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Reply to the letter of Susanna Löfgren and Peter Örn to Bert Lenten (28. Feb. 2008)

Introductory remark:

My laboratory had the task to make a genetic analysis of the LWFG kept in captivity in Germany. As stated in our publication, we have used nucleotide sequences of the mitochondrial cyt b gene to infer the composition of the maternal lines present in the samples. As an independent approach we have analysed 8 microsatellite loci from nuclear DNA to infer on the relatedness of both maternal and paternal lines. The methods used are standard methods in population and conservation genetics. My laboratory has worked in this field for more than 15 years by now and we have published more than 100 papers in refereed international journals.

Remarks to statements in the letter:

“Generally, SEPA considers the sample sizes as being too small, especially regarding the mtDNA-analysis and its statistical treatment. It would be valuable to analyse the statistical implication of analysing 87 of the total number of German captive Lesser White-fronted Goose (LWfG).”

Comment: We included only 70 LWFG from the original sample in the phylogenetic analysis, because we were not able to amplify the complete cyt b gene of all 87 birds. And we need complete datasets for network analyses. From the partial sequences obtained from the other 17 birds, we could see that they were not hybrids with Greylag geese. There is no need to have a larger sample size for the genetic analyses; the results are clearcut and statistically relevant with the present numbers. The main criterion for selection of “clean” birds are the microsatellite data and not the mtDNA data (as we had no obvious hybrids).

Our initial analysis comprised more than 150 samples from Swedish and Finnish captive LWFG as a service to our Scandinavian friends; we have found that especially the Finnish breeding stocks are widely contaminated by hybrids with Greylag geese (indicating that our methods work properly!). But the analysis of the Scandinavian birds was neither the topic of our publication nor was it relevant for the German reintroduction programme.

“In the first part of the article, the mtDNA-test reveals that the haplotype of the larger part of the captive German LWfG is similar to wild Greater White-fronted Goose (GWfG) (“Lineage I”). Within “Lineage I” the Russian LWfG individuals have a separate haplotype. “Lineage II” seems to consist of haplotypes, which are “private” to LWfG. Several individuals from each original group have not been included in the mtDNA analysis (20% of the German LWfG). This does not seem to be followed up in the article. The number of wild GWfG in the mtDNA analysis is 57, although the original number was only 38.”

Comment: We included only 70 LWfG from the original sample in the phylogenetic analysis, because we were not able to amplify the complete cyt b gene of all 87 birds. The number of GWfG is composed of 38 birds from Northern Germany, and 19 birds from breeding grounds in Siberia; my co-authors obviously forgot to include the Russian wild birds in Table 1; this will be changed in the proofs.

“The following microsatellite analysis with assignment test revealed that 8 out of the original German geese have strange DNA and are suggested to be erased. The assignment test was made without the mtDNA data. Pedall et al (2008) draws the final conclusion that all except for the above mentioned 8 specimen would represent an excellent base for a breeding and reintroduction program. SEPA draws the following conclusion; If we assume that the 8 individuals with strange DNA belonged to “Lineage I”, then 34 (43%) specimen from this lineage would remain which has mtDNA in common with wild GWfG. SEPA does not consider that this part constitutes a good base for breeding and supplementing in the field.”

Comment: I must object against this manipulation of our data; we have analysed all 87 captive LWfG by STR-analysis and out of these 8 were dubious; this leaves us with 79 birds that are suitable and not 34 as stated in the letter! In the breeding programme LWfG from lineage I and II will be used, since also the natural populations shows both haplotypes.

I hope that my comments could convince you that our genetic analysis is based on solid science and not speculation. If any questions are left open don't hesitate to ask me- I will try to answer them.

We are convinced that the reintroduction project will really help LWfG to survive in Scandinavia and hope that it can be carried out without further delay.

