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AFRICAN-EURASIAN MIGRATORY WATERBIRDS

WORKSHOP FOR THE REVISION OF THE INTERNATIONAL SINGLE SPECIES ACTION PLAN FOR THE TAIGA BEAN GOOSE

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DEFINING FAVOURABLE REFERENCE VALUES FOR THE TAIGA BEAN GOOSE POPULATIONS (*ANSER FABALIS FABALIS*)[1]

Discussion paper on considerations relevant to determining Favourable Reference Population sizes (FRPs)

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The revision process for the International Single Species Action Plan (ISSAP) for the Conservation of the Taiga Bean Goose will align this plan with the Revised Format and Guidelines for AEWA International Single and Multi-species Action Plans (adopted in 2022 by the eighth Meeting of the Parties to AEWA). The format and guidelines envision, *inter alia*, the definition of Favourable Reference Values (FRVs) for each population covered by an International Species Action Plan. The definition of FRVs is a crucial step, as it provides the reference for assessing whether a population is in a Favourable Conservation Status, and thus whether AEWA's requirements are being met.

This document outlines relevant considerations for determining the Favourable Reference Population sizes (FRPs) for the four populations of Taiga Bean Goose and makes tentative proposals for defining FRPs. It is intended to provide a basis for discussing this topic at the ISSAP revision workshop. However, it will only be possible to finalise the definition of FRPs for populations of Taiga Bean Goose once there is a better assessment of the population status, ranges and habitats.

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Introduction

The long-term goal of the current International Single Species Action Plan (ISSAP) for the Taiga Bean Goose is to "*To restore and maintain the population at a favourable conservation status of 165,000 – 190,000 birds in total (5,000 – 10,000 individuals in Western, 60,000 – 80,000 individuals in Central and 100,000 individuals in Eastern 1 & 2 sub-populations, with stable or increasing trends*" (Marjakangas et al. 2015)[2]. This goal reflected Parties' commitment (per Article II.1 of AEWA's Agreement text) to restore populations of AEWA species to, and maintain them at, a Favourable Conservation Status (FCS).

While AEWA's Agreement text does not provide its own definition of FCS, it incorporates through reference[3] the following definition, provided by Article I.1(c) of the Convention on Migratory Species (CMS):

"Conservation status" will be taken as "favourable" when:

1. population dynamics data indicate that the migratory species is maintaining itself on a long-term basis as a viable component of its ecosystems;
2. the range of the migratory species is neither currently being reduced, nor is likely to be reduced, on a long-term basis;
3. there is, and will be in the foreseeable future, sufficient habitat to maintain the population of the migratory species on a long-term basis; and
4. the distribution and abundance of the migratory species approach historic coverage and levels to the extent that potentially suitable ecosystems exist and to the extent consistent with wise wildlife management.

At the time of the adoption of the Taiga Bean Goose ISSAP by the Meeting of the Parties (MOP) to AEWA in 2015, there were no guidelines or established procedures for how to interpret and apply the concept of FCS under AEWA; and AEWA still lacks a MOP-adopted guidance document on this topic.[4] However, in 2017 the AEWA Technical Committee endorsed a short provisional guidance document on the interpretation of FCS. Moreover, since 2015, the processes to develop International Single Species Management Plans (ISSMPs) and Adaptive Flyway Management Programmes (AFMPs) for Barnacle Goose and Greylag Goose (implemented in 2018) under the European Goose Management Platform (EGMP) produced detailed, species-specific discussion papers to inform the definition of FCS of the target populations.

Favourable Reference Values (FRVs) were used as measurable indicators that describe hypotheses about the size of the population, its distribution and the availability and quality of habitat that describe the FCS (Doc. AEWA/EGMIWG/Inf.5.12). The Revised Format and Guidelines for AEWA International Single and Multi-species Action Plans (adopted in 2022 by AEWA MOP8) envision that FRVs will be established for each population covered by an ISSAP, and that these will be established in accordance with the CMS definition of FCS.

[2] Throughout this document the use of 'sub-populations' or 'management units' have been replaced by 'populations'.
[3] AEWA Article I.2.
[4] A process has commenced to develop guidance on the interpretation and establishment of Favourable Reference Values under AEWA, for submission to the AEWA MOP. However, it is not anticipated that this process will be completed in time for the 9th session of the MOP (MOP9).

