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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.

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Editorial

From the middle of the 19th century, traditional goose habitats in Northern America and Europe became deteriorated as a result of human actions, which reduced the extent and quality of available habitat. Human populations increased, hunting became more common and widespread and there was an upsurge in human activities on the arctic breeding areas of most goose species.

These developments resulted in dramatic declines in goose numbers in the northern hemisphere. Originally, wintering geese exploited natural wetlands, such as coastal and inland marshlands as well as natural flood plains, but human activities and the cultivation of formerly natural habitats, resulted in increasing numbers using agricultural land for feeding. Subsequently, numbers of most goose species have increased in what is generally considered to be a great success story for nature conservation.

On the other hand, increasing numbers of feeding geese on agricultural land has created growing conflicts with farmers, concerned about yield reduction and loss of income. As a result, in many countries, farmers demand compensation payments for yield loss caused by geese, as well as considerable reductions in the size of goose populations by shooting. In the Netherlands, thousands of mainly Greylag Geese have been caught during the flightless moult period and killed with carbon dioxide gas.

These developments have stimulated the editorial board to offer Goose Bulletin 14 as a special issue about "goose problems", featuring some of the plans and methods proposed and adopted to solve these problems. The board feels that an open exchange of local experiences with goose problems in Europe could be very helpful to prevent the "reinvention of the wheel" and to provide everyone with a suite of solutions to a range of local problems.

For this reason, we would greatly appreciate if all of you that are dealing with "goose problems" in his/her region or country could find some time to produce a brief manuscript about your experiences, both those that have been successful and those that have not worked.

The next issue of the GOOSE BULLETIN is planned to appear in May 2012 as a special issue about "goose problems", which means that material for this issue should have reached the editor-in-chief not later than the 31st of March 2012.

The Editorial Board

Second announcement on the forthcoming 14th meeting of the Goose Specialist Group

On behalf of the conference organizers,
Paul Shimmings & Per Ivar Nicolaisen

As announced by Ingunn Tombre at the recent meeting in Elista, the 14th meeting of the Goose Specialist Group (GSG) will be held in Steinkjer, Norway between 17th – 21st April 2012 (precise dates to be confirmed). The meeting will be hosted by the College in Nord-Trøndelag (HiNT) at the Faculty of Agriculture and Information Technology in Steinkjer. Special focus will be towards Svalbard populations of Pink-footed and Barnacle Geese.

Steinkjer is situated about 120 kilometers north of Trondheim. If arriving by car, you will need to follow the E6 road north of Trondheim (signposted to Narvik). There are flights from Oslo as well as from several other European airports directly to Trondheim (Værnes airport). Trains go at least once an hour from just outside the airport and stop just 200 metres from the college in Steinkjer.

There will also be a mid-conference excursion by bus to look at some of the specialities near to Steinkjer. We hope to see spring-staging Pink-footed Geese, as well as other geese, White-tailed Eagles and large numbers of migrant thrushes. In addition, and if there are sufficient people interested, we will also arrange evening excursions by minibus to look for moose.

A special conference website has been established (http://www.gsg2012.com/), which can also be accessed by following a link from the GSG's own website (www.geese.org/gsg/). Conference costs as well as registration form for booking can be found on the same website. The conference organizers may be contacted directly by e-mail (goosesg2012@gmail.com). Conference costs include all food, as well as the mid-conference excursion. Maps, train timetables and other useful information will shortly appear on the website.

Please check the above websites regularly for any news, announcements, information and such like. The conference programme will also be made available here, both the provisional as well as final programme.

The board of the GSG will try to obtain funding for participants requiring financial assistance. Those requiring financial assistance are asked to contact Ingunn Tombre (Ingunn.Tombre@nina.no) as soon as possible, indicating how much assistance they require.

We hope to see many of you as possible in Steinkjer in April 2012!!

A pilot analysis of diet composition of Barnacle Geese *Branta leucopsis* at a sub-arctic salt marsh on the Kanin peninsula, Russia

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Abstract
We analysed diets of Barnacle Geese *Branta leucopsis* during the nesting and brood rearing period in a recently founded colony on a sub-arctic salt marsh. Proportions of different plant constituents in the faecal material varied between incubating females nesting in different landscape types, adult birds with broods and goslings. Divergence in diet composition of incubating females was not very distinct, but apparently those females that nested in or adjacent to the salt marsh dunes and tundra, did not fly to the marsh to feed, but preferred to stay in the proximity of the nesting territory. A substantial part of the diet of Barnacle Goose families was composed of *Puccinellia.* spp., the basal parts of *Puccinellia.* spp. tillers predominated in diets of goslings, whereas photosynthesizing parts were mostly present in the diet of adult birds.

Key words: *Branta leucopsis,* hurdle model, faecal analysis, diet composition, salt marsh, breeding.

Introduction

In recent decades, new breeding areas have been founded at sub-arctic former staging sites used by Barnacle Geese *Branta leucopsis* belonging to the Russian-Baltic-North Sea population (VAN DER JEUGD et al. 2009). The range expansion of this rapidly growing population has been facilitated by changes in land use in the historical wintering areas and staging grounds (FEIGE et al. 2008). Despite being an adaptive response, the southward redistribution is in fact an invasive process, in which a species meets new environmental conditions. One of the possible complications for Barnacle Geese nesting at lower latitudes may be a less predictable food supply during the breeding season.

In this paper we attempt to quantify the feeding behaviour of Barnacle Geese at one of the recently established sub-arctic colonies. For this purpose we analyzed the contents of droppings of incubating females, nesting in different landscape types, and of parents and goslings in families.

Methods

The investigated Barnacle Goose colony was first established on the west (White Sea) coast of the Kanin peninsula (centred on 67° 52' 0” N, 44° 7' 60” E) in the 1980s (FILCHAGOV & LEONOVICH 1995), and is situated on the salt marsh in the delta of the Shoina river. The Shoina delta salt marsh has always been an important staging site for Barnacle Geese, migrating towards their traditional breeding sites on the Novaya Zemlya archipelago and Vaigach island.

The majority of nests occur on the salt marsh and nests are located on capes, islets and peninsulas in a network of small lakes. A part of the colony extends into the adjacent dunes and hilly and shrub tundra.
After hatching, families from all over the colony concentrate on the lower salt marsh, with a particular preference for areas overgrown by *Puccinellia* spp*, C. subspathacea* and *Plantago shrenkii*.

The field research was conducted during the period June 5 – July 30 in 2009. Pilot botanical descriptions were obtained for the following landscape types:

1. Low marsh (LM) with variable vegetation cover and heterogeneous vegetation composition, from bare mud, sometimes covered with algal crust to dense (70 – 90 %) marsh vegetation with dominance of *Puccinellia* spp*./Carex subspathacea*,
2. Middle marsh (MM) with dense cover of grasses (*Calamagrostis* spp. */Alopecurus* spp. */Festuca* spp.) and sedges (*C. rariflora, C. subspathacea*)
3. Elevated marsh with dry grass stand (EM), mostly formed by *Calamagrostis/Alopecurus*/sedges or *Calamagrostis/Juncus* with *Hippuris* and algae in the lakes.
4. Shrub tundra and dunes (T&D); the landscape type included a gradient from the marsh to tundra and dunes.

Fresh droppings of incubating Barnacle Goose females were collected from 98 nest rims in the four landscape types (50, 12, 25 and 11 in LM, MM, EM and T&D, correspondingly) throughout the incubation period. We assumed that contents of these droppings represented the diet during the incubation period.
Ten fresh dropping samples from parents with broods and 10 samples from juveniles in these broods were collected at the foraging locations. Each sample contained at least 3 individual droppings. Each faecal sample was homogenized, and 3 g (dry weight) of the sample material was taken for the analysis. Epidermal fragments that remained intact during passage through the goose gut were counted using the method introduced by OWEN (1975).

In the faecal samples we detected cuticles of cells of the following food groups:

1. *Puccinellia* spp*.,* above-ground photosynthesizing parts (APP),
2. *Puccinellia* spp., basal parts of stem (BPP),
3. *Carex subspathacea,*
4. *Poaceae (Alopecurus* spp.*, Festuca* spp.*, Poa* spp.*, Calamagrostis* spp.*, Agrostis* spp.*, Deschampsia* spp.*, Leymus* spp.*, Trisetum* spp.*),*
5. Sedges (*Cyperaceae*) and Rushes (*Juncaceae*) (*Luzula* spp.*, Juncus jerardii, Eleocharis* spp.*, Carex* spp. (not including *C. subspathacea*), *Eriophorum* spp.),
6. Dead plant material, mostly of sedges and grasses (including generative parts),
7. Generative parts (seeds and flowers) of sedges and grasses,
8. Forbs (*Potentilla* spp.*, Rumex* spp.*, Polygonum* spp.*, Senecio* spp.*, Astragalus* spp.*, Draba* spp.),
9. *Triglochin maritima* and low marsh dycotiledonous plants (*Plantago shrenkii., Stellaria humifusa*),
10. Algae and *Hippuris tetraphylla,*
11. Mosses (*Bryophyta*),
12. Insects (*Insecta*),
13. Horsetails (*Equisetaceae*),
14. Willows (*Salicaceae*),
15. Unidentified plant fragments.

The latter group, together with algae and *H. tetraphylla*, willows, horsetails, mosses and insects, were excluded from the analysis, due to their rare occurrence in the samples. Thus only 9 food groups were used.

Statistical analysis

All analyses have been carried out in R. 2. 10. 1 (R DEVELOPMENT CORE TEAM 2009). Dropping sample contents were represented by a table of 9 food groups by 118 dropping samples, collected from Barnacle Goose females nesting in each of the four landscape types, parents after hatching, and juveniles.

To assess the variation in contents of droppings from the 6 groups, a PCA analysis (package vegan; OKSANEN et al. 2009) on a distance matrix, computed for the table, using the chord dissimilarity coefficient was applied. The preliminary data transformation into a distance matrix allowed us to solve the problem of double zeros (LEGENDRE & GALLAGHER 2001). To define the extent to which the variation was explained by landscape type of the nesting location or by age (nesting parent during brood rearing or juvenile), we introduced the explanatory variable Landscape/Status to an RDA. Redundancy analysis or RDA-PCNM consists of (i) the modification of a distance matrix by applying a threshold under which the distances are measured and above which all distances are regarded as being large (neighbourhood matrix) ; (ii) the calculation of the principal coordinates of the neighbourhood matrix (PCNM); and (iii) the use of the positive eigenvalues of the principal coordinate analysis as explanatory variables in redundancy analysis (BORCARD & LEGENDRE 2002; BORCARD et al. 2004).This variable indicated states which determined being juvenile or parent with brood for the respective groups and nesting landscape type for incubating females.

Univariate hurdle models (ZUUR et al. 2009) from the package pscl (JACKMAN 2009) were applied to specify differences in proportions of the food groups between the Landscape/Status groups. Hurdle count models are two-component models with a truncated count component for positive counts and a hurdle component that models the zero vs. larger counts. The total number of fragments of each of the food groups in a sample was allocated as the response variable, Landscape/Status - as an explanatory variable and a total number of all fragments in a sample was introduced as an offset. A negative binomial distribution with log link was applied for the count model. Only groups with the highest loadings on the first two axes were analyzed.

Results

Ordination

In a PCA applied on the dietary data for incubating females using the covariance matrix, the first two axes explained 57% of the variation. Assuming that the variation was generated by the variation in vegetation composition between the landscape types, we introduced landscape type as an explanatory variable to conduct RDA on the data. The first two axes in RDA explained 10% of the total variation in the dietary data, which was 47% less than in the unrestricted ordination (PCA). Hence, the dietary variation is not fully explained by the variation in vegetation composition between the landscape types.

Addition of dietary samples, collected from broods, and introduction of an explanatory variable Landscape-Status, which considered nesting Landscape for incubating females and age (juvenile/adult) for brood members, improved the relative RDA results, although not significantly (13% variation explained by RDA versus 57%, explained by PCA).

The small proportion of variation, explained by RDA, was considered as evidence of heterogeneity in vegetation composition within each of the landscape types. This has presumably caused differences in diet composition even in birds that share the same landscape type, although individual preferences in food plants choice could be another reason for the variation in diet composition.

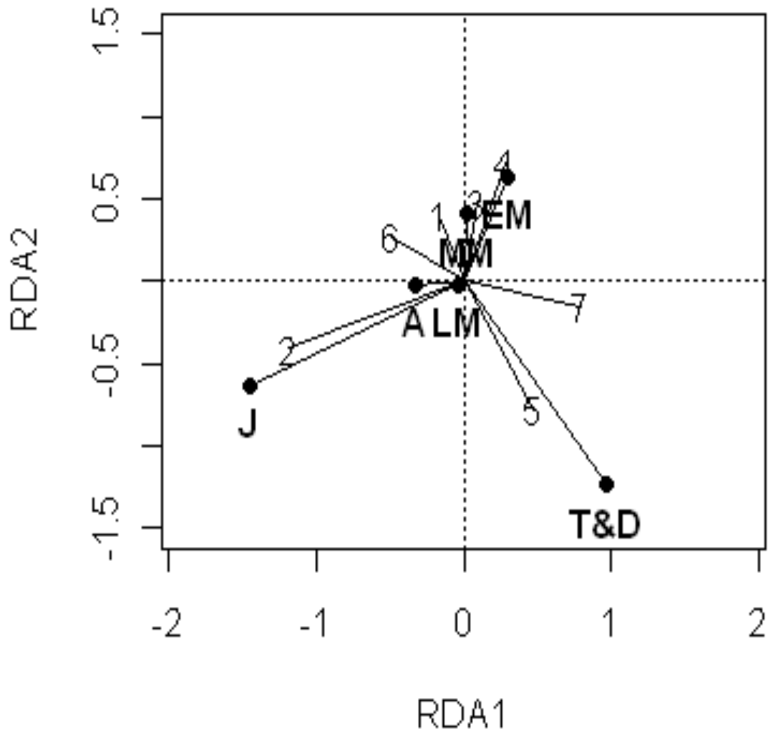

Fig. 1. An RDA plot of the content of collections of faeces collected from adult Barnacle Geese with broods (A), juvenile Barnacle Geese (J), incubating females, nesting on the low marsh (LM), middle marsh (MM), elevated marsh (EM) and in tundra and dunes (T&D). Eigenvectors of food plant species/groups: above-ground photosynthesizing parts of *Puccinellia* spp., APP (1), basal parts of *Puccinellia* spp. tillers, BPP (2), vegetative parts of grasses (3), dead plant material (4), generative parts (flowers and seeds) of sedges and grasses (5), *Triglochin* spp. and low marsh dycotiledons (6) and vegetative parts of sedges (7) are plotted.

