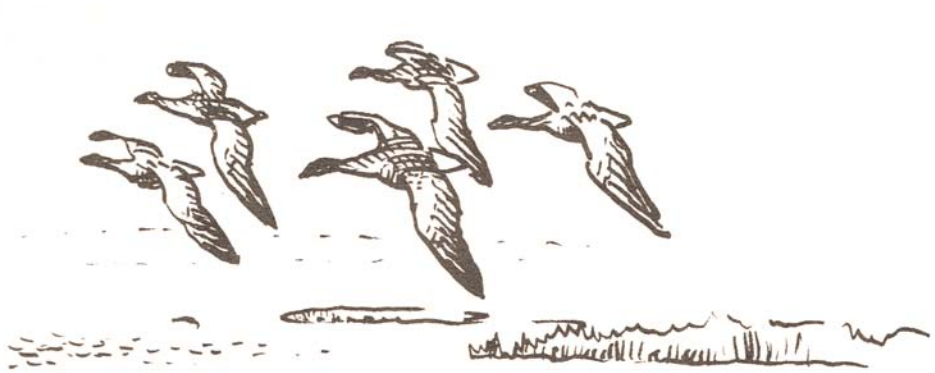

GOOSE BULLETIN

ISSUE 10 – MAY 2010

Contents:

GOOSE BULLETIN is the official bulletin of the Goose Specialist Group of Wetlands International and IUCN

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GOOSE BULLETIN appears as required, but at least once a year in electronic form. The bulletin aims to improve communication and exchange information amongst goose researchers throughout the world. It publishes contributions covering goose research and monitoring projects, project proposals, status and progress reports, information about new literature concerning geese, as well as regular reports and information from the Goose Database.
Contributions for the **GOOSE BULLETIN** are welcomed from all members of the Goose Specialist Group and should be sent as a Word-file to the Editor-in-chief.
Authors of named contributions in the **GOOSE BULLETIN** are personally responsible for the contents of their contribution, which do not necessarily reflect the views of the Editorial Board or the Goose Specialist Group.

ISSN: 1879-517X

Editorial

The Editorial Board was overwhelmed by the number of positive reactions to the first issue of the resurrected GOOSE BULLETIN (GOOSE BULLETIN 9) and with this 10th issue proudly presents the second issue of the new sequence.
Again we can present a smorgasbord of short presentations of results, calls for support as well as reports of on-going research focused on species as well as regions. Also the line-up of authors reflects the international character of the Goose Specialist Group.
The effects of climate change and changes in landscape use within the range of the geese are expected to lead to considerable changes in goose numbers and distribution in the near future. In order to be able to respond effectively to these changes as well as to build and maintain an effective monitoring and conservation network, stronger international co-operation will be required.
Since the first meeting of the Goose Specialist Group in 1981, these gatherings have played an important role in stimulating and facilitating international co-operation in goose research, monitoring and conservation. Between 1989 and 1996 the first sequence of the IWRB Goose Research Newsletter/ GOOSE BULLETIN strongly supported the activities of the Goose Specialist Group and played a key role in the exchange of information within the international group of goose researchers between the meetings. The flow of good manuscripts from the groups members, of which some are published here in the 10th issue, gives us distinct impression that the bulletin again could play a vital communication role in the future for the Goose Specialist Group.
We have been delighted by the number of manuscripts received for publication in this bulletin, which resulted in an unexpected amount of work for the editorial board. We are very happy that Carl Mitchell was willing to help us and has joined the editorial board; welcome Carl!

The next issue of the GOOSE BULLETIN is planned to appear in November 2010, which means that material for this issue should have reached the editor-in-chief not later than 30st September 2010.

The Editorial Board

First Announcement of the 13th meeting of the Goose Specialist Group of the IUCN-SSC and Wetlands International

The 13th meeting of the Goose Specialist Group of the IUCN-SSC and Wetlands International will be held jointly with the Goose, Swan and Duck Study Group (GSDSG) of northern Eurasia in **Elista, Kalmykia (Russian Federation)** from

Thursday 24 March to Tuesday 29 March 2011

with a mid-conference excursion to the Manych Lake on Saturday 26 March.
If sufficient numbers of people are interested, a 5-day post-conference excursion will be organized.

The scientific programme is in the capable hands of Aleksandr (Sascha) Kondratyev. Konstantin Litvin is the central link between the GSG-board and the GSDSG, and Sonia Rozenfeld and Petr Glazov are responsible for local organisation and all practical arrangements.

More extensive information on the GSG-website (www.geese.org/gsg) in June 2010, but keep these dates free in your calendar.

Programme draft:
WATERFOWL OF NORTHERN EURASIA: GEOGRAPHY, POPULATION AND ENVIRONMENTAL DYNAMICS AND POPULATION MANAGEMENT

PLANNED SESSIONS:

1. Geography of populations (flyway delineation in Eurasia).
   Convenors: Poyarkov & Ebbinge
   Review of main Eurasian waterfowl flyways with special emphasis on
   1.1. key staging sites for different taxonomical groups (swans, geese, dabbling ducks, diving ducks)
   1.2. habitat studies of wintering sites, staging sites and breeding sites
2. Dynamics of populations and environments.
   Convenors: Syroechkovskiy & Madsen
   a. Natural fluctuations in environmental conditions – overviews about Eurasian steppe zones, prairie pothole regions and Australian arid wetland zones
   b. Human impact on population dynamics
      Papers on:
      2.1. population trends –causes and possible actions by man
      2.2. rare and endangered species
      2.3. habitats, feeding, breeding success etc.
3. Population management
   Convenors: Rozenfeld & Fox
   a. global overview of waterfowl population management strategies and practical solutions
   b. seasonal hunting-free zones to protect endangered species
4. Flyway approach as an international and national political tool.
   Similarities and differences between flyways.
   Practical solutions at the local level.
   Further knowledge required.
   Future tasks.

There will also be room for several parallel sessions focusing in more detail on several goose species: e.g. Lesser White-fronted Geese, Red-breasted Geese, Bean Geese, Pink-footed Geese and Greylag Geese.

Kalmykia
The Republic of Kalmykia is part of the Russian Federation, situated west of the Caspian Sea and the only state in Europe, where the dominant religion is buddhism. The Buddhism in Kalmykia is of Tibetan origin. The capital is called Elista and is situated in the western part of the country.
The country has become well-known as an international "Chess Mecca", due to the fact that its President, Kirsan Ilyumzhinov, is the head of the International Chess Federation (FIDE).

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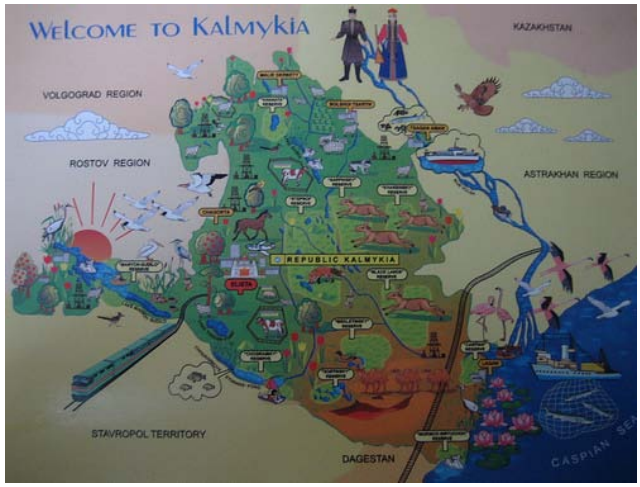
Climate

The climate of Kalmykia is continental, i.e. hot and dry summers and cold winters with little snow. The continental character of the climate intensifies from west to east. The average January temperatures are negative throughout the whole republic: -7° to -9° C in the southern and south-western and -10° to -12° C in the northern part of the country. Winter temperatures can drop below -35° C in the northern regions. One of the specialities of the climate is a considerable number of sunny days, 280 per year. The duration of the warm period is 240 - 275 days. Average temperatures of July are 23.5° - 25.5° C, but the temperature maximum reaches 40° - 44° C.



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There is a positive temperature gradient from north to south as well as from south to east and Kalmykia is the most arid region in the south of the European part of Russia. The annual precipitation does not exceed 210-340 mm.

Month	temperature			precipitation	
	min	max	average	mm	days
1	-8,8	-2,9	-5,9	25	6
2	-8,4	-2,0	-5,2	18	5
3	-2,8	4,7	1,0	17	5
4	5,1	16,4	10,8	22	4
5	11,2	23,6	17,4	37	5
6	15,7	28,1	21,9	50	6
7	18,3	30,9	24,6	40	5
8	16,7	29,6	23,2	31	4
9	11,7	23,5	17,6	29	4
10	4,6	14,3	9,5	23	4
11	0,2	6,3	3,3	28	6
12	-4,4	0,5	-2,0	29	8

Weather data for Elista (Republic of Kalmykia, Russian Federation
(source: Deutscher Wetter Dienst, dwd)

Besides agriculture, Kalmykia has a well-developed industrial sector, including the food processing and oil and gas industries. Because most of Kalmykia is arid, irrigation is necessary for agriculture. The Chernye Zemli Irrigation Scheme in southern Kalmykia receives water from the Caucasian rivers Terek and Kuma via a chain of canals: water flows from the Terek to the Kuma via the Terek-Kuma Canal, then to the Chogray Reservoir on the East Manych River via the Kuma-Manych Canal, and finally into Kalmykia's steppes over the Chernye Zemli Main Canal, constructed in the 1970s.
These water bodies periodically are of considerable importance for waterbirds.

Geese of northern Black Sea coasts: changes in status between the 19th and 21st centuries.

Tatiana Ardamatskaya & Antonina Rudenko
Black Sea Biosphere Reserve, Lermontova Str. 1. UA 75600 Goloya Pristan, Ukrain; arudenko@gopri.hs.ukrtel.net

The Sea of Azov and Black Sea region is important for a many Eurasian Anseriformes. The area provides many critical staging sites for migrating Anseriformes . Throughout the year, six goose species occur along northern Black Sea coasts, of which only the Greylag Goose *Anser anser* breeds. The other five species (Bean Goose *A. fabalis*, White-fronted Goose *A. albifrons*, Lesser White-fronted Goose *A. erythropus*, Snow Goose *Chen caerulescens* and Red-breasted Goose *Branta ruficollis*) are only observed during migration or winter in the region. Over the last 200 years, there have been considerable changes in the number of geese observed, linked to the dramatic deterioration in suitable ecological conditions for geese in the area.

The Greylag Goose was a common breeding species in the Dnieper Delta in the 19th century. In the 1940s, the population showed a dramatic decrease because of a number of adverse environmental changes and, by the 1950s, only a few scattered pairs remained on some Dnieper Delta lakes.
Since the 1980s and the early 1990s, due to the introduction of protective measures (creation of nature reserves and the prohibition of hunting) the breeding population of Greylag Geese has increased again. Currently the Greylag Goose is a common, though not numerous breeding species of the Dnieper Delta and the coastal lakes. Most birds leave the area after breeding, but a small number stay throughout the summer.
Greylag Geese can be shot during the hunting season, although hunters mainly shoot migrating geese. Peak numbers vary between years from 500 to 4470 individuals. In the late 1990s in the Kherson region up to 2000 individuals per annum were taken by hunting, and in 2002, 1508 were shot.

The White-fronted Goose was an abundant species in the 19th century and is currently the most numerous goose species on the Black Sea Coasts during migration and in winter. During peak migration (mid to late March) goose flocks of 250 or more individuals regularly fly along the coast over the Dolgyj, Tendra and Dzharilgach islands during the day. Stopover sites are known from the steppe, spits and fields. During favourable weather conditions, numbers of White-fronted Geese can be high and have increased in the late 20th century. The maximum number of wintering White-fronted Geese was 47000 recorded in 1993. Despite the difficulty of shooting flying geese, in 2004 about 2000 individuals of this species were shot.

The Lesser White-fronted Goose is an irregular migrating and wintering species along the northern Black Sea Coast. During migration the species forms mixed flocks with Greylag Geese, but more often with White-fronted Geese. Some are shot illegally, despite the fact that the species is protected.

The Bean Goose was not recorded from the northern Black Sea Coasts in the 19th and early 20th century. In the 1970s, flocks of up to 15-20 were encountered and it became an irregular migrating and wintering species. In the early 1990s the number of wintering Bean Geese increased and by 1992, about 1000 individuals were recorded. However, by the late 1990s Bean Geese again ceased to winter.

The Snow Goose was a rare and irregular migratory and wintering species in the 20th century). Mostly due to roaming first-year birds from a zoo at Askania-Nova (where the species lives in semi-captive free-flying conditions), the species is now more regularly seen, although the possibly of genuinely wild birds cannot be ruled out. Snow Geese are now a rare species during migration times, mostly associated with White-fronted Goose flocks in Dzhalilgachsky Bay, but they have also been recorded in the summer in Tendra Bay.

The Red-breasted Goose was considered as a rare species along the northern Black Sea coast in the first half of the 20th century. Since the late 1950s, there have been regular observations of the species along the coasts of Tendra Bay. From the middle of the 1960s small flocks have been observed, not only in flight and feeding on the steppe, but also in each winter. A large increase in numbers was recorded from the middle of the 1980s. Currently the Red-breasted Goose is a common, but not numerous migrating and wintering species along the northern Black Sea Coast. In winter it feeds with White-fronted Geese, but does not mix with them and keeps more or less separated. The maximum count of wintering birds was 600 individuals in the 1990s.

Management of geese and agriculture in the Wadden Sea.

Niels Kanstrup
Dansk Jagtakademi, Skrejrupvej 31, DK-8410 Rønde, Denmark; nk@danskjagtakademi.dk

In late February 2010, a working group of the Wadden Sea Forum made its conclusions after a one year working period. The background was the increasing conflicts resulting from an expansion in the numbers of geese staging and wintering and feeding in agricultural areas in the Wadden Sea. Seven goose populations are involved.
Most attention has been given to the Barnacle Goose *Branta leucopsis* – once a scarce bird in the area but today numbering 780,000 individuals with peak counts of 600,000 in the Wadden Sea alone. Barnacle Geese have shown a tremendous ability to adapt to changing conditions in recent years. Numbers have increased as has the length of their stay in the area. The geese are able to graze the sward very short and thereby cause significant yield losses – at least locally.

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The working group consisted of representatives of bird conservation, farmers and the local administrations of the three countries involved: The Netherlands, Germany (Lower Saxony and Schleswig-Holstein) and Denmark, and chaired by an independent consultant. The main recommendations were:

- to establish a trilateral Goose Management Group with all sectors and regions represented in order to develop a trilateral goose management plan in line with the guidance and recommendations given by the group; to monitor and evaluate the experiences with goose management; and to provide trilateral information and knowledge exchange;
- to develop a set of agreed management objectives concerning geese and their protection across the trilateral Wadden Sea Region and to describe the overall present goose use and prediction of future sustainability of the Wadden Sea Region;
- to analyze the vulnerability of crops and sites in relation to goose distribution and to examine the economic effects of goose grazing;
- to develop and implement a spatial goose management approach as the core of a future strategy with the aim of transforming a conflict situation to one of coexistence. This will encompass the designation of Go- and No-Go-Areas on the basis of analyzing goose concentrations in defined spatial areas to achieve the most efficient joint management, in the framework of a future spatial goose management plan to develop various management tools;
- to encourage an open dialogue and to strive for good cooperation with farmers and other stakeholders involved in the Wadden Sea Region;
- to develop agri-environmental schemes which allows farmers to be paid for their environmental services related to geese, taking into account that conflicts must be minimized and that costs for tax-payers must be at a level justified by efficiency of the management.

The report will be discussed by the 11th Trilateral Governmental Conference on the Protection of the Wadden Sea, Sylt, 17 - 19 March 2010

Read more here: http://www.waddensea-forum.org/Specialissues/Goose/GRD-final_layout.pdf

Bar-headed Geese *Anser indicus*: notes from breeding and wintering areas

Joost van der Ven, the Netherlands; Prakash Gole, India; Gerard Ouweneel, the Netherlands.
J.A. van der Ven, P.O.Box 157, NL-3940 AD Doorn; javanderven@gmail.com

1. Introduction

This contribution was based both on a study of literature and the results of many field visits. The three authors visited Myanmar on various occasions. The first author lived in that country for several years. Van der Ven and Gole visited the Bar-headed Goose breeding-grounds in Kyrgyzia, in which country van der Ven lived for seven years, first in 1992 and later in 1995-1998 and 2000-2004. Gole studied Bar-headed Geese for many years on their breeding-grounds in Ladakh, India and in their wintering-grounds in Central-India.

There are small populations of free-flying Bar-headed Geese in England, Germany and in the Netherlands, originating from escapes. In the past escaped Bar-headed Geese bred also in Sweden and Norway.
In the Netherlands the first breeding was recorded in 1977 and annually from 1986 onwards. In 2000, at least 70-100 breeding-pairs were present, showing an annual increase of 10% (VAN DEN BERG & HAAS 2009, LENSINK & HORSSEN 2002).

2. Breeding

Bar-headed Geese breed under rather extreme circumstances near lakes, which are situated between 3,000-5,000 metres. They generally breed in small colonies, however colonies of several thousand pairs have been reported (SCOTT 1989).

2.1. China

The largest colonies are found in China, especially in Tibet. We know these sites from photographs (VON TREUENFELS 1995). Sometimes they breed on islands, but more regularly on the edge of lakes. Due to high summer temperatures, water levels tend to fall.
In spring 2005, many dead birds were reported from the colony at Qinghai Lake in Qinghai (China). From some of these birds, isolates of bird flu were obtained (CHEN *et al.* 2005, LIU et al. 2005) although the symptoms also indicated possibly that botulism was also involved, although alternatives to H5N1 were not seriously investigated. During periods with high temperatures and shrinking water levels, botulism can develop easily (MINESTERIE V&M 1977). Bird flu is more related with domestic fowl and with contacts between them and wild populations of birds (FARNDON 2005).
Currently there is little information about the occurrence of Bar-headed Geese both as a breeding and wintering bird in China. As this country supports the main part of the Bar-headed Goose population, it is regrettable that it was impossible to obtain adequate information from China to complete this assessment.