Best regards

Prof. Dr. Michael Wink

Comments of Aktion Zwerggans on the SEPA letter from 28-02-2008

In its letter from 28.02.2008 the Swedish Environmental Protection Agency (SEPA) commented on the paper by Pedall et al. (2008). Prof. Michael Wink as head of the mentioned study and co-author of the respective paper, in his letter from 29.03.2008 replies to these comments concerning all questions of the genetic issue.

I. Supposed reduced viability of offspring of the captive breeding stock.

In addition to these comments, Aktion Zwerggans wants to take the opportunity to comment on the second issue raised in the letter by SEPA, which states:

“SEPA would also like to point out that captive bred specimen (that have been so for several generations) may not be well suited for supplementations into the wild because of the possible genetic and/or behavioural adaptations to captivity both at individual and population level. “

This concern of SEPA in our opinion is not supported by practical experience with a number of waterbird species, as we will point out in the following:

1. Lesser White-fronted Goose (*Anser erythropus*).

The late Dr. Lambert von Essen started a re-introduction programme in Sweden in 1981. He decided to avoid the main threats by creating a new safe migration route to safe wintering grounds. He used semi-domestic Barnacle Geese (*Branta leucopsis*) as foster parents for Lesser White-fronted goslings, which in this way learned from their foster parents to migrate to safe wintering grounds in Western Europe. In the scope of this project between 1981 and 1999, a total of 301 goslings and 47 one-to-two year old Lesser White-fronted Geese were released in a former breeding area in Swedish Lapland.

With his programme Von Essen showed that geese are imprinted on the area where they learn to fly and that young geese must be guided by their parents to the winter quarters. The Swedish re-introduction project founded the only expanding Lesser White-fronted Goose population worldwide. Today it consists of about 100-130 birds, all of them migrating to the Netherlands to winter. Although this project has been very successful, there are some genetic problems. Since 1991 in the range of the Swedish introduction scheme, a number of hybrids between Barnacle and Lesser-White fronted Geese were recorded (ANDERSSON & LARSSON 2006, KOFFIJBERG et al. 2005 & 2006).

The original Lesser White-fronted Goose population of Fennoscandia decreases with 5 % per annum, whereas the Swedish re-introduced population, descending from a captive breeding population, which was bred in captivity for at least 50 years (10-15 generations), shows a slow increase (AARVAK & TIMONEN 2004, ANDERSSON & LARSSON 2006, KOFFIJBERG et al. 2005 & 2006).

Also the Lesser Whitefronts from the Moullec flight 1999 (offspring of an about 50 year-old captive breeding stock) showed their viability; although these birds had to fly back to Sweden, without parents to protect them, more than 50% of the birds that left Sweden (n=27) arrived in Östermalma in spring and were caught, whereas several birds of this group were recorded in subsequent years in Eastern Germany, at the Lower Rhine and in Villafafilla (Spain) (MOOIJ 2001)

The German breeding stock was newly founded after the Second World War, mainly in the 1960s and 1970s from newly caught Russian birds.

2. Greater White-fronted Goose (*Anser albifrons*)

Since the 1980s Greater White-fronted Geese are breeding in the Netherlands. Until 1988, as a national ban on the use of live-decoys for hunting was declared, only a few breeding pairs were confirmed.

Since the ban of live-decoys a considerable number of Greater Whitefronts, most of them breeding in captivity for a considerable number of generations, were released by hunters and the free-living population increased to the current level of several 1,000 birds and estimated 200-250 breeding pairs. The population is considered to be extremely viable and a dramatic increase is expected for the future (BIJLSMA et al. 2001, HUSTING & VERGEER 2002).

3. Barnacle Goose (*Branta leucopsis*)

Influenced by Hagenbeck's in Hamburg, but also from the ideas of some staff members at Skansen (Stockholm Zoo) a major reconstruction of the animal exhibits at Skansen started in the 1920s. Instead of the steel-barred cages, a number of animals were to be housed in open enclosures.

