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Roosta, Estonia, 27 April – 2 May 2001

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Introduction

The 6th annual meeting of the Goose Specialist Group of Wetlands International was held from 27 April till 2 May 2002, in Roosta, Estonia.

Sixty people from 20 different countries were present. Thanks to generous travel grants from the International Co-ordination Unit of Wetlands International and the Dutch agricultural counsellors in Moscow, Warsaw and Bucuresti we could also welcome participants from as far as Bulgaria, Kazakhstan, Kirgiziya, Poland and Russia.
The meeting was organized by the Environmental Protection Institute of the Estonian Agricultural University from Tartu, and our hosts did an excellent job in organizing the meeting.

The conference was held in a holiday centre in Roosta, some 100 km to the south-west of Tallinn, on the shore of the Baltic Sea. This centre was equipped with a conference centre and resaturant, and all modern facilities like a beamer for those wishing to use powerpoint, overhead projectors and even old fashioned slide projectors were available.

In the conference room, enlivened with many posters, we were welcomed by Professor Lembit Nei, the pro-rector of the Estonian Agricultural University.

Excursion

Spring 2001 was late in western Europe, so the expected large flocks of Barnacle Geese were not yet present, but we were able to see one of their primary spring staging areas around Matsalu Bay with already several thousands of these beautiful geese. Some Lesser White-fronted Geese were seen during the excursion, as well as many other interesting and spectacular birds, such as Sea Eagles.

Task forces

The most active of all of the goose task forces, the Lesser White-fronted Goose Task Force, chaired by Petteri Tolvanen and Ingar Øien,was again present in full strength. This threatened goose species is extremely attractive for many people, and the 'flying circus' of Christian and Paola Moullec was again a major topic for discussion. Johan Mooij brought a film about this French project, and Ingar Øien showed a very contrasting film about the Norwegian conservation effort to protect the last remaining wild Lesser White-fronted Geese.

Though most participants agree that the key issue to preserve and restore the Lesser White-fronted Goose is improved protection from hunting, it is often easier to raise funds for spectacular projects like the French project using captive Lesser White-fronted Geese imprinted to follow ultra-light aircraft.

For further information on the activities of the Lesser White-fronted Goose Task Force, I would like to refer to their website http://www.metsa.fi/natural/projects/lwfg/
Other task forces that have come into being, are the Bean Goose Complex Task Force chaired by Konstantin Litvin (RU), the Greylag Goose Task Force chaired by Leif Nilsson (SV), the Age-ratio Assessment Task Force chaired by Peter Cranswick (UK) and Kees Koffijberg (NL), the Bar-headed Goose Task Force chaired by Aleksandr Yakovlev (KG) and finally the Red-breasted Goose Task Force chaired by Sergey Dereliev (BG).

Acknowledgements

I would like to thank Aivar Leito and his team for organizing the 6th annual meeting of the Goose Specialist Group, and Ian Patterson for taking up the task of editing all of the contributions presented during the meeting in this volume, which will be send out to all 400 registered members of the Goose Specialist Group.

Next meeting

José Juan Chans invited us to have the next meeting at the Biological Station in the Cota Doñana in Spain in December 2002. Further details of the next meeting will be announced on our website (http://www.wetlands.org) at the beginning of 2002.

Bart Ebbinge
Chairman of the Goose Specialist Group.

Editor's note

The abstracts which make up these Proceedings are based on the set circulated prior to the meeting, with additional ones invited from delegates who presented posters or who made presentations to workshop sessions. The authors of the original abstracts were invited to modify them after the meeting, but only about half did so.

In the interests of uniformity, the abstracts have been restricted to one page. Authors who originally submitted longer abstracts were invited to shorten them, while those who submitted short texts were given the opportunity to expand them. In cases where this was not done, long texts have been shortened by editing and short ones have been given wider line spacing, to improve clarity.

All abstracts have been edited for English and for uniformity of format and conventions. Apologies to anyone who feels that the sense of their text has been altered!

Ian Patterson.

Obituary

Lambart von Essen (1920-2000)

Special attention was paid to the death of Dr Lambart von Essen, who died on 27 July 2000. This Grand Old Man of the Lesser White-fronted Goose conservation work, as Juha Markola wrote in his obituary, died at 80 years of age. He started his re-introduction programme of the globally threatened Lesser White-fronted Goose in Östermalma (Sweden) in 1981, and built up a new stock of well over a hundred Lesser White-fronted Geese, breeding in Swedish Lapland, and wintering in the Netherlands. He achieved this by using semi-captive Barnacle Geese, which were known to migrate annually from Sweden to the Netherlands, as foster parents. Regularly Lambart came to the Netherlands to look at his favourite goose 'Limping Lotta'.

His project was criticized, because some scientists feared that these cross-fostered Lesser White-fronted Geese would pair up with Barnacle Geese later in life. This, however, did not happen, and the released Lesser White-fronts paired with their own kind, possibly because all their siblings were Lesser White-fronts, too. Later DNA-analysis shed some doubt on the origin of the captive breeding stock that Lambart von Essen was using, and this problem is still under investigation.

However, when Lambart started his project in 1981 nobody was aware of this problem. The charming and cheerful way in which he enthusiastically devoted his life to this project will make us all remember him with deep respect as a devoted and honest man. Moreover, Lambart's experiment proved conclusively that geese really learn from their parents where to migrate in winter, and are thus not genetically 'shaped' in this respect.

Bart Ebbinge

Lambart von Esseni foto

Abstracts

Staging geese and conflicts with agriculture in the Azov-Black sea region

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The northwest Black Sea, the Azov Sea, Sivash, and the deltas of the Dnieper, Dniester and Danube, together form a very important wintering migrating and breeding area for waterfowl.

In this region six species of geese were registered: the Greylag Goose, White-fronted Goose, Lesser White-fronted Goose, Bean Goose, Snow Goose and Red-breasted Goose. In addition, three species of *Branta*: *Branta bernicla*, *B.leucopsis*, *b.canadensis* have been registered as rare or sporadic migrants.

A considerable increase in the number of migrating geese and their staging during migration have been observed in the region in the last 15-20 years. This is the result of the total increase in their numbers, changing of traditional winter sites (for example by the Red-breasted Goose), caused by the warming climate, improving of the forage reserve in the autumn-winter period (development of irrigating and watering agriculture, rice industry and others), improving bird protection, and the creation of new protected territories, including IBA.

Regular staging geese during the migration season number from some hundreds to 1.5-2.5 thousands. Important areas are; the Danube delta with Danube lakes, Dniester delta and adjoining estuaries, the Dnieper delta; Yagorlitsky, Tendrovsky, Dzhaarylgachsky , Karkinitsky bays; Central and Eastern Sivash, Utlyuksky and Molochny estuaries; Obitochnaya spit; and the ponds in Askania-Nova nature reserve. During the spring migration, salt-marshes, where geese may feed and close to large water bodies, and fields of winter wheat, are important for staging.

The White-fronted Goose is the most numerous wintering goose species and during the migration makes use of fields of winter wheat. In the Danube delta region the damage to winter crops caused by geese reached 90%. Producers of grain are displeased by this fact. They started to use simple scarers, but they are not effective. The same problems occur in the whole Azov-Black Sea region. So far, this conflict remains unsolved.

Impact of hunting activities on the Greylag Goose (Anser anser) population wintering in the Guadalquivir Marshes.

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The Guadalquivir Marshes has long been known as the most important wintering area in Spain (Calderon *et al*. 1991) and also traditionally site for hunting waterfowl in general, and the greylag goose in particular (Chapman y Buck 1910, Mulero 1987). We analyse the evolution in the hunting practices: hunting areas, hunting-bag limit and evolution of wintering greylag goose population. In the other hand, lead shot ingestion is the main cause of heavy metal poisoning in waterfowl, and lead has been recognized as an important cause of death in birds for more than a hundred years (Bellrose 1959, Sanderson and Bellrose 1986). As one of the more common waterfowl species wintering in the Guadalquivir marshes, the Greylag Goose is likely to suffer considerable lead contamination from ingestion of spent shot-gun shot (Mateo *et al*. 1998). In winter 98/99 we found lead gunshot in 17.74% of the gizzards analized, and 4% in winter 99/00. On the other hand, in April 1998 the Aznalcollar mine tailing lagoon failed and approximately 5 million cubic metres of acid wastes rich in heavy metals were released into the Guadiamar river, which is a major tributary of the Guadalquivir, threatening the Doñana area.

The sludge contained 1.2% lead, and 8 out of the 11 bird species tested from affected areas following the accident had elevated blood lead levels (Benito *et al*. 1999). Lead isotopes ratios (blood) were determined to ascertain their exposure to pyrite sludge from the toxic spill of the Aznalcollar mine verses other lead sources such as hunting. The first results seem to show that Greylag Geese wintering in Doñana area are exposed to considerable lead contamination from gunshot, but not generally to the pyrite sludge (Meharg *et al*. in press). In addition, X-Ray examination of individuals found dead or killed by hunters showed that a high percentage of them (50% in winter 99/00) to have gunshot in their tissues, representing a potencial risk for raptor species, including endangered ones like Spanish Imperial Eagle (*Aquila adalberti)* or Red Kite (*Milvus milvus*). Last winter (1999/2000) we found lead shots in 1.4% of the Red Kite pellets studied and in 5.26% of the Spanish Imperial Eagle ones. All these results suggest that hunting is an important factor impacting goose populations wintering in the Guadalquivir marshes and hence all the species whose diet is based on geese during the winter time.

Age assessments of geese: current activity in Europe and options for integrated flyway monitoring

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Monitoring recruitment in goose populations is essential for research and conservation. Monitoring of demographic parameters is integral to understanding of population processes. Productivity assessments can also be used as an alert to potential problems on the breeding grounds, as a forewarning of change in population size, and to help determine bag limits.

For most goose species, plumage differences and behaviour enable age assessments (the proportion of young and brood size) to be made in the field by experienced observers. These are normally carried out in the autumn staging or wintering grounds. However, a number of factors may cause variation between samples, including plumage, time of year, location, habitat and flock size. Thus, in NE Scotland, the proportion of young Pink-footed Geese decreased steadily after arrival. By contrast, the proportion of young Dark-bellied Brent Geese in Britain in 1999 increased to a peak in mid winter, before declining again in spring, and there was marked variation in the proportion of young for samples according to flock size.

Many countries make age assessments on an annual basis. However, in some recent years, owing to the lack of international co-ordination, no assessments were made for some species. Consequently, a questionnaire was distributed to national co-ordinators to determine the extent of age assessment activity and assess the how and if countries might contribute to an internationally co-ordinated scheme.

At the time of Goose2001, replies had been received from around 10 countries, mostly those bordering the North Sea. Assessments for populations with restricted distributions was already occurring in some countries, e.g. Svalbard Pink-footed Goose. However, for widespread populations, notably *fabalis* and *rossicus* Bean Goose, Russian White-fronted Goose and Northwest Europe and Central Europe Greylag Goose, assessments were apparently made in only a small part of the range.