2.2. India

In Ladakh (India) Bar-headed Geese breed in three high-altitude lakes, totalling around 500 pairs (GOLE, unpubl. data; PRINS & VAN WIEREN 2004).

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2.3. Tajikistan

Further breeding colonies occur in Tajikistan. Thirty years ago around 300 nests were counted in two lakes of the high Pamir (ABDUSALYAMOR 1988), but recent information suggest smaller numbers.

2.4. Russian Federation

Bar-headed Geese probably breed in the Russian Altai Mountains, but reliable data were not available. There is a small colony in the Republic of Tuva, a part of the Russian Federation. This colony holds about twenty pairs. Tuva has no high mountains and here the geese nest in trees, using old nests of kites (BARANOV 1991).

2.5. Mongolia

Bar-headed Geese also breed in Mongolia, but there is no recent information about the size of the breeding population that most probably still holds up to 5,000 birds (BADARCH et al. 2003).

Bar-headed Goose breeding site at Son(g) Kul lake in Kyrgyzia.

2.6. Kyrgyzia

In Kyrgyzia the Bar-headed Goose breeds in two high altitude mountain lakes, named Son(g) Kul and Chatyr Kul. The breeding sites are situated on the edge of the breeding range of the species' distribution. Between 1992 and 2005 both lakes were visited during the breeding period on various occasions (KONURBAEV & TIMIRKHANOV 2003, VAN DER VEN 2002 & 2004, VOROBEEV & VAN DER VEN 2003).

Son Kul is situated in the high mountains of the Central Tien Shan, west of Naryn. The lake is located in the centre of a wide-open plateau, surrounded by high mountains, which reach over 3,000m. It is a freshwater lake with a surface of 273 km^2 and a maximum depth of 15 m.

Breeding habitats and conflicts

The climate is severe, with frequent winds. The average annual air temperature is –3.5 ^{o}C and snow lasts for about 200 days a year. Son Kul lake freezes in September and the ice does not melt before mid-June. Many small, clean mountain rivers contribute to the lake. Only the Kokjerty river flows out of the lake into the Naryn river. The large waterfalls in the Kokjerty prevent fish moving from the Naryn river into the lake.

Originally Son Kul was fishless. Around 1975 the commercial introduction of fish started. Before this there was a rich fauna of *Gammarus*. Though the lake was a fully protected nature reserve (zapovjednik) and introductions were against the regulations, commercial fishing was allowed. The protected status of a part of the lake was lifted. Peled *Coregonus peled* and Common Whitefish *C. lavaretus* were introduced. Today two non-commercial fish species from Kyrgyzia occur in the lake as well. The official harvest *rate* was fixed at 300 tonnes per annum, but unofficial estimates suggest double this figure is taken.

In the late 1970s Son Kul was heavily polluted by pesticides, due to agricultural activities in the surrounding areas. Officially fishing was banned, however, illegal fishing activities continued. After algae blooms were reported up to the 1990s, fishing was allowed again. There is no management and the harvest is estimated at about 600 tonnes per annum. About half of the lake has the status of a reserve, where fishing is not allowed, but the fish do not observe the borders and neither do the fisherman. The Bar-headed Geese use to breed on small islands; in the late 1990s the colony was of about ten nests. In 2002 and 2003 there was only one nest. Some erosion of the islands has taken place but the nesting islands were only slightly damaged.

The Academy of Sciences of Kyrgyzia allowed and financed a reintroduction project for the Bar-headed Goose. With the help of domestic ducks and other means, an artificial project was started in Issyk Kul. The young geese were released in September onto the frozen Son Kul. One might guess the results. This project stopped in 2003, following the intervention of Wetlands International. Before these experiences are repeated at the second lake, Chatyr Kul, we consider the introduction of alien fish to be the cause of the disappearance of the Bar-headed Geese from Son Kul.

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The lake of Chatyr Kul lies about 100 km south of Naryn, close to the Chinese border and near the Torugart Pass. This lake is about half of the size of Son Kul and lies at 3,530 m.

The surrounding Chatyr Kul mountains rise up to 7,000m. The lake is frozen from September until June. Chatyr Kul is rather shallow and can freeze to the bottom; there are only a few deeper spots. The water is slightly saline (2 parts per thousand) and there are no fish. Many rivers and streams flow into the lake; but no rivers or streams flow out. Of all the rivers only the Kekagyr is permanent. In the mouth of several mountain streams we found some fish, but they stayed in the rivers and did not enter the saline lake. The fish are known as Severtzov's Scaled Osman, a few centimetres long and regarded as a dwarf form of the larger (up to 50 cm) Scaled Osman *Diptychus maculatos.*

The fully protected Chatyr Kul has a colony of around 70 pairs of Bar-headed Geese. Unlike Son Kul the birds do not breed on real islands but on heaps of old vegetation, created by drifting ice. As Kyrgyzia joined the Ramsar Convention, van der Ven was invited to take part in a project with the aim to bring Son Kul and Chatyr Kul under the Convention.

It was a coincidence that during these preparations the status as zapovjednik (fully protected nature reserve for scientific purposes only) of Chatyr Kul was lifted by presidential decree to enable some people to introduce commercial fishing. For several reasons this project was not realized and the new president restored the protected status of Chatyr Kul. It is clear that the status of the lake will stay uncertain. The Ramsar Bureau has been asked to make a strong statement in responses to these changes in management in an attempt to maintain the status of the reserve.

Previous information on the size of the colonies both in Son Kul as well as in Chatyr Kul are apparently not available and, in any case, are likely to be unreliable. In July 2004 the colony of Chatyr Kul was visited. Common Coot *Fulica atra* with juveniles and the first migrating waders at 4,000m were a rather uncommon experience. A new species for Kyrgyzia though not for Central Asia, was a Pomarine Skua *Stercorarius pomarinus.* Also new for Chatyr Kul was the observation of a flock of c. 1,000 moulting Ruddy Shelduck *Tadorna ferruginea*. The flightless birds did not flock together and it looked like the birds remained in the water.

Finding the colony of the Bar-headed Goose was not difficult. Around 70 nests were counted, situated on the 'floating' islands. Some nests still contained eggs, but most eggs were hatched. No juveniles were present. There were a lot of unhatched eggs scattered around the empty nests. Apparently gulls showed no interest in these eggs and maybe other predators are absent. In previous years there were also many unhatched eggs, in spite of the presence of a lot of gulls. It is possible that the shell of these eggs is too hard for the bills of the Brown-headed Gulls *Larus brunnicephalus* and Black-headed Gulls *L. ridibundus.* However, Pallas's Gulls *L. ichthyaetus* with stronger, heavier bills were present as well.

There were a lot of unhatched eggs scattered around the empty nests.

It took some time to find the families with juveniles. Thanks to the Small Grants Fund of the Ramsar Convention we used a small motorboat, which enabled us to look for them. The families were scattered all over the lake, with the majority in the south-western part. No geese were found on land. The families contained 2 adults and 5-7 juveniles.

Food supply

As no vegetation was available, we wondered which kind of food the geese would eat. Even if there is some poor vegetation, with temperatures below 10^0 C, grasses produce hardly any proteins. With the help of Dr. Jonathan Davies we were able to study the content of the water. A lot of spawn from the freshwater shrimp *Gammarus krevetki* was found all over the lake. Zooplankton density is 18,090 specimen/m^3 with a biomass of 7,39 g/m^3 in shallow water and 2,95 g/m^3 to a depth of five meter. In the plankton *Cladocera* and *Copepoda* were well represented. *Gammarids* and *chironomid* larvae dominate the zoo benthos. The average biomass of zoo benthos was nearly 400 kg/ha.

Apparently the Bar-headed Geese - both adults as well as the juveniles - and most likely the flightless moulting Ruddy Shelducks eat larvae and plankton and they survive and grow well on this diet. In Ladakh, Gole also found that there was no food for the (young) geese and plankton was also well represented in the high altitude mountain lakes.

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It looks like the disappearance of breeding Bar-headed Geese from Son Kul was the immediate result of the introduction of (commercial) fish into this lake. As the birds need high food densities to survive and reproduce, it is not possible for them to compete with introduced fish. Fishless lakes are an underestimated rich biotope. Introduction of fish in these lakes should be banned. High-mountain lakes are clearly not an environment suitable for long-term fish production. After the fish have consumed all the plankton, their abundance exceeds the carrying capacity of the lake and their numbers cannot be sustained. After the short-term benefits are eaten, artificial feeding of the fish stocks is needed, which is ruinous for the ecological balance of such sensitive ecosystems.

2.7. Numbers and distribution

Table 1. Estimated total number of breeding pairs of Bar-headed Goose

Country	Number of pairs
Russian Federation, Altai Mountains	? (probably not breeding)
Russian Federation, Tuva	10-20
Kyrgyzia	70
Tajikistan	100?
Mongolia	? several 100s
China	? (may be 15,000)
India, Ladakh	500

Based on these estimates the size of the breeding population at least reaches 15,000 – 20,000 breeding pairs, mainly breeding in China.

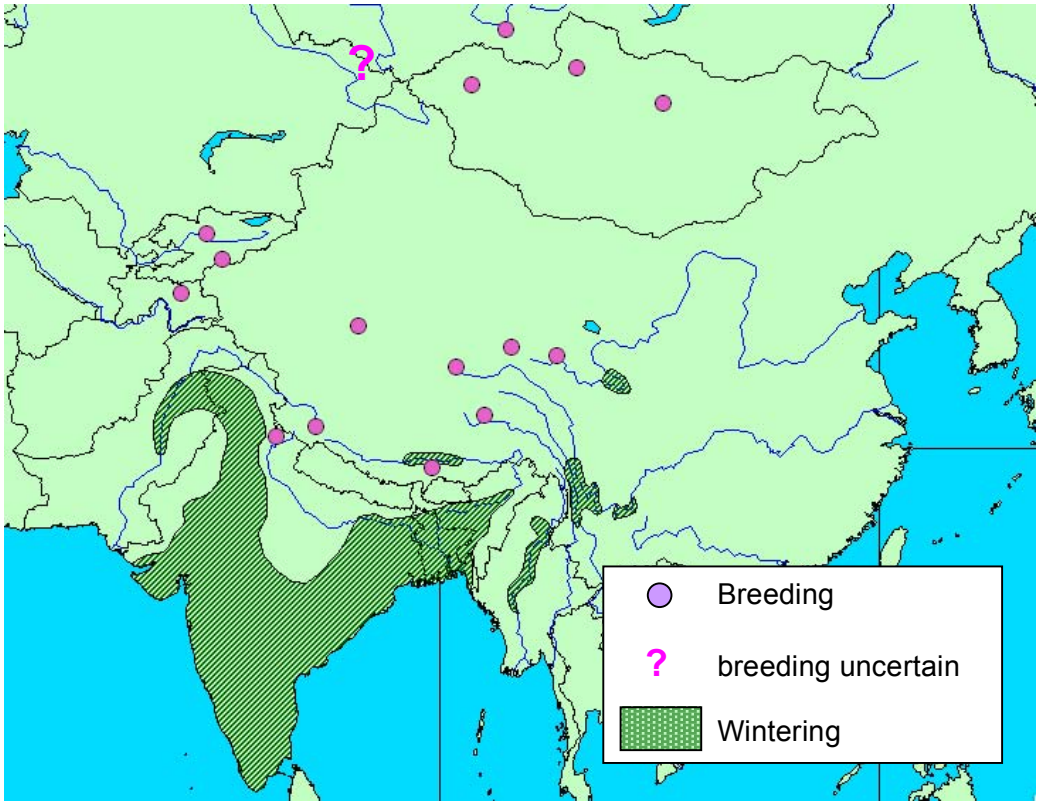


Fig. 1. Breeding and wintering distribution of the Bar-headed Goose

3. Migrating

As the winters at high altitude areas are harsh, the Bar-headed Geese have to migrate. On migration they have to pass over the Himalayas and it has been shown that they reach an altitude of nearly 10,000m. Migrating Bar-headed Geese have been reported from several countries including Bhutan and Nepal (DEL HOYO *et al.* 1992, LI *et al.* 2009). It looks like the migration routes are pretty safe. In winter 2009, a neck-collared Bar-headed Goose was observed in Tamil Nadu in southern India in a flock of 120 Bar-headed Geese. That bird, an adult female, was captured on 17 July 2008 in a moulting flock in the Darkhad Valley in northern Mongolia on 51.19376 N; 99.41078 E, at least 5,000 km from the location in Tamil Nadu, where the bird was located.

4. Wintering

Due to the lack of recent information from China, the only reliable way to estimate the size of the world population of the Bar-headed Goose is through winter-counts. In the late 1980's it was considered that there were over 10,000 birds (MADGE & BURN 1988), but that was probably an underestimate. The coordinated Asian Waterbird Census, started by IWRB in 1987 gave, for the first time, a result based on counts in the wintering areas, where the geese concentrate in bigger flocks.

4.1. Indian subcontinent

Pakistan has a good wintering population (LI *et al.* 2009). The highest number winters in India, where the birds occur scattered all over the country, with the majority just south of the wintering areas of the Greylag Goose *Anser anser* (south of Delhi and Mumbai). However, during extreme dry winters Bar-headed Geese stay in northern India. Competition and interference between Bar-headed and Greylag Geese where these species occur together (as in Bharatpur) does not seem to occur. In India during wintertime 20,000 – 30,000 geese are reported (LI *et al.* 2009).

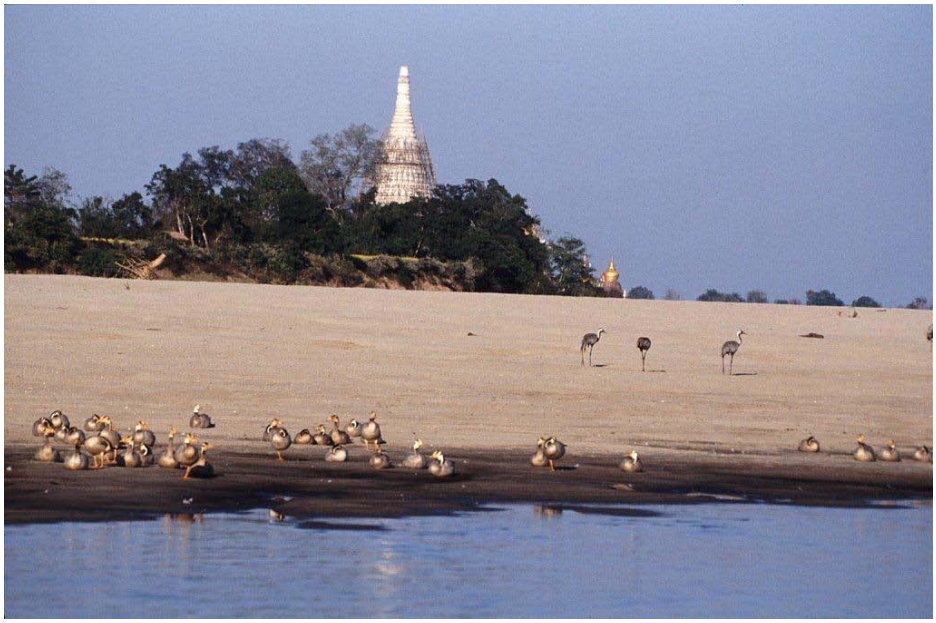
4.2. China

Despite the lack of good coverage, it is considered that more than 10,000 Bar-headed Geese winter in China (BISHOP *et al.* 1997, BISHOP 2008, LI *et al.* 2009).
BISHOP *et al.* 1997 gave recent information about Bar-headed Geese in south-central Tibet during the winter. Whilst counting Black-necked Cranes *Grus nigricollis* and Bar-headed Geese in the early 1990's, the number of wintering Bar-headed Geese was estimated at between 13,000 and 14,500 individuals. It is supposed that these birds do not migrate to other areas but stay in that area the entire winter. In winter 2007 over 30,000 Bar-headed Geese were counted on the same location (BISHOP 2008).

This area includes the new established "Yarlung Zangbo River Middle Reaches BN-Crane Nature Reserve". Almost half of the wintering goose population stayed within the borders of the reserve. It is not known if these geese had wintered at that location for several decades and it is possible that these birds wintered in India in the past. It is a challenge to find this out. Better quality winter counts and more analyses of the results are urgently required.

4.3. Central Asia

During 2003-2005,International Waterfowl Counts counted 75,000 Greylag Geese, Greater White-fronted Geese *Anser albifrons* and Bean Geese *A.fabalis* , but no Bar-headed Geese were found (SOLOKHA 2006).



Wintering Bar-headed Geese along the Ayeyarwady river

4.5. Myanmar

Until recently, hardly anything was known about wintering Bar-headed Geese in Myanmar or their abundance. During our first visit in 1999 we asked our guide about these birds and showed him a picture. The man answered that in his opinion this species was once observed in his country. During the first day of our stay in Kachin State, the most northern state of Myanmar, we counted at least 1,000 Bar-headed Geese. The sandbanks of the Ayeyarwady-river are excellent places for resting, both during night and day-time.

During our visits in 1999 – 2007, we regularly counted c.3,000 Bar-headed Geese between Myitkynia and Bhamo in December/January. We regularly observed mixed flocks with Greylag Geese, so it looks like that along the Ayeyarwady they seem to mix with other geese, unlike in India. In the morning they move to the fields around the river for feeding. During the rest of the day and night time they stay on the sandbanks. During clear nights they continue to feed on the fields. Bar-headed Geese were also located on Indawgyi Lake, south of Bhamo and along the smaller Chindwin river.

The geese are protected by law, but once we observed a policeman shooting them. Hunting is not common practice in Myanmar and birds are not worth a bullet. The country is now more open for people, and stricter protection rules are needed. The total number of wintering Bar-headed Geese in Myanmar is thought to be around 5,000 individuals.

4.6. Estimated population size

Data collected in this study indicate a population size of 50,000 – 65,000 individuals (Tab. 2).