This document outlines relevant considerations for determining the Favourable Reference Values, with a focus on Favourable Reference Population sizes (FRP), for the four populations of Taiga Bean Goose, and makes a tentative proposal for defining FRPs, as a basis for discussions at the Taiga Bean Goose revision workshop, 1-3 April 2025. Definitions of Favourable Reference Habitat (FRH) and Range (FRR) will be incorporated into one integrated definition of FRV's later in the revision process, at which stage the FRP may require further refinement.

Definition of Favourable Reference Population

In the absence of MOP-adopted AEWA guidance on defining FRVs, the assessment below follows the considerations outlined in the EU (Bijlsma et al. 2019; DG Environment 2023) and AEWA Technical Committee guidelines and takes into account AEWA's past practice in setting FRVs – in particular, for the Greylag Goose and Barnacle Goose (Doc. AEWA/EGMIWG/Inf.6.10; Doc. AEWA/EGMIWG/Inf.6.11).

The EU guidance and previous processes under AEWA have recognized two different approaches to establish FRVs: either an approach based on historic reference levels (comparing the current situation to a more favourable historical situation, i.e. a 'reference based' approach), or an approach based on modelled information for the population, i.e. a 'population based' approach. In most cases, e.g., Barnacle Geese and Greylag Geese, historic reference levels are poorly documented and a population-based approach has been used. In the case of the Pink-footed Goose, historic records of the population size and trajectories go back to the 1930s and, in a longer time perspective, demographic inference can be made based on whole genome and RAD sequencing data. Given the long time series and independent sources at hand, a reference-based approach has recently been applied to tentatively define the FRP for the Svalbard population of Pink-footed Goose (see Doc. AEWA/PfG/ISSMP/1.10)

Population status and FRP estimation

The Taiga Bean Goose is divided into four biogeographic populations, formerly treated as management units[5] (Marjakangas et al. 2015). Currently, we lack detailed information about the genetic distinctiveness of the four populations, historic trends in population sizes and demographic rates. For three of the populations, we lack current reliable population estimates, and knowledge of the distribution of the two eastern populations is scant. The FRP assessment is therefore only preliminary and requires better data before a more detailed assessment can be made. In the case of the Central population, the reference-based approach can be used.

According to the available FRV guidance, FRPs shall exceed both legal thresholds, such as the Directive and the Agreement Values (DV and AV respectively) and the Minimum Viable Population (MVP) for demographic and genetic viability. Unfortunately, the availability of demographic information is insufficient to define a demographic MVP and genetic information is not available to assess genetic

[5] Given stakeholders' familiarity with referring to the 'Western MU', 'Central MU', 'Eastern 1 MU' and 'Eastern 2 MU', the terms 'Western population', 'Central population', 'Eastern 1 population' and 'Eastern 2 population' will be used for the purposes of the Taiga Bean Goose ISSAP Revision Workshop. At present, Table 1 of AEWA's Annex 3 lists these as the 'Scandinavia/Denmark and UK' population, 'Finland and NW Russia/Sweden, Denmark and Germany' population, and 'West Siberia/Poland and Germany' population of *Anser fabalis fabalis*, and the 'West & Central Siberia/Turkmenistan to W China' population of *Anser fabalis johanseni* respectively. However, a proposal will be made to AEWA MOP9 to change these to: 'Scandinavia (br)' population, 'Finland and NW Russia (br)' population, 'Germany and Poland (nbr)' population, and 'Central Asia (nbr)' population of *Anser fabalis fabalis*. Assuming that the MOP adopts these amendments, these new population names will ultimately be reflected in the revised Taiga Bean Goose ISSAP.

viability. Therefore, we apply allometric relationships to estimate the MVP following the recommendation of Bijlsma et al. (2019). For birds larger than 1 kg, the recommended upscaled MPV is thereby estimated at 2,500 breeding pairs, which we translate into winter population size using the standard multiplier factor of 3.0 widely used for waterbirds (Meininger, Schekkerman and van Roomen 1995). This results in an estimated MVP value of 7,500 individuals.