This development continued during the 1930s, and the CEO of Skansen, Director Carl Fries, took the initiative to release the caged Sea Eagles (*Haliaeetus albicillus*), Grey Herons (*Ardea cineria*) and different goose species 'to the wild'.

Skansen still has a free-flying and migrating population of the Barnacle Goose (*Branta leucopsis*), deriving from those released birds and now spreading over Middle Sweden. Until 1999 they played a very important role in the attempt to save the highly endangered Lesser White-fronted Goose (*Anser erythropus*). In a coordinated breeding and insitu program the Barnacle geese were foster parents for the Lesser White-fronted Goose goslings and teaching them a safer migratory route.

These Barnacle geese are not less viable as their conspecifics of wild origin and the offspring of these released captive birds recently mixed with birds of the Baltic and Russian breeding population (EAZA 2004, MADSEN et al. 1999).

4. Canada Goose (*Branta canadensis*)

Canada Geese originate from Northern America, but in Europe were locally introduced from captivity, especially in Great Britain since the 17th century, in Sweden and Norway in the 1930s. Especially in the 20th century there was rapid population growth in these countries. In the 1960s the species was also introduced in Belgium, Finland, France, Germany and the Netherlands.

The species is now abundant in England, parts of Scotland and in Fennoscandia as well as increasing in the Netherlands, Germany, Switzerland and France. Only the Swedish-Finnish population and a part of the Norwegian birds are migratory.

In a number of countries it was feared the species could endanger the recovering Greylag Goose population, due to its aggressive and competitive behaviour (MADSEN et al. 1999). Some European populations suffer reduced genetic variability (TEGELSTRÖM & SJÖBERG 1995), but reduced viability has seldom been reported (HEGGBERGER 1991).

5. Egyptian Goose (*Alopochen aegyptiacus*)

Egyptian Geese were kept in captivity in Western Europe at least since the 17th century and became more widespread in semi-domestication in bird collections and parks during the 19th century. Every now and then single birds or small flocks escaped from captivity, but these birds did not survive long enough to colonize these areas.

First breeding records in the wild from the end of the 19th century in Norfolk (UK), from the 1960's in the Netherlands, from the 1980s in Belgium and Germany and from the 1990s in Northern France. It seems that the species started to breed in Europe independent from each other both in the UK and in the Netherlands. From the Netherlands the rapidly growing population spread to Germany and Belgium and from the latter to France.

Nowadays the Western European population is estimated totalling more than 10,000 breeding pairs or more than 40,000 individuals, with an increasing tendency.

Because of the competitive dominance of the species and the feared negative consequences for native breeding species the Egyptian Goose was declared a huntable species in parts of Germany to reduce the population. This viable and expanding population descends from only a few escaped birds from semi-domesticated captive populations, which were kept in captivity for at least 100 years (BAUER & GLUTZ VON BLOTZHEIM 1968, CRAMP & SIMMONS 1977, ERHART & BEKHUIS 1996, HAGEMEIJER & BLAIR 1977, HUSTING & VERGEER 2002, LENSINK 1996, MOOIJ & BRÄSECKE 2000, SNOW & PERRINS 1998, TEIXEIRA 1979, VLAAMSE AVIFAUNA COMMISSIE 1989, WITHERBY et al. 1939).

6. Ruddy Shelduck (*Tadorna ferruginea*)

Since a number of centuries Ruddy Shelducks are kept in captivity in Western Europe, especially in the United Kingdom, the Netherlands and Belgium, which have a long tradition in keeping exotic waterbirds in captivity. Due to escapes from waterfowl collections, where they were kept for a considerable number of generations, nowadays there are small breeding populations of Ruddy Shelducks in the Netherlands, Germany and Switzerland.