It is suggested that co-ordination of an international scheme should focus upon common standards (for survey methods and data in particular) and timing (to ensure common 'priority dates' across the ranges; ideally, assessments should be made early in autumn or early winter, to avoid losses due to hunting and while young can be aged readily in the field).

A brief workshop discussed a range of points; co-ordination with Wetlands International; linkage with the goose database; the means of co-ordination; common standards for age determination and sampling; agreed dates for the international census; and guidance to counters. It was agreed to establish an Age Assessment Task Force under the auspices of the Goose Specialist Group to take this work forward.

Management of geese grazing agricultural land on Islay, Scotland during the winter and spring

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The island of Islay lies off the west coast of Scotland and attracts 40-50,000 geese from Greenland (Barnacle Geese *Branta leucopsis* and Greenland White-fronted Geese *Anser albifrons flavirostris*) during the winter and spring. These geese feed on grass pasture which is used for rearing sheep and cattle, and the economic damage to the farming economy has been estimated to be about £12,000 per farm (about 19,000 Euro). With over 100 farms on the island, the total cost to the island's economy is clearly substantial.

A management scheme has been put in place to assist in scaring geese off sensitive pasture types (new reseeds) while allowing geese to feed on other pastures, for which compensation payments are made on the basis of past goose grazing pressure. Compensation payments are liable to exceed £600,000 (~952,000 Euro) with additional money being spent on scaring equipment and staff to manage the whole scheme. Licences to shoot Barnacle Geese have been granted as an aid to scaring, with numbers strictly controlled to ensure that total numbers shot do not endanger the conservation status of this important winter/spring population. The poster will discuss each element of the management scheme, with particular reference to the overall policy framework for managing goose populations present in Scotland during the winter and spring period that the Government agreed to in 2000.

Density dependent population limitation in Dark-bellied Brent Geese

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The dynamics were investigated of the world population of Dark-bellied Brent Geese (*Branta b. bernicla*, L.), which winter in western Europe and reproduce on the Siberian tundra. The world population fluctuated between approximately 220,000 and 310,000 individuals in the last decade of the 20th century—after recovering from an extremely low level of about 15,000 in 1955. The cyclical fluctuations are related to the population dynamics of lemmings on the Taymyr Peninsula in Siberia and have been present during the whole study period 1955-1998. We investigated whether, apart from these fluctuations, the population size will level off due to density dependence in reproduction or in survival. This being the case, we also aimed at predicting the approximate equilibrium population size.

Data are provided on the world population since 1955, giving details on adult survival and reproduction. A simple discrete-time model was formulated where the reproductive season in Siberia and the winter season in Europe are treated separately allowing for density dependence during either season.

The nature of the density dependence for the model was estimated from the data. Density dependence was significant in reproduction, but not in adult survival. We argue that availability of suitable nesting habitat is an important factor influencing reproduction potential, but the possibility of other influences (e.g. during spring staging) cannot be excluded.

Analysis of the simple model yields a relation between the predicted equilibrium population size and a constant adult death rate estimated at 0.149, which corresponds to a predicted equilibrium population size of 300.000. Although it is tempting to use such a generic model as a basis to gauge effects of habitat loss on migrating bird species, great care should be taken in formulating rules-of-thumb.

Key words: density dependence, seasonal environment, *Branta b. bernicla*, population modelling, population limitation.

Nomadism or site-fidelity: two different breeding strategies in Dark-bellied Brent Geese.

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Dark-bellied Brent Geese often nest in association with Herring Gulls, but can also nest very successfully within territories of nesting Snowy Owls, or more or less scattered on the tundra. Because of year-to-year variations in predator pressure, the latter two types of nesting habitat are not available every year. Snowy Owls tend to breed only in lemming peak years (once every three years on the Taimyr peninsula), and the same Snowy Owl territories are not occupied on a regular basis. This means that in order to use these types of nesting opportunities Brent Geese have to adopt a nomadic strategy and have to search for suitable nesting sites immediately after arrival in the breeding area. Within Herring Gull colonies, which are predictable from year to year, individual Brent Geese can be be very site-faithful.

Individually marked Brent Geese have been studied during two complete lemming cycles from 1990-1995 in the Lidia Bay, Pyasina delta, western Taimyr. Additional information from the wintering grounds allowed us to determine whether individuals were stiill alive and thus to estimate the rate of return of surviving individuals to the same nesting site.

The data were recorded as $Y_{ij} = 1$ in case goose i returned to the breeding site in year j, and $Y_{ij} = 0$ when goose i did not return in year j. The latter required a sighting of that goose at the wintering grounds or a return in any subsequent year. Observations which did not meet these requirements were denoted as missing. The observations were modelled by means of the following Probit-Normal model:

$$Y_{ij} \sim \text{Binomial}(1, P_{ij}) \qquad \text{for goose } i \text{ and year } j$$

$$\text{Probit}(P_{ij}) = \mu_{ij} + E_i \quad ; \quad E_i \sim \text{Normal}(0, \sigma^2)$$

$$\mu_{ij} = \mu + year_j + ringingsite_{k(i)}$$

The binomial distribution arises naturally in this context, with P_{ij} the probability of returning to the breeding site. This probability is linked to *year* and *ringing site* effects, analogous to ordinary probit regression. A random goose effect E_i was added which reflects the assumption that some geese are nomadic (with low values of E_i and thus a low probability of returning) and others are site-faithful (with high values of E_i). Parameters in this model were estimated by means of maximum likelihood, which necessitated a general purpose optimisation routine.

It is postulated that at the present high Brent Goose population levels gull colonies are fully saturated as a Brent Goose nesting habitat, and an increased proportion of the Dark-bellied Brent Goose population has to adopt a nomadic breeding strategy.

Spatial-temporal pattern of goose bags in Hungary - effect of shooting on dynamics of huntable goose species

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The author describes and analyses the spatial-temporal pattern of distribution of two species of goose bags, that of the Bean Goose (*Anser fabalis)* and the White-fronted Goose (*Anser albifrons)* that can be hunted in Hungary, in the period of 1970-2000. He compares the temporal changes of pattern with the dynamics of species according to the database of the Hungarian Goose Monitoring Scheme. It is possible to determine the spatial pattern of distribution of goose bags and the temporal changes in the distribution. Since Bean Geese mostly stage and winter in Dunántúl (the west part of Hungary) while White-fronted Geese tend to stage and winter in Alföld (Great Hungarian Plain in the east of Hungary), there is a close relationship between the numbers of the staging-wintering stock and the spatial distribution of goose bags.

The author determines the hunting pressure and the changes of hunting pressure based on the scale of exploitation and the number of staging-wintering individuals. It is possible to show the relation between the increase in hunting pressure and the decrease of the staging-wintering stock particularly in case of White-fronted Geese. The decrease of the stock of White-fronted Geese was, however, the result of the combined effect of the increased hunting pressure and other ecological factors.

The changes of the stock dynamics of Bean Geese and consequently, the changes of Bean Geese bags can be explained mainly by the shortage of food supply as a result of privatization (decreasing sites of corn cultivation and consequently, the decrease of harvest and harvest losses).

The Hunting Decree introduced in 1993 (8/1993) determined the modes of goose hunting and it limited goose bags to four geese per hunter per day. We have also established the network of reservation zones in the traditional night gathering and resting sites where hunting is strictly banned. In addition, this degree - up to the present day - permits the hunting of White-fronted Geese only when a specific official hunting permission is issued.

The wise use of exploitation introduced by this Hunting Degree and the changes of certain ecological factors (a more humid period) enabled an increase in goose populations staging and wintering in Hungary.

Trends in the breeding and staging population of the Greylag Goose (Anser anser) in Hungary

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Sterbetz(1966) estimated the breeding population of the Greylag Goose in Hungary in 1965 to be 250 pairs - without the Hungarian part of Ferto-tó. By 1977, the population has grown to 350-400 pairs (Sterbetz 1984). In the beginning of the 1980's, Aradi and Kovaks (1982) gave an estimate of 650-760 pairs of the breeding population of the Greylag Goose. In the second half of the 1990s the Nomenclator Avium Hungarae (Magyar *et al.* 1998) estimated the breeding population of the Greylag Goose in Hungary at 1,000-1,100 pairs.

In the course of the breeding population census of 2000, however - contrary to the previous data - we have found a minimum of 2,000 breeding pairs in Hungary, which is almost twice as much as the previous estimate. The author shows the distribution of the breeding population of the Greylag Goose in 2000, he locates and describes the characteristic breeding habitats and determines the low scale of endangerment of nesting sites. The basis of the increase of the population was the protected location of nesting sites, the lack of disturbance and the abundant food supply. The increase was foreseen since the surveys in September organized by the Goose Research Group, which already included the year's reproduction, gave an estimate of 10,000-12,000 individuals.

The breeding population has increased during autumn with newcomers. While in the beginning of the 1980's the culminating number was first 8000-10,000, then it accounted for only 3,000-4,000 individuals, in the November of 1999 we observed 39,700 individuals, which was almost four times (ten times) greater than the former results.
This happened in a period when the Greylag Goose is a species listed in the II/1. Supplement of the EU Bird Directive, which means that it can be hunted all over Europe. The species can also be hunted in the countries bordering Hungary which are not members of the EU as well as in the breeding sites of the birds who just frequent Hungary. On grounds of these trends and quantity relations, a proposal was made to determine the hunting season of the Greylag Goose and to limit it to the period between 1 October and 31 December. It was also proposed to limit the bags to four geese per hunter per day. In addition, there is a valid hunting ban in the gathering and wintering sites.

Management of herbivorous bird species in the Schleswig-Holstein Wadden Sea region

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In the Schleswig-Holstein Wadden Sea region, measurable damage to crops is caused by three species that can be considered to originate in the Wadden Sea, the Brent Goose *Branta bernicla*, the Barnacle Goose *Branta leucopsis* and the Wigeon *Anas penelope*.

Whereas the Brent Goose mainly conflicts with agricultural grazing schemes and hay production on the Halligen (small low saltmarsh islands), the Barnacle Goose and the Wigeon cause damage to arable crops and grassland on the mainland coast and on the islands.

The Hallig Programme, which solved the goose damage conflict on the Halligen, was implemented in 1987 and revised in 1992. It was adopted to secure and improve the income of the Hallig population and to ensure that the Halligen are preserved in their present state. The programme takes into consideration the interests of landscape protection, agriculture, coastal protection, nature conservation and tourism. The programme, which is financed through European Union, federal and state funds, is voluntary. The Hallig Programme finances activities which enhance nature conservation, compensates for restrictions in farming practice and compensates for damage done by Brent Geese to grazing areas for domestic animals. Two further schemes which are included in the Hallig Programme restrict further the number of grazing animals and compensate for the total abandonment of agricultural activities on saltmarshes.

