

Tomas Aarvak, Ingar Jostein Øien,
Svein-Håkon Lorentsen & Henrik Brøseth

The Lesser White-fronted Goose Monitoring Programme

Annual Report 1995



Report No. 57 from the
Lesser White-fronted Goose Project

Norwegian Ornithological Society


BirdLife[®]
INTERNATIONAL

Report No. 4-1995



NINA • NIKU



NOF RAPPORTSERIE

RAPPORT NR. 4-1995

**Tomas Aarvak, Ingar Jostein Øien,
Svein-Håkon Lorentsen & Henrik Brøseth**

The Lesser White-fronted Goose Monitoring Programme

Annual Report 1995

**NORSK ORNITOLOGISK FORENING (NOF)
KLÆBU 1995**

Tomas Aarvak

Øvre Møllenberggt. 74
N-7043 Trondheim
Norway

Svein-Håkon Lorentsen

Norsk Institutt for Naturforskning
Tungasletta 2
N-7005 Trondheim
Norway

Ingar Jostein Øien

Norsk Ornitologisk Forening
Seminarplassen 5
N-7060 Klæbu
Norway

Henrik Brøseth

Norsk Institutt for Naturforskning
Tungasletta 2
N-7005 Trondheim
Norway

© Norwegian Ornithological Society, N- 7060 Klæbu

All photographs by Ingar Jostein Øien

Printed November 1995

Front page printed by Steen Offset AS, Bergen

Number of copies: 200

ISSN 0805-4932

ISBN 82-990868-9-2

PREFACE

This report contains the results of the work conducted from January until October 1995, but it also includes some findings from earlier years.

A steering board composed of George Bangjord, Jostein Sandvik, Ingar Jostein Øien (leader) and Tomas Aarvak has directed the project in 1995. The satellite telemetry part, has been carried out in co-operation with Svein-Håkon Lorentsen from the Norwegian Institute for Nature Research (NINA) and the Hungarian Ornithological and Nature Conservation Society (MME). A final report from the satellite telemetry project will be prepared during 1996, and the results will be published separately.

Several persons have contributed to the project. Special thanks are due to Torkjell Morset at Statskog, Mountain Service, in Lakselv for his outstanding logistic- and personal assistance during the field work, and to Barb Lamprecht at Stabbursneset Naturhus og Museum. We also appreciate the support from those having participated in the field work; Per Anders Elvertrø, Geir Rudolfsen, Sten Torger Salomonsen, Roar Sandodden and Kjetil Solbakken.

We would also like to thank those who have taken interest in the species and the problems facing it, and have contributed with various kinds of information: Christina Bjørkli, Gunnar Henriksen, Lars Krempig, Harald Mørken and Per Tangen.

We are further indebted to the Norwegian Air Force for transport with helicopter and to Major Lyng at the Porsangmoen.division of the Norwegian Army for loan of equipment which were essential for the success of the project this year.

Financial support is provided by: Department of Environmental Affairs - Office of the County Governor of Finnmark, Department of Environmental Affairs - Office of the County Governor of Nordland, the Directorate for Nature Management and Porsanger municipality - Finnmark.

The satellite telemetry part of the project is funded by the Ministry of Environment through a program for environmental collaboration between Hungary and Norway, and Department of Environmental Affairs - Office of the County Governor of Finnmark

Trondheim, November 1995

Tomas Aarvak

Ingar J. Øien

Svein-Håkon Lorentsen

Henrik Brøseth

CONTENTS

ABSTRACT	1
1. INTRODUCTION	2
1.1 Background.....	2
2. STUDIES ON STAGING GROUND IN FINNMARK	3
2.1 Study area.....	3
2.2 Methods.....	3
2.3 Number of staging Lesser White-fronted Geese in spring.....	5
2.4 Staging time in spring.....	7
2.5 Observations on autumn migration.....	7
3. BREEDING AREAS IN FINNMARK	8
3.1 Results from the breeding grounds.....	8
3.2 Chick production.....	9
4. MIGRATION ROUTES AND WINTERING GROUNDS	11
4.1 Background.....	11
4.2 Catch during pre-breeding staging at Valdak.....	11
4.3 Catch on the moulting ground.....	13
4.4 Preliminary results of the satellite telemetry.....	13
4.5 Biometric data of Lesser White-fronted Goose.....	14
5. REFERENCES	15
APPENDIX 1.....	16

ABSTRACT

This report contains the results from the work on Lesser White-fronted Goose in Norway, in the period January-October 1995.

Monitoring of the staging area Valdak, in the Porsangen fjord in Finnmark county, was conducted, both in the pre-breeding period and in autumn subsequent to the moulting. In spring, a minimum of 60 individuals were staging, as estimated from a method of individual identification by belly patches. In autumn a total of 128 birds was registered, distributed in 61 adults and 67 immatures.

The main breeding area in Finnmark was surveyed in the moulting period, when the area was visited in order to catch moulting geese for attachment of transmitters for satellite telemetry. In the area, we found 18 adults and 21 goslings, distributed in six pairs with goslings, one adult with one gosling, one female and a pair without goslings, and one non-breeding pair. An area situated on the Norwegian-Finnish border, was surveyed by World Wildlife Fund Finland. Only one pair with five goslings were seen in these area.

For the first time the project has managed to accomplish counts of families and social groups

in order to estimate brood size, productivity, and the juvenile proportion of the population. With failed breeders, the mean production was 2,6 chicks per pair, as estimated from observations in the moulting period. Counts made post breeding at the staging area at Valdak yielded to different estimates on gosling production. Based only on pairs with offspring the mean brood size was 3,9 goslings. An estimate based on the number of immatures divided by the number of adults (in pairs), yielded a mean brood size of 2,2. The proportion of immatures during the post-breeding staging at Valdak was 52,3%.

In 1995 the project has been co-operating with the Norwegian Institute for Nature Research (NINA) and the Hungarian Ornithological and Nature Conservation Society (MME). The aim is to identify the migration routes and wintering grounds for the species by satellite tracking of individual birds. By October, four Lesser White-fronted Geese have been instrumented with satellite-transmitters in Norway. So far, the bearings have revealed a migration from the breeding grounds to a post breeding area in Norway (Valdak). The birds migrated further to a staging area in N. Russia, to eastern Germany and to Hungary.



