of the world population) are given the highest priority also in the Fennoscandian LWfG conservation project.

The Fennoscandian LWfG conservation project has since 1994 been purposefully working to reveal the migration routes and key sites for the species e.g. by means of satellite tracking and ringing. So far, most of the migration route is revealed for the part of the Fennoscandian population that is wintering in the border areas of Greece and Turkey (referred to as the westernmost, or European flyway). The flyway of the population referred to as the western (main) population is revealed from the breeding grounds to the staging areas in north-western Kazakstan, but the southernmost part of this migration route and the wintering sites south / southwest of Kazakstan remain unknown. The size of the western (main) population is estimated currently at 8,000-13,000 individuals (Wetlands International 2002) and the breeding areas of this population stretches from the north-western Russia in west to the eastern parts of Taimyr Peninsula in the east. The Fennoscandian LWfG population differs in terms of genetics - and partly also migration routes - from other LWfG sub-populations and should therefore be considered as a separate unit for conservation.

Photo. Adult pair of Lesser White-fronted Geese feeding on the Valdak Marshes, Norway. © Ingar Jostein Øien, May 1999

Reintroduction

Quite a lot of debate has been going on in the recent years about the plans and programmes on reintroduction of LWfG. The Fennoscandian LWfG conservation project takes in the current situation a critical stand towards the reintroduction of LWfG for a number of reasons. The most frequently discussed question is the genetic composition of the stocks used for reintroduction. The main reasons to be critical to the suitability of the current captive stocks for reintroduction are the following:

— Based on studies of captive LWfG populations, hybridisation between LWfG and White-fronted Goose (*Anser albifrons*) has occurred during the captive history: the captive LWfG carry the mitochondrial DNA of *Anser albifrons* (cf. Ruokonen 2001), and evidently, also part of the nuclear DNA of the captive LWfG is inherited from *Anser albifrons*.

— Because the mitochondrial and nuclear DNA of *Anser albifrons* are not linked in the captive LWfG stocks, eliminating only the individuals with the mitochondrial DNA of *Anser albifrons* does not solve the problem, because there are also individuals possessing mitochondrial DNA of LWfG, but nuclear DNA of both of the species.

— Hybridisation between these species in the wild has not been recorded in the DNA studies, even though almost 100 individuals of LWfG and White-fronted Geese have been sampled covering the whole distribution range of LWfG, and despite the fact that the two species occur in mixed flocks during migration and wintering when mating is supposed to take place (Ruokonen 2001).

— Based on the mitochondrial DNA, the wild Fennoscandian LWfG population differs significantly from other LWfG sub-populations and thus the Fennoscandian population should be considered as a separate management unit in conservation biology (Ruokonen 2001), while the captive LWfG stocks are a mixture of western and eastern LWfG mitochondrial DNA types.

Re-introduction programmes are not given priority in the International Action Plan for the LWfG published by the Council of Europe in 1996, but mentioned as a last resort if all other actions fail and only by following the IUCN criteria for re-introduction. Even the most critically endangered of all LWfG sub-populations, the Fennoscandian breeding population, has still a chance for recovery. The international document providing guidance for the introduction, along with the International Action Plan for LWfG, is the IUCN Species Survival Commission (SSC) guidelines for reintroduction programmes (available on Internet at http://www.iucn.org/themes/ssc/pubs/policy/reinte.htm). According to the IUCN guidelines, the captive stock used to restock the wild population should be genetically as close as possible to the wild population that was extirpated from the reintroduction area. This is not the case with the current captive stocks used (or planned to be used) in the LWfG reintroduction programmes in question. Also, according to the IUCN criteria, there should be no remnant wild population in the release area, to prevent spread of disease, social disruption and introduction of alien genes in the wild population. If the reintroduction programmes would be successful by establishing one or more new populations in Fennoscandia (as they naturally aim to), the reintroduced population would relatively soon get in contact with the wild population either on the breeding grounds or along the migration routes.

In addition to the dubious genetic composition of the captive LWfG stocks, the Fennoscandian LWfG conservation project has stressed repeatedly, that in the present situation the conservation efforts to save the wild populations are very urgent. On the other hand, there is no urgency to pay much effort to – or implement new – reintroduction programmes in the present situation, where the genetic suitability of the captive

Photo. The field where a neck-banded White-fronted Goose was located in Sivachovska Khersonskoi Oblast, Crimea. © Tomas Aarvak

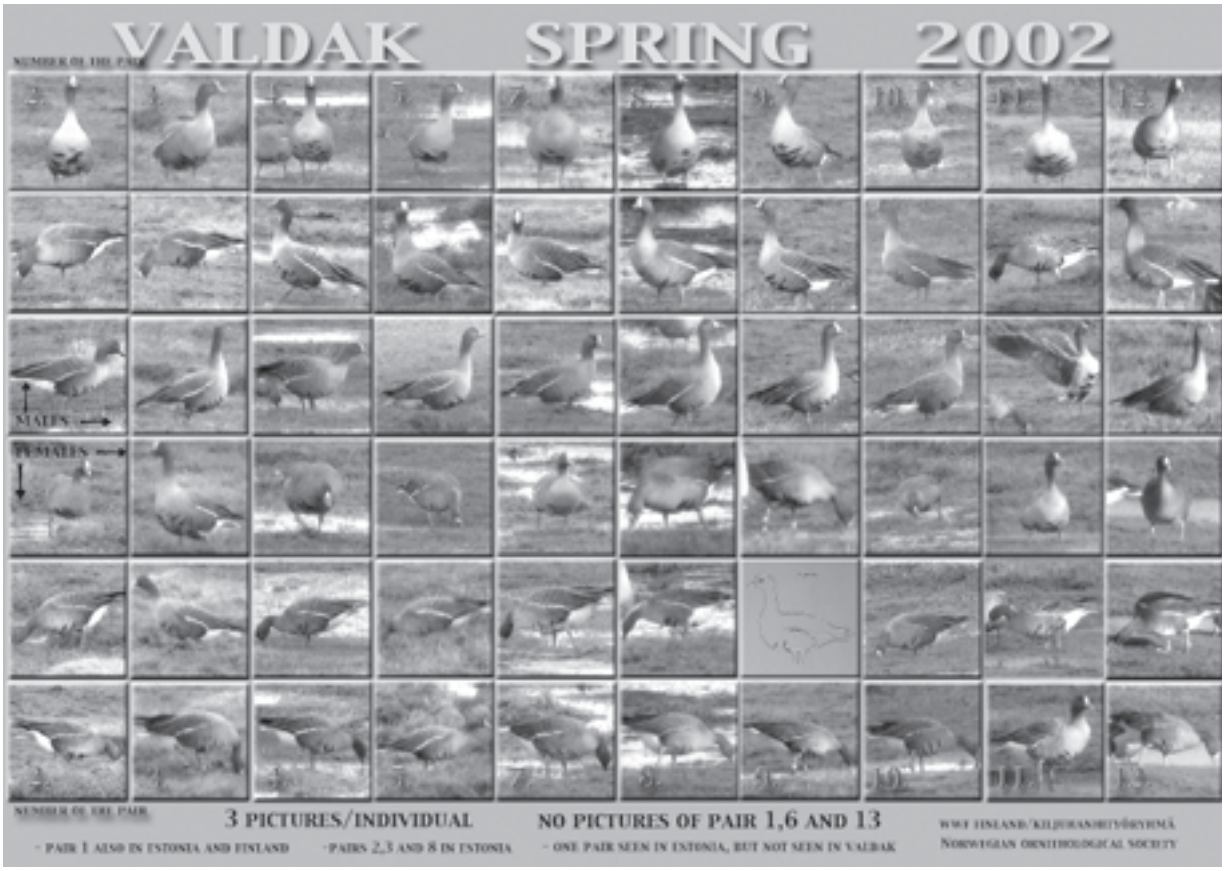

Photo. A collection of digital video captures of the Lesser White-fronted Goose individuals recorded at the Valdak Marhes, Finnmark, Norway, in spring 2002. The numbered columns refer to different pairs; the upper three images in each column show males in different angles, and the lower three images in each pair show females (three images of each individual). © Ari Leinonen and the Fennoscandian Lesser White-fronted Goose conservation project

Photo. Roosting geese on Lake Kulykol, Kazakstan. Lake Kulykol is one of the most important staging sites of the Western Palearctic population of Lesser White-fronted Goose. © Ingar Jostein Øien, September 2002

LWfG stocks for reintroduction is at best questionable. Resources spent on the reintroduction programmes in the current situation can also be viewed as a waste of the time, effort and resources, that should be directed towards eliminating the threats such as excess hunting, poaching, habitat destruction in the struggle for rescuing the wild LWfG populations and their habitats.

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Photo. Adult Lesser White-fronted Goose staging in Matsalu Nature Reserve, Estonia. The adult male Lesser White-fronted Goose (pair 6/2003) can be identified individually by the belly patch pattern. Digital video capture © WWF Finland Lesser White-fronted Goose working group, April 2003

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Monitoring of Lesser White-fronted Geese in western Estonia in 2001–2003

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1. Introduction

In the beginning of the 20th century, the Lesser White-fronted Goose (*Anser erythropus*, later LWfG) was a common breeding bird in the mountain regions of northern Fennoscandia, and a major migration route passed through the north-western parts of Estonia (Norderhaug & Norderhaug 1984). The crash of the Fennoscandian LWfG population during the first half of the 20th century surely affected the numbers of LWfG migrating through Estonia. Until the 1960's, LWfG was a scarce but regular visitor in Estonia during the spring and autumn migration (Leibak et al. 1994). In the years 1957–1967, 346 individuals were recorded in the Matsalu Nature Reserve according to Kumari and Jõgi (1972). In the 1970's, no confirmed observations of the species were made in Estonia (Leibak et al. 1994). Since 1985, single individuals and small groups were observed in western Estonia, mainly in flocks of Barnacle Geese (*Branta leucopsis*), and many of these wore Swedish colour rings. Thus, it was presumed that all the LWfG observed in western Estonia originate from the Swedish reintroduction programme (Leibak et al. 1994). The LWfG observations accepted by the Estonian Rarities Committee were published by Lilleleht & Leibak (1991) and Lilleleht (1999). After 1997, LWfG was excluded from the species list of Estonian Rarities Committee.

An important spring staging area for the Fennoscandian population of LWfG was revealed at Matsalu, western Estonia, in 1996–1998 (Tolvanen 1999), and at least 32 individuals were observed in the area in April–May 1998 without systematic monitoring (Tolvanen 1999). In 1999, the LWfG project of WWF Finland organised for the first time spring monitoring of LWfG in western Estonia, and since then the spring monitoring has been carried out annually in co-operation with the Finnish LWfG project and the Matsalu Nature Reserve. A summary of the status, occurrence and identification of LWfG in Estonia was published (in Estonian) by Tolvanen & Leito (2000).

In 2001–2003, the spring monitoring of LWfG in western Estonia was carried out in co-operation between the Finnish WWF LWfG project, the North Ostrobothnia Regional Environment Centre (Finland), and the staff of Matsalu Nature Reserve. The main aims of the monitoring programme are to count, age and identify individually the LWfG staging in the area, to locate the most important roosting and feeding places, and to assess possible threats for LWfG in the area. In autumn 2001, the staff of Matsalu Nature Reserve monitored staging geese in the surroundings of the Matsalu Bay during the whole migration period of arctic geese. In autumn 2003, staging geese were monitored in Matsalu area during the whole migration period, and in addition a joint Estonian-Finnish observation group checked briefly the potential staging areas at the southern coast of Matsalu Bay and along the western coast of Estonia from Pärnu to Häädemeeste. In addition, observations received from birdwatchers active in the area are included in the present paper. In Silma Nature Reserve and surroundings, autumn monitoring of geese was carried out two – three times every week in September-October 2001–2003.

2. Spring monitoring

2.1. Methods

In 2001, the monitoring of geese was started by the staff of Matsalu Nature Reserve in areas surrounding the Matsalu Bay on April 9. The Tahu coastal meadows in the Silma Nature Reserve were monitored from 16 April onwards. The intensive monitoring of LWfG, organised by the Finnish WWF LWfG project, covered the usual staging period of the LWfG: 20 April – 9 May. All the sites known to be visited by LWfG in previous years of monitoring were surveyed (Figure 1) by the established methods, and new potential feeding and roosting sites were searched for. In addition to the Matsalu–Haapsalu–Noarootsi region, the Audru fields west of Pärnu were visited on 29 April, 2 May, 5–6 May and 8 May, and field areas around Tartu were surveyed on 30 April and 9 May. On 5–6 May, all potential staging areas of LWfG on the western coast of Estonia from Virtsu to Häädemeeste were visited.

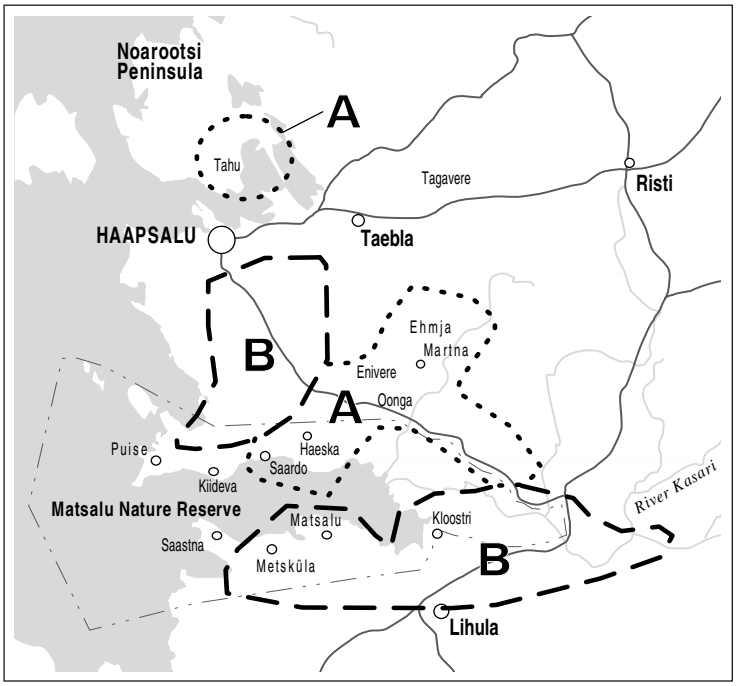

Figure 1. Spring monitoring areas. A: surveyed daily or almost daily during the spring monitoring period each year, B: surveyed weekly during the monitoring period each year.

In 2002, the geese arrived exceptionally early in Estonia: the first White-fronted (*Anser albifrons*) and Bean Geese (*A. fabalis*) in Matsalu were observed already on 12 March. Henceforth, the geese continued to arrive in constantly as the spring was truly early; warm weather period with only little rain started in the beginning of April and continued during the whole monitoring period. The monitoring of geese was started in Matsalu area already at the end of March by the Matsalu Nature Reserve staff. The intensive monitoring of LWfG, organised by the Finnish WWF LWfG project, started approximately one week earlier than usual, and the intensive monitoring period covered the period 12 April – 9 May. All the sites known to be visited by LWfG in previous years of

Table 1. Observations of Lesser White-fronted Geese in Estonia in 2001– 2003.

Date	Place	Ind.	Notes
Spring 2001			
23 Apr	Haeska	8 ad	on the fields at 17:00–20:30
24 Apr	Haeska	10 ad	on the fields at 08:20–09:15, took off towards the coastal meadows and stayed there, turned back to the fields in the evening
25 Apr	Haeska	10 ad	on the fields at 10:00, flew to the coastal meadows at 12:10 and stayed there until 17:30, turned back to the fields and stayed there at least until 19:10
26 Apr	Haeska	11 ad	on the fields at 06:10–08:30, took off towards the coastal meadows, stayed there at least until 15:00
27 Apr	Haeska	11 ad	on the fields at 10:00–10:15, took off towards the coastal meadows
28 Apr	Haeska	11–13 ad	flock of 11 ind. on the fields at 05:00–06:00 and 2 ad on the fields at 09:00–10:15, when the 2 ad took off towards the coastal meadows (the 2 ad possibly different individuals, i.e. possibly 13 individuals in total, but only 11 seen at a time)
29 Apr	Haeska	2 ad	on the fields in the morning
29 Apr	Haeska	8 ad	on the coastal meadow SE of the Haeska birdwatching tower at 16:30
30 Apr	Haeska	2 ad	on the coastal meadow at 08:00 in the morning, visited the fields and turned back to the coastal meadow at 10:00
30 Apr	Tahu	11 ad	the same flock that was at Haeska until 28 Apr
1 May	Haeska	2 ad	on the coastal meadow
1 May	Tahu	11 ad	on the coastal meadow until evening
2 May	Haeska	2 ad	pair
2 May	Tahu	11 ad	on the coastal meadow at 06:30–07:15
3 May	Haeska	2 ad	on the coastal meadow at 15:00
3 May	Tahu	11 ad	at 16:30 in a flock on the coastal meadow
4 May	Haeska	2 ad	pair
4 May	Tahu	11 ad	in a flock on the coastal meadow in the evening
5 May	Tahu	2 ad	on the coastal meadow at 17:15–19:30
6 May	Tahu	2 ad	at 09:00–10:00
7 May	Haeska	2 ad	on the coastal meadow
7 May	Tahu	11 ad	in a flock on the coastal meadow in the evening
8 May	Tahu	4 ad	on the coastal meadow at 18:00–19:30
9 May	Tahu	4 ad	on the coastal meadow at 18:00–20:00, same individuals as on 8 May
10 May	Tahu	4 ad	on the coastal meadow at 18:00–19:00, same individuals as on 8–9 May
Autumn 2001			
18 Oct	Haeska	2 ad	landed on Matsalu Bay SE of the Haeska bird watching tower at 17:00, apparently unringed birds
20 Oct	Kloostri Pagasi	1 ad	in flight towards E along the River Kasari at sunrise in a small flock of Tundra Bean Geese (*A. f. rossicus)*
Spring 2002			
16 Apr	Haeska	2 ad	on the coastal meadow at 17:35–18:50, took off towards the fields
17 Apr	Haeska	2 ad	the same pair on the coastal meadow, flew to the fields by the Haeska manor at 16:30
18 Apr	Haeska	2 ad	the same pair on the fields at 06:30–09:40, took off towards the coastal meadows; at 17:50–18:20 on the coastal meadow, took off and flew to the fields by the Haeska manor
19 Apr	Haeska	2 ad	the same pair on the field by the manor at 06:00–06:55; at 14:15–18:20 on the coastal meadow near the tower, took off and flew to the fields E of the manor, at 20:45 still on the fields
20 Apr	Haeska	2 ad	a new pair on the fields in the N part of Haeska village at 10:30–10:35, took off towards the coastal meadows
22 Apr	Kabli	1 ad	migrating with Wigeons (*Anas penelope*) along the coastline
22 Apr	Tahu	4 ad	two new pairs at Tahu, female with Norwegian colour-ring
23 Apr	Tahu	4 ad	same birds as on 22 April on the Tahu coastal meadow at 18:00–19:30
24 Apr	Tahu	4 ad	same birds as on 22–23 April on Tahu meadow, with White-fronted Geese
27 Apr	Haeska	2 ad	feeding on the coastal meadow at 19:35–21:00
28 Apr	Noarootsi Saare	9	on the fields at 21:10–21:30
29 Apr	Noarootsi Saare	11	on the fields at 05:20–08:50
29 Apr	Noarootsi Aulepa	11	same birds on the field at 20:40
30 Apr	Tahu	9	arrived from N, on the shore at 10:55–11:10, then flew to the southern side of Noarootsi peninsula
30 Apr	Noarootsi Saare	11	feeding on the fields at 19:30
1 May	Haapsalu Tagalaht	13	2 ind. and a flock of 11 ind. on the Roograhu islet at 14:10, same individuals as in preceding days
2 May	Noarootsi Saare	14	on the fields at 06:25–06:55, took off towards Sutlepa meri Bay; later 14 small geese (possibly LWfG) flying SW
Spring 2003			
19 Apr	Lihula Kirikuküla	4	probably LWfG: 2 pairs on flooded area at the edge of reed bed ca 1,5 km north-west from Matsalu Nature Reserve visitor center at 19:30
23 Apr	Haeska	4 ad	on the fields of the village in the evening
24 Apr	Haeska	4 ad	same individuals, on the fields of the village from 14:30 until 20:15
25 Apr	Haeska	2 ad	same individuals, on the fields of the village in the evening until 20:25
26 Apr	Haeska	1 ad	on the fields north of the manor; at least 1 LWfG in a large goose flock at 06:40 in the morning
27 Apr	Haeska	4 ad	on the fields north of the manor at 18:35
28 Apr	Noarootsi Saare	6	2ad + 4 2-cy in a flock on the fields at 13:45 and 16:50–17:20
28 Apr	Haeska	9 ad	on the fields east of the manor at 17:30–18:40 and 19:45–20:55, stayed on the fields in the dusk
29 Apr	Haeska	9 ad	same individuals, on the fields east of the manor at 09:48-11:18
30 Apr	Haeska	9 ad	same individuals, on the coastal meadow east of the bird watching tower at 13:10–14:20, flew towards the fields by the manor
1 May	Haeska	9 ad	same individuals, on the fields east of the manor at 07:20, 09:00, 14:45-15:00
2 May	Haeska	9 ad	same individuals, in the southern part of the Haeska village fields at 07:10–07:20
4 May	Haeska	9 ad	same individuals, in the southern part of the Haeska village fields at 08:40–09:35
5 May	Haeska	9 ad	same individuals, on the coastal meadow east of the bird watching tower at 07:50–10:00, 17:30–19:20

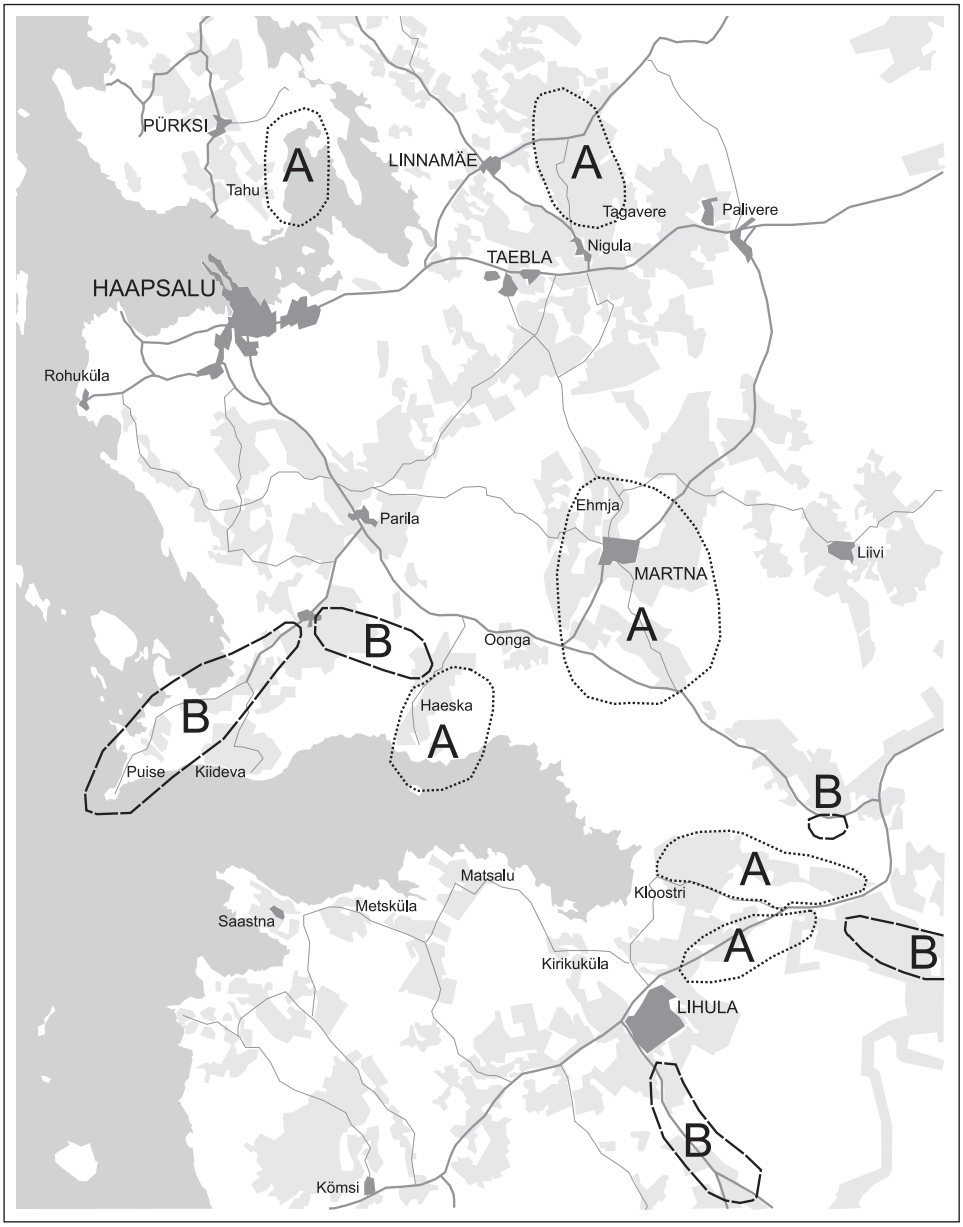

Figure 2. Monitoring area in autumn 2001 and 2003. A: surveyed twice–three times every week during the autumn monitoring period, B: surveyed twice–three times during the monitoring period.

monitoring (Figure 1) were surveyed by the established methods, and new potential areas were searched for.

In 2003, the first half of April was very cold. During 5–6 April, lots of migratory birds that had already arrived in Estonia died due to snow storm and coldness. The spring actually started only in 19-23 April, when the maximum day temperatures rose to 16–18°C; also the first LWfG were observed during this period. The staff of Matsalu and Silma Nature Reserves started the monitoring of geese in their area in 14 April. The intensive monitoring of LWfG, organised by the Finnish WWF LWfG project, covered the period 16 April – 8 May. Again, all the sites known to be visited by LWfG in previous years of monitoring (Figure 1) were surveyed by the established methods, and new potential areas were searched for. In addition, the fields of Audru and Papsaare were checked on 21 April.

In every possible observing situation the LWfG were recorded by digital video camera (Canon MV10) mounted on a Leica Apo Televid telescope (with 20x ocular). This combination enables to record the geese at much longer distances than it would be possible with traditional photographic equipment. The main purpose of the video recording is to improve the identification of individuals and pairs, and finally to reveal migratory movements and life history of individuals by comparing the belly patch patterns on the video tapes from different staging sites. In addition to the monitoring activities by Matsalu and Silma Nature Reserves and the Finnish LWfG project, valuable observations were received annually also from Finnish ornithologists birding in the area.

