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AEWA INTERNATIONAL SINGLE SPECIES ACTION PLAN FOR THE CONSERVATION OF THE TAIGA BEAN GOOSE (*Anser fabalis fabalis*)

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International Single Species Action Plan for the Conservation of the Taiga Bean Goose

Anser fabalis fabalis

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Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA)

International Single Species Action Plan for the Conservation of the Taiga Bean Goose

Anser fabalis fabalis

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Stakeholder workshop:	12-14 November 2013, Tuusula, Finland
First draft:	Presented to the participants of the stakeholder workshop in May 2014
Second draft:	Presented to the range states and the European Commission in November 2014 and subsequently to the 12th Meeting of the AEWA Technical Committee, 3-6 March 2015, Bonn, Germany
Third draft:	Presented to the 10th Meeting of the AEWA Standing Committee, 8-10 July 2015, Kampala, Uganda and approved for submission to the 6th Session of the Meeting of the Parties to AEWA (MOP6)
Final draft:	Adopted by MOP6, 9-14 November 2015, Bonn, Germany.

Geographical scope
This International Single Species Action Plan applies to and shall be implemented in the following countries: Belarus, Denmark, Estonia, Finland, Germany, Kazakhstan, Latvia, Lithuania, the Netherlands, Norway, Poland, the Russian Federation, Sweden, Ukraine and the United Kingdom.

Reviews
This International Single Species Action Plan should be reviewed and updated every 10 years (first revision in 2025).

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Picture on the front cover
Taiga Bean Goose (*Anser fabalis fabalis*) © Markus Varesvuo (www.birdphoto.fi)

Note on transliteration
The transliteration of Russian Cyrillic characters follows the ISO 9:1995 standard, except for geographical names with established English spelling conventions.

Disclaimer

Contents

Preface

This International Single Species Action Plan for the Conservation of the Taiga Bean Goose (*Anser fabalis fabalis*) was been jointly initiated by the Finnish Ministry of Agriculture and Forestry, the Finnish Wildlife Agency and the UNEP/AEWA Secretariat. Financial support for the action planning process was provided by the Finnish Ministry of Agriculture and Forestry. An action-planning workshop with representatives from range states and key stakeholders was held in Tuusula, Finland on 12-14 November 2013.

A first draft was prepared by the drafting group led by the Finnish Wildlife Agency and submitted to the workshop participants for comments in May 2014, and after a revision based on the comments and suggestions received, a second draft was presented for consultation to the range states and the AEWA Technical Committee in November 2014. The final draft was presented to the AEWA Standing Committee in July 2015 and subsequently adopted by the 6th Session of the Meeting of the Parties to AEWA in November 2015.

This Action Plan broadly follows the revised format for Single Species Action Plans approved by the 4th Session of the Meeting of the Parties to AEWA in September 2008.

Executive Summary

Taiga Bean Goose – a quarry species in decline

Taiga Bean Geese (*Anser fabalis fabalis*) breed discontinuously in the boreal zone from Fennoscandia to Western Siberia and winter in North-west Europe and Central Asia. The Taiga Bean Goose is one of the few declining goose populations in the Western Palearctic; the wintering population size, estimated at 100,000 birds in the mid-1990s, had decreased to 63,000 by 2009. The Bean Goose is globally categorised as a species of Least Concern in the IUCN Red List, because no distinction is made between the subspecies, and the population of the Tundra Bean Goose (*Anser f. rossicus*) is considered stable and is much more abundant than the Taiga Bean Goose.

Under AEWA, however, a distinction is made between the subspecies and subsequently the North-east European/North-west European population of the Taiga Bean Goose is listed on Column A, Category 3c* of Table 1 of the AEWA Action Plan. The current categorisation means that hunting of the Taiga Bean Goose may still continue on a sustainable use basis within the framework of an International Single Species Action Plan. The other AEWA-listed population of the Taiga Bean Goose (West & Central Siberia/Turkmenistan to W China) is on Column A, Category 1c, which implies strict protection.