Table 2. Total number of wintering Bar-headed Goose (individuals)

Country	Numbers wintering
China	15,000 – 30,000
India	max. 25,000
Pakistan	max. 5,000
Bangladesh	< 500
Nepal	< 200
Myanmar	max. 5,000

5. Conclusions about the population size

Recently the world-population of Bar-headed Geese was estimated at 50,000-60,000 birds (WETLANDS INTERNATIONAL 2006), a number which was based on the combined counts in the known wintering areas. Tibet was not included (or only partially), i.e. the real size of the Bar-headed Goose population is probably close to 75,000 individuals. However, the population estimate of 60,000 birds was based entirely on winter counts. At that time, the total counted never reached 30,000 birds, which means that both 60,000 and 75,000 individuals represent an overestimate, even considering the recent shift in wintering Bar-headed Geese from India towards Tibet. For many reasons, it is highly desirable that reliable population estimates for the Bar-headed Goose are compiled as soon as possible. More counts and more information from the breeding areas are therefore needed.

Table 3. Counts of Bar-headed Geese in winter in Asia 1987-2007 (LI *et al.* 2009).

1987	**3.605**	*1994*	**15.426**	*2001*	**17.947**
1988	**5.385**	*1995*	**8.429**	*2002*	**17.089**
1989	**6.693**	*1996*	**12.269**	*2003*	**27.922**
1990	**14.316**	*1997*	**4.655**	*2004*	**28.086**
1991	**13.305**	*1998*	**3.853**	*2005*	**38.922**
1992	**21.841**	*1999*	**8.917**	*2006*	**24.492**
1993	**15.811**	*2000*	**8.228**	*2007*	**63.107**

Please note: it is not possible to compare these data without full knowledge of the background information. In many years, wintering sites in China were not included. In several years Wetlands International did not give attention to this programme and ignored its coordinating tasks. Only the figures relating to the most recent years give a reliable figure of the birds counted in the region. The only conclusion might be that more areas with wintering geese are counted. No attention is given to the fact that a shift took place from former wintering areas in India with more birds now staying in China. The figure for 2007 is still under review.

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Arctic geese in Eastern Asia: agriculture in the south triggers and steers population dynamics in the north.

Alexandre V. Andreev
Institute of biological problems of the North, Portovaya 18, RU-685000 Magadan, Russia, alexandrea@mail.ru

To the memory of Rudy Drent

During the "Holocene revolution" at the end of the postglacial epoch many Arctic ungulates faded into extinction. What constituted the end for many northern mammal species turned out to be a boom time for Arctic geese, which were suddenly exposed to a broad diversity of wetlands and wealth of foods in the form of grasses, sedges and horsetails. The numerical abundance and taxonomic diversity of geese one finds in the early decades of the 20th century is clear evidence of the prosperity achieved by the group of avian herbivores, which dominated this rich ecological niche, exploiting the seasonal mosaic of available food items.. Several generations of explorers were impressed by the abundance of Arctic geese. For the nomads of the far north and east, flocks of wild geese certainly provided an important subsistence source, but these birds often symbolized more than simply food. In spring, the arrival of migratory flocks heralded the end of a long-lasting winter, when life often went from hand to mouth. In summer, it was an exciting family trip to the goose moulting grounds. In autumn, the flying flocks indicated a short period of relaxation after a busy summer time, full of mosquitoes and perpetual work. So, a little more than 60-70 years ago the Asian tundra was still swarming with wild geese, but later that story went through several dramatic turns. Until the 1970s, the abundance of all goose species declined on all continents: in Asia, mostly due to habitat loss on the wintering grounds. Spring hunting on the flyways was intensive and especially so on the nesting grounds. Later, by the end of the 20th century, the trends changed again, only now with contrasting trends on different continents.

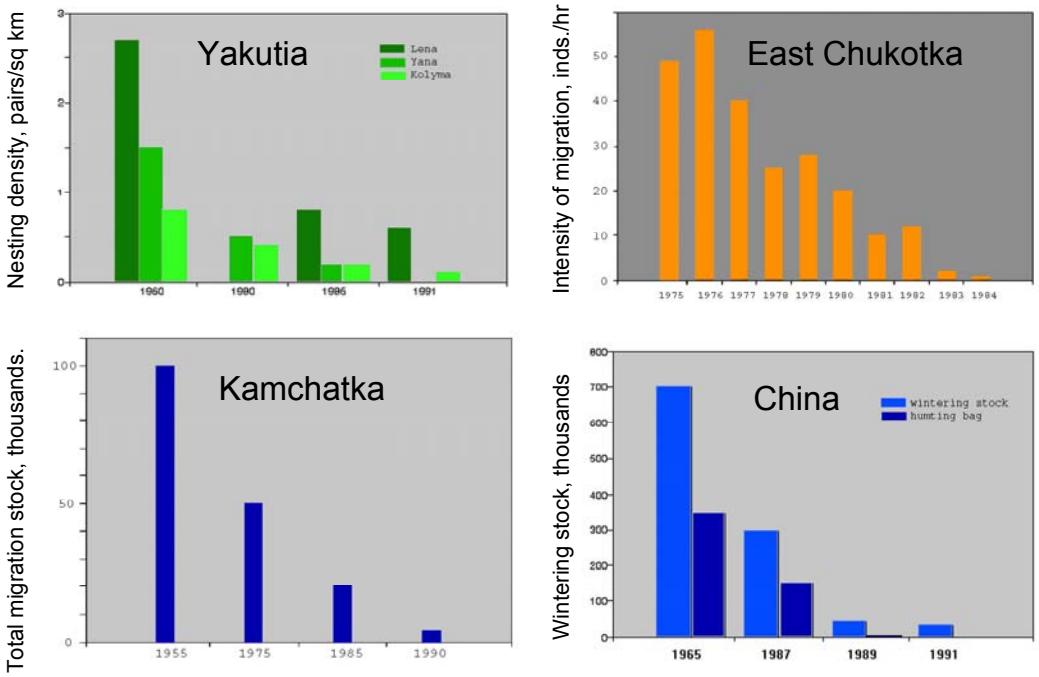

Fig. 1. Decline of goose populations in NE Asia 1960s-1990s.
Data from ANDREEV 1997.

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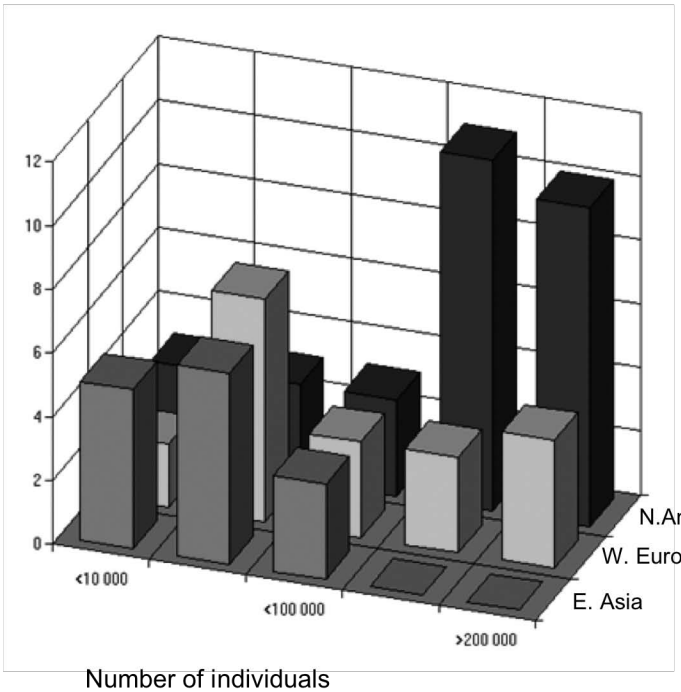
Current number of Arctic Geese in the Northern Hemisphere

From the 1970-1980s, Arctic geese populations grew quickly in North America. In Europe the trends were less rapid, but equally positive. In Asia, the trend was negative (Fig. 1). By the late 1980s, the total number of 14 goose species in Northern Hemisphere was estimated at 8.5 million individuals (Fig. 2, MADSEN *et al.* 1995). By late 1990s this estimate grew 2.5 times reaching approximately 21.5 million individuals, above all due to the large increase of Snow Goose *Chen caerulescens* populations in America (Fig. 3, WETLANDS INTERNATIONAL 2002). In the countries of Eastern Asia the total abundance of wintering geese continued to decline throughout the entire 20th century, and the trend accelerated from the 1970s. By the early 1990s, most of the geographic populations lost 50-90% of their initial (potential) number (ANDREEV 1997). By early 2000s this trend started to reverse, particularly in Japan and Korea (KURECHI, in litt.).



	1992	2002
N. America	4 mln	16 mln
W.Europe	1,5 mln	4 mln
E. Asia	0,3 mln	0,45 mln

Fig. 2. Size of goose populations in the early 1990s (graph, table) and early 2000s (table) (from MADSEN *et al.* 1996; WETLANDS INTERNATIONAL 2002).

These differences reflect differing conditions within the winter ranges of the Arctic geese. Most likely, the connection between farmland habitats and geese in Western Europe was established during the period of industrial development that stimulated advances in agriculture to feed a working urban populace. This connection may have occurred even earlier in East Asia. The process accelerated as coastal habitats began to be transformed. Similar processes might have occurred in North America from the early 1900s. Hence, when talking of the "natural abundance" of geese in the first half of the 20th century one should bear in mind, that this level of abundance already reflected enhanced food accessibility on European arable lands and Asiatic paddy fields. By the second part of the 20th century, agriculture in all countries where Arctic geese used to winter had been radically transformed. Farming became more industrial with larger fields, chemical fertilizers, machine sowing and harvesting. At the same time, geographical limits to agriculture moved further north. Perhaps such changes happened most rapidly in North America, with maize being the chief crop. Less dramatic, but in the same direction, changes occurred in Europe (oat, barley, wheat) and Asia (rice, buckwheat, soya).

From the early 1970s, goose hunting was restricted or banned in some European countries and Japan (YOKOTA *et al.* 1982; EBBINGE 1991). At the same time, depopulation of "grey geese" in China was a kind of state-supported industry, whereas unlimited spring hunting in the Russian Far East and high levels of economic activity in the Russian Arctic between 1960s and 1980s aggravated this sad decline (ANDREEV 1997).

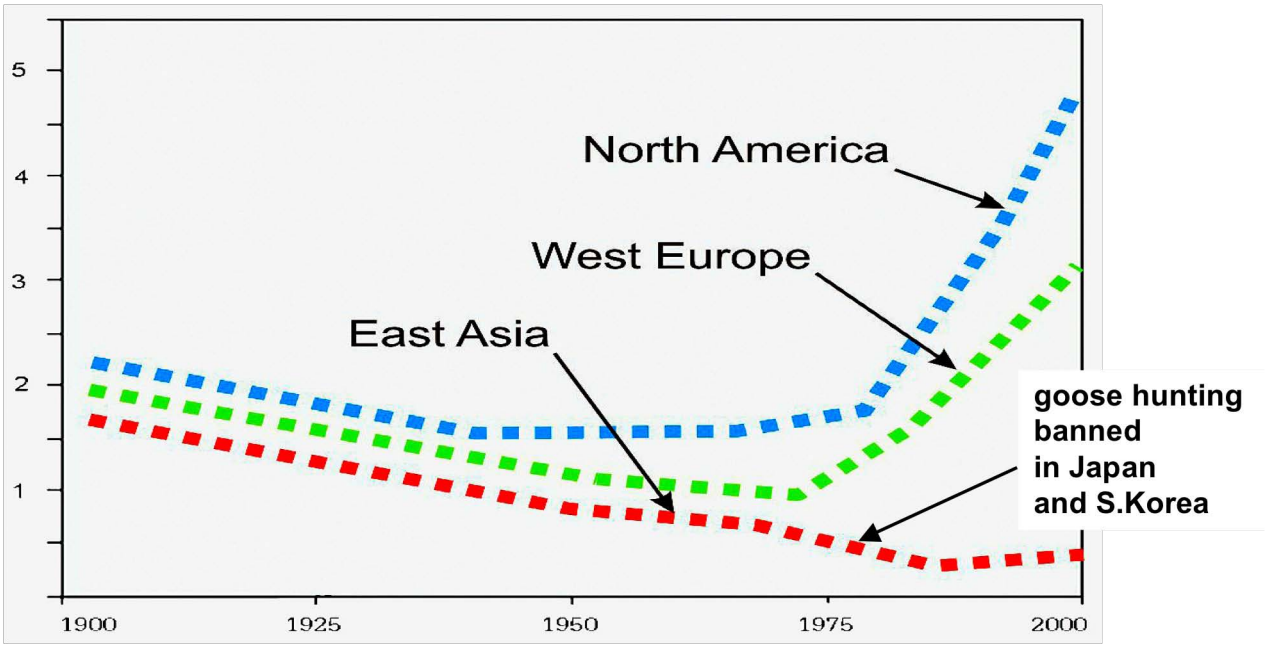


Fig. 3. Trends of geese number in the 20th century (Source: MADSEN *et al.* 1996; ANDREEV 1997; WETLANDS INTERNATIONAL 2002).

Changes in the breeding ranges of Arctic geese were less dramatic. At high latitudes, the geese tend to prosper at sites where landscapes are dynamic and the grassland habitats, dominated by sedges, cotton grass and horsetails, continuously change. These include lower reaches of rivers, their valleys, lakeshores, drained lake shoals and coastal terraces affected by floods, wind tides and thermo-carst erosion.
Thus, the hotspots of geese diversity and abundance coincide with vast Arctic plains, large river deltas and greater coastal lakes especially. Currently, the most important areas for geese in North-East Asia are the Kolyma delta (6 species) and Anadyr estuary (4 species) (ANDREEV 2004). Furthermore 60,000 - 80,000 Snow Geese, nesting on Wrangel Island (STISHOV *et al.* 1991) essentially "improve" the goose statistics in north east Russia.

Among the factors determining breeding success of Arctic geese, landscape features provide a steady backdrop for a string of dynamic circumstances: the accessibility and quality of spring food (SEDINGER & RAVELING. 1986), distribution of snow packs (SYROECHKOVSKY & KRECHMAR 1981), and predation rate depending on rodent cycles (SUMMERS & UNDERHILL 1987; SYROECHKOVSKY *et al.* 1991). Most important, however, is the extent of individual body reserves at the time the birds arrive to their breeding sites (THOMAS 1986; THOMPSON & RAVELING 1987; EBBINGE & SPAANS 1992). The latter depends on wintering conditions and the availability of food in transit habitats during spring migration. Thus, the details of flyway ecology deserve deeper insight.

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Migration of geese in north east Asia

Like many other birds, geese migrate to the north because food is plentiful there in summer. This abundance, however, is restricted in time and unevenly distributed in space. Both on the wintering and breeding grounds the quality of food constantly changes (SEDINGER 1984). Their digestibility negatively correlates with the fibre content and never gets high (DRENT & PRINS 1987; BAIRLEIN 1999). For large herbivorous birds these circumstances may become crucial, especially in spring, when a low-calorie diet has to simultaneously support several energetically costly activities. In the annual cycle of Arctic geese the most important goal is the need to synchronize the period of peak gosling growth with the peak of green vegetation biomass quality in tundra ecosystems. For example, the peak gosling growth in Tundra Bean Geese *Anser fabalis rossicus* ocurs between the third and sixth weeks after hatching, which in the Kolyma lowlands falls between 5th and 20th of July (ANDREEV 1993). Even during this, the period of most optimal food availability, broods have to use particular microhabitats to maximise food intake. Typical breeding habitat of Tundra Bean Goose in a small tundra valley of the Konkovaya river provides a clear example of such dependence (Fig. 4).

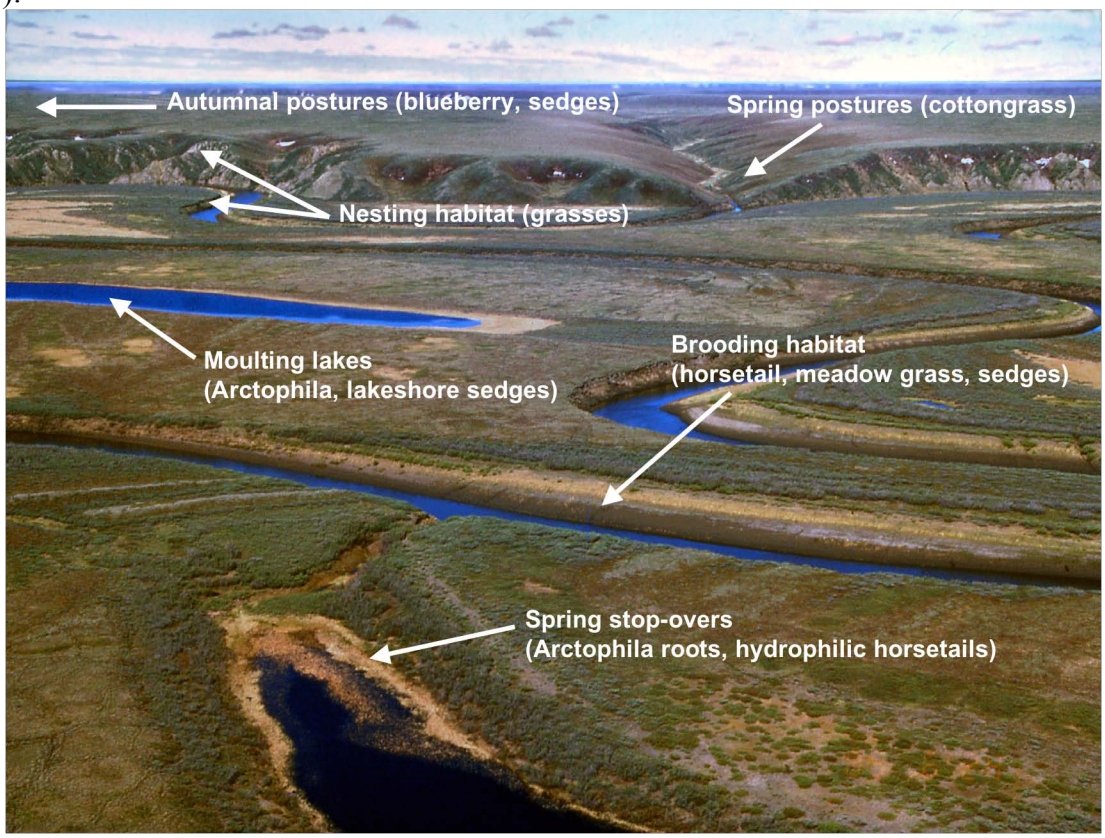

Fig. 4. Example of summer habitat use by the Tundra Bean Goose in Konkovaya valley – a typical breeding habitat of this species on Kolyma-Indigirka plains.