2.2. Results

Spring 2001. During the spring 2001, altogether 13 LWfG were observed at two traditional sites, Haeska (Ridala) and Tahu (Noarootsi) within the period 23 April–10 May (Table 1). The first flock of LWfG arrived at Haeska on 23 April and stayed there at least until 28 April. The same flock was found at the coastal meadows of Tahu on 30 April, and the flock stayed at Tahu until 7 May. Two individuals (one adult pair) of this flock stayed in Tahu until 10 May. On 29 April, a new pair (identified by the belly patch pattern) arrived at Haeska, and this pair stayed there until 7 May, when they moved to Tahu, and joined the other remaining pair there. The last observation of LWfG (two adult pairs) was made in Tahu in the evening of 10 May. The coastal meadows of Tahu were still checked daily on 11–13 May, but no LWfG were observed any more. The length of the staging period was 18 days (23 April–10 May). All individuals were aged as adults (i.e. older than 2-cy). All individuals were recorded on digital video, and identified individually by the belly patch pattern. In addition, a colour-ringed bird of Swedish reintroduction origin was seen at the Audru fields, west of Pärnu, on 11 May (Antti Luukkonen, pers. comm.).

Spring 2002. During the spring 2002, 16 different LWfG individuals were observed. LWfG were observed at the two traditional sites, Haeska (Ridala) and Tahu (Noarootsi), during the period 12 April – 9 May (Table 1). The first pair arrived at Haeska on 16 April, and stayed there at least until 19 April. On 20 April a new pair was observed at Haeska. At the coastal meadow of Tahu, the first two pairs were found on 22 April. A flock of 9 individuals was observed on 28 April on the Saare fields in Silma Nature Reserve, and a flock of 14 individuals was observed on the same place on 2 May. The last LWfG observation (flock of 14 individuals) was made on Saare fields in the morning of 2 May. On 3 May – 6 May the all usual staging places of LWfG at Noarootsi, Haeska, Haapsalu, Martna, Rannamõisa and Kloostri were checked several times, but no more LWfG were found. The length of the staging period was 17 days (16 April – 2 May). Half (8 individuals) of the LWfG were adults, and half of them (8 indi-

Photo. A sign introducing the Lesser White-fronted Geese to visitors at the Haeska bird watching tower in the Matsalu Nature Reserve, Estonia. Staging Lesser White-fronted Geese can often be observed right from the Haeska tower. © Petteri Tolvanen, April 2001

viduals) were aged as 2-cy birds. All individuals were recorded on digital video and identified individually by the belly patch pattern.

Spring 2003. During the spring 2003, at least 15 different LWfG individuals were observed. LWfG were observed at the two traditional sites, Haeska (Ridala) and Saare (Noarootsi), during the period 16 April – 8 May (Table 1). In addition, an observation of four probable LWfG was made on 19 April on the southern coast of Matsalu Bay (Kirikuküla floods): 2 pairs of small short-billed *Anser* geese were observed in a flock of 700 White-fronted and 100 Bean Geese. The area was checked later twice with no results. The first LWfG (4 ad) were recorded in Haeska on 23 April, and on 28 April five more ad LWfG joined the flock. In the same day, 28 April, a new a flock of 6 LWfG (2 ad + 4 2-cy) was seen briefly on the Saare fields (Noarootsi). This was the only LWfG observation outside Haeska in the spring 2003, and these birds stayed at Saare only so briefly, that they were not possible to record on video. The flock in Haeska stayed there until the evening of 5 May. The length of the staging period was at least 13 days (23 April – 5 May). All individuals, except for the flock of 6 individuals on the Saare fields on 28 April, were recorded on digital video and identified individually by the belly patch pattern.

Resightings of colour ringed LWfG in 2001–2003. Colour ringed LWfG, ringed by the Fennoscandian LWfG conservation project at the Valdak Marshes (Finnmark, Norway) were observed in Estonia every spring in the report period. A well known individual ringed in May 2000 and resighted since then several times in Norway, Estonia, Finland and Hungary, was seen in 25 April – 3 May 2001 (Haeska and Tahu), in 22 April – 2 May 2002 (Tahu and Saare), and in 23 April – 5 May 2003 (Haeska). This was the only colour ringed individual of the Fennoscandian wild population recorded in Estonia in the years 2001 and 2002. In 2003, also two other colour ringed LWfG of the Fennoscandian wild population were recorded (Haeska, 24 April – 5 May / 28 April – 5 May), both of these individual ringed in May 2002.

2.3. Discussion

In 2001, the total number of LWfG was clearly lower than in previous years of monitoring in the area; cf. at least 32 individuals observed in 1998 (Tolvanen 1999), 43–51 individuals in 1999 (Tolvanen et al. 2000), and 35 individuals in 2000 (Pynnönen & Tolvanen 2001). The absence of 2nd calendar-year individuals was most likely a consequence of poor breeding success on the Fennoscandian breeding grounds in the summer 2000 (Aarvak & Øien 2001). The length of the staging period was similar to the previous years of monitoring in the area, and also the sites visited by LWfG were the same.

In 2002, the number was slightly higher that in the previous year, but still considerably lower than in the preceding years. The proportion of 2nd calendar-year was 50%, which is a high figure and reflects the good breeding success of the Fennoscandian population in 2001 (see Aarvak & Øien 2004, pg 19–24 in this report). One of the adult LWfG was the same female (colour ringed in Norway) as in the previous spring, but with a different male this time. The length of the staging period was quite similar to the previous years of monitoring, but the staging took place ca one week earlier than in the preceding years. This was most likely due to the very warm and early spring in 2002.

In 2003, the total number of LWfG was similar to the two previous years; i.e. clearly lower than in preceding years of monitoring in the area. The share of 2-cy birds was relatively high, ca 27% (4 individuals). The length of the staging period was a bit less than the average.

The sites visited by LWfG in 2001–2003 were in large scale the

same as in the preceding years of monitoring, but in 2002-2003 the behaviour of the birds differed to some extent from the usual: LWfG were found in Haeska area on fields which they have never used before, for example on the field in the northern part of Haeska village and the small fields north of the Haeska manor. In the Silma Nature Reserve area, the LWfG visited in 2002-2003 the traditional roosting site on Tahu meadows only occasionally, but used fields in the Saare village for feeding, and visited (in 2002) even the Aulepa village ca 10 km north of Tahu. In 2002, the LWfG also seemed to visit areas south from Tahu meadow, e.g. the Roograhu Islet in Haapsalu Tagalaht (Haapsalu Bay).

3. Autumn

3.1. Methods

In 2001, the staff of the Matsalu Nature Reserve monitored geese in the Matsalu area almost daily during the period 27 September – 2 November, and the staff of the Silma Nature Reserve monitored geese in the Haapsalu–Noarootsi region during the period 16 September – 22 October. The Finnish LWfG project arranged a short survey in Matsalu area on 20–21 October. In addition, observations were received from Finnish ornithologists birding in the area. The autumn monitoring area is shown on Figure 2.

In autumn 2002, special monitoring for geese was not arranged in the area.

In 2003, autumn monitoring of geese was carried out during the period 22 September – 14 October in the Matsalu area, and on 8 September – 10 October in the Noarootsi–Linnamäe–Taebla region. The usual staging areas of migrating geese on the coastal meadows and fields were visited two - three times every week. In addition, the potential staging areas in south-western Estonia (Häädemeeste–Nigula area) were surveyed shortly on 6–7 October.

3.2. Results

During autumn 2001, two observations of LWfG were made, concerning (two or) three different individuals of presumably wild origin (Table 1). Besides these observations, a migrating flock of three small *Anser* geese (most likely LWfG) was observed at the Puise Cape on 11 October (Maire Toming). In addition, a colour-ringed bird of Swedish reintroduction origin was seen at Uugla on 11 October.

In 2003, the numbers of arctic geese on the autumn migration turned out to be exceptionally low in western Estonia. During the monitoring period, only ca 100 White-fronted Geese were seen on traditional staging areas in western and south-western Estonia. No LWfG were observed.

3.3. Discussion

Based on the autumn observations in recent years, it seems likely that small numbers of LWfG regularly occur in western Estonia also during the autumn migration. On 19 September 1999, four adult LWfG were observed at the Pagasi fields in the eastern parts of the Matsalu Nature Reserve (Tolvanen et al. 2000). Besides the Matsalu region, autumn records of LWfG have been reported also from the areas surrounding the Nigula Nature Reserve in south-western Estonia: on 11 October 1997 44 individuals at Tali-Kaunsaare, Pärnumaa (Lilleleht 1999), on 12 October 1997 9 individuals at Pihke, Pärnumaa (Lilleleht 1999), and in autumn 2000 a flock of ca 30 individuals was seen on the fields of Tali (Maire Toming, pers.comm.). There is evidently a need to intensify the autumn monitoring of LWfG in Estonia.

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The spring migration of the Lesser White-fronted Goose on Bothnian Bay coast, Finland, in 2001–2003

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1. Introduction

The Bothnian Bay region on the western coast of Finland near the town of Oulu was for a long time the only known staging area for the Lesser White-fronted Goose (*Anser erythropus*, subsequently referred to as LWfG) around the Baltic Sea. By 1970's staging LWfG disappeared from the southern part of Gulf of Bothnia in Pori region and from the coast of Västerbotten in Sweden (e.g. Soikkeli 1973, Markkola 2001).

After 1996 it has been revealed that LWfG staging on Bothnian Bay coast and migrating via Hungary from the wintering area in the border area between Greece and Turkey, stage also in western Estonia at the Bay of Matsalu and at the Bay of Haapsalu (e.g. Aarvak et al. 2000, Pynnönen & Tolvanen 2001). In Oulu region, there are three traditional staging sites, which are situated in the south-eastern part of the Hailuoto Island, at Säärenperä on the mainland in the border region of the municipalities of Siikajoki and Lumijoki, and at the Bay of Liminganlahti. Especially Hailuoto has been a famous staging area for LWfG since 1800's (Sandman 1892). In the beginning of the 1900s, estimates of migrating LWfG during springtime were as high as 10,000 individuals (Merikallio 1910). According to hunters even more LWfG were staging in the autumn (e.g. Virkkula 1926).

The LWfG monitoring scheme in Oulu region was started in 1985, and the accuracy of counts is considerably high thanks to annual and nearly continuous observing over the whole day and night and registration of individually unique belly patterns (see Øien et al. 1996). During the period 1985-1988, the most important area for LWfG was the Bay of Liminganlahti, in 1988-1998 the southern part of Hailuoto, but in 1999 and 2000 Säärenperä (Markkola 2001). Springs 2001, 2002 and 2003 were 17th to 19th consecutive years in the history of spring monitoring.

2. Methods

The aim of the annual spring monitoring of LWfG in the study area is to count staging LWfG as accurately as possible, to collect data on the juvenile survival during the winter by detecting the proportion of 2nd calendar-year birds, and to collect as much possible data on the biology of the LWfG (for details, see Markkola & Timonen 2000). We tried to record the belly patch pattern of all individuals by video filming or by drawing. Observation activities were carried out in all the three sites where LWfG have regularly been staging during last years: (1) the coastal meadows of Tömppä on Hailuoto, (2) Säärenperä and the Bay of Savilahti, which is located 1-2 km west of Säärenperä, and (3) the Bay of Liminganlahti. In 2001, one observation of migrating LWfG was reported also from Pyhäjoki, 50 km south of the regular monitoring area. The more detailed description of the staging areas have been presented earlier (see Markkola 2001).

The monitoring period in 2001 was from 6 to 17 May, in 2002 from 30 April to 15 May and in 2003 from 26 April to 20 May. In 2002 the monitoring was started exceptionally early because of the very early spring migration in the Estonian staging sites. The early start was done also in 2003 though the timing of migration in this year was near the average. The monitoring effort in all years was concentrated in Säärenperä (started in 6 May) and in Tömppä. Liminganlahti Bay was visited irregularly in all years: in 2001 during 7 days, in 2002 during 7 days and in 2003 only twice.

In 2001 the monitoring work was carried out by 8 observers, in 2002 by 14 observers, and in 2003 by 10 observers. All of them are listed in the acknowledgements. The video analysis of filmed geese in 2001–2003 was done by Ari Leinonen (Leinonen 2002a,b).

3. Results and discussion

3.1. Weather and ice conditions

Spring 2001. The winter 2000–2001 was mild in the study area, especially in December and January. Instead, March was 3-4 degrees colder than the 30-year average (Ilmatieteen laitos 2001a, b, c). In April, the weather was 1-2 degrees warmer than the average, and the thermal growing season began already in April, more than a week earlier than usually (Ilmatieteen laitos 2001d). The first days of May were warm, but around 5 May the weather turned cooler. A new heat wave arrived 7 May, bringing the first LWfG on 8-10 May when it was unusually warm. On 13 and 14 May the temperature was around 5-12 degrees during nights and days. On 13 May, when most of the LWfG continued their migration, there was a southern wind blowing in the morning, but it ended at noon and turned to the north and then gradually to the west. The last two weeks of May were considerable cold (Ilmatieteen laitos 2001e).

As in 2000, the sea ice melted fast after the mild winter. Already on 6 May the coastal area between Hailuoto and the continent was free of ice, except the eastern part of Luodonselkä and the mouth of Bay of Liminganlahti. Some ice remained for a longer time along the coastline of Siikajoki and the archipelago of Isomatala (south of Tömppä on Hailuoto). After 7 May large ice fields were found only west of Hailuoto and north of the ferry route between Oulunsalo and Hailuoto. Also these ice fields disappeared quickly.

Spring 2002. In April 2002, there were two heat waves, and already with the latter on 20-30 April the first LWfG arrived in the study area. Thermal growing season started already on 22 April, two weeks before the average. May was on average two degrees warmer than usual, and the first days of the month and the period 10-15 May were very warm. The average temperature of spring 2002 (March–May) was ca 3ºC warmer than the 30-year average (Ilmatieteen laitos 2002 a,b,c). The sea ice melted early. On 28 April the ferry route between Oulunsalo and Hailuoto was over 3 km wide open, and on 6 May there were only some ice left on the shore of Lumijoki, Varjakka. On 12 May all coastal waters were open.

Spring 2003. In April there was very warm weather during 10-21 April. Thermal spring started 1,5-2 weeks before the long term average. The snow melted till end of April quite extensively. Since 21 April cold weather spread to the area. The average temperature of April was 0,4ºC colder (Ilmatieteen laitos 2003a) than the long term average. May started with cold weather which dominated till around 11 May. On 12-13 May the warm weather spread to area which coincided with three LWfG arriving. The weather

Table 1. The spring migration of LWfG in Oulu region in 2001. "Cumulative sum" means the sum of different individuals which have visited a certain place on certain date during the whole migration season. "Goosedays" means the number individuals multiplied by observation days, indicating the significance of place as a staging area, e.g. two and three geese at one site on two successive days makes five goosedays at the site. No number (empty cell): not surveyed.

Area / Date of May	6	7	8	9	10	11	12	13	14	15	Total
Hailuoto, Tömppä											
Daily number	0	0	4	0	0	0	0	0	2–4	2	8–10 "goosedays"
Cumulative sum	0	0	4	4	4	4	4	4	6–8	6-8	6-8 individuals
Siikajoki,Säärenperä											
Daily number	0	6	10	8–12	8	8	10	13	2	2	67–71 "goosedays"
Cumulative sum	0	6	10	12	12	12	14	17	17	17	17 individuals
Bay of Liminganlahti											
Daily number	0	0	0	0	0				0	0	0 "goosedays"
Cumulative sum	0	0	0	0	0				0	0	0 individuals
Daily sum of all places	0	6	12	8–12	8	8	10	13	4–6	4	71–73 "goosedays"
Cumulative sum of all places	0	6	12	14	14	14	16	17	17	17	17 individuals

remained warm till around 20 May. The average temperature of May was 1,0ºC above the long term average. Thermal growing season started around 9-12 May which is on average time.

Ice melted later than in the previous year (spring 2002 was exceptionally early). On 27 April the ferry route between Oulunsalo and Hailuoto was mostly 1-1,5 km widely open and nor before 4 May as wide as 3 km (as on 28 April in 2002). On 7 May the sea area between Siikajoki and southeastern parts of Hailuoto was free of ice, but the ice still covered the shores between Säärenperä, Härkäsäikkä (Hailuoto), Varjakka (Lumijoki) and Oulunsalo. On 13 May the mouth of Liminganlahti Bay and the sea area on the outside were still ice-covered. All coastal waters were free of ice in the study area by 16 May.

3.2. Timing of migration and numbers of geese

Spring 2001. The first six LWfG arrived at Säärenperä 7 May (Table 1), which is a typical time for the first migrants (e.g. Markkola 2001). On next morning four LWfG were seen on Hailuoto, and the first six were still at Säärenperä. By the evening, the four new individuals moved from Hailuoto to Säärenperä. Among the 10 LWfG present at Säärenperä, however, six were new, which meant that one new pair had appeared and one of the original three pairs had disappeared. Eight or 12 LWfG were counted at Säärenperä on 9 May and according to the film material a new pair had arrived. Three LWfG migrating northwards were reported from Pyhäjoki 13 May at c. 08:30 a.m. Before that, at 06:30, also in the same place, four small geese – probably LWfG – were migrating north (Janne Aalto et al.). By 10.30 a.m. three new individuals had joined the flock at Säärenperä.

On 14 May two or four LWfG individuals were seen on Hailuoto and two of them had already been seen at Säärenperä. The big flock of Säärenperä was not found anymore during the day. One pair was still present in Tömppä meadow on 15 May, and one pair at Säärenperä on the same day. Next day both pairs were gone. The total number of LWfG in spring 2001 was only 17 individuals, which is the lowest number in history (Figure 1). This was down nine individuals compared with the previous year, e.g. a decrease of 35 %.

The average staging time of LWfG individuals was 4,2-4,3 days/individual counted on the basis of all goosedays and the number of different individuals. The longest observed staging period was 7 days and the shortest less than one day. In spring 2000 the average staging time was 6 days (Markkola 2001). The staging period started in 2001 exactly at the same time as in 2000: 7 May. In spring 2001 the staging in the study area was over on 15 May, i.e. two days earlier than in 2000. The monitoring work was ended on 17 May in Hailuoto and on 18 May at Säärenperä.

Photo. A field at Säärenperä, where LWfG feed in some years. Most commonly LWfG graze coastal meadows. © WWF Finland Lesser White-fronted Goose working group

Spring 2002. The first LWfG was seen already on 20 April migrating east at Sannanlahti at the Bay of Liminganlahti (J.Aalto & A.Pesola, pers. comm.) and later on the same day the same bird was seen at Virkkula some kilometres further east on the coast of the Liminganlahti Bay (H.Aalto & K. Niitepöld, pers.comm). This is a typical time for the occurrence of single LWfG (possibly of Swedish reintroduction origin) that probably are following migrating Bean Geese (*Anser fabalis fabalis*) from southern Sweden.

The first LWfG flock of six individuals arrived at Säärenperä on 30 April (Table 2). Excluding the single individual in April in a flock of Bean Geese, this is the earliest arrival date in the history of monitoring. Generally the first arrival date is on 7 May or later (e.g. Markkola 2001). The first four individuals were seen landing from a great height, presumably straight from migration flight. The other two individuals came flying low from the west. The arrival of the first LWfG took place before the regular observing had even began.

On 1 May these six LWfG flew to Hailuoto, but they turned back to Säärenperä later in the same evening. On 2-4 May the same flock spent their time mainly in the Savilahti Bay. On 5 May five new individuals arrived. Some of them continued probably their migration on 8 May, when four LWfG and a flock of 11 possible LWfG were seen. On 9 May no LWfG were seen, but on the next day eight LWfG were seen. Only four of these were properly recorded and at least one pair and one juvenile belonged to the already seen group. On 11 May all LWfG were gone - many days before the average peak migration date (15-17 May). The monitoring activity was discontinued 15 May, but as late as on 19 May a single juvenile LWfG was seen flying east in a group of

Table 2. The spring migration of LWfG in Oulu region in 2002. See explanations in the legend for table 1.

Area/ date Apr–May	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
Hailuoto, Tömppä																	
Daily number		(6)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	(6) "goosedays"
Cumulative sum		(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6) individuals
Siikajoki, Säärenperä																	
Daily number	6	6	6	6	6	11	11	11	4–11	0	8	0	0	0	0	0	75–82 "goosedays"
Cumulative sum	6	6	6	6	6	11	11	11	11	11	11–16	11–16	11–16	11–16	11–16	11–16	11–16 individuals
Bay of Liminganlahti																	
Daily number										0	0	0	0	0	0	0	0 "goosedays"
Cumulative sum										0	0	0	0	0	0	0	0 individuals
Daily sum of all places	6	6	6	6	6	11	11	11	4–11	0	8	0	0	0	0	0	75–82 "goosedays"
Cumul. sum of all places	6	6	6	6	6	11	11	11	11	11	11–16	11–16	11–16	11–16	11–16	11–16	11–16 individuals

Table 3. The spring migration of LWfG in Oulu region in 2003. See explanations in the legend for table 1.

Area / Date of May	6	7	8	9	10	11	12	13	14	15	16	17	18	Total
Hailuoto, Tömppä														
Daily number	0	0	0	0	0	0	0	0	0	0	0	0	0	0 'goosedays'
Cumulative sum	0	0	0	0	0	0	0	0	0	0	0	0	0	0 individuals
Siikajoki,Säärenperä														
Daily number	1	0	2	2	5	2	2	5	5	5	5		3	37 'goosedays'
Cumulative sum	1	1	3	3	6	6	6	9	9	9	9		9	9 individuals
Bay of Liminganlahti														
Daily number							2	0						2 'goosedays'
Cumulative sum							2	2	2	2	2	2	2	2 individuals
Daily sum of all places	1	0	2	2	5	2	2	5	5	5	5		3	37 'goosedays'
Cumulat. sum of all places	1	1	3	3	6	6	6	9	9	9	9	9	9	9 individuals

Greylag Geese (*Anser anser*) at Varjakka, in the mouth of the Bay of Liminganlahti (M. Komulainen, pers.comm.).

In 2002, it was difficult to assess accurately the average staging time per individual due to difficulties with identifying all individuals; at minimum the average staging period/individual was 4.4 days, and at maximum 6.9 days. The longest recorded staging period of an individual was 9 days, while some other individuals possibly staged less than one day.

Spring 2003. Spring 2003 was the first year when LWfG were seen only in Säärenperä. The former best area, Tömppä in Hailuoto has for some unknown reason had a declining trend. The first single LWfG was found on 6 May in Säärenperä and it was not seen after that. The next geese were an adult pair on 8 May in Savilahti Bay. On 10 May a flock of three LWfG was seen flying towards west in Säärenperä but on 11-12 May only the original adult pair was present. It is possible that the flying geese were the same as seen on 13 May when three new individuals (two adults and one juvenile) had arrived to Savilahti Bay. The only observation from the Liminganlahti Bay was on 12 May when two individuals were seen flying on the fields of Lumijoki towards Liminganlahti Bay. On 13-16 May five individuals were feeding in the coastal meadows of Savilahti Bay, and on 17 May only three birds were present. The intensive monitoring ended on 18 May but the field trips continued in the area after that. The average staging period of LWfG individuals was 4,1 days

3.3. Age structure

As in spring 2000, also in 2001 only adult LWfG were observed. This was expected according to monitoring results from Porsangen Fjord in autumn 2000 when only two juveniles and eight adults were reported – the lowest number in the history of autumn monitoring at that site (Aarvak & Øien 2001).

In 2002, at least six (nine) 2nd calendar-year LWfG were observed. The first flock of six LWfG consisted of three adults and three 2nd cy birds. In the second flock there were two adults and three juveniles. In the flock of eight individuals seen on 10 May three adults and two juveniles were identified, of which at least one juvenile had been seen earlier. The last three individuals of this flock were not aged. The minimum number of juveniles during the spring 2002 (six) was the highest figure since 1993. Altogether ca 14 2nd cy LWfG were seen in Estonia or Finland during the spring 2002, as could be expected after the good juvenile production year 2001 in Central Finnmark, when 12 broods with altogether 38 goslings were seen at Porsangen Fjord (Aarvak & Øien 2004, pp. 19–24 in this report). In fact, the number of broods and goslings in 2001 was the second highest in the history of Porsangen Fjord autumn monitoring (Aarvak & Øien 2004, pp. 19–24 in this report).

In 2003 one juvenile out of six individuals (one individuals age undetermined) was found. In Estonia the proportion of juveniles was relatively high with 27 % (Tolvanen et al 2004, pp. 9–13 in this report), which was similar to the observations in Finland.

3.4. Habitat use

In 2001, only two LWfG were seen (once) visiting the fields at Säärenperä on 13 May at 08.30. p.m.. As the LWfG prefer natural coastal meadows in the study area, this was a typical pattern (Markkola 2001). In 2000, the LWfG used 5,5 % of their time in fields,

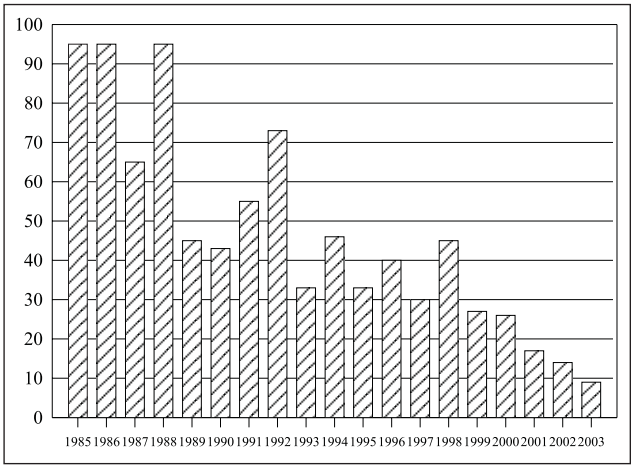

Figure 1. Spring numbers of LWfG in the Oulu region in 1985–2003.

and in day-time even 23 % of their active feeding time - which was exceptionally much (Markkola 2001).

In 2002, the first arrivals were seen to graze in the fields in seven different occasions during 1–5 May, but later the LWfG did not leave the shore meadows at all. In 2003 LWfG were seen only on the shore.

2002–2003 the LWfG were not seen at all on Hailuoto for the first time in the history of the monitoring in the Oulu region. In recent years the proportion of LWfG in Tömppä meadows has been decreasing and the time that visiting LWfG spend in the area has become shorter. Formerly, Tömppä was the most important staging site in the Bothnian Bay region. The reason for this can only be speculated. Probably the grazed meadows of Savilahti Bay in the mainland are at the moment more attractive than mown meadows of Tömppä. This may be due to the more patchy surface of the grazed meadow forming a mosaic of less used places and over-grazed and trampled bare patches with the preferred diet species *Triglochin palustris* as the only common remaining species.

In 2001 and 2002 - as in 1999 and 2000 - the LWfG staged mostly on the coastal meadows of Savilahti Bay, which are located outside the area protected by the National Conservation Program of Wetlands of Finland and Natura 2000 network. The suitable conditions outside the nature reserve area were created by cattle grazing that commenced in 1998 supported by supplementary protection scheme by the EU. Protection of this area outside Natura 2000 will be secured by establishing a Protected Habitat Type (low-growth meadows) area with a special conservation concern according to the Finnish Nature Conservation Act .