In the middle of the 1980's damage to arable crops in Schleswig-Holstein increased dramatically. Damage is mainly caused by Wigeon and Barnacle Geese and to a lesser extent by Greylag Geese *Anser anser*, Brent Geese, Mallard *Anas platyrhynchos* and swans *Cygnus spp*.. There is a long history of damage to arable crops by the Barnacle Goose on the Schleswig-Holstein west coast, at least since the beginning of the last century. Large scale feeding on arable crops by the Wigeon is a relatively new phenomenon, first recorded on the west coast at the end of the 1980's. The extent of the damage to arable crops fluctuates greatly from year to year depending on weather conditions and their effect on the damaged crops. In "normal" years about 1000 ha of winter crops, mainly winter wheat and winter rape, are damaged. Compensation for damage done to arable crops by *Branta* geese and Wigeon on the west coast of Schleswig-Holstein has been paid by the state government since 1991. Guidelines for the compensation of damage to arable crops by Branta geese and Wigeon were implemented in Schleswig-Holstein in 1994. Compensation payments for damage to arable crops caused by ducks, geese and swans in Schleswig-Holstein in the winter have fluctuated from about 100,000 DM in 1993 to 450,000 DM in 1994.

Both Wigeon and Barnacle Geese feed on grassland adjacent to the Wadden Sea. According to reports of farmers considerable local damage is caused to meadows by these species. Since autumn 1998 financial support in the form of contracts has been offered to farmers by the state government as part of a nature conservation scheme "Zukunft auf dem Lande" (according to Regulation EG Nr.1257/99).

For further information see: www.wattenmeer-nationalpark.de

Early autumn migration in Norwegian Greylag Geese: an effect of hunting?

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Recoveries of non-breeding Greylags ringed during the moulting period in Vikna and Vega in central Norway 1961-71, indicated a principal migrating period of Norwegian Greylags from September to October at this time. The moulting grounds in Vega recruits local birds or birds from farther north, while Vikna recruits local birds as well as birds from the Baltic area. While many Vikna birds thus were shot in Denmark from 1 August, only one from Vega was shot there before September. Most of the Norwegian Greylags were still present in Norway in September, as shown by the numbers shot there in September and October.

Observations of neck-banded birds both at Vega and abroad since 1986 clearly indicate that many Greylags from Vega today often migrate south gradually as early as the beginning of August. At the end of the 1980's many Greylags left the breeding area on the first day of the open season (21 August), probably as a direct response to the intense disturbance caused by the hunting all day round, with no refuges for the geese. Data from shot geese shows that many birds had not fulfilled their wing feather growth when the open season was changed to 10 August. They were thus forced to migrate south with reduced flying capacity and in with less body reserves than they normally would have at the start on their migration.

The hunting pressure was thus intense, mainly on late breeders, including both adults and their juveniles that had not migrated when the season opened. It seems thus reasonable to expect that this might have resulted in a skewed mortality rate between early and late breeders. This may be the reason for the observed change towards early breeding during the 1990's. Further studies, including survival rates and breeding success of neck-banded Greylags at Vega are, however, necessary to improve the validation of this hypothesis. This change will also be studied in light of a possible reduction of *Zostera* along the Norwegian coast around 1980.

Recent changes in the spring staging area in Norway for Svalbard Barnacle Geese.

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A further expansion of the spring staging area for Svalbard Barnacle Geese has taken place since the mid-1990's. Many birds are now staging as far north as the Vesterålen area (69°30'N), about 450 km north of the traditional staging areas around Vega (65°40'N). Although the northern limit for staging has changed dramatically, the southern limit has not altered since the mid-1970's. Possible reasons for establishment of staging areas farther north may be habitat degradation in the southern staging areas, changes in local management strategies for geese in the southern staging areas (under local management plans geese are scared from intensively managed grasslands to refuge areas on marginal land), a rapid increase in the population or climatic changes. Effects on future population growth and population dynamics will be investigated, as birds staging further north may profit energetically on a much shorter final stage of the migration route to the breeding places on Svalbard.

Resightings of ringed individuals indicate that there is a general shift northwards, with known individuals altering their staging area from e.g. Herøy in the south to Vesterålen in the north. This is a recent phenomena, which coincided with co-ordinated scaring on Herøy. At the same time the population increased, and this must also have led to geese moving to new areas when the traditional sites probably reached carrying capacity.

Barnacle Geese formerly staged on island archipelagos with low intensity management. Due to depopulation of the traditional staging islands and a cessation of land management the geese have begun to stage in intensive farmland areas or to islands farther north grazed by sheep. The shift to new staging areas has resulted in a conflict with agricultural interests in areas not previously grazed by Barnacle Geese.

Spring staging areas of the Greenland White-fronted Goose identified by satellite telemetry

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During spring 1998 and 1999, ten Greenland White-fronted Geese fitted with satellite transmitters on the wintering grounds at Wexford, Ireland, migrated to West Greenland where they provided new information on spring staging areas and staging periods. The geese staged in 11 different areas, of which eight were new and three were previously known from aerial surveys performed in 1995 and 1997. In 2000, areas known from previous aerial surveys together with the new areas identified by satellite telemetry were surveyed from the air. On 15 and 16 May, the numbers of Greenland White-fronted Geese were counted at 34 of these areas in ice-free West Greenland between 66º 30' N and 70º N. A total of 3,177 geese were counted in 28 staging areas, three of which held more than 50% of all geese counted and c. 75% of which were counted in six areas.

The average minimum staging period for these geese was 11.2 days, but the staging period in 1998 was significantly shorter (7.2 days) than in 1999 (13.3 days). This difference was probably due to a 4ºC higher mean May temperature in 1998 compared to 1999. Seven of the 10 tagged geese used northern staging areas (north of 68º) before continuing northwards, and this distribution differed significantly from the distribution of all geese counted on the staging areas. This more northern distribution fits with the general pattern of geese wintering in the southern part of their range tending to nest in the north of the breeding range. Although 11 known spring staging areas fall within territories designated as Ramsar wetlands of International Importance, only two of the six best sites are designated in this way.

Key words: Greenland White-fronted Goose, spring staging, satellite

telemetry, West Greenland, Wexford-Ireland, Ramsar sites

Changes in Barnacle Goose nest distribution on Vaygach Island (1986-1997)

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Studies on the breeding biology of the Barnacle Goose (*Branta leucopsis*) were carried out at the Dolgaya Guba Bay area (70°15'N, 58°48'E), northeast of Vaygach Island, in 1986-1988 and 1995-1997. The search for nests and mapping their position were conducted in an area of up to 130 km^2 from the beginning of June till early August. We determined clutch and egg size, timing of breeding and breeding success. A total of 223 nests congregated in 11 colonies, of up to 35 nests, were found. Barnacle Geese preferred to lay eggs in permanent nest-cups.

In the area inspected, ca. 200 nest-cups were found, of which only 94 were occupied in 1988 (a season with optimal weather conditions). The largest colony consisted of 32 nests and was found at sea-cliffs of the bay. In 1989-1988, all nests were located at ledges of river and sea cliffs, in canyons, rocky outcrops and on small islands in lakes, i.e. at sites partly accessible for Arctic Foxes. Approximately half of nests were inland, in canyons and cliffs up to the center of the island (ca. 15 km off the coast). No nests were found in flat habitats.

In 1995-1997, the distribution of nests within breeding habitats was different. Several small colonies were initiated on the coast and at nearshore small islands at sea. The position and size of the largest colony at the sea-cliffs, which consisted of 35 nests in 1996, was the same. Geese numbers at inland colonies on rocks decreased and some colonies disappeared altogether. Nest numbers at the cliff-face colonies in the canyon of the Yangoyakha River that were studied in most detail, decreased but several nests were initiated on the flat bank. In 1996, five single nests were found in flat habitat 3 km off the coast. Three of those clutches survived till hatching. In general redistribution of nests from inland to coastal nesting habitats took place. Barnacle Geese seemed to ignore the traditional Vaygach Island breeding sites on rock and canyon ledges and began to nest on flat habitats.

The increase in the Russian population of the Barnacle Goose, and the initiation of colonies along the migration route, cannot be explained by overpopulation of traditional breeding habitats. The revolutionary switch between breeding habitats took place not only at new breeding sites on the coast of the Barents Sea but also in breeding areas at Vaygach Island.

Greylag Geese and conflicts in Orrevatnet Nature Reserve, Rogaland, Norway

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Orrevatnet Nature Reserve is unique in Norway, concerning the number of birds, the diversity of species, bird migration, hunting history, location, magnitude etc. In autumn 1999, there was a trial with the purpose of deciding the amount of compensation to the farmers for their loss of hunting income due to the establishment of the reserve in 1996. One of the main topics during the trial, was the banning of duck shooting and the subsequent increase in damage to farmland.

The reserve is almost 100 acres, 90 % of which consist of lake and the rest of land. It has been known for centuries as both a national and international important area for birds all year round. The breeding population of Greylag Geese has probably been stable for a while. However, it is difficult to access the change in numbers, since the geese are very timid and are easily disturbed from the area. Daily counts show that the numbers change depending on the breeding period, weather conditions and disturbances in the area. In August-September, the number of Greylag Geese can reach 1200–1500 individuals.

The winter population is more stable, and in the latest years there has been approximately 200–300 birds without any significant increase after the establishment of the reserve. Other species of geese may also be a significant part of the area's total number of geese. During the winter 98/99 there were 40 Pink-footed Geese, 70 Bean Beese, 4 Barnacle Geese and 10-15 White-fronted Geese in the area. In the period November 1997-January 1998, 1,500 White-fronted Geese were observed in the area.

The Greylag Goose is however the most numerous goose in Rogaland County, and from 1980 the shooting ban for Greylag geese was lifted after being in affect for several years. In 1995, the year before the establishment of the reserve, 620 geese were shot around the water. Today geese are occasionally shot legally.

The largest flocks of geese have been observed during spring and autumn migration. In interviews in 1989, more than 70 % of the farmers claimed that they have observed flocks with more than 100 geese, and that most damage is done to perennial pastures. Interviews with 52 farmers in 1999 show that 83% claim to have fields damaged by birds, and 50 % claim that the damage is due to geese and swans.

Due to conflicts between farmers and the geese, between hunters and the environmental authorities, between birdwatchers and the hunters and farmers, it has been decided to start a process in order to create a management plan for the area. It is the hope, that the process and the final result will benefit the farmers, hunters, environmentalists and the birds.