This AEWA International Single Species Action Plan is the first flyway conservation plan under the Agreement for a species in decline which is still open for hunting. The Plan outlines the distribution and status of the subspecies, actual or potential threats to the Taiga Bean Goose, and lays out the framework for action including an overall action plan goal, objectives and key actions to achieve the required results. The plan does not seek to pre-determine the possible actions to be implemented by range states with regard to harvest or possible hunting bans. Such actions will be developed by the range states within the context of an adaptive harvest management framework following the adoption of this plan.

Scope of the Action Plan

This Action Plan covers the entire subspecies *Anser f. fabalis* which is confined to the Western Palearctic and western parts of the Eastern Palearctic. Four sub-populations can be recognised based on their different breeding and wintering areas, which serve as management units for the purpose of this Action Plan:

- **Western sub-population** (breeding in Northern and Central Sweden and Southern and Central Norway, wintering in Northern Denmark and Northern and Eastern United Kingdom; current 2014 estimated winter population size: 1,500 individuals)
- **Central sub-population** (breeding in Northernmost Sweden, Northern Norway, Northern and Central Finland and adjacent North-western parts of Russia, wintering mostly in Southern Sweden and South-east Denmark: 35,000 individuals)
- **Eastern 1 sub-population** (breeding in upper Pechora region and western parts of west Siberian lowlands of Russia, wintering mostly in North-east Germany and North-west Poland: 15,000 individuals)
- **Eastern 2 sub-population** (breeding in eastern parts of west Siberian lowlands of Russia, wintering in North-west China, South-east Kazakhstan and east Kyrgyzstan; winter population size unknown)

In addition to the range states mentioned above, Taiga Bean Geese also occur regularly in Estonia, Latvia, Lithuania, the Netherlands, Ukraine and Belarus during migration or in small numbers in winter.

Threats

Knowledge of the specific processes and factors affecting the change in population size of the Taiga Bean Goose are scarce or lacking, and thus the exact causes for the population decline are unknown. However, a number of actual or potential threats facing the Taiga Bean Goose have been identified. Both legal and illegal harvest are considered to significantly affect both adult survival and reproductive rates, while human disturbance may be contributing to the reduction of reproductive rates. Both overharvest and human disturbance are especially considered to have adverse effects on the two Eastern sub-populations. The loss, fragmentation and degradation of suitable habitat due to forestry, infrastructure development and other human-related factors are also considered significant threats to Taiga Bean Geese.

Long-term Goal

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).

Framework for Action

The purpose of this Action Plan is to stabilize the overall population size as well as the numbers in each sub-population at least at their current levels within 5 years, and to enable the sub-populations to start to recover and increase within 10 years.

Objectives

To achieve this Goal, the following key objectives have been established in consultation with national authorities and key stakeholders:

1. Increase survival rate of adults.
2. Increase reproductive rates.
3. Stop ongoing loss, fragmentation and degradation of habitats, and restore lost, fragmented and degraded habitats.

Results required to achieve the Objectives (numbering relates to Objectives above):

1.1 Legal harvest does not jeopardise an increase of adult survival rates.

1.2 Illegal harvest is reduced to non-significant levels.

1.3 Impact of huntable native predators on breeding and moulting areas is reduced.

1.4 Impact of alien predators on breeding and moulting areas is reduced.

1.5 Lead poisoning is minimised.

1.6 Poisoning and contamination from oil on breeding areas is minimised.

2.1 Disturbance on breeding and spring staging areas is reduced.

2.2 Inter-specific competition on spring staging areas is reduced.

3.1 Impact of forestry works is reduced.

3.2 Grassland habitats on spring staging areas are restored and maintained.

3.3 Breeding and staging habitats are not further lost due to oil and gas developments.

3.4 Impact of agriculture on natural Taiga Bean Goose habitats is minimised.

Actions through which the results identified above are to be achieved are defined in more detail in the Framework for Action (see Chapter 6). For each action, relevant range states and management units, priority, timescale and responsible bodies are identified. Priority is given to the actions most likely to have an effect on the reduction of avoidable annual mortality. Hence particular emphasis is placed on the development and implementation of an international **Adaptive Harvest Management (AHM)** framework to adjust harvest levels to reflect the current status of the population, based on agreed objectives, management alternatives, predictive models, effective monitoring programmes and iterative learning.