3.5. Numbers and patterns change

From 2001 to 2003 the number of LWfG on the Bothnian Bay coast has been the lowest ever, 17 in 2001, 11-16 individuals in 2002 and finally only nine individuals in 2003. The total decline from 2000 (with 26 ind.) till 2003 was 65%. The decrease from 2000 to 2001 seems to be more than an artefact, because the decrease was even more obvious in Estonia and in northern Norway (see Tolvanen et al. 2004, p. 9–13 in this report and Aarvak & Øien 2004, p. 19–24 in this report).

In 2001, all or nearly all LWfG individuals recorded in Estonia and Finland (16-19 ind.) were seen in Finland, and 13 of them in Estonia. In 2002, the total sum of individuals recorded in Estonia and Finland was higher than in the previous year: altogether 25 individuals were recorded, but of these only one adult pair and probably three juveniles staged in both places. Thus, in spite of the decline in numbers both in Estonia and Finland, the total number of birds of this flyway increased 2001–2002 by ca 31% based on the combined data from Estonia and Finland. However, the increasing numbers were due to juvenile birds. The number of adults declined from 17 (in 2001) to 6–9 (in 2002) in Finland, from 13 (in 2001) to 5 (in 2002) in Estonia, and from 19 (in 2001) to 11 (in 2002) in the combined Estonian–Finnish data. This was a strange pattern, as the survival rate of adults should be much greater than in juveniles. One possible explanation for this is that many adults passed through both Estonia and Finland without having stop-over at all, and went straight to the more northern staging and/or breeding areas.

In 2003 altogther 15-22 LWfG were seen in Estonia (n=15-19) and Finland (n=9). Of the 12 individuals documented in video tapes in Estonia orFinland only one pair was not seen Estonia and only one pair seen both in Estonia in Finland was not seen in Valdak.

The observation that some LWfG of this flyway pass Oulu region without staging is new and probably connected to the exceptionally early phenology of spring 2002 even compared with the also warm previous spring. Before observing in Estonia this would have been interpreted as a serious decline of the LWfG population.

In 2003 warm weather mostly with S-SE tailwinds prevailed 12-20 May during the main migration period of the LWfG.

Some LWfG were seen outside the regular staging areas in 2002: 22 May a juvenile LWfG was seen with six Bean Geese at Joutenaapa in Salla in eastern Lapland (Petri Piisilä, pers. comm.) and a juvenile 26 May with 13 Bean Geese at Kalliojärvi in Kuhmo in eastern central Finland (Riikka Kaartinen, pers.comm).

3.6. The westernmost flyway still unsafe for LWfG

According to the present knowledge the LWfG migrating to the Caspian/Black Sea wintering areas via Kazakstan do not visit Bothnian Bay in spring, which means that all LWfG staging in Oulu region are following the migration route from the wintering site in border areas of Greece and Turkey, and flying via Hungary and Estonia to the staging area on the Bothnian Bay coast (e.g. Aarvak et al. 2000). The fact that the numbers of LWfG have declined sharply after 1988 in the staging area on the Bothnian Bay coast (Figure 1) shows that there are also serious threats along this westernmost migration route.

There is an urgent need to improve conservation by revealing as many as possible of the still unknown staging and wintering sites and to promote conservation of all known places. In order to enhance conservation an application for an EU Life project "Conservation of *Anser erythropus* on European migration route" has been submitted to EU in autumn 2003.

3.7. Insufficient conservation in Oulu region

According to the Finnish Red List (Rassi et al. 2001), LWfG is classified as critically endangered (CR) in Finland. According to Rassi (2001) all known and *potential* occurrence areas of CR species should be protected. As hunting is the main threat to the LWfG and it resembles legal game species, all places where LWfG occur and *potentially* occur, should be protected with a hunting ban.

Probably the growing hunting pressure in Oulu region in 1960s and 1970s still diminished the already declining number of LWfG using this route and forced the surviving LWfG more and more to choose the autumn route which leads from Finnmark and Lapland eastwards to the Kanin peninsula and after that southwards east of Finland (see the route in Lorentsen et al. 1998). As a consequence of this, the LWfG visit the staging places in Oulu region currently mostly during the spring migration, but still these traditional sites are at least *potential* autumn staging places of LWfG as well. In most years the south-eastern part of the isle of Hailuoto (Tömppä—Isomatala coastal meadows) has been the most important staging site for the LWfG. Traditionally, this area has also been the most important site for autumn staging.

In spite of the high conservation status of the LWfG and the

possible threat for LWfG in this area in autumn, the regional environmental authority in charge of the conservation of these sites (the Northern Ostrobothnia Regional Environment Centre, subsequently referred to as NOREC) has not accomplished complete conservation (hunting ban) of the LWfG sites in autumn, in spite of appeals by Wetland International and the Finnish LWfG conservation project. As an exception, Säärenperä, one of the three staging areas of Oulu region, will be protected also by a hunting ban. Even here there is still need for improvements: the meadows preferred by LWfG recently are outside the nature reserve (see chapter 3.4).

In 2001 NOREC was planning to apply for an EU Life project to establish the nature reserves and carry out a number of management actions. Along with this planning NOREC suggested the hunting free zones to unimportant places concerning the conservation of LWfG. In their reply to the ministry and their letter to the LWfG working group of Finland the representatives of NOREC claimed that reconsidering the hunting free zone in the already established nature reserves would have brought the Life project plans to danger.

4. Acknowledgements

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Monitoring of staging Lesser White-fronted Geese at the Valdak Marshes, Norway, in the years 2001–2003

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Photo. Adult Lesser White-fronted Geese interacting when defending feeding territories and mates at the Valdak Marshes, Norway. © Ingar Jostein Øien, May 1999

1. Introduction

The Fennoscandian LWfG project run by WWF Finland and NOF has annually monitored the staging areas for Lesser White-fronted Geese (*Anser erythropus*, subsequently referred to as LWfG) in Varangerfjord (since 1995) and at the Valdak Marshes (since 1990) in Norway. At present only the traditional staging area at Valdak seems to be important for the small remaining population in the northernmost areas of Fennoscandia. The Valdak Marshes is situated in the Porsangen Fjord in western Finnmark, and this area is utilised as the last staging area before the onset of breeding and as the first staging area after the moulting period. The results of the monitoring work during spring and autumn staging in the years 2001 to 2003 at the Valdak Marshes are reported in this article. The article also reiterates results presented in previous annual reports (see Aarvak et al. 1996, 1997, Aarvak & Øien 1999, 2000, 2001) from the monitoring and research work, but more comprehensive discussions are omitted, and is restricted to a short discussion on the results from the years 2001 to 2003. Results from the monitoring work at Skjåholmen are published elsewhere in the present report (Kaartinen 2004 pp. 27–28 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. This is a particularly important part of the shallow inner part of the Porsangen Fjord, which by itself makes up one of the most important wetland areas for birds in northern Scandinavia. It is also classified as a BirdLife International Important Bird Area (IBA) (Norwegian IBA 012, Lislevand et al. 2000). The Valdak Marshes is one of the largest salt and brackish marshes in northern Norway (Elven & Johansen 1982), and represents an extremely important feeding/fattening 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 without any disturbance to the birds using a telescope (20-60 x magnification).

Since 1998 we have used a video camera (Sony Handycam) to film the geese through the telescope. This method has increased the possibilities for accurate individual identification and age determination of the staging geese significantly (Aarvak et al. 1999). With this method it is possible to distinguish subadult pairs from adult pairs, and to more securely separate single subadults from immatures and subadult pairs from adult ones. Subadults are here defined as birds in their third calendar year, while immatures are in their second calendar year (see Øien et al. 1999 about details on ageing).

The aim of the *spring* monitoring (14.05.-06.06.2001, 08.05.-05.06.2002 and 09.05-04.06.2003) was to follow the progress of migration and register the total number of staging LWfG in the

Table 1. Numbers of Lesser White-fronted Geese at the Valdak Marshes during spring staging in 1993-2003. 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, 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	% imm./ subad	Total no. of ind.
1993	32	32		4			5.9	68
1994	24	26		4			7.1	56
1995	48	>25		>10			>16.7	>60
1996	31	23		10			17.9	56
1997	32	26		7			11.9	59
1998	37	33	5	5	3		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
2001	22	18	1	0		3	7.3 (5)	41
2002	29	13		14	1	2	34.9	43
2003	25	14	5	9			34.1	41

(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 subad. are included in the ad pairs column, and not in the subad pair column.
(5) Including one subadult in the "ad. pairs" column.

area. As in former years, the individuals were identified by the individual patterns of the belly patches following a thorough description of the method given by Øien et al. (1996). We monitored the number of staging individuals and staging time of the pairs (turnover rates), and in addition, we carried out behavioural studies of dominance and of daily activity of individuals and flocks, food preferences, tolerance to- and level of disturbance, habitat use and migratory movements.

During *autumn* monitoring (21.08.-04.09.2001, 20.08.-04.09.2002 and 21.08-04.09.2003), the emphasis was put on carrying out counts of families and social groups in order to obtain estimates on brood size, productivity and proportion of immatures in the population. The staging geese with goslings were recorded by video camera to increase the efficiency of identification.

Since 1995, a number of LWfG has been caught in Norway, Finland and Russia to map the migration routes by use of satellite telemetry. A number of 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 spring 2001, and in both spring and autumn 2002 and 2003, time was spent on attempts to catch more geese for colour ringing. In spring 2001 we used a small cannon-net covering an area of 180 m^2 (15 x 12 m). This size is sufficient for catching during spring staging when individual pairs defend feeding territories and only 1-2 pairs can be caught at the same time in one shot. In spring and autumn 2002 and 2003 we used a new and larger cannon-net covering an area of 1350m^2 (50 x 27 m).

A specially developed data program for running Monte Carlo simulations (with 100 000 repetitions) was used to test population development trends in chapter 3.5 (cf. Lorentsen 2002).

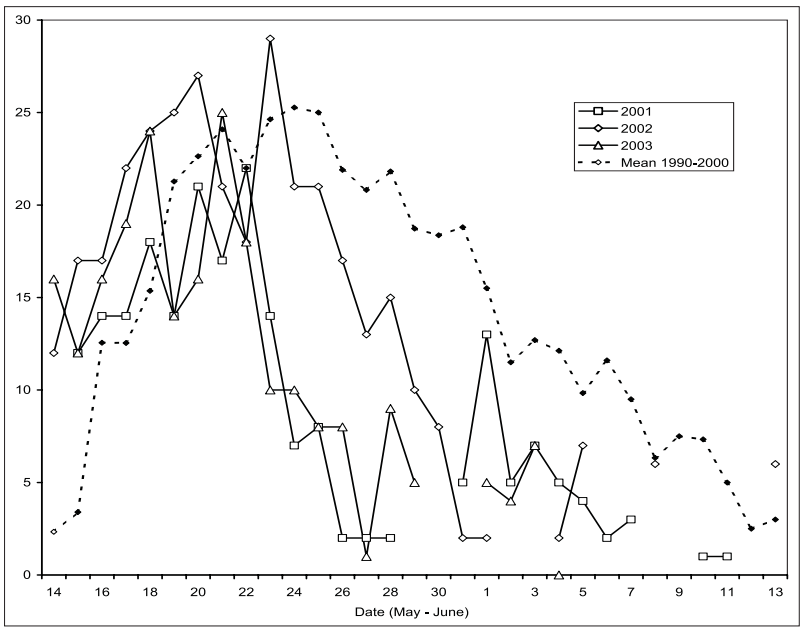

Figure 1. Maximum daily numbers of Lesser White-fronted Geese observed in the period May-June in 2001–2003. Daily means for the years 1990–2000 is also presented to give an overview of the staging phenology.

3. Results

3.1. Spring staging

In 2001, the first LWfG (12 individuals) were already present on 15 May at the start of the monitoring period. Thereafter the numbers increased slowly, reaching a peak of only 22 individuals on 22 May, after when the numbers decreased rapidly (Figure 1). One pair and a single adult were still present at the end of the monitoring period on 7 June. A single adult was also seen on 10 and 11 June (Barb L. Håland, pers. comm.) (Figure 1). In total, 41 individuals were staging at the Valdak Marshes in spring 2001 (Figure 2), distributed as 18 "adult pairs" (including one pair consisting of one adult and one 3rd cy) and one pure subadult pair (Table 1). No second calendar year birds were seen for the first time during the history of monitoring at Valdak.

In 2002, the first pair was seen on 10 May. The numbers increased and reached a peak of 29 individuals on 23 May (Figure 1). Thereafter the numbers dwindled slowly. At the end of the monitoring period (6 June) seven individuals were present. After the regular monitoring period, six individuals were seen on 13 June (A. Espelien, pers. comm.). Altogether 43 individuals were staging at the Valdak Marshes in 2002 (Figure 2), distributed as 13 adult pairs, two single adults, one single subadult and 14 immatures (2 cy) (Table 1).

In 2003, as many as 16 LWfG arrived on 14 May, and the numbers increased slowly until 21 May, when a peak of 25 individuals were registered, but the numbers dropped quite fast afterwards.

Table 2. Autumn age ratio and annual brood sizes of Lesser White-fronted Geese in 1981-2003 at the Valdak Marshes (see also Table 4 for distribution of broods and number of pairs with broods).

Year	n adults	n juveniles	n total	% juveniles	n flocks	Mean brood[1]	Mean brood[2]	Mean brood[3]
1981	10	18	28	64.3	1		3.6	
1982–86	no data							
1987	10	18	28	64.3	1		3.6	
1988–91	no data							
1992	24	34	58	58.6	?		2.8	
1993	no data							
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)
2001	24	38	62	61.3	3	3.2	3.2	2.0
2002	28	34	62	54.8	2	3.1	2.4	2.6
2003	20	27	47	57.4	1	3.9	2.7	1.9

[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 three independent flocks.

The number of geese and turnover of individuals followed the same pattern as in 2001 (Figure 1). Altogether 41 individuals were staging at the Valdak Marshes in 2003 (Figure 2), distributed as 14 pairs, two single adults, two 3cy and eight 2cy birds (Table 1).

Percentages of immatures and subadults are given in Table 1. However, these percentages are not directly comparable between the periods 1993-1997 and 1998-2003, since subadults were registered as adults before 1998. The comparable immature percentages for the years 1998-2003 are 6.0, 12.1, 12.7, 0.0, 32.6 and 22.0 respectively. In 2001, 2002 and 2003, the mean staging period for adult LWfG pairs was 6.0 (n=13), 6.9 (n=13) and 6.2 (n=14) days, respectively (Figure 3), when the pairs already present during the arrival of the authors and those still left at our departure were omitted. The mean staging time in 2001 and 2003 were among the lowest registered while 2002 was quite close to the overall mean for all previous years (1993-2000: mean 7.2, SE=0.5, n=8). We have, however, not tested for differences between years since we do not have sufficient data on individual pairs and how their staging time changes between years. We have data during several years only for some few individuals (e.g. Aarvak & Øien 1999).

No geese were caught during spring staging in 2001. Four LWfG caught in 2000 were resighted this spring (see Table 5, chapter 3.4). Spring 2002 was more successful: Five LWfG were caught and colour ringed in addition to a re-trapping of the 'Green Black' (right leg) female on 12 May. Two out of these were 2cy birds. On this day we also got a pair of Pink-footed Geese (*Anser brachyrhynchus*) as by-catch. Both birds were given neckbands. On 27 May, an additional five 2cy LWfG were caught. As a by-catch on this day, two young White-fronted Geese (*Anser albifrons albifrons*) were caught. Three LWfG colour ringed in earlier years were resighted in 2002 (see Table 5). In 2003, we caught two LWfG, one 2cy and one adult bird, as well as three adult Bean Geese (*Anser fabalis*). The bean geese were given neckbands, and all the geese were given tail mounted radio transmitters (Biotrack TW3, 10 grams, with cable-tie fixing). However, due to unexpected problems, the geese were unfortunately never tracked from fixed wing aircraft as planned. Six colour ringed individuals from earlier years were resighted in spring 2003.

3.2. Autumn staging

2001 was the seventh consecutive year when continuous monitoring during the LWfG autumn staging at the Valdak Marshes was accomplished. The first 41 LWfG were observed on 21 August by two Swiss birdwatchers (R.E. Wrånes, pers. comm.). On

Table 3. The autumn staging periods at the Valdak Marshes in 1981-2003 (all observations are from the period 16 August to 10 September).

Year	Observation dates (extremes) First	Last	Occasional	Time span in days
1981			17.08.	(1)
1987			20.08.	(1)
1992	18.08.	20.08.		(3)
1994	17.08.	10.09.		25
1995	19.08.	06.09.		19
1996	22.08.	05.09.		15
1997	20.08.	03.09.		15
1998	17.08.	02.09.		17
1999	16.08.	03.09.		19
2000	18.08.	04.09.		18
2001	20.08.	03.09.		15
2002	20.08.	04.09.	(09.09.02)	16
2003	17.08.	04.09.		19

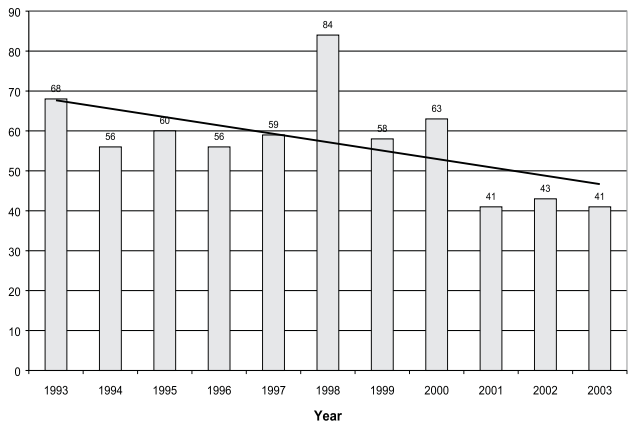

Figure 2. Total number of spring staging LWfG estimated from drawings of belly patches (blue bars) observed at the Valdak Marshes in the years 1993-2003. A linear trend line is shown to illustrate the observed decrease.

22 August the flock had increased to 45 individuals. Three new pairs (with one, one and four goslings per pair respectively) arrived on 25 august and one new pair with one gosling on 26 August. The whole flock disappeared between 3 August at 21:00 p.m. – 4 August at 04:00 a.m. A total of 62 individuals staged there during a period of three weeks (see Tables 2 and 3). These were distributed as 12 pairs with 38 goslings. Contrary to earlier

Table 4. Distribution of brood sizes (post-moult) at the staging areas of Valdak Marshes (VM) in 1994-2003, Skjåholmen Island (SI) in 1995–2003 and in the breeding grounds in 1994 and 1995. No data exists from the breeding areas in Norway in 1996 - 2003 (see also Table 2).

Area	Brood size						Mean	SD	n	Year
	1	2	3	4	5	6	brood size		broods	
Breeding area	3		1	1			2.0	1.4	5	1994
Staging area VM	1	2	4				* 2.4	0.8	7	1994
Breeding area	1	1	3	1	2		3.3	1.4	8	1995
Staging area SI		2					2.0	0	2	1995
Staging area VM		4	3	2	6	2	3.9	1.4	17	1995
Staging area SI					1		5.0	-	1	1996
Staging area VM	1	3	4	1			2.6	0.9	9	1996
Staging area SI		2	1				2.3	0.6	3	1997
Staging area VM		2	1		5		4.0	1.4	8	1997
Staging area SI		3					2.0	0	3	1998
Staging area VM	2	4	2	1	1	1	2.8	1.6	11	1998
Staging area SI		2					2.0	-	1	1999
Staging area VM	1	1	2	2			2.8	1.1	6	1999
Staging area VM		1					(2.0)	-	1	2000
Staging area VM	3		3	5		1	3.2	1.5	12	2001
Staging area VM		5	1	4	1		3.1	1.1	11	2002
Staging area VM		1	2	1	3		3.9	1.2	7	2003

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

years, no single adults or adult pairs without goslings were seen.

In 2002, the first flock of 50 individuals was seen on 20 August. The flock increased on two occasions until it reached a total of 62 individuals (see Table 2). High numbers of geese were seen as late as on 9 September and it is quite likely that most of these were LWfG (G. Ingebretsen, pers. comm.). The flock comprised 11 pairs with 34 goslings as well as one adult pair without goslings and four 2cy birds (see Tables 2 and 3).

In 2003, the first LWfG was seen on 14 August in a flock of c. 40 geese (T. Morset pers. comm.), and on 17 August a minimum of 15 LWfG was seen in a flock of c. 80 geese (G. Ingebretsen pers. comm.). On 18 August 32 LWfG was seen. Of these were four colour ringed (D. Jerstad pers. comm.). In total we observed 47 LWfG this autumn, of which 27 were juveniles (see Tables 2 and 3). Seven broods were registered at Valdak this autumn.

As in all previous years, the autumn observations date from the period 16 August - 10 September (1981-2000, see Table 3). This yields a range of 26 days of autumn staging. However, in most years continuous observation effort has been limited to the period from 20 August to the first few days of September, and we assume that the actual staging period could start earlier and in some years it might end later than observed now.

As compared to the spring staging period when the geese spend all their time at the Valdak Marshes, the LWfG utilise the marshes much less during autumn, and then mostly during late evenings, nights and early mornings. The most common pattern is that they only rarely stay at the marshes during daytime, which is normally spent on the adjacent small islands in the innermost part of the Porsangen Fjord. However, this pattern may vary between years. Both in 2001 and 2002, the geese were present almost continuously at Valdak during the whole staging period.

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. Mean brood size (weighted by year) observed at the Valdak Marshes in the years 1994 - 2003 is 3.1 (sd=0.7, n=10), although this fluctuates significantly between years (Aarvak et al. 1997).

A total of 24 adults and 38 (61%) juveniles were registered during the autumn monitoring period in 2001. Twelve pairs brought goslings, yielding a mean brood size of 3.2 (Tables 2 and 4). In 2002 a total of 28 adults and 34 juveniles (55%) were seen in autumn. Eleven pairs brought goslings, yielding a mean brood size of 3.1 (Tables 2 and 4). In 2003 a total of 20 adults and 27 juveniles (57%) were seen in autumn. Seven pairs brought goslings, yielding a mean brood size of 3.9 (Tables 2 and 4).

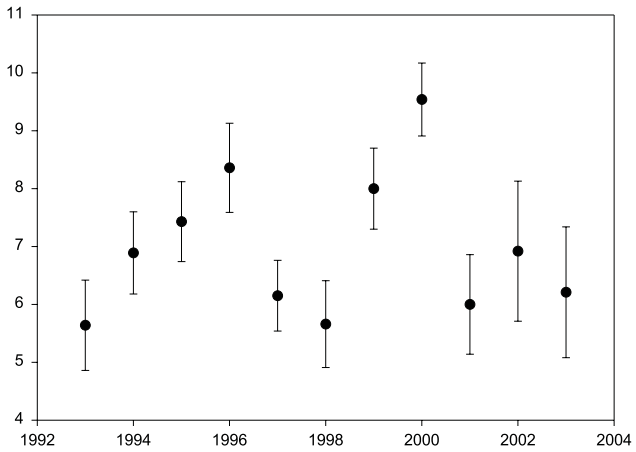

Figure 3. Mean staging time of Lesser White-fronted Goose pairs at the Valdak Marshes in the years 1993-2003.

No young LWfG were seen on the Skjåholmen Island or coastal areas in the Varangerfjord area in the years 2001-2003 (see Kaartinen 2004, pp 27–28 in this report).

Estimates on brood size can be derived in different ways. The probably best estimate is based on number of juveniles compared with the number of pairs observed (potential breeders) in the pre-breeding period (Mean brood[3] - cf. Aarvak et al. 1997), which yields an estimate of 2.0, 2.6 and 1.9 for 2001, 2002 and 2003 respectively (goslings per potential breeding pair). Based on the number of juveniles produced during summer in relation to all birds present at Valdak the previous spring we get a ratio of 48.1%, 44.2% and 39.7% juveniles in the autumn/winter population. For the years 1994, 1995, 1996, 1997, 1998, 1999 and 2000 we obtain an estimated proportion of 37.1%, 52.8%, 29.1%, 35.2%, 27.0%, 29.3% and 3.2% respectively, with a mean for all years of 34.6% (sd=13.9, n=10).

3.4. Colour ring observations

Only four colour ringed LWfG were seen at the Valdak Marshes during the spring staging period in *2001*. Three of them were also seen during autumn. Surprisingly, also five other colour ringed LWfG staged at the marshes during autumn (Table 5). During spring staging in *2002* we resighted three individuals from previ-

Table 5. Observed colour ringed Lesser White-fronted Geese at the Valdak Marshes in 2001, 2002 and 2003. S = spring, A = autumn, M = male, F = female, X = unknown.

Colour code	Sex	Season	Year
Black-Yellow (left)	M	A	2001
White-Black (left)	F	A	2001
Yellow-White (right)	M	A	2001
		A	2002
White-Black (right)	M	S + A	2001
Yellow-Red (right)	F	S + A	2001
		S + A	2002
Red-Black (left)	M	A	2001
Black-Orange (right)	F	A	2001
Yellow-Orange (right)	F	S + A	2001
Green-Black (right)	F	S	2001
		S + A	2002
		S + A	*2003*
Black-Green (right)	X	A	2002
White-Green (left)	X	A	2002
	M	S	2003
Orange-Green (left)	X	A	2002
Black-Red (left)	M	A	2002
		S + A	2003
Black-Orange (left)	F	S	2003
Red-White (left)	F	S + A	2003

ous years. Similarly, seven colour ringed LWfG were seen in autumn 2002, of which three were the same as those seen during spring (ringed in previous years), one was new (ringed in another year), and three was ringed during spring 2002 (Table 5). In spring *2003*, six individuals ringed in previous years were seen. Four of them were also seen during autumn (Table 5).

Of the colour ringed geese, the female Green-Black (right) was also seen in Haeska, Estonia in the period 26-27 April 2002 in a flock of 11 LWfG.

3.5. Population trend

We have earlier shown that the spring numbers utilising the Valdak Marshes have decreased by 5% annually in the period 1992-1997, as estimated by Monte Carlo simulation (Øien et al. 1996, Aarvak et al. 1997). In 2001-2003 the number of geese was much lower than in the period 1993-2000. A Monte Carlo simulation based on total numbers during the spring staging period for the years 1993-2003 shows a negative trend (- 4.0% annually) for this population (p=0.07, n=11) (see also figure 2). Taken into account the special environmental conditions in the springs 2001 to 2003 with very little snow in the staging and breeding areas we did the simulation also with a spring number in 2001 increased from the 41 observed to an estimated 50 individuals and for 2002 with the number increased from 43 to 46. The "new" estimate for 2001 is a subjective estimate, based on the fact that five colour ringed LWfG that were not seen in spring, staged at the Valdak Marshes during autumn. Similarly, we observed one additional colour-ringed individual in autumn 2002 (cf. Table 5). Also with these numbers the annual decrease is almost significant (-3.3% annually, p=0.07, n=11). However, if we also add the years 1990-1992, for which the total numbers are more uncertain because the methodology of identification of LWfG based on the belly patterns was recently developed, the trend is significantly negative (-3.4% annually, p=0.04, n=14). This represents a decrease of 36.0% since the monitoring started in 1990. If we conduct a similar analysis on the spring staging data collected in the Bothnian Bay area for the years 1985-2003, the trend is here also significantly negative with a decrease of -10.5% annually (p<0.001, n=19). By 2003 the number of staging LWfG has decreased by 86.5% since 1985 in the Bothnian Bay area. The trend is highly significantly negative also when only the years 1990-2003 (similar time period as for the Valdak data) are used in the analysis (-12.1% annually, p=0.006, n=14). The data from the Bothnian Bay were taken from Markkola & Luukkonen (2004, pp 14–18 in this report).