However, results of the ordination indicated divergence in the proportions of certain food plant groups between the bird groups (Fig 1). The first RDA axis accounted for 7% of the variation in the data, the second one for 6% (Fig. 1) and the third axis only for 2%. The first axis was characterized by high positive loadings of Cyperacean and Juncacean vegetative parts and Cyperacean and Poacean seeds and negative loadings of *Puccinellia* spp. basal parts and low marsh dycotyledons. The second axis represented positive loading of dead plant material and grass (plus lesser loadings of *C. subspathacea* and *Puccinellia* spp. above-ground parts) and negative – of *Cyperacean* and *Juncacean* seeds and basal parts of *Puccinellia* spp. We applied univariate modelling to verify and provide more detail from the results of ordination.

Hurdle model

We ran hurdle models (with a negative binomial distribution) for those plant species that gave the largest loadings on the first two axes in the RDA, conducted for the dataset with nesting females and broods combined. The results of the hurdle models are given below, together with median values of proportions of each food group in diets of Barnacle Geese from different Landscape/Status groups:

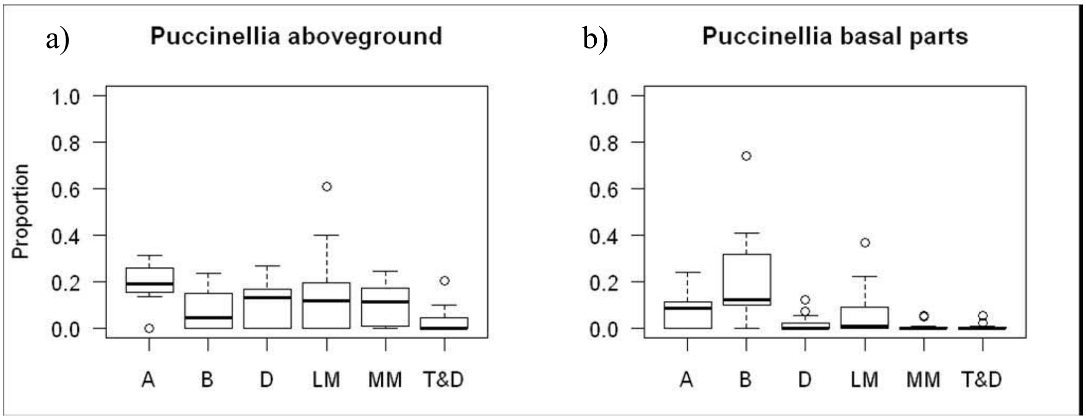

Figure 2. Proportion of above-ground photosynthesizing parts of *Puccinellia* spp., APP (a) and basal parts of *Puccinellia* spp. tillers, BPP (b) in the faecal material collected from adult Barnacle Geese with broods (A), juvenile Barnacle Geese (B), incubating females, nesting on the low marsh (LM), middle marsh (MM), elevated marsh (D) and in tundra and dunes (T&D). The values represent median percentage frequencies (1st and 3rd quartiles and outliers) for each food group.

1) Diet composition of Barnacle Goose juveniles differed from diets of each of the other groups by a large proportion of BPP (*count model component, P<0.001*; proportion = 12.2%; Fig 2b). This food group comprised 8.6% in diet of parents and its proportion was negligible in diets of incubating females, except for the LM nesters (0.8%), which was indicated by the hurdle component of the model (*P= 0.008, 0.01, 0.01 and 0.05 for Juveniles - MM, Juveniles – EM, Juveniles – T&D and Juveniles – LM correspondingly*) ;
2) APP were virtually absent in diets of T&D nesters, which differentiated T&D from the rest of the Landscape/Status groups, except for the Juveniles *(hurdle model component P= 0.01, 0.02, 0.01, 0.03 and 0.13 for T&D – Parents, T&D – EM, T&D – LM, T&D – MM and T&D – Juveniles correspondingly)*, in which APP were presented in noticeable amount (proportion 11.5 , 12 and 13% in MM, LM and EM correspondingly, 19% in adults with broods and only 4.8% in juveniles; Fig 2a);
3) Cyperacean and Juncacean vegetative parts were notably (median proportion 48.6%) and statistically significantly higher than in other groups presented in diets of T&D nesters *(count model component, P = 0.045, 0.043, 0.0003, 0.001 and 0.002 for T&D – Parents, T&D – Juveniles, T&D – EM, T&D – LM and T&D – MM, correspondingly)*. Proportion of this group was 9.1, 12.7, 15.8 and 18% in diets of MM, LM and EM nesters and in adults with broods, correspondingly. In juveniles this food was present only occasionally *(hurdle model component, T&D – Juveniles, P=0.027)* ;
4) Cyperacean and Poacean generative parts were typical only for diets of T&D nesters with proportion in it 10.9% *(count model component, P < 0.001 for T&D – LM, P = 0.004 and 0.03 for T&D – EM and T&D – MM, correspondingly; hurdle model component, P = 0.005 for T&D – Juveniles and for T&D – Parents, P= 0.03 for T&D – EM and P = 0.008 for T&D – LM)*;
5) Dead plant material was found in diets of EM (3.4%); in MM and LM nesters it occurred only occasionally, and in the rest of the groups this food group was absent;
6) *Triglochin maritima*, *Plantago shrenkii* and *Stellaria humifusa* were present in diets of female Barnacle Geese from all the landscape types, but its frequency and proportion in the diet of T&D nesters was minor (3.4%) and significantly smaller than in the diet of LM nesters (*hurdle model component, P=0.005 for LM – T&D*), in which the proportion of this food group was 23.1 %.

BPP were only consumed in any significant amounts by juveniles and parents in broods (predominating in the diet of juveniles), while APP served a popular food source for all the birds feeding on the marsh, but not for the birds nesting in T&D.

Discussion

Geese belonging to the genus *Branta* have always been considered to be non-destructive grazers, somewhat in contrast to *Anser* species, in the sense that, unlike *Anser* geese, they do not grub, but rather pluck the above-ground parts of tillers (PROP 1991, VAN DER GRAAF et al. 2004, BLACK et al. 2007). In this context, the discovery of the basal parts of *Puccinellia* spp. tillers (BPP) in the diet of Barnacle Geese here is surprising in itself. BPP comprised a substantial part of the diet of parents in broods and the greater part of the goslings' diet.

A very likely reason for a high preference of BPP by Barnacle Geese is the high digestibility and unique nutrient content of this food source. BPP at this stage contains meristemal tissues, comprised of non-differentiated cells with thin walls, and are thus easily digested. Besides, meristems are rich in water soluble proteins and amino-acids, particularly methionine - a sulfur-containing amino acid, involved in various metabolic processes (JABRIN *et al*. 2003, OKAZAKI et al. 2007), especially in plants growing on saline soil (GORHAM & GORHAM 1955, MORI 1999). As proposed by SEDINGER (1984), the presence of sulfur-containing amino acids in the goslings' diet in turn aids them in the assimilation of plant protein.

Although parents Barnacle Geese consumed sufficient amounts of BPP, the proportion of this food in their diet was lower than the proportion of APP. Direct observations are needed to determine the cause for such divergence between adult and juvenile Barnacle Geese. However, we suggest behaviour that avoids direct competition between parents and offspring (TURCOTTE & BEDARD 1989, BLACK et al. 2007), combined with differing techniques of feeding between goslings and parents Barnacle Geese, as one of the possible causes.

While BPP constituted a conspicuous part of the diet of parents with broods it was marginally represented in the diet of incubating females. This may be a result of the attentiveness of the nesting females to her nest territory, indicated by the slight divergence in diet composition between incubating females, even nesting in parts of the salt marsh that differed in vegetation. Incubating females nesting in adjacent tundra and dunes, rarely performed feeding trips to the lower marsh, and mostly fed on the vegetation that was available in the proximity of their nesting territory, irrespectively of the food quality. This conclusion is testified by direct observations (unpubl.). Attentiveness of incubating females to her nest territory has also been found in Barnacle Geese, nesting on Svalbard (FOX et al. 2007) and is thought to be related to better nest protection, mostly from avian predators (PROP et al. 1984, ALSOS et al. 1998, FOX et al. 2007).

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References

ALSOS I.G., A. ELVEBAKK & G.W GABRIELSEN (1998): Vegetation exploitation by barnacle geese *Branta leucopsis* during incubation on Svalbard. - Polar Research 17: 1-14.

BLACK J.M., J. PROP & K. LARSSON (EDS.) (2007): Wild goose dilemmas. Population consequences of individual decisions in barnacle geese. - Branta Press, Groningen.

BORCARD D. & LEGENDRE P. (2002). All-scale spatial analysis of ecological data by means of principal coordinates of neighbour matrices. Ecological Modelling 153, 51-68.

BORCARD D., LEGENDRE P., AVOIS-JACQUET C. & TUOMISTO H. (2004). Dissecting the spatial structure of ecological data at multiple scales. Ecology 85, 1826-1832

FEIGE N., H.P. VAN DER JEUGD, A.J. VAN DER GRAAF, K. LARSSON, A. LEITO & J. STAHL (2008): Newly established breeding sites of the Barnacle Goose *Branta leucopsis* in Northwestern Europe – an overview of breeding habitats and colony development. - Vogelwelt 129: 244 – 252.

FILCHAGOV A.V.& V.V. LEONOVICH (1992): Breeding range expansion of barnacle and brent geese in the Russian-European North. - Polar Res 11:41–46.

FOX A.D., E. BERGERSEN, I.M. TOMBRE & J. MADSEN (2007): Minimal intra-seasonal dietary overlap of Barnacle and Pink-footed Geese on their breeding grounds in Svalbard. - Polar Biol. 30: 759 – 776.

GORHAM A.V. & E. GORHAM (1955): Iron, Manganese, Ash, and Nitrogen in some Plants from Salt Marsh and Shingle Habitats. - Ann. Bot. 19: 571-577.

JABRIN S., S. RAVANEL, B. GAMBONNET, R. DOUCE & F. REBEILLE (2003): One-carbon metabolism in plants. Regulation of tetrahydrofolate synthesis during germination and seedling development. - Plant Physiol 131: 1431-1439.

JACKMAN S. (2009): pscl: Classes and Methods for R Developed in the Political Science Computational Laboratory, Stanford University. - Department of Political Science, Stanford University. Stanford, California. R package version 1.03.2. - URL http://pscl.stanford.edu/.

LEGENDRE P. & E.D. GALLAGHER (2001): Ecologically meaningful transformations for ordination of species data. - Oecologia 129: 271–280.

MORI S. (1999): Iron acquisition by plants. - Current Opinion in Plant Biology 2:250–253

OKAZAKI S., M. SUGAWARA, K.-I. YUHASHI & K. MINAMISAWA (2007): Rhizobitoxine-induced Chlorosis Occurs in Coincidence with Methionine Deficiency in Soybeans. - Annals of Botany 100: 55 - 59.

OKSANEN J., R. KINDT, P. LEGENDRE, B. O'HARA, G.L. SIMPSON, P. SOLYMOS, M.H.H. STEVENS & H. WAGNER (2009): vegan: Community Ecology Package. - R package version 1.15-4 - http://CRAN.R-project.org/package=vegan.

OWEN M. (1975): An assessment of faecal analysis technique in waterfowl feeding studies. - J. Wildlife Manag. 39: 163 – 167.

PROP J. (1991): Food exploitation patterns by brent geese during spring staging. - Ardea 79: 331 – 342.

PROP J. & J. DE VRIES (1993): Impact of snow and food conditions on the reproductive performance of barnacle geese *Branta leucopsis*. - Ornis Scandinavica 24:110 – 121.

PROP J. & M. LOONEN (1989): Goose flocks and food exploitation: the importance of being first. - Acta XIX Congressus Internationalis Ornithologici: 1878 – 1887.

PROP J., M.R. VAN EERDEN & R.H. DRENT (1984): Reproductive success of the barnacle goose in relation to food exploitation on the breeding grounds, western Spitsbergen. - Norsk Polarinstitutt Skrifter 181: 87 – 117.

R DEVELOPMENT CORE TEAM (2009): R: A Language and Environment for Statistical Computing.V. 2.10.1. Vienna: R Foundation for Statistical Computing. - http://www.R-project.org.

SEDINGER J.S. (1984): Protein and amino acid composition of tundra vegetation in relation to nutritional requirements of geese. - J. Wildlife Manag. 48: 1128 – 1136.

TURCOTTE Y. &. J. BEDARD (1989): Shared parental investment, parent-offspring conflict and brood size in Greater Snow Goose. - Anim. Behav. 38: 703- 706.

VAN DER GRAAF A.J., O.V. LAVRINENKO, V. ELSAKOV, M.R. VAN EERDEN & J. STAHL (2004): Habitat use of barnacle geese at a sub-arctic salt marsh in the Kolokolkova Bay, Russia. - Polar Biol 27: 651–660.
VAN DER JEUGD H.P., G. EICHHORN, K.E. LITVIN, J. STAHL, K. LARSSON, A.J. VAN DER GRAAF & R.H. DRENT (2009): Keeping up with early springs: rapid range expansion in an avian herbivore incurs a mismatch between reproductive timing and food supply. - Global Change Biol. 15: 1057 – 1071.
ZUUR A.F., E.N. IENO, N.J. WALKER, A.A. SAVELIEV & G.M. SMITH (EDS.) (2009): Mixed Effects Models and Extensions in Ecology with R. Springer.

Polar Bears and Snow Geese – collision course?