In Switzerland it was decided to eradicate the Ruddy Shelduck, because of feared negative effects of the species on native species due to its competitive dominance (HAGEMEIJER & BLAIR 1977, LENSINK 1996, MOOIJ & BRÄSECKE 2000, SCHWEIZER VOGELSCHUTZ/SCHWEIZERISCHE VOGELWARTE SEMPACH 2006)

7. Ruddy Duck (*Oxyura jamaicensis*)

The Ruddy Duck originally is a native breeding bird from Northern America, but was introduced to wildfowl collections in the UK in the 1940s. Occasionally birds escaped, but most of them died shortly after.

First official record of escape in 1953 and first breeding record in Britain in 1960. Since then the feral population in the UK became established and increased to a level of c. 6,000 individuals in 2000. During this increase also the number of records in neighbouring parts of Europe increased and first breeding records were reported from the Netherlands (1977), France (1988), Belgium and Spain (1991), presumably all originating from the UK.

In Spain the species is crossbreeding with White-headed Duck (*Oxyura leucocephala*), producing hybrids and endangering the genetic purity of the latter. Due to its aggressive courting behaviour and willingness to interbreed with the endangered native White-headed Duck of southern Europe the Ruddy Duck has caused some concern and worried conservationists developed a controversial scheme to extirpate the Ruddy Duck in Europe (HAGEMEIJER & BLAIR 1977; HENDERSON 2006, SCHWEIZER VOGELSCHUTZ/SCHWEIZERISCHE VOGELWARTE SEMPACH 2006).

8. Domestic (“Soup”) Goose (*Anser anser* forma *domesticus*)

This group of geese is no species, but a group composed of a historical cultivated breed of the Greylag Goose as well as hybrids of these geese with Greylag, Bar-headed, Canada and Barnacle Goose. Domestication of Greylag Geese started some 4,000 years ago. Although a part of these birds became too heavy to fly or has crippled wings, most of them are extremely viable and in the Netherlands regionally up to 20% of the Greylag Geese is paired with a “Soup Goose”.

The number of breeding pairs in the Netherlands is estimated at 3,000-4,000 pairs with additional 4,000-6,000 non-breeders. The population is increasing by 10% per year and it is feared that it could become a threat to the local Greylag populations in near future (HUSTING & VERGEER 2002).

This selection of examples of the fate of escaped or released captive waterbirds in the wild of Europe, does not support the fears of SEPA that released waterbirds like Lesser Whitefronts of the German captive breeding stock might be less viable than the decreasing wild population of the species.

Furthermore, Aktion Zwerggans likes to point out, that if the fears of SEPA “that captive bred specimen (that have been so for several generations) may not be well suited for supplementations into the wild because of the possible genetic and/or behavioural adaptations to captivity both at individual and population level” would be correct, this problem also would exist for the offspring of a newly founded captive breeding stock from Russian wild birds, which has to be built up for a number of generations in captivity, before the first birds can be released (SEPA made an educated guess of 10-15 years).

As a result in that case SEPA also would have a supposed “less viable” Lesser White-fronted Goose population, only with a delay of 10-15 years.

Besides in our opinion this sudden change of mind of SEPA cannot be coherent with the common rule of the continuance of authorities and their decisions in democratic states.

II. SEPA decision to “the pilot project on re-introduction of Lesser White-fronted Goose (*Anser erythropus*) using ultra-light planes” from 20-10-2005

In the SEPA decision to “the pilot project on re-introduction of Lesser White-fronted Goose (*Anser erythropus*) using ultra-light planes” from 20-10-2005 it is stated that SEPA fears that re-introduction based on a totally new breeding stock is not likely to start in the near 10 – 15 years. For that reason SEPA argued that there is a need to find solutions that include the possibility of using birds of the current captive breeding stocks, while at the same time bearing in mind the need for minimising the risk of genetic contamination (“Sammantaget ger detta vid handen att en återutplantering som baseras på ett totalt nytt bestånd knappast kan påbörjas under de närmaste 10-15 åren. Av den anledningen är det enligt verkets uppfattning angeläget att hitta lösningar som möjliggör en användning av redan hägnhållna fåglar, samtidigt som risken för genetiska föroreningar minimeras.”)