Photo. An adult Lesser White-fronted Goose at the Valdak Marshes, Norway. © Ingar Jostein Øien, May 1999

4. Discussion

The number of LWfG registered during spring staging in the years 2001 to 2003 was lower as compared to the earlier years. However, the environmental conditions during spring evidently made it favourable for some of the geese to migrate directly into the breeding areas, thereby yielding a too low estimate of the number of staging geese at the Valdak Marshes. This effect was documented during autumn staging in 2001 and 2002, when several colour ringed LWfG that were not seen at the Valdak Marshes during spring, turned up at the marshes with goslings in autumn.

Based on the data collected at the Valdak Marshes during spring staging, we have documented that the population development is negative.

The numbers of juveniles registered during autumns 2001-2003 were good, and the survival of the goslings from 2001 to 2002 and 2002 to 2003 seems to have been good. However, for the overall population development, gosling production does not have as significant impact as does adult mortality (Lampila 2001). As discussed by Aarvak & Øien (1999), it is of vital importance that conservation measures are undertaken to reduce the adult mortality rate in the Fennoscandian LWfG population . Minor changes would most certainly have a considerable impact on the population trend. The population size is at present at such a low level, that it cannot stand several consecutive years of low reproduction. It is therefore important to identify all factors that may limit reproduction. Above all, it is of crucial importance that all necessary protection measures are carried out quickly 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 staging ground.

Data from the staging grounds in Hungary in autumn 2003 (Janos Tar pers comm.) could, however, indicate that the Fennoscandian population may have left the most critical phase behind. In October 2003, nearly 100% of the LWfG registered a month earlier during post breeding at the Valdak Marshes, was observed in Hortobágy. We have earlier assumed that c. 50% of the population utilises the western/European migration route. If this year's

data represent a permanent shift within the Fennoscandian population, it signals a potential for population growth in the years to come. An increased focus on safeguarding of the staging and wintering grounds on the western/European migration route through a common European initiative, could thus be crucial for the survival of the Fennoscandian LWfG population.

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Monitoring spring migration of Lesser White-fronted Goose in Finnish and Norwegian Lapland, and surveys in former core breeding area in Finland in 2001–2003

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1. Introduction

The annual monitoring of the spring migration of the Fennoscandian breeding population of Lesser White-fronted Goose (*Anser erythropus*, subsequently referred to as LWfG) is carried out along the migration route, beginning in the Hortobágy area in Hungary (Tar 2000), and continuing in the spring staging areas in western Estonia and on the Bothnian Bay coast in Finland. Before reaching the staging site at the Valdak Marshes in the Porsangen Fjord in Norway (Aarvak & Øien 2001) and/or the breeding sites in Norwegian and Finnish Lapland, some individuals stage in the valley of the Tana river on the border of Finland and Norway (e.g. Pynnönen & Tolvanen 2000, Tolvanen et al. 1999). The individual belly patch patterns of LWfG observed at each staging site are drawn or recorded on video. This enables individual recognition of migrating birds (cf. Øien et al. 1996).

In this article the spring migration monitoring in the Tana river valley and summer surveys of former breeding areas in Finland are summarised.

2. Spring migration monitoring in river Tana valley in 2001–2003

Spring monitoring of LWfG was carried out between 15–30 May in 2001 (Polojärvi 2001), 2-30 May in 2002 (Polojärvi 2002) and 5-28 May in 2003 (Polojärvi 2003). In 2001, the monitoring area covered the fields along the river Tana from Tana Bru, Norway, southwards to Karigasniemi, Finland. In addition, some potential staging areas of geese in Finland between Karigasniemi and Kaamanen, as well as in Utsjoki and Kaamanen were surveyed. In 2002, the monitoring covered the same areas, but additional areas were included in the survey in Norway: the fields of Polmak and the Varangerfjord area. In 2003, the monitoring was performed in the same areas as in 2001, except that the Norwegian side was not visited at all.

In spring 2001, due to very warm weather, the Bean Geese (*Anser fabalis)* arrived in northern Lapland already in the beginning of April. Snow and ice melted early at the breeding areas in the mountains, and made it possible for the geese to move early to these areas. The weather in May was much colder, and during the monitoring the temperatures were low (–2 - +7 ^{O}C) with frequent snowfalls.

Also the spring in 2002 was warm the phenology being about two weeks earlier than the average. In 2003, the spring was again early, one to two weeks before the average. The mean temperature in May was c. 2^{o}C above the 30-year average (Ilmatieteen Laitos 2003).

Five different LWfG individuals were observed in 2001. None of these birds wore neckbands or leg rings. The first pair was found at Båteng, Norway on 17 May, one single adult (or 3rd calendar-year) bird in Sirbma, Norway, on 18 May and a pair also in Sirbma on 23 May. The first pair was seen flying above the fields of Båteng continuing eastwards. The single LWfG in the Sirbma fields was observed together with four Bean Geese and one Greylag Goose (*Anser anser)*. The second pair in Sirbma was seen also with four Bean Geese and a Greylag Goose. All the observed LWfG were interpreted as different individuals according to their belly patch pattern.

In 2002, no LWfG were observed during the spring monitoring, and also numbers of other geese were lower than normal. This was probably because of the warm weather and the geese might be allready in breeding areas.

Other observed goose species in 2001 were Bean Goose (altogether c. 78 individuals), Greylag Goose (c. 5 ind.), Pink-footed Goose (*Anser brachyrhynchus)* (c. 6 ind.) and Bar-headed Goose (*Anser indicus)* (2 ind.).

In 2002, other observed goose species were (estimated total minimum numbers): Bean Goose: 202 individuals, White-fronted Goose (*Anser albifrons)*: 1 ind., Greylag Goose 6 ind., Pink-footed Goose 14 ind. and Bar-headed Goose 2 ind. Also four unidentified *Anser*-geese (probably Bean Geese) were seen on 21 May on the island of Skjåholmen in the Varangerfjord.

In 2003, the only observed LWfG individual was an adult seen on 14-16 May in Sirbma fields. On 16 May this individual together with other geese was scared away by a Red Fox (*Vulpes vulpes*) and it flew eastwards along the Tana river valley. Bean Geese were more abundant than the two earlier years, e.g. on 14 May altogether 138 ind. was seen in Sirbma. Other observed goose species were one Pink-footed Goose, one White-fronted Goose and one Greylag Goose.

At the Sirbma fields, which is the most important single spring staging site of geese in the area, human disturbance was lower in 2001 than in 2002. During four days in 2002, the disturbance was fairly intense and there were no geese present during that time.

3. Former core breeding area surveys in 2001-2003

Field surveys in the former core breeding area for LWfG in Finland were carried out in 2001 and 2002. In 2003 no organised field survey was carried out in the area, but a voluntary field team visited the area briefly in July. The surveys were carried out in the periods 12–22 June in 2001 (Holmström 2001) and 9–19 June in 2002 (Holmström et al. 2002). Four persons (Heikki Holmström, Matti Koistinen, Juha Merilä, Tuomo Turpeenniemi) participated in the surveys in 2001 and three persons (Heikki Holmström, Juhani Karvonen, Risto Karvonen) in 2002.

The snow layer was exceptionally thin in the winter 2000-2001. According to a shelter cabin diary there were only a couple of centimetres of snow in the end of December. The spring flood was minimal and the ground soil was very dry. Temperatures were low in the end of May but rose by the beginning of June. Heat waves occurred in the beginning and at the end of survey. Rain showers were daily in the period 13–17 June and the weather was mainly foggy and cold (Holmström 2001).

The spring 2002 came very early to northern Lapland. The temperatures from March to May were 2–2.5 ^{o}C warmer than on average. In the beginning of the survey period all lakes were free of ice and almost all snow had melted. There was no more flooding and the ground soil was even drier than in the beginning of summer 2001. Rainfall was also minimal and it rained only once during the whole period (Holmström et al. 2002). Also the spring

Photo. The weather conditions on the breeding grounds of Lesser White-fronted Geese in Norwegian and Finnish Lapland can still be quite wintry by the time of the egg laying. © Petteri Tolvanen, June 1993

2003 was very early in Lapland, but June was relatively cold. In July the temperatures were high and well above the average. This summer was also very dry.

There were no observations of LWfG in 2001. In 2002, one adult individual was observed in the areas later in the summer during the Arctic Fox monitoring. This LWfG was observed 2 July in the Kaldoaivi region in a flock of five Bean Geese. In 2003 the western parts of the former core breeding areas in Finnish Lapland were briefly surveyed by a volunteer team in the period 15 –17 July, but no LWfG were observed.

Approximately 44 Bean Geese were seen during the survey in 2001. Also, a Greylag Goose was observed flying and alarming above a lake. In 2002, altogether 26 Bean Geese were observed. Also unidentified *Anser*-goose were seen: a single individual and flocks of 3 and 5 individuals.

Human activity in the survey area was relatively low: two hikers were seen in the area in both surveys, but according to the shelter cabin diaries there were also other hikers in the area following the marked hiking route.

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Monitoring the autumn migration of Lesser White-fronted Goose in Varangerfjord area, Norway, in 2001–2003

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1. Introduction

The Varangerfjord area in Eastern Finnmark, Norway, has been considered as the other important staging ground for Lesser White-fronted Geese (*Anser erythropus*, subsequently referred to as LWfG) in northern Norway, where the main site is the Valdak Marshes in Porsangerfjord, Western Finnmark (e.g. Aarvak & Øien 2001, Tolvanen et al. 1998). The number of staging LWfG has been in the range of 3-50 LWfG (minimum estimates) in the Varangerfjord area during autumn migration monitoring in years 1995-1999 (Tolvanen 2000). Year 2000 was the first year without any observations of LWfG since the monitoring in this area began (Kaartinen 2001). Monitoring of the autumn migration of Lesser White-fronted Geese was continued in 2001-2003 (7th-9th monitoring years).

2. Monitoring in 2001

In 2001, the monitoring was carried out in 'the traditional way' (e.g. Tolvanen 2000, Tolvanen et al. 1998) mainly on the island of Skjåholmen. Also other potential areas were checked during 18–31 August, including Barvikmyra marsh near Vardø, the coastal meadows between Kiberg and Ekkerøya (especially the Komagelv Delta and the small cape to the north of Skallelv), the coastal meadows in Veines and on the southern shore of Meskfjorden, the Sirbma fields along the Tana River, a couple of small lakes near Pulmankijärvi, the Tana and Neiden river deltas and the Ferdesmyra marsh near Neiden (see Table 1).

No LWfG were observed. Possible faecal pellets of LWfG were found on Skjåholmen, though they seemed to be quite old, maybe originating from the previous spring or early summer. Human disturbance on Skjåholmen was low, only two berry pickers were seen visiting the island during the period. The monitoring was carried out by Jyrki Pynnönen and Riikka Kaartinen.

3. Monitoring in 2002

In 2002, based on the results from the previous autumn, the monitoring schedule was changed so that the survey was done mainly by observing the potential staging sites on the mainland. Also, the Skjåholmen Island was covered by observations from the mainland with telescope. The Skjåholmen Island was visited only briefly. For the schedule of the survey, see Table 1.

No LWfG observations were made during the monitoring period. Potential faecal pellets of LWfG were found only on Skjåholmen despite the fact that several sites were carefully checked for faeces, tracks and plumes. These carefully checked areas include the southern shoreline of Meskfjorden, the northern shoreline of Veines, the Nesseby Church cape, the coastline from Storelvosen to Store Ekkerøya, the Skallelv River Delta, the small cape to the north of Komagelv village, Sandtangen in Neiden Delta and a meadow on the eastern side of the Tana River Delta. Four field-

Photo. On the Skjåholmen island (Varangerfjord, Finnmark, Norway) the Lesser White-fronted Geese prefer to feed on the narrow low growth meadow zone on the sea shore. The Lesser White-fronted Goose observation hide is visible on the right. © Petteri Tolvanen, August 1999

workers carried out the monitoring: Kati Könönen and Petteri Tolvanen in 14–16 August and Jyrki Pynnönen and Riikka Kaartinen in 17–30 August.

However, outside the regular monitoring one LWfG was observed in a flock of 240 moulting Bean Geese (*Anser fabalis*) near the lake Bergebyvatnet on the Varanger Peninsula, Finnmark on 28 July (Systad et al. 2003).

4. Monitoring in 2003

In year 2003 the monitoring period was longer (altogether 23 days) than in the two previous years. It was carried out in the period 13 August to 4 September. The observers were divided into two field teams (13 - 23 August; Jukka Hauru and Heikki Holmström and 24 August - 4 September; Jyrki Pynnönen and Heini Hyvärinen).

The monitoring was done from the mainland and the island Skjåholmen was not visited. The monitoring activity was similar to that in previous year - the best possible staging places were visited by driving around the coastal area. The monitored area was larger than in the two previous years, e.g. the southern Varangerfjord area was visited twice.

After two years of absence a flock of 7 LWfG was seen on 23 August in Skjåholmen island. The birds were identified from the mainland, walking on the northern side of the island. At least two individuals were adults but the others were not seen good enough for age determination. In the next evening the geese were not seen any more.

5. Acknowledgements

Thanks to Fylkesmannen i Finnmark, Miljøvernavdelingen for providing a rubber boat for transportation to Skjåholmen. The Forest and Park Service in Finland funded the monitoring activities in all three years.

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Table 1. Schedule of the LWfG monitoring in the Varangerfjord area in 2001-2003.

2001	Schedule
18 Aug	Nesseby – Skjåholmen
19 Aug	Skjåholmen
20 Aug	Skjåholmen – Nesseby – Barvikmyra - Kiberg – Ekkerøya – Skjåholmen
21-22 Aug	Skjåholmen
23 Aug	Skjåholmen – Veines – Meskfjorden – Skjåholmen
24-28 Aug	Skjåholmen
29 Aug	Skjåholmen – Meskfjorden – Pulmankijärvi
30 Aug	Pulmankijärvi – Sirma – Pulmankijärvi – Tana Delta/Høyholmen – Meskfjorden – Skjåholmen (monitoring from the mainland) – Veines – Ferdesmyra
31 Aug	Neiden Delta – Ferdesmyra

2002	Schedule
14 Aug	Nuorgam – Varangerbotn – Nesseby – Skallelv
15 Aug	Skallelv – Barvikmyra – Vadsø – Nesseby
16 Aug	Nesseby – Varangerbotn – Tana Delta – Nuorgam
17 Aug	Kevo – Nuorgam – Varangerbotn – Meskfjorden – Vadsø – Storelvosen
18 Aug	Storelvosen – Ekkerøya – Meskfjorden
19 Aug	Meskfjorden – Nesseby – Skjåholmen
20-21 Aug	Skjåholmen
22 Aug	Skjåholmen – Vadsø – Ekkerøya – Barvikmyra – Seglodden
23 Aug	Seglodden – Hamningberg – Barvikmyra – Vardø – Komagelv – Skallelv – Lille Ekkerøya (from mainland) – Storelvosen
24 Aug	Storelvosen – Ekkerøya – Vadsø – Nesseby – Meskfjorden – Näätämö
25 Aug	Näätämö – Ferdesmyra – Neiden Delta – Bugøynes
26 Aug	Bugøynes – Veines – Meskfjorden – Nesseby
27 Aug	Nesseby – Meskfjorden – Ekkerøya
28 Aug	Ekkerøya – Storelv – Vadsø – Nesseby
29 Aug	Nesseby – Meskfjorden – Tana Delta
30 Aug	Tana Delta – Nuorgam – Sirma –Kevo

2003	Schedule
13 Aug	Utsjoki Korretoja - Nuorgam - Tana delta
14 Aug	Tana delta - Meskfjorden - Nesseby - Vadsø - Ekkerøja
15 Aug	Ekkerøja - Barviksmyran - Vardø
16 Aug	Vardø - Ekkerøja - Meskfjorden - Nesseby
17 Aug	Nesseby - Munkfjorden - Svanvik - Noatun
18 Aug	Noatun - Svanvik - Grense Jakobselv - Näätämö
19 Aug	Näätämö - Ferdesmyra - Ekkerøja - Nesseby
20 Aug	Nesseby - Varangebotn - Tana delta
21 Aug	Tana delta - Meskfjorden - Nesseby
22 Aug	Nesseby - Nuorgam - Ekkerøja
23 Aug	Ekkerøja - Nesseby - Sirma - Saariselkä
24 Aug	Saariselkä - Näätämö - Ferdesmyra - Nesseby
25 Aug	Nesseby - Karlebotn - Nesseby
26 Aug	Nesseby - Vadsø - Hamningberg
27 Aug	Hamningberg - Barviksmyran - Vardø
28 Aug	Vardø - Ekkerøja - Nesseby
29 Aug	Nesseby - Veines - Pykeija - Noatun
30 Aug	Noatun - Näätämö - Nesseby
31 Aug	Nesseby - Vadsø - Ekkerøja
1 Sep	Ekkerøja - Barviksmyra - Vardø
2 Sep	Vardø - Ekkerøja - Nesseby
3 Sep	Nesseby - Karlebotn - Tana delta
4 Sep	Tana delta - Nuorgam - Sirma -Kittilä

The autumn migration survey of Lesser White-fronted Goose in Bothnian Bay area, Finland, in 2002

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1. Introduction

Recent knowledge about the autumn migration routes of Fennoscandian Lesser White-fronted Goose (*Anser erythropus*, subsequently referred to as LWfG) is nowadays quite scattered. Based on satellite telemetry studies it has been revealed that some proportion of Nordic LWfG move to northern Russia, Kanin peninsula and from there migrate to Greece and Turkey (e.g. Lorentsen et al. 1998). One part of population continues along another flyway to Kazakstan and further south from there (Tolvanen & Pynnönen 1998).

The autumn staging of LWfG has been a very traditional phenomenon on Bothnian Bay area and the island of Hailuoto, but during the last decades the autumn observations have been irregular (Markkola & Merilä 1998, Markkola et al. 1998). The fact that the autumn numbers have declined more than the spring numbers suggest that hunting (and disturbance) in the staging areas may have had an effect on staging behaviour of geese. Satellite telemetry has revealed that even LWfG on the way to the westernmost wintering areas in the border area of Greece and Turkey first migrate eastwards from Finnmark and Lapland and then turn south-west (Lorentsen et al. 1998). Earlier the majority of LWfG of this flyway staged on Hailuoto and its vicinity. The high hunting pressure has also ended the autumn staging of Bean Geese (*Anser fabalis*) in Oulu region and the opening of the shooting season on 20 August annually launches the autumn migration of the Greylag Goose. In early autumn (August-September) there simply are not enough large peaceful coastal meadow areas where a goose flock could stay undisturbed more than a few hours.

Autumn migration surveys have not been organized before. A survey was organized in autumn 2002 in order to reveal possible migrating LWfG and to gather data of hunting pressure in still used LWfG spring staging places, which at least some time ago were autumn migration staging places, too.

2. The study area and methods

The main survey area was Hailuoto island where the former most important autumn staging areas have been situated. The main sites in Hailuoto were Tömppä meadow and the isle Isomatala but also additional potential areas were checked, most frequently the meadow capes of Kaara and Pökönnokka. On the mainland some surveys were done at the Bay of Liminganlahti and in the municipality of Siikajoki (meadows of Karinkanta and Tauvo).

On Hailuoto the observation schedule consisted of daily round walks and intensive observing from good observation points. Hunters were counted and mapped during each visit. This was done on the mainland only once. The number of geese and other waterfowl were counted during almost every visit.

The observation period covered the main part of September. On Hailuoto the number of observation days was 26 (159 observation hours) and on the mainland only 4 (c.28 observation hours). It can be assumed that there are altogether 396 hours of potential migration and observing time (12 hours/day) during the period 27 August –28 September. On Hailuoto the number of observation hours covered c. 40 % of the total potential observation time. The respective coverage in the mainland was c.7 %.

The main observer (on Hailuoto) was Aappo Luukkonen. Other participants were Juha Markkola, Petri Lampila, Juhani Karvonen and Markus Keskitalo.

3. Results

No LWfG were found. The only identified goose species were Bean Goose and Greylag Goose (*Anser anser*). In addition unidentified Anser - and Anser/Branta -geese were seen. On Hailuoto altogether 114 migrating and 47 staging Bean Geese were counted as well as 32 migrating and 42 staging Anser sp. On the mainland 104 migrating and 24 staging Bean Geese were seen, as well as 21 migrating and one staging Anser sp. The peak migration took place on 4, 5, 10, 14, 16, 19 and 20 September when altogether 319 Bean Geese and unidentified Anser sp. (c. 83 % of all geese individuals) were seen.

Hunters were present during 14 visits out of altogether 18 in Tömppä area, i.e. the "disturbance percent" was 78 %. The minimum estimate of the disturbance is obtained when the unvisited days are included as non-hunting days. Thus the obtained (but probably too optimistic) minimum disturbance percent was 43. On the isle of Isomatala on 27 August - 5 September (before the shooting period was closed there) the disturbance percent was 100 (4 visits) and the minimum disturbance estimate 44 %. These figures show that in actual conditions LWfG have no chance to stage in this "protected area". On 22 August an illegally shot Barnacle Goose (*Branta leucopsis*) was found in Rautaletto near Tömppä area. The shooting has most likely taken place on Isomatala.

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Field survey of Lesser White-fronted Goose on the Kola Peninsula, north-western Russia, in June 2001

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1. Introduction

The status of the Lesser-White-fronted Goose (*Anser erythropus*, subsequently referred to as LWfG) on the Kola Peninsula, north-western Russia, has been unclear. A summary of the knowledge on the distribution and abundance of LWfG was presented by Aikio et al. (1999). According to them, the information on present distribution is inaccurate and sporadic.

The Fennoscandian sub-population of LWfG has been found out to be a genetically distinct conservation unit (Ruokonen & Lumme 1999). The breeding population of the Kola Peninsula most likely represents the same population as the LWfG breeding in Norwegian and Finnish Lapland, although no genetic analysis has been done to reveal this. In order to receive information on the status and breeding distribution of LWfG in Kola Peninsula, a field expedition was carried out in 13-25 June 2001, in the areas around the Lake Enozero (68º07'N, 38 º05'E). The area was the same where a Finnish biologist observed LWfG in the autumns of 1997 and 1999 (see Aikio et al 1999). According to Mikhailov (1993), LWfG breeds regularly in the areas near River Yokanga and Lake Enozero.

The survey was funded and organised by the North Ostrobothnia Regional Environmental Centre, the Finnish Ministry of Environment, the Northern Lapland District for Wilderness Management of Metsähallitus and WWF Finland. Metsähallitus (Finnish Forest and Park Service) was also interested to gain knowledge on the status of Arctic Fox (*Alopex lagopus*) which is another species of conservation concern in Fennoscandia.

2. Survey area and methods

The survey area was situated ca 220 km southeast of Murmansk. The survey team was divided in two parts: one team surveyed the area between Lake Maksim and the northern and eastern parts of Lake Chiliyavr, and the other team surveyed the northern, eastern and southern shores of Lake Enozero (Figure 1). The vegetation in the area consists mainly of treeless tundra with many lakes, ponds, rivers and brooks (see photo). Higher Birch stands were found only in some places along the large rivers. The largest river in the area is the River Varzina flowing northward from Lake Enozero to the Barents Sea. The mires and bogs of the area were usually small and the peat layer was thin as is typical for the tundra areas. Part of the survey area is included in the Tundra Nature Reserve (Tundrovyi Zakasnik).

The area lacks permanent human settlement, but is used by reindeer herders. However, no humans were seen in the area during the survey. Close to the sea shore by the River Varzina there are salmon fishing camps. The helicopter flights to the fishing camps were regular but the flight routes were not leading over the survey area.

Photo. A view to Lake Enozero, Kola Peninsula, north-western Russia. © Petteri Tolvanen, June 2001

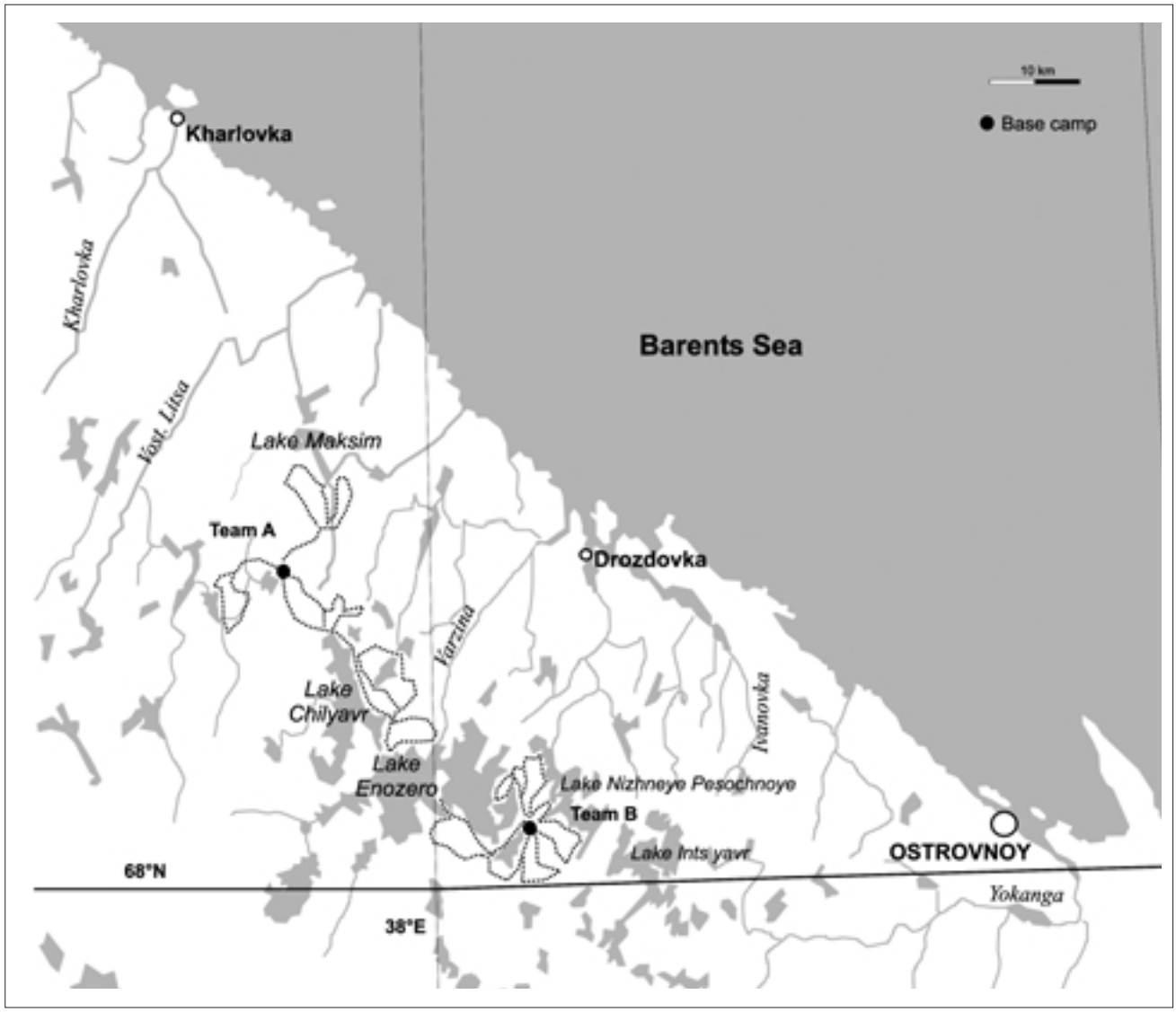

Figure 1. Survey routes of the two field teams in the surroundings of the Lake Enozero, Kola Peninsula, Russia, in June 2001. The black dots indicate the locations of the base camps.