Immediate priority is also given to the analysis of available data to fill knowledge gaps regarding survival and reproductive rates, population size, flyways and hunting bags. However, an assessment of sustainable harvest is possible under the AHM framework without a complete knowledge of all biological parameters of a species' life cycle.

International Coordination of Action Plan Implementation

Appropriate international organisational and management structures are vital to the successful and coordinated implementation of International Single Species Action Plans. To this end, an inter-governmental **AEWA Taiga Bean Goose International Working Group** will be convened following the adoption of the plan. The International Working Group will coordinate and guide the implementation and further development of the actions foreseen in the Action Plan. This will include, in particular, decisions and actions to be taken within the Adaptive Harvest Management framework. In addition, key range states are encouraged to establish National Working Groups and to develop and adopt National Action Plans for the Taiga Bean Goose.

1. Introduction

The recovery of goose populations wintering or breeding in Western Europe has been one of the success stories of European wildlife management and conservation. A number of reasons for these increases in abundance have been put forward (e.g. Madsen et al. 1999; Fox et al. 2010), but these remain many, varied and interacting, with few scientific studies demonstrating beyond doubt the major causes. These include changes in:

- Climate;
- Land use changes which provided improvements in winter feeding conditions;
- Reductions in hunting on the staging and wintering grounds (in some cases as a result of legislation); and
- Reductions in harvest on nesting areas (through hunting, egg collection, capture of goslings and moulting adults).

The changes in, and interactions between, the various factors that have potentially regulated and limited goose population size in the past make it difficult to tease out the key factors that have been responsible for the expansion in their numbers in more recent times.

Despite the overall tendency for increasing numbers, not all populations are showing a favourable conservation status, and the review of Fox et al. (2010) demonstrated declining numbers amongst five goose populations during the last 10-15 years. The Taiga Bean Goose (*Anser fabalis fabalis*) is currently the subject of special focus due to the fact that this quarry species is one of the few declining goose populations in the Western Palearctic (e.g. Mooij 2011). The wintering population size, estimated at 100,000 birds in the mid-1990s, decreased to 63,000 by 2009 (Fox & Madsen 1999, Fox et al. 2010). The current population estimate is between 50,000-70,000 individuals (Wetlands International 2015).

Table 1 of the Action Plan to the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA) lists two populations of the Taiga Bean Goose: the North-east European/North-west European population and the population of West & Central Siberia/Turkmenistan to W China. The latter is on Column A, Category 1c, which implies strict protection.

In line with the provisions for population status listing, in 2012 the Meeting of the Parties to AEWA upgraded the conservation status of the NE European/NW European population of the Taiga Bean Goose to Column A, Category 3c* from its previous listing in Column B, Category 1[1].

With this amendment, the legal status of the population requires it to be subject to measures as described in Paragraph 2.1.1 of the AEWA Action Plan: "…*By way of exception for those populations listed in Categories 2 and 3 in Column A and which are marked by an asterisk, and those populations listed in Category 4 in Column A, hunting may continue on a sustainable use basis*[2]*. This sustainable use shall be conducted within the framework of an international species action plan, through which Parties will endeavour to implement the principles of adaptive harvest management. Such use shall, as a minimum,*

[1] The European Union was not in a position to accept this amendment without a prior change in EU law and therefore entered a reservation with respect to the inclusion of the North-east Europe/North-west Europe population of Taiga Bean Goose in Category 3c of Column A in Table 1 of the AEWA Action Plan.

[2] As defined in the Convention on Biological Diversity and the AEWA Action Plan, "sustainable use means the use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations".

be subject to the same legal measures as the taking of birds from populations listed in Column B of Table 1, as required in paragraph 2.1.2 below."

Hence, hunting of this population can only be permitted if there is an approved International Species Action Plan in place defining the modalities of sustainable use. Truly sustainable use can be achieved only at the flyway level by involving all range states where this population is being hunted. This Action Plan is the tool ensuring a coordinated and agreed approach to the sustainable use of the Taiga Bean Goose along its entire flyway.