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For several years I took my ornithology class to the Dakotas to witness the spectacle of the spring Snow Goose migration. Huge noisy flocks of migrating geese stretching from horizon to horizon provide an experience we all remember for a lifetime. The geese would fly right over parked vans and land a short distance away in a field, providing amazing glimpses of large flocks. It was hard to focus on a single bird, with thousands of birds milling about. We often estimated that we observed at least a million birds during a weekend field trip.

A main reason for this spectacle was the dramatic increase in the population of Snow Geese. Favorable conditions on the wintering grounds led to high over-winter survival, and females could arrive at their arctic nesting sites in very good condition, necessary for producing a clutch of eggs. This resulted in a huge population explosion.

Unfortunately, a consequence of this population increase is that they have been destroying the arctic tundra nesting grounds. This occurs because of the way they feed – pulling plants out of the ground rather than grazing them (so that they can grow again). This alteration of the environment affects other species, and led to the authorization at state and Federal levels of a spring hunt, with reduced restrictions and high bag limits. Although I've heard them called "sky carp" or "tundra maggots" they are very tasty in the spring after having fed in southern grain fields all winter.

Our first few trips to the Yankton area of South Dakota for the spring Snow Goose hunt were a blast. We got a few birds over decoys and did some ditch sneaks. It was clear that compared to pre-hunt times, the behavior of the geese had changed. They now fly high and drop almost straight into the middle of a field, skillfully avoiding a parked car or person on the road like the plague. After trying a few what-the-heck shots and wasting some expensive heavy-shot ammo, I got my range finder on some overhead flocks and determined they were at least 150 yards up. They had smartened up indeed.

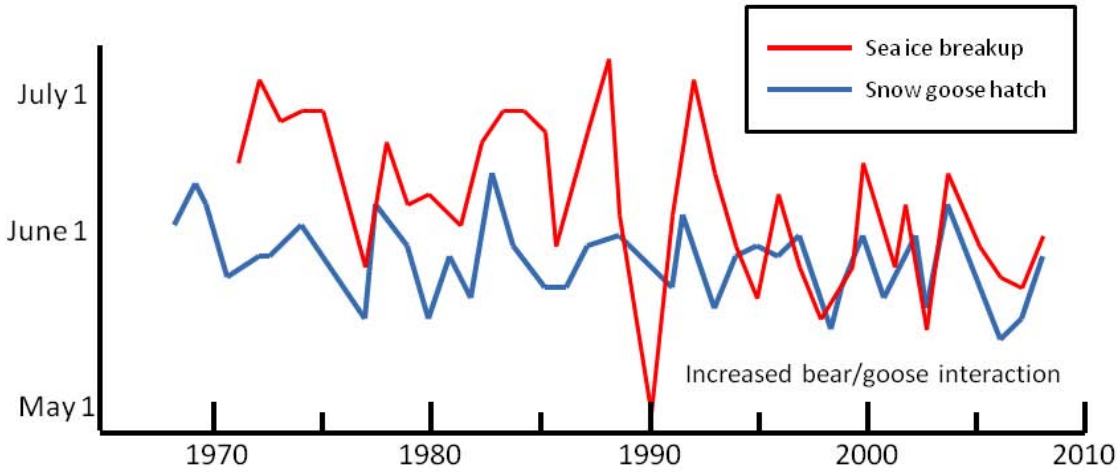

Fig. 1. Timing of sea ice breakup (red line) and Snow Goose *Anser caerulescens* nesting (blue line) in western Hudson Bay from Rockwell and colleagues. Note that the timing of the two becomes more and more intertwined towards the present, resulting in Polar Bears coming ashore earlier than normal and preying on Snow Goose eggs.

Our hunts ended when in our last effort, after chasing spooky flocks and encountering a large number of hunters, our decoys were stolen from a field during the night. Sort of spoiled our enthusiasm and we haven't returned.

In general, it is not clear that the spring hunt has directly reduced snow goose population numbers, although it might have had an indirect effect. By chasing migrating flocks around, hunters have interfered with the ability of females to gather enough food to produce consistently large and successful clutches of eggs and subsequent broods. And, there's a new sheriff in town - Polar Bears!

Polar Bears typically feed on ringed seal pups on the pack ice of the arctic oceans (including Hudson Bay) during the spring. With the earlier and earlier disappearance of a large percentage of this habitat (Fig. 1), caused by global warming, their ability to catch young seals has also disappeared.
However, recent observations have shown that the bears have a trick or two up their coats. The bears are starting to come ashore earlier than normal because of the early disappearance of sea ice, where they find colonies of snow geese sitting on large clutches of eggs. Snow Goose omelets anyone?

The birds, not having had to cope with a predator like a Polar Bear, make no attempt to hide their eggs or put their nests in inaccessible places (there are few such places on the flat tundra). The bears can in short order (pun intended) wipe out a nesting colony of geese (Fig. 2).

Fig. 2. Snow Goose *Anser caerulescens* nest after visit from Polar Bear *Ursus maritimus*, with one remaining eggshell bearing hole from Polar Bear canine tooth (photo courtesy of Robert Rockwell)

Will it compensate for the lack of human hunter's success in reducing goose numbers? Robert Rockwell from the American Museum of Natural History (NYC) and his colleagues from the AMNH and Utah State University made some theoretical models that predict the fate of bears, Snow Geese, and their interactions along the Cape Churchill Peninsula of western Hudson Bay. They predict that the bears will reduce the Snow Goose population, but it will not wipe out the geese. The reason is that the overlap between the nesting season and ice breakup is not perfect, as Fig. 1 shows. Thus, some years the bears will not get to the Snow Goose nesting grounds in time to feast on eggs, in other years they will. In the years bears don't make it to the nesting grounds in time for breakfast, the geese will nest successfully, keeping goose populations going.

Although Rockwell's study does not predict the total annihilation of the nesting Snow Geese along Hudson Bay, the decline could be substantial. For example, assuming a starting population of 50 000 nesting pairs, their models predict that in 25 years there would be around 5 000 nests, a reduction of 90%. If this were true across the board, the Snow Goose numbers would be reduced far below the targets set by U.S. and Canadian agencies. Of course this might not happen because Snow Geese nest in other areas where there are fewer Polar Bears, although the distribution of bears and Snow Geese is incompletely known. Incidentally, polar bears in Europe are also forced inland by early ice melt and are preying on other species of geese, such as the Barnacle Goose *Branta leucopsis*. So, it's not that our bears are particularly innovative.

There are many complicating factors. In some years, the bears might arrive only in time to eat eggs from late nesting geese. Snow Geese live many years, and if they lose their eggs in one year, they might be successful the next.

Alternatively, it is possible that polar bears will move ashore early even if the ice does not disappear, if they develop a taste for eggs. In fact, Rockwell remarked to me "I was gratified this spring to find a fat subadult male standing amidst 30-40 empty snow goose nest bowls - he has obviously read our work, come ashore early and was feasting!!" He also mentioned that in some areas, seal-hunting bears come ashore for an "egg break" and then go back to hunting seals!

The unfolding saga of the consequences of global warming is well illustrated by the interactions between polar bears and snow geese. Even the extreme global-warming doubter has trouble explaining why sea ice is melting earlier and earlier as shown in the graph (not the same as what's causing global warming, be it man or natural factors). This is pretty basic stuff – ice melts in warm water. It seems clear that the goose and bear are entering into a new era of interactions. Perhaps snow geese should nest as earlier, although they might already be nesting as early as possible. In the end, maybe the bears won't make it if all they have are snow goose eggs.

Some scientists in fact predict the extinction of the polar bear. Rockwell recalled a quote from an old Inuk hunter who said something like "Things are changing and the bears will change too. Some will die and some will be skinnier. But just like the Inuit, they will still be around a long time from now." Rockwell says he's betting on the bears to survive. Time will tell but I hope he's right.

A new research project: Improving the knowledge on Greylag Goose in France

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The Greylag Geese (*Anser a. anser*) observed on migration and/or wintering in France belong to the north-west European flyway population, with a total estimated 610 000 individuals and an increasing trend since the 1990s (FOX et al. 2010). However, it is an acknowledged fact that the population of north-west Europe includes several entities whose ecology, migratory behaviour and conservation status can differ.
This has been demonstrated for the Scandinavian populations (see in particular PISTORIUS et al. 2006 & 2007), notably that of Norway, the most migratory, whose conservation status does not appear to be satisfactory (hunting in Spain and France being suggested as one of the explanatory factors for this situation).

The data on ringing and marking of individuals obtained over more than 25 years show that individuals observed in France originate from Norway, Sweden, The Netherlands, Denmark and Germany. The Norwegian birds appear to constitute the largest numbers transiting through France to winter in Spain. The origin of the birds on migration or wintering in the Camargue has not yet been clearly identified.

Recent studies of the trends in numbers and migratory behaviour of this species show major changes in the distribution range of this population for which Spain represents the southern limit of the wintering range: earlier spring migration (Fouquet et al. 2009), earlier arrival to Nordic breeding sites (Nilsson 2008), greater concentrations of the birds in The Netherlands in winter (50% of the estimated population), a trend towards sedentary settlement amongst Dutch birds (<5% of individuals migrate towards the south, Voslamber et al., 2010) and recent wintering in the south of Sweden.

In Spain, the numbers are not well known, except in the Guadalquivir marismas (RENDON et al. 2008) with annual variations according to environmental conditions, notably precipitation and its effects on wetland extent and quality, which acts on the duration of winter staging of the birds. Hence, there is a spatial redistribution of the birds to the north of this major wintering site.

In France, wintering numbers are of the order of 15 000 individuals in January with a stable trend in numbers since the 2004-2005 season, except in the Camargue. The hunting harvests mainly occur during the autumn migration (estimated at 20 000 birds for the 1998-1999 season). At the scale of the distribution range, the harvests (hunting, other means of destruction to limit agricultural damage) are unknown. The numbers passing through France on migration are not precisely known, with only a rough estimate of 100 000 birds made in the 1980s.
The general objectives of this programme is to aim to attain a better understanding of the functioning of the population of north-west Europe and to supplement the information relating to the change in migratory behaviour of this species by using new methods and approaches (e.g. by monitoring individual movements using GPS telemetry in Norway, Spain, the Czech Republic and Camargue).

Fig. 1. Greylag Geese *Anser anser* (© Michael Maggs, Wikimedia Commons)

This programme relies also on classical methods (analysis of ring recoveries, of the data of the ringing-marking database of the geese.org database of the Goose Specialist Group of harvests and counts at the national level and along the flyway, monitoring of wintering sites). These various complementary methods should enable a better knowledge of wintering numbers in Spain and their use of sites in time and space, of the origin of birds counted in the Camargue and the proportion of birds of different breeding provenance that frequent France on migration and in winter.

This programme, planned to run over 3 years, is based on 6 components presented below which were discussed in 2010 and validated in mid-January 2011 by the working group set up for that purpose at the request of the Ministry of Ecology (MEDDTL). This working group, coordinated by the ONCFS, is also the steering committee of this programme, which will be joined if necessary by the scientific officers of each of these components. A summary of the results obtained in each of these components will be produced regularly according to the state of progress of each component, discussed and validated by the steering committee.

Each component of the programme has a scientific officer and several scientific and technical partners chosen according to the contents of the component. It also has an accompanying projected budget.

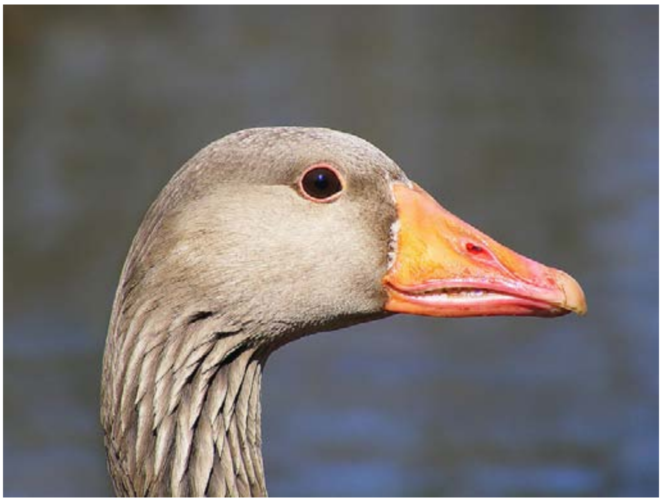

Fig. 2. Greylag Goose *Anser anser* (© AllenMcC., Wikimedia Commons)

To date, the financing of the programme is secured only by the ONCFS and the National Hunters' Federation (FNC). Because of the limited funds and human resources available, priorities were set in the choice of the components that should start in 2011. In this way, the components 1, 3 and 4 of the programme were the subject of a presentation in the ONCFS technical committee on 15 June 2011 and three one-year research conventions are currently being drafted : component 1- (convention with L. Nilsson, Swedish Ornithological Society, Sweden), component 3- (convention with A. Green from the Donana Biological Station, Spain) and component 4- (convention with P. Musil, University of Prague, Czech Republic, and Tour du Valat, France)

The components 2 (France), 5 (Norway) and 6 (harvests) will be gradually developed according to available financial and human resources. Exchanges and discussions will also start in September 2011 for the component 2 relating to the monitoring of wintering and migration chronology in France (extent of involvement of observation networks, definition of protocols, in particular for the postnuptial migration). Component 5 (Norway) started in 2010 with the attachment of 10 GPS devices on Norwegian birds (part of the FNC programme).

The working group has defined and elaborated the content of the programme which is based on the 6 following components :

Component 1 : Historical and current analysis of the goose ringing-marking database of the geese.org database of the Goose Specialist Group, and that of the CRBPO (Research Center of Birds Populations Biology, France).

Component 2 : Monitoring of greylag geese wintering and migration chronology in France.

Component 3 : Monitoring of migration and wintering patterns of the Spanish population.

Component 4 : Origin and migratory movements of greylag geese wintering in Camargue.

Component 5 : Satellite tracking of Norwegian individuals and breeding success monitoring.

Component 6 : Analysis of harvests along the Atlantic flyway

To ensure the implementation of this programme, the ONCFS will assume its coordination and running with all the members of the working group.

References

FOUQUET, M, V. SCHRICKE & C. FOUQUE (2009): Greylag geese *Anser anser* depart earlier in spring: an analysis of goose migration from western France over the years 1980-2005. - Wildfowl, 59: 145-153.