Der moderne Zustand der Artenpopulation von Anser indicus und die Aktualität seines Erhaltens

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Im Vortrag sind die Ergäbnisse von Felduntersuchungen des Zustands der Artenpopulation von Gänsen Anser indicus enthalten, die vom Autor in 1991-2000 Jahren im Territorium des Kirgisistans durgeführt wurden. Die relative Analyse von erhaltenen Ergäbnissen mit den Literaturangaben der ähnlichen Daten vom 50er und 90er Jahren (Kydyraliev A. 1991) zeigt, daß die Anzahl der Artenpopulation in lätzten 30-35 Jahren 10-15 mal reduziert wurde und bleibt auf dem Niveau, das unfähig ist, seine Reproduktion unter den natürlichen Bedingungen zu gewährleisten.

Die Naturschutzmaßnahmen, die von der Regierung Kirgisistans in 1970-2000 Jahren (Jakovlev A. 1997) durchgeführt wurden, inkl.die Verfahren der Reintroduktion, die vom Autor in 1995-1999 Jahren (Jakovlev A. 1998) verwirklicht wurden betsätigt, daß mit den Anstrengungen eines Staates in den Grenzen seines Territoriums kann man nicht dieses internationales Problem lösen, das ist genau das Problem des Erhaltens von Anzahl der Arten. Diese Schlußfolgerung bestätigt sich mit der Analyse der Literaturangaben von Forschern für die Population der Berggänsen innerhalb Kirgisistans in den Überwinterungsstationen in China (Bishof, M 1997) in Indien (Gole P 1987, A. Salim, 1961) in Pakistan (Roberts T. 1991), sowie mit Hilfe von Untersuchungen von Orgive M. 1978) und anderen, die von katostrophischer Reduzierung der gesamten Anzahl und Areal seiner Verbreitung in den letzten Jahrzehnten zeugen.

Deswegen das Hauptziel ist das Informieren der internationalen wissenschaftlichen und naturschützlichen Öffentlichkeit, mit dem Ziel, die Strategie zu erarbeiten und die koordenierten Anstrengungen durchzuführen, um die Art im ganzen Lebensraum zu erhalten.

Im Vortrag werden die Gründe der Reduzierung von der Artenanzahl verhandelt und werden die Maßnahmen für die Stabilisierung seiner Anzahl angeboten.

The goose fields of Olonetz : co-operation between conservation and agriculture

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The grass fields of Olonetz, southern Karelia, are particularly important as a spring staging area for White-fronted Geese *Anser albifrons* and Bean Geese *Anser fabalis*. The geese use the fields for feeding during the day and rest on the water of Lake Ladoga and big, open peatbogs during the night. During a three-year study financed by WWF and conducted by the Karelian Academy of Science, over one million individuals of 130 bird species were registered in an annual spring study. In addition to harbouring geese, these fields are also used for winter hay production to feed dairy cows of nearby state farms. Recently, the goose fields have become over-grown by bushes due to decreased grassland management. Economic difficulties during the last ten years have made the necessary cultivation of the fields impossible.

For the past two years, WWF and the Baltic Fund for Nature have co-operated with the main state farm "Iljinsky" in Olonetz to improve grassland management in favour of both cattle and geese. The co-operation has involved discussion meetings to develop a common understanding of problems, exchange of expertise, a study tour to Sweden discussing and experiencing mowing techniques and diary production, and financial support to improve grassland management, grass seed quality and species composition.

The result has been very positive. The yield of perennial grasses has increased by 24.3%. The "Iljinsky" farm harvested 42% more winter cattle feed than the previous year, which was enough to fulfill the demand for a whole year. As a result of better cattle feed, annual milk production has increased substantially and the farm's total milk production increased by 25%. This increase also resulted in an increase in milk revenue by RUR.

Several bird watching towers have also been built. Cooperation with local tourist entrepreneurs has begun so that tourists interested in spring goose migration are able to visit the area, thereby helping increase opportunities for local people to earn a living.

The Friends of the Lesser White-fronted Goose

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The Society "Friends of the Lesser White-fronted Goose". The objective of the "Friends of the LWfG" society is the survival of the Lesser White-fronted Goose *(Anser erythropus)*. The Friends support a LWfG farm at Hämeenkoski, Finland, in order to re-introduce the LWfG in their original Scandinavian breeding range. We also support conservation efforts on the breeding and wintering areas and along the migration routes co-operating with authorities in different countries and organizations of nature conservationists and hunters. The farm is run all year round by Pentti Alho, who takes care of the birds' well being.

The Lesser White-fronted Geese of the World. The Lesser White-fronted Goose *(Anser erythropus)* is almost extinct in Europe and globally critically threatened. East Siberian LWfG migrate to China, western ones migrate to the Caspian and Black Sea regions. The main reasons for the decline are deterioration of wintering grounds and hunting in East Europe and Asia - in sharp contrast to the favourable conditions arctic geese meet on their wintering grounds in West-European countries, like the Netherlands where hunting is restricted.

The Finnish and Swedish Re-introduction / Re-stocking Project(s). The Finnish and Swedish LWfG were lost in the 1970's and 1990's. No more than 100 birds survive in Norway. These birds seem to migrate south to the Balkan peninsula.

In Sweden, all LWfG belong to a population created by the re-introduction programme. They are manipulated to migrate to the Netherlands, and number more than 70 today. In Finnish Lapland about 150 captive-born Lesser White-fronts were released in 1989-97, but none of them were observed there later. The problems of the natural population also affected the re-introduced birds. The Finnish project's failure was not total, though. We have learned how to farm LWfG, a difficult task in many ways, since these geese are very sensitive, and lay only half a dozen eggs a year - no more even if the eggs are removed from the nest. To secure the growth of the Swedish / Finnish population, up to 150 goslings a year are needed. It is the intention of the Friends of the Lesser White-fronted Goose, to use our farm at Hämeenkoski - the world's largest production site of LWf goslings - for this purpose.

Captive birds**.** The LWfG is regarded as a species with only one race. A recent DNA-study hints at possible racial differences and possible hybridization of captive birds with Barnacle Goose *(Anser albifrons);* these species seem to hybridize naturally. The Swedish and Finnish re-introduction programmes are conducting thorough studies of the genetic background of their captive stock (Cf. our second poster). Probably, re-stocking will continue in 2002.

Except for the Finnish and Swedish re-introduction farms, far fewer than 100 LWfG are known to be held in zoos. In addition to this, there are some private bird-keepers. No recently caught birds are known to exist in captivity, since the last pair was killed by a dog. As it is already almost impossible to obtain pairs of free living LWfG, the captive ones form an immensely valuable gene bank of these rare birds.

A mathematical model for the population growth of the re-introduced Lesser White-fronted Goose, (*Anser erythropus*) in Sweden

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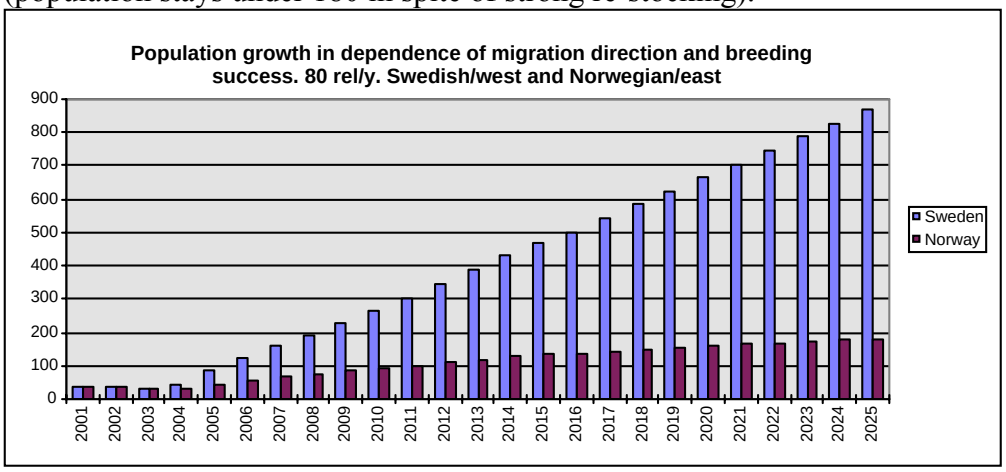
The protection status of the original Scandinavian LWfG population has been clarified by recent studies, notably the reports of the LIFE-Nature sponsored Finnish/ Fennoscandian Lesser White-fronted Goose conservation project, and the Swedish re-introduction project. Of the natural population (> 10.000), less than 100 survive, dying out at a rate of 5% . The reasons can be found along the migration routes; these LWfG migrate south-east. To reduce the extreme mortality - particularly of 1. cy. birds - along this route, hunting control is urgent, but imposing it meets with problems. All measures should be taken to rescue the natural population, but we must prepare for their extinction. In the Swedish re-stocking programme, LWfG goslings were imprinted on Barnacle Goose *(Branta leucopsis)* foster parents, thus creating an alternative migratory behaviour and a dramatic drop in the migration mortality.

The fertility of the re-introduced 70-80 geese in Sweden surpasses their mortality. My mathematical model predicts the future of this population. As a sample of results, the diagram below compares population growth with 80 annually released goslings and either Swedish/Netherlands (continuing growth) or Norwegian/East migration behaviour (population stays under 180 in spite of strong re-stocking).



The economy of re-stocking**:** Taking into account the cost structure of the program, we recommend the Swedish system, and annual release of 80 goslings: This builds upon the calculation sketched below. The direct goal is defined to be a free-living population of LWfG producing 100 natual goslings annually. Direct farming costs sum up to 500 Euro for each released gosling -- but carrying out the actual re-introductions and keeping all the necessary infrastructure going needs an independent part of at least 30,000 Euro / year. This estimate leads to the following cost table. Monitoring and research add to these numbers (Remark: Risks rise with slow re-stocking.):

annual releases	20	39	50	**80**	100
needed years	54	40	26	**18**	15
1000 Euro / year	40	45	55	**70**	80
M Euro / total	2,2	1,8	1,4	**1,2**	1,2

The Barnacle Goose in the most important bird areas (IBA) in Estonia

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West-Estonia is the most biogeographically important key area for the Barnacle Goose (*Branta leucopsis*) as a stop-over region, with as many as 180,000 – 200,000 individuals using this region as a major place for feeding and resting during the spring migration. To select and protect the areas, which are important for staging Barnacle Geese, the Estonian Ornithological, Society (EOS) has identified them during the Important Bird Areas (IBA) project. IBAs are important sites for the conservation of the world's birds by applying locally a set of objective criteria to an internationally agreed global standard.

Altogether, 20 out of 53 IBA's in Estonia fulfil the criteria of international importance and 18 of them qualify as having a global significance for the protection of the Barnacle Goose. Unfortunately only 33% of IBA's important for the Barnacle Goose are afforded by some legal protection through their overlap with the national protected-area network. All IBA's are important from the EU Birds Directive viewpoint as part of the NATURA 2000 network. EOS will present all appropriate areas as candidate Special Protected Areas (SPA) for the final designation.