The Western population (formerly Western MU), breeding in Sweden and Norway and staging and wintering in Norway, Denmark, and the United Kingdom (Scotland and England). This population currently numbers 1,500-2,400 individuals (Johnson et al. 2024); historic population size is not known (the highest known number is 2,400 in 2022). However, adding up the wintering numbers in the UK and Denmark in the 1980s suggests that the wintering population was probably within the same population size range at that time (Madsen 1986; Nilsson, van den Bergh and Madsen 1999). There have been range contractions in both the Swedish breeding range (Eriksson and Henricsson 1990) and the wintering range in the UK (Nilsson, van den Bergh and Madsen 1999) in the last century, suggesting a population decline. Numbers wintering in the UK have declined during the last two decades; however, it is uncertain whether this reflects a real decline in overall population size or an increasing shortstopping in the staging and wintering areas in northern Jutland, Denmark.

In the absence of systematic long-term monitoring of the population, a reference-based approach to defining FRP is not possible. Considering the fact that the allometric upscaled MVP value is 3.5–5 times larger than the current population size, and which is much larger than the estimated range loss, we propose setting the FRP at the level of the upscaled MVP, i.e. 7,500 individuals until better demographic, genetic and distribution data becomes available. This value also exceeds both the DV and the AV.

The Central population (formerly Central MU), breeding in Fennoscandia and northwestern Russia and staging and wintering in Finland, Sweden, Denmark and northeast Germany. This population currently numbers around 75,000 individuals in spring (Johnson et al. 2024). The population appears to have increased during the 1970s and 1980s, reaching 70,000 - 76,000 in autumn in the late 1980s (Nilsson, van den Bergh and Madsen 1999); however, based on an integrated population model (IPM) estimates, the population thereafter declined to a level of 50,000 to 60,000 (spring) until the mid-2010s (Johnson et al. 2024). Following the introduction of a hunting moratorium in Finland in 2014, the population has steadily increased, reaching the ISSAP-agreed population recovery target of 70,000 in the late 2010s. The IPM indicates that the population is approaching carrying capacity, predicted to be around 80,000 individuals (Johnson et al. 2024) (Fig. 1). The breeding range in Finland has not changed; however, the quality of the habitat has deteriorated due to intensive forestry causing drainage of Bean Goose breeding habitats (Marjakangas et al. 2015).

The availability of historical data allows the use of the reference-based approach. In case of the Central population of the Taiga Bean Goose, the historic population trajectory goes back to 1977 (Fig. 1). Systematic counts performed in Sweden in October since 1977 can be assumed to capture almost the entire Central population. From 1996 onwards, an IPM, using both counts and harvest data, has provided estimates for both October, January and March. To define a reference-based FRP, we propose to use the spring population size (which was also done for the Pink-footed Goose). Therefore, we have converted the Swedish autumn counts from 1977-1995 to spring estimates, subtracting the IPM-based difference between autumn and spring population estimates (see Fig. 1), which was on average 6,579 individuals, equivalent to 10.3 %. The resulting spring trajectory is shown in Fig.1, using a 5-year running mean to smoothen the erratic variation in the annual counts.

Relying on the Swedish counts, the historic maximum was 60,000 individuals (reached in spring 1988). In comparison, the DV is 40,000 (1980) and the AV 48,000 (2000). Compared to the upscaled MVP of 7,500 individuals in winter, the proposed historic reference value is approximately eight times higher, and the legal AEWA Agreement value is approximately six times higher. Since the historic value exceeds the legal values, it is proposed to define the FRP at the historic value of 60,000.