Migratory routes of geese in Eastern Asia concentrate into three major routess: the East Palearctic, the West Pacific and the East Pacific flyways. The first connects Siberian mainland breeding grounds (from Lena to Chaun) with wintering quarters in China. The second joins Chukotka, Koryakland and Kamchatka with Japan and Korea. The third leads from Wrangel Island and Chukotka to the Bering Sea and North America. The first and second paths are mostly used by the "grey geese" (*Anser fabalis serrirostris*, *A.f. middendorfii*, *A.albifrons*, *A.erythropus*), the third – by "coloured geese" (*Chen caerulescens*, *Philacte canagica*, *Branta bernicla nigricans*) (Fig. 5).

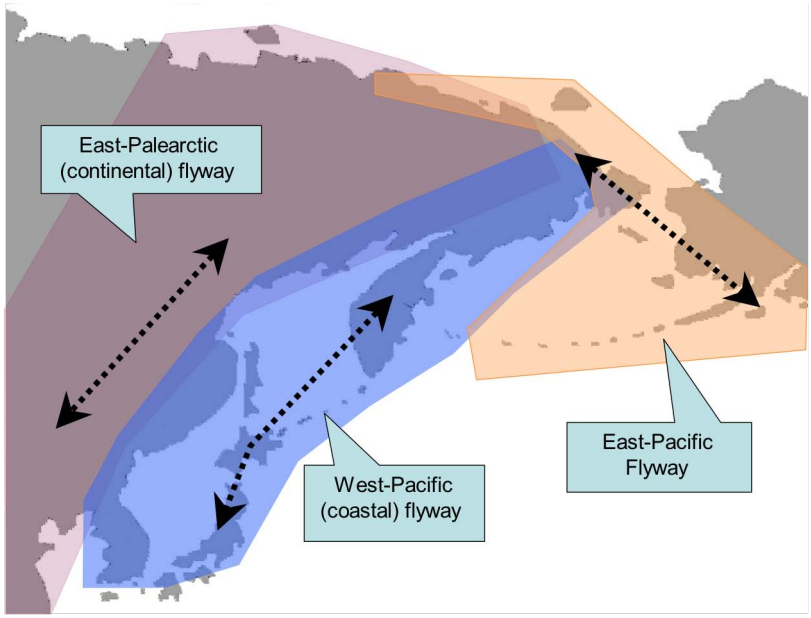

Fig. 5. Major flyways of geese in NE Asia.

The wintering grounds of geese in East Asia lie south of the zero degree isotherm between 30° and 35°N. To provide goslings with the best growing conditions, breeding geese must begin spring migration early. For example, Bean Geese wintering in the Yang-tse valley leave by the end of February. Following the leading edge of spring plant growth initiation, they migrate northwards to the spring staging sites. There are three major transit areas in East Asia: the Zeya-Bureya plain (DOUGINTSOV 1996), the Khanka lake lowland (BOCHARNIKOV & GLUSCHENKO 1996) and central part of Hokkaido (KURECHI *et al.* 1994) (Fig. 6). All three are located between 44 and 50°N. Geese arrive there by late March-early April and spend 2-4 weeks before they start to move further north. A distance of 3000-3500km still remains to reach the breeding sites.

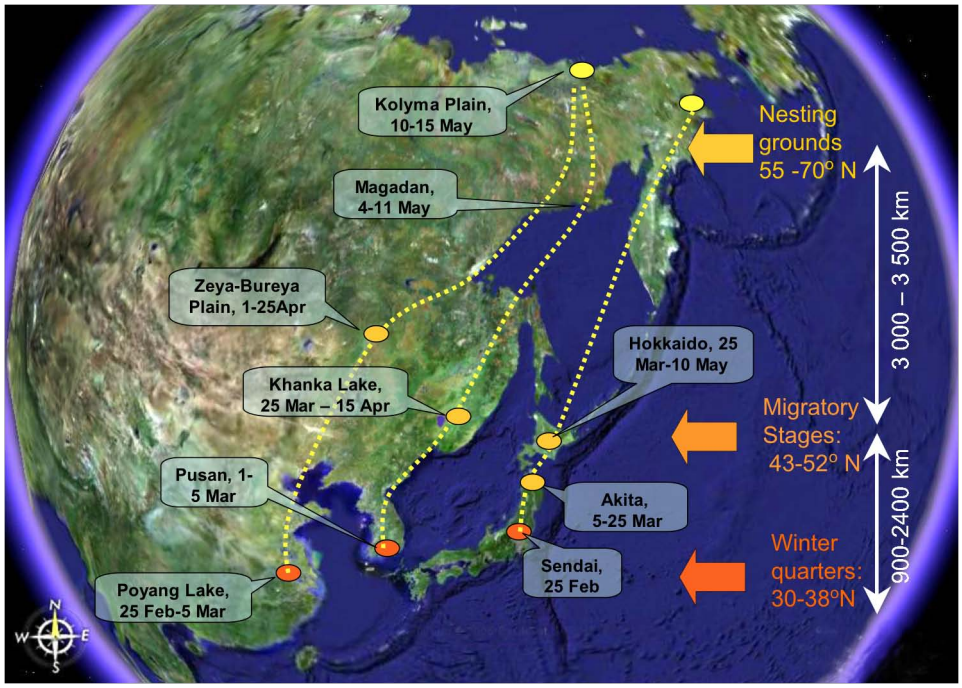

Fig. 6. Spring migration of Tundra Bean Geese in NE Asia
(see explanation in the text).

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The entire length of goose flyways within the East-Palearctic migratory system varies between 4700 and 5700 km. North of the spring stopover sites migrating geese have to fly over the snow covered ranges of the Dzhugdzhur, Verkhoyansk, Kolyma, Koryak and Anadyr highlands. A good portion of the East-Pacific flyway extends over open sea and ice. Geese are surely able to find stopover sites along these routes: rare and ephemeral, these so-called "spring oases" are scattered over melting riverbeds, with nearby wind-scoured escarpments and lakeshores. The location of such sites are well known to local hunters – in contrast to the biology of the geese - during these short stops. Food abundance and availability at such oases follows the progress of spring and snow melting. Changing from year to year, they have little in common with local agriculture. In early springs such sites may support the geese during the last days of migration. Compared to major stopover sites in temperate latitudes, overall their energetic role is relatively modest.

According to satellite tracking data, White-fronted Geese migrate in "dashes" lasting 10-12 hrs and covering 900-1,000 km (ANDREEV 1997). Comparing data on the timing of Arctic geese migration and distances covered (fromvarious literature sources) shows that the average speed of their spring migration is far below this rate of movement, varying from 100 km/day in the Snow Geese to 175 km/day in White-fronted Geese (Table 1). It turns out that during spring migration, long-distance dashes are interspersed with more or less prolonged stops of 3-5 days. Detailed data on the calendar and stopover biology of geese in Asia are scarce. The itinerary of migratory Snow Geese in North America is better understood.

Tab.1. Average speed of "fast" spring migration in 3 goose species breeding in NE Asia

Species	Flyway	Latitudes	Start of migration period*)	End of migration period*)	Duration of the period, days	Length of migration, km	Average speed, km/day
White-fronted goose	Hokkaido-Anadyr	42-62N	120	140	20	3500	175
Tundra bean goose	Blagoveschensk – Kolyma delta	50-70N	115	140	25	3000	120
Snow goose	Saskatchewan – Wrangel island	52-72N	104	149	45	4550	100

- *) – days from the beginning of year
- Based on data from KRECHMAR *et al.* 1991, ANDREEV 1997, ARMSTRONG *et al.* 1999

Snow Geese from Wrangel Island winter in two disjunct areas: North Washington – south British Columbia (48°N) and California (32°N) (Armstrong *et al.* 1999). The corresponding distances between wintering and nesting sites are 4500 and 6500 km (Fig. 7). In spring, the geese start to leave California from the first days of March. Prolonged staging is known on the plains of Oregon (44°N), Saskatchewan (52°N), near Anchorage (61°N), Yukon delta (64°N) and on Seward Peninsula (66°N). Due to a general climatic asymmetry in the North Pacific Rim, the spring chronology of the Anchorage plains and Yukon delta are 1.5 to 2 weeks ahead compared with corresponding latitudes of North-East Asia. According to B. KESSEL (1989), Snow Geese leave Seward and cross the Bering Straits by 20-25 May. The first heralding flocks arrive at Wrangel island in the last week of May (STISHOV *et al.* 1991). Hence, to cover 800-1200 km in Asia the birds take about 5-7 days.

From Table 1 one can see, that the spring schedules of Asiatic and North-American geese are similar. However, Asiatic birds have to migrate under more severe conditions.

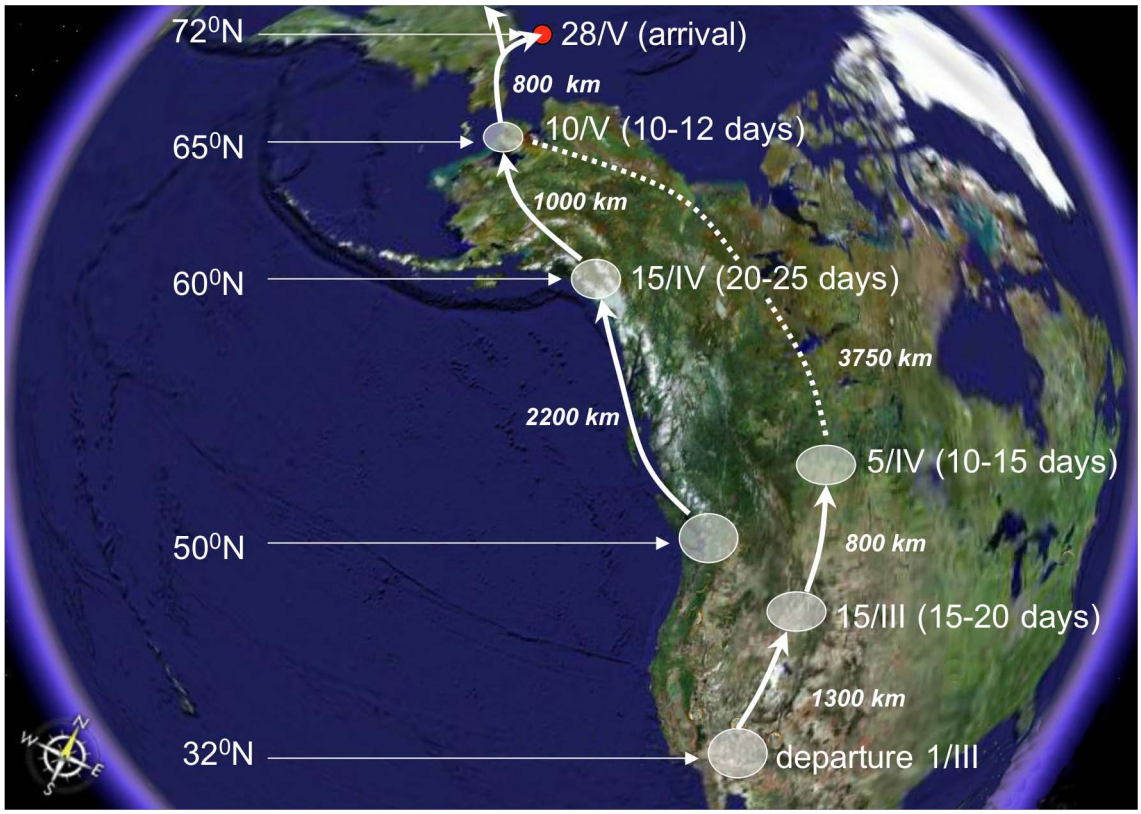

Fig. 7. Spring migration of Snow geese from Wrangel Island (see explanation in the text).

Energetics of migratory geese

During the first month of spring migration, the "grey geese" from the wintering grounds in China cover over 2,500 km, reaching the valley of Amur near Blagoveschensk by early April. Hence, their speed during this "slow migration" phase averages 80-85 km/day.

The Khingan range fringes the right side of Amur valley (China) and the vast extensively cultivated Zeya-Bureya plains that stretch along Amur on the left bank (Russia) (Fig. 8). Large fields are sowed with wheat, barley, buckwheat and soya, as well as some corn. Flocks of Tundra Bean Geese stop here for 3-4 weeks (from late March to late April), and White-fronted Geese for 2-3 weeks (from mid-April to 5-8 May) (DOUGINTSOV 1996).

According to V. DOUGINTSOV's calculations, in spring the Zeya-Bureya plains may provide 250-450 kg/ha of waste grain, left behind after the autumn harvest. Local hunters traditionally burn straw on the fields in early spring. The patchwork of slightly baked grains is most attractive to the geese. Due to these circumstances, right from arrival the geese become "granivorous birds" with lush food resources. According to my estimates, consuming about 180 g/day wheat, a Tundra Bean Goose is able to gain 30-35 g/day fat stores. During the entire staging period each bird would consume about 5.5 kg of grain. White-fronted Geese also feed on grain, but are prone to switch to green wheat sprouts as soon as they begin to emerge in the third week of April.

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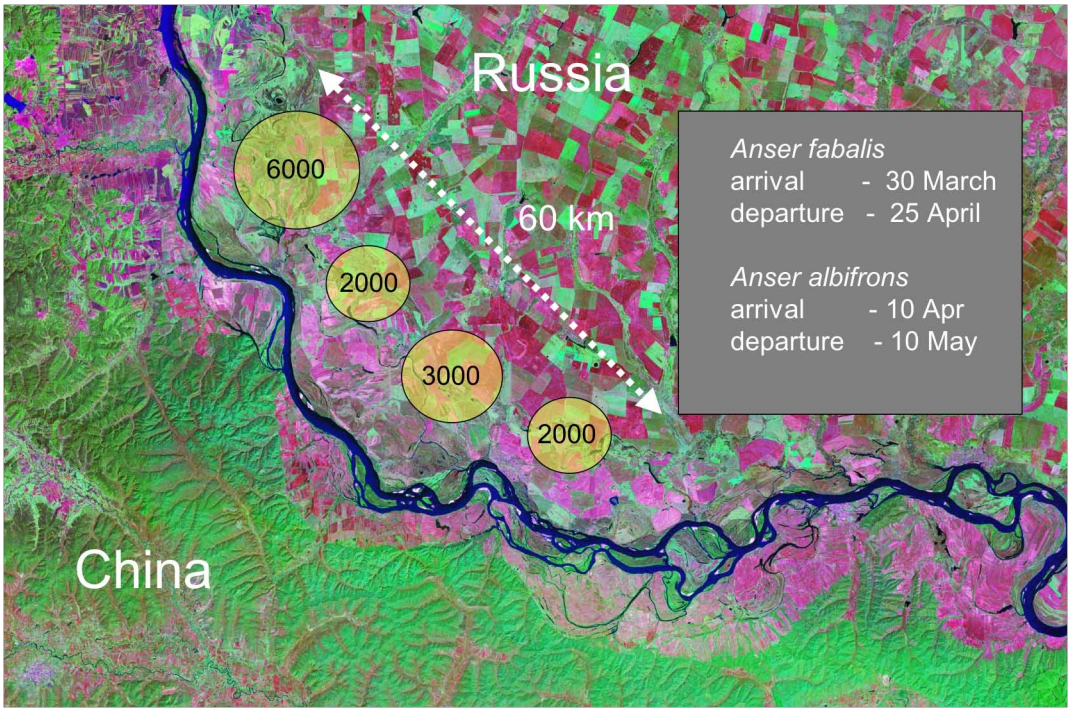

Fig. 8. Spring stages of "grey" geese on the Zeya-Bureya plains. Figures in the circles indicate the maximum number of birds (From ANDREEV 1997 and DOUGINTSOV 1996).

Due to hyperphagy and fattening, the body mass of transient geese on the Zeya-Bureya plains reach record values. The minimal body mass occurs among moulting birds in July. Body mass statistics clearly show these differences (Fig. 7). When the Tundra Bean Geese leave their spring staging areas, the females weigh 3.8 kg on average, the males 4.3 kg (Table 2). Quantitative models based on these statistics indicate that by the end of the staging period, fat reserves make up to 25-28% of body mass in Tundra Bean Geese (Fig. 8). Previously, a similar pattern was found for the Taimyr Black Brent *Branta bernicla*, wintering in Western Europe (EBBINGE & SPAANS 1992). However, in the literature on White-fronted Geese in Asia and Wrangel Snow Geese I failed to gather comparable statistics.

The food value of the Zeya-Bureya plains is the result of the combination of the Amurland climate (dry springs and wet autumns) and local farming traditions (purposely excessive sowing). Further north, this "fast-food festival" ends abruptly, with long distances and endless cold. This part of the migratory route is covered in about two weeks with an average speed of 250 km/day. In this phase, fat reserves start to become exhausted rapidly. But the degree to which this happens in each individual is the key affects the reproductive potential of that individual in a given season.

Two different strategies for the use of nesting habitat resources are known (DRENT & DAAN 1980). In the first case, the fat and protein resources, remaining after migration, are immediately activated for investment in clutch formation. These species follow a more "capital breeder" strategy. An example of this "everything-or-nothing strategy" is described in Arctic Canada for Snow and Ross's Geese *Chen rossii* (RAVELING 1978). Even at lower latitudes the Snow Goose follows this option (ANKNEY & MCINNES 1978). In the second case, much of fat and protein resources are used during the migration and pre-breeding season. To meet the costly demands of early breeding season, the birds have to rely upon local resources of spring habitats. Most of "grey geese" follow this more "income breeder" strategy".