The AEWA International Species Action Plans adopted by the Meetings of the Parties are operative documents derived from the legal text of the Agreement (paragraphs 2.2.1 and 4.3.4 of the AEWA Action Plan) and should therefore, by extension, be implemented by the Parties. In this particular case, hunting (sustainable or otherwise) which takes place outside of the framework of an International Action Plan would be in breach of the Agreement.

The current Taiga Bean Goose population is not numerically large and is thought not to cause any major agricultural damages at present by virtue of its habitat use, although this needs to be determined throughout the flyway. Taiga Bean Geese are important quarry for subsistence and sport hunters, a factor which also needs to be taken into consideration, and it is the definition of what constitutes sustainable use of this population that forms the basis for the discussions within this Action Plan.

The action planning process was officially launched at a stakeholder workshop that was held in Tuusula, Finland, 12-14 November 2013. At the workshop the Framework for Action (goal, objectives, results and actions) of the forthcoming Plan were formed on the basis of a problem analysis based on the input of the participants representing the range states as well as a range of stakeholders.

This Action Plan provides a summary of current knowledge of the biological, hunting and conservation status of the population along the flyway. This pool of knowledge, including unpublished data and expert opinion, was further developed based on the information provided by range states and stakeholders at the workshop.

2. Biological Assessment

2.1 General Information

This International Single Species Action Plan covers the entire subspecies *fabalis* of the Bean Goose *Anser fabalis*, with the common name Taiga Bean Goose. Recent analysis of recoveries of metal rings, re-sightings of neck-banded individuals and satellite tracking provides the basis for dividing the two AEWA-listed populations of the Taiga Bean Goose into four discrete flyways, which form the basis of the management units adopted for the purpose of the Plan.

2.2 Taxonomy and Biogeography

Phylum: Chordata
Class: Aves
Order: Anseriformes
Family: Anatidae
Species: *Anser fabalis* (Latham, 1787)
Subspecies: *Anser fabalis fabalis* (Latham, 1787)
Biogeographic population: Western Palearctic and the western parts of Eastern Palearctic

2.2.1 Biogeographic populations of Bean Goose

Two subspecies of the Bean Goose occur in the Western Palearctic and western parts of the Eastern Palearctic, the Taiga Bean Goose *A. f. fabalis* and the Tundra Bean Goose *A. f. rossicus* (van den Bergh 1999, Ruokonen et al. 2008). Equivalent "Taiga" (*A. f. middendorffii*) and "Tundra" (*A. f. serrirostris*) types of Bean Geese exist in the Eastern Palearctic. Another western "Taiga" subspecies *johanseni* was proposed by Delacour (1951), and it is still recognised in some current handbooks (e.g. Carboneras et al. 2014). However, there is strong genetic, morphological and ecological evidence that Bean Geese breeding in western Siberian taiga and wintering in Central Asia belong to the subspecies *fabalis*, and the existence of *johanseni* is questionable (e.g. Burgers et al. 1991, Mooij & Zöckler 1999, Ruokonen et al. 2008, Heinicke 2009, Ruokonen & Aarvak 2011).

Western Taiga Bean Geese breed in the boreal coniferous forest or taiga zone, while Tundra Bean Geese breed in the low arctic tundra, with the breeding ranges of both subspecies extending from North-western Siberia to Northern and Central Fennoscandia. The migration routes and winter ranges of the two subspecies partly overlap (Figure 1). The two subspecies are difficult to distinguish in the field, hence they either have not been separated in goose counts, or Tundra Bean Geese may have been overlooked in areas considered traditionally only to hold Taiga Bean Geese, and vice versa (Heinicke 2010a, Koffijberg et al. 2011, Heinicke & de Jong 2013).

2.2.2 Sub-populations/flyway management units of Taiga Bean Geese

Based on recent analyses of ring recoveries, sequential re-sightings of neck-banded geese and telemetric tracking of individually marked birds, four more or less discrete flyways of Taiga Bean Geese in Western Eurasia are now recognised (Figure 2; see Appendix 1). Although it is likely that there is some interchange of individuals between these sub-populations/management units, these are adopted here as a pragmatic basis for actions defined under this Action Plan because they represent relatively discrete units which are likely to respond differently to geographically and temporally defined management actions which can, in turn, be incorporated into an adaptive management framework.