The survey was carried out by seven participants which were divided in two separate field teams. The base camps of teams were located ca 40 kilometres apart. The groups flew to the survey areas by helicopter from Murmansk on 13 June. The effective surveying period in the field was 13–25 June. The first team (referred to as team A) settled the base camp at the northern side of Lake Chiliyavr (68°10N, 37°45E) and made from there rounds extending at maximum ca 25 kilometres north up to Lake Maksim and River Sidorovka, and to southeast up to the upper course of River Varzina (Figure 1). The second team (referred to as team B) was based on the south-eastern side of Lake Enozero making from there hikes to western shores and middle parts of Lake Enozero. The two survey teams covered an area of ca 300 km^2 as estimated from the route markings on the field maps.

The field teams tried to cover vast potential breeding areas by walking and observing the areas with telescopes. The observing was made mainly at night time. Breeding status of observed LWfG was assessed by behaviour.

3. Results

The survey teams observed four LWfG in three different localities: two single adults and one alarming adult pair. Two single individuals were observed by team A and an alarming pair by team B. The localities of observations are shown in Figure 1. On 18 June, a single LWfG was seen in a flock of 14 Tundra Bean Geese (*Anser fabalis rossicus*). The flock was feeding on berries and flew some rounds over the observer and disappeared flying at the distance of some kilometres. On 22 June, one adult individual was seen near the base camp number 2. It landed, stayed for a while and then continued to southeast calling. On 17 June, one alarming pair was found on the south-eastern side of Lake Enozero. The pair was alarming because of the observer and an Arctic Fox on the shore of the lake. The pair was not relocated on 24 June when two other observers went to the area to search for it.

The Tundra Bean Goose is an abundant breeding species of the area according to the observations: altogether 566 individuals were seen (320 ind. by team A and 246 ind. by team B). All observations of Bean Goose concern the subspecies *rossicus*. Tens of alarming pairs were detected as well as smaller flocks. The biggest flock observed consisted of 55 individuals. In addition, one subadult White-fronted Goose (*Anser albifrons*) was seen on the south-eastern side of Lake Enozero.

Of avian predators the following species were recorded: White-tailed Eagles (*Haliaetus albicilla*), (most likely breeding), one Golden Eagle (*Aquila chrysaetos*), one Gyr Falcon (*Falco rusticolus*), several Rough-legged Buzzards (*Buteo lagopus*), two flocks of Pomarine Skuas (*Stercorarius pomarinus*), one Great Skua (*Stercorarius skua*) and Glaucous Gull (*Larus hyperboreus*) (adult pair attacking a White-tailed Eagle at the Lake Enozero; possibly breeding).

Altogether six Brown Bears (*Ursus arctos*) and four Wolverines (*Gulo gulo*) were seen. The trails of Wolf (*Canis lupus*) were seen a couple of times. In addition, the teams saw in total four Arctic Foxes and found at least six active nests.

4. Discussion

The observations of the distribution of LWfG in the area are difficult to generalise over wider areas in the Kola peninsula. The restricted observation data does not allow us to make reliable density estimations. The two single LWfG were interpreted to be non-breeders, but the adult pair behaved like they were a breeding pair. A very rough and approximate breeding density estimate, calculated simply by dividing the number of observed, probably breeding LWfG pairs by the surveyed area, would be ca 0.003 pairs per km^2. It is difficult to compare the density of LWfG in the area with the respective areas in Finland and Norway, since no accurate estimates of breeding density have been presented in these areas, either.

According to Bianki et al. (1993) the breeding frequency of LWfG in the area between the Yokanga and Ponoy rivers is in 8-10 years out of a 10 year-period. However, it is still possible that the total LWfG breeding population of the whole Kola peninsula could be perhaps some tens of pairs, taking into account the huge area of potentially suitable and mostly intact breeding habitat for LWfG. Future work is still needed to receive reliable information on the status and size of the LWfG breeding population on the Kola Peninsula.

Based on visual assessment, the tundra ecosystem of the survey area was clearly in a better shape than e.g. the respective tundra vegetation in the northernmost parts of Finnish Lapland, where extensive over-grazing by Reindeer is evident. The number and density of large predators (mammals) was clearly higher than in Finnish and Norwegian Lapland, and the vast untouched lichen grounds and healthy Willow bushes along brooks indicated much lower grazing pressure by Reindeer as compared with respective vegetation in the northernmost parts of Finnish Lapland. The survey year was not a peak vole and lemming year. The Rough-legged Buzzards were scarce and many of the Arctic Fox nests were inactive.

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Migration of Lesser White-fronted Goose in Hungary and protection of their Hungarian staging sites

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1. Introduction

In 1997, the Hortobágy Society for the Protection of Birds and Nature started the Lesser White-fronted Goose (*Anser erythropus*, subsequently referred to as LWfG) research and conservation programme. The main activities of the Society are surveys of the populations of endangered breeding species in Hungary, the creation and maintenance of important bird habitats, and active protection of bird species.

The globally threatened population of LWfG is decreasing in Hungary, too. Since Hortobágy region is the main site where LWfG linger for a long time during their migration, a protection programme there can strongly contribute to the survival of the species. In spring the staging period of LWfG in Hortobágy is only short and irregular, 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 LWfG. Today, the presence of less than a hundred individuals is known during autumn migration, almost exclusively in Hortobágy. Outside the Hortobágy area the species may rarely appear around Lake Fehér near Szeged, on Biharugra and Begécsi fishponds, in Kardoskút, around Ferto Lake and in Sárrét in Transdanubia.

We regard as our most important goal 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 the LWfG arrive, we also should create freshly grown grazing fields on the usually extremely dry parts of the puszta which they like to visit, by inundating these areas. In addition, we want to explore the threats to conservation, reshape hunters' way of thinking, give educational lectures and publish public awareness leaflets.

Summarising our earlier data, in autumn the first LWfG families arrive at Hortobágy fishpond in the first half of September, where they gather in one of the inlets shallow enough. Usually, their number peaks in the second half of October. After this the number decreases slowly and LWfG start to mix with White-fronted Geese flocks (*Anser albifrons*), and it gets more difficult to find them among the flocks of many thousands of birds. With the decrease in temperature, LWfG continue their migration towards wintering places together with flocks of White-fronted Geese. Usually they leave by the middle of November, but when the weather is favourable, this 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 could be observed.

2. Occurrence of LWfG in Hortobágy area in 2001

During the winter 2000–2001, some thousands of geese overwintered in the area because of the mild weather. Also LWfG were observed in some cases, and few individuals overwintered successfully from late December 2000 to January – February 2001.

There were four colour-ringed birds among the seven LWfG observed on 24 January 2001. We saw these birds several times from September 2000 onwards, so they had stayed in the Hortobágy area for four months. In addition, more than 20 Red-breasted Geese (*Branta ruficollis*) overwintered in the area.

The weather turned milder in mid-February 2001 and huge flocks of geese returned from south. We have less than ten records from this spring migration period. Maximum number was 32 on 13 March in Dinnyés-lapos. The last spring record was 27 individuals on 15 March. Afterwards the weather suddenly became warmer and the LWfG disappeared from Hortobágy.

We have records of LWfG until 25 March from Western Hungary and even the maximum number for this area during the last 10 years was from that day: 5 adult individuals.

The first autumn record was 9 birds on 25 September (families with one and four juveniles respectively). The parents with one juvenile wore colour rings. One week later 54 individuals were present at Dinnyés-lapos. Until this time the LWfG usually went there to graze in the mornings and evenings. At that time 7-12 White-tailed Eagles disturbed them continuously on the Hortobágy fishponds. Therefore they moved to the Bivalyhalmi fishponds in a distance of few kilometres. They spent both days and nights there, and fed on a nearby wheat field together with Greylag Geese. The highest number was reached on 15 October when 59 individuals were back in the Hortobágy fishponds. They remained there until the end of October. In the first half of November a flock of 38 ind. moved over to the Virágoskúti fishponds, where they were present until the fishpond was concealed by the ice cover. Last record was two adults and one juvenile on 21 November in the Bivalyhalmi fishponds. There were no observations in irregular localities, except during the transfer in October-November. The reason for the first transfer was the disturbance of eagles, and the second was the attraction of huge goose flocks.

3. Occurrence of LWfG in Hortobágy area in 2002

The first record (one 2cy bird) was made on 4 February, followed by observations of a few individuals around the Hortobágy fishponds until mid-March. The spring maximum (54 ind.) was reached on 27 March. Five of these birds were colour-ringed. This flock disappeared from Hortobágy one week later. There were six 2cy birds in Cserepes on a barley field together with non-breeding Greylag Geese from mid-April to 9 May. They spent the nights on the nearby flooded places, and during daytime they did not go for drinking at the fish ponds. They drank at inland waters and roosted there as well. These birds disappeared when the field was ploughed. In addition there was one more record: one 2nd cy on 16 May at the Hortobágy fishponds. The LWfG stayed there for unusually long time this spring, which is interesting. Obviously they did not breed this year (LWfG rarely, if ever, breeds as 2cy – edit. comm.).

The first autumn record in 2002 (19 individuals) was made on 17 September at the Hortobágy fishponds. After that the number of LWfG increased and peaked on 20 October with 49 ind. in the Dinnyés-lapos.

The number of LWfG decreased by the end of October, and there were only two records in November in the Hortobágy area. We observed six different colour ringed LWfG during the autumn.

4. Current status of LWfG habitats in the Hortobágy area

The **Hortobágy fishponds** is the most important roosting place of LWfG. They start the morning flights to the feeding grounds from fish ponds and come back to overnight every evening. The biggest fish pond was dried out in both the years 2001 and 2002 making it a suitable roosting place for LWfG, since they prefer low water level at the roosting sites. The National Park Directory kept the water level low in 2002 in order to provide an excellent roosting place for geese as well a good breeding site for other wetland birds. During summer the pioneer plants established a luxurious vegetation in the drying bed. At the end of August the pond was filled up again to the same level as in spring. Thus LWfG often spent time in this temporary feeding place, mostly in early morning hours. They fed on fresh leaves, sprouts and seeds.

It seems that one of the most important features of staging and feeding areas for migrating LWfG is the possibility to have a good view far away.

The **Virágoskúti fishponds** is situated on the northeastern edge of Hortobágy. The most valuable part of this pond-complex is 820-hectare large pond no. IV. It is one of the most important wildfowl congregatory places in the Hortobágy. From late August to early November the water level is at ca. 50% of the maximum because of the fishing activities making it a perfect feeding place for geese. There is however one disadvantage: only the surrounding smaller ponds are legally protected. There are two active hunting companies in the area. Hunting is allowed only for ducks, but it causes disturbance also for geese. Foreign hunters spend on average 10-15 days in this area, although the number of hunting days is reduced year by year. After the Hortobágy National Park's wardens have been keeping frequent control on hunters, the number of hunters has decreased both in the Hortobágy and in neighbouring areas. Most of the local hunters blame hunting control for the decrease of guest hunters. The shallow-water pond beds with shelves are suitable roosting and drinking places during midday. There is an urgent need for legal protection of this area.

The reed-bed is wide and high, so some observation hides would be recommended in order to provide more observation data of birds in this area. This is the second most important site for LWfG in the Hortobágy.

Dinnyés-lapos is the most important feeding place of LWfG where the geese occur regularly during both spring and autumn. In both 2001 and 2002 the late summer and early autumn were wet, and therefore geese could find proper green grazing fields. They often remained all day in the feeding place before returning to the fish pond. The geese could use this place for weeks, unless raptors did not disturb them. It would be important to manage the area to keep it suitable for LWfG by adding water to the system in order to maintain good feeding and drinking places for LWfG. In this area a herd of cattle is grazing to keep grass short. Until now, the place is not overgrown with bushes. Obviously, one important task in this place is to maintain suitable environmental conditions for geese.

Other feeding places

LWfG usually feed in the grasslands situated only 2-3 km northwards and westwards from the fishponds. In the autumn they prefer fresh wheat lands and maize stubble fields, although wheat fields are preferred also in spring. Such areas are not permanent, because farmers change them annually. Single-species groups and flocks of LWfG do not move to agricultural landscapes, but do so only in mixed flocks with Greylag and White-fronted Geese. In

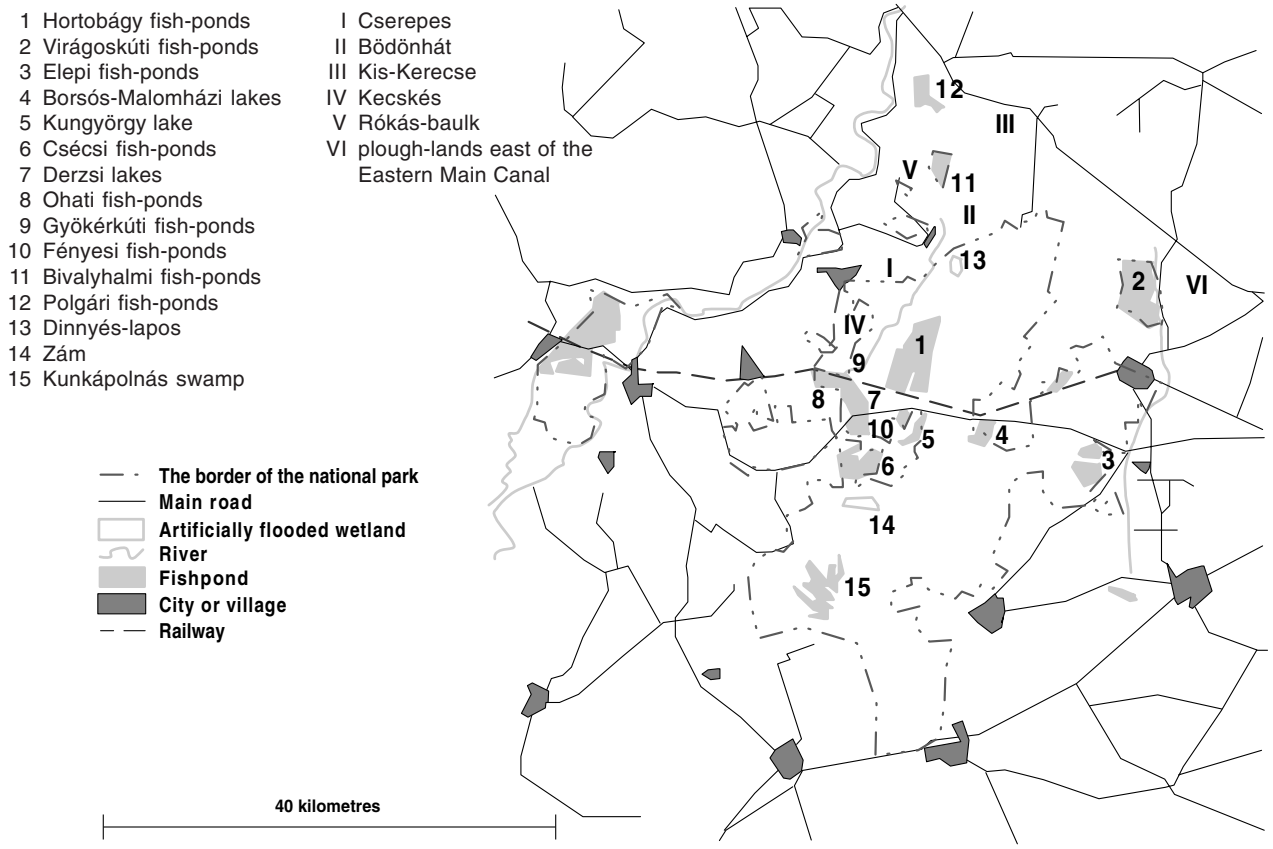

Figure 1. Map of the roosting and feeding sites of the Lesser White-fronted Geese in the Hortobágy area, Hungary.

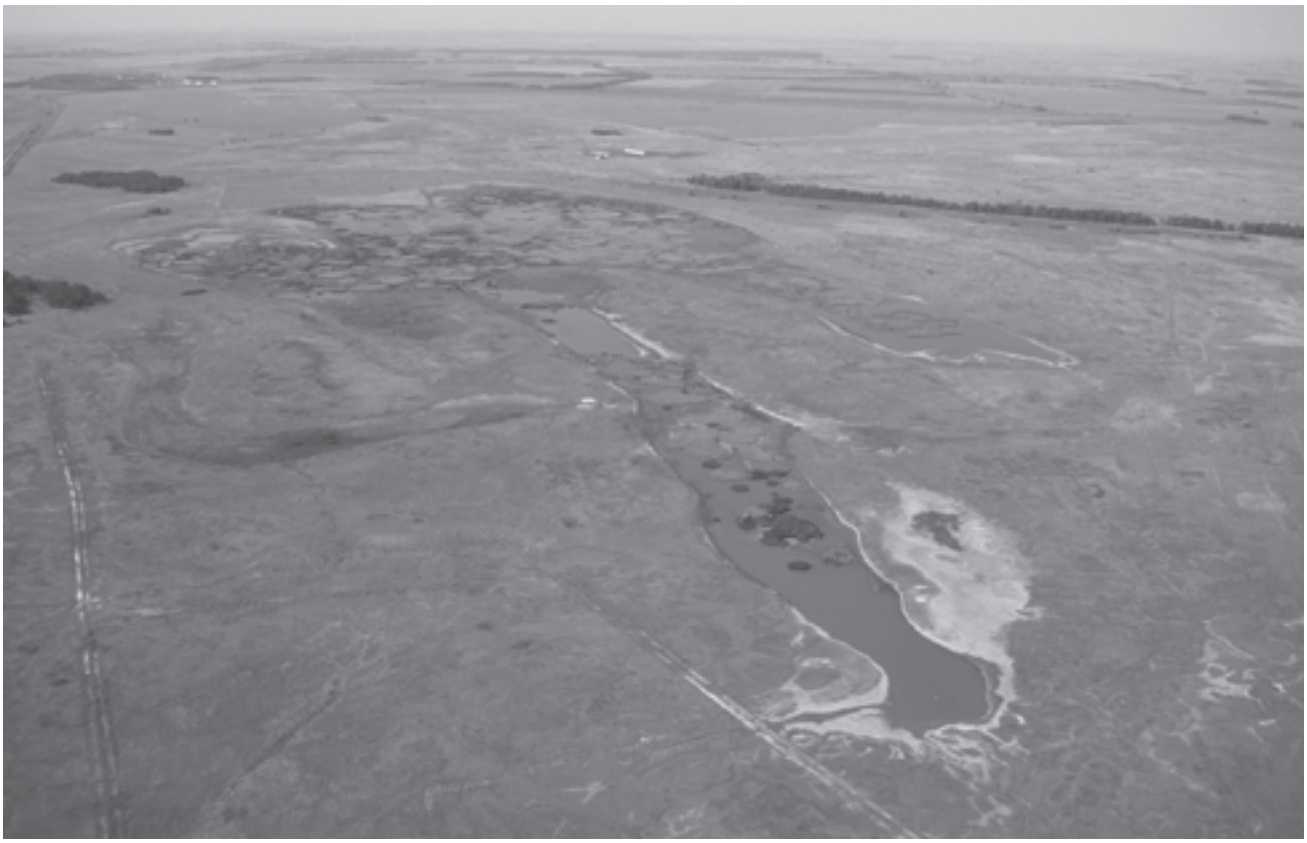

Photo. Aerial view of Dinnyés-lapos, the most important feeding place of Lesser White-fronted Geese in the Hortobágy National Park, Hungary. © Janos Tar

such cases shooting or poisoning could be possible threats, although we do not know any such incidents. It would be favourable to sow corn for geese.

5. LWfG surveys in other parts of the country

In addition to Hortobágy area, there are also some records of LWfG in other areas from the last two years. Usually the same birds are observed in several subsequent days. LWfG (except in Hortobágy) occur mixed among White-fronted or Bean Geese flocks.

Biharugra fishponds: One adult LWfG was observed in mid–January in 2001. There are six more records of 1-4 adult individuals from the period 3–17 March in 2002.

Lake Ferto: There are 15 records of 1-5 individuals (mostly adults) from 2001- 2002 between the end of December and mid-March. In recent years the number of White-fronted Geese has been increasing, which could be one of the reasons for increasing number of LWfG records. Some years ago there were less than 1000 White-fronted Geese present in this area.

Lake Tatai Öreg: 2 ind. (one ad and one juv) on 28 November 2002.

Dinnyési-ferto: 3 ad on 6 November 2002.

Natron lakes in Kiskunság: four records from 2001–2002 of 1-2 ind. in a time (both adult and 1st cy-birds); three records from November and one from March.

6. Future tasks for more effective protection of LWfG in Hungary

We consider the following actions as highest priority in the LWfG conservation work in Hungary in the near future:

– Habitat preservation: achieving ideal conditions for staging LWfG on migration by organising the flood of water or grazing areas, if needed. Ensuring optimal water level for geese in the fishponds is needed

– Monitoring carried out continuously all over the Hortobágy several times in a week with extra attention to the traditional places and with the same effort on other, suitable sites depending on the movements of geese

– The observed birds should be aged and colour-rings should be recorded

– Hunting control with extra attention to places visited by LWfG

– Public information about the status and threats of the LWfG

– Obtain information from other important goose congregatory areas in Hungary

7. Acknowledgements

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Inventories and catching attempts of Lesser White-fronted Geese *Anser erythropus* at Lake Kulykol, Kazakstan, in 2002 and 2003

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1. Introduction

The world population of Lesser White-fronted Geese (*Anser erythropus*, subsequently referred to as LWfG) has declined dramatically since the 1950's, and the species is at present considered as globally threatened. Studies at staging and breeding places in Fennoscandia, as well as migration studies by use of satellite transmitters have shown that the most important reasons for the population decline are found along the migration route and in the wintering areas, such as heavy hunting pressure and loss of feeding habitats. The main wintering areas are probably close to the Caspian and Black Seas, and at least formerly the majority was found in Azerbaijan in mid-winter (Lorentsen et al. 1999). Today the ultimate wintering areas of the majority of the LWfG following the Western Palearctic flyway are unknown. The most important stopover sites for LWfG following the eastern route on the Western Palearctic flyway on the way to the wintering areas are located in the northern part of Kazakstan. Here, Lake Kulykol (51°20'N 61°50'E; Figure 1) is at present the most important roosting lake for LWfG during autumn staging. Inventories of geese in the lake have been carried out during several years in the beginning of October (e.g. Tolvanen et al. 2000, Yerokhov et al. 2000).

Photo. Net being prepared for catching at the mudflats on Lake Kulykol in 2002. © Petteri Tolvanen, September 2002

In the periods of 29 September - 16 October 2002 and 23 September - 10 October 2003, inventories and catching attempts were carried out. The main aims were:

1) To catch LWfG in order to attach satellite transmitters for mapping of the migration route to the still mainly unknown wintering areas of the western (Caspian/Black Sea) flyway population

2) Monitor staging numbers of LWfG and other goose species;

3) Collect information on how different goose species distribute on the lake

2. Methods

In 2002 we tried various methods for catching; a passive trap (10x10x2m) in shallow water, clap-net, whoosh-net, mist nets (11 x 30 feet) and snares. Along with these methods, we also used combinations of sound (LWfG calls) and goose dummies painted like LWfG. In 2003 we used two small cannon nets (12 x 6m) at the mid-day sleeping places of the LWfG.

The methods for counting geese and estimating species and age composition followed the field instructions published by 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. Data on species and age ratios were collected during daytime in random samples from the flocks returning back to the lake for resting and drinking. Only estimated numbers without confidence estimates are given. The latter requires specific simulations since individuals of the different species and age groups are not randomly distributed in the samples (own unpublished data).

Table 1. Total numbers and flight directions of geese during mornings in Lake Kulykol in autumn 2002. * = Number for both directions E and C. See map (Figure 4) for directions.

Date	E Southeast	C Southwest	B West	A North	Total	Locality
29.09.02	* 37,355			5,400	42,800	Camp first
30.09.02	* 41,426		5,500	5,500	52,500	Camp main
02.10.02	23,546	12,240			35,800	Camp main
03.10.02	20,610	28,000			48,600	Camp main
06.10.02	13,000	36,200			49,200	Camp main
09.10.02	2,570	34,120	6,680	43,500	Camp main	

Figure 1.The location of Lake Kulykol in northern Kazakstan.

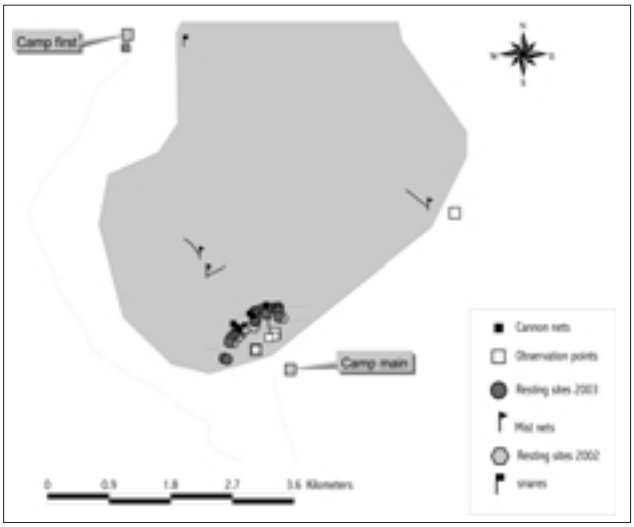

Figure 2. The catching and observation points in 2002 and 2003 in the southern bay of Lake Kulykol, Kazakstan.

Table 2. Proportion of different goose species in random samples at Lake Kulykol in autumn 2002, based on random sample data. See map (Figure 4) for directions.

Date	Sample direction	no of ind. Sampled	A. albifrons %	A. erythropus %	A. anser %	B. ruficollis %
29.09.02	C	1,230	65.5	9.8	21.1	3.5
30.09.02	A	150	0.0	2.7	83.3	14.0
02.10.02	A	1,170	3.0	1.6	95.4	0.0
11.10.02		150	8.7	10.0	78.7	2.7
Total		3,160				

For results of earlier surveys within the framework of NOF and WWF Finland in the Kustanay region, see Tolvanen & Pynnönen (1998), Markkola et al. (1998) and Tolvanen et al. (1999, 2000, 2001).