1. INTRODUCTION

1.1 BACKGROUND

The Lesser White-fronted Goose *Anser erythropus* breeds (in a belt) from northern Fennoscandia and northern Russia to far east Siberia, and winters from Balkans in the west to the Caspian Sea, and further east in China and the Korean peninsula. The Fennoscandian breeding population was estimated to be in excess of 10.000 individuals during the first half of this century (Norderhaug & Norderhaug 1984), but it has suffered a dramatic decrease during this century (Madsen 1995), especially the western and eastern populations. At present it is one of the most endangered bird species in Fennoscandia (Norway, Sweden and Finland). The breeding range has been reduced by 50%, and the breeding population by 90-95% (Norderhaug & Norderhaug 1982). Most of this decline has taken place after the second World War. The Lesser White-fronted Goose is today categorised as directly endangered on the Norwegian Red List (Størkersen 1992) and on the ICBP World Checklist of Threatened Birds (Collar & Andrew 1988), which means that the species will become extinct if the negative population trend continues. At a meeting in May 1993, the Nordic Lesser White-fronted Goose Research Group and the IWRB Goose Research Group, estimated the total population to approximately 60 pairs.

The Norwegian Ornithological Society (NOF) Project Lesser White-fronted Goose was initiated in 1986 and started its field work in 1987. The goals of the project is to obtain population estimates, survey the known breeding areas, and work for better protection of staging and breeding areas. Implemented in the goals, were also to survey the breeding success and stages of moult, and to examine food preferences. A status report were made (in Norwegian) in 1993 (Øien & Aarvak 1993, Aarvak & Øien 1994) and summarises the knowledge and results in the period 1987 to 1993.

In 1994, NOF started a project aiming to locate migration routes and wintering grounds for the Lesser White-fronted Goose, by use of satellite telemetry (see chapter 4.1). The project is cooperating with the Norwegian Institute for Nature Research (NINA) and the Hungarian Ornithological and Nature Conservation Society (MME) in order to uncover the migration routes and the wintering grounds by satellite tracking birds both from Norway and Hungary.

2. STUDIES ON STAGING GROUND IN FINNMARK

2.1 STUDY AREA

The Valdak marshes (70°09'N 24°54' E) which are part of the Stabburnes nature reserve, is situated in the Porsangen fjord in Finnmark county, northern Norway. The Stabburnes nature reserve makes a large delta of fluvial deposits. On the delta surface there are several fossil river beds and ancient shorelines, which document the gradual upheaval of the land after the last glacial period. Valdak marshes are one of the largest salt- and brackish marshes in Northern Norway and is composed of peat-bogs and salt-marshes with many arctic plant communities (Figure 1). The reserve which is a Ramsar site is important as a resting and feeding area for many species of migratory wetland birds. It is also the most important staging area for Lesser White-fronted Geese in Fennoscandia. The arctic grass *Puccinella phytanodes* dominates the vegetation, and makes the major food item for the geese during staging in spring and autumn (own observations).

2.2 METHODS

Stabburnes is a headland made up of glacial fluvial depositions, and constitutes a natural watching point with a height of approximately 25 metres over the peat-bogs and salt-marshes of Valdak. Studies of the Lesser White-fronted Geese were carried out by the observers sitting close to the edge of the headland, just beneath the rim, to ensure that the silhouettes could not be seen from beneath. Under this circumstance, the foraging birds can easily be studied at a distance of 250-300 metres without disturbing the birds. Because of the angle between the rim of the headland and the wetlands below, we assess this to be the optimum distance to carry out the studies. Telescopes (20-45X and 25-60X magnification), were used to carry out these studies.

The Lesser White-fronted Geese usually forage in couples or in small groups consisting of one pair and one or two immature birds. The male