Table 2. Body mass of the Tundra Bean Goose in different seasons

Date	*Site*	*Latitude*	*Phase of yearly cycle*	*n*	*Mean body mass, g*	*SE*	*min*	*max*
males								
22-27Apr (1993)	Blagoveschensk	50	Transit stage	2	4275	25	4250	4300
7-12 May (2005)	Magadan	60	migration	13	3970	150	3850	4150
31-30 May (1980-1986)	Kolyma delta	68	Arrival in breeding range	7	3439	363	3100	4100
26-31 July (1993)	Kolyma-Indigirka lowland	70	moulting	27	3237	303	2700	3550
29 July (1995)	Kolyma-Indigirka lowland	70	moulting	67	3030	246	2650	3450
females								
22-27 Apr (1993)	Blagoveschensk	50	Transit stage	2	3863	442	3550	4175
7-12 May (2005)	Magadan	60	migration	5	3333	208	3480	3700
31-30 May (1980-1986)	Kolyma delta	68	Arrival in breeding range	7	2934	217	2650	3250
26-31 July (1993)	Kolyma-Indigirka Lowland	70	moulting	28	2828	232	2350	3200
29 July (1995)	Kolyma-Indigirka Lowland	70	moulting	56	2664	198	2250	3000

Data on migrating birds were collected from hunting bags, data on moulting birds collected during trapping the birds for colour-banding.

Taking the Tundra Bean Goose as an example, I calculated the balance of energy demands and fat reserves of individual females during the "fast phase of migration" and upon arrival at the breeding grounds. Statistics on body mass (Fig. 9), combined with an energetic model of the costs of waterfowl flight (Fig. 10) allowed the prediction of fat consumption in birds of different size. This model is constructed on the following assumptions: the energy cost of migratory flight (PE_m) is proportional to flight duration (Tm), being set at the level approximately 10 times Basal Metabolic Rate (BM). Hence, $PE_m=10BM*T_m$, kJ (DOLNIK 1995). Further on: $BM=0.9Wb^{0.732}$ kJH/hr, $T_m=L/V$, where L – distance, km, V – flight speed. In larger waterfowl, V varies from 70-85 km, depending on body mass. The body mass equivalent (E) is substituted as 25 kJ/g/g.

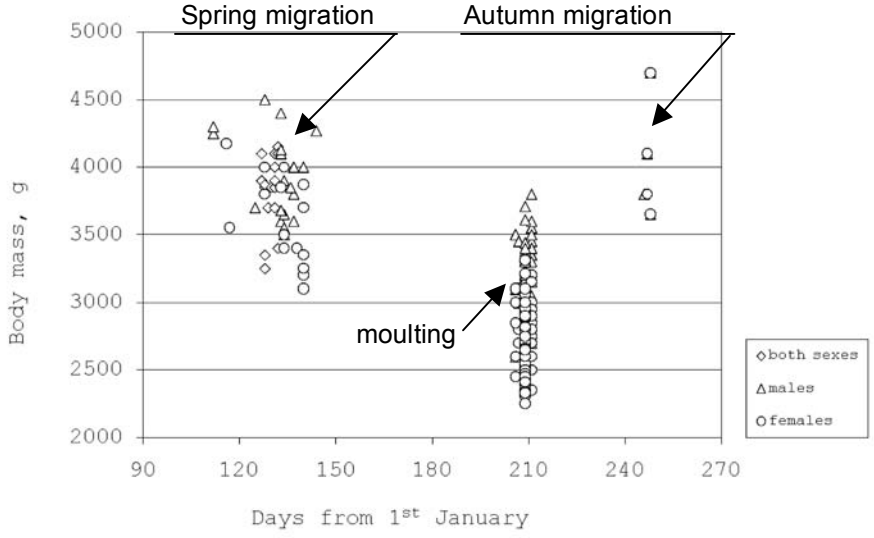

Fig. 9. Seasonal dynamics of the body mass in Tundra Bean Goose.

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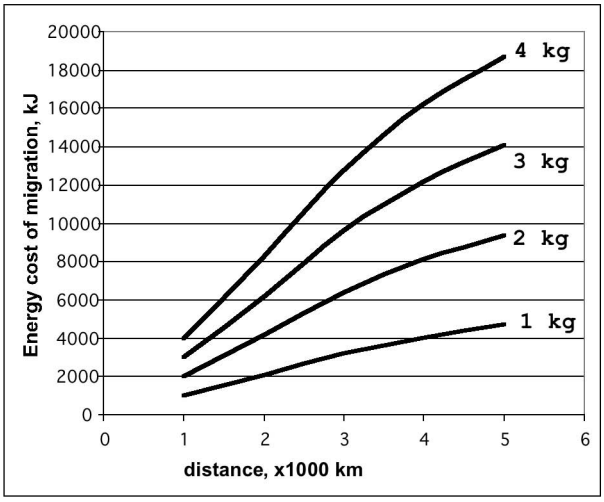

Fig. 10. Quantitative model of flight cost in large waterbirds.

According to the calculations, a flight of c. 3,000 km in length, will cost a c. 4.0 kg Bean Goose 460 g of fat. A 2.5 kg White-fronted Goose would burn 110 g fat to cover 1,000 km (Fig. 11). Within the limits of goose body masses (1.5-4.5 kg) one can find that the transportation of 1 kg body mass over 1,000 km costs 40-45 g fuel (mostly fat). Upon arrival on the breeding grounds Tundra Bean Geese still may retain about 400 g of body reserves – c. 45% of initial mass of fat stores. Similar calculations for White-fronted Geese suggest 50-55%, for Snow Geese, up to 80% of fat remains. These estimates suppose a more "capital breeder " strategy in the Snow Goose, and a more "income breeder" strategy in the Bean Goose. The White-fronted Goose occupies an intermediate position. The next question is: to what degree does the remaining mass of fat and protein reserves meet the demands of clutch formation?

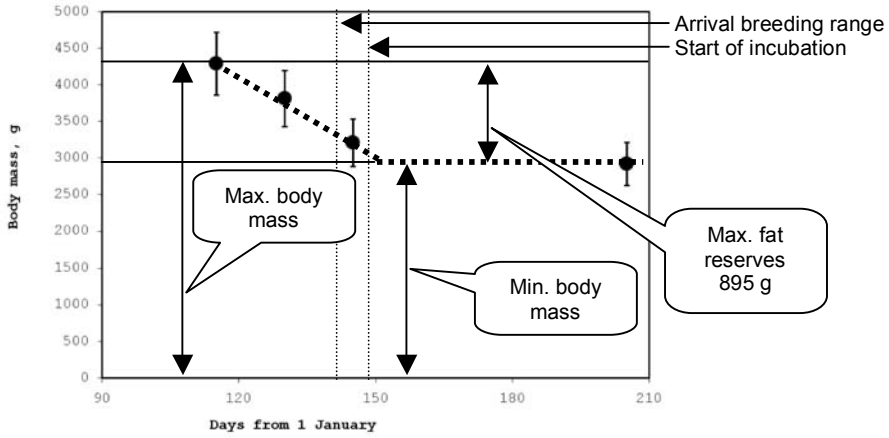

Fig. 11. Consumption of fat stores in Tundra Bean Goose during spring migration and early breeding season.

In different phases of the reproductive cycle the daily energy budget (DEB), comprises two components: the cost of daily existence (DEE) and productive energy (PE). Using my estimates for the Tundra Bean Goose, the DEB peaks at 2.8-3.2 BM during transit stages (hyperphagy, storing fat); 2.3-2.5 BM during "fast migration"; 2.0-2.1BM during clutch formation; 1.4-1.5 BM during incubation (ANDREEV 1990, Fig. 12). Multiplying these "standard" levels by the duration of corresponding phases, one could calculate the total energy budget and, consequently, the estimates of food requirements to pass through the most demanding period of yearly cycle.

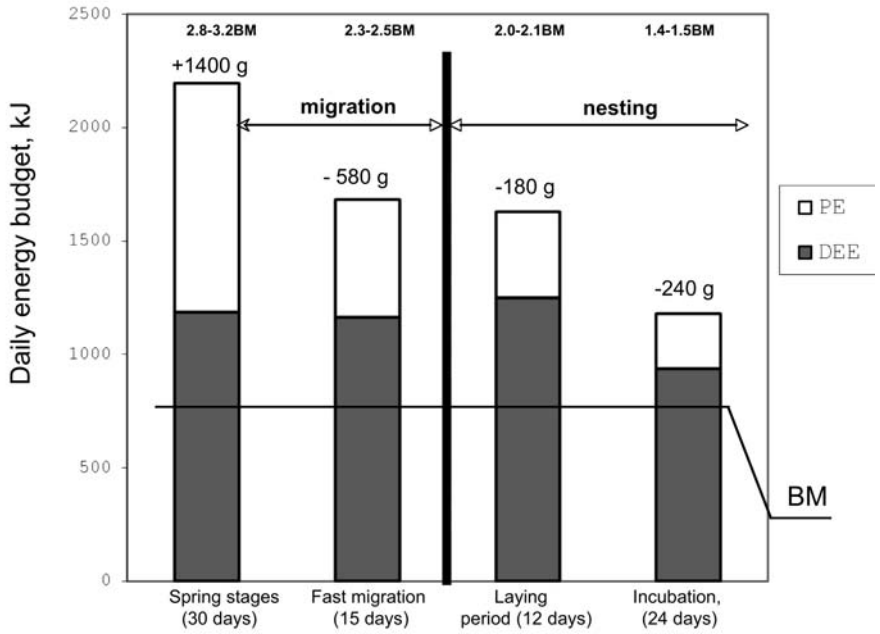

Fig. 12. Energy cost of early reproduction in Tundra Bean Goose (as simulated for a 3,000 g female, fat equivalents in grams). Figures in the upper row indicate the mean level of expenditures (times BM)

Calculations show that from migration to incubation the total cost of daily existence exceeds the total cost of productive requirements 2.7 times. In the units of "fat currency" this gives 2,879g (DEE) against 1,000g (PE) in 30 days. Hence, the amount of fat reserves gained during the transit stages generally coincides with the cost of reproduction. About 58% of that amount is used for migration (flight), the rest 42% (420g) would help to cover the formation of 5-6 eggs. However, this amount of fat reserves would not provide enough energy for everyday existence, which is equivalent to c.50g fat/day or 650-700g for the entire clutch formation period. As Tundra Bean Goose cannot access of that mass of fat, various factors become significant to account for how geese may balance their energy budgets at this time. Among them the abundance of snow and the progress of snow melting along the flyway; timing of ground melting in river beds, where roots of grasses might become available, the disturbance by hunters on resting stops, the abundance of rodents in winter: high lemming density leads to destruction of cotton-grass tussocks, depriving the geese of blooming cotton-grass - their major spring food. These circumstances explain why the clutch and brood size in Arctic "grey geese" varies from year to year so dramatically. It declines in the north and is negatively correlateed with the lemming density (KRECHMAR *et al.* 1991).

To summarize, the possibility of undisturbed feeding at transit stopovers and upon arrival on the breeding grounds is an important condition for enhancing the breeding success of "grey" geese in the tundra, whereas the very extent of flyways and scarcity of foods along them force the geese to react "proportionally" to the seasons and habitat.

Conclusion

In the 20th century Arctic geese passed through the second"revolution" of changes in their environment since the Holocene. During this period, their wintering and flyway conditions changed dramatically: they have become richer in food stocks and shifted northward. Most of the Arctic geese have benefited from these changes, some, like the Snow Goose have shown explosive population growth.

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After 1950s, the goose populations of Eastern Asia lost much of their breeding and wintering habitats. On the other hand, they managed to pass through "bottle necks" in Japan and Korea, by switching from natural coastal habitats to paddy fields. These populations keep growing, gaining benefits from intensified agriculture and conservation efforts (e.g. prohibited hunting).

Upon arrival on the tundra breeding grounds, Arctic geese may either breed immediately ("capital breeder" strategy) or use local food resources to restore body condition after migration ("income breeder" strategy). Both of these strategies depend on food availability on staging grounds. Grey geese of Eastern Asia exploit the "income breeder" strategy. On the Kolyma-Indigirka plains the density of blooming cotton-grass – a major source of nutrients in spring – determines their breeding success.

Long distances between staging sites (i.e. the northern limits of agriculture) and nesting grounds in Eastern Asia may hamper population growth of "grey" geese. In Europe and North America these distances are shorter, and Arctic geese are limited either by the carrying capacity of breeding habitats ("income breeders") or harsh spring conditions ("capital breeders").

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Some recent news of the Brent goose *Branta b.bernicla* in France

Vincent Schricke
ONCFS, 39 Bd. Albert Einstein, CS 42355, F-44323 Nantes Cedex 3; vincent.schricke@oncfs.gouv.fr

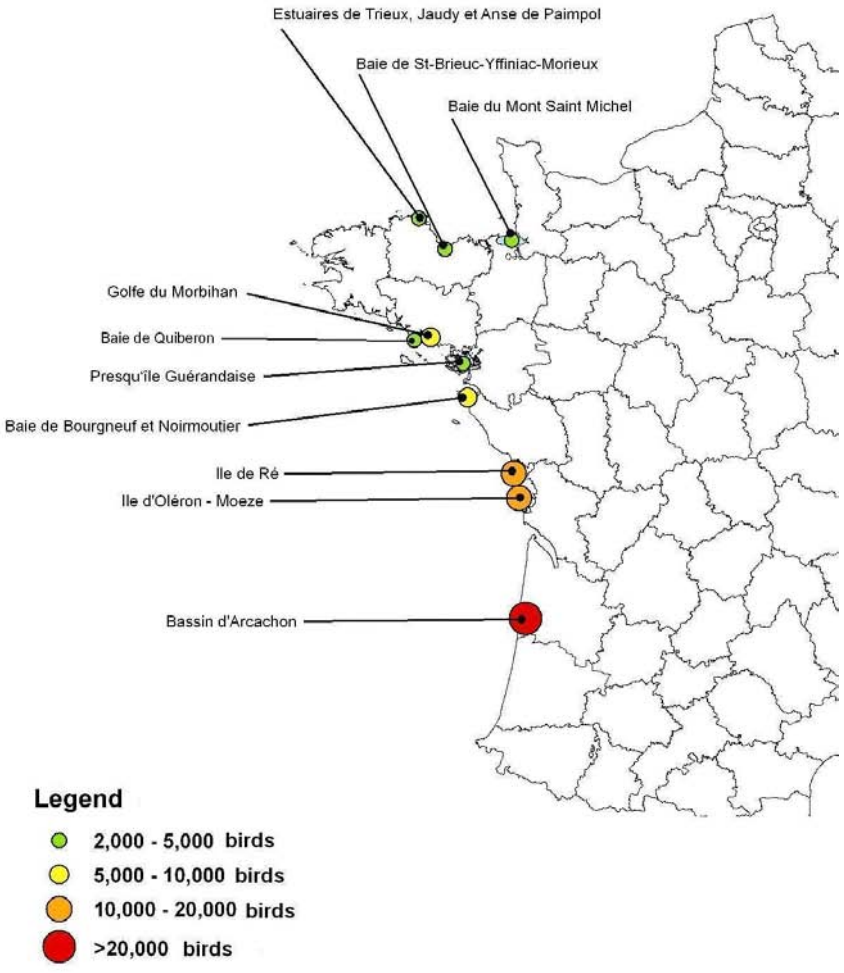
This paper is a summary of a talk presented in Bonn, Germany, 15-16 December 2009, during the meeting of the AEWA Dark-bellied Brent goose Action Plan Workshop.

Introduction

The Dark-bellied Brent Goose *Branta b.bernicla* is a migratory goose subspecies, which winters in France along the Manche-Atlantic coast from September to April. It has been a protected species since 1962 by a ministerial order.

Fig. 1 : Spatial distribution of the 10 key sites in France

Average number (mid-january counts 2004/09)

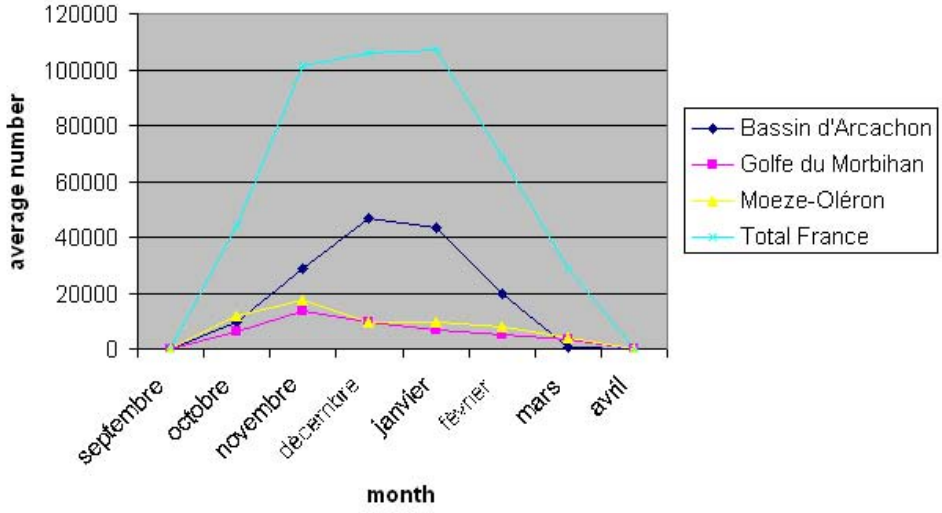


Distribution and movements

During the winter season, this species occurs mainly on the Atlantic coast, from Presqu'île du Cotentin in the north to the Bassin d'Arcachon in the south. About 40 wintering areas are regularly occupied every year but only 10 key sites are of importance international (> 2000 birds, Fig. 1).

The peak in abundance at the main four key sites varies during the season in relation to the availability of food resources (GILLIER & MAHEO 1998): a peak occurs in November in the Golfe du Morbihan and in December/January in the 'île de Ré, Moeze- île d'Oléron and Bassin d'Arcachon. There is a shift of the population from the north to the south during the wintering season (Fig.2).