3. Results

3.1. Catching 2002

Various methods for catching LWfG were applied during the period from 29 September until the work commenced on 12 October due to heavy snowfall and windy conditions. Three Grey Plovers (*Pluvialis squatarola)*, one Dunlin (*Calidris alpina)*, one Great Crested Grebe (*Podiceps cristatus)*, one Pochard (*Aythya ferina)*, and one Teal (*Anas crecca)* were caught with the mist nets and snares, but unfortunately no LWfG. One adult LWfG got stuck in one of the snares, but was eventually able to escape. Only one goose was caught: an adult Greylag Goose (*Anser anser)* on 10 October in one of the mist-nets (it was ringed with a Moscow stainless steel ring). The various locations in Lake Kulykol are given in Figure 2.

3.2. Catching 2003

Daytime on 24 and 25 September was used to collect data on species and numbers, as well as doing observations on where the LWfG were resting during daytime. In the evening on 25 September the first cannon net (Figure 2) was mounted on the shoreline. The second net was mounted on the mudflat in the evening of 27 September. Due to very nice and warm weather, the water level was decreasing and net No. 1 was moved further out on the mudflat in the evening on 30 September, then again on 4 and lastly on 5 October (see Figure 2 for position of nets). The nets were always moved in the evening when the lake was empty of geese (see section 3.7 behaviour). Net No 2 was also moved in the evening on 5 October. The changing water level was a problem since we never were able to locate the nets in the optimal areas at the correspondingly changing roosting places. Another problem turned up by surprise: the electrical wires to launch the cannon nets were partly cut on several occasions. This was probably the work of Red Foxes (*Vulpes vulpes*) or Wolves (*Canis lupus*). Unfortunately, no geese were caught during the whole catching period and we dismounted the cannon nets in the evening on 9 October.

The unsuccessful catching attempt can partly be explained with the relative small amount of LWfG staging at the lake. Also, quite few LWfG were roosting on the mudflats. The highest number was observed on the first day, when 870 LWfG were resting on the mudflat. Unfortunately, this situation did not last and it soon became evident that the catching operation would be a very difficult task since very few LWfG visited the mudflats during daytime (Figure 3).

3.3. Species counts in 2002

The total amount of geese was counted during the morning flight. The first count was conducted from "Camp first", while the other morning flight counts were conducted from "Camp main" (Figure 2). The total counts varied between 35,800 and 52,500 geese (Table 1).

Species proportions and age ratios were sampled on five days between 29 September and 9 October, and it turned out that the species proportion changed markedly between days and flight directions (Table 2). It seemed that the majority of LWfG and White-fronted Geese (*Anser albifrons*) left in direction C and B, while Greylag Geese mainly flew southeast - in direction E (Figure 4). At one occasion , c. 1,000 LWfG were seen returning during midday from north. Unfortunately, we do not have sufficient data to be able to analyse the species specific flight directions further. Given the species proportions we sampled, the estimates of the number of each species are very crude and partly based on impressions from the field: LWfG: 5,000, White-fronted Goose 14,000, Greylag Goose 27,000 and Red-breasted Goose (*Branta ruficollis*) 6,000 individuals.

The highest direct count of LWfG resting on the mud bank in the southern part of the lake was 1,050 individuals. Similarly the

Table 3. Total numbers and flight directions of geese during mornings in Lake Kulykol in autumn 2003. All the mornings from 3 to 7 October were too foggy for conducting counts.

Date	C Southwest	B West	A Northwest	E Southeast	D South	Total	Comment	Locality
24.09.03	17010	2240	4196	0	0	23500		Camp first
26.09.03	7830	2875	16015	1030	0	27750		Camp first
28.09.03	-	-	-	-	-	>10000	Incomplete, foggy	Camp first
29.09.03	7260	1060	6830	0	660	15750		Camp first
01.10.03	6850	1990	12680	880	0	22400		Camp first
08.10.03	7235	3235	5480	-	-	15950		Camp first

Table 4. Proportion of different goose species in random samples at Lake Kulykol in autumn 2002, based on random sample data. See map (Figure 2) for directions.

Date	no ind. Sampled	A. albifrons %	A. erythropus %	A. anser %	B. ruficollis %	T. ferruginea %
25.09.03	249	4.0	2.8	72.7	20.5	0
28.09.03	484	11.2	2.8	23.8	56.2	5.9
30.09.03	1378	63.1	4.1	16.9	14.4	1.5

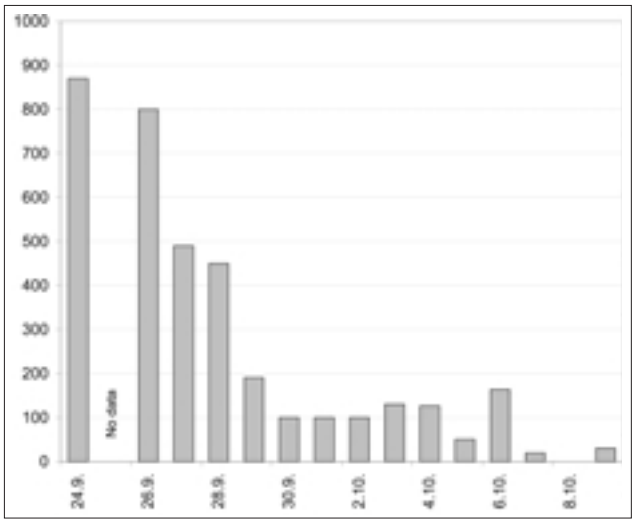

Figure 3. Numbers of LWfG resting on the shore in the southern part of Lake Kulykol in 2003 (see figure 2 for localities).

highest direct count of Ruddy Shelducks (*Tadorna ferruginea)* was 4,500 individuals.

The total number of geese (approximately 52,000) was 30% higher in 2002 than in October 2000 when 40,300 geese were counted, but markedly lower than in October 1999 when 86,000 geese were roosting on the lake. It constitutes only a small fraction as compared with October 1998, when 160,000 geese were present (cf. Tolvanen et al. 2001). This huge difference could be due to variation in the timing of migration, but it is also likely that the considerable variation in water level have influence on the fluctuations. In 2002 the water level in Lake Kulykol was relatively low, but still sufficient for the geese to utilise it as a roosting lake. Concerning the timing of migration we have no data for 2002, but in 2000, local hunters informed that the mass migration of geese had already passed when the survey was carried out between 3-7 October (cf. Tolvanen et al. 2001).

One Tundra Bean Goose (*Anser fabalis serrirostris)* was seen on 2 October, and a pair of Taiga – type Bean Geese was seen on 11 October.

3.4. Species counts in 2003

The total amount of geese was counted during the morning flight. All counts were conducted from "camp first" (Figure 2). The total counts varied between 15,750 and 27,750 geese (Table 3). Species proportions and age ratios were sampled on three different days between 25 and 30 September, and also this year, the species proportion changed markedly between days and directions (Table 4).

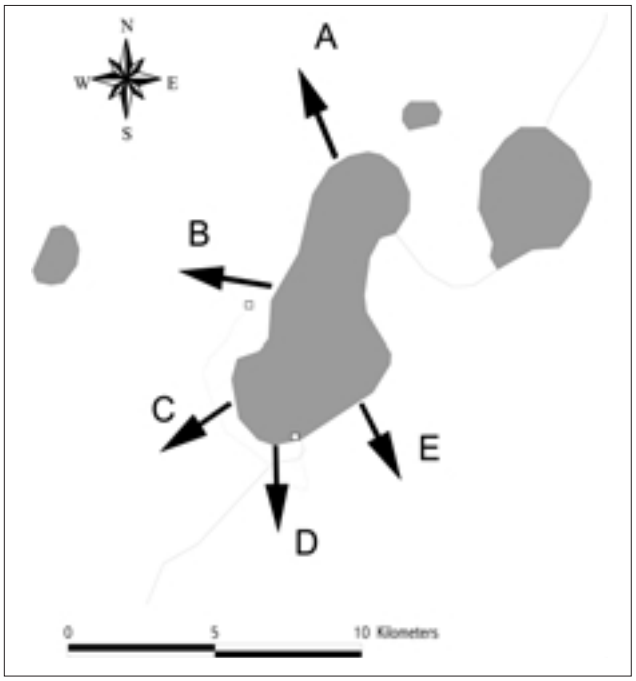

Figure 4. Flight directions of geese at Lake Kulykol, Kazakstan in September – October in 2002 and 2003.

This was partly because different species left in different proportions in the various flight directions, but it was also an effect of active long distance migration to and from the area. On 29 September we counted only 16,000 geese in the morning and also the lake seemed very calm with little noise from the resting geese as compared to earlier days. Also the species proportion changed markedly. Our data are not sufficient for a detailed elucidation of the migration, but it seemed like very many Red-breasted Geese and Greylag Geese left the area around 28 and 29 September. Also the number of LWfG decreased steadily (see Figure 4). During daytime when the geese normally would leave to the feeding areas, huge number of White-fronted Geese arrived, having a behaviour typical for arriving migrants. They arrived with much noise from high altitude and, as soon as they landed on the lake, they immediately started preening and sleeping. The species proportion data supported this assumption, showing an increase in White-fronted Geese from 4 % on the first day of fieldwork to 63 % on 30 September.

Concerning the flight directions to and from the feeding areas it seemed that the majority of the LWfG and White-fronted Geese (*Anser albifrons*) left in direction A and B, while the Greylag Geese mainly flew southwest (in direction A) and west (direction C) (Figure 5). Unfortunately, we have insufficient data for any further analyses. According to the species proportions that we have

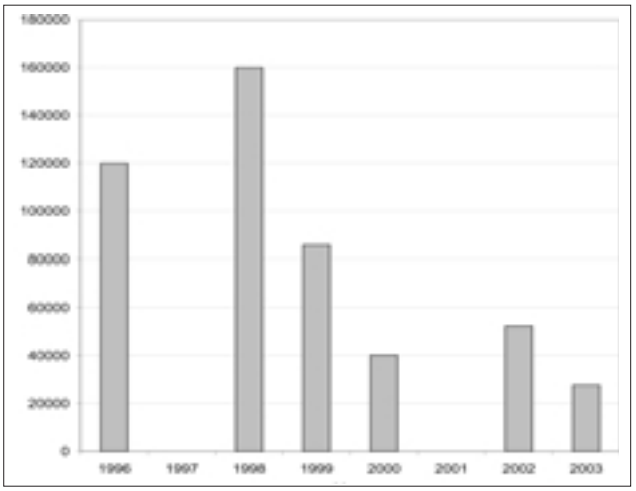

Figure 5. Maximum numbers of geese at Lake Kulykol in the years 1996-2003, counted through the Fennoscandian LWfG Conservation Project.

sampled, the estimates of the daily maximum number of each species are very crude and partly based on the subjective impressions from the field: LWfG 900, White-fronted Goose 14,100, Greylag Goose 6,600, Red-breasted Goose 15,600 and Ruddy Shelduck 1,600 individuals.

The highest direct count of LWfG resting on the mud bank in the southern part of the lake was 870 individuals. Similarly, the highest direct count of Ruddy Shelducks was 920 individuals.

In autumn 2003, we counted the lowest number of geese since the Fennoscandian LWfG conservation project started to work in the Kustanay area in autumn 1996. The highest count of geese in 2003 (c. 27,750) was 47 % lower than in 2002, and considerably lower than in all earlier years (cf. Tolvanen et al. 2001, Figure 3). This huge difference could be due to variation in the timing of migration, but it is most likely also an effect of the extensive variation in water level at the lake. In 2003, the water level at Lake Kulykol was very low and nearly insufficient for the geese to utilise it as a roosting lake.

3.5. Breeding success of LWfG and White-fronted Goose 2002–2003

Brood sizes were estimated by actively searching for flying LWfG where all birds observed simultaneously could be correctly aged. However, few LWfG flew close enough in the return flights from the field, so 95% of the observed samples were taken when the geese left (flew and walked) for the mud bank on the southern shore of Lake Kulykol to rest during midday (Figure 2). Mean brood sizes were 3.3 (sd=1.2, n=66) and 3.1 immatures / pair (sd=1.3, n=87) in 2002 and 2003 respectively. The mean brood size of White-fronted Geese (later referred to as WfG) in 2003 was exactly the same, 3.1 immatures / pair (sd=1.48, n=154).

The age ratio samples in 2002 comprised 148 adults and 120 juveniles, implying a juvenile ratio of 44.8% in the population at this stage of the annual cycle. In 2003, a total of 278 adults and 149 juveniles were sampled (juvenile ratio of 34.9%), e.g. the juvenile proportion was 21% lower in 2003 than in the year before. The age ratio in the same lake in 2000 was only 27.0% (Tolvanen et al. 2001).

In 2003 we also collected a larger sample on the age ratio and mean brood size in the WfG. The mean brood sizes were similar for the two species, but the juvenile proportion of WfG was only 26.1% (561 adults and 198 juveniles), e.g. 25% lower than for the LWfG. This shows that a higher proportion of the breeding pairs of LWfG succeeded compared with the WfG.

3.6. Observation of colour ringed LWfG

Observations of colour ringed LWfG are extremely rare for the birds migrating on the eastern side of the Ural Mountains. The first observation from Lake Kulykol was made in 2002, when a LWfG with colour leg rings was seen on 2 October at 12:10 p.m. on the shore in a flock of approximately 700 LWfG. The colour ring code was Orange-Green (left leg, read from above). The flock was scared away after half an hour, but at 13:40 p.m. it was seen again in the same area, although the flock had increased to 1050 LWfG. This individual was a 2 cy bird caught together with four other 2 cy LWfG by cannon net at the Valdak Marshes in northern Norway (Aarvak & Øien 2004, pp 19-24 in this report).

In 2003, a LWfG with a green neckband with white letters was seen on 25 September, but the observation conditions were very unfavourable. During mid day there was very much heat dissipation making even identification of goose species difficult. Only during the last hours of the day the observation conditions were good. On 15 October at 14:15 p.m. another (possibly the same bird?) neck banded LWfG was found together with a female and three goslings. It was followed continuously until the observation conditions were good enough for actually reading the numbers on the neckband. The neckband was also seen and read on the next day 16 October. This LWfG was ringed as an adult female at the Yamal Peninsula, northern Russia on 22 June in 1996 (K. Litvin pers. comm.).

3.7. Behaviour

The first observed copulation (to our knowledge) by LWfG during autumn and winter was seen at Lake Kulykol on 2 October, 11:20 a.m. in 2002. The pair was lying on the water in a flock consisting of 200-300 LWfG, 1000 Red-breasted Geese and 1000 Greylag Geese. The behaviour was similar to that observed at the Valdak Marshes in the Porsangen Fjord area, Norway, during

Photo. A flock of Red-breasted and Greylag Geese in flight at Lake Kulykol, north-western Kazakstan. © Petteri Tolvanen, October 2002

spring staging (Øien & Aarvak 1991, Bangjord & Broen 1990). They initiated the copulation with 15-20 seconds of head dipping in the water before the copulation took place. The latter lasted only 4-5 seconds. Afterwards they remained in the water spending some time preening.

Lake Kulykol is one of the very few lakes in the whole distribution range of the species where LWfG can be seen resting in good numbers on the shore. Normally the LWfG will be the first geese to enter the shore and lay down to rest during early afternoon. After some 50-100 LWfG have lain down, the first Red-breasted Geese will join them, followed by more LWfG, Ruddy Shelducks and some WfG. The last species to enter the resting flock will be Greylag Geese. The arrival order of geese to the shore is not easy to explain, but it possibly hints to the often-claimed fact that LWfG are more curious and confident than e.g. Greylag Geese, thereby making them more vulnerable to predation and not the least, hunting.

The diurnal rhythm of geese at the lake is illustrated with the observations made on 1 October. The first geese left the lake at 07:10 (a total of 22,400 individuals was counted this morning), when it was still almost completely dark. Already at 08:30, the whole morning flight was finished. At this time the daylight had also arrived. Some geese always stayed at the lake. Around noon the first geese started to arrive from the feeding areas, and at 15:00 most of them had arrived. Then, depending on the migratory activity (arriving geese), it was quite steady until 17:00 when the geese again left for the feeding areas. At 18:30 there were only few hundred geese left. The geese then stayed in the feeding areas until dawn, around 20:30, before they returned to the lake.

4. Discussion

Since the most important objective of the fieldwork in Lake Kulykol was to catch LWfG, the work both in 2002 and 2003 must be categorised as less successful. The lack of success was an effect of various factors. The number of geese at the lake was very low thereby decreasing the chance of a successful catch, and the changing water level also made it difficult to predict the roosting sites.

Valuable results were however the information gathered on the age distribution, indicating a good breeding season in 2003 for the LWfG which was evident in the large brood size and high proportion of juveniles in the age ratio samples. In 2003 we also collected data on productivity of White-fronted Geese, showing that even when the brood size was similar, the number of non-breeders and unsuccessful breeders were higher among the White-fronted Geese, e.g. the production was higher for the LWfG than the White-fronted Goose.

Also, the observation of the colour neck banded adult LWfG (ringed at the Yamal Peninsula, Russia, in 1996) and the observation of the colour ringed 2nd calendar-year LWfG from Norway in 2002 was very valuable, since these provide direct evidence that the LWfG from the Fennoscandian population and the west Siberian population mix during autumn.

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Conservation work for the wetlands in Kustanay region, north-western Kazakstan, in 2001–2003

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1. Background

As a result of international research (e.g. Tolvanen & Pynnönen 1998, Markkola et al. 1998, Tolvanen et al. 1999, Tolvanen et al. 2000, Tolvanen et al. 2001), the wetlands of Kustanay region in north-western Kazakhstan have been proved to be extremely important as a staging area for two globally threatened goose species: Lesser White-fronted Goose (*Anser erythropus*, subsequently referred to as LWfG) and Red-breasted Goose (*Branta ruficollis,* subsequently referred to as RbG). Hundreds of thousands of arctic geese pass through the area during the migration. In autumn, the arctic geese, i.e. White-fronted Geese (*Anser albifrons*), RbG and LWfG, stage in the area for several weeks from late September to late October. Adequate protection and hunting control at these sites is of vital importance for both of these species.

The recent estimate of the world population of LWfG is 22,000–27,000 individuals (Wetlands International 2002). The world population is divided to western and eastern flyway populations, with a geographic divide approximately in the eastern part of the Taimyr Peninsula in Siberia. The western flyway population (8, 000–13, 000 individuals) breeds in the forest tundra zone of Russia, west of eastern Taimyr Peninsula, and migrates mainly via north-western Kazakhstan to the still mainly unknown wintering sites in the Caspian and Black Sea area. The Kustanay region wetlands are the most important stop-over area of this LWfG flyway population. A minor part, apparently not more than a few hundreds of individuals, of the western flyway population migrate via eastern Central Europe and Hungary to Greece and Turkey for winter. The highly endangered Fennoscandian sub-population of LWfG presently numbers only 30–50 breeding pairs in the Nordic countries, and shows genetic evidence of being a distinct conservation unit within the western main population. Approximately half of the Fennoscandian population follows the westernmost migration route, while another half of the population follows the main flyway of the western population and stages in Kustanay region during the migration. E.g. in September 2002, a LWfG colour-ringed in Norway in May 2002 was observed at Lake Kulykol in Kustanay region. (see Aarvak et al 2004, pp 36–40 in this report)

The final goal for the LWfG conservation work is the recovery of all sub-populations to a sustainable level. As the migration route from the breeding grounds to the staging area in Kustanay region is already mainly revealed, one of the main challenges of the conservation work is to reveal the migration route and staging sites south from the Kustanay region. Thus, ringing and satellite tracking projects to localise these sites, and subsequently efforts to implement conservation measures there, have the highest priority in the LWfG conservation work at the moment. At the same time, it is equally urgent and important to establish a network of well-managed protected wetland areas of international conservation status in the known migration stop-over sites, especially in the Kustanay region.

The RbG is another globally threatened arctic goose species, for which the Kustanay region wetlands are of vital importance

Photo. The governor of the Kustanay region hosted the international seminar on conservation of the Kustanay region wetlands, organised by the project in Kustanay in October 2002. © Jari Peltomäki

as a migration stopover area. The world population of RbG is estimated at 88,000 birds (Wetlands International 2002), i.e. almost ten times more than the western flyway population of LWfG. Virtually the whole world RbG population migrates through north-western Kazakhstan. In winter, the RbG population is very concentrated at less than ten locations on the Black Sea coast. RbG was formerly thought to be much rarer, but recent counts suggest that this was mainly due to underestimation . In the 1960's RbG showed a redistribution in wintering area from the Caspian to the Black Sea coast.

Successful conservation work on RbG is essentially easier as compared to the conservation of LWfG, because the wintering sites of RbG are known, and management plans are being produced for the most important sites. The RbG is also easy to recognise from other goose species, and thus the species protection and awareness campaigns for hunters are much more effective than is the case with LWfG. Current threats to RbG include loss of breeding habitat through oil exploration, agricultural changes in wintering areas, and also hunting at the main roost sites in Bulgaria. Many birds are still being shot there by tourist hunters from other European countries.

2. WWF Kustanay project in 2001–2003

In 1999, WWF Sweden launched a project to establish a network of wetland protection areas in north-western Kazakstan (see Bragina 2000), and in 2000 WWF Finland, supported by the Finnish Ministry of Foreign Affairs, joined the project. The WWF Kustanay project is aiming to provide scientifically justified recommendations on planning, creation, and improvement of the network of the protected areas. In addition, the project aims to promote ecotourism as a sustainable alternative for the hunting tourism in the area. The ecotourism business is still new in Kazakstan, and it has been concentrated mostly to the southern parts of the country. However, the wetlands, steppes and primeval Pine forests of the Kustanay region offer an attractive supplement for Kazakstan birding trips. The concrete aim of the WWF Kustanay project is to produce a well justified account of the possibilities and infrastructure for birding in the area, including detailed and up-to-date species lists and suggestions for possible routes. The current WWF Kustanay project expired by June 2003.

The list of the important wetlands of Kustanay and North Kazakstan 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. the lakes Kulykol, Ayke, Zharsor-Urkash, Small and Big Sankebai, Sarykopa, Aksuat and other Naurzum wetlands, Kushmurun, Koybagar, Tyuntyugur–Zhanshura–Biesoygan, Bozshakol, Neklyudovo, Shoshkaly, Teniz-Karakamys, Kamyshovoye–Zhamankol, Sultan–Aksuat group of lakes, Zhaltyr–Zharken group of lakes, Maybalyk group of lakes, and Lebyazhye (Kamyshovye) (cf. Bragina & Bragin 2002, Kovshar 2000, Tolvanen & Pynnönen 1998, Markkola et al. 1998, Tolvanen et al. 1999, Tolvanen et al. 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 critically endangered Siberian White Crane (*Grus leucogeranus)* has staging sites in the Naurzum Nature Reserve and at the Zharsor-Urkash lakes.

In October 2002, the WWF Kustanay project organised an international seminar on conservation of the Kustanay region wetlands, in co-operation with the Ministry of Environmental Conservation of Kazakhstan, Forest Committee of the Ministry of Agriculture of Kazakhstan, the government and nature conservation authorities of the Kustanay Oblast, the Institute of Zoology of Ministry of Education and Academy of Science of Kazakhstan, and the University of Kustanay. The seminar was attended by nature conservation experts from Kazakhstan, Russia, Finland, and Great Britain.

Photo. The project manager Tatyana Bragina presenting the report "The most important wetlands of North Kazakhstan: Kostanai Oblast and west part of North-Kazakhstan Oblast", published in the project seminarin October 2002. © Jari Peltomäki

Based on the results of the WWF Kustanay project, the seminar emphasised the global importance of these wetlands in an official resolution paper that was signed by all participating organisations, including the Governor of Kustanay Oblast, Ministry of Environmental Conservation of Kazakhstan, Forest Committee of the Ministry of Agriculture of Kazakhstan, Interregional Commission on Sustainable Development / National Ecological Centre (ICSD-NEC), Institute of Zoology of the Ministry of Education / Academy of Sciences of the Republic of Kazakhstan, Kustanay Oblast department for forest and biological resources, Kustanay State University, WWF, International Crane Foundation (ICF), NGO Naurzum, and the Association of NGOs of Kustanay Oblast. The seminar resolution emphasises the necessity to urge the process of the Republic of Kazakhstan joining the Ramsar Convention on Wetlands and Convention on Migratory species (CMS - Bonn convention). The resolution also puts forward a proposal to include the Kustanay region wetlands in the Ramsar List of Wetlands of International Importance. The seminar recommended to include the ecological needs of wetlands to the water management plans of the region, and stressed the need to develop sustainable use of the wetlands and natural resources in the region, along with the adequate conservation status of most vulnerable and valuable areas for the benefit of nature and local people. After the seminar, the resolution

document was handed to Ministry of Environment Conservation, Forest and Hunting Committee, local government of the Kustanay Oblast, and other stakeholders involved.

A report presenting the main results of the WWF Kustanay project and the conservation values of the key wetland areas of the project area, including maps and detailed descriptions of the project sites (Bragina & Bragin 2002), was published in the seminar, as well as an annotated check-list booklet of the fauna of the Naurzum Nature Reserve (Bragin & Bragina 2002).

Other major achievements of the WWF Kustanay project include:

– the Naurzum Nature Reserve expanded by 103.000 hectares of steppes and wetlands

– incorporation of the Lake Sarykopa as a zakaznik (nature reserve) under the administration of the Naurzum Nature Reserve

– preparation of the necessary documents to initiate the establishment of a new protected area, the Zharsor-Urkash Crane zakaznik (sanctuary), have been prepared and sent to the government

– the WWF project team initiated the nomination of the Naurzum zapovednik as a part of the UNESCO World Heritage site 'Steppe and Lakes of North Kazakstan' (including the Naurzum and Kurgaldzhinskiy Nature Reserves); the WWF project has worked with IUCN and other stakeholders towards the nomination; in February 2003 the initiative was included in a letter from the Goverment of Kazakstan to UNESCO, and discussed in the Goverment of Kazakstan in June 2003

– spring hunting of geese and waterfowl was forbidden in Kustanay region for the spring 2003 by the decision of the Department for forestry and game management of the Kustanay Oblast

– work with the NGO "Kustanay Tourist Association" and other stakeholders towards developing ecological tourism in the project area

3. Future conservation work in the project area

A large GEF (Global Environment Facility) / UNEP project is currently being formulated involving four countries (Kazakhstan, Russia, Iran and China) under the co-ordination of the International Crane Foundation (ICF), aiming to conserve a chain of wetland sites of which the Siberian White Crane is dependent , including Lake Kulykol, the Zharsor-Urkash Lakes and the Naurzum lakes in Kustanay region. The Siberian White Crane GEF project will undertake specific interventions to address threats at individual wetlands along the flyway, seeking to secure their ecological integrity for the benefit of the wide range of biodiversity that depends on them. It will also involve wider national activities in support of site conservation and public awareness. The project will have a major international component, improving co-ordination and strengthening capacity for flyway conservation efforts. The site-level activities of the GEF project include strengthening legal protection and enforcement, developing and implementing site management plans, capacity building for site management, environmental education and public awareness programmes and alternative livelihood projects. At national level, the GEF project is aiming to undertake actions to strengthen the national legislative, policy and planning framework for wetland and waterfowl conservation, strengthen capacity for international co-operation, and undertake national activities that support site conservation such as monitoring, training, education and public awareness programmes.