Focus on the Caspian Sea. A Regional Action Plan for Protection of the Lesser White-fronted Goose (*Anser erythropus*).

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The Caspian Sea Region is very important for migratory water birds from Western Siberia and North Eastern Europe. Millions of water birds winter or stop on the coastal wetlands of the Caspian Sea and unfrozen water reservoirs. The Lesser White-fronted Goose (*Anser erythropus*) is one of the most endangered of them.

During last few decades the world population of the LWfG has decreased to one-fifth. The present number has been estimated to be around 15,000 to 20,000. About half of the geese migrate to or through the Caspian region. Reasons for the dramatic decrease of the LWfG are; the reduction of relevant wintering habitats due to growing human population; increased hunting pressure and disturbance everywhere; and the transformations of coastal zones due to the water level fluctuations of the Caspian Sea by 2.5 m in the 20th century.

Scientific information about the annual life cycle of the LWfG is still insufficiently available for the goal orientated protection measures of the species. Most international joint efforts have so far been directed to the breeding grounds of the species. The continuous decline of the species has affirmed us that it is now the last moment to draw our attention to what is going on by the migration routes and wintering grounds of this beloved goose.

A group of waterfowl specialists from Azerbaijan, Finland, Islamic Republic of Iran, Kazakhstan, Kyrgyz Republic, Russian Federation, Turkmenistan and Uzbekistan is deeply concerned about the alarming state of the LWfG. They have prepared by means of International co-operation and financing the booklet ”Focus on the Caspian Sea” for accelerating protection measures of the species. The aim of the project is to 1) create a monitoring programme and network and 2) to compile national Action Plans for the protection of the species. The third and most difficult phase is to implement conservation measures in practice.

Looking for molecular markers: using of the RAPD-PCR analysis for determinaton of the DNA-polymorphism among two close species - White-fronted Goose (*Anser albifrons*) and Lesser White-fronted Goose *(Anser erythropus)*.

Kholodova, M.V., Chendrik, A.G. and Skuratov, N.I.
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The White-fronted Goose (*Anser albifrons*) and Lesser White-fronted Goose *(A. erythropus)* geese are very similar. The rate of divergence tested by means of the analyses of the control region (one of the most rapidly evolved regions of the mtDNA) was rather low (Ruokonen 2001). The aim of our work was to determine some molecular markers which can help in identification of these two species. At the first stage, we tested the RAPD-PCR analysis which is able to give an information about the total DNA. This method is based on the amplification of genomic DNA by using a single oligonucleotide of random sequence as primer. The amplification products resolved on agarose or polyacrilamide gel give rise to a complex pattern, specific for a given genome. In comparison to the classic methods, RAPD doesn't need previous information regarding the sequence, and only little DNA (Williams *et al*., 1990; Welsh *et al*., 1991; Masetti *et al*., 1996).

We used muscle and feather samples of 7 LWfG collected in nature (Polar Ural region), 11 LWfG from the farm in Finland, and 7 WfG from the Moscow Zoo. Preliminary results show that our two primers were able to show the differences between these species. The RAPD patterns of wild LWfG and from farm birds were very similar with primer P03 (fig.1) and identical with P4. All patterns of LWFG were different from the patterns of WfG. It is interesting, that the WfG samples were different not only from LWfG but also were polymorphic in their own group. The RAPD-PCR patterns from feather and muscles were similar, so both can be used -- very useful for non-invasive sampling, important for endangered species. The number of tested samples was limited. More are needed to study the relationship between these species and to find the most informative molecular markers which can help in conservation of the LWfG and study of the hybridisation problem.

RAPD pattern with primer P03**.** Wfth- wild LWfG (feather), Wmscl- wild LWfG (muscle), WF - WfG, L - LWfG from farm.

Wfth	Wmscl	L7	L9	L10	L13	L15	WF2	WF3
___	___	___	___	___	___	___	___	___
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Increasing importance of the Dutch Wadden Sea to spring-staging Barnacle Geese

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The Netherlands are situated within the core wintering area of Barnacle Geese in Western-Europe. Numbers counted during peak occurrence in December/January have increased considerably and varied between 218,000 and 263,000 individuals in 1995-99. Parallel to the increase of the wintering population, spring migration has been delayed and large numbers stay within the country well into April, with departures until mid-May. For this reason, an additional census of Barnacle Geese was added to the national monthly goose surveys in 1997. These counts show that in April up to 75% of the wintering population might still be present.

The most important concentrations are found in the eastern part of the Wadden Sea, especially the Frisian and Groningen mainland coast, the Dollard area and the island of Schiermonnikoog. Recently, spring distribution tends to expand westward to islands of Ameland and Terschelling. This recent increase of spring-staging Barnacle Geese is discussed with respect to changes in habitat in the Wadden Sea, westward expansion of breeding areas and possible interactions with Brent Geese.

Problems of the Greylag Goose breeding population in the Gopło Millenium Park - Landscape Park in the Twentieth Century.

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Lake Gopło is the location of one of the largest colonies of the Greylag Goose in Poland. The goose has been present continuously in the region of this water body since the late 19th century. At that time it was probably one of the few known breeding grounds of this species in Poland. In the early 20th century several breeding pairs living in the northern part of Potrzymiech bred here. In the 1960's the population numbered as many as 100 nesting pairs, and in the late 1980's the breeding population amounted to 300 pairs. In the years 1988-1996 there were between 130 and 150 nesting pairs. The majority of the nesting pairs are located in the central part of Gopło.

At Lake Gopło individuals marked with green, black, and white plastic collars were found. Of the marked birds observed, the majority had green collars, which are used to mark Greylags in the Milicz Ponds Reservation. In 1995, four marked birds were observed, of which three were marked in Poland and one in Spain. In 1996 as many as 17 geese with collars were recorded, of which 13 were marked in Poland, three in Spain, and one in Germany.

The more detailed investigation of the breeding biology of this species was started in 1997. The breeding behaviour, especially adoption and nesting success, was noted. Fisheries, angling and sailing cause disturbance to birds, and hunting and recreation are problems. Other threats are reed-harvesting and egg contamination.

Study of genetic relatedness among individuals of the wild Greylag Goose breeding at Lake Gopło - project and preliminary results

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Field observations have led to the suggestion that Greylag Geese (*Anser anser*) engage in intraspecific brood parasitism and extra-pair fertilization. Also, the adoption of goslings by the adults has been observed. To study these issues, we launched a project with the use of DNA markers to detect the scale of the problems. We collected blood samples from several species of ducks and geese. The aim was to determine the sequences of the starters in order to observe differences among individuals in the Greylag Goose genome. From 2001 we will start to mark nesting geese individually with colour neck-bands (we propose green/black) and we will collect their blood to examine the relatedness among members of goose families and between the families.

Did the organochlorine contamination found in the eggs in incubated broods cause its desertion by hens of the Greylag Goose ?

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The investigated eggs were collected in the Lake Gopło, Wielkopolska Region, Poland. Polychlorinated hydrocarbons, due to their lipophilic properties, can accumulate in the bodies of Greylags at the time of intensive feeding on cultivated fields after their return from wintering grounds and at the time of laying eggs in the spring. We collected 16 eggs from deserted nests and, for comparison, three eggs from normally hatched nests in 1998 and 1999, respectively. In all the eggs we found chlorinated aromatic hydrocarbons like HCB, HCH isomers, DDT and its metabolites. The results show that the concentrations of polychlorinated hydrocarbons were higher in 1998 than in 1999. The differences in the contents of Lindane (Y-HCH), p.p'DDD, p.p'DDT and Endrin were highly statistically significant between the years.

Elasticity analysis of the European and Western Asian Lesser White-fronted Goose (Anser erythropus) population

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The Lesser White-fronted Goose (later LWfG) is the most threatened of the goose species occurring in the Western Palearctic. For example the Fennoscandian population declined during the 20th century to one percent of the original size. The reasons for the decline are partly unknown, but it is obvious that hunting along migration routes and in wintering quarters and earlier also in the moulting and breeding areas is the main reason.

The aim of this study was to find out what factor (survival probabilities of different age classes; breeding success) affects most the population growth coefficient (λ). This would give a chance to target the conservation work where it is most effective. A tool to probably achieve this goal was supposed to be the elasticity analysis.

For the elasticity analysis a half-year life cycle graph for the LWfG was made. The survival probability during the first half year (from the 1st calendar year in the autumn to 2nd cy. in spring) was calculated according to the data produced at Valdak marshes, Norway, which is a staging area of both broods in autumn and returning flocks in spring. The rest of the of survival probabilities were calculated from the data collected in Finnish spring staging areas 1985-1999. Breeding success (measured as female goslings that have survived until autumn and arrived to the first autumn staging areas) was calculated from juvenile percentage observed at Valdak marshes and in Northwestern Kazakhstan.

Results show that the most important factor determining the population growth coefficient is the survival probability of the adults, both overwinter and oversummer. Their elasticity value was c. ten times higher than that of any other factors. A measure to apply this in practical conservation could be to inform hunters to avoid shooting adult LWfG and White-fronted Geese (ie geese with the white front patch), since these two species are almost inseparable in hasty hunting situations, but the age classes are are quite easy to separate. This result also brings out the greater harmful effect of the spring hunting, since at that time presumably a much larger proportion of the hunting bag consists of 'valuable' adults than is the case in the autumn.

Migration strategy of Arctic breeding Barnacle Geese with special reference to passing and staging in Estonia

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The influence of climatic conditions on the migration phenology of Barnacle Geese is well documented. The mean arrival date of geese in Estonia has been 10 days earlier in mild winter and early spring periods in 1970's and 1990's compared to the cold winter and late spring period in 1960's (Leito 1996 and unpubl.). In the wintering ground in Germany and the Netherlands the weather dependent movements ("Pendelzug") of geese are common (Busche 1977, etc.). In this way the Barnacle Goose is very flexible to the climate-weather changes.

The direct dependence of the migration on the food quality is not yet finally proved, but the fact is that the geese follow the young vegetation, with the highest water and protein content and digestibility rate. When moving to the north in spring, an additional positive co-factor of food quality is an increased caloric value of plants from south towards north. The energy content of plants is also higher in spring than in winter (Bliss 1962, Dyleyjova 1975). In the Russian population of the Barnacle Goose the accumulation of fat deposition starts in late winter in the Netherlands and Germany and finishes in spring staging areas in Estonia and Gotland. Much higher utilisation rate of the food (MEC) in spring in Estonia compared to the wintering ground indirectly confirm the dependence of spring migration on food quality (Leito & Renno 1983).

The duration of staging is determined mostly by the time of fat deposition. The Barnacle Goose needs a period of 10 days as minimum for full fat deposition to be in condition for the long migration flight. In spring staging, the geese must accumulate additional energy for egg laying and hatching. For that reason the geese need a higher quality of food and a longer period for staging in spring compared to the autumn.