FOX, A.D, B.S. EBBINGE, C. MITCHELL, T. HEINICKE, T. AARVAK, K. COLHOUN, P. CLAUSEN, S. DERELIEV, S. FARAGO, K. KOFFIJBERG, H. KRUCKENBERG, M.J.J.E. LOONEN, J. MADSEN, J. MOOIJ, P. MUSIL, L. NILSSON, S. PIHL & H. VAN DER JEUGD (2010): Current estimates of goose population sizes in western Europe, a gap analysis and an assessment of trends. - Ornis Svecica 20: 115-127.

NILSSON, L. (2008): Migration de retour des oies cendrées: de plus en plus tôt. - Rapport déposé à la TRC par la LPO.

PISTORIUS, P.A., A. FOLLESTAD & E.E. TAYLOR (2006): Declining winter survival and fitness implications associated with latitudinal distribution in Norwegian Greylag geese *Anser anser.* - Ibis 148: 114-125.

PISTORIUS, P.A., A. FOLLESTAD, L. NILSSON & E.E. TAYLOR (2007): A demographic comparison of two Nordic populations of Greylag Geese Anser anser. Ibis 149: 553-563.

RENDON, M.A., A.J. GREEN, E. AGUILERA & P. ALMARAZ (2008): Status, distribution and long-term changes in the waterbird community wintering in Donana, southwest Spain. - Biological Conservation 141: 1371-1388.

VOSLAMBER, B., E. KNECHT & D. KLEIJN (2010): Dutch Greylag Geese *Anser anser*: migrants or residents? - Ornis Svecica 20: 207-214.

Survey of geese in some parts of the Kumo – Manych Depression, Russian Federation in March 2011

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1. Introduction

The Kumo – Manych Depression in the Russian Federation between the Sea of Azov and Caspian Sea is a well known migration route for arctic geese and other waterfowl. Latest data is published in 2011 by AEWA (ROZENFELD 2011) and http://www.geese.org/gsg/ (2011).

2. Material and methods

A Finnish team of four ornithologists visited some areas of the Kumo – Manych Depression in 20-26 March 2011 and surveyed waterfowl and terrestrial birds during the peak migration period for geese and ducks. Weather conditions were not different to other recent years, with temperature varying from +0 C to +15 C and snow covering the terrain in some days.

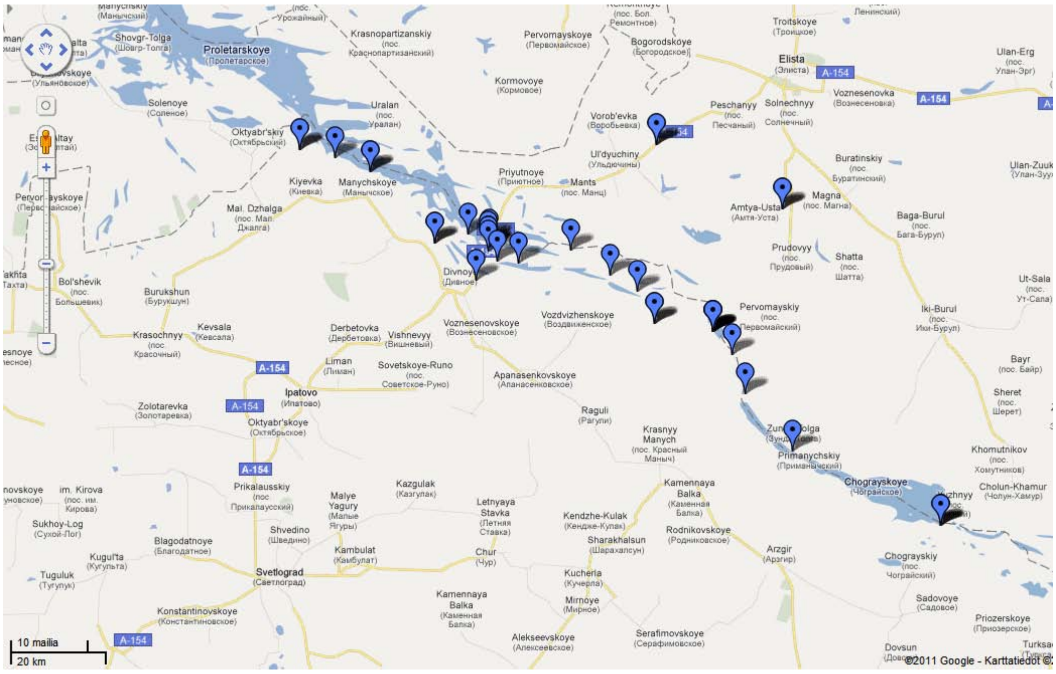

Fig. 1. The observation points with geese in the Kumo – Manych Depression area in 20-26 March 2011. © Erkki Kellomäki 2011.

The team visited most of the accessible sites along the main river systems by cars (both 4WD and ordinary). The sites (about 40) were selected beforehand in consultation with a local ornithologist Mr. Viktor Fedosov from Divnoye village, Stavropol region. The distance between outermost observation points was about 160 km. Those observation sites where geese were recorded are shown in Fig. 1. The team followed the same research methods as used in geese surveys in 2005 – 2007 on Kostanay steppe, Kazakhstan.

3. Results

Altogether, 111 771 individuals of 108 different bird species were recorded.

3.1. Geese

We counted 66 386 geese in all, including *Anser albifrons* (the most numerous goose species 48 371 – 86% of identified geese, see Fig. 2), local breeding species *Anser anser* (1 077, 2%), *Branta ruficollis* (6 937, 12%) and only 21 *Anser erythropus* (0.04%) which is globally endangered. In addition, 9 980 geese could not be identified (*Anser/Branta*). The largest goose flocks were seen near the Kumo – Manych watercourse, which is a chain of low-salt reservoirs. Geese seemed to prefer green winter wheat fields. Spring hunting of geese and other waterfowl was still allowed in Stavropol region in 2011.

3.2. Other waterfowl

Species and the number of other waterfowl species (swans, ducks, grebes, pelicans, cormorants, egrets, herons) are given in Table 1.

Table 1. The number of other waterfowl species other than geese counted in the Kumo-Manych Depression in late March 2011.

Cygnus olor	624	*Anas platyrhynchos*	582	*Aythya nyroca*	27	*Anatidae* (not identified)	7300
Cygnus columbianus	11	*Anas clypeata*	417	*Aythya fuligula*	2063	*Podiceps cristatus*	431
Cygnus cygnus	227	*Anas acuta*	746	*Aythya marila*	2	*Phalacrocorax carbo*	749
Tadorna ferruginea	441	*Anas querquedula*	609	*Bucephala clangula*	900	*Pelecanus crispus*	109
Tadorna tadorna	570	*Anas crecca*	866	*Mergellus albellus*	288	*Ardea cinerea*	57
Anas strepera	16	*Netta rufina*	1170	*Mergus serrator*	1	*Ardea alba*	39
Anas penelope	932	*Aythya ferina*	1584	*Oxyura leucocephala*	803	*Platalea leucorodia*	4

4. Comparison with other geese surveys in the Kumo – Manych Depression area

ROZENFELD (2011) gives following data of numbers of staging geese in Kalmykia in 6-27 March 2010: *Anser albifrons* 91 175 (67% of recorded geese), *Anser anser* 565 (0.4%), *Anser erythropus* 366 (0.3%), *Branta ruficollis* 43 480 (32%).

Rozenfeld made an aerial survey over the whole area of Kumo-Manych depression in Kalmykia again in 30-31 March 2011 and counted 90 000 (70%) *Anser albifrons*, 26 000 (20%) *Branta ruficollis*, 840 (0.7%) *Anser erythropus* and 11 500 (9%) *Anser anser*. This data are from the website http://www.geese.org/gsg/.

Fig. 2. Kumo–Manych-depression (© Johan Mooij)

Comparison with data given by ROZENFELD (2011) is difficult to achieve because of the larger survey area covered by the Rozenfeld reports, longer time period (6-27 March 2010) and differing survey methods (e.g. her aerial surveys). *Anser albifrons* remains the dominant goose species in March. Numbers of *Anser anser* seem to increase towards the end of March within the migration period. *Branta ruficollis* are reasonably numerous but only a few *Anser erythropus* individuals were seen in all three surveys.

5. Acknowledgements

Mr. Alexander Nikitin provided us accommodation in his Motel ”Manych-Gudilo” and arranged transportations. Mr. Viktor Fedosov was our local guide and gave transportation to observation sites. Ms. Sonia Rozenfeld gave beforehand important information about her earlier surveys in the region. She made our work more fruitful.

Fig.2. *Anser albifrons* flock on a winter wheat field. (© Eero Peltonen 2011)

6. References

ROZENFELD, S. (2011): Regulation of Spring and Autumn Hunting on Waterbirds in the Kumo-Manych Depression, Russian Federation, March 2010-February 2011. - AEWA Lesser White fronted Goose International Working Group Report Series No. 2. Bonn, Germany.

Recent numbers and trends in wintering and migratory geese and swans in The Netherlands

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Introduction

During the non-breeding season, The Netherlands support important numbers of 8 out of 30 recognized goose populations in the Western Palearctic. Counts of wintering and migratory geese are carried out monthly from September to May (April and May only *Branta* species), as part of a governmental ecological monitoring scheme (NEM). Fieldwork is achieved with the aid of about 1 500 dedicated voluntary counters, co-ordinated by SOVON. For most species, the census scheme covers all relevant staging sites and thus numbers represent national totals. Only Greylag Goose, Canada Goose and Egyptian Goose (as well as Mute Swan) have recently expanded their distribution well beyond the traditional staging sites (incl. urbanized areas) which are not surveyed in all months. In this contribution we review recent trends in numbers and size of wintering goose populations in The Netherlands. For practical reasons, swans have been included as well, since they occur at the same staging sites and are covered by the same counting scheme.

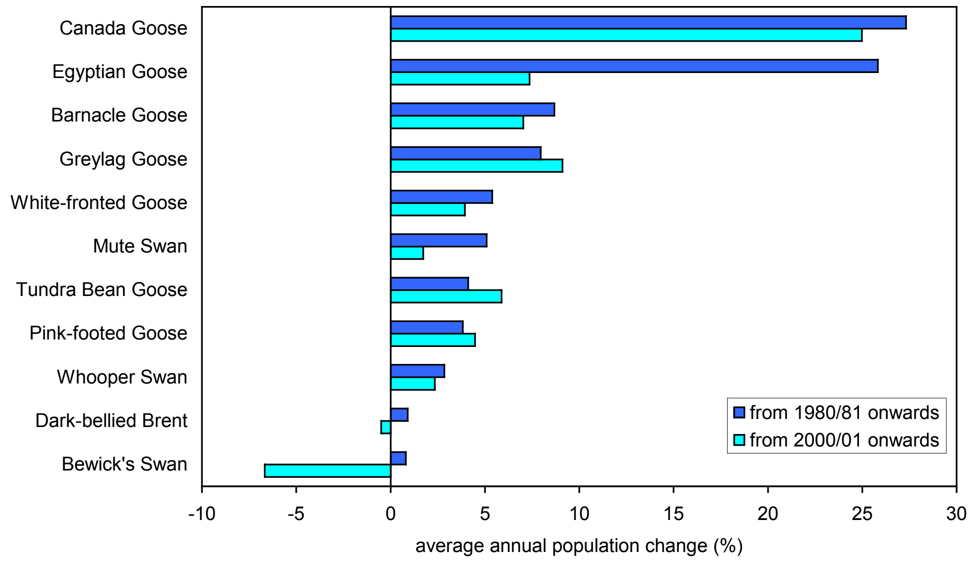

Fig. 1. Trends in wintering and migratory geese and swan numbers in The Netherlands since 1980/81. Trends are expressed by average annual change (%) of seasonal averages, thus taking into account all counts throughout the year.

Population trends

Like elsewhere in the range, numbers of most species of swans and geese have been increasing since the 1970s. Highest annual growth rates (>25%) are observed in non-native species like (Greater) Canada Goose and Egyptian Goose (Fig. 1). Both species have established extensive breeding populations in The Netherlands from the late 1960s onwards and meanwhile have expanded their distribution range in nearly all parts of the country (SOVON 2002).

Hence, numbers counted during the monthly censuses will underestimate the actual numbers present (Tab. 1). Among the native species, Greylag Goose and Barnacle Goose increased in numbers by an average of 8% per annum. Most other species show annual growth rates of around 5%. Only for Dark-bellied Brent Geese and Bewick's Swans are annual population changes from 1980 onwards close to zero. Both species initially showed an increase until the mid 1990s, but have decreased since (see below).

Tab. 1. Numbers of wintering and migratory geese (incl. swans and Egyptian Goose) in The Netherlands since 2005/06. Shown are seasonal peak counts, including some estimates for sites only partially covered in the monitoring scheme. Taiga Bean Goose is missing since numbers are currently under review. In most species, except Mute Swan, Greylag Goose, Canada Goose and Egyptian Goose, numbers represent national totals.

		2005/06	**2006/07**	**2007/08**	**2008/09**	**2009/10**
type of winter:		mild	mild	mild	mild	cold
Mute Swan	***Cygnus olor***	34 000	35 000	39 000	40 000	38 000
Bewick's Swan	***Cygnus columbianus***	15 000	12 000	12 000	11 000	9 600
Whooper Swan	***Cygnus cygnus***	2 600	1 800	1 900	2 600	2 900
Tundra Bean Goose	***Anser fabalis rossicus***	204 000	177 000	175 000	190 000	266 000
Pink-footed Goose	***Anser brachyrhynchus***	49 000	48 000	44 000	45 000	42 000
White-fronted Goose	***Anser albifrons***	853 000	830 000	830 000	883 000	793 000
Lesser White-fronted Goose	***Anser erythropus***	76	89	114	88	101
Greylag Goose	***Anser anser***	360 000	379 000	426 000	477 000	487 000
Canada Goose	***Branta canadensis***	16 000	22 000	22 000	25 000	27 000
Barnacle Goose	***Anser leucopsis***	523 000	405 000	508 000	474 000	653 000
Dark-bellied Brent Goose	***Branta bernicla bernicla***	115 000	104 000	110 000	80 000	78 000
Egyptian Goose	***Alopochen aegyptiacus***	30 000	31 000	35 000	36 000	35 000

In many species, the upward trends have levelled off after 2000. This is notably the case for the Egyptian Goose, for which most local populations now show some signs of saturation. In addition, mortality from increased hunting effort since 2000 might have contributed to the observed reductions in recent growth rates. In 2007/08, at least 20 000 Egyptian Geese were shot and estimates for total hunting bag even range up to 40 000 individuals (MONTIZAAN & SIEBENGA 2010, Tab. 2).