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Distribution of Lesser White-fronted Goose in the Malozemelskaya Tundra in northern Russia

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1. Introduction, methods and study area

Until recently, data on the distribution, numbers and biology of Lesser White-fronted Goose (*Anser erythropus,* subsequently referred to as LWfG) in the Malozemelskaya Tundra in the European Russian Arctic has been poorly known. Our research on LWfG was conducted in the years 1977–2002 in the Malozemelskaya Tundra and in 1996–2000 in the Pechora Delta area (Figure 1).

During these periods, we did not register LWfG during the breeding period in the watershed of the Soima and the Sula rivers, in the Indiga River Basin, in the Pechora Delta or on the Russkij Zavorot Peninsula. In the basins of the Velt and the Neruta rivers (see photos), LWfG were registered in various habitats: hilly dwarf birch shrub–moss–lichen tundra, boggy willow–sedge river floodplain, steep river banks overgrown with herbs and shrubs, and marine coastal marshes. In these habitats, we registered single birds, pairs and small flocks consisting of up to ten birds. The marshes on the sea coast are sites where moulting ducks and geese concentrate. LWfG were observed at these sites until mid-July (mostly flocks of 20–30 individuals).

The breeding biotopes are 25–30 meters steep river banks with herb vegetation, mosses, Willow shrubs (*Salix spp*.) and Dwarf Birch (*Betula nana*), sometimes with large mounds and sand–clay outcrops. The river bottom is usually stony, and on the opposite bank there is often a wide sandy shallow, followed by wet grassland with Willow shrubs (see photo). Usually LWfG nests aggregate in the vicinity to the nests of birds of prey (see photo) (Mineev 1989).

2. Results and discussion

2.1. Productivity and densities

In the Velt River Basin in 2002, LWfG broods were met on 1 July. The average brood size was 5.8 goslings per brood (n=4). In total, we registered 79 LWfG, including goslings and non-breeding birds. In the floodplains of the Velt River we counted altogether 199 LWfG. The density of LWfG in the upper reaches of the river was 4.5 ind./km along the boating route and in the lower reaches respectively 0.6 ind./km. The density of geese in typical tundra habitats in the upper Velt River basin was 0.3 birds/km^2. In early July, in the Barents Sea coastline (the Velt River mouth) geese moved slightly, and in late July and in August there were no birds present (Mineev & Mineev 2002).

In the Neruta River basin in 1999, in a 20-km long part of a floodplain we registered altogether 47 LWfG, resulting in a density of 0.1 birds/km^2.

2.2. Migration of LWfG in the area

It is determine that based on our field observations of the migration of LWfG along the Barents Sea coastline and the Komi Republic, that at least two migration routes exist here. One of them is following the Barents Sea coastline (Figure 2). In spring, the geese following this route are found annually on the Sengey Strait coastline, in the Kolokolkova Bay, and in the lower reaches of the Neruta River. Migrating birds reaching the Kolokolkova Bay turn inland towards the tundra, and continue further along the Neruta River valley to the upper reaches of the river. In the Pe-

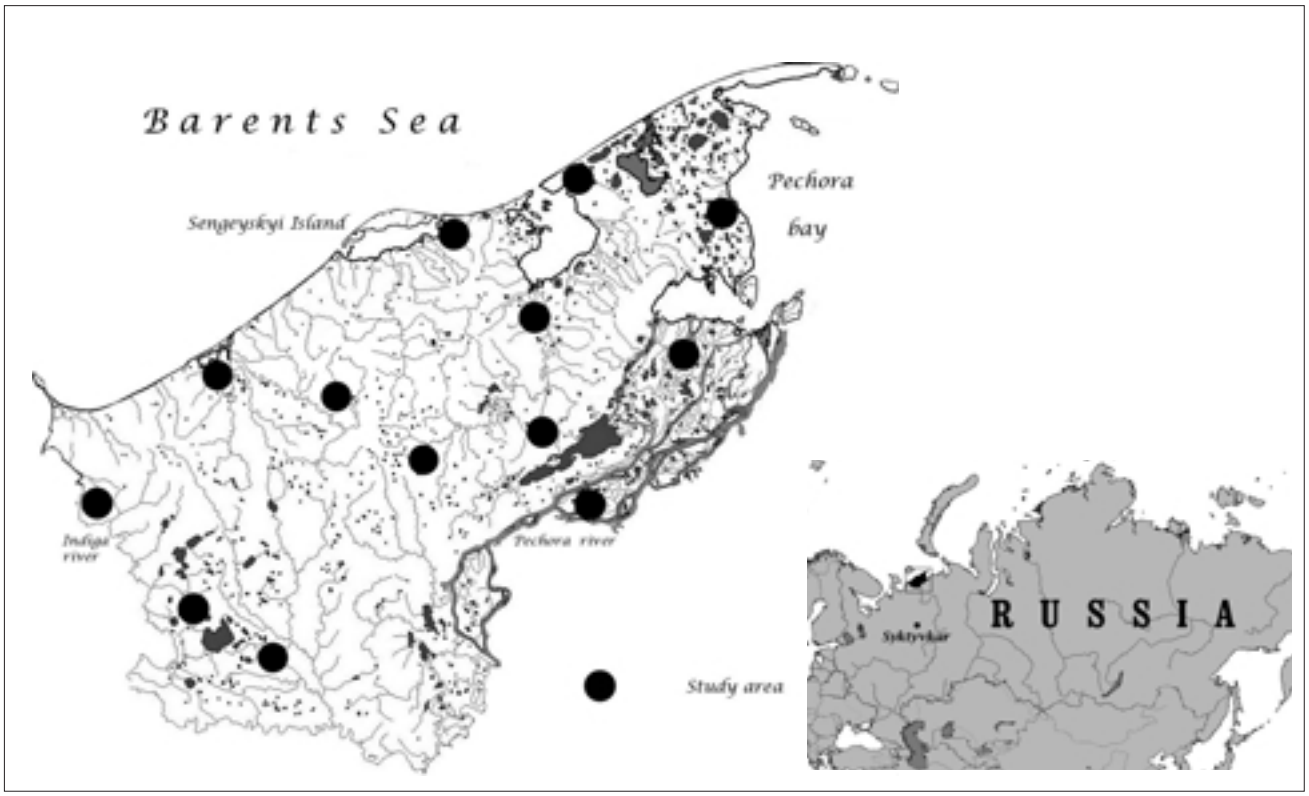

Figure 1. Location of the Malozemelskaya Tundra in European Russia and map of the Malozemelskaya Tundra with study sites.

Photo. A Lesser White-fronted Goose on the nest, that has been built and used in earlier years by a Rough-legged Buzzard. It shows the typical lurk posture on the nest - crooked neck lays on the back of the bird. Headwaters of the More-Yu River, Bolshezemelskaya Tundra. © Yurij N. Mineev, 1974

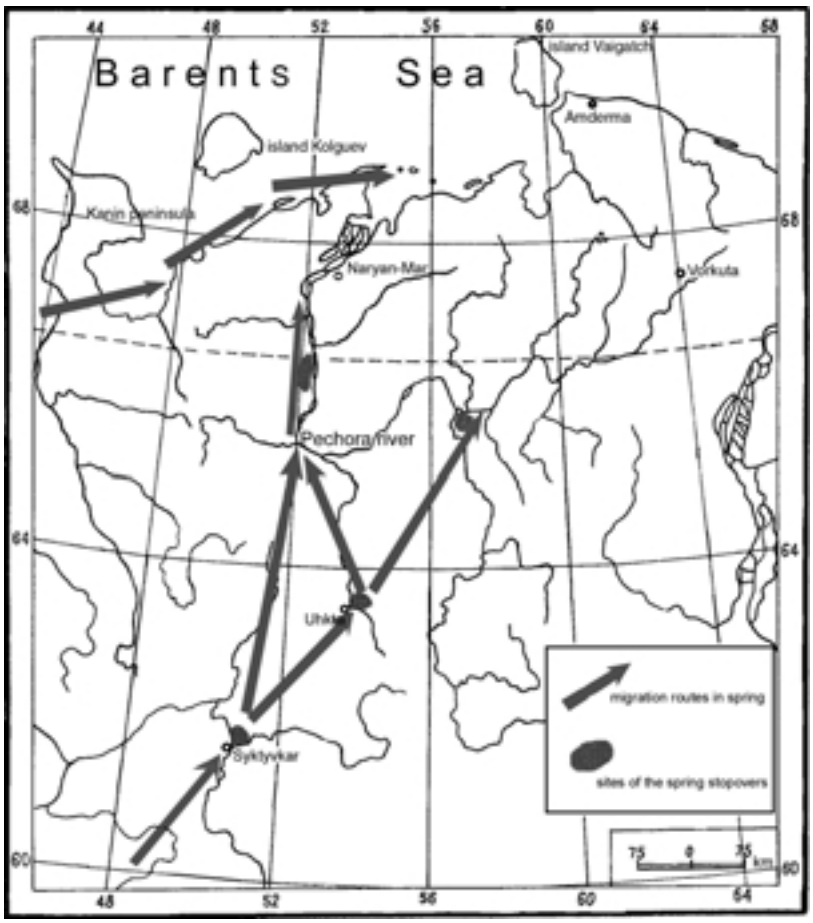

Figure 2. Migration routes of the Lesser White-fronted Goose in the north-east of European Russia.

chora Delta, only very few LWfG were observed during the spring migration. The other migration route of LWfG crosses the Komi Republic (Figure 2), with main spring staging sites in the Sysola River floodplain near Syktyvkar, in the vicinities of the Ukhta Town, on the lower reaches of the Pechora River (the Ust-Tsilma, the Izhma and the Usinsk districts), and at the Pechora Delta and further to the north or northeast. The geese following this route stay on agricultural lands and river valleys.

Our data on autumn migration is inadequate for any conclusions. In September 1995, two LWfG marked by satellite transmitters in Finland and Norway were registered in the Ukhta district (Lorentsen et al. 1998).

2.3. Conclusions

The results of our research allow us to conclude that the most important breeding sites LWfG in

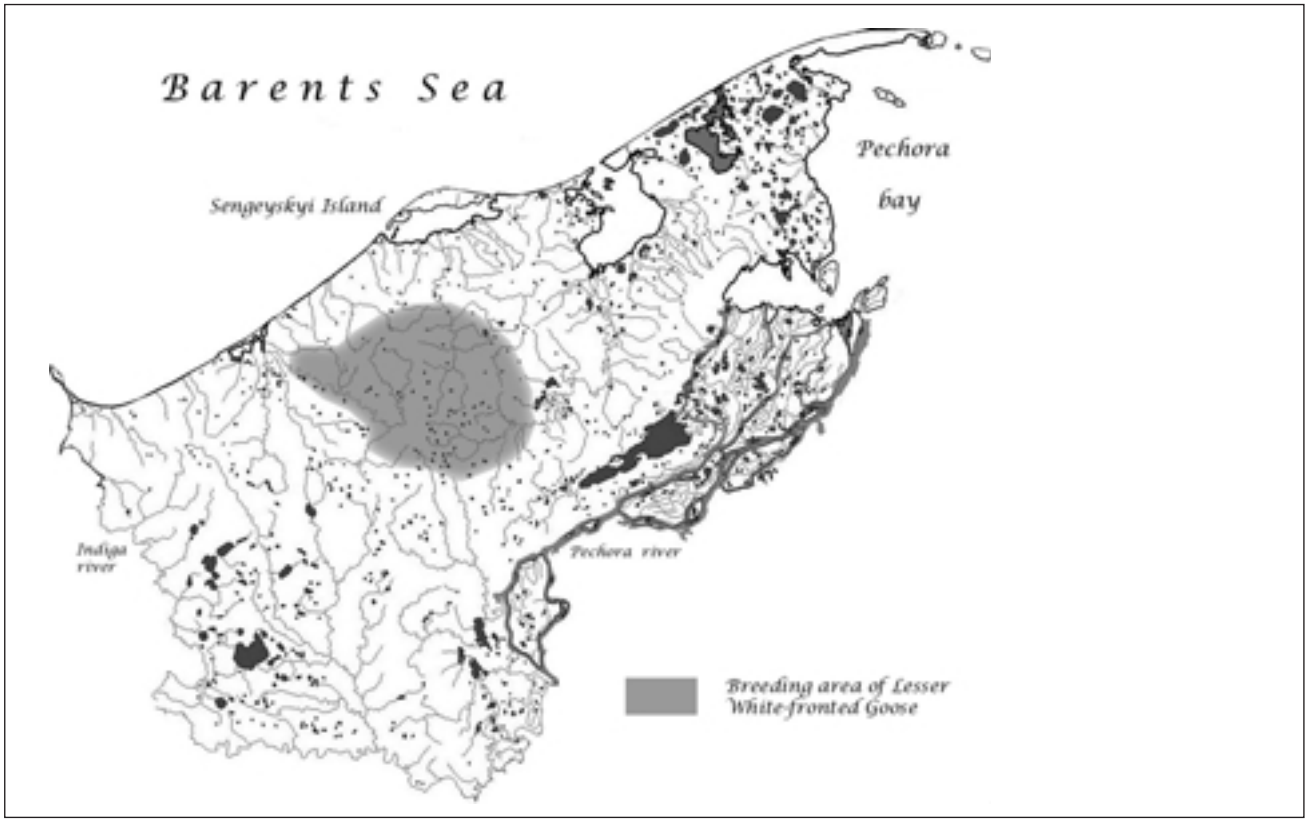

Figure 3. Breeding area of the Lesser White-fronted Goose in the Malozemelskaya Tundra, European Russia.

the Malozemelskaya Tundra are situated in the divide of the Velt and Neruta rivers (Figure 3), which is a low mountain ridge abundant with lakes, brooks and rivers. Altogether, we registered 256 LWfG in the study area. The density of the LWfG population in the Neruta basin was 11.8 ind./km^2, and in the Velt River basin 9.5 ind./km^2. Extrapolating these densities to the entire Malozemelskaya Tundra area this would lead to a rough estimate of about 1,000–1,500 LWfG individuals in the area, which however might be an overestimate.

The number of LWfG breeding in the East-European tundra is decreasing. This is most probably due to the heavy hunting pressure and the deterioration of traditional wintering habitats in the former Soviet Union countries and other countries in the Caspian and Black Sea region. The low population level of LWfG and the specific landscape features of the preferred breeding sites have lead to a patchy distribution of the species. At present, LWfG breed exclusively in optimal habitats in our study area, and most probably the breeding area of LWfG in the East-European tundra has always been patchy.

3. Acknowledgements

The field research in 1999–2000 was supported by OMPO (Migratory birds of Western Palearctic, France).

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Photo. The Velt River Valley. © Oleg Yu. Mineev

Survey of wintering Lesser White-fronted Geese in Crimea, Ukraine in 2002

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1. Introduction

Little has been known about the migration and wintering of Lesser White-fronted Goose (*Anser erythropus*, subsequently referred to as LWfG) in Ukraine, especially on the Crimean Peninsula. The first record of LWfG in recent times is from 1995. In the years 1998–2000, more detailed counts have been carried out in Crimea. In the winter 1999–2000, 579 LWfG were counted (Grinchenko 2001). By the aid of Fennoscandian LWfG conservation project it was possible to arrange a LWfG survey of the whole peninsula during the winter 2002.

2. Methods

In the period 18 January – 2 February 2002, a winter survey for LWfG was carried out in co-operation between the Fennoscandian Lesser White-fronted Goose conservation project and the Asov-Black Sea Ornithological Station (Ukraine). The following areas were covered: West, Central and Eastern Sivash, the Kerch Peninsula, Karkinitska coastline, the western coast of Crimea up to Lake Donuzlav, and the coastal areas north of Sivash (continental Ukraine).

In contrast to the LWfG surveys carried out in Kazakstan, where the geese are counted during the morning flight from the roosting lakes (Tolvanen et al. 1999), the current survey was based on counts of geese in the feeding areas during daytime. In Crimea, the geese use the Azov and Black seas as a night-time roost, making it impossible to count the morning flights from the roost in the same standardised way as in the staging areas in Kazakstan with well defined roosting lakes and flight directions.

3. Results

During the survey altogether 103,000 geese were counted. White-fronted Goose (*Anser albifrons)* accounted for the major part with identified 54,100 individuals. The total sums of other goose species in the survey were: Red-breasted Goose (*Branta ruficollis)* 8,840 ind., Greylag Goose (*Anser anser)* 175 ind., Bean Goose (*Anser fabalis)* 5 ind. and LWfG 12 ind.. In addition, 39,700 un-

Photo. Goose searching in Crimea in January 2002. From left to right: Gustaf Nordenswan, Jyrki Pynnönen, Alexander Grinchenko and Vladimir Popenko. © Tomas Aarvak

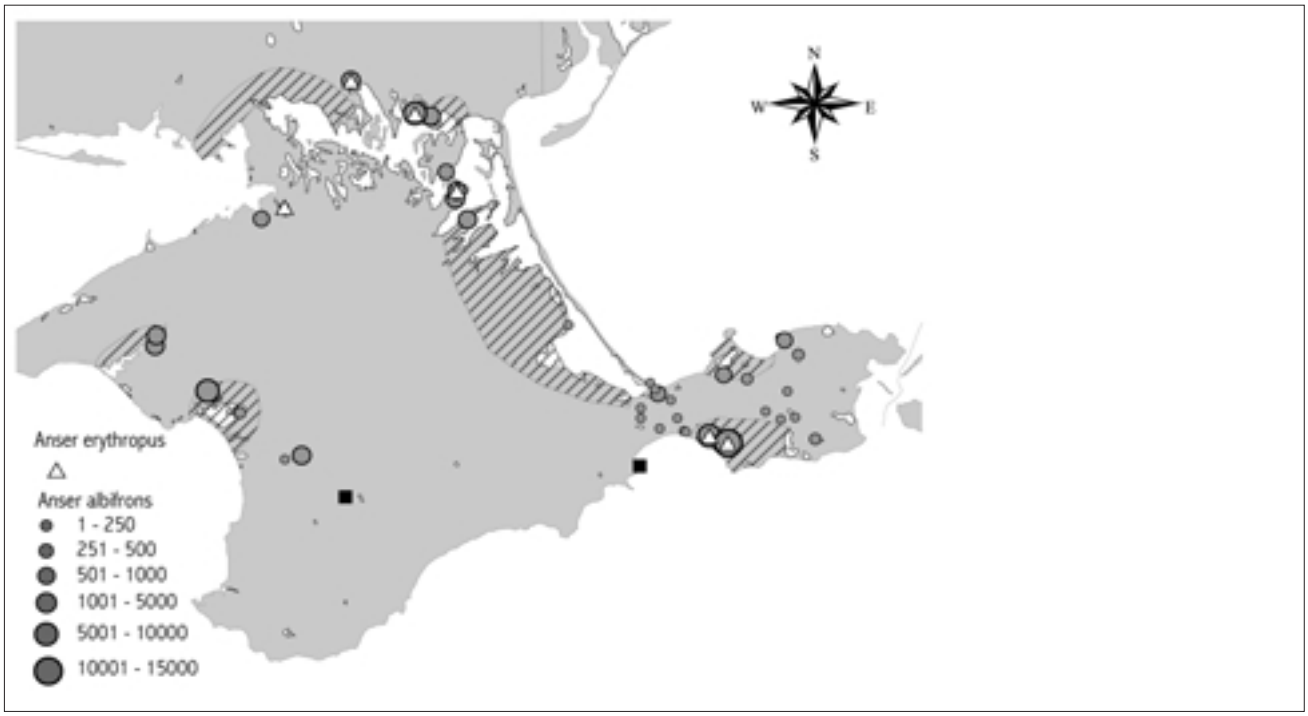

Figure 1. Distribution of White-fronted and Lesser White-fronted Geese in Crimea, Ukraine, in January-February 2002. Shaded areas show traditional goose wintering areas.

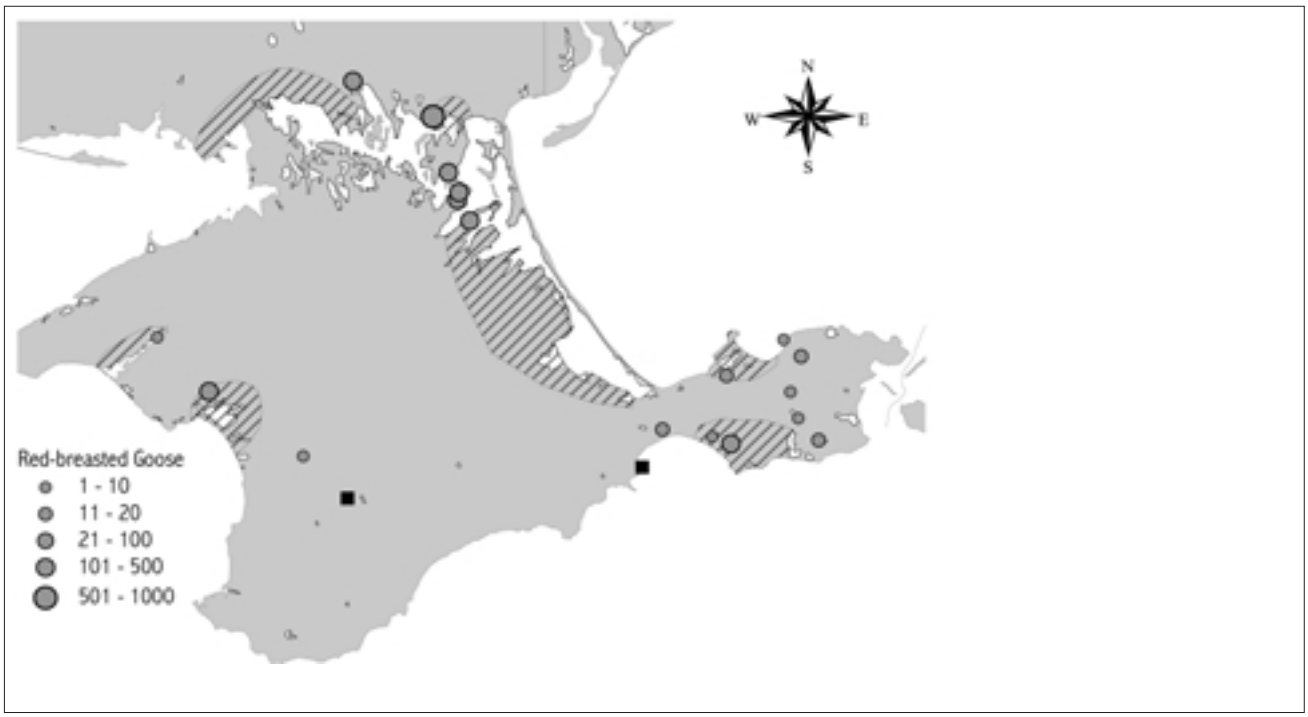

Figure 2. Distribution of Red-breasted Geese in Crimea, Ukraine, in January-February 2002. Shaded areas show traditional goose wintering areas. The last group of "530-7000" is arbitrary since this has only one record – a flock of 7000 Red-breasts.

identified geese were counted. The distribution of LWfG and White-fronted Geese is given in Figure 1, while the distribution of Red-breasted Geese is given in Figure 2. Roughly estimated 80% of the potential goose areas in the study area were covered during the survey. The traditional goose staging and wintering areas are shaded in the maps (Figures 1 & 2).

The observed LWfG occurred as single individuals interspersed in the flocks of White-fronted Geese. Only one of the 12 individuals was a juvenile (2 cy) bird. Also within the White-fronted Goose the juvenile proportion was low, varying between 1 and 20 % with a mean of 12.8% (n=1926 individuals aged in random samples). The brood size of White-fronted Geese was also low, with a mean of 1.4 (sd=0.8, n=93). The situation for Red-breasted Geese was similar, leading to the conclusion that the preceding breeding season for the arctic geese wintering on Crimea had failed.

Other interesting findings were two Tundra Bean Geese (*Anser fabalis rossicus)* and a White-fronted Goose with a bluish neck band with white letters B 47 (seen on 30 January, Sivachovska Khersonskoi Oblast).

4. Discussion

The survey was unfortunately carried out after a period (12 December – 8 January) with very unfavourable weather conditions

Photo. White-fronted Geese are the main hunting object during winter in Crimea. From left to right: Juri (driver), Alexander Grinchenko (researcher), Vladimir Popenko (researcher) and Oleg Nagaev (driver). © Tomas Aarvak

for wintering geese. Heavy snow fall (25-40 cm) and temperatures between –20 and –28°C caused the whole Sivash area to be covered with ice. Similarly, the ice reached as far as 5-10 km out from the shoreline in the Azov Sea. Because of these unfavourable conditions, most geese had left Crimea before the survey. A rough 'guestimate' would imply that the 100,000 geese still present comprised approximately a third of the usual number of wintering geese in this area. The wintering geese on Crimea shift sites or leave the region very easily depending on weather conditions. This makes it difficult to plan a optimal timing for a winter survey of geese.

Intensive hunting is also thought to have effects on the wintering goose populations, through disturbance, preventing the geese from feeding, and direct killing. The hunting on Crimea is rather intensive in many parts of the region with official hunting days on Wednesdays, Saturdays and Sundays. Reinforcement in the protection is needed to improve the conservation status of wintering geese in the area.

For information about the various wetland sites (Ramsar sites, international important wetlands) in Ukraine, see: http://www.ramsar.org/profiles_ukraine.htm. Another good source of information is the homepage of the Azov-Black Sea Ornithological Station at: http://ornitology.narod.ru/english/index.html.

5. Acknowledgements

We are grateful for the very good company and help during the field survey by our eminent drivers Oleg Nagaev and Shasha Chistilin. We would also like to thank Sergej Prokopenko and his daughter Zhenia for various help. Financial support was given by Finnish Ministry of Environment and WWF-Finland.

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Lesser White-fronted Geese shot in Spain in the winters 1985/86–2000/01

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The occurrence of Lesser White-fronted Goose (*Anser erythropus*, subsequently referred to as LWfG) in Spain up to 1999 was summarised by Persson (2000). Since then, much data have been gained and number of records for the period 1985-1999 has doubled (Persson 2002). Among these additions were the first reports of hunted LWfG in Spain since the 19th century (see Chapman & Buck 1893).

In total, eight LWfG have been reported shot in Spain during the last 16 winters, all of them in the Doñana area (Table 1). All shot birds were unmarked. The same applied to an individual captured at Lucio de Marilópez on 13 June 1991 and 22 April 1992 (Ibáñez 1991, 1992).