In long staging the geese have also more time to find the best feeding sites and learn to know the neighbourhood to avoid predators and to become accustomed to human activities. Being a long-lived bird and having steady staging sites the geese know the area better and better from year to year. In this way they can minimise the energy spent for food finding, avoidance of danger and maximise the efficiency of fat deposition.

The situation of staging areas is predetermined by the geographical location of the breeding and wintering grounds, on the migration strategy in general and on the distribution of sources available. For the Russian population of the Barnacle Goose the only suitable region for mass-scale staging is situated in the Baltic Sea: along the coast of West Estonia and in large islands like Saaremaa, Hiiumaa and Gotland. There are located large coastal meadows and arable lands attractive for feeding. There are no habitat limits for the region as whole but only for local sites. Besides occupying the new coastal areas, the geese are feeding more often on the fields inland.

On habitat management for geese in Matsalu nature reserve

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Man has inhabited the Matsalu area since it appeared from the sea as the result of land-lift. Grazing and mowing have shaped thousands of hectares of wet meadows. Greylag, Bean, White-fronted and Barnacle Geese stop on the meadows both in spring and in autumn. Most of the European population of the Lesser White-fronted Goose (ca 40 individuals) also migrates through the area.

Regaining of Estonian independence followed by radical de-regulation of agriculture resulted in dramatic drop of agricultural production in Estonia. Numbers of domestic animals dropped, coastal and alluvial meadows started quickly to fall out of use, threatening - among other wetland values - the habitats of migrating geese.

The first management plan for the Matsalu wetland was endorsed by the minister of environment in 1994. In order to avoid loss of the meadows mowing and grazing contracts with the farmers are prescribed in the plan. Money for that has been allocated since 1996. Contracts are made every year for meadow management. The area of the mown alluvial meadows has risen from ca 500 ha in 1995 to more than 2,000. Grazing pressure has slightly increased but in most cases is still insufficient. Integrated coastal zone management plan for Matsalu area was ready in 1996 and was further elaborated as an integrated coastal management plan for Väinameri area in 2000. Several international projects have been launched in order to implement these plans. In spite of some success in managing the wetland the problems are still with us. Below is a sample of problems, objectives and actions related to goose habitat management from the ICM plan for Väinameri. Of 21 problems outlined in the plan, three are important to goose habitat management: overgrowth of the meadows; conflict between the farmers and geese; and further decline in agriculture.

Objectives for five years

Of 10 management objectives in the plan following three are important for geese: restoration and maintaining of optimal grazing intensity on coastal pastures; harvest of hay on 3000 ha of alluvial and other wet meadows; and clearing valuable meadow sites from bush or reed.

Actions necessary to achieve the objectives

1. Restoration and maintaining of optimal grazing intensity
2. Harvest of hay on 3000 ha of alluvial and other wet meadows
3. Clear valuable meadow sites from bush or reed

All the above listed actions are being implemented in the course of daily activities of Matsalu Nature Reserve management. However, the scale of the actions must be further increased and the integration with other sectors enhanced.

Activities and results of the Finnish Lesser White-fronted Goose Life Project 1997–2000

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EU Life-Nature project for the Lesser White-fronted Goose (LWfG) was implemented by Finnish conservation authorities and voluntary organisations (WWF) in co-operation with the Wetlands International LWfG Task Force and a number of national and international organisations e.g. in Norway and Russia. The aims of the project were; to gain actual information about migration routes and wintering areas where to target conservation efforts and survey different LWfG sub-populations; to improve public awareness of the endangered status of the LWfG, especially among hunters; and to intensify protection of the LWfG in breeding, staging and wintering areas.

Migration routes and wintering areas were searched by tagging LWfG with satellite transmitters in Russian main breeding areas. The Yamal (Western Siberia) LWfG migrated to NW Kazakhstan, to which some LWfG coming from Nordic countries have been followed by satellite. The Taimyr (Central Siberia) LWfG also migrated to the steppe lakes of Kazakhstan, but more east, results thus confirming the outstanding importance of N Kazakhstan. Only one of the transmitter LWfG reached the wintering quarters or their vicinity in the Caspian Sea area, others were shot earlier or the transmitter stopped. The connection between stop-over sites of Estonia, Bothnian Bay, Finland and Norway was confirmed thanks to colour-rings and registration of individually-recognisable belly patches.

Improved monitoring in known key-areas and inventories in newly revealed places gave updated estimates of different sub-populations and their trends in Eurasia. In the concentration area of the main Eurasian population in NW Kazkhstan 5,770, 7,300-12,300 and 3,880 LWfG were counted in 1997-99. The western population (Scandinavia - Central Siberia) seems to number 8,000-15,000 individuals. Combined with recent winter figures in China this suggests at least 24,000, probably 30,000 as the global population.

All Finnish breeding and staging areas of the LWfG were included in the Nature 2000 network. A hunting-free zone will be established on Bothnian Bay Coast at Säärenperä, which is the second most important starting area in Finland. The expropriation process of this area will be completed by summer 2001. In Kazakhstan hunting free zones were expanded around some roosting lakes.

Increasing LWfG conservation networking and international co-operation and improving public awareness took place. To make the LWfG conservation work known to a wide international audience “Fennoscandian Lesser White-fronted Goose Conservation Project Annual Report“ was established together with the Norwegians, and it has now been published for three years.

Conservation situation and habitat restoration programme of the Ramsar Area – Old Lake at Tata (Hungary)

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The Old Lake at Tata is one of the most special wintering areas of geese in the Pannon region. Its main characteristic is that the lake serves as one of the nicest examples for the concurrence of nature and culture. In spite of the fact that it has a comparatively small extension (220 hectares altogether), 20,000-35,000 geese (mainly Bean and White-fronted Geese) spend their winter here together with lots of ducks and gulls. The lake is nearly completely surrounded by the town called Tata with 25,000 inhabitants, though the wider area of the lake is also considered to be one of the most urbanized regions of Hungary.

The Old Lake and its near 600-hectare area have been a nature conservation area since 1977 and a Ramsar area since 1989. Waterfowl shooting has been forbidden since 1993 (12% of geese being bagged came from here previously). However, in consequence of considerable urbanization there are many combined effects pressing heavily on the geese spending the winter on the lake. The most important effects are: lighting effects of the town's public lighting; traffic noises of the town, the near motorway and the railway; petards and fireworks on New Year's Eve; headlights of the cars illegally entering the shore of the lake; direct disturbance from people (walking on the ice or in the bed, skaters, autumn fishing period, etc.); and the growth of the built-up areas in Tata in the last two hundred years.

The fact that geese visit the Old Lake in large quantities in spite of these environmental effects even these days is due to consistent nature reserving measures. However, in order to maintain the Old Lake as a Ramsar area in the future it is necessary to do some certain reconstructing intervention at present. The most important habitat restoration tasks are: rehabilitation of the shore-zone (restoration of the 10 hectare creek near the estuary); removal of the concreted shores and restoration of the former quicksand of approximately 2 kms length; removal of the considerable part of the 1.2 million m^3 silt which has accumulated during the decades (forming the new sandbank system in the bed as a resting place for geese); extensive increase of the reeds (restoring the 30 hectares of reeds of the 1960's) and naturalizing a practical experience; shaping approximately 200 hectares of biological screening field to improve the quality of the "Által" brook which nourishes the lake and increases the habitat near the lake; revision of the water regulation system of the lake, primarily considering ecological and recreational guidelines; launching of an integrative programme to protect the water quality and to modernize leasehold in the entire 460 square km catchment area of the lake; establishment of a nature reserve information center; and launching of ecotourism

The expenditure forecast of the "Ecological Rehabilitation Programme of the Old Lake at Tata" is about 13 million Euros.

Breeding of Greylag Geese in the Matsalu nature reserve

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The Matsalu reedbeds and islets have long been among most important nesting sites of Greylag Geese in Estonia. About half of the Estonian population was found to nest here in the first half of the last century (Paakspuu, 1973). Due to an overall increase in the Estonian population, especially during 1960-1970's when the species colonised many small islets, the share of Matsalu has fallen to about one third.

Greylag Geese nesting in the reeds of Matsalu were counted from helicopters in 1980-1988 (Kastepõld, Mägi, 1994). Numbers of pairs fluctuated between 157 and 306, averaging 240. The preferred habitats were inner parts of the reedbeds with small pools where the species breeds colonially. Many fewer geese can be found both in the dry overgrowing part of the reedbed and in the outer part with large pools.

Breeding of Greylag Geese on islets of Matsalu bay and Väinameri has been monitored since 1958. The numbers on Väinameri islets peaked at over 100 in 1980's, having increased tenfold from the beginning of the study period (Mägi, Kastepõld, Paakspuu, 1993). The numbers of the Greylag Geese on the Väinameri islets have somewhat declined during 1990's, probably due to competition for nesting sites with the growing numbers of mute swans. Both species prefer the same islets as nesting sites. Nesting on the Matsalu bay islets has fluctuated from 10-15 pairs at the beginning of study period, through temporary recessions to an average of 40 pairs in the last decade of the century, having peaked at 72 pairs in 1994.

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Staging of geese in the Matsalu nature reserve

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Matsalu is an important stopover site in East-Atlantic flyway of arctic waterfowl. Shallow bays, coastal and alluvial meadows and reedbed are perfect for resting of geese while surrounding fields offer food for all species of geese. During the spring regular counts were carried out in 1996-1999. Once a week coastal and alluvial meadows and fields were checked to estimate the number of staging waterfowl, i.e. geese. Autumn migration numbers were collected during the evening census in 15 years period; also in 1998-2000, regular checking of coastal meadows, reedbed and fields was carried out.

The Bean Goose (*Anser fabalis*): Arrives at the end of March, resting usually on the Kasari meadow. Total number exceeds 1,000 in one week. During the day feeds on surrounding fields, often together with White-fronted Geese. In autumn arrives numerously (counted more than 1,600 individuals at once) in the end of September and stays for a couple of weeks.

White-fronted Goose (*Anser albifrons*): Staging sites and arrival are similar to Bean Goose. In the end of the migration period stops also often on coastal meadows of Matsalu Bay and in mouth of River Kasari. The number in spring might be up to 3000. In autumn a few thousands stop for a short period in the beginning of October in shallow end of Matsalu Bay. Non-stopping flocks might be observed also in the same time.

Lesser White-fronted Goose (*Anser erythropus*): Recently discovered stopping site on Haeska coastal meadow where up to 40 geese might stop. Feeds in surroundings of Haeska. Few LWfG have been observed in flocks of Barnacle Geese.

Greylag Goose (*Anser anser*): In spring, the earliest migratory birds stay in flocks together with Bean and White-fronted Geese. Numbers are usually between 1,500-2,000. In June about 600 geese moult on the Moonsund islets. In the fall Greylags are the most numerous geese, with 5,000-11,000 individuals. For roosting, prefers Kasari meadow and coastal plains.