In Dark-bellied Brent and especially Bewick's Swan, numbers declined after 2000, as evident from the lower seasonal peak counts (Tab. 1). In Bewick's Swan, the population trend is currently at the same level as it was in the late 1970s and early 1980s.

Numbers

During winter, White-fronted Goose is the most abundant species (Tab. 1). Peak numbers in most recent winters are well above 800 000 individuals, representing on average 70% of the flyway population.

Peak numbers of Barnacle Goose have recently increased to 653 000 birds, which is more than 80% of the Barents Sea/Baltic/North Sea population. As elsewhere in NW- and Central Europe, winter 2009/10 was the first cold winter in 13 years, including prolonged periods of snow cover and occasional blizzards from late December to mid February.

Tab. 2. Most recent hunting bag statistics in goose and swan species in The Netherlands (after MONTIZAAN & SIEBENGA 2010).

Species	Hunting bag 2007/08	Remark
Mute Swan	5 191	Shooting requires special permits
White-fronted Goose	42 081	In framework of management scheme
Greylag Goose	80 793	In framework of management scheme (42 125 ind.) and special permits from 1 April to 1 October (38 668 ind., mainly breeding birds)
Canada Goose	> 4 768	Statistics incomplete
Barnacle Goose	2 382	Shooting requires special permits, only refers to local breeding population, mainly province Zuid-Holland
Egyptian Goose	> 20 264	Statistics incomplete

As a result, peak numbers of Tundra Bean Goose were the highest ever observed since the start of the regular counting scheme in the early 1970s, probably driven by an exodus from eastern Europe. The same applies to Barnacle Geese, of which the regular wintering population was probably supplemented by birds usually wintering in Northern Germany. In contrast, numbers of Whooper Swans, formerly also a typical species that showed influxes during cold winters, only slightly increased. In Bewick's Swan and White-fronted Goose, lower peak numbers point to an exodus to countries southwest of The Netherlands. This fits well with observations of about 7 000 Bewick's Swans in the UK in January (HOLT et al. 2011) and high numbers of geese in Flanders, Belgium from late December to February (DEVOS & KUIJKEN 2010). Here, numbers of Tundra Bean Goose, White-fronted Goose (peak numbers up to 73 300 in January) and Barnacle Goose were the highest observed in the past decades. It is striking that numbers of (European) White-fronted Geese in the UK were similar as in previous years (HOLT et al. 2011), despite the harsh winter conditions on the continent.

Fig. 2. White-fronted Geese *Anser albifrons* (© Hans Glader)

Changes in management

Since 2005/06 a new management scheme for wintering geese has been established. On a national scale, 80 000 ha of grassland area has been designated as "goose feeding areas" where geese are left undisturbed and a specific agri-environmental scheme operates to compensate farmers for damage to their fields. Focus species are White-fronted Goose and Greylag Goose (and Wigeon). The aim is to concentrate these species within the feeding areas and perform active scaring outside these areas, including limited shooting. Results from the monthly counts, including detailed mapping of goose flocks, have been used to evaluate possible changes in distribution (VAN DER JEUGD et al. 2008). In the first three winters of the new management scheme 57-60% of wintering geese and Wigeon concentrated in the feeding areas. When distribution before and after designation of the feeding areas was compared, a slight increase of 2-3% in numbers towards the feeding areas was observed, but this change was not statistically significant. Currently, distribution patterns are continuing to be monitored and the next evaluation will show if significant changes have occurred. As part of the new management scheme, hunting bags in some species have shown an increase, especially in White-fronted Goose (Tab. 2). Besides, growing conflicts arise with breeding geese, notably Greylag Goose and Canada Goose, that have established expanding populations in many parts of the country..

Fig. 3. Greylag *Anser anser* and White-fronted Goose *Anser albifrons* in the almost 4 900 year old "Meidum Geese scene".

References

DEVOS K. & E. KUIJKEN (2010): Overwinterende ganzen in Vlaanderen tijdens de winter 2009/10. - Vogelnieuws 14: 24-31

HOLT C.A., G.E. AUSTIN, N.A. CALBRADE, H.J. MELLAN, C. MITCHELL, D.A. STROUD, S.R., & A.J. MUSGROVE (2011): Waterbirds in the UK 2009/10: The Wetland Bird Survey. - BTO/RSPB/JNCC, Thetford.

VAN DER JEUGD H., E. VAN WINDEN & K. KOFFIJBERG (2008): Evaluatie opvangbeleid 2005-2008: overwinterende ganzen en smienten. Deelrapport 5: invloed opvangbeleid op de verspreiding van overwinterende ganzen en smienten binnen Nederland. - SOVON-onderzoeksrapport 2008/20. SOVON Vogelonderzoek Nederland, Beek-Ubbergen.

MONTIZAAN M.G.E. & S. SIEBENGA (2010): WBE Databank Nieuwsbrief 8. - KNJV, Amersfoort.

SOVON (2002): Atlas van de Nederlandse Broedvogels 1998-2000. - NNM Naturalis/KNNV/EIS, Leiden.

Kolguev - Island of geese

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1. Introduction

Although long recognised an important breeding area for Western Palaearctic geese, Kolguev Island remains one of the most poorly studied and mysterious places in the Russian Arctic. During the past 100 years ornithologists have only visited the island for short periods, no longer than 30 days.

It was not until 1894 that the first ornithologist visited Kolguev Island. In that year the British ornithologist Aubyn Trevor-Battye spent the summer on the island and wrote a book about his stay. In that time, the Brent Goose (*Branta bernicla*) was the most common breeding goose species on Kolguev, followed by the Tundra Bean Goose (*Anser fabalis rossicus*) and the White-fronted Goose (*Anser albifrons*), whereas the Barnacle Goose (*Branta leucopsis*) was absent (TREVOR-BATTYE 1895). In the early 20th century the Brent Goose lost its dominance and although Brent and Bean Goose seem to have declined at that time, the Bean Goose seemed to be the most common goose species and the Barnacle Goose was still not breeding on Kolguev than (TOLMATCHEW 1927, PLESKE 1928). Since the 1980s, the Barnacle Goose has colonised as a breeding species on Kolguev, with only a few hundred pairs in the late 1980s (GAVRILO 1991). In 1994 und 1995 V. V. MOROZOV and E. E. SYROECHKOVSKY implemented an extensive research programme on the island. At this time, the White-fronted Goose was the most common breeding species followed by the Bean Goose, whereas the Barnacle Goose was breeding there with about 6 000 breeding pairs (MOROZOV & SYROECHKOVSKY 2004).

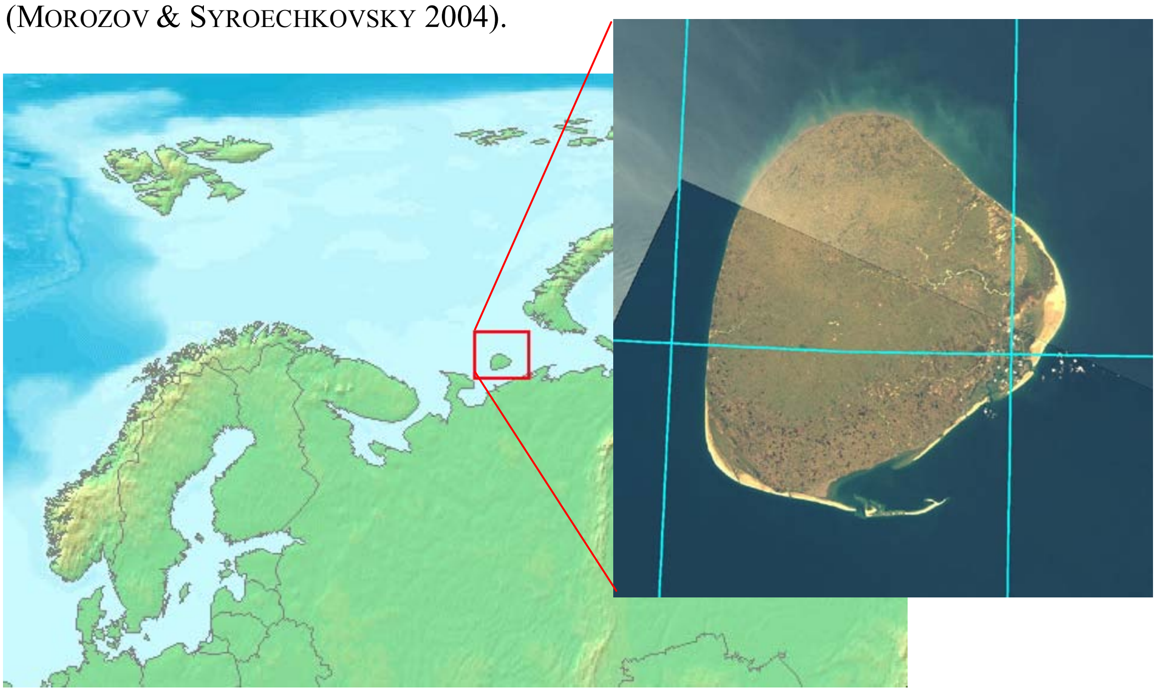

Fig. 1. Kolguev Island is situated in the Barentsz Sea (Landsat7-image by www.grida.no/ecora/maps.aspx)

Kolguev Island is an island of more than 5 000 km^2 in the south-eastern part of the Barents Sea and separated from the mainland by the mere 70 - 80 km of the Pomor Strait. The island is approximately round in shape and stretches about 83 km east to west and about 92 km from north to south. Although most of the island has a hilly relief ranging from 20 to 60 m in height, elevations of 140 - 173 m are attained in the central part of the island. From the inland uplands, rain and melt water flow to the sea by many rivers of varying sizes, which radiate from the centre to the sea. The largest river is the Peschanka, some 150 km long, characterized by sandy shores and sandbanks. The island shows a mosaic of swampy tundra in the river valleys and dry and swampy tundra in the higher parts. Permafrost is found at a depth of about one meter and more in summer. In the southern and eastern parts of the island there are extended lowland plains, at elevations of 1.5 - 3 m above sea level in the east and 5 - 12 m. in the south (southern lapta).

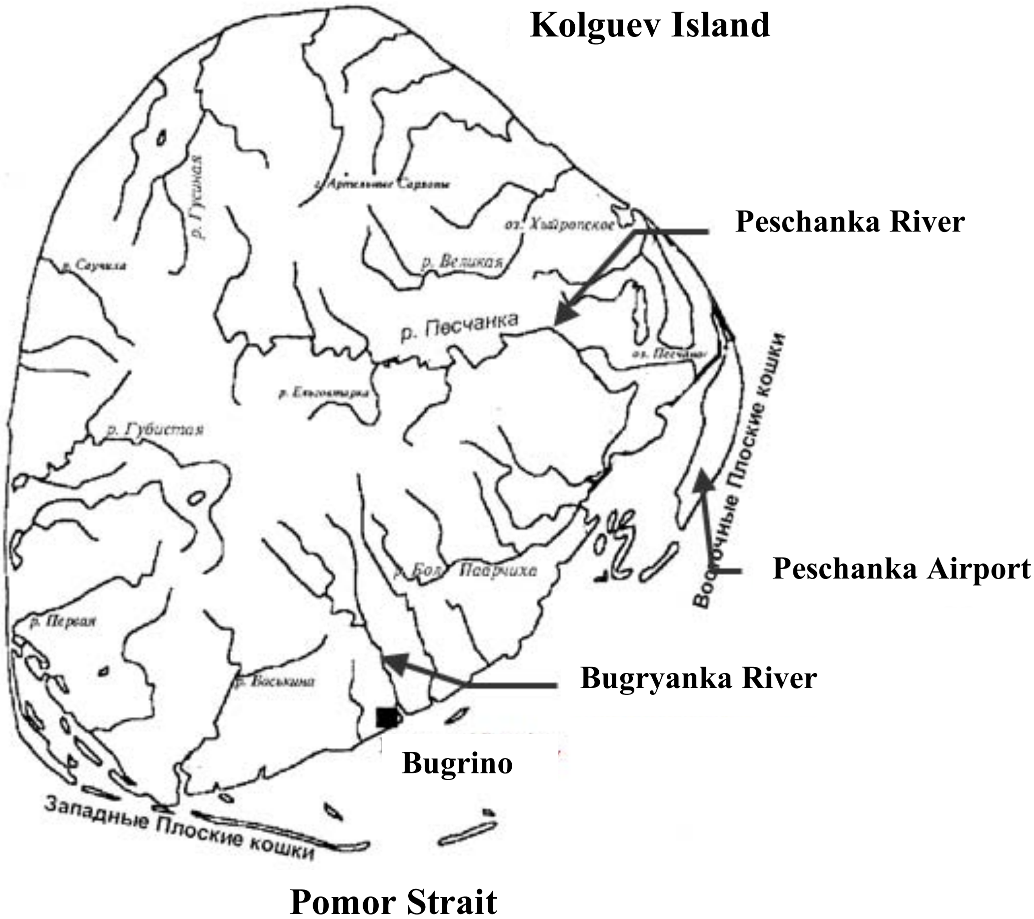

Fig. 2. Map of rivers on Kolguev Island

These rill-cut (laidy) and gullied (lapti) plains are flooded by the sea during storms. Along these low terraces lie sandy spits and bars (koshki) that form large lagoons. The largest spit, with a length of about 22 km and a width of about 7 km, is found at the mouth of the Peschanka River on the eastern coast of Kolguev. On the southeastern coast of the island, at the mouth of the Bugryanka River, lies the village of Bugrino, which is inhabited by about 450 individuals, most of them are Nenets people, who mainly earn their living from fishery and reindeer herding. At present the herd of reindeer numbers about 7 800 animals.