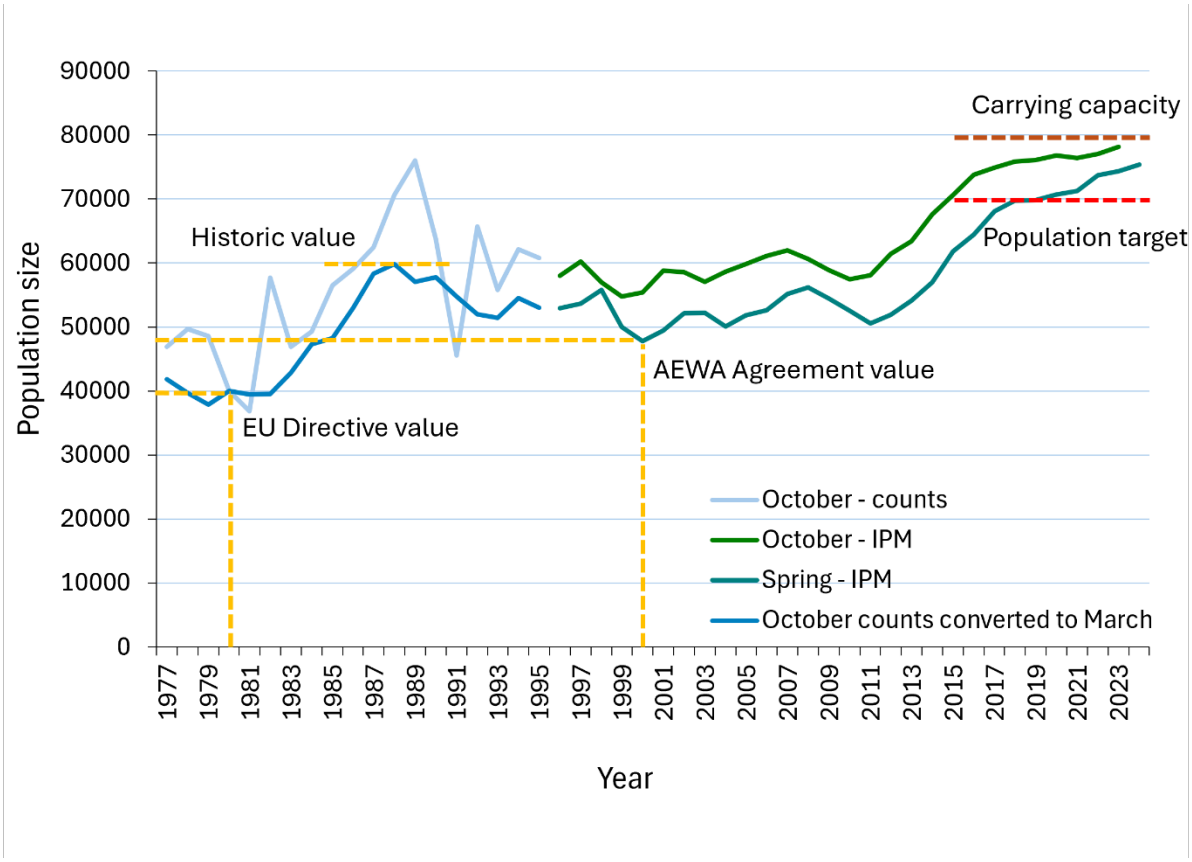

Figure 1. Trajectory of the Central population of the Taiga Bean Goose. The graph is based on autumn counts in Sweden 1977-1995, integrated population model assessments for autumn and spring, 1996-2024 as well as a calculated conversion of the autumn counts to spring estimates, using a 5-year running mean, 1977-1995 (see text for explanation). Shown is also the spring population size at the time when the EU Birds Directive came into force (40,000 in 1980), the AEWA Agreement came into force (48,000 in year 2000), as well as the historic reference population size (60,000 in year 1988). In the upper right corner are shown the median population target in the existing ISSAP as well as the model-predicted carrying capacity of the population size.

The Eastern 1 population (formerly Eastern 1 MU), breeding in two distinct areas in Russia, in the upper Pechora region close to the Ural Mountains, and in Western Siberian lowlands, and staging/wintering in the Baltic countries, Belarus, Poland and north-east Germany (Rozenfeld et al. 2024). The breeding range in Western Siberia overlaps with the breeding range of the Eastern 2 population. Therefore, the FRP setting should be based on the wintering population. In such cases, only the reference-based approach is recommended (see Bijlsma et al. 2019).

There is uncertainty about the population size, but it has currently been estimated at 15,000-20,000 individuals (see draft biological assessment for this population, Doc. AEWA/TBG/ISSAP/1.6. The population has declined during the last decades; however, historic population sizes are unclear because there has been a mixing of the Eastern 1 and the Central populations on the wintering grounds which is difficult to account for. The upscaled MVP of 7,500 individuals is approximately half the current

population size. The FRP should be based on historic count data. However, this will be only possible after having the historic data more thoroughly scrutinized. Therefore, it is proposed that the FRP for the Eastern 1 population not be set until this work is completed.