Barnacle Goose (*Branta leucopsis*): Most numerous goose in spring. Arrival in the middle of April, and number grows constantly up to 45,000 until departure in last decade of May. Prefers coastal plains – Haeska, Põgari, Salmi, Saastna where flocks up to 10,000 individuals are gathering. Often also on surrounding meadows and fields. In autumn couple of thousand are staying from September to November. In this time Barnacles more often are leaving the coastal areas and are coming to inland fields.

Brent Goose (*Branta bernicla*): Passes the Matsalu area at the end of May in small numbers. The species has been observed a couple of times on small islets (flocks of 200 individuals).

Field choice of staging Greylag Geese in southernmost Sweden during spring

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As a part of a long term study of a neck-banded Greylag Goose population in south Sweden, regular counts of geese have been undertaken in an inland and a coastal area in SW Sweden from the arrival of the first geese in spring until the geese left in autumn. The study population breeds in the lake area but use both the coastal area and the lake area as staging areas before breeding in spring. The lake area is mostly used by local birds for staging before breeding and by non-breeding flocks, but in early spring they are joined by staging geese from further north in Sweden.

In the coastal area staging Greylags are mostly found just after the arrival in January and February or during colder periods when they are forced to leave the inland for the coast which has much less snow. The geese mostly change between feeding on autumn-sown cereals (mostly wheat) during cold periods and grassland during milder periods. In one spring they used left-over sugar beet spill.

In the inland area, the dominant field types used are grassland and winter wheat. A golf course close to one of the lakes is also much used both by staging and local Greylags. At the arrival in February winter-wheat accounts for a large proportion of the feeding Greylags, but this proportion decreases over the season and more and more feed on grassland areas close to the lakes. The geese also use newly sown fields when available, picking up the corns.

Generally conflicts with agriculture are relatively limited during this period of the year mostly being related to feeding on newly sown fields. Locally breeding geese will make an inpact on spring sown cereals, the families sometimes being joined by pre-moulting flocks.

Turnover of individuals in a local population of Pink-footed Geese in autumn

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In the first two months after arriving in Britain in autumn, the Iceland/Greenland population of Pink-footed Geese shows a significant decrease in the proportion of juveniles and in mean family size. The cause of this decline is not clear, but could involve different migration times of families and non breeders, or of larger and smaller families, or could be the result of differential higher shooting mortality suffered by juveniles.

A recent increase in the proportion of the population marked with neck collars has allowed an analysis of the turnover of individuals in a local roost population at the Loch of Strathbeg in the north-east of Scotland. This shows that the autumn population at the site is highly dynamic, with most marked individuals staying for only a few weeks, so that age ratio and family size estimates are being made on a continually changing sample of the population. Different components of the population may pass through the area at different times during the autumn, since birds marked with neck collars in north Iceland occurred at Strathbeg significantly earlier than those marked in central Iceland in both autumn 1999 and autumn 2000. This might in turn suggest that the decline in the percentage of juveniles and in mean family size is related to a later passage through the area of a part of the population with more non breeders and smaller families than the earlier birds.

Status of the most important staging areas of the Bean Goose in Finland

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The Bean Goose is the most abundant staging goose species in Finland. The breeding population is considered to be stable. The Bean Goose is a very valuable game species and thousands of hunters are seeking it during the hunting season from 20 August to 31 December. The number of hunters and the bag of Bean Geese have increased in the last decades but the population size has been stable or has shown a slightly decreasing trend in some areas.

However, the size of the population migrating through Finland is unknown. The spring migration starts at the end of March in south-western Finland and in early April in central Finland. The peak numbers has been observed to be one or even two weeks earlier in the 1990's than in the 1970's. The trend seems to be fixed. When it comes to the migration routes, it seems that there are two different routes during spring migration in Finland. Ringing studies have shown that the migration route starts from southern Sweden. The Bean Goose flocks cross the Bay of Bothnia and arrive in south-western Finland. This route flows along the eastern coast of the Gulf of Bothnia to the Oulu region and further to the breeding grounds in northern Finland and north-western part of Russia.

There are at least six sites in this western route where the peak numbers of staging geese are over 1,000 individuals regularly on spring migration. The Bean Geese rest and feed in the large field areas in western Finland. The most important staging areas are located near the city of Oulu in central Finland. The peak numbers are regularly 5,000-8,000 individuals. The other main staging areas are located near the cities of Pori, Kristiinankaupunki, Vaasa, Kauhava - Lapua and Siikajoki. The other migration route seems to go along the south eastern and eastern part of Finland.

The most important staging areas of this route are located in the north Karelia. Peak numbers of the most important sites on this route are fewer than 500 individuals regularly. In general, it seems that the number of important staging sites where the goose numbers are over 1,000 individuals has increased from 1970's to 1990's. The trend of the population size is unclear. BirdLife Finland has paid a special attention to the status of the Bean Goose in Finland. They have start a special project that aims to clarify the population size and the possible trends of the species in Finland.

Red-Breasted Goose in Ukraine

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The northwestern coast of the Black Sea from the Danube Delta (45°30' N 29° E) to the Dnepr Delta (46° N 32°30' E) including the Yagorlystski and Tendra Bays and the area of the Azov coast and Crimean Peninsula, hold the highest concentrations of Red-breasted Geese in the Ukraine during migration. The most important area for the geese in winter is between the Danube and the Dniester Rivers. It is a Ramsar site wetland – Tusla limans. During the winter, the geese migrate between the Ukraine and Romania-Bulgaria depending on weather conditions;

Spring migration through the Azov-Black Sea basin begins in early March, with mass migration occurring during March-early April. In autumn, birds begin to pass through the region during the September, with mass migration occurring in October-early November. The Red-breasted Geese are usually seen mixed with migrating White-fronted Geese. The distinction between birds on migration and those staying to winter in the Ukraine is not clear. However, birds arriving during late November to early December are assumed to winter in the Ukraine, and birds seen from early March onwards are assumed to be on migration to the breeding grounds.

Numbers of Red-breasted Geese wintering in the Ukraine are likely to have increased during the 1970's as the geese shifted from the Caspian to the Black Sea. In the period up to 1989, wintering numbers were thought to be about 100, but since then counts have increased from 86 in 1980 to a maximum of 9,175 in 1998 **(**Rusev *et al.*, 1998**).** The lower numbers recorded in winter 1996 (370) were probably due to the very cold weather that year when birds were likely to have moved further south (Rusev *et al.*, 1997). The increase in Red-breasted Goose numbers over the past 5-10 years is likely to be the result of better coverage during mid winter counts.

The Red-breasted Goose is listed under Category II of the Red Data Book of the Ukraine, and as such, any hunting of the species is illegal. However, illegal shooting is widespread in staging and wintering areas. The hunting season for legal quarry is on Saturdays, Sundays and Wednesdays from the second Saturday of August until the end of November or mid December. The season can be prolonged, however, by the hare-hunting season, which occurs from December to January.

Hunters and farmers have used the apparent increase in numbers on the wintering grounds to successfully lobby for an increase in the duration of the hunting season and an increase in shooting quotas from one to three geese per hunter per day. Though protected by law, at least 1,000 Red-breasted Geese are shot annually during the hunting of White-fronted Geese. There is concern that this will cause a decline in the birds using that area. Hunting activity requires greater control through the enforcement of tougher legislation and more restrictive quotas.

The bag of grey geese Anser sp. in France during the hunting season 1998-1999, with special reference to the Greylag Goose Anser anser

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Two enquiries have been carried out in France 15 years apart, allowing the calculation of specific hunting bags. Regarding the grey geese (Greylag Goose *Anser anser*, Bean Goose *A. fabalis* and White-fronted Goose *A. albifrons*), which are game species of minor importance in France, the national hunting bag has been estimated at 18,000 (± 20%) and 20,850 birds (± 22 %) birds in 1983-1984 and 1998-1999 respectively. Most of these birds were Greylag Geese.

The spatial distribution of the catch fits with the distribution of the Greylag Goose, the main migration route of which goes from the Belgian border to the Atlantic seabord and the Basque country, with a less important flyway going from the Ardennes and Alsace (border with Luxembourg and Germany) to the Mediterranean, through the wetlands of Champagne and the Rhône valley. The monthly distribution of the catch shows that most birds were killed during the autumn (September-November) and pre-breeding (February) migrations.

When considered in relation to the size of the Northwest Europe population of Greylag Goose, the French catch is of significant importance in term of population conservation.

A recent law, issued in July 2000, has shortened the hunting season for migratory birds in France. Goose hunting is now allowed from 1 September to 31 January, as in most European countries. Positive effects for Greylag Geese are thus expected in the short term. Particularly, the fact that hunting is no longer allowed in February must reduce the annual bag by c. 20 %, and migrating birds will encounter improved conditions on their stop-over areas, allowing longer stays and more favourable foraging conditions.

Recent changes in numbers and distribution of staging geese in Lithuania and the associated agricultural problems

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Ten species of geese are recorded in Lithuania. Only the Greylag Goose *Anser anser* has recently re-established as breeding species in Lithuania while all other species occur as passage migrants, winterers or vagrants. A very marked increase in numbers of staging Greater White-fronted Geese *Anser albifrons*, Greylag Geese and Barnacle Geese *Branta leucopsis* was recorded in Lithuania in recent decades, while numbers of staging Bean Geese *Anser fabalis* have rapidly declined since the 1980's. During the last 30 years, the numbers of Greater White-fronted Geese staging in Lithuania in early spring have increased rapidly from almost nil to more than 100,000 and the stop-over sites of this species in the Nemunas river delta area at present are among the most important in Europe.

A rapid increase in numbers of Greater White-fronted Geese was caused by a general westward redistribution of the wintering population when Lithuania occurred on the new migratory route of passing geese. The rapid decline in numbers of staging Bean Geese was probably partly caused by the increased inter-specific competition for favoured food resources and optimum roosting sites with Greater White-fronted Geese. There is a special concern about staging Lesser White-fronted Geese in Lithuania. So far this globally threatened species in Lithuania is not protected. Recent redistribution of the key stop-over sites of migratory geese populations results in new conflicts with agriculture in certain administrative districts of Lithuania. No damage compensation schemes are available for local farmers and therefore the consequences of crop damage caused by birds are more serious than in the countries of EU. Research, management and conservation priorities should be given to safeguard internationally important staging areas for geese in Lithuania.

The Ecology of the Light-bellied Brent Goose in North East Ireland

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The Eastern Canadian High Arctic Light-bellied Brent Goose (Branta bernicla hrota) is one of four stocks of light-bellied Brent Geese. It is protected throughout its European range under Article 4 of the EC Birds Directive79/409 (1979), and is also Category A listed in the African-Eurasian Waterbird Agreement (AEWA). The first complete Irish census in 1960-61 recorded just under 12,000 birds and since then numbers have increased, peaking in the early and mid 1980's with numbers just below 25,000 recorded.