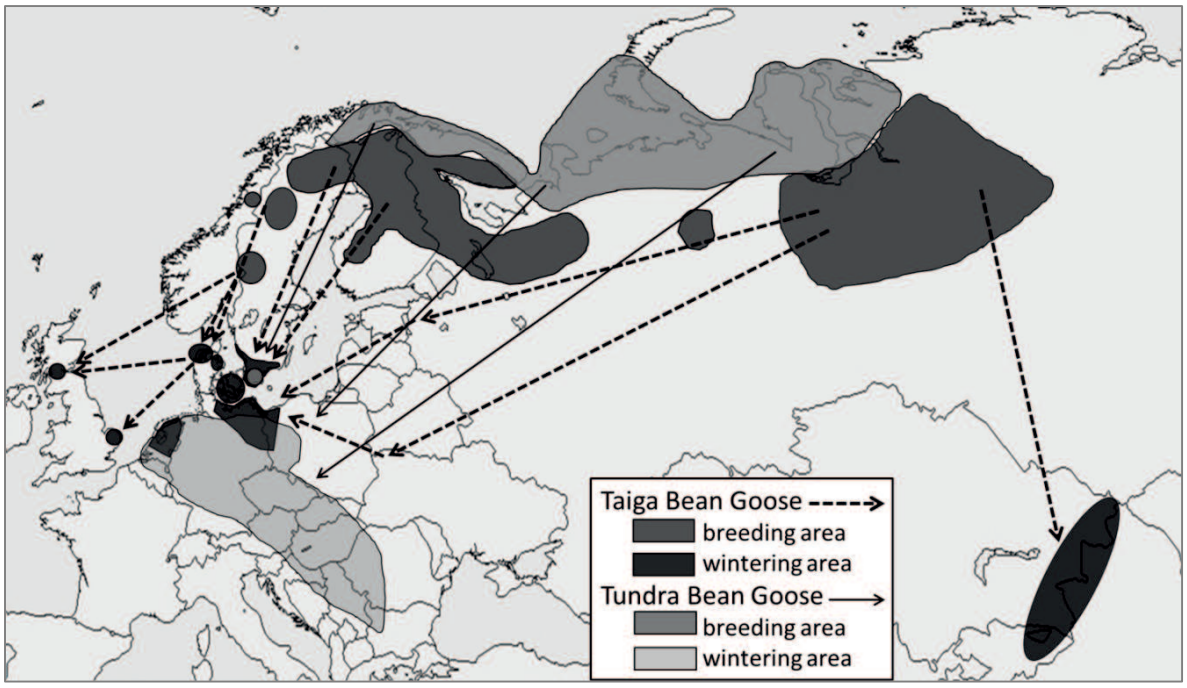


Figure 1. The flyways of the Taiga and Tundra Bean Geese in the Western Palearctic and western parts of the Eastern Palearctic.