After thorough consideration of all facts SEPA decided not to wait for 10-15 year to re-introduce birds of a totally new breeding stock from captured Russian birds, but to approve a pilot project now, using genetically tested birds of the current captive stocks.

This approval to the ultra-light project was made under the conditions that ”3. För att reducera risken för att fåglar med hybridbakgrund används, får endast fjällgäss (eller deras avkomma) användas som insamlats i naturen eller har undersökts genetiskt genom studier av mitokondrieDNA, åtminstone 10 mikrosatellitloci och ISSR-metoden, och därvid inga spår av främmande gener påträffats. (3. To reduce the risk of using birds of hybrid origin, only Lesser White-fronted geese (or their offspring) that have been collected in the wild or have been genetically screened using analyses of mitochondrial DNA, at least 10 microsatellite loci and the ISSR method, and found not carrying alien genes, should be used in the project.)”

With support of the Deutsche Bundesstiftung Umwelt and SEPA Aktion Zwerggans invested a considerable amount of money in the genetic testing of the birds of the captive German breeding stock to meet this condition, documented in the paper by Pedall et al.2008.

Another of the conditions of SEPA under which the pilot-project was approved (SEPA decision taken 20-10-2005) was: “4. Alla fjällgäss skall märkas individuellt på ett sätt som tillåter individuell identifiering i fält och även gör det möjligt att skilja fåglarna från individer som tillhör den redan återutplanterade populationen.” (4. All birds should be individually marked in a way that allows individual identification in the field and also makes it possible to separate the birds from individuals belonging to the existing re-introduced population.).

With this condition SEPA wanted to ensure that the life-history of each released bird can be followed individually, to enable Aktion Zwerggans to analyse and evaluate the results of the pilot-project.

Focal points of this evaluation should be to compare the results of the ultra-light pilot-project with the results of the Swedish foster parent method. The most important parameter to compare both methods is the overall viability of birds of both groups (return rate of the released birds, mortality rate, reproductive performance in later years etc.).

SEPA decided that the approval of the pilot-project from October 2005 should not be regarded as a standpoint on the issue of a possible future large-scale re-introduction programme by means of ultra-light planes and that a full review of the pilot project has to be carried at the end of the two flights of the pilot-project, including a comparison of the results with the Swedish technique using foster parents.

SEPA approved the pilot-project with the clear aim to compare the results of different re-introduction methods as well as overall viability of the project birds.

The additional condition that – in contradiction with the original approval document of SEPA - only offspring of wild caught specimen of the Russian population should be used in the pilot-project would make a clean comparison of both methods impossible.

III. Concluding remarks:

In spite of the fact that there are cases where the offspring of animals bred in captivity showed to be less viable as their free-living conspecifics, there are no indications that this is the case in waterbird species like the Lesser White-fronted Goose.

If SEPA, in spite of the comments given here to the viability item as well as the genetic issue by Prof. Michael Wink, stays with its additional condition to use “only offspring of wild caught Russian specimen for the project in Aktion Zwerggans” this means a further delay of the first ultra-light pilot-project flight for at least 10 - 15 years, needed to build an operable breeding stock, which could donate 25 goslings a year without endangering future development potential of the breeding stock. Such a time span is unforeseeable for a non-profit organisation like Aktion Zwerggans, which depends on the allocation of funds and the voluntary work of its members.

Furthermore relying on the continuance of authorities and their decisions and based on the SEPA decision of October 2005 far more than 100.000 Euros were invested so far in preparations for the pilot-project (development, construction and acquisition of two ultra-light aircraft, training of pilots, monitoring of potential flyways, breeding of geese, genetic testing etc.). This investment would have been wasted.

Wesel, 15-03-2008

For the Aktion Zwerggans e.V.

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