The Eastern 2 population (formerly Eastern 2 MU), breeding in Russia the eastern parts of Western Siberian lowlands, extending to the Yenisei River basin in the east and wintering in southeast Kazakhstan, eastern Kyrgyzstan, and northwest China (Heinicke 2009; Rozenfeld et al. 2018 cited in the biological assessment in the draft revised ISSAP). There is uncertainty about the population size, which may be as low as 1,000 individuals (see draft biological assessment for this population, Doc. AEWA/TBG/ISSAP/1.7.) Heinicke (2009) estimated a population size ranging between 1,000 and 5000 individuals. Numbers observed on the breeding, staging and wintering grounds have declined during the last decades, but the historic population size is unclear. However, Heinicke (2009) estimated the historic population size in the range of thousands or even tens of thousands. The breeding range as well as non-breeding range also appear to have severely contracted. The subspecies was once a regular migrant across Central Asia, while now it is restricted to a much smaller area. The current population size is much smaller than the upscaled MVP of 7,500 individuals in winter. However, setting the FRP at MVP level would be insufficient for the FRP. The historic data and irreversible land-use changes should be further scrutinized before a more informed FRP can be defined for this population.

To summarise, the various reference values for each population are listed in Table 1.

Taking into account the available EU Guidance, the definition of 'Favourable Conservation Status' in the Convention on Migratory Species (CMS), and the previous processes for defining FRVs under AEWA, the following considerations should be made concerning the Favourable Reference Population (evaluation is written in italics):

1. The Favourable Reference Population should be a viable component of its ecosystem in the long-term[6].
   This appears to be fulfilled for the Central population, whereas it is uncertain for the other three populations because of the declines in population size and range and the smaller than upscaled MVP size of the Western and the Eastern 2 populations.

2. Abundance should approach historic levels as far as it is feasible and consistent with wise wildlife management[7].
   Abundance of the Central population has exceeded the known historic levels, which has been accomplished by a hunting moratorium and a carefully managed slight reopening of hunting opportunities. The Western population has not responded positively to a hunting ban on the wintering grounds and the reasons for this remain unclear; the range has contracted. The Eastern 1 and Eastern 2 populations have declined and their ranges have contracted. Hence, these three populations have unfavourable population sizes.

3. The Favourable Reference Population should be at least the size when the EU Directive came into force. In previous determinations of FRPs under AEWA it was similarly agreed that, in principle, the FRP should be at least the size when the Agreement came into force.

[6] The CMS definition of FCS includes the following element: "population dynamics data indicate that the migratory species is maintaining itself on a long-term basis as a viable component of its ecosystems".
[7] The CMS definition of FCS includes that: "the distribution and abundance of the migratory species approach historic coverage and levels to the extent that potentially suitable ecosystems exist and to the extent consistent with wise wildlife management".

The Central population exceeds the size when the EU Directive came into force and when AEWA came into force. For the other populations, the assessment cannot be made because the populations were not defined by that time.

4. Both DG Environment (2017) and the AEWA Technical Committee (2017) recognise that FRVs do not automatically correspond to the 'potential values' such as carrying capacity, but these should be used to understand restoration opportunities and constraints.
   The Central population has not reached carrying capacity but appears to be approaching it; however, there remains restoration opportunities with regard to habitat restoration, control of alien predators and better control of human disturbance on the breeding grounds. For the Western population, it is unclear whether the population is at carrying capacity or not; however, there is probably a restoration potential. For the Eastern 1 and Eastern 2 populations, further work is required to assess the status.

5. When applying the reference-based approach and the population has not undergone visible shifts or reductions in the past and the current population size is large enough to ensure the long-term viability of the population, DG Environment (2017: p.117) advise that the Favourable Reference Population size should be equal to the current population size except for populations that are secure and have triggered human-wildlife conflict. In that case the FRP should be lower than the Current Value.
   The Central population of the Taiga Bean Goose has increased recently and can be regarded as secure; concerns of damage to agricultural crops caused by Taiga Bean Geese exist (particularly in Sweden). Therefore, it is justifiable that the FRP can be defined at a level below the current level. For the other three populations, this cannot be assessed; however, their population sizes have an unfavourable status.