Figure 1. *The Valdak marshes viewed towards the headland Stabburnes.*



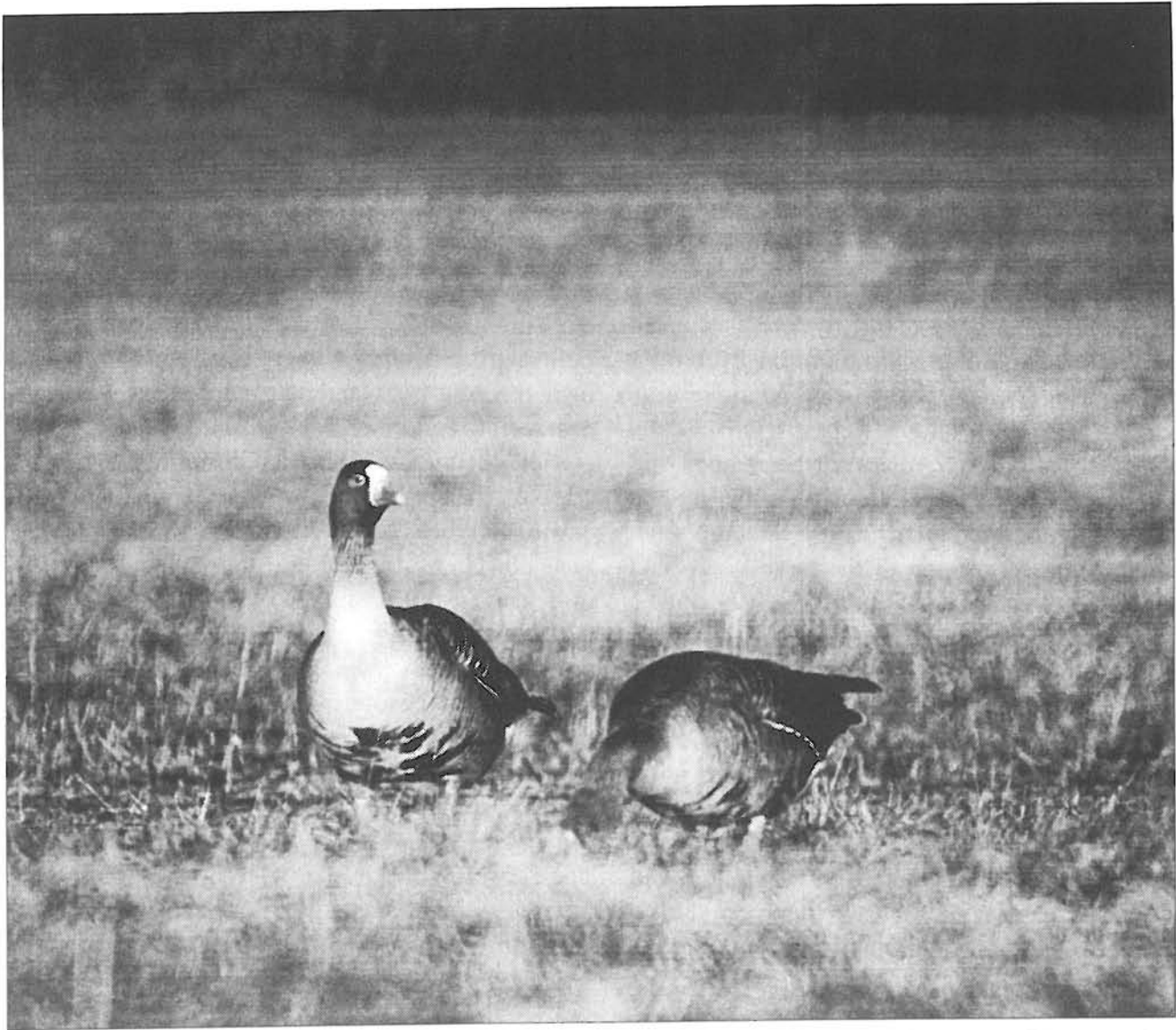


Figure 2. A pair of Lesser White-fronted Geese at the Valdak marshes. The male at the left is scanning for predators, while the female is grazing.

frequently scan for raptors and other predators, while the female spends most of the time searching for food (Lorentsen et al. unpubl). This foraging pattern implies that the pattern of the belly patches of the male is easy to study when he is scanning for predators, while the belly patches of the female are far more difficult to observe (Figure 2).

In order to monitor the progress of staging, and to determine the total number of staging Lesser White-fronted Geese, the belly patches of each individual is painted with high accuracy on ready made sheets with the outline of a goose pair in front view, and from each side (Figure 3). Two observers were always present, and the identification of each pair was always agreed between the observers. Restlessness among the geese is

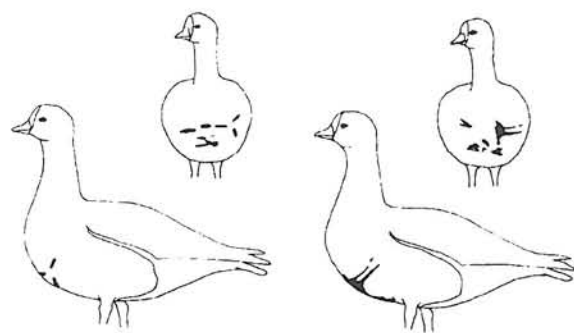


Figure 3. The belly patches of two different males of Lesser White-fronted Geese.

common in this period, and because some pairs leave the flock for some shorter periods, and new pairs arrive, the identification process is a continuous process. Thus most of the birds are identified several times every day in the staging period. Some of the individuals may show similarities in the patterns of the belly patches, although none of the individuals are exactly alike. A more thorough description of the method of identification of individual Lesser White-fronted Geese is described by Øien et. al. (unpubl).

Daily activity of individuals and flocks, food preferences, tolerance of disturbance, habitat use, flying activity and migratory movements have also been registered.

2.3 NUMBER OF STAGING LESSER WHITE-FRONTED GEESE IN SPRING

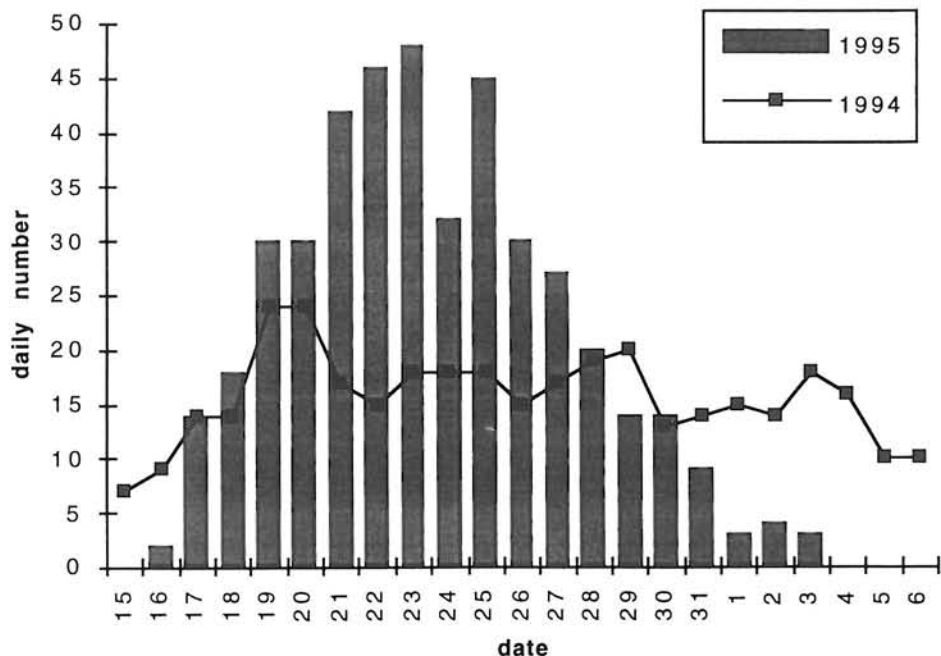
In 1995 the observers arrived at Valdak on the 13th of May, and at this time no Lesser White-fronted Geese were present, as opposed to messages received some days earlier. However small flocks of Greylag geese *Anser anser* and Bean Geese *Anser fabalis* were present. The first Lesser White-fronted Geese were observed in the afternoon on the 16th of May. Thereafter the number of geese increased rapidly, reaching a peak at May 24th with a total of 48 birds, and subsequently

decreasing very fast (Figure 4). Compared with earlier years (1990-94) the increase in number of birds were more rapid (Figure 5), reaching a maximum which has not been observed since 1978. Nevertheless, the total number of geese migrating through the area is about the same as previous years, as estimated from the method of individually identifiable belly patches (Figure 6).