Bugrino is the "capitol" of Kolguev and has a wooden landing strip for helicopters and up to one flight per week. In the eastern part of the island, two Russian oil and gas companies have each established a settlement of about 120 people on the banks of Peschanka Lake, where they exploit the fossil fuels. On the eastern spit not far from the mouth of the Peschanka River, an airstrip (Peschanka Airport) has been built where planes up to the size of an AN 26 - a light, twin-engine cargo turboprop - land at irregular intervals Sandy roads for buses, trucks and all-terrain vehicles link the company settlements, several exploration sites, and the airport. In the north of the island are a meteorological station and a nautical station, both with crews of two persons, as well as an unmanned lighthouse. A few times per year, special tundra vehicles may traverse between these stations and the company settlements. In the neighbourhood of the meteorological station is a deserted former military camp for border troops as well as a hunting camp for rich oil-company officials. Except for the hunting, most more-or-less intensive human activities are concentrated along the east coast of the island, whereas central parts of the inland are used for reindeer herding.

2. The geese of Kolguev

Currently three goose species are breeding on Kolguev Island: Bean, White-fronted and Barnacle Goose.

2.1. Breeding biology

The geese arrive at Kolguev Island in the early days of May (KONDRATYEV & ZAYNAGUTDINOVA 2008, KRUCKENBERG et al. 2008, MOROZOV & SYROECHKOVSKY 2004), but mass arrival occurs during the last third of May (25-27 May).
The number of geese on upland tundra ranges from 16 to 65 birds km^{-2}, perhaps including mainly non-breeding birds, as the majority of birds encountered during the incubation period are families with young from the previous year. The geese feed extensively on Aquatic Sedge (*Carex aquatilis*), which is growing not only along the shores of lakes and ponds, but also on upland, moss-grassy tundra.

Fig. 3. Valley of the Peschanka river on Kolguev (© Johan Mooij).

The first nests of Bean Geese were found in the end of May, those of the Barnacle Geese and White-fronted Geese in the beginning of June. The geese stayed at their nests after laying the first egg, and incubation constancy was extremely high. Male constancy and behaviour differed drastically between the pairs, and these differences were not related to the incubation stage, but were more probably explained by the individual social status of the birds. In contrast, all observed females had only one recess per day, usually for 4–8 minutes, during which time they eagerly fed on sedges, drank, bathed and made short flights.
The nest-initiation period is long on Kolguev and, subsequently, the hatching period is also prolonged, lasting almost one month. First hatching was observed in the last week of June.

Fig. 4. Nest of Barnacle Goose *Branta leucopsis* on Kolguev 2006 (© Johan Mooij).

2.1.1. White-fronted Goose *Anser albifrons*
The majority of White-fronted Goose nests hatched during the first week of July. White-fronted Geese are the most widespread and opportunistic in their habitat selection. They are especially numerous in habitats with sedge wetlands, low bushes and hummocks. Other important breeding-habitat types are the slopes and bottoms of steep ravines. In general there is a tendency to build nests along edge habitats, such as the upper or lower slopes of ravines, the bushy edges of creeks and on hummocks with bushy vegetation along the lake shores or water courses on upland tundra. All these habitats combine both good shelter and good sightlines from the nesting site. Very common nesting habitats are ravine sources in upland habitats, where water courses are overgrown with scrub willow.

2.1.2. Bean Goose *Anser fabalis*
Bean Goose hatching dates were some days earlier as those of the White-fronted Goose and the distribution of their nests differs from that of the former species; Bean Geese select habitats that are more well-drained and more strongly associated with glacial lakes and the upper slopes of ravines, where the habitat is more open, with less cover but better view.

2.1.3. Barnacle Goose *Branta leucopsis*

Barnacle Geese, on the contrary, mostly breed on the flat, wet plains of the Peshanka River valley, occupying the lower parts of its delta. Besides the Peshanka River valley and coastal sedge marshes in the valleys and mouths of other small rivers, Barnacle Geese were also found nesting in the middle of the island in the source area of several rivers, where they were strongly associated with Peregrine Falcon *Falco perigrinus* nesting sites.

Fig. 5. Kolguev landscape with sedge wetlands, low bushes and hummocks (© Johan Mooij).

2.2. Breeding density and population size

Breeding density of Barnacle Geese varied in different parts of the colony, from 1 100 to 3 000 nests km^{-2}, and the total number of nests in the main colony on the Peschanka River was estimated to be no less than 60 000, which would mean a population of about 170 000 individuals. The suitable nesting area for White-fronted Geese on Kolguev is about 4 500 km^2 and, with an average breeding density 40 nests km^{-2}, the breeding population was estimated to be 180 000 breeding pairs, which, together with non-breeders, gives a total population of 400 000 – 600 000 White-fronted Geese on Kolguev in early summer. The number of Bean Geese on the island was estimated at 100 000 – 200 000 individuals, of which estimated 30 000 – 60 000 breeding pairs.

According most recent estimates (FOX et al. 2010) there are about 870 000 Barnacle Geese of which c. 770 000 belong to the Russian-Baltic population. The Western Palearctic population of the White-fronted Goose at present is estimated at 1.5 million birds, of which less than 25 000 are Greenland White-fronts and that of the Bean Goose at 613 000 individuals, of which c. 63 000 are Taiga and 550 000 are Tundra Bean Geese.

Based on the high densities of nesting White-fronted, Bean and Barnacle Geese found on Kolguev island a conservative estimate of the percentage of the total breeding population nesting on the island was made. It seems that about 26-40% of the White-fronted Goose, 22% of the Barnacle Goose and 18-36% of the Tundra Bean Goose population of the Western Palearctic may breed on this relatively small island (KONDRATYEV & ZAYNAGUTDINOVA 2008, KRUCKENBERG et al. 2008). The breeding density is more then 40 times higher than on the Taimyr Peninsula, and more than 3-4 times higher than on the mainland around the Pechora Delta. So, based on these results, Kolguev is the most important nesting ground of the Western Palaearctic for the three goose species studied.

2.3. Moult

Moulting of non-breeding individuals of the three main goose species started in early (Barnacle Geese) or mid-July (Bean Geese and White-fronted Geese).

The majority of non-breeders as well as early failed breeders left eastern Kolguev by the end of June, migrating to the northeast in flocks, so that during the brood-rearing period mainly families with goslings and some small groups of non-or-failed breeders remained on the eastern part of the island.

By satellite-telemetry it was shown, that most White-fronted non-or-failed breeders left Kolguev to moult e.g. on Novaya Zemlya or the Taimyr Peninsula.

In contrast to White-fronted Geese, Bean Geese did not leave Kolguev Island in late June for moult migration. Moulting groups of Bean Geese were recorded in different parts of the interior of the island. They were mostly recorded in the glacial landscape, occupying small lakes, but also on the lakes in the lower reaches of the Dorozhkina River and on some other rivers in the northern part of the island. The moulting group size varied from four to 750 individuals. At the same time, the biggest moulting flock of non-breeding White-fronted Geese was only 50 birds. Because moulting flocks of non-breeding White-fronts were extremely rare on Kolguev, perhaps they consisted only of late failed breeders.

Barnacle Goose was the most abundant moulting species, and flocks of up to 250 individuals were observed on the Peschanka River, with distances of 2–3 km between flocks. Such moulting flocks were also recorded on another big river – the Elgov-Tarka, and also on glacial lakes in the interior of the island.

Fig. 6. Flocks of moulting Barnacle Geese *Branta leucopsis* on Kolguev (© Alexander Kondratyev).

2.4. Influence of predation

On Kolguev, the most important prey animals of the Eurasian tundra - lemmings - are lacking, but still the typical tundra predators, such as the Arctic Fox *Alopex lagopus*, Rough-legged Buzzard *Buteo lagopus*, Glaucous Gull *Larus hyperboreus*, Arctic Skua *Stercorarius parasiticus* and Snowy Owl *Nyctea scandiaca*, are present in considerable numbers. Within the study area of approximately 80 sq.km^2 there were at least four fox dens, each with 5-7 pups, and at least 30 broods of the Glaucous Gull, each with 2-3 chicks. These species have been shown to be the main predators of the geese on Kolguev, Shortly after hatching, especially, most families reacted with panic on the appearance of one of these predators and started to run, which left the goslings largely unprotected.

Fig. 7. Arctic Fox *Alopex lagopus* one of the most important goose predators on Kolguev Island (© Johan Mooij)

This behaviour made it easy for the predators to catch small goslings. Furthermore, because of the panic reaction of their parents, a considerable number of goslings lost their parents and became easy prey. Later in the season, an increasing number of parents reacted not with panic, but with defensive behaviour and defended their goslings successfully. However, we observed a distinct difference in the predator defence behaviour of the species of geese. Whereas Barnacle Geese often gathered in big flocks, with a few adult birds defending the entire flock of young, the White-fronted Geese remained largely by themselves or only in loose contact with neighbouring families. Their defence strategy relied much more on hiding in the vegetation at the approach of a predator. They behaved rather secretly, hiding in the vegetation and preferred to stay between the taller sedges and rushes of the salt marsh. Barnacle Geese flocked into increasingly larger groups, heading for the open, but fertile salt marshes, where together they were able to parry attacks from avian predators such as Glaucous Gulls, but also Snowy Owls, by creating defence circles, with young and vulnerable members of the group placed in the middle.

During the study period, the food supply for the predators was so large that at least some of the Glaucous Gulls, after killing a gosling, only ate the liver (ZÖCKLER et al. 2009). Quite a few freshly killed goslings were found around the fox dens.

3. Human impact

3.1. Oil and gas exploration

On the eastern part of Kolguev, two Russian companies are prospecting and drilling for oil and gas. These companies each employ about 120 people, who live in two settlements in the centre of the exploitation area. On the eastern spit not far from the mouth of the Peschanka River, an airstrip has been built (Peschanka Airport), where planes (up to the size of an AN 24) land at irregular times. There are some periods (crew-exchange of the oil companies) when airplane frequency is one plane per day landing and taking off. In between there are long periods without any air traffic at all.

Sandy roads have been built for lorry-buses, trucks and all-terrain vehicles (vesdekhods) between these company settlements and several exploration sites as well as the airport.

To build these roads, a number of hills were dug up and several square kilometres of tundra disturbed, lakes drained and rivers dammed up. Furthermore, there are a considerable number of former drilling sites. At these sites and in their vicinity, the tundra vegetation is disturbed

The people of the oil villages do not hunt on the island, but do fish along the upper and lower parts of the Peschanka River.

Fig. 8. Oil village on Kolguev Island (© Johan Mooij).

3.2. Hunting

Indigenous people of the village of Bugrino traditionally live from reindeer-herding, fishing and hunting. Besides the usual disturbance around settlements, their influence through hunting is highest in the vicinity of Bugrino. Because of the relatively low number of people living in the village, the influence of indigenous hunting might not be too high. On average, the number of hunters in Bugrino village fluctuates between 120 and 150 people, and an average hunter uses about 400 – 600 cartridges per year, mostly hunting only geese in the spring and Willow (Ptarmigan) Grouse (*Lagopus mutus*) in autumn. Their average harvest might roughly be estimated at 20-100 geese per person per season, with a total bag of 2 000 – 3 000 geese for the village per year.

Fig. 9. The village of Bugrino, “capitol” of Kolguev (© Helmut Kruckenberg)

In the north of the island there is a hunting camp for rich oil officials. During the hunting season, selected oil executives are flown into the hunting camp by helicopter. These hunters are equipped with the most modern equipment and are very mobile. By means of helicopter they can reach every part of the island and are transported to the best hunting sites with high numbers of geese. Before the hunters arrive these sites are explored by special scouts.

After hunting, the tourist hunters are collected again and brought back to the comfortable camp to celebrate and relax. At the end of the hunting season these hunters leave the island again by helicopter. This kind of hunting not only brings disturbance to considerable parts of the island, but also is very effective from a hunting point of view, which means that it is easy for these hunters to shoot a large number of geese almost everywhere on Kolguev. Most of the birds bagged are buried. There are no data to estimate the hunting bag of such tourists, and the level of such hunting tourism has decreased. In recent years the number of such tourists has decreased in the vicinity of Bugrino village. Formerly, their total bag was estimated at 2 000 – 3 000 geese per spring – i.e., nearly the same as the subsistence hunt by the inhabitants of Bugrino village.

4. Some final remarks

Since the beginning of the 1990s, the breeding success of White-fronted, Bean and Barnacle Goose has declined continuously. During this period, hunting pressure increased markedly (KRUCKENBERG & MOOIJ 2007, MOOIJ 2005 & in press). Most likely, low breeding success is a result of processes on the breeding grounds. Kolguev is the most important nesting area in the Western Palaearctic for the three goose species reported upon here. Nesting conditions on this island have an extremely potent effect on the total populations of White-fronted, Bean and Barnacle Geese in western Europe. Therefore the island is of outstanding importance in the flyway context and should be considered as key area for site safeguard, as well as a base for future studies on population dynamics mechanisms (e.g., density dependence, gosling survival, predation, human impact, influence of weather and climate).

5. References

FOX, A.D., B.S. EBBINGE, C. MITCHELL, T. HEINICKE, T. AARVAK, K. COLHOUN, P. CLAUSEN, S. DERELIEV, S. FARAGÓ, K. KOFFIJBERG, H. KRUCKENBERG, M.J.J.E. LOONEN, J. MADSEN, J. MOOIJ, P. MUSIL, L. NILSSON, S. PIHL & H. VAN DER JEUGD (2010): Current estimates of goose population sizes in western Europe, a gap analysis and an assessment of trends. - Ornis Svecica 20: 115–127

GAVRILO, M. V. (1991): Barnacle goose on the Kolguev island.- Proc. of 10-th All-union ornithol. Conf. part 2, vol. 1: p.128. Minsk. (in Russian).

KRUCKENBERG, H., A. KONDRATYEV, J.H. MOOIJ, C. ZÖCKLER & E. ZAYNAGUTDINOVA (2008): White-fronted Goose Flyway Population Status. - Interim Report of a preliminary study in 2006. - Angewandte Feldbiologie Band II: 1-63. ISSN 1861-227X.