It can be assumed that the total number of shot LWfG in Doñana during the last 16 winters is several times greater than the eight individuals included in Table 1. Only a small proportion of the neck-collared Greylag Geese shot in Doñana has been ever reported (Persson 1999). A low reporting frequency is most likely applicable also to LWfG shot in this particular area. On the other hand total lack of reports from other parts of Spain probably reflects the true situation, that none was shot outside the Doñana area during these winters. In the winter of 2001/02, however, one LWfG was shot at Villafáfila.

The significance of the Spanish hunting kills is hard to determine as we know neither the total number of shot LWfG nor the origin of all these birds. The possibility that some of the shot birds may come from the wild Fennoscandian population urges, however, for action. A first step to trace the origin is to examine all available observations of LWfG in Spain during the last 16 years (data in Persson 2002).

With the exception of an individual captured in summer, all observations of LWfG in Spain fall within the time frame typical for wintering Norwegian Greylag Geese *Anser anser sylvestris*. Besides, all sighted individuals were among flocks of Greylag Geese, chiefly Norwegian. Two or three individuals came from the Finnish re-stocking project and at least the same number from the Swedish reintroduction project. Regarding the others, of which the vast majority were unmarked, nothing is known about their origin. As for most species nowadays, escapes from captivity must be taken into account, but I regard that source as insignificant. If escapes had been involved, quite a few individuals should have been sighted in autumn, in the large flocks of West Baltic Greylag Geese *Anser anser anser*, which arrive in Doñana significantly earlier than their Norwegian counterparts (Persson 1993). Instead, three other origins must be considered: descendants of re-established Swedish birds, the native Fennoscandian population and more eastern breeding populations.

A well-known behaviour among geese is that individuals of one species, singly or in small parties, are prone to join more numerous species. In that way, birds can move to winter quarters far from their normal ones. This phenomenon can lead to the paradox, that the rarer a species becomes the more vagrants occur. The autumn migration pattern of the LWfG, with several stopovers of considerable distance , facilitates such a behaviour. When ready to leave a staging area, LWfG may follow the geese migrating from/through that area just then, independent of in which way they arrived. In that way, LWfG could be assumed to arrive (e.g. from Russian breeding grounds) to staging areas in north-western Europe among flocks of White-fronted Geese *Anser albifrons*, and leave these areas together with Greylag Geese.

Table 1. Lesser White-fronted Geese reported shot in Spain in the winters 1985/86–2000/01. All localities are situated in Doñana.

Date	Number	Locality	Reference
2 Feb 1987	1 ind	Marisma de Hinojos	Pereira 1987
21 Jan 1988	1 ad+1 juv	Caño de Guadiamar	García 1988
4 Jan 1989	1 juv	Los Caracoles	Rodríguez 1989
Winter 1996/97	2 ind	La Abundancia	García 1998
Nov 1997	2 ind	Cantarita	García 1998

An individual staging in Isla de Menorca in March might indicate a direct migration route between the Pannonic region and Spain. Other observations are, however, consistent with the LWfG migrating together with Greylag Geese in the East Atlantic flyway. In Spain, several of the individuals were sighted during days following a major influx of Greylag Geese, and the majority seemed to arrive during the last week of November, or later. With such a late departure from The Netherlands, it is an open question from where the unmarked LWfG originate. Possibly they could be of a mixed origin, including birds from the Swedish re-established population, the Fennoscandian population, and one or more of the Russian subpopulations.

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The reintroduction of the Lesser White-fronted Goose in Swedish Lapland – a summary for 2000–2003

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Photo. A flock of Lesser White-fronted Geese in flight. © Ingar Jostein Øien

During the last four years the Swedish programme on reintroduction of Lesser White-fronted Goose (*Anser erythropus*, subsequently referred to as LWfG) has been hampered by the discovery that some birds in our captive stock carry genes from the White-fronted Goose (*Anser albifrons*). As a consequence, no geese have been released in the wild during these four years. In 2000, the Swedish captive LWfG population produced 41 fledglings, and in 2001, 32 juveniles came on their wings. All these goslings were added to the Öster-Malma captive stock. In 2002, we decided not to invest in rearing goslings, which resulted in the whole group of birds more or less forming one flock. Two pairs behaved as obvious pairs and were moved to separate cages and they produced four fledglings. In 2003 we moved half of our geese to a new site. Altogether nine birds fledged this year.

The LWfG population in the release area in Swedish Lapland, consisting of released birds and their descendants, has been doing well during the period 2000-2003. In 2000, we recorded four nests and supposed another two breeding records in the core of the release area. About the same number was found in 2001. In 2000, four families showed up at the stop-over sites in Medelpad and Hälsingland at the Swedish coast of the Gulf of Bothnia (450 km south of the reintroduction area) followed by five families in 2001; total number of fledglings was 14 and 15 respectively (Table 1). The most successful breeding pair, consisting of two formerly released birds, produced six fledglings in each of the years 1999-2001. It can be noted that from 2000 to 2001 this pair shifted breeding site from a lake situated outside the core area into the release area a distance of about 15 km.

Table 1. Number of broods and fledglings produced in the reintroduced Lesser White-fronted Goose population in Swedish Lapland 1999–2003. Figures for 2003 are minimum numbers.

Year	Number of broods	Fledglings
1999	4	13
2000	4	14
2001	5	15
2002	8	21
2003	8	20
In total, 1999–2003	29	83

In 2002, an all-time highest number of eight families and 21 juveniles appeared at the stop-over sites at the coast (Table 1). This success came as a surprise because we had not found so many breeding pairs in the surveyed core area and the prospering populations of lemmings and other rodents crashed already during the late winter. This could indicate that the overall predation pressure (from Red Fox (*Vulpes vulpes*), American Mink (*Mustela vison*), Stoat (*Mustela erminea*), Raven (*Corvus corax*), Hooded Crow (*Corvus corone cornix*) etc.) on alternative preys was very high; e.g. the breeding success of Willow Grouse (*Lagopus lagopus*) was poor. One LWfG female nesting on an island, and easily observed from a distance lost its clutch during the late phase of the incubation. Just a few days later we observed a mink patrolling the breeding and neighbouring islands and it seemed to be well acquainted with the area. For the first time ever after ice melting we saw a Red Fox systematically scanning some islands in the same lake. There are indications that some more nests of LWfG were lost due to predation.

In 2003, four nesting records were obtained from the core area and a minimum of eight families appeared at Hudiksvall accompanied by at least 20 young geese.

During 1999-2003, the LWfG in the release area in Lapland have produced 29 broods with altogether 83 fledglings (Table 1). One of the families in 2002 came from a lake about 30 km from the release area and furthermore the fact that few pairs were observed in the core area in contrast to the number showing up during autumn migration also indicates that some geese are breeding outside the area surveyed by us. The goose parents in 2002 con-

sisted of five pairs in which both geese parents were unmarked and three pairs with males marked and females not. In 2003, again 13 out of 16 parents were not banded.

In winter, the Swedish LWfG stay in The Netherlands in areas close to the coast, and during spring and autumn migration they use the area around Hudiksvall in Sweden as stop-over site (see von Essen 1996, von Essen et al 2000). Some LWfG also moult at that locality; e.g. in 2002 14 birds were moulting there. The Hjälstaviken Ramsar site in central Sweden is used by some geese especially during autumn but few families show up there. No other annually used autumn stop-over site is known between Hudiksvall and the North Sea coast in Germany/The Netherlands, indicating that at least some geese make the autumn journey more or less as a non-stop flight.

The genetic investigations of LWfG carried out by Minna Ruokonen, University of Oulu, Finland, and late Håkan Tegelström, University of Uppsala, Sweden (see Tegelström et al. 2001), now also comprising all known LWfG in captivity in Sweden, could by mitochondrial DNA analysis be able to prove the presence of White-fronted Goose genes among some of the birds in the Öster-Malma stock. These birds have been removed. Birds kept by other breeders in Sweden and mainly originating from ornamental parks and breeders outside Sweden had a higher frequency of hybrid progeny. For the future rearing we plan to use the geese where no genetic contamination has been confirmed and try to compose pairs in order to maximise the genetic variability. There are also plans to try to obtain eggs or wild geese from European breeding areas in order to secure a gene pool of birds for future releasing programmes (Andersson et. al in prep).

The Swedish Association for Hunting and Wildlife Management is running the project but it is also funded by WWF Sweden, the Swedish Environmental Protection Agency and the Alvins Fund. The members of the working group in 2000-2003 were Åke Andersson (manager), Anders Bylin, Bo Fagerström, Susanna Löfgren/Torsten Larsson, Per Arne Olsson/Ulf Sterler, Per-Olof Palm and Bertil Österberg. Anders Bylin passed away in January 2002.

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SHORT NEWS

Winter bird survey in the Lower Chang Jiang (Yangtze) River basin, China

Two teams surveyed a group of lakes in Hunan, Hubei, Jiangxi and Anhui provinces during a three-week period in January 2003. The main target species was Dunlin (*Calidris alpina*), but all waterbirds were counted. Despite significant logistical problems and very foggy weather, altogether 242,000 waterbirds were counted : 48,000 Dunlins, 12 000 Spotted Redshanks (*Tringa erythropus*), 12,500 Pied Avocets (*Recurvirostra avosetta*), 6,500 Eurasian Spoonbills (*Platalea leucorodia*), 1,362 Oriental Storks (*Ciconia boyciana*), 16,300 Tundra Swans (*Cygnus columbianus*), 27,100 Swan Geese (*Anser cygnoides*), 25,700 Bean Geese (*Anser fabalis*) (*middendorfii / serrirostris* sub-species), 16,600 Lesser White-fronted Geese (*Anser erythropus*) and 646 Hooded Cranes (*Grus monacha*). Incidentally, later another 105 Hooded Cranes in the Chang Jiang estuary were seen (Chongming Dao).

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The occurrence and protection status of the Lesser White-fronted Goose in Georgia

The Lesser White-fronted Goose (*Anser erythropus*) (Georgian name: Tzripina bati) is under legal protection in Georgia. The species is recommended to be included to the second edition of the Red Data Book of Georgia.

The status of the species in Georgia can be considered as vagrant or probably a very rare and irregular migrant and/or wintering species occurring in small numbers. The species is recorded in various marshy wetlands on lowlands and plains, usually on large shallow lakes with dense reedbeds and occasionally in fishponds and reservoirs. It also occurs sporadically elsewhere.

According to my data collected since 1972 within the territory of Georgia, there are 26 records with altogether minimum of 104 individuals from 12 localities. Most of the records are from lakes in eastern Georgia, and less in western Georgia. Eighteen out of 26 sightings are from 5 sites in the eastern part of the country (i.e. in the Caspian Sea basin) (in total 76 individuals) and 8 observations (28 birds) are from the western areas (i.e. in the Black Sea basin).

Most of the records in Georgia are from late winter. Two records (in total 5 individuals) are from November, five from December (24 birds), seven observations are from January (33 birds) and twelve records are from February (42 birds). The earliest autumn observation is on 6 November 1974 and the latest winter record is done on 24 February 1985.

In 23 cases (more than 88% of all sightings), LWfG were recorded in flocks of White-fronted Geese (*Anser albifrons*). LWfG were recorded only two times (4 and 2 individuals) in mixed flocks together with Greylag Geese (*Anser anser*) and in one case a solitary individual was recorded in a large flock of ducks.

The population origin of the birds recorded in Georgia is not known. Unfortunately, all areas where the species has been recorded during last decades, are intensively hunted, but cases of shooting have been registered only in 1960´s and 1970´s (Priklonski & Polyakova, 1978).

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— The above was extracted from the list BirdNetCaucasus@yahoogroups.com. Eds.

New spring observations of Lesser White-Fronted Geese migrating across south and south-east regions of Kazakhstan

It is confirmed that some number of LWfG spend the winter period in the inner wetlands of the Central Asian Republics and in spring they move across the Syrdarya River basin (Shoshkakol lakes system near the Turkestan city) and far to the north and north-east regions of Kazakhstan.

New additional findings confirm this: Three LWfG were observed by the Kazakstan ornithologists F. Karpov, V. Kovshar and O. Belyalov in the semi-desert area in the spring flood plain, together with a flock of Ruddy Shelducks (*Tadorna ferruginea*), about 100 km to the west from Almaty on 9 March 2003. The LWfG were resting and feeding. They were observed about two hours and stayed at the flood plain after the observers left. Taken into account the direction of this local flyway, LWfG can arrive the area perhaps from south Kazakstan region where spring migrating waterfowl arrive from Uzbekistan and Turkmenistan.

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Illegal hunting in Norway

On 26 April 2003, birdwatchers witnessed a local farmer in Femsjøen, Østfold County, shooting at a mixed flock of Canada Geese (*Branta canadensis*) and Lesser White-fronted Geese (*Anser erythropus*). A Canada Goose was the only one that was shoot dead. The incident did not lead to juridical consequences. The LWfG in the area most probably originate from the Swedish reintroduced population.

Eds.

New web site: Portal to the Lesser White-fronted Goose

The Internet pages "Portal to the Lesser White-fronted Goose" have recent news about sightings, surveys, meeting announcements etc. The site covers the whole distribution area of the wild populations. The current report will also be available here as do the former reports from the Fennoscandian LWfG conservation project. You can find it at: www.piskulka.net.

Eds.

The entire European breeding population of Lesser White-fronted Goose wintering in the Evros Delta, Greece?

During the first days of January 2004, 52 Lesser White-fronted Geese (*Anser erythropus*) were observed in the saltmarshes surrounding the Drana Lagoon, Evros Delta. The flock, that comprised both adult and immature birds, was associated with White-fronted Geese (*Anser albifrons*) and Red-breasted Geese (*Branta ruficollis*), and may be considered as a unit feeding and flying together.

The habitat used by the geese is essentially natural. They feed on halophytic vegetation and are resting on the natural lagoon of Drana currently subjected to restoration works undertaken in the framework of an EU supported LIFE program.

Lesser White-fronted Geese are considered endangered on a global scale i.e. likely to become definitively extinct if the negative trend continues. Estimated at more than 10,000 individuals less than a century ago, the European breeding population situated in Lapland is at the verge of extinction. It was precisely estimated at around 50 birds during surveys conducted in the autumn 2003 on the shores of the Porsangen Fjord by Norwegian ornithologists (but this count is not representing the entire Fennoscandian population; e.g. in the Varanger Fjord area a flock of seven birds was observed simultaneously in the autumn 2003). Specific studies conducted in 1995 using satellite transmitters have concluded that a part of this Fennos-

candian population do winter in the Evros Delta. It was also confirmed for the flock of January 2004 since one of the geese had been colour-ringed in May 2002 in northern Norway.

The Evros Delta is integrated in a Special Protection Area and is a Natura 2000 site under the terms of the European Directives. It consists of numerous priority habitats, including the lagoons and saltmarshes used by the geese. During the annual cycle, the Evros Delta hosts several endangered birds (including the critically endangered Slender-billed Curlew *Numenius tenuirostris*) and mammal species. It is the last area along Mediterranean coast where arctic geese breeding in the Siberian tundra come for the winter. It is also one of the very last areas in Europe were arctic geese are feeding almost exclusively on natural habitats. It is a unique site at the European scale.

It may thus now be safely assumed that the survival of the European breeding population of Lesser White-fronted Geese is highly dependent on the wintering conditions prevailing in the Evros delta and in particular in Drana Lagoon and associated marshes. Wintering conditions represent indeed an important bottleneck in geese population dynamics.

The efforts currently invested for the restoration of Drana Lagoon are therefore extremely pertinent and need to be pursued. The feeding ecology of the wintering geese is under study. It is hoped that the result will help to manage the saltmarshes and solve the problems of inadequate grazing. Since winter 2003/2004 it is again allowed to hunt White-fronted Geese, which was not a progressive decision. But, the key issue is the strict application of the non-hunting zones. This is actually the case in the Evros Delta but the deep involvement of the Forestry Department in Alexandroupolis together with the hunters themselves is absolutely necessary to maintain this level of protection since it appears that the situation is degrading with several cases of hunting at night reported. Besides that, the increasing number of visitors guided to the wetland by the team of the Evros Delta Information Centre (Loutros) is a very positive step to promote the local awareness of the economic and patrimonial value of the site.

The survey of wintering Lesser White-fronted Geese is supported by the LIFE Nature program "Restoration and Conservation Management of Drana Lagoon in the Evros Delta".

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Photo. Adult Lesser White-fronted Goose caught for colour ringing at the Valdak Marshes, Norway. © Ingar Jostein Øien, May 2002

New threats to the core breeding area of the Fennoscandian Lesser White-fronted Geese

The status of the core breeding area for LWfG in Fennoscandia was described by Øien et al. (2001) in the Fennoscandian Lesser White-fronted Goose monitoring project – Annual report 2000. In the periods 29 May – 1 June 2001 and 6–13 July 2002 the Fennoscandian LWfG conservation project carried out field surveys in the same area.

We did not observe LWfG in the area in neither of these surveys. In both years, however, the reproduction of the Fennoscandian breeding population was relatively good, as shown by the monitoring of the autumn staging at the Valdak Marshes (Aarvak & Øien 2004, pp. 19–24 in this report). The reason for the absence of LWfG in this area is therefore not due to failed breeding seasons. During the fieldwork in the area in 2002 we registered use of 4WD motorbikes in the area as well as extensive daily airplane traffic to and from lakes nearby at very low altitude. Our lack of observations may indicate that the LWfG have a flexible use of this core area and adjacent areas. It will be a challenge in the coming years to map the LWfG spatial and temporal use of the breeding areas in Fennoscandia. This is important to make out if disturbing activities or technical encroachments are planned in nearby areas that also may be used as breeding areas for the LWfG.

At present a 66 kV power line cross directly through the core breeding area, and a new power line (300 (420) kV) is now planned in parallel with the existing one. Power lines do in general influence bird populations both indirectly through area demand and habitat changes along the line, and directly when birds are injured or killed by electrocution or by collision. All flying bird species may potentially suffer from collision with power lines. Ducks and geese make up a considerable amount (24%) of avian power line collision victims (Bevanger 1998). In general, young and inexperienced birds are more often victims to collisions. Even more significantly, among species adapted to high juvenile mortality, additional adult mortality have a higher influence on the population development, as have been demonstrated to be the case for LWfG (Lampila 2001).

In this particular case, a technical encroachment like this could have considerable negative impact on the LWfG population development, both due to increased mortality risk, but also due to occupation of important breeding habitat for the LWfG since the power line is planned to run directly through the area that makes up the core breeding area for the remaining LWfG population in Fennoscandia. Another indirect and direct negative influence will be that of construction roads to and from the power line that further increase habitat destruction and disturbance to breeding or moulting LWfG. How this road will be utilised later is also of a major concern. Does this open up for easy access to fishing camps and the construction of such? An application for building a huge tourist centre in the core area was turned down recently, but a new road into the area could give the plans new actuality.

So far, no thorough environmental impact assessment has been carried out for

the planned power line, but the material possessed by the Fennoscandian LWfG conservation project is already sufficient to temporarily assess the environmental impact of the planned power line through this area. The Fennoscandian LWfG conservation project did so in a letter to the County Governor of Finnmark in December 2003. In this letter, the environmental values of the area are assessed as very high (unique), and the degree of the technical encroachment as high. In the standard matrix used for Environmental Impact Assessments in Norway (Statens vegvesen 1995), the planned power line was rated to have very big negative consequences.

Further pressure on this area must be avoided, and the responsible Nature Management Authorities in Norway; The County Governor of Finnmark and the Norwegian Directorate for Nature Management (DN) must allocate all possible efforts to ensure that this power line will not become a reality. The already existing 66 kV power line that runs through the area does cross the most frequently used migration route from the staging areas to the breeding areas. This line has the worst possible location because the direction of the migration of LWfG is in a straight line towards the power line that partly crosses the important wetlands in the area. A ground cable through this area should be seriously considered also for the existing 66kV power line.

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An informative web site for Red Data books in central Asia

The Red Data web site for central Asia can be found at http://redlist.freenet.uz/index.html. The site covers Kazakstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan and has both English and Russian versions.

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THE RED DATA BOOK of the Republic of Uzbekistan has been published in 2003

The English abstract of Red Data book of Uzbekistan gives the following details for the Lesser White-fronted Goose: Vulnerable, naturally rare (VU:R D1), locally distributed, migratory northern palearctic species. Occurs within water reservoirs of the basins of Amu-Darya and Syr-Darya rivers, southern Aral region, Dengizkul, Aydarkul lakes, Chardara, Surkhandarya water reservoirs (migration, wintering). Inhabits in the floodlands of rivers, big water reservoirs with well-developed submerged and bank vegetation, fields of cereals. In the past it was observed in extremely low numbers, at present from 200 to 2000 individuals annually during migration and wintering. Limiting factors: destruction of habitats as a results of the changes of water regime in the Aral basin. Included in IUCN Red List [VU].

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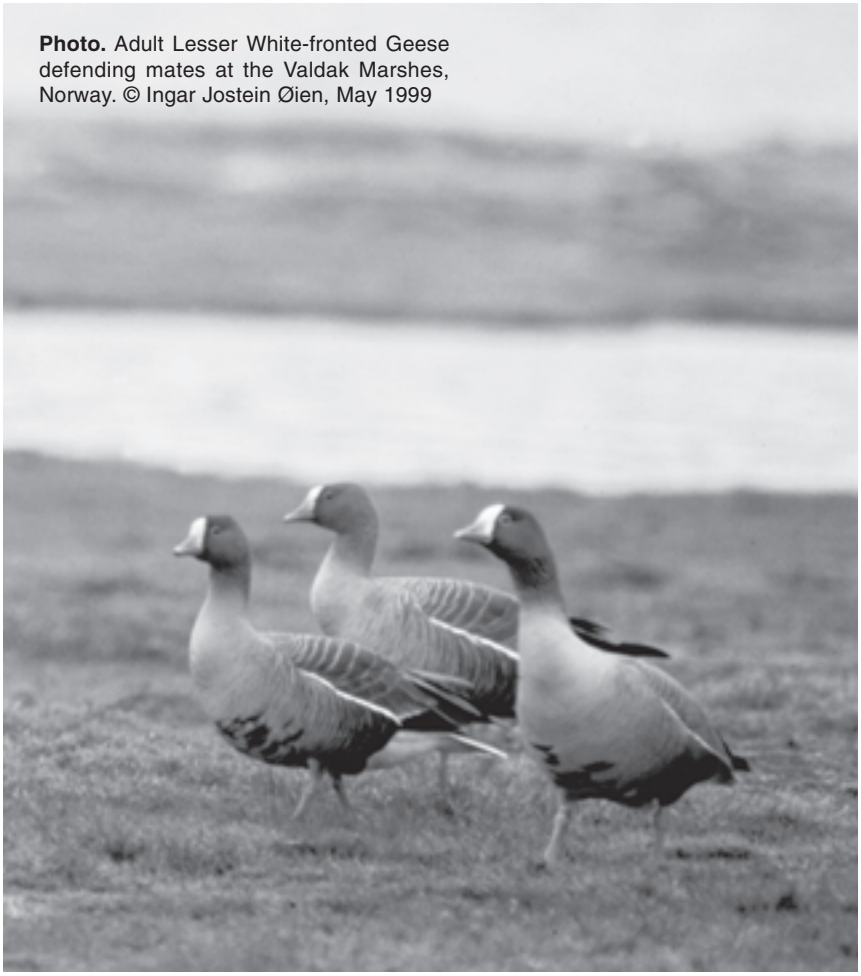

Photo. Adult Lesser White-fronted Geese defending mates at the Valdak Marshes, Norway. © Ingar Jostein Øien, May 1999

APPENDIX A

APPENDIX A: Publications of the Fennoscandian Lesser White-fronted Goose conservation project during the report period

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Grinchenko, A., Popenko, V., Aarvak, T., Nordenswan, G. & Pynnönen, J. 2003. Survey of wintering geese on lake Siwash and in the Crimea. Casarca 9: 313-316. (in Russian with English summary)

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The similarity of the Lesser White-fronted Goose *(Anser erythropus)* **and the White-fronted Goose** *(Anser albifrons)* **is one of the main problems in the conservation of the Lesser White-fronted Goose.**

Size alone can not be used to separate the species beacuse of the considerable variation in body size within both of the species. The head of the Lesser White-front is smaller and neater, more rounded (sometimes the head appears to be box-shaped) with a relatively bigger eye and steeper forehead than in White-fronted Goose. The bill is relatively much shorter than in White-fronted Goose and almost triangular in shape. The neck of Lesser White-front is distinctly shorter and relatively thicker than in the White-front. In a flock on the ground, a good hint for sorting out a Lesser White-front is the overall darkness of the bird. In addition, Lesser White-fronts normally show a more upright posture than White-fronts. The wings of the Lesser White-front are relatively somewhat longer, reaching beyond the tail (when fully grown), but careful observation is necessary because also White-fronts can sit in a position where the wings reach beyond the tail.

Flight identification

The colouring of the wing of Lesser White-fronted Goose and White-fronted Goose is very similar. The primary coverts and the base of a few outermost primaries are rather light blue–grey in both species. Both of the species has one clearly visible white wing bar, formed by the white tips of the greater secondary coverts.

The smaller size of the Lesser White-front alone is not always a good feature in flight identification, but the shorter neck and bill, and the relatively somewhat narrower wings of the Lesser White-front are flight charasteristics that should be paid attention to. This, combined with the shape of the head and the uniform darkness of the head and the upper neck of the Lesser White-fronted Goose are often the only valuable features for flight identification. Also the typical, clear (not rasping) and whistling "tu-yu(-yu)" voice of the Lesser White-front is an useful idenfication character for experienced observers. Lesser White-front lacks the sharp "click-click-click-click" call of the White-fronted Goose.

The identification is easier if a direct comparison with the other species is possible. Especially single juvenile Lesser White-fronts in a flock of White-fronted Geese are extremely difficult to discover and identify.

Further information on identification:

Øien, I.J., Tolvanen, P., Aarvak, T. & Markkola, J. 1999: Occurrence and identification of Lesser White-fronted Goose. – Alula 5:18–23.

Above: adult Lesser White-fronted (second individual from below) Goose in a flock of White-fronted geese

Below. The ground colour of head and neck is one of the most important and useful features to separate adult Lesser White-fronted Goose from White-fronted Goose. In the Lesser White-front (lower), the head and the upper two thirds of the neck is quite uniformly dark brown, distinctly darker than in the White-fronted Goose (upper). In the White-fronted Goose, only a narrow zone at the rear margin of the white blaze is dark brown, contrasting clearly with the light brown head and neck.

The short triangular bill of the Lesser White-front is brighter pink in colour than the bill of the White-front, and the white blaze reaches further up on crown. Both species show much variation in the size of the white blaze; some individuals (especially 2nd calendar-year birds in spring) have very small white blaze and the shape of the blaze should not be used as an identification feature alone.

Even if the swollen bright-yellow eye ring of the Lesser White-fronted Goose is prominent at short distances, it is normally not visible beyond 300 metres, but exceptionally the eye-ring can be seen with a good telescope at a distance of c. 600 metres. It is also worth noting that c. 20% of White-fronts of the nominate race show a thin dull yellow eye ring.

Adult White-fronted Goose
Anser albifrons albifrons

Adult Lesser White-fronted Goose
Anser erythropus