Counts, which are unsystematic and not standardised, of staging Lesser White-fronted Geese has been carried out on Valdak since 1972, and the number of geese has fluctuated between 10 and 55 individuals. This counts, however represents the maximum number of birds observed simultaneously each season, and are biased due to varying observation effort (Figure 7). The method of individual identification by belly patches enabled calculations of overall turnover rates (Appendix 1). Thus the total number of geese staging in the area could easily be calculated (Figure 6, Table 1). In 1995, a minimum of 60 birds were staging at Valdak, as estimated by the method of individual recognising.

The minimum number of 60 geese observed in 1995 is almost equal to the minimum numbers for previous years. In the years 1991-1994 the registered number of pairs are more accurate than in 1995. This is due to the effort spent in the catch of Lesser White-fronted Geese by use of cannon nets this year. As described in chapter 5.2, two

Figure 4. Maximum daily number of Lesser White-fronted Geese observed in the period 15th May - 6th June 1994 and 1995.



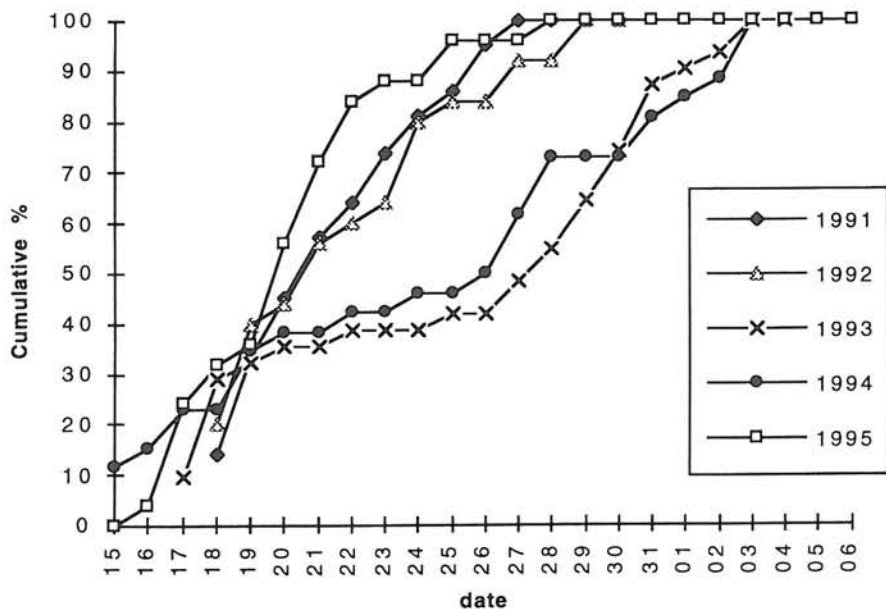


Figure 5. Cumulative % growth curve showing the arrival of Lesser White-fronted Goose pairs in spring, in the years 1991 to 1995.

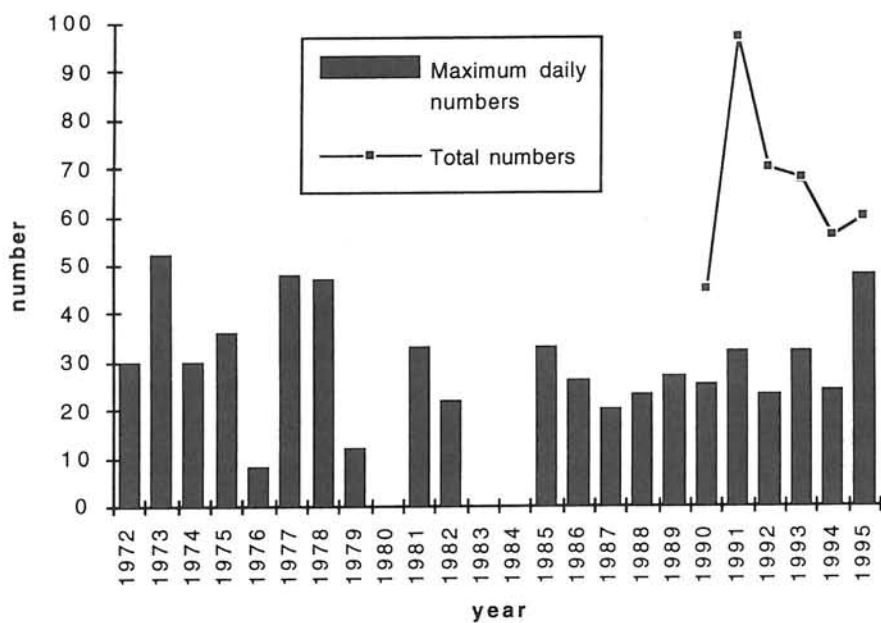


Figure 6. Maximum daily number of Lesser White-fronted Geese (years 1972-1995) and the total number estimated from drawings of belly patches (years 1990-1995) observed at the Valdak marshes. There is no information available from the years 1980, 1983 and 1984.