KRUCKENBERG, H. & J.H. MOOIJ (2007): Warum Wissenschaft und Vogelschutz die Gänsejagd in Deutschland ablehnen. – Ber. Vogelschutz 44: 107-119.

KONDRATYEV, A. & E. ZAYNAGUTDINOVA (2008): Greater White-fronted Geese *Anser albifrons* and Bean Geese *A. fabalis* on Kolguev Island – abundance, habitat distribution, and breeding biology. Vogelwelt 129: 326–333.

MOOIJ, J.H. (2005): Protection and use of waterbirds in the European Union. - Beitr.Jagd- & Wildforschung 30: 49-76.

MOROZOV, V.V. & E.E. SYROECHKOVSKY JR. (2004): Materials to our knowledge of bird fauna of Kolguev. - Ornitologia 31: 9–50. (in Russian)

PLESKE, T. (1928): Birds of the Eurasian tundra. - Boston Mem. Boston Soc. nat. Hist. 6 (3): 1 – 485.
TOLMATCHEW, A. (1927): Eine Sommerreise nach der Insel Kolguev i. J. 1925. – Geografiska annaler 9: 67-80.
TREVOR-BATTYE, A. (1895): Ice-bound on Kolguev, a chapter in the exploration of Arctic Europe, to which is added a record of the natural history of the island. - Archibald Constable and Company, London.
ZÖCKLER, C., H. KRUCKENBERG, M. GAVRILO, A. KONDRATYEV & V. BARZUN (2009): Status und Ökologie der Eismöwe *Larus hyperboreus* auf der russischen Insel Kolguev in der Barentssee. – Limicola 23: 58-78.

Ukrainian business helps the Ukrainian Society for the Protection of Birds to save biodiversity

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In September 2011, the Ukrainian Society for the Protection of Birds (BirdLife Partner in Ukraine) signed a long term cooperation agreement with Agrofusion holding, the biggest B2B tomato paste producer in Ukraine**.** Agrofusion has now become the first national funder of the USPB's nature conservation activity. Under the company's "Regional Farming" programme, Agrofusion is donating funds to support the work on biodiversity conservation in Ukraine. Together with USPB, a joint conservation programme was developed to work towards preventing the extinction of endangered bird species listed on the Red Data Book of Ukraine and the IUCN Red List of threatened species. "We are very proud to work with Agrofusion and to raise money for the support of our conservation efforts within the country," said Oleg Dudkin, Executive Director of the USPB. "Agrofusion is truly dedicated to help save wildlife and their habitats."

Red-breasted Goose *Branta ruficollis* (© Nicky Petkov/BSPB)

The Red-breasted Goose becomes the first species benefiting from the cooperation. Each year, thousands of Red-breasted Geese from Arctic Russia arrive in Ukraine for wintering within wetlands along Azov and Black Sea coast lines and adjacent areas. In order to gather field data about the species population trends, simultaneous winter counts are conducted at roosting sites. Future simultaneous winter counts of Red-breasted Goose for Kherson and Mykolaiv regions, which USPB conducts annually from October till April in the south of Ukraine, will be partly funded by Agrofusion.

A flock of Red-breasted Geese *Branta ruficollis* (© Nicky Petkov/BSPB)

The coordinated counts during winter time in Ukraine, Romania and Bulgaria coordinated by the Red-breasted Goose International Working Group (www.brantaruficollis.org) have been pivotal for assessing status and trends of the species global population in the last decade. In recent years the importance of Ukraine as wintering ground is probably increasing again due to mild and warm winters and geese short stop further north than they used to some 10 years ago. However detailed information was lacking in the past 4-5 years and this funding support by Agrofusion will contribute to better knowledge about the current numbers and distribution of the Red-breasted Goose in Ukraine.

In addition to supporting the counts, next October Agrofusion is planning to conduct training sessions for its employees to raise their awareness about the issues of endangered species, which is an important step toward building a more nature friendly and aware society in Ukraine.

For more information, please contact the author

Important conference and celebration at Churchill, Canada, 24-27 September 2011.

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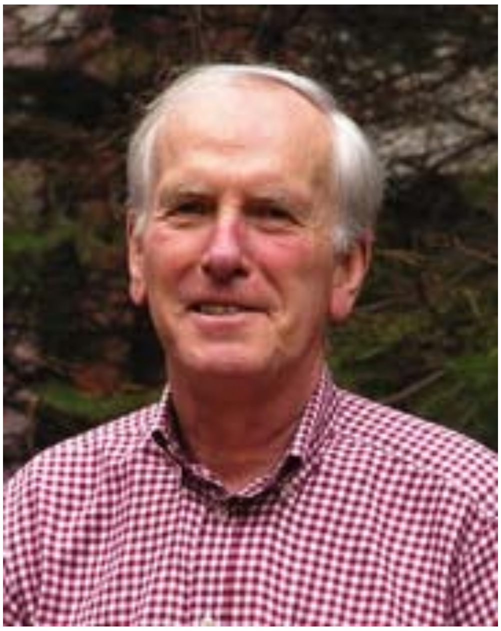
Recently, two important events to the goose world occurred in the Northern Manitoba community of Churchill.

The first was the opening of a brand new state-of-the-art Research Centre. The Churchill Northern Studies Centre has been in existence since 1977 but a brand new building has just been completed offering visiting scientists with up-to-date laboratories and accommodation. Those studying Snow Geese *Anser caerulescens* at the La Pérouse Bay colony and Canada Geese *Branta canadensis* at Cape Churchill have used the CNSC for many years but earlier researchers would be amazed at the quality of the new facilities. This has been possible initially through donations from the Weston Family, federal and provincial government agencies and the community of Churchill. Representatives of the Weston family, the Mayor of Churchill and the Premier of Manitoba were present for the official opening, as were many members of the scientific community world-wide.

The second event was a conference to coincide with the opening of the Centre. This was to celebrate the life and work of Professor Bob Jefferies whose work on the interactions between Snow Geese and their food supply has been a classical study of animal –plant interactions, which has become a classical study on par with the long term studies of Rudy Drent on geese and salt marshes in Europe and Tony Sinclair on mammalian herbivores on the Serengeti.



The late Dr. Bob (R.L.) Jefferies
(photo from www.ipygaps.org/ bob-jefferies-symposium)

Bob Jefferies joined the La Pérouse Bay Snow Goose Project in 1978 and applied his considerable intellect to a detailed study of the vegetation of La Pérouse Bay and its interactions with the expanding goose population until his death in 2009. This study extending for more than 30 years provided one of the most detailed examples of animal –goose interactions that has ever been carried out. It also contributed to an understanding of climate change.

A flock of Snow Geese *Anser caerulescens* (© Julia Flanagan)

The conference itself was a tribute to Bob from a wide number of scientists from around the world. It was aimed at both the wider scientific community and also to Churchill residents. The conference opened in the Town Centre in Churchill with a presentation by Professor Fred Cooke on the early establishment of the La Pérouse Bay Project. He emphasised the interactions between the scientists and the members of the Churchill community. Without the support of the local residents, scientists find it difficult to work effectively. Professor Cooke outlined the first establishment of the project in 1968, by himself and Ken Ross an undergraduate student from Queen's University, in Kingston, Ontario. The work expanded under the guidance of Dr George Finney, the first PhD student associated with the work. George was the first to establish a sound ecological and computer based system of data collection to assure long term comparisons. Later the project was managed by Dr. Robert Rockwell, of the City University of New York.
Professor Cooke also related his experiences as the first Scientific Director of CNSC where he established field courses involving not only undergraduates from universities in the south but also interested local residents of the North.

Other talks during the 2½ days of the conference were from several colleagues of Bob's and others who had worked in the Canadian Arctic in several disciplines, including climatology, archaeology and health studies. There were several of Bob's former students who demonstrated how Bob's work had influenced their own careers. These included Peter Kotanen, David Hik and Dawn Bazely.
From the perspective of goose biologists, there were three presentations, which were particularly notable.

The first by Dr. Maarten Loonen, outlined his long term Barnacle Goose studies in Spitzbergen. Maarten showed his work to be a strong legacy of the La Pérouse Bay project. He had worked on that project during his graduate days. The goose – plant interactions first demonstrated by Bob Jefferies were explored in another goose species in a different spectrum of plants. He extended the findings of Bob and showed some interesting parallels when expanding goose species negatively interact with a fragile Arctic environment. As with the Snow Geese, an excess of available food in the wintering grounds results in expanding populations and a consequent degradations of the Arctic ecosystem.

The second was by Emma Horrigan, a graduate student from the University of Toronto, who outlined the goose research, which had been carried out by the Hudson Bay Project (an expanded extension of the original La Pérouse Bay project) in recent years. Unfortunately the senior scientists of the Hudson Bay project were unable to attend the conference and dedication, but Emma was most effective in filling in for them.

As expected most of the goose research is now carried out at other locations around the lower Hudson Bay, as the habitat deterioration has made La Pérouse Bay itself unsuitable for major nesting. 2010 was the first season where no Snow Geese had successfully nested in the area and those few, which did attempt were predated by polar Bears, which seem to be expanding in the area during the breeding season.
The global Snow Goose population continues to expand, despite the management practices which were controversially introduced in the 1990's. Most new nesters are now located far south of the original La Pérouse Bay colony, along the coast in the recently established Wapusk National Park. With the reduction of the geese locally, there was some evidence of recovery of some of the salt-marsh vegetation.

The third was a summary of the major bird research findings, which had emerged for the La Pérouse Bay during the first 25 years of the project. These included

1. A genetic analysis of the major colour genes and their impact on mate choice.
2. Natural selection in the wild using qualitative and quantitative characters.
3. Interactions between geese and the vegetation. This was the major topic, which was led by Bob.
4. Ecological studies of other bird species – Common Eider, Willow Ptarmigan, Red-necked Phalarope, Semi-palmated Sandpipers, Savannah Sparrows.
5. Problems of an ever-expanding goose population. Demographic studies.

Overall the celebration of Bob Jefferies' work brought together a wide variety of studies and showed the vast extent of the influence of this remarkable man.

USGS John Wesley Powell Center for Analysis and Synthesis - Report on the second meeting "Circumpolar assessment of ecological mismatch between avian herbivores and plant phenology"

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A group of 16 scientists convened September 20-23, 2011 to continue our collaborations begun last year. We principally spent our time in two subgroups, with daily revisiting with the whole ensemble group. The first subgroup focused on the timing of nesting of various goose populations in relation to metrics representative of the nutritive quality and biomass of forage plants at breeding sites. The second subgroup focused on the serial nature of migratory rest stops enroute from wintering to breeding sites and how geese may optimize this northward movement relative to phenology.

The first subgroup spent much time debating what remotely sensed metric of NDVI best represented plant phenology relevant to geese. Empirical data from ground based studies of the growth and nitrogen content of goose forage plants were correlated with NDVI metrics. From these analyses and related ones, it was ultimately determined that the date when NDVI reached 50% of its maximal value for the year was an appropriate date to identify peak foraging conditions for growing goslings. Our annual measure of mismatch then became the difference, in days, between mean hatch date of geese in year i and population j and the date of 50% of maximum NDVI ("green-up") in year i and population j. Looking across year for each population, the slope of the relationship between mean hatch date and greenup should be 1.0 if geese annually match the variation in spring plant phenology and 0.0 if geese hatch their young independent of spring plant phenology.

Juvenile White-fronted Geese *Anser albifrons* on Kolguev Island (© Johan Mooij).

This slope varied among 14 populations, with a strong relationship to breeding latitude. Those populations at higher latitudes had lower slopes, indicating they were not matching the variations in plant phenology as closely as populations breeding farther to the south. We then went on to evaluate for a subset of these populations whether there was any evidence of a demographic consequences of this mismatch.

Gosling body mass at summer's end was considered the most sensitive barometer of summer-long foraging conditions and such data existed for at least 5 of these populations. The only one of these 5 populations that had clear demographic impacts of mismatch was the most northern population, thus suggesting that more northern populations may be more vulnerable to ecological mismatch. The biological context of our mismatch models is such that even for populations not presently showing effects of mismatch, we may be able to predict at what point such demographic consequences should become evident.

The second subgroup developed two main foci. The first objective is to evaluate whether conditions at wintering and migration stopover sites give migrating geese useful signals about the timing of vegetation phenology at their breeding sites, and how that may impact their timing of breeding. We are currently contrasting four different goose populations (though we may add others) where we are assembling phenological metrics (NDVI, temperature, snow cover) at migration and breeding sites and evaluating correlations among these areas.
We will describe at what point on their migration different populations obtain reliable signals about conditions at their breeding sites (i.e., higher correlations between phenological metrics at migration stopover and breeding sites), and then evaluate our prediction that higher correlations will correspond to less mismatch in their timing of breeding. The second objective of this subgroup is to investigate movement decisions of individual geese as they migrate between wintering and breeding sites. We will examine the movements of geese marked with satellite transmitters to examine whether their temporal pattern of Northward movement is tightly coupled with patterns of temperature, snowmelt, and vegetation phenology. We supplement existing knowledge by examining individual movements in several species, the utility of remote sensing datasets (primarily NDVI) in explaining northward movements, and explicitly test the prediction that in late migration breeding individuals jump ahead of the "green wave" and arrive at breeding sites so their goslings benefit when the green wave arrives. Arctic migrants already face the challenge of timing their migration to optimize their reproductive performance. Arctic ecosystems are generally warming more rapidly than other ecosystems, which can lead to a greater likelihood of mismatch between actual and optimal timing of breeding. Because cues along the migration path can be important to mitigating potential timing mismatches on breeding areas, knowledge of environmental change along migratory pathways can aid in both explaining and further predicting the impact of climate warming on Arctic migrants.

JOEL SCHMUTZ et al. – Phenological mismatch greatest in the Arctic for migratory herbivores. - Draft manuscript in December 2011.
JIM SEDINGER et al. – Demographic consequences of early springs for herbivores migrating to the Arctic. - Draft manuscript in February 2012.
PETER FAST et al. – The importance of spring weather conditions in predicting optimal nesting schedules. - Draft manuscript in February 2012.
PETER FAST et al. – Tracking the green wave? Individual movement decisions in a migratory herbivore. - Draft manuscript in June 2012.