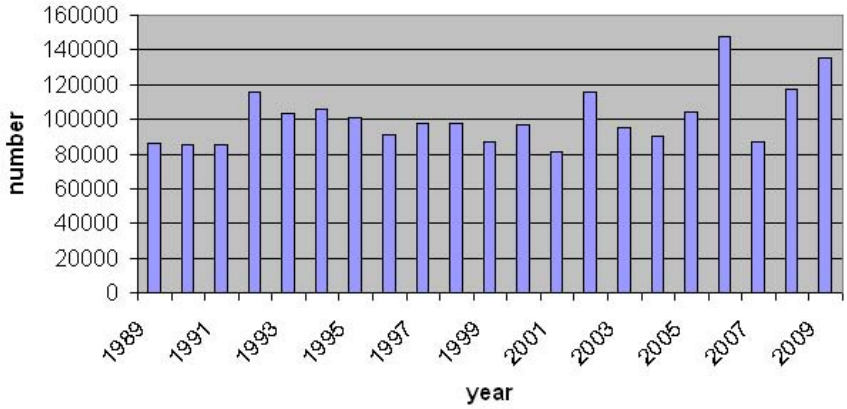
Fig. 2: Phenology of Brent geese in France. Average mid-january counts 2000-2009



Abundance and trends

Due to the highly variable breeding success, the French wintering population shows large fluctuations but seems to have increased in the recent years. The wintering population size has been more than 100,000 birds in January since the 2001-2002 season, supporting at least 50% of the total population (peak of 147,700 birds in January 2006, Fig. 3). The Bassin d'Arcachon is the main wintering area in France holding the majority of the French population in January during the last 10 year period.

Fig. 3: Trend of number of Brent geese in France. Mid-january counts 1989-2009. (source: LPO/Wetlands International)



Habitats and diet

The Brent goose occurs on natural and semi-natural habitats: mudflats (*Zostera* sp. and *Alga* beds), and salt-marshes (*Puccinellia maritima*) in some areas (e.g. Baie du Mont Saint-Michel). There is no regular use of agricultural land.

The use of these habitats depends on the human activities, the status of the food resources (in quality and quantity) and the recent expansion of the area of sea couch grass *Elymus athericus*, as observed in the Baie du Mont Saint-Michel (SCHRICKE 2010; VALERY et al. 2008).
For example, the extent of *Zostera noltii* beds have decreased by 34% during the last 20 years (4,564 ha in 2007) and *Zostera marina* by 73% (104 ha in 2008) (DALLOYAU et al. 2009). But other areas, like the Baie de Bourgneuf, showed fluctuations of *Zostera noltii* beds: an increase during 1982-1998 period (117 ha to 423 ha) and a decrease during 1998-2001 period (187 ha in 2001) (HARIN 2004).

Threats
Two major threats can affect this species in France: a reduction in feeding habitats (in quality and quantity) and an increase of economic and recreational activities (i.e. those that cause disturbance) (SCHRICKE 2004).
To reduce these main threats, there are some local actions have been initiated, incuding a project in the Baie du Mont Saint-Michel to stop the *Elymus* invasion on salt-marshes and, in some areas, sectoral policies to limit the disturbance by human activities and to protect *Zostera* beds (e.g. a ban on the shell-fishery in some parts of the Golfe du Morbihan).

Conclusion
Even if the Brent goose distribution in France occurs within a network of sites with legal protection status (86% of the national population included in IBAs, 97% in SPAs and 93% in protected areas under national law), this species need particular attention because of its specific habitat use.

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Occurrence of Egyptian Goose *Alopochen aegyptiacus* in Europe

Hakon Kampe-Persson
University of Lund, Department of Animal Ecology, Allarp 414-19, S-295 91 Bromölla (Sweden); kampepersson@hotmail.com

The Egyptian Goose *Alopochen aegyptiacus* is an invasive species that has become quite numerous in Europe and which is still spreading to new areas (Table 1). Therefor the species deserves attention, even though it is not a true goose. This short communication aims at summarising the current status of the species in Europe. The picture is incomplete however, partly because the population estimates from countries supporting the largest populations are out of date and partly as no data were obtained from the Rarities Committees in Ireland, Denmark, Norway, Portugal, Spain, Romania, Belarus, Ukraine and Cyprus. This lack of response should be seen as a warning, that the species might be more numerous than shown in Table 1. In Denmark, for instance, no less than 544 observations of 1-63 individuals were listed for 2009 (www.dofbasen.dk).

The Egyptian Goose was introduced into the UK from Africa in the 17th century and flocks of full-winged geese were widely distributed in Britain by the mid-19th century. That fact makes it impossible to determine if observations made in continental Europe in the 19th century and in the beginning of the 20th were of wild birds or of escapes. Ringing studies in Africa have shown that seasonal movements of up to 1,000 km take place (SHEWELL 1959). From 1967, the species also bred in continental Europe, often after local escapes, first in The Netherlands, thereafter also in Belgium, Germany and France (LENSINK 1996). Except for a score of pairs, the entire European population is found in these five countries today. In view of the fact that most national estimates are 5-10 years out of date, the total European population most likely exceeds 10,000 breeding pairs. And, if the national populations have continued to increase after the year of the latest estimate in a similar way as before, the number of pairs might be much higher than that. The size of the British population is supposed to have been unchanged from the mid-19th century until the late 1980s. SUTHERLAND & ALLPORT (1991) estimated the spring population in 1988 to be about 400 birds, including 144 pairs and similar estimates have also been published by others (ATKINSON-WILLES 1963, LACK 1986). 1n 1999, this population was estimated at 1,000 birds (BAKER *et al.* 2006). That figure corresponds to 360 pairs if the ratio between total number of birds and number of pairs was the same as in 1988.

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In The Netherlands, the population increased from one pair in 1967 to seven in 1972, 48 in 1977, 115 in 1983, 345 in 1989, 1,350 in 1994 and at least 4,500-5,000 in 2000 (LENSINK 2002). However, the number of individuals counted in July 2009 (SOVON-NIEUWS 2010-1) indicates that the Dutch population might have ceased to increase since the turn of the millennium.

Table 1. Occurrence and number of Egyptian Geese *Alopochen aegyptiacus* in Europe. Year of first observation, year of first breeding, latest count/estimate of number of breeding pairs (year within brackets), latest count/estimate of number of individuals (year within brackets) and up to three data sources are given for each country or region. A horizontal bar implies that the country lacks breeding records, while an empty box implies that no data were available. Superscript numbers against states indicate data sources listed in the References.

	Year of first observation	Year of first breeding	Number of pairs	Number of individuals	Sources
United Kingdom	(1600s)	1800s	144 (’88)	1,000 (’99)	11,13,26
Ireland				1 (’00)	
Denmark	1983	2000	7 (’09)	≥63 (’09)	
Norway	2002			2 (’06)	23
Sweden	1993	2004	1 (’08)	40 (’08)	5,20
Finland	1968	-	-	0 (’08)	
Lithuania	2002	-	-	0 (’09)	
Poland	1877	2007	2 (’09)		15
Germany	1866	1981	2,200-2,600 (’05)		4
The Netherlands	1915	1967	4,500-5000 (’00)	21,829 (’09)	18,19
Flanders, Belgium	1870	1981	1,300 (’05)		1
Wallonia, Belgium		1985-1990	330-590 (’01-07)		12
Brussels, Belgium		1969	37-41 (’03)		28
Luxembourg	1984	2007	2 (’08)	130 (’08)	16
France	1800s	1985	25-40 (’09)	210-235 (’06)	8
Spain			occasional breeder		
Portugal			occasional breeder		21
Switzerland	1996	2003	2 (’08)		14,27
Liechtenstein	2009	-	-	2 (’09)	
Austria	2003	-	-	8 (’09)	
Italy	1800s	-	not self-sustaining		9
Malta	1914	-	-	0 (’09)	7
Hungary	1993	-	-	1 (’08)	10
Czech Republic	1979	2008	2 (’08)	37 (’08)	24
Greece	2004	-	-	0 (’08)	29
Cyprus		-	-		6
Total:			**8,800-9,900**		

How will the population develop in the years to come? Which scenarios can be expected in those five countries where the species bred for the first time during the period 2003-2008? Will these countries get occasional breeding as in the Iberian Peninsula, a slowly increasing population as in Britain or a rapidly growing population as in The Netherlands, Belgium and Germany? Unfortunately, our knowledge about the species’ ecology is too limited to answer such questions.

After studying the species in Britain in the 1980s SUTHERLAND & ALLPORT (1991) concluded that "Egyptian Geese only attempt to breed in sites with short grass for chicks to graze, open water for protection of the young and a suitable nest site such as an island, or an old tree with holes or epicormic shoots." Furthermore, they stated that "due to the strong territoriality, restricted breeding habitat, low productivity and a history of constant population size it seems unlikely that this species will ever show the increases displayed by Canada Geese, Greylag Geese or Ruddy Duck." This seems to be true for Britain, maybe also for the Nordic countries, but not for North-west Europe.

Besides the afore-mentioned population developments, a fourth scenario is possible in the "new" breeding countries. In Denmark, the Egyptian Goose is on the Black List and active measures are taken to prevent the species from becoming established (MILJØMINISTERIET 2009). Such measures have also been discussed in Sweden, but no decisions have yet been taken.

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Bean Goose neck-banding projects in Europe – a recent overview

Thomas Heinicke
Federation of German Avifaunists (DDA), German Goose and Swan monitoring program, Chausseestr. 1, D-18581 Vilmnitz, Germany; thomas.heinicke@dda-web.de

Introduction

The exact breeding, staging and wintering distribution of Taiga and Tundra Bean Geese *Anser fabalis ssp*. in Europe is still under hot debate, as well as the size of the different populations involved. Colour-marking of individual Bean Geese correctly assigned to the correct race represents an effective tool to learn more about distribution patterns, migration routes and strategies of both Bean Goose *races*, occurring in Europe and will therefore contribute to this ongoing discussion process.

After a first extensive period of Bean Goose marking in Europe mainly in the 1970s and 1980s with colour-marking projects in Germany, Sweden, Norway, Finland (neck-bands) and the Netherlands (legrings), a second period was started in the last decade with several new ongoing projects.
The following accounts provide an overview of projects working recently. More detailed information are given about the codes used (including illustrations), as well as some notes on results and where different neck-bands can be expected to be seen.

Black neck-bands with white inscription (codes: A03 to A12)

Between 2003 and 2006, eight birds were ringed during the spring migration at the Valdak marshes, Finnmark, in Northern Norway. This site holds 150-220 Bean Geese during spring staging. In 2006, one adult female was additionally tagged with a satellite transmitter. All birds belong to ssp. *rossicus*, proven by measurements and genetic tests (ØIEN & AARVAK 2007, AARVAK & ØIEN 2009).

Fig. 1: Tundra Bean Goose, marked in May 2005 at Valdak marshes/Finnmark, Norway. Photo: *Ingar J. Øien*

Neck-band observations show connections to a moulting site of up to 1,000 Tundra Bean Geese on the Varanger peninsula in East Finnmark. Except for one recovery during a cold spell in January 2006 on Rügen Island in Germany, all other neck-band readings between the months September and early May are from Sweden.

Most observations during autumn and early spring are from Central Sweden, while records in winter months are concentrated in north east Skåne. Between late April and early May, altogether 4 of these birds were found staging in Luleå region in northern Sweden (for details see AARVAK & ØIEN 2009).

Contact: Tomas Aarvak, tomas@birdlife.no

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Black neck-bands with white inscription (codes: H25 to H38, ZZT, ONA, ONB, DAJ to DAY)

Altogether 24 Tundra Bean Geese have been ringed with black neck-bands, normally used for European Greater White-fronted Geese *Anser albifrons*. Codes H25 to H38 (14 birds) were banded in 1999 in the Netherlands, while codes DAJ to DAY (7 birds) were used in late autumn 2008 in Saxony/Germany. Codes ONA and ONB have been used on two birds, caught during spring migration 2006 at Nove Mlyny reservoir in Czech Republic, while code ZZT is a bird, ringed in July 2008 on Kolguev Island (Russia).

Observations of these birds are within the normal range of the Baltic/North Sea-population of Tundra Bean Geese. Interestingly, one of the Czech birds was observed in two consecutive winters in NW Saxony/Germany.

Contact: Thomas Heinicke, thomas.heinicke@gmx.net (all birds can also be reported online via www.geese.org)

Fig. 2: Tundra Bean Geese in Drenthe, Netherlands. Photo: *Peter Volten*

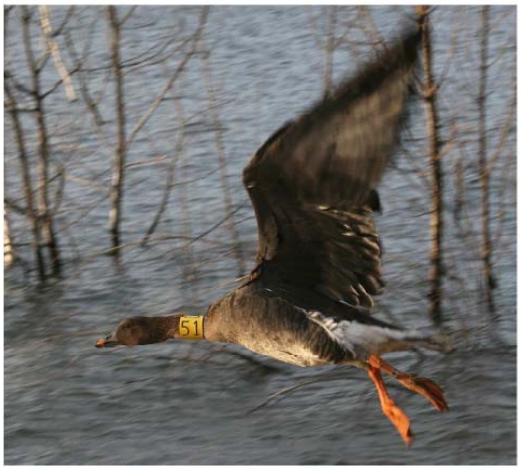

Fig. 3: Tundra Bean Goose, marked near Leipzig/Saxony, Germany during release. Photo: *Jürgen Steudtner*

Yellow neck-bands with black inscription (new design: 1 letter and in 90° 2 numbers/letters; old design: number-letter-number or number-letter-letter, all in a row)

This project continues former neck-banding activities in East Germany (at lake Gülpe/Brandenburg; led by late Prof. Rutschke) and was restarted in late winter 2006. One of the main goals is to study the migration strategies and routes of Taiga and Tundra Bean Geese in Europe. Therefore, this project now runs in close collaboration with international goose researchers in Germany, The Netherlands and Russia. There is close cooperation with the "European Greater White-fronted Goose project" (Helmut Kruckenberg, Bart Ebbinge/Alterra; see www.blessgans.de), with most geese being neck-banded in the Netherlands by goose catchers of the "Nederlandse Vereniging van Ganzenvangers" together with Alterra/Wageningen.

Between 2006 and 2010, about 750 Bean Geese have been marked with neck-bands of the new design (letter-number-number with using prefix letters: O, P, T, U, V, Z, L, J, e.g. O75; since 2009/20 also 3 letters, starting with letter A, e.g. AAZ), while in the period 2001-2004 another 95 birds has been marked with codes of the old design (number-U-number; e.g. 1U0).

Although most birds were neck-banded in The Netherlands (all belong to ssp. *rossicus*), an additional 231 Bean Geese (193 *rossicus*, 38 *fabalis*) were marked between 2006-2008 in East Germany (ringing places Lake Gülpe, Lower Odra National Park & near Leipzig).

In summers 2006 to 2008, 30 birds (29 *rossicus*, 1 *fabalis*; with letter P) were ringed as breeding/moulting birds on Kolguev Island (Russia) by Helmut Kruckenberg and Alexander Kondratyev (see expedition report at www.blessgans.de).

Another 21 Tundra Bean Geese have been ringed in summer 2008 and 2009 as moulting birds at Neruta River near Pechora Delta/Russia (codes U76-U97, P50, O63) and one *rossicus* bird during spring migration 2009 at Kologriv, Kostroma district/Russia (ringer: Konstantin Litvin and colleagues).

A very few birds survive with rings from the old Lake Gülpe project, which stopped in 1993. These previously yellow rings have faded and are now nearly whitish. The following design was used: number-letter-number (e.g.1V5; following letters were used: A, E, J, G, L, N, P, R, V, X, Y, Z) and number-letter-letter (e.g. 2CX; only numbers 1 to 7 were used).

Fig. 4: Tundra Bean Goose, marked in the Netherlands in winter 2009/10 with new ring design. Photo: *Leo Schilperoort*

More than 8,800 neck-band observations and/or reports of shot birds of Tundra Bean Geese, ringed between 1999 and 2010 under this project, were reported from 17 European countries so far. Due to a very good observer density, most observations are from The Netherlands and Germany, but a increasing numbers of neck-band sightings are now also reported from Poland.

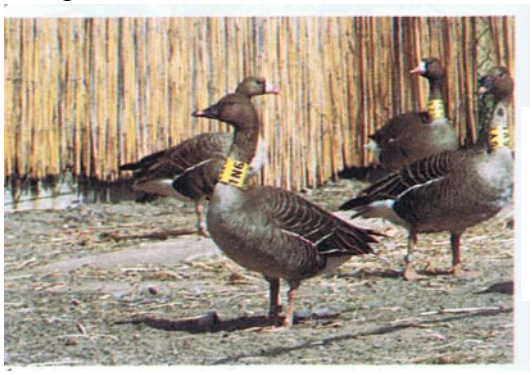

Fig. 5: Tundra Bean Goose of the old Lake Gülpe project. Photo: *Helga Liebherr*

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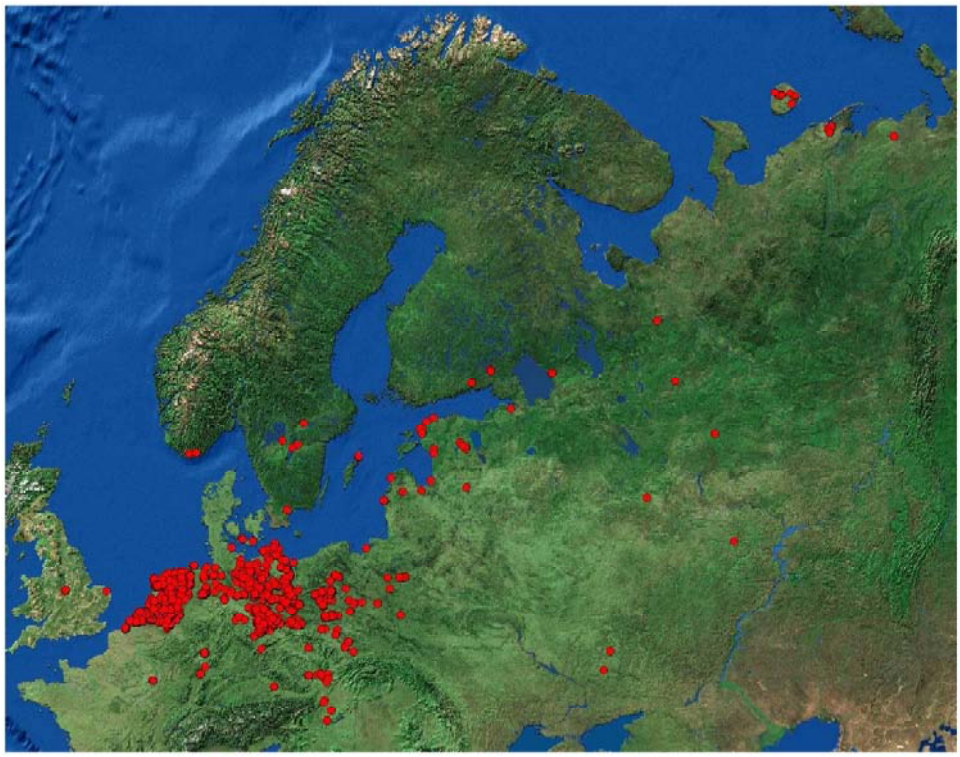

Fig. 6: Records (observations and shot birds) of Tundra Bean Geese, neckbanded between 1999 and 2010 in The Netherlands, Germany, Russia and the Czech Republic.