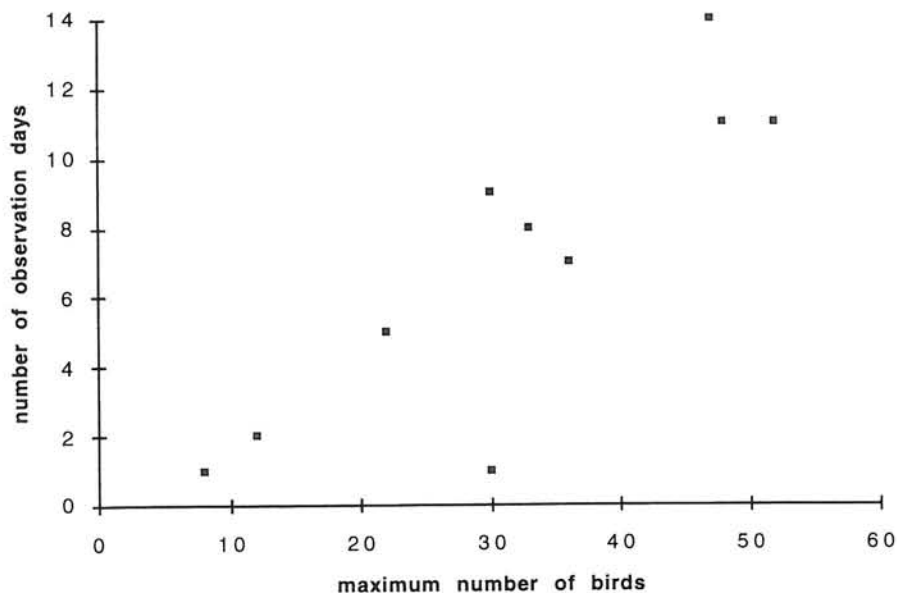


Figure 7. Maximum daily numbers of Lesser White-fronted Geese (years 1972-1981) are close related to observation effort as measured in days.

Table 1. Overview of numbers of Lesser White-fronted Geese at the Valdak marshes in the years 1990-95. The table shows the maximum number of staging geese on the best day, distribution of adults in pairs and immatures, and total number of staging individuals each year.

Year	Maximum on one day	Number of pairs	Number of immatures	Proportion immatures	Total number of individuals
1990	25	≥ 21	≥ 3		≥ 45
1991	32	≥ 43	≥ 13	≥ 15,0 %	≥ 97
1992	23	≥ 25	≥ 13	≥ 26,0 %	≥ 70
1993	32	≥ 32	≥ 4	≥ 6,3 %	≥ 68
1994	24	≥ 26	≥ 4	≥ 7,7 %	≥ 56
1995	48	≥ 25	≥ 10	≥ 16,7 %	≥ 60

Table 2. Overview of mean staging time of Lesser White-fronted Geese at the Valdak marshes in the years 1991-95 as estimated from the "belly patch method".

Year	1991	1992	1993	1994	1995
\bar{x}	4,4	3,4	6,2	7,4	7,9
n	43	25	32	26	25

shots were fired with the cannon net, one shot the 21th of May and one shot the 24th of May. On the 24th of May, only six of the 32 adults present, were identified. The effect of the number of unidentified pairs has not been estimated, but we assess it to be no more than 1-2 pairs missing on the total number.

2.4 STAGING TIME IN SPRING

The geese graze intensively in the area, before leaving for the breeding ground. In 1995 the mean staging period for the pairs were 7,9 days, which is a little longer than in previous years (Table 2). The duration of the staging period is estimated through use of the "belly patch method". The significance of the variation will be described in a separate publication.

2.5 OBSERVATIONS ON AUTUMN MIGRATION

Until 1992 it was unknown for the project that the Valdak marshes were used also as a post-breeding staging area. However, not until 1995 the project has been able to monitor the geese at this time of year. This autumn the aim was to obtain data on the number of geese staging as well as on the chick production.

At Valdak, the first geese were observed on the 19th of August. A flock of 83 individuals with approximately 60-70% immatures were observed. The flock was also counted August 20th, and then 82 individuals were counted. The exact number of immatures was difficult to obtain, due to a very restless behaviour (Per Tangen pers. comm.). Field workers from the project arrived at Valdak on the

24th of August, and the geese were still present. Our experience confirmed the findings of Tangen. The geese were extremely restless, and conflicts occurred frequently, both between the adults, and between the adults and the immatures.

The flock was counted regularly and it turned out to comprise 85 individuals, 43 immatures and 42 adults (see also Table 5 and 6 [chapter 3] on brood counts and age ratios). The structure of the flock was unchanged from August 24th until it was last seen on the 29th of August. In the flock was also the pair with satellite transmitters which was caught on Valdak in spring, and the bird which was caught on the breeding grounds on the 27th of July. (see chapter 4.2).

Lesser White-fronted Geese were also heard on the morning of the 30th of August, but no birds were seen. At the 31th of August a new flock arrived between 12⁰⁰ and 14⁰⁰ hours. It consisted of 43 individuals. This flock splitted immediately in to two flocks of 25 and 18 individuals. The first flock consisted of seven adults and 18 immatures, and the second flock consisted of 12 adults and six immatures. In the second flock were also a female caught in the breeding area on the 31th of July. Both these flocks were seen regularly until the 5th of September. The flock of 25 individuals were last seen the 6th of September.

This autumn a total of 128 individuals was registered (61 adults and 67 immatures).

3. BREEDING AREAS IN FINNMARK

The location of the breeding areas are confidential data and is not reported here. The codes (A-G) used in this report are decoded in a confidential report to the environmental authority in Norway in 1994 (Aarvak & Brøseth 1994).

3.1 RESULTS FROM THE BREEDING GROUNDS

Three known breeding areas have been surveyed in 1995 in Finnmark. Area (A) and (C) are the most important breeding areas of the seven areas that have been used regularly since 1985. The project was unfortunately not able to survey all the breeding areas this year.

In 1995, the main breeding area in Finnmark (A) was visited in order to catch moulting geese for satellite tracking. The area was not mainly surveyed in order to obtain data on the total numbers of geese in the area or on the chick production. However, the whole area was carefully

searched for moulting geese. In the area, which covers ca 130 km², we found 18 adults and 21 goslings, distributed in six pairs with goslings, one adult with one gosling, one female and a pair without goslings, and one non-breeding pair (see also chapter 5). This agrees well with the surveys carried out in 1990 and 1994. Both in 1990 and 1994, the surveys were conducted during spring, in the pre-laying period. In 1990, 15-30 individuals (6-15 pairs) was estimated to be breeding in this area. In 1994 only 4-5 pairs were found, but the spring was very late this year, and it was assumed that all the birds had not yet arrived when the inventory was carried out (Aarvak & Brøseth 1994). Area (C) and (G), which are situated on the Norwegian-Finnish border, were also surveyed in 1995 by WWF-Finland. No Lesser White-fronted Geese were found breeding on the Norwegian side of the border in neither of the areas this year. In area (C) only one pair with five goslings were seen. In area (G), nine non-breeding birds which had just started moulting, were seen on the 26th of August (J. Markkola pers. comm.).