New Publications 2010/2011

BALDWIN, F.B., R.T. ALISAUSKAS, & J.O. LEAFLOOR (2011): Nest survival and density of Cackling Geese (*Branta hutchinsii*) inside and outside a Ross's Goose (*Chen rossii*) colony. – Auk 128: 404-414.

CRABTREE, R., E. HUMPHREYS, A. MOXEY & C. WERNHAM (2011): 2010 Review of Goose Management Policy in Scotland. - BTO and CJC Consulting report to the Scottish Government

ESKELIN, T. & S. TIMONEN (2010): Survey of Possible Lesser White-fronted Goose (*Anser erythropus*) Wintering Sites in the Syrian Arab Republic, 14-24 February 2010. - AEWA Lesser White-fronted Goose International Working Group Report Series No. 1. Bonn, Germany.

FOX, A.D., L. CAO, Y. ZHANG, M. BARTER, M.J. ZHAO, F.J. MENG & S.L. WANG (2011): Declines in the tuber-feeding waterbird guild at Shengjin Lake National Nature Reserve, China – a barometer of submerged macrophyte collapse? - Aquatic Conservation: Marine and Freshwater Ecosystems 21: 82-91.

FOX, A.D., C. MITCHELL, M.D. WEEGMAN, L. GRIFFIN, H. THOMAS, D.A. STROUD & I.S. FRANCIS (2011): Potential factors influencing increasing numbers of Canada Geese in Isunngua, west Greenland. - Wildfowl 61: 30-44.

GUSTAVSSON, C.G. (2011): A white feathered area on the forehead is more common in hybrids of greylag goose *Anser anser* and greater Canada goose *Branta canadensis* than in the parent species. - Ett vitt befjädrat område på huvudet närmast näbben är vanligare på hybrider mellan grågås *Anser anser* och kanadagås *Branta canadensis* än det är på föräldraarterna. – Ornis Svecica 21: 37-44.

HOBSON, K.A., C.M. SHARP, R.L. JEFFRIES, R.F. ROCKWELL & K.F. ABRAHAM (2001): Nutruent allocation strategies to eggs by Snow Geese (*Chen caerulescens*) at a sub-arctic colony. – Auk 128: 156-165.

HORNMAN M., F. HUSTINGS, K. KOFFIJBERG, E. VAN WINDEN, SOVON GANZEN- EN ZWANENWERK-GROEP & L. SOLDAAT (2011): Watervogels in Nederland in 2008/2009. - SOVON-monitoringrapport 2011/03, Waterdienst-rapport BM 10.24. - SOVON Vogelonderzoek Nederland, Nijmegen.

HOYE B.J., V.J. MUNSTER, H. NISHIURA, R.A.M. FOUCHIER. J. MADSEN & M. KLAASSEN (2011): Reconstructing an annual cycle of interaction: natural infection and antibody dynamics to avian influenza along a migratory flyway. - Oikos 120:748-755.

KAMPE-PERSSON, H. (2011): How large proportion of the bean geese counted in sweden was made up of taiga bean geese *Anser fabalis fabalis*? - Hur stor andel av de i Sverige inräknade sädgässen har utgjorts av taigasädgäss *Anser fabalis fabalis*? - Ornis Svecica 21: 58-60.

KARAGICHEVA, J., E. RAKHIMBERDIEV, D. DOBRYNIN, A. SAVELIEV, S. ROZENFELD, O. POKROVSKAYA, J. STAHL, J. PROP & K. LITVIN (2011): Individual inter-annual nest-site relocation behaviour drives dynamics of a recently established Barnacle Goose *Branta leucopsis* colony in sub-arctic Russia. – Ibis 153: 622-626.

KRUCKENBERG, H., J.H. MOOIJ, P. SÜDBECK & T. HEINICKE (2011): Die internationale Verantwortung Deutschlands für den Schutz arktischer und nordischer Wildgänse. – Teil I: Verbreitung der Arten in Deutschland. – Naturschutz und Landschaftsplanung 43 (11): 334-342.

KRUCKENBERG, H., J.H. MOOIJ, P. SÜDBECK & T. HEINICKE (2011): Die internationale Verantwortung Deutschlands für den Schutz arktischer und nordischer Wildgänse. – Teil II: Bewertung, Gefährdung und Schutzmaßnahmen. – Naturschutz und Landschaftsplanung 43 (12): in print.

LEMAIRE, A.J.J. & P. WIERSMA (2011): Schatting van de huidige en toekomstige gewasschade door Canadese Ganzen in Nederland. SOVON-informatierapport 2011-01. - SOVON Vogelonderzoek Nederland, Nijmegen.

MITCHELL, C., L. GRIFFIN, M. TRINDER, J. NEWTH & C. URQUHART (2011): The status and distribution of summering Greylag Geese *Anser anser* in Scotland, 2008–09. – Bird Study 58, 338–348

MUSGROVE, A.J., G.E. AUSTIN, R.D. HEARN, C.A. HOLT, D.A. STROUD & S.R. WOTTON (2011): Overwinter population estimates of British waterbirds - British Birds 104: 364–397.

NILSSON, L. & J. MÅNSSON (TRANOR) (2011): Inventeringar av Sjöfåglar, Gäss och Tranor i Sverige. - Internationella sjöfågel – och gåsinventeringarna i Sverige. Årsrapport för 2010/2011 - Counts of staging and wintering waterfowl, geese and cranes in Sweden. Annual report 2010/11. - Department of Biology, Lund University.

PORTUGAL, S.J., J.A. GREEN, T. PIERSMA, G. EICHHORN & P.J. BUTLER (2011): Greater energy stores enable flightless moulting geese to increase resting behaviour. – Ibis 153: 868–874.

PORTUGAL, S.J., P.J. BUTLER, J.A. GREEN & P. CASSEY (2011): Indications of phenotypic plasticity in moulting birds: captive geese reveal adaptive changes in mineralisation of their long bones during wing moult. - J Ornithol. 152: 1055-1061.

ROZENFELD, S. (2011): Regulation of Spring and Autumn Hunting on Waterbirds in the Kumo-Manych Depression, Russian Federation, March 2010-February 2011. - AEWA Lesser White fronted Goose International Working Group Report Series No. 2. Bonn, Germany.

RUOKONEN, M., T. AARVAK, R.K. CHESSER, A.-C. LUNDQVIST & J. MERILÄ (2010): Temporal increase in mtDNA diversity in a declining population. - Molecular Ecology 19 (12): 2408-2417.

RUOKONEN M. & T. AARVAK (2011) Typology revisited: historical taxa of the bean goose – pink-footed goose complex. - Ardea 99 (1): 103 - 112.

VAN EERDEN M.R., G. LENSELINK & M. ZIJLSTRA (2010): Long-term changes in wetland area and composition in The Netherlands affecting the carrying capacity for wintering waterbirds. - Ardea 98: 265 - 282.

VOSLAMBER B. & J.T. VULINK (2010): Experimental manipulation of water table and grazing pressure as a tool for developing and maintaining habitat diversity for waterbirds. - Ardea 98: 329 - 338.

WYLEGAŁA P. & B. KRĄKOWSKI (2010): Liczebność i rozmieszczenie gęsi w czasie wędrōwki i zimowania w Wielkopolsce w latach 2000-2009 (Numbers and distribution of geese dring migration and wintering in the Wielkopolska region in 2000-2009). - Ornis Polonia 51:107-116 (Polish with English summary).

ZHANG, Y., L. CAO, M. BARTER, A.D. FOX, M. ZHAO, F. MENG, H. SHI, Y. JIANG & W. ZHU (2011): Changing distribution and abundance of Swan Geese *Anser cygnoides* in the Yangtze River floodplain: the likely loss of a very important wintering site. - Bird Conservation International 21: 36-48.

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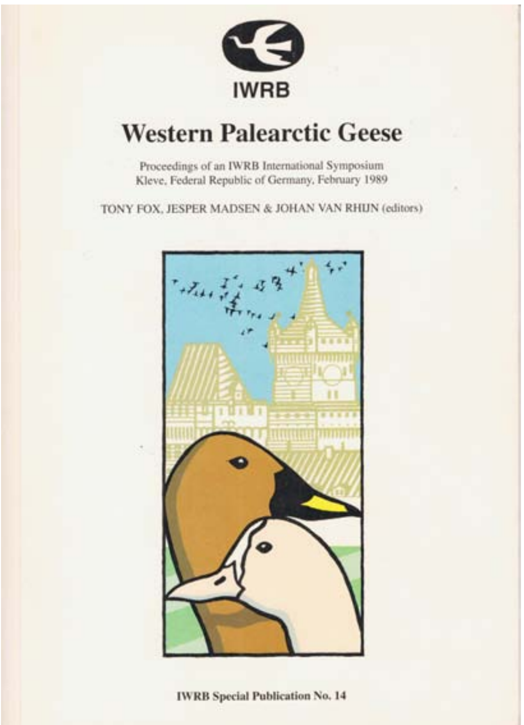

Proceedings of the Goose Meeting 1989 (Kleve, Germany) and Goose 2007 (Xanten, Germany)
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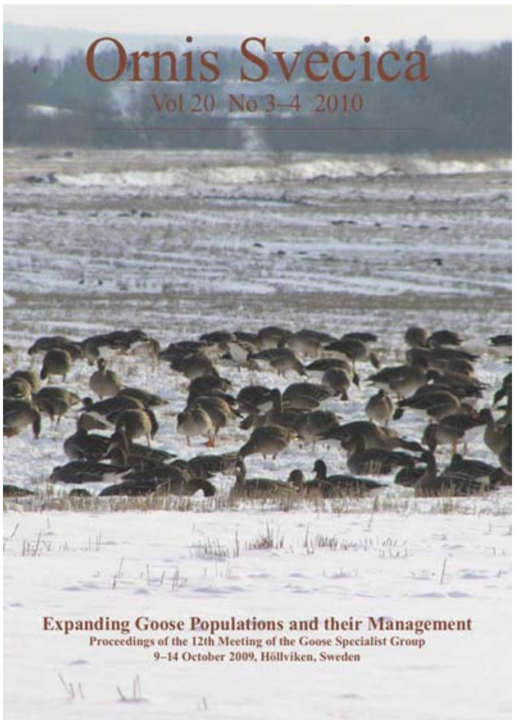

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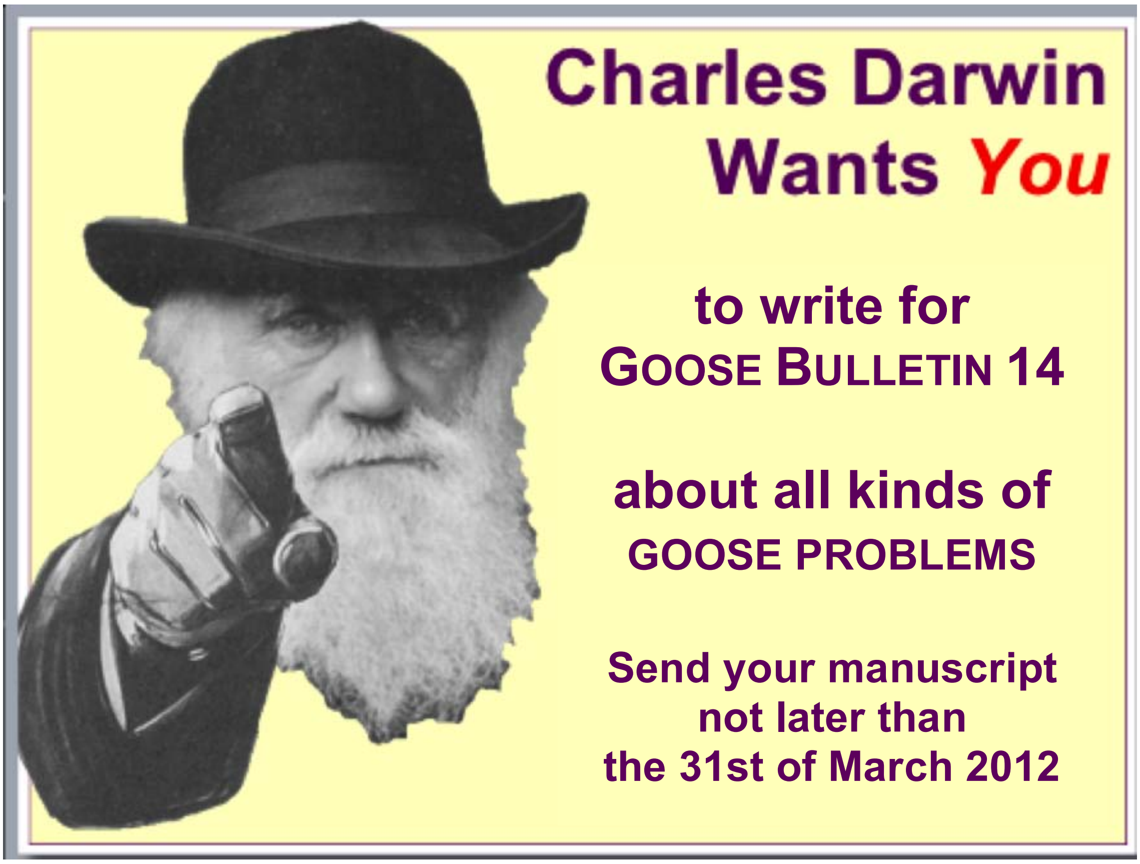
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All manuscripts should be submitted in English language and in electronic form. Text files should be submitted in ".doc"-format, Font "Times New Roman 12 point", tables and graphs in ".xls"-format and pictures in good quality and ".jpg"-format.

Species names should be written with capitals as follows: Greylag Goose, Greenland White-fronted Goose etc. Follow an appropriate authority for common names (e.g. Checklist of Birds of the Western Palearctic). Give the (scientific) Latin name in full, in *italics*, at first mention in the main text, not separated by brackets.

Numbers - less than ten use words e.g. (one, two three etc) greater than 10, use numbers with blank for numbers over 1 000.

In case of doubt please look at the last issue of the Goose Bulletin.

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