Staging in Western Iceland in autumn and spring, on this lengthy migratory flight, the Light-bellied Brent Goose is unique in that the entire population, of at present 19,000 birds (Irish Brent Goose Research Group Census, 1999), overwinters in Ireland. Strangford Lough on the North East Coast of Ireland plays host to 75% of this population in the autumn and early winter (O'Briain & Healy 1991).

In recent years, The Queen's University of Belfast has been leading the research on the behavioural ecology of this species, forming collaborative associations with national conservation agencies. Research comprises the study of the birds' individual feeding behaviour and its interactions with other herbivorous species (Mathers, 1995), habitat selection and seasonal distribution (Portig, 1997), the monitoring of inland grazing and field selection preference (Campton, 1998) and the extent of human disturbance and possible implications to overwintering Brent geese (Stone, 1999).

Current research centres on individual feeding behaviour in response to changing food resources and human disturbance. In particular, the development and validation of an enzyme immunoassay to quantify concentrations of cortisol in faeces as a biochemical tool to measure stress in Brent geese with a view to developing an effective management and conservation protocol for this vulnerable Arctic migratory goose.

The Lesser White-fronted Goose in Kazakhstan: numbers, locations & main features of its ecology in seasonal migration periods

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Introduction. Monitoring studies on LWfG migration conducted in 1997-2000 in the territory of Kostanay Oblast (Northern Kazakhstan) estimated the most important parameters, characterizing the modern status, migration period, flock size and age structure, as well as major ecological features at the resting and feeding sites. Most of this information is original and even unique since LWfG do not concentrate in such great numbers anywhere else in the western area.

Migration period. The spring migration period in the Kostanay region lasts for 35-45 days and usually occurs in the second half of April - May. During stopovers, large concentrations on the lakes are rare; more often geese disperse over the cultivated fields where they can find enough food and water. The autumn migration period is longer - up to 70-75 days, starting from the end of August - beginning of September till the beginning of November.

Numbers and distribution at key sites. The total numbers of LWfG on the observed territory reaches 2,000. The most important lakes for their stopovers are Kulykol and Bolshakol lakes, to a lesser extent - Koibagar Lake. The LWfG main stopovers are the lakes of Totengir, Sypsyn and Urkashsor-Zharsor hollows. The number of LWfG calculated in 1997-observation period was 10,413; with 6,389 in 1998, and 6,910 in 1999. The key stopovers are Kulykol, Koibagar, Tontegir -Zhanshura, Bozshakol and Lebyazh'e lakes

Groups and flock size**.** In accordance with the observation data at the resting and feeding stopover sites, LWfG establish mostly small groups and flocks. The majority of such groups usually contain 4-6 birds. More rarely, groups exceeding 10 and 20 birds were seen. During the flight from the lakes to the fields for feeding the flock size was larger than during the resting period at the lakes. As an exception, a huge flock of 290 birds was seen once at the Suylykol Lake on 4 October 2000.

Age composition in the autumn period. Age composition was determined only during the autumn period for two years - 1998 and 1999. The ratio between mature and young (first year) birds changes during the years of observation starting from 1.0:0.5 to 1.0:3.4 in 1998; and starting from 1.0:0.6 to 1.0:1.6 in 1999. These data proved success of breeding in each year. Thus breeding in 1998 was more successful than in 1999.

Feeding activity. During the spring migration single peak of the feeding activity was registered. It covered the main part of the day. LWfG leave the lakes after midday between 15:30 and 18:30 and stay at the feeding sites during the night. The birds come back to the lakes during the morning between 8:35 and 11:45. During the autumn two periods of feeding were clearly observed, a morning period from 07:10 till 12:30 and an evening one from 15:20 till 20:30.

Main threats and limiting factors. The main threat at the stopovers feeding sites is hunting. The percentage of the LWfG killed by the hunters constituted in different years from 1 to 5-6%. A significant threat to the stopover sites is reed beds burning. It deprives LWfG of shelter. The lakes' unstable hydro regime is a limiting factor, which influences the main change in LWfG concentrations which occurred in different years.

Taxonomic status of *bernicla* and *nigricans* Brent Geese in Siberia

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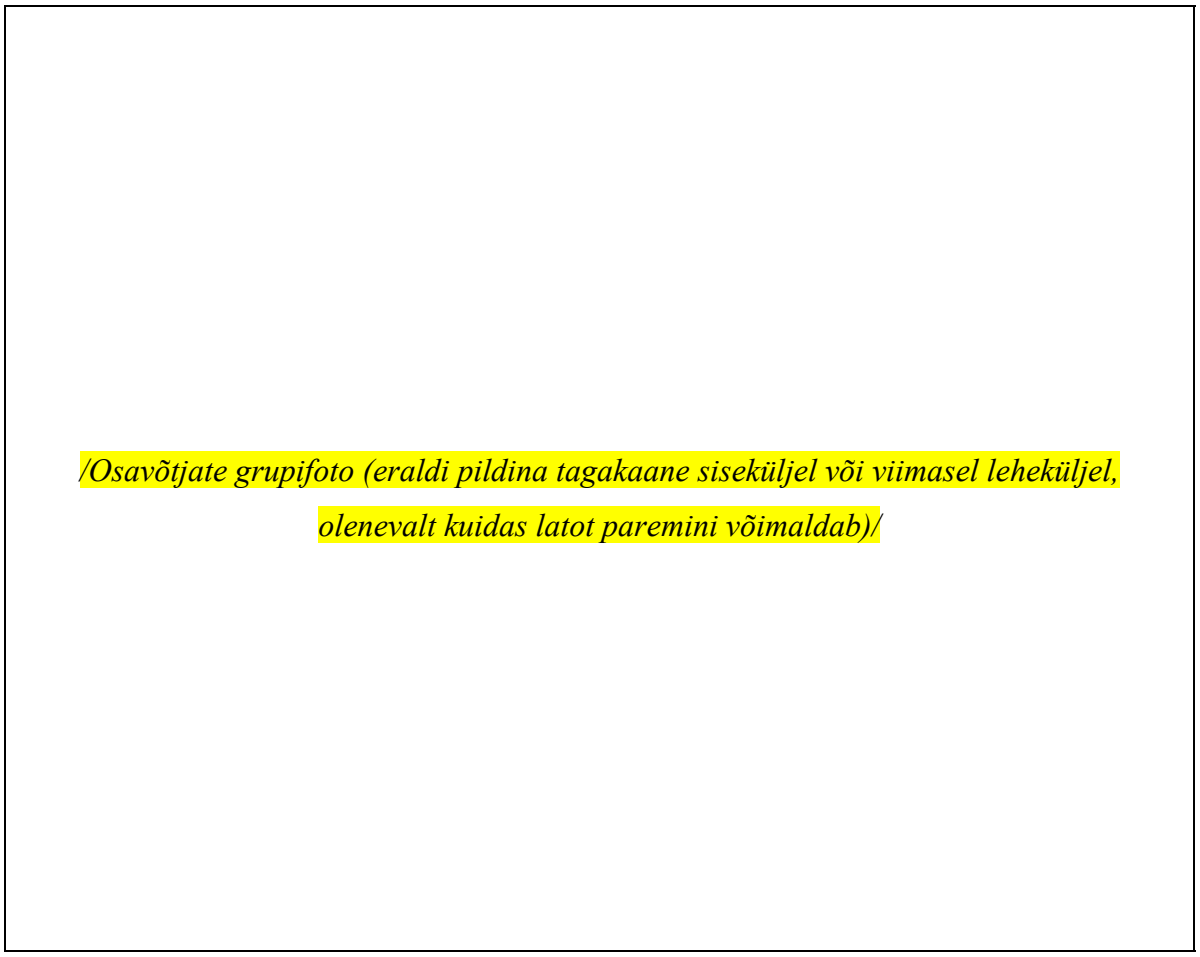
Several expeditions in the last years to Eastern Siberia aimed to achieve a clearer understanding about the status of the Brent Goose (*Branta bernicla*) in Siberia.

Despite several recent publications and announcements (Stepanyan 1990, Millingon 1997, Sangster *et al*. 1997) and the discussion on the European Bird Net (EBN, e.g. Inskipp and Sangster in April 1997) there is considerable doubt as to whether to split *Branta b. bernicla* and *B. b. nigricans* into two different species after we found several mixed colonies in NW Yakutia.

The Black Brent Goose (*B. b. nigricans*) breeds throughout Eastern Siberia as far west as Olenyoksky bay at 73.22ºN; 118.25ºE (Syroechkovski 1996). There are two populations distinguished. One migrates to Pacific America, the other is known to winter in low numbers in Japan, China and Korea (Miyabayashi 1995). The total Pacific American population is considered to be stable at either 114,000 birds (Madsen *et al*. 1996), 124,000 birds (Kokarev 1996) or 184 800 (Rose & Scott 1994). The proportion of Siberian birds is unknown but probably increasing or stable. The Asian Pacific population is estimated by all authors to number fewer than 7,000 birds and has a declining trend (Rose & Scott 1994, Syroechkovski 1995, Madsen *et al*. 1996). Due to the lack of ringed birds or sightings in Asia there is still no knowledge about the breeding site of this population. Coloured ringing at three different localities in the Olenyok and the Western Lena Delta put light on the whereabouts of this population. Six American and one Dutch colour rings collected from local hunters show the presence of two flyways and two populations mixing in the Olenyok - Western Lena Delta area. In October 1997 a ringed Brent Goose of the subspecies *bernicla* was controlled on the West Frisian island of Vlieland in The Netherlands (Spaans pers.comm.). The bird was ringed in July 1997 on the nest on the island Maly Petrushka, West Lena Delta (73 03 N; 122 21 E). This is, at more than 5,500 km, the longest distance of migrating Dark-bellied Brent Goose yet known. Two more recoveries from Western Europe and another recovery from the main wintering grounds in Mexico in 1999 further demonstrates the overlap of two flyways in this Siberian colony and the likely mixing of both subspecies.

We found a total of 154 pairs in the five colonies we visited with about 132 pairs in the Olenyok and 22 pairs in the Western Lena Delta. The proportion of *bernicla* between the two subspecies varied in the colonies from 15% to over 95% from the most eastern to the western colonies. One colony showed only *B.b.bernicla* birds. The biggest colony in the Olenyok Delta with about 90 pairs showed about 50% birds of *B.b. bernicla* and 50% of *B.b. nigricans*. We observed eight pairs with birds of both subspecies. Five birds showed characters of both subspecies and considered as intermediate birds (Syroechkovski *et al*. 1998). Increasingly mixed pairs have also been observed on the wintering grounds in Western Europe (e.g. summary in Bloomfield & McCallum 2001)



Participants of the 6th Annual Meeting of the Goose Specialist Group of Wetlands International (GOOSE2001) at Roosta, Estonia on 1 May 2001