Interestingly, all birds neck-banded on Kolguev Island and near Pechora delta, were reported back in the range of the Baltic-North Sea population only.
In contrast to this, observations of Taiga Bean Geese, neck-banded in the Lower Odra National Park in the state of Brandenburg/Germany, were restricted to north east Germany and north west Poland. Observations of these birds in Sweden belong to only one single individual, indicating that most Taiga Bean Geese wintering in Germany and Poland probably use an autumn migration route south of the Baltic Sea.

Fig. 7: Records (observations and shot birds) of Taiga Bean Geese, neck-banded in autumn 2007 in the Lower Odra National Park in the state of Brandenburg/Germany.

The record of a shot bird from mid September in the Lower Ob floodplain shows that probably many Taiga Bean Geese wintering in Germany and Poland originate from the West Siberian lowlands.

Contact: Thomas Heinicke, thomas.heinicke@gmx.net (all birds can also be reported online via www.geese.org)

Blue neck-bands with white inscription (design: 1 letter and in 90° 2 letters)
As part of a new ongoing study investigating the migration of Scandinavian Bean Geese, 74 birds were neck-banded during spring staging in 2005-2009 in northern Sweden (37 birds in Umeå and Luleå region each). Thirty (41%) of the birds belonged to the race *rossicus*. Of the birds caught in the Ume River Delta 97% were *fabalis*, but in the Alvik area only 22% belonged to this race. Additionally, 10 birds (8 *fabalis*, 2 *rossicus*) were tagged with satellite transmitters between 2007 and 2009.

Until now, Swedish Taiga Bean Geese were reported back from staging and wintering areas in Sweden and Denmark only.

Fig. 8: Taiga Bean Goose, marked and satellite tagged in spring 2009 near Umeå, northern Sweden. Photo: *Thomas Heinicke*

Fig. 9: Tundra Bean Goose, marked and satellite tagged in spring 2009 near Luleå, northern Sweden. Photo: *Thomas Heinicke*

While most observations of the Tundra Bean Geese were from staging and wintering areas in Sweden itself, some birds were also reported during spring migration 2009 in Norwegian Finnmark and neighbouring Finland. In summer 2009 some birds were recorded at a *rossicus* moulting place on Varanger peninsula. Interestingly, two of the Swedish *rossicus* were seen during autumn migration in Eastern Germany, with one of these birds later reported back from The Netherlands.

More information about the ringing project and first results can be found at: http://www.zoo.ekol.lu.se/waterfowl/BEANGOOSE/TAIGA-BEAN.htm.

Contact: Leif Nilsson, leif.nilsson@zooekol.lu.se (all birds can also be reported online via www.geese.org)

Red neck-bands with white inscription (design: letter-number in a row, 1 letter and in 270° 2 numbers)
The first Finnish Bean Goose neck-banding project was carried out during 1978-1994 by the Finnish Game and Fisheries Research Institute. During that period, 905 Bean Geese were marked with orange or red neck-bands, mostly at or near the breeding grounds.

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Fig. 10: Finnish Taiga Bean Goose, spring 2007 near Kristinestad, Finland.
Photo: *Skaftung Nature*

In 2001, a second Finnish Bean Goose project was started, this time coordinated by BirdLife Finland with the main partners from the Finnish game and fisheries research institute, North Ostrobothnia Regional Environment Centre, University of Oulu and Metsähallitus.
During this second project, a few hundred Taiga Bean Geese were marked with red neck-bands on the breeding grounds in North Ostrobothnia and Finnish Lapland (for further information please contact Jorma Pessa: jorma.pessa@ely-keskus.fi).

Finnish Taiga Bean Geese mainly winter in Sweden, and to a lesser extent also in Denmark. Observations of these birds outside Scandinavia are rare, with only about ten different birds reported during the last years from Germany (mostly in the northeast) and none from The Netherlands.

Contact: Finnish Museum of Natural History, Ringing centre, P.O. Box 26 FI-00014 University of Helsinki, Finland, elmu_ren@cc.helsinki.fi

White neck-bands with black inscription (design: letter A+ 1 letter or number)

During the summers of 1996 and 1997, ten Tundra Bean Geese were neck-banded on Vaygach Island/Russia by the Institute of Ecology and Evolution (Russian Academy of Science).
Altogether eight out of the ten birds were reported back at European wintering grounds, with four birds in the Pannonian region, five birds in East Germany and one bird in The Netherlands.
Interestingly, two of the birds seen in Central Europe, were reported back later in East Germany. The last observations of these birds were recorded in 2003.

Fig. 11: Tundra Bean Goose, marked on Vaygach island/Russia.
Photo: *Konstantin Litvin*

Contact: Konstantin Litvin, Russian Bird Ringing Centre Moscow,
bird.ring.rus@gmail.com

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The "SPRING" project for investigating goose staging areas in the Upper Volga region

V. Avdanin, Y. Anisimov, P. Glazov, K. Litvin & O. Pokrovskaya
Bird Ringing Centre of Russia, IEE RAS, Bird Ringing Centre, 117312, Moscow, Russia; olga.b.pokrovskaya@gmail.com

In recent years a special BBI-MATRA project for migrating goose studies has been successfully running in Russia. This "SPRING" project aims to develop a Master Plan for sustainable conservation and management of marshes and riverine areas as protected spring staging areas for geese and endangered migratory bird species as well as to develop a long-term survey program on geese migration routes between Europe and the Central European Russia. The SPRING project is planned for three years (2008-2010) and is being implemented by Alterra Wageningen UR and the Severtsov Institute of Ecology and Evolution of the Russian Academy of Sciences (IEE), thereby co-operating on a permanent basis with the Institute of Geography of the Russian Academy of Sciences (IG) and "Kologrivsky Les" State Nature Reserve. The project covers four districts (Yaroslavskaya, Ivanovskaya, Vladimirskaya and Kostromskaya) which will be monitored to determine which areas play a key role as feeding or resting places for migrating birds. In two field study seasons several new important staging areas were found and almost all well-known stopovers were carefully inspected.

One of the most important and fruitful elements of the SPRING project is the catching of geese in Kologriv. Kologriv is the smallest town in Russia – now with only about 4000 inhabitants. It is situated in the north-eastern part of Kostroma Oblast on the Unzha river – a tributary of the Volga river.

The Unzha floodplain near the town is one of the most important spring staging areas for geese migrating to their breeding grounds in Northern Russia. Every year thousands of birds (mostly White-fronted Geese *Anser albifrons*) spend several days or weeks feeding on the fertile fields of the "Kologriv floodplain" Reserve. The high density of grazing geese, the flat nature of the terrain and the protection status of the reserve make the Unzha floodplain a very suitable place for goose catching. Using clap-nets – like traditional Dutch goose catchers – we caught 144 White-fronted Geese and one Bean Goose *Anser fabalis* in two years (36 birds in two catching attempts in 2008 and 109 birds in three catching attempts in 2009).

All birds were marked with "Moskva" metal rings and neckcollars - black for White-fronted Geese and yellow for the Bean Goose.

The records of geese we marked in these years suggest the consistent preference of the same staging areas by geese on migration. Marked geese were also recorded in northwest Europe (The Netherlands, Germany, Poland, Belgium, Denmark).

By January 2010 the ring reporting rate of birds ringed in 2008 was 80 % and of birds ringed in 2009 was 66 %. These figures confirm the success of the marking program.

Catching geese is difficult even for professionals because of the special equipment and permissions needed, however, bird-watching has become more popular. Every year people from different towns in the Kostroma region come to Kologriv to see the geese as close as possible, probably better here than anywhere else in European Russia.

Members of the SPRING project also take part in an annual local festival - "Goose Day" celebrated at the beginning of May. The festival held each year since 2004, has been approved by the District Administration, and receives their financial support. All district schools participate in a childrens' art competition. Participation in the festival by the department leaders of the Kostroma Regional Administration, and leaders and deputies of the Regional Parliament has become a tradition. Information on the festival has been annually broadcasted on central and regional TV channels. On this day everyone can use professional binoculars and telescopes to watch geese.

Request for participation of ornithologists to the monitoring of Greylag Geese *Anser anser* in France

Vincent Schricke
ONCFS, CNERA Avifaune migratrice, 39 Bd Albert Einstein CS 42355, F-44323 Nantes Cedex 3, France; vincent.schricke@oncfs.gouv.fr

Greylag Geese *Anser anser* wintering in France belong to the Northwest European population with a favourable conservation status and an increasing trend for several years (last estimate : 610,000 individuals).

Since 1984, this species has been monitored by marking individuals with coloured neck-bands in Sweden and Norway (Nordic programme initiated by L. Nilsson) and since 1990 in The Netherlands (programme initiated by B. Voslamber).
Other countries such as Germany and the Czech Republic mark this species less intensively, and a few individuals were recently marked in the Camargue. This monitoring by marking (6,400 marked birds, 250,000 resightings) has been the subject of many publications focused both on the species' ecology and on migration strategies. Individuals on migration through France are mainly of Swedish and Norwegian origin and are observed in particular along the Atlantic flyway. A few birds from The Netherlands are also seen in France during autumn and spring migration. The website (www.geese.org) gives details of marking results for this population, provided that one registers to have access to the data. All the geese banding and marking programmes are also available on the site www.cr-birding.be.

The Netherlands continued to mark individuals in 2009 (1,000 marked birds) to improve the knowledge of movements within this country as well as outside of it. The results already obtained for the 1990-2008 period have shown that a proportion of the birds are sedentary and remain close to the nesting sites, whereas others are migratory with movements to Spain via France.

In addition to winter counts, the ONCFS has conducted since the 1980's a monitoring study of prenuptial migration in western France. The recent analysis of results over the 1980-2005 period shows an increasingly early migration (FOUQUET *et al.,* 2009). The ONCFS is also an active member of the Goose Specialist Group of Wetlands International since its creation in 1995. In this respect, it took part in the 12th meeting held in October 2009 in Sweden. During this meeting, L. Nilsson presented an update on the situation of this species. At his request and that of The Netherlands, France was asked to intensify the resightings of marked birds, in particular along the Atlantic coast and the Der Lake area, to confirm the flyways used by geese.

We encourage all French or foreign ornithologists to take part in the monitoring of marked geese, particularly in important wintering areas and during autumn and spring migrations. Any resighting of an individual can be entered directly into the site www.geese.org, or sent to Leif Nilsson (Leif.Nilsson@zooekol.lu.se) , by specifying the code (letter or number series), colour of the neck-band, place and date.

Reference

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Moulting concentrations of non-breeding Greylag Geese *Anser anser* in Germany – an updated overview

Thomas Heinicke)[1] & Bernd Koop)[2]

)[1] Federation of German Avifaunists (DDA), German Goose and Swan monitoring program, Chausseestr. 1, D-18581 Vilmnitz, Germany; thomas.heinicke@dda-web.de

)[2] Dörpstraat 9, D-24306 Lebrade, Germany; Bkoop.Avifauna@t-online.de

Introduction

The Greylag Goose *Anser anser* is the only indigenous breeding goose of the genus *Anser* in Germany. Due to an expansion of the breeding range of the remaining wild populations in northern and eastern Germany and several reintroduction events in many places in western and southern Germany, the Greylag Goose nowadays is a widespread and common breeding bird in most parts of Germany. While successful breeding birds remain for brood-rearing in the breeding areas during spring and summer, non-breeders or failed breeders undertake a moult migration to special moulting places to renew their wing feathers.

In the 1970s and 1980s, most Greylag Geese breeding in northern and eastern Germany undertook a moult migration to sites in The Netherlands, Denmark, Southern Sweden and sporadically even to coastal areas of central Norway (e.g. HAACK & RINGLEBEN 1972, FOX *et al.* 1995, ZIJLSTRA *et al.* 1991, RUTSCHKE *et al.* 1982, LITZBARSKI 1979, 1982).

At that time, only a very few moulting places with small numbers of non-breeders were known in northern Germany (e.g. SCHMIDT-MOSER 1986) and from the Lower Rhine area (JOHAN MOOIJ in litt.).

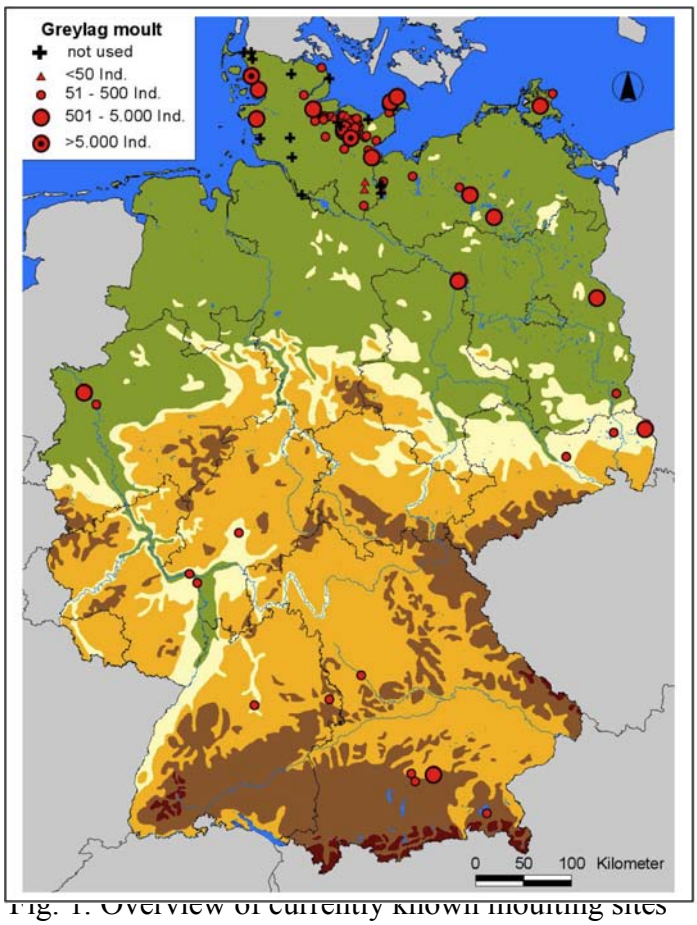

Fig. 1: Overview of currently known moulting sites of non-breeding Greylag Geese *Anser anser* in Germany. Site maxima are shown for the period 2005-2009.

Since then, the moult migration of non-breeders in Germany has changed. In the early 1990s, many new moulting sites were established in Schleswig-Holstein (KOOP 1999). Since the late 1990s, several new moulting sites were also found in eastern Germany (HEINICKE 2007). While we have good knowledge about the moulting sites of non-breeding Greylags in Schleswig-Holstein, the information for eastern Germany is still fragmentary. But very little is known about the moult of non-breeding Greylags of the several reintroduced Greylag Goose populations in west and south Germany.

As the number of moulting Greylag non-breeders in Germany nowadays form a significant part of the total North West European Greylag Goose population, we want to report on the current knowledge about moulting site distribution and the number of moulting non-breeders in Germany, gathered during the 2009 moulting season.

Where are moulting places of non-breeders in Germany?

The majority of the known moulting places are concentrated in water-rich landscapes of the north German lowlands, similar to the core area of the breeding distribution of Greylag Geese in Germany.

Most important moulting sites in Germany can actually be found in Schleswig-Holstein, where such places are concentrated in the Koog (polder) areas along the west coast, in the lake district of Ostholstein and on Fehmarn Island. In Mecklenburg-Western Pomerania, moulting sites are found in the Mecklenburg lake district, on Rügen Island and in the lake Schaalsee region. Other important moulting sites in inland areas of eastern Germany are found in the Lower Havel region (Saxony-Anhalt), in the Altfriedland fishponds (Brandenburg) and in several fish pond areas of Lusatia (Saxony and Brandenburg). The moulting site "Altfriedland" seems to be connected with a well-known moulting site in the Warta lowlands in nearby Poland.

In west and southern Germany, only a few moulting sites of non-breeders were known until now. The largest moult aggregations were found in the Lower Rhine area (North Rhine-Westphalia) and in Bavaria (Munich region, Lake Chiemsee and Lake Altmühl). Smaller moult concentrations were also known from the Rhine Valley near Mainz (Rhineland-Palatinate), in the Horloff floodplain (Hesse), in Stuttgart city and at Stockmühl reservoir (both Baden-Württemberg).