Table 4. An overview of the observations of Lesser White-fronted Geese and discoveries of tracks and signs on the breeding grounds in 1995. The areas A-G is situated in Finnmark county.

Area	Number of geese	Time period	Comments
A	18 ad. and 21 goslings	20/7 - 2/8 1995	Moult feathers and droppings from 1995 and 1994 found
B	no information exist from 1995		
C	2 ad. and 5 goslings		Moult feathers and droppings from 1995 and 1994 found
D	no information exist from 1995		
E	no information exist from 1995		
F	no information exist from 1995		
G	9 non-breeders	26/8 1995	Moult feathers and droppings from 1995 and 1994 found

3.2 CHICK PRODUCTION

For the first time the project has managed to accomplish counts of families and social groups in order to estimate brood size, productivity, and juvenile proportion of the population. These data, together with information on total number of geese, permit analysis of population fluctuations. Counts based on the proportion of adults and immatures in different times of the year, can give estimates on mortality and recruitment. These methods have been used on other species of geese, with varying results. The probably best method to estimate mortality and recruitment is through capture - recapture techniques, but this is, unfortunately, not advisable for the Lesser White-fronted Goose due to the very small population size in Fennoscandia.

Here we report our findings, without discussing possible differences and causes, because the material is still too fragmented to make valid conclusions. This is particular due to small sample size from earlier years, and methodical differences. Norderhaug and Norderhaug (1981, 1984) collec-

ted available data on egg clutches and broods in Fennoscandia from this century (year 1960 until 1980). The average clutch size was 4.9 (n=14), range 3-6. The average brood size was 4.1 (n=23), range 1-6.

In 1995, seven broods were found during the moulting period in area (A), and one brood in area (C). In addition, one pair and a lone female without goslings, were found in area (A) at the same time as the seven broods. They are assumed failed breeders, and are combined with the pairs with broods in Table 5. With the failed breeders, the mean production was 2,6 (n=10, S.D.=1,84). This is slightly more than in 1994 (Table 5, Figure 8). Counts made post breeding at the staging area Valdak (chapter 2.4) yields to different estimates on gosling production. Based only on pairs with goslings, we get a mean brood size of 3,9 goslings (n=17, S.D.=1,43). This figure takes not into consideration failed breeders and mortality after fledging. An estimate based on number of immatures divided by the number of adults (in pairs), yields a mean brood size of 2,2 (n=30 [Table 6]).

Table 5. Distribution of broods on the post-nesting staging area (Valdak marshes), and breeding areas (areas C & D) in 1994 and area (A & C) in 1995.

Area	Brood allocation							Mean brood size	SD	n broods	Year
	0	1	2	3	4	5	6				
Breeding area		3		1	1			2,00	1,41	5	1994
Staging area		1	2	4				2,43*	0,78	7	
Breeding area	2	1	1	3	1	2		2,60	1,84	10**	1995
Staging area			4	3	2	6	2	3,94	1,43	17	

* One flock of 32 individuals (16 goslings) has been omitted, because the distribution of broods are unknown (se also Table 6).

** A pair of non-breeders were seen in addition.

Table 6. Autumn age ratio and yearly brood sizes by Lesser White-fronted Geese, years 1981-1995, based on counts during autumn migration at the Valdak marshes.

Year	n adults	n immatures	n total	% immatures	n flocks	Mean brood		Observers***
						* brood	** brood	
1981	10	18	28	64,3	1	3,6		FR
1982-86	no data exist							
1987	10	18	28	64,3	1	3,6		JKN
1988-91	no data exist							
1992	24	34	58	58,6	?	2,8		CB
1993	no data exist							
1994	31	33	64	51,6†	3	2,4	2,2	PT, BOH, HM
1995	61	67	128	52,3	3	3,9	2,2	own observations

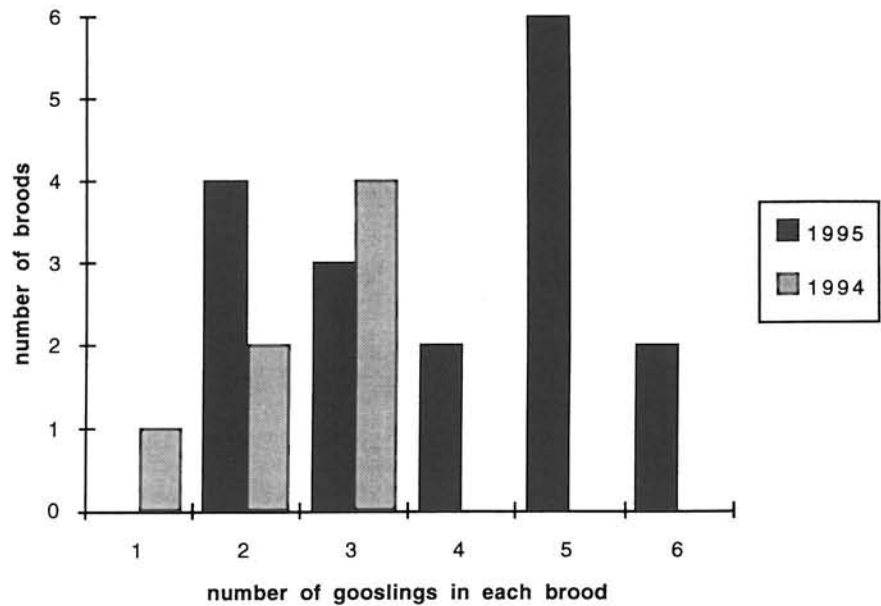
* Counts of pairs with broods.

** Number of immatures divided by number of adults (pairs).

*** Observers; Christina Bjørkli (CB), Bjørn Ove Høiland (BOH), Harald Mørken (HM), Jan Kåre Ness (JKN), Fritz Rikardsen (FR) and Per Tangen (PT).

† Assumed that the observations are three independent flocks.