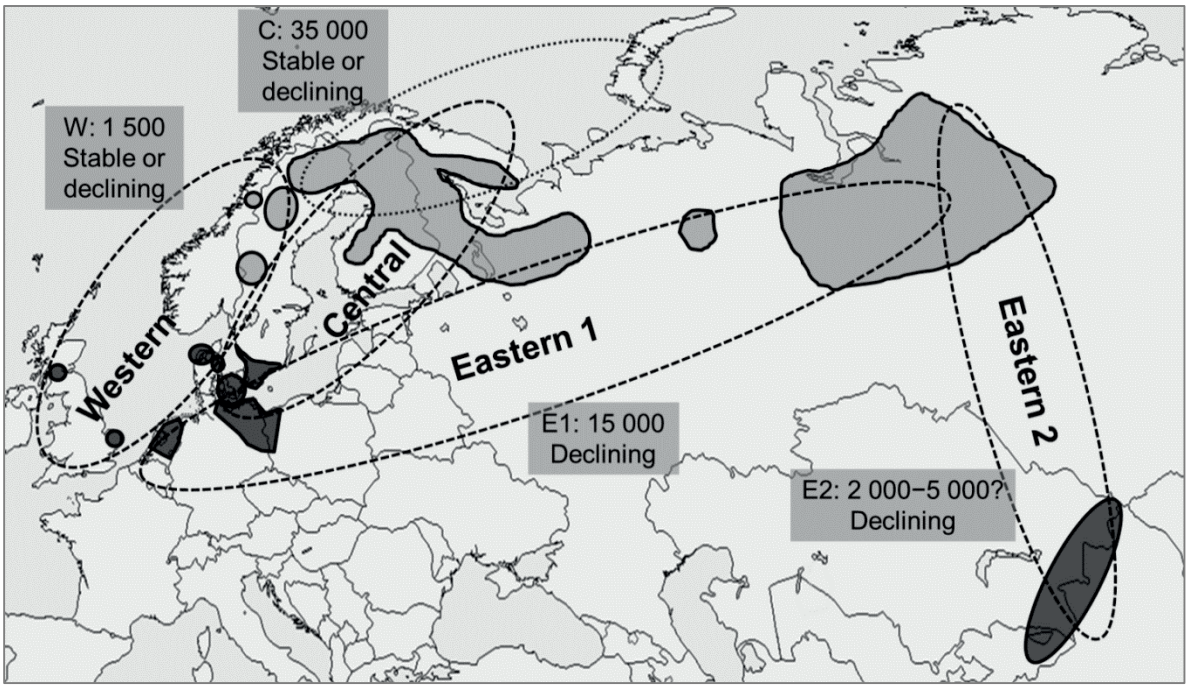


Figure 2. Geographical representation of the provisional flyway units delineated for the Taiga Bean Goose population, identified to support the establishment of management units for the purpose of this Action Plan. The numbers refer to estimated current population sizes accompanied by indicative trends, and the broken lines link breeding areas (light grey) with specific winter quarters (dark grey). The dotted area indicates linkages between breeding areas in northern Fennoscandia and known moulting areas in Novaya Zemlya and the Kola Peninsula.

2.3 Distribution Throughout the Annual Cycle

Taiga Bean Geese breed in the territory of four range states (Figures 1 and 2, Table 1). No major changes in the general breeding range have been reported during recent decades. The annual distribution of Taiga Bean Geese including spring, moult and autumn migrations, breeding and wintering are briefly presented below by sub-population/management unit. A more detailed description of the distribution of each sub-population throughout the annual cycle is given in Appendix 1.

Table 1. Main occurrence of Taiga Bean Geese throughout the annual cycle by range state in the AEWA Agreement Area: ▢ = less than 1,000 / ▢ = more than 1,000 individuals.

Contracting Parties to AEWA	**Occurrence throughout the annual cycle**		
	Breeding	**Staging**	**Wintering**
Denmark		▢	▢
Estonia		▢	
Finland	▢	▢	
Germany		▢	▢
Latvia		▢	
Lithuania		▢	
Netherlands			▢
Norway	▢	▢	▢
Sweden	▢	▢	▢
Ukraine		▢	
United Kingdom			▢
Non-party range states*			
Belarus		▢	
Kazakhstan		▢	▢
Poland		▢	▢
Russian Federation	▢	▢	

*At the time of adoption of this International Single Species Action Plan at the 6th Meeting of the AEWA Parties in 2015 (*The Agreement entered into force for Belarus on 1 April 2016*)

2.3.1 Western sub-population/management unit

The Western management unit comprises birds breeding in the central parts of Scandinavia and wintering almost exclusively in the United Kingdom and Jutland, Northern Denmark (Figure 2). For instance, nearly all re-sightings during the non-breeding season of Taiga Bean Geese neck-banded during the breeding season in Northern Sweden and Central Norway are from Western Sweden, South and South-east Norway, Northern Jutland in Denmark and Norfolk and Scotland in the United Kingdom.

There has been no exchange of marked birds between the Scotland and Norfolk wintering groups. Even though the overall range of these birds is fragmented, it is considered expedient to include them in a common management unit, because this unit is:

- numerically rather small;
- functionally protected from all hunting throughout its range; and
- also thought to be biologically discrete based on re-sightings and recoveries of marked birds in some portions of this flyway.

On this basis, it can therefore be considered under similar management throughout, occurring as it does under the jurisdictions of just four Western European range states.