Preliminary conclusions

It will only be possible to finalize the FRP definition for the four populations of Taiga Bean Goose once we have a better assessment of the population status, ranges and habitats. For the further discussions about the target-setting for the Central population, it is proposed that the reference-based FRP can be used as a preliminary guidance. Since the ISSAP was agreed with an overall goal of recovery of the population (and its management units), it appears prudent to use the historic level of 60,000 individuals as the FRP benchmark which is above the DV and AV and below the ISSAP median target.

Table 1. Reference population values and population sizes of the four populations of the Taiga Bean Goose.

Values/Population	Western	Central	Eastern 1	Eastern 2
Historic known value	Unknown (2,400 in 2022)	60,000 (1988)	20,000 (tbc)	Thousands to tens of thousands
EU Directive value	1,000-2,000	40,000 (1980)	Unknown	NA
AEWA Agreement value	1,000-2,000	48,000 (2000)	NA	NA
Current ISSAP target	4,000	60,000-80,000	NA	NA
Current ISSAP long-term goal	5,000-10,000	60,000-80,000	100,000 (for both populations)	
Current value	1,500 (2023)	75,000 (2024)	15,000-20,000 (2020s)	1,000-5,000 (2000-2020)
Proposed FRP	7,500	60,000	To be defined	To be defined

References

Bijlsma, R.J., Agrillo, E., Attorre, F., Boitani, L., Brunner, A., Evans, P., Foppen, R., Gubbay, S., Janssen, J.A.M., Kleunen, A., Langhout, W. van, Noordhuis, R., Pacifici, M., Ramírez, I., Rondinini, C., Roomen, M., Siepel H. van, and Winter, H.V. 2019. Defining and applying the concept of Favourable Reference Values for species and habitats under the EU Birds and Habitats Directives. Technical report. Wageningen, Wageningen Environmental Research, Report 2928. 94 pp.

DG Environment 2023. *Reporting under Article 17 of the Habitats Directive: Guidelines on concepts and definitions – Article 17 of Directive 92/43/EEC, Reporting period 2019-2024.* European Commission. https://cdr.eionet.europa.eu/help/habitats_art17/Reporting2025/Final%20Guidelines%20Art.%2017_2019-2024.pdf/

Eriksson, P. and Henricsson, T. 1990. Sädgåsen *Anser fabalis* i Åsele lappmark. Vår Fågelvärld 49: 7–14.

Heinicke, T. 2009. Status of the Bean Goose *Anser fabalis* wintering in Eastern 2. Wildfowl 59: 77–99.

Johnson, F.A., Sørensen, I.H., Baveco, H., Koffijberg, K., Germain, R.R., and Madsen, J. 2024. Population Status and Assessment Report 2024. EGMP Technical Report No. 22. Bonn, Germany. https://egmp.aewa.info/sites/default/files/meeting_files/documents/AEWA_EGM_IWG_9_8_EGMP_Population_Status_and_Assessment_Report%202024_Final.pdf

Madsen, J. 1986. Danske rastepladser for gæs. Gåsetællinger 1980-1983. Fredningsstyrelsen, Miljøministeriet. København. 114 pp.

Meininger, P., Schekkerman, H. and van Roomen, M. 1995. Population estimates and 1% criteria for waterbird species occurring in the Netherlands: Suggestions for standardization. Limosa 68: 41–48)

Nilsson, L., van den Bergh, L. and Madsen, J. 1999. Taiga Bean Goose Anser fabalis fabalis. Pp. 20-36, in: Madsen, J., Cracknell, J. and Fox, A.D. (eds.) Goose populations of the Western Palearctic. A review of status and distribution. Wetlands International Publication No. 48. National Environmental Research Institute, Denmark. Rønde, Denmark.

Rozenfeld, S.B., Strelnikov, E.G. and Volkov, S.V. 2024. Migration routes and key stopovers of *Anser fabalis fabalis* (Anseriformes): Critical protection gaps. Nature Conservation Research 9: 80-92.