Figure 8. *Frequency distribution of broods by number of goslings in the brood, during autumn staging at Valdak in 1994 and 1995.*



4. MIGRATION ROUTES AND WINTERING GROUNDS

4.1 BACKGROUND

As described in part 1.1, the Lesser White-fronted Goose has undergone a severe reduction in population size and range throughout its distribution area. Through The Norwegian Lesser White-fronted Goose project, an extensive survey of staging- and breeding areas has been undertaken in Norway, and the available data from Fennoscandia suggest that the main causes of the decline should be sought along the migratory route and in the wintering quarters (Øien & Aarvak 1993). This is in accordance with an action plan developed by IWRB for the Lesser White-fronted Goose. It is stated that the combination of negative factors potentially acting on the breeding grounds is probably not sufficient to explain the rapid rate of decline that took place after the second world war. Probably the sharp decline has been caused primarily by negative factors in the winter quarters, i.e. habitat loss and excessive hunting (Madsen 1995). Unfortunately, the migration routes and wintering grounds of the Fennoscandian population are poorly known.

In 1993 NOF made a project description of a project designated to identify the migration routes and wintering grounds by satellite tracking of individual birds. Once the staging and wintering areas had been identified, studies on habitat requirements, behaviour and conservation status of the species in the identified staging and wintering grounds should be initiated.

In 1994 NOF took part in a satellite telemetry pilote project run by World Wildlife Fund in Finland. One pair and one gosling were caught in the moulting period, and the male was equipped with a satellite transmitter. The male was tracked during late summer and was eventually found dead after one month, on an island in Finnmark county, Norway. The gosling was later shot in a wetland area near the city of Temrjuk, Southern Russia, the 19th of October the same year (Aarvak & Øien 1995).

In 1995 the plan of NOF was realised, in cooperation with the Norwegian Institute for Nature Research (NINA) and the Hungarian Ornitholo-



Figure 8. *Two of the authors T. Aarvak (left) and I.J. Øien (right) shows the satellite tracked pair caught at Valdak on the 24th of May.*



Figure 9. *Shows the way the satellite transmitters were attached by tubulon teflon tapes.*

gical and Nature Conservation Society (MME). The project has since the start, had a close contact with the finish and swedish groups, that works with Lesser White-fronted Geese. To ensure that the satellite telemetry project should work out properly, co-operation past national borders was a condition. A international network was created, with ornithological societies throughout Europe, BirdLife International, International Waterfowl and Wetlands Research Bureau (IWRB) and WWF-international. This was to ensure a good coverage, no matter where the birds should show up. It will also ensure that the continued effort to save the species, as soon as the staging- and wintering areas are located, will be better.

4.2 CATCH DURING PRE-BREEDING STAGING AT VALDAK

Catching highly mobile birds as geese, is not easy. Cannon-nets have proved to be the best option for goose catching, and seem to be the only reliable method. Other methods, as use of clap-nets, has been employed with varying success.

Field workers from NOF and NINA arrived at Valdak, Finnmark County, 13th May, before the Lesser White-fronted Geese arrived. The first days were used to test the equipment in another area, to ensure a perfect catch, and to make observations on the movements of the geese at the Valdak

marshes. On the 19th of May, two cannon-nets were mounted in the salt-marsh. The first shot was fired on the 21th of May. The pair that was shot at, took off and escaped because the net did not unfold properly. This was partly due to the very soft ground which reduced the power of the cannons. The next attempt was done on the 24th of May and this time a pair was caught. The biometrics, satellite-transmitter number, colour ring code and ring number are given in Table 7.

4.3 CATCH ON THE MOULTING GROUND

In late summer adult geese and one year old birds become flightless during the simultaneous moult of wing and tail feathers. During this period, the (arctic nesting) geese are extremely wary and depend on a safe area of water serving as a refuge. With varying success, depending on species, geese can be herded into a netting corral and caught. This technique exploits the birds escape behaviour. Pink-footed Geese *Anser brachyrhynchus* and Bean Geese *Anser fabalis* will retire on land and assemble on hillocks, while Barnacle Geese *Branta leucopsis* and Greylag Geese *Anser anser* will take refuge on water. In these species it is quite easy to catch large number of individuals. The Greenland White-fronted Goose *Anser albifrons flavirostris* is far more difficult to catch since the flocks are small and scattered over a wide area (Fox & Stroud 1981). This is the same situation that can be seen in the Lesser White-fronted Goose. When it discovers possible danger on long distance (as far as 2 kilometres) it will try to escape over land, and are able to move several kilometres in short time. When surprised at short distances, it rushes into water, but attempts to reach land as fast as possible in order to hide in the *Salix* vegetation.

The catch was carried out by eight persons divided in two teams. This was due to a better search ability, i.e. to survey larger areas in shorter time. The groups had to consist of at least four persons to independently carry out a catch if the possibility emerged. When geese were located the other group were called for by walkie-talkies, and then the whole team could participate. In short the following procedure was used. The geese were

located by use of telescopes from long distance. Then a team encircled the geese in a way that no one were seen or heard. One person directed the rest of the team from a vantage point with radios. Two persons in a rubber boat (with 7HP engine) were hiding nearby. Then at an appointed time the team appeared and flushed the geese to the water. The personnel in the rubber boat could subsequently carry out the catch with landing nets.

In the first trial the rubber boat got a tear and became of no use. In the second trial, at the 27th of August, the geese started to move from one pond to another before the team were in position, and we tried to encircle the flock in a small river valley, before they were able to get into a big lake where the geese would be out of reach for further attempts. This time the result was a male Lesser White-fronted Goose. One of the team were after the first catch attempt missioned to get materials to repair the boat. When he returned, and the boat was repaired, the next attempt to catch geese (31th of August) went very easy. The encircling team flushed a pair of geese on water, and from the rubber boat the geese were caught with landing nets in five minutes.

The biometrics, satellite-transmitter number, colour ring code and ring number are given in Table 7.

4.4 PRELIMINARY RESULTS OF THE SATELLITE TELEMETRY

By October 1995, four Lesser White-fronted Geese have been instrumented with satellite transmitters in Norway (Chapter 4.2 & 4.3). During November 1995, the intention is to instrument another two geese in Hungary, in cooperation with Hungarian Ornithological and Nature Conservation Society (MME).