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All of the known 95 Greylag Goose moulting sites in Germany are also used as breeding sites by the species. As Greylag Geese in active wing moult are susceptible to disturbance, moulting sites in Germany are often situated in protected areas with restrictions on recreational use or in water bodies outside of protected areas, but with parts inaccessible for tourism. Although most moulting places are lakes or fish pond areas, some moulting sites are also found in nature protection zones of the Koog's in western Schleswig-Holstein, in restored wetlands (e.g. Rügen, Lower Havel) as well as in nature protection zones of flood plains and river mouths.

How many non-breeding Greylags moult in Germany?
For the moulting season 2009, we gathered information of more than 49,300 moulting non-breeders. These numbers are allocated in the following sites or regions:

- Schleswig-Holstein, west coast: 17,400
- Ostholstein: 15,100
- Mecklenburg-Western Pomerania: >5,000
- Lower Havel floodplain (Saxony-Anhalt): 1,100
- Altfriedland fishponds (Brandenburg): 4,100
- Fish pond areas in Lusatia region (Brandenburg and Saxony): >1,200
- Bavaria: >2,500
- Lower Rhine area (North Rhine-Westphalia): >2,200
- Rhine Valley near Mainz (Rhineland-Palatinate): >160
- Horloff floodplain (Hesse): 370
- Stockmühl reservoir (Baden-Württemberg): 60
- Max-Eyth-See/Stuttgart (Baden-Württemberg: 200

An initial analysis of the development of moulting non-breeders in Schleswig-Holstein showed a positive trend, with numbers increasing during a ten years period from 13,100 birds in 1999 (KOOP 1999) to more than 32,000 birds in 2009. The most significant increase was recorded for moulting sites at the west coast, where numbers tripled, while numbers in Ostholstein doubled during the same period.

Comparing the number of moulting non-breeding Greylag Geese in Germany with the current population size of 610,000 birds of the NW European Greylag Goose population (LEIF NILSSON in litt.), more than 8% of the total population can be found nowadays moulting in Germany. This suggests a major shift in the distribution of non-breeding moulting sites in Europe since the 1970/80s and calls for a new and updated Europe-wide overview on moulting sites of Greylag Geese.

Where do moulting non-breeders in Germany originate?
While moulting birds at several smaller moulting sites probably mostly consist of failed local breeders, the major moulting places are visited by geese from larger geographical regions, qualifying them as of supra-regional importance.

Neck-band sightings at moulting sites in Schleswig-Holstein revealed that a number of Swedish birds might be involved in the non-breeding gathering there. Nevertheless, a high percentage of these moulting birds probably belong to the large breeding population of Schleswig-Holstein.

Preliminary results of a new neck-banding project (since 2007) on moulting non-breeders on Rügen Island/Mecklenburg-Western Pomerania show that most moult visitors come from breeding areas in Western Pomerania, north east Brandenburg and the northern half of Poland, whereas single birds also belong to the breeding populations of Lusatia, western Brandenburg, Sweden and The Netherlands. Neck-band observations of birds, marked as moulting birds on Rügen Island, showed some exchange with moulting sites at lake Müritz/Mecklenburg and to the Altfriedland fishponds/Brandenburg.

For the large moulting site at Ismaningen reservoir near Munich there are some indications that this site is not only used by Bavarian non-breeders, but also visited by birds of the Czech breeding population.

Fig. 2: Greylag Geese in active wing moult; lake Nonnensee Bergen/Rügen (Foto: T. Heinicke)

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Bart Ebbinge awarded with the „Golden Brent-Goose-Feather“

Since 1998 the administration of the German “Nationalpark Schlewig-Holsteinischer Wattenmeer“, together with the local communities and NGO’s, annually organises “Brent Goose days“. The idea was originated in the late 1980’s on Vancouver Island (Canada), where they organise an annual “Brentfestival” since the early 1990’s. Both events have the aim of developing and strengthening green tourism associated with the Brent Geese.

Since 2000 the ceremony of the grand opening of the “Brent Goose Days” takes place on the small island of Hallig Hooge with the bestowal of the “Goldene Ringelgansfeder” (Golden Brent-Goose-Feather), an award for persons, who render outstanding services to the protection of the Brent Goose and its habitat.

In 2001 Peter Prokosch was the first goose researcher to receive the award followed by Hans-Heiner Bergmann in 2005.

On 19th of April 2010 the 13th "Ringelganstage“ opened with the bestowal of the "Goldene Ringelgansfeder" to the chairman of the Goose Specialist Group of Wetlands International and IUCN, Bart Ebbinge.

Foto: Hans-Ulrich Roesner

In his citation Dr. Johannes Oelerich, Director of the organising LKN, highlighted that Bart Ebbinge has been undertaking research on Brent Geese for almost 40 years and that most of the results of these studies were extremely relevant for the protection of the species and its habitat. Since 1990, Bart Ebbinge has not only studied Brent Geese on the wintering area but also at the breeding sites on Taimyr Peninsula. The Brent Goose is the species that especially fascinates him, but although Bart's name primarily is connected with the Brent Goose, he also studied other goose species, like Barnacle, Greylag and Greater White-fronted Goose.
Together with Andrew St.Joseph and Peter Prokosch Bart Ebbinge started the Brent Goose colour-ringing scheme in the early 1970's, which is one of the oldest and most successful goose ringing programmes in Europe.

In Memoriam: Heribert Kalchreuter (13 March 1939 - 14 March 2010)

Prof. Dr. Heribert Kalchreuter or 'Herby', as many people who knew him well called him, passed away on the 14th March 2010.
Heribert Kalchreuter studied geology and forestry in Munich and gained his Diploma in Forestry at the Albert-Ludwigs-Universität Freiburg, where he also received his Doctorate in 1970. He undertook numerous study tours throughout Europe and the Americas and was a lecturer at the College of African Wildlife Management in the Republic of Tanzania and worked for the Hunting Department of the German Federal Ministry of Food, Agriculture and Forestry. In 1994 he habilitated at the Agricultural University of Poznan, Poland.
In 2002, upon nomination by the University, he was awarded a Professorship by the Polish President, Alexander Kwasniewski.

Heribert Kalchreuter was an active supporter of Wetlands International and until a few years ago Chairman of the Woodcock and Snipe Specialist Group. Furthermore he played an instrumental role in the development and negotiation of the Agreement on the Conservation of the African-Eurasian Migratory Waterbirds (AEWA). Between 1999 and 2005 he represented the International Council for Game and Wildlife Conservation (CIC) at the AEWA Technical Committee.
Although a passionate hunter, he was able to bridge the gap between hunters and nature conservationists through his pragmatic and diplomatic approach.
Heribert Kalchreuter published numerous publications, including his two most famous books "Die Sache mit der Jagd" and "Zurück in die Wildnis".

Read more:
http://www.wetlands.org/NewsandEvents/NewsPressreleases/tabid/60/articleType/ArticleView/articleId/2196/Default.aspx

New Publications

Goose management in the Netherlands - Evaluation of the Period 2005-2008

The Netherlands harbours large wintering populations of geese and Wigeon. The Dutch Government is obliged to preserve present population levels, at the same time the Government strives to avoid further increase of the costs of crop damage. In order to achieve this a new policy has been implemented.

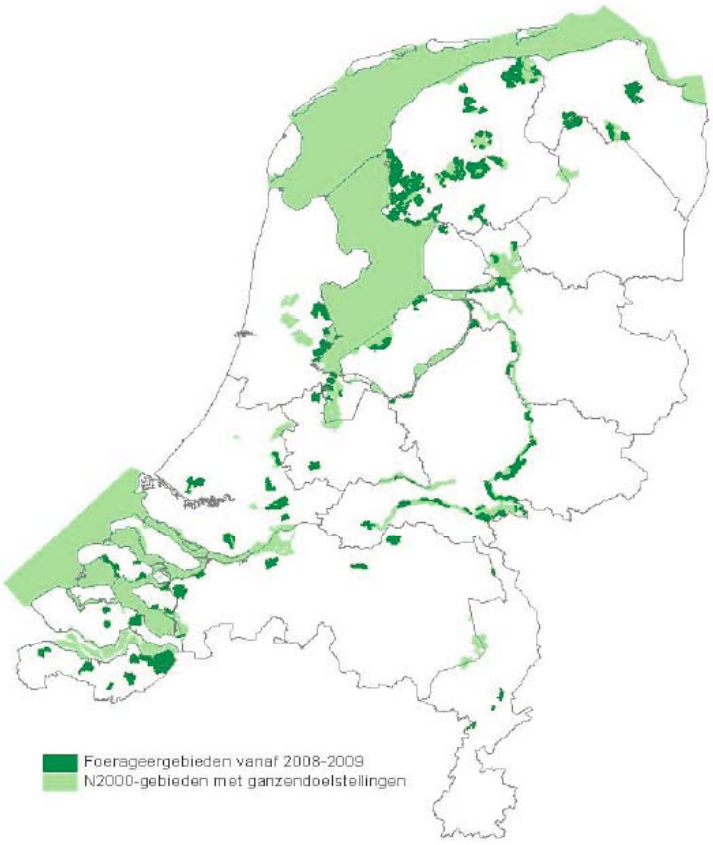

Fig. 1. Accommodation areas 2008-2009 for wintering geese and Wigeon (dark green) as well as Nature 2000 areas (lime).

In order to reduce conflicts with agriculture as well as waterbird damage compensation costs, the Dutch government introduced a new waterbird damage management policy (Beleidskader Faunabeheer), which aims to concentrate wintering waterfowl in designated accommodation areas.

Since 2005, in addition to Birds Directive SPA sites and nature reserves, approximately 80,000 ha were designated, where geese and Wigeon should be able to feed undisturbed, whereas it is allowed to scare them away from all other agricultural land. In areas where it is allowed to disturb the birds, they can be scared away from the fields mainly by non-lethal methods but partly also by lethal shooting. In the accommodation areas, where wintering geese and Wigeon should be able to feed undisturbed, the farmers get a financial compensation from the government for accommodating the birds. Outside these areas estimated goose damage was compensated.

An evaluation of this policy in 2009 showed that in spite of efforts to concentrate wintering geese and Wigeon in the accommodation areas, the birds only spent up to 60 % of their feeding time in these areas. Waterbird damage costs outside the accommodation areas were not reduced and the total costs for waterbird damage management more than doubled from about 7 million Euro before the new policy (only damage compensation) to 17 million Euros per annum (costs for accommodation and damage compensation). The numbers of geese and Wigeon shot during the evaluation period again reached the level of the 1990s, before the hunting ban of 2002-2005.

The evaluation report indicates that these results do not necessarily mean that the policy has failed. The disturbance outside the accommodation areas was not enough to scare the birds away, whereas the disturbance rate in the accommodation areas was too high to keep them there. Furthermore the geese stayed longer in The Netherlands than in former years and the prices of crops and management generally increased. Therefore the total costs were higher than expected.

Vogelbescherming (BirdLife-Netherlands) holds a differing view and concluded that the accommodation policy 2005-2008 failed and the "old" damage compensation scheme was cheaper and less complicated and therefore the only sensible decision would be to resume the former system of damage compensation affiliated with a hunting ban.

The results of these studies were published in a number of reports (in Dutch) that can be downloaded under: www.kennisonline.wur.nl/BO/BO-02/002/018/producten.html

Goose eggs may help Polar Bears to survive climate change.

In recent years, much of the sea ice that Polar Bears *Ursus maritimus* use as a platform for hunting seals (Pinnipeds) has melted, forcing some Polar Bears - particularly young males - farther north or onto land, where they are not as adept at hunting. When stuck on land for months, a Polar Bear typically is forced to survive on its own fat reserves. It is feared that due to this development Polar Bears even could become extinct. But according to scientists at the American Museum of Natural History it seems that they could avoid extinction - despite many starving to death in coming years – because some bears have found a new food source, viz. goose and duck eggs.

North American goose populations declined in the late 19th and the early 20th century, but have recovered and expanded again since the middle of the last century, mainly because of improved wintering conditions due to enhanced agriculture and reduced hunting pressure. Because of the high number of colony breeding Snow Geese *Chen caerulescens* locally the tundra vegetation is being degradated in and around some of the colonies.

When Polar Bears switch to the tundra, most of them live on their fat reserves, but in some areas, they may enter the nesting grounds of Snow Geese. Sub-adult Polar Bears appear to come ashore before more mature individuals and the earliest sub-adults are beginning to overlap with the nesting period of the large colony of Snow Geese also occupying the Cape Churchill Peninsula.
The eggs these bears are known to eat could make up some of their energy shortfall. Goose eggs and developing embryos are a highly nutritious source of food to opportunistic foragers. The earlier these eggs are consumed during the Snow Goose nesting period, the greater would be the energy that is available.

Recent studies have shown that the annual survival rate for sub-adult bears declined in contrast to that of prime aged individuals. If this reduction in survival is related to an increasing energy deficit, as suggested by some authors, the consumption of goose eggs may reverse the trend and help stabilize the population, at least for some period of time. The total number of Polar Bears that could benefit from this resource will depend on the increasing temporal overlap with the nesting period and on the foraging behaviours of individuals eating the eggs.
Recent research of Robert Rockwell, a research associate in Ornithology at the American Museum of Natural History and a Professor of Biology at City College at City University of New York and his graduate student, Linda Gormezano, showed that the effects of climate change will bring additional sources of food as the movement of both populations begins earlier each spring. They calculated that the rate of change in ice breakup is, on average, 0.72 days earlier each year, and that hatching time is also moving forward by 0.16 days each year. Current trends indicate that the arrival of Polar Bears will overlap the mean hatching period in 3.6 years, and egg consumption could become a routine, reliable option. At this point, a bear would need to consume the eggs of 43 nests to replace the energy gained from the average day of hunting seals. But within a decade, because timing changes would put bears in contact with even more nests with younger embryos (younger embryos are more nutritious), a bear would only need to consume the eggs of 34 nests to get the same amount of energy.

This development would not only help Polar bears to survive climate change, but would also reduce the number of successfully breeding Snow Geese.

The research was funded by the Hudson Bay Project and the American Museum of Natural History and the results were published in Polar Biology 32, Number 4 / April 2009: 539-547.

New Publications 2009

BORBACH-JAENE, J., H. KRUCKENBERG & J. BELLEBAUM (2009): Auswirkungen von Lebensraumzerschneidung auf die Tragkapazität von Gänserastgebieten am Beispiel des Rheinderlandes (Ostfriesland). - Osnabrücker Naturwissenschaftliche Mitteilungen 35: 83-90.

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ZÖCKLER, C., H. KRUCKENBERG, M. GAVRILO, A. KONDRATYEV & V. BUZUM (2009) : Status und Ökologie der Eismöwe *Larus hyperboreus* auf der russischen Insel Kolgujew in der Barentssee. - Limicola 23 : 58-78.

Call for help:

As discussed during the last meeting we invite all goose researchers to send their publications to our data bank of geese literature. Not only international but also local publications (including those in languages other than English) are most welcome.

Please send your publications, preferably as a pdf file, to Fred Cottaar - fred.cottaar@tiscali.nl

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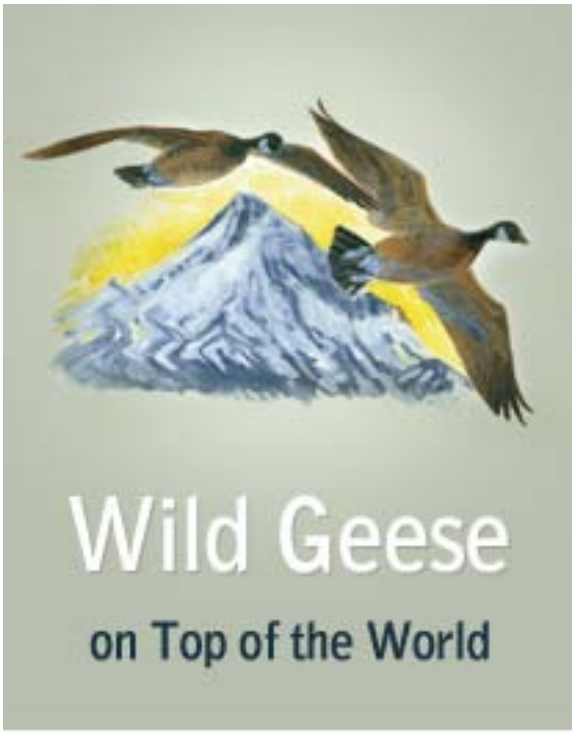
Announcement: 12th North American Arctic Goose Conference



For more than thirty years, the North American Arctic Goose Conference and Workshop (NAAG) has been the premier meeting for bringing together waterfowl researchers, managers, conservationists, and students with a passion for geese. The conference has grown from a small meeting centered largely on North American white goose populations to an international meeting addressing science, conservation and management of geese nesting throughout the Arctic.

NAAG provides a forum for cutting edge research that advances our basic understanding of avian biology, ecology and theoretical advances in broad fields including behavioral ecology, nutritional ecology, population ecology and foraging ecology.

NAAG also serves as a forum for discussions on goose management and conservation. Goose management has become more complicated as goose population size and distribution changes in response to human alterations of the landscape and evolving agricultural practices change the suitability of habitats for geese. These immediate challenges are foreshadowed by concerns about how global climate change may influence geese.

NAAG 12 is the first conference to include Canada and Cackling geese nesting in Alaska because these birds have recently been included under the umbrella of the Arctic Goose Joint Venture. We are pleased that our brood has expanded! Highlights of the science program for NAAG 12 include a symposium on goose-grazing interactions to honor Dr. Robert Jefferies and a workshop on Canada Goose taxonomy, continuing the discussions started by Dr. Robert Zink's plenary talk at NAAG 11 in Reno.

The 12th North American Arctic Goose Conference will be held from January 11th to 15th, 2011 in the DoubleTree Hotel, Portland, Oregon

Conference registration includes access to all plenary, contributed paper, and poster sessions, 3 buffet breakfasts, 3 lunches, 6 refreshment breaks, pre-conference opening reception on Tuesday evening (January 11th), one banquet ticket, and access to the hospitality room each evening.

Cost

Regular (by 15 December)	$325
Early Bird (by 1 October)	$275
Regular Student	$275
Early Bird Student	$200

Go to http://www.naagconference.com/registration to register

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