The breeding areas of the Western management unit are inadequately known for instance due to the limited coverage of ornithological effort spent during the breeding season. Nevertheless, the breeding range is probably sparsely and unevenly populated. Available data indicate that these birds mostly moult at or near their breeding areas, but this inference needs to be underpinned by data from telemetric studies.

2.3.2 Central sub-population/management unit

The Central management unit encompasses breeding areas in Northernmost Sweden, Northern and Central Finland, North-east Norway and in Russian Karelia, the Kola Peninsula and Arkhangelsk district (Figure 2). Thanks to the Bird Atlas survey conducted in 2006-2010, the present breeding distribution in Finland is relatively well known. On the other hand, the border between the Western and Central management units in northern Sweden is ambiguous, and the exact breeding distribution in North-west Russia and North-east Norway is poorly known. It is also unclear, whether the breeding ranges of Taiga and Tundra Bean Geese are completely separate or whether they overlap at the border of taiga and tundra habitats (this applies to the Eastern 1 and 2 management units as well).

However, there is evidence for overlap in Bolshezemelskaya tundra (Nenetsky autonomous okrug) where both subspecies are nesting (V. Morozov pers. comm.). Except for the short-term aggregation of broods, there are neither historical nor recent records of large moulting concentrations from Swedish and Finnish breeding areas. However, there is firm evidence of non-breeders and failed breeders migrating to the Kola Peninsula or Novaya Zemlya for moulting. Unfortunately, the concentrations of moulting Bean Geese observed in Finnmark, Northern Norway, in the 1960s and 1970s were not identified by subspecies.

Finnish and Swedish breeding birds winter mostly in Southern Sweden and South-east Denmark, and a few birds may continue into North-east Germany, depending on the severity of winter weather. However, there have been no records of Finnish birds wintering in North-east Germany since 2010, and also the cold weather movements to North-west Germany and to the Netherlands which occurred prior to 2000 have ceased. Taiga Bean Geese regularly occurring in Eastern Jutland are most likely to originate from breeding areas in Northernmost Sweden, but may be influenced by emigration and association with birds from elsewhere. Birds from the Russian parts of the Central management unit are also thought to winter mostly in Sweden and South-east Denmark, but this remains to be confirmed by neck-banding and telemetric studies. It is noteworthy that no neck-banded or transmitter-tagged birds of this management unit have been reported from the United Kingdom or Poland.

2.3.3 Eastern 1 sub-population/management unit

Taiga Bean Geese of the Eastern 1 management unit breed in two distinct areas, in the upper Pechora region close to the Ural Mountains, and in Western Siberian lowlands (Figure 2). The boundaries of the larger Western Siberian breeding area are unclear, and little is known about these birds at all, which is understandable given the vastness of the area. However, there are important nesting, autumn and spring staging areas along the prominent Western Siberian river basins. Most of the Taiga Bean Geese ringed as wintering birds in the Netherlands were reported back during spring and autumn migration from North-east Germany, Poland, Eastern Europe, the European part of Russia (east to the Central management unit) as well as from Western Siberia. Thus, birds originating from breeding areas in Eastern European Russia and especially in Western Siberia were regular and abundant winter visitors in

the Netherlands and Belgium in the past. Based on ring recoveries, most of the Taiga Bean Geese that reached the Netherlands in severe winters came from wintering areas in North-east Germany and neighbouring Poland.

At present, Taiga Bean Geese from the Eastern 1 management unit probably winter almost exclusively in North-east Germany and North-west Poland and possibly in lower numbers in Southern Sweden and only in small numbers in the Netherlands. To conclude, there is potentially some overlap in North-east Germany and Southern Sweden between Taiga Bean Geese assigned to the Central and to the Eastern 1 management units.

2.3.4 Eastern 2 sub-population/management unit

Very little is known about the Taiga Bean Geese of the Eastern 2 management unit. Their breeding area is thought to be in the eastern parts of Western Siberian lowlands, extending to the Yenisei River basin in the east (Figure 2), but this needs to be confirmed by studies on individually marked geese. The birds of this management unit winter in a few areas of South-east Kazakhstan, Eastern Kyrgyzstan