The four transmitters (Chapter 4.2 & 4.3) have sent signals regularly since they were mounted on the geese. So far, the bearings have revealed a migration from the breeding ground to a post breeding staging area in northern Norway. There they rested for a few days before they migrated to a staging area in northern Russia. Through the bearings we were able to follow the geese from N. Russia to eastern Germany and further to

Hungary. A final report from the satellite telemetry project, with all the details, will be published separately when all the results are available.

The Finish project, run by WWF-Finland, has managed to instrument one male Lesser White-fronted Goose in 1995. This male migrated to the same area in northern Russia, but went further east than our birds in the following lap. It was, in early October, plotted in Kazakhstan

4.5 BIOMETRIC DATA OF LESSER WHITE-FRONTED GOOSE

Very little information is available on the biometrics of wild Lesser White-fronted Geese. This year, totally five geese has been caught, and the biometrics is presented in Table 7. Even though the sample size is limited, we assess it to be important to make the biometrics available.

Table 7. *Biometric data on Lesser White-fronted Geese caught in 1995. Measurements are given in millimetres og grams.*

	Individuals				
Ring number	345867	345868	361551	361552	361553
Satellite transmitter no.	24675	24676	24678		24677
Colour-ring code			R-B-Y*	R-Y-R*	R-B-W*
Sex	F	M	M	M	F
Age	3K+	3K+	3K+	3K+	3K+
Wing-length (left)	392	403	238**	232**	212**
Wing-length (right)	393	399	240**	230**	211**
Tarsus (left)***	75,4	80,0	80,0	83,8	73,2
Tarsus (right)***	70,0	78,0	82,5	81,6	74,3
Weight	2.250	2.000	1.850	1.760	1.500
Head + bill	82,0	87,6	91,0	91,7	84,4
Bill	29,3	35,0	37,0	33,7	34,3
White forehead (length)	27,2	32,0	27,9	19,5	20,7
Trapping date	24.05	24.05	27.07	31.07	31.07

* Colour-rings (read from above): R-B-Y = Red-Black-Yellow (Right leg), R-Y-R = Red-Yellow-Red (Left leg), R-B-W = Red-Blue-White (Left leg).

** The birds were caught during the flightless period (moult), and the wings were not fully grown.

*** Tarsus measured from the back of the intertarsal joint to the distal edge of last large complete scale at the front of the foot, and not from the notch at the back of the intertarsal joint. Measurements exist for individual no.345867 and 345868 with the last method.

5. REFERENCES

- Collar, N.J. & Andrew, P. 1988. *Birds to watch*. The ICBP world checklist of treathened birds. ICBP Techn. Publ. No.9, Cambridge.
- Fox, A.D. & Stroud, D.A. 1981. *Report of the 1979 Greenland White-fronted Goose study expedition to Eqalungmiut Nunât, West Greenland*. University College of Wales, Aberystwyth.
- Lorentsen, S.H., Øien, I.J., Aarvak, T. & Bangjord, G. (Behavioural data) unpubl.
- Madsen, J. 1995. *Action plan for the Lesser White-fronted Goose*. National environmental research institute, Denmark. 23pp.
- Norderhaug, A. & Norderhaug, M. 1981. The Lesser White-fronted Goose *Anser erythropus* in Fennoscandia. *Vår Fuglefauna* 4: 165-170 (in Norwegian).
- Norderhaug, A. & Norderhaug, M. 1982. *Anser erythropus* in Fennoscandia. *Aquila* 89: 93-101.
- Norderhaug, A. & Norderhaug, M. 1984. Status of the Lesser White-fronted Goose, *Anser erythropus*, in Fennoscandia. *Swedish Wildlife Res.* 13: 171-185.
- Øien, I.J. & Aarvak, T. 1993. *Status of Lesser White-fronted Goose Anser erythropus in Fennoscandia. A summary of the activity of the Lesser White-fronted Goose project 1987-1992*. Norwegian Ornithological Society. 47 pp. (in Norwegian)
- Øien, I.J., Aarvak, T., Lorentsen, S.H & Bangjord, G. *Individual recognizing of Lesser White-fronted Geese (Anser erythropus) by the belly patches*. Unpubl.
- Størkersen, Ø. 1992. *Threatened species in Norway. Norwegian red list*. Directorate for Nature Management. DN-report 1992-6 (in Norwegian).
- Aarvak, T. & Brøseth, H. 1994. Surveys on breeding ground and catch of Lesser White-fronted Geese in 1994. Klæbu: Norwegian Ornithological Society. Confidential. *NOF Rapportserie. Report No.1-1994* (in Norwegian)
- Aarvak, T. & Øien, I.J. 1994. The Lesser White-fronted Goose *Anser erythropus* — a threatened species in Norway. The activity of the Lesser White-fronted Goose project 1987-1993. *Vår Fuglefauna* 17: 70-80 (in Norwegian)
- Aarvak, T. & Øien, I.J. 1995. Recovery of Lesser White-fronted Goose *Anser erythropus* from Southern Russia. *Vår Fuglefauna* 18: 112-113 (In Norwegian with English summary)

APPENDIX 1

Overview of identified Lesser White-fronted Goose pairs at Valdak in May-June 1995.

		date																			
		15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	1	2	3	4
p a i r n u m b e r	1		x	x		x	x		x	x	x	x	x								
	2			x	x	x	x	x	x			x									
	3			x	x	x		x	x	x						x					
	4			x	x	x				x		x	x								
	5			x	x	x	x	x	x			x	x	x							
	6			x	x	x	x	x	x	x		x			x						
	7				x	x	x	x			x	x									
	8				x	x		x	x	x					x	x	x				
	9					x	x	x	x	x		x	x	x		x	x	x	x	x	x
	10						x	x	x												
	11						x	x		x											
	12						x	x				x	x		x		x				
	13						x			x		x	x		x		x	x			
	14						x	x	x	x		x			x						
	15							x		x	x	x									
	16							x				x	x								
	17							x	x	x		x			x	x	x				
	18							x	x			x									
	19								x	x		x			x						
	20									x	x		x	x	x		x				
	21									x	x										
	22										x		x	x		x	x				
	23												x	x	x			x			
	24												x	x	x	x	x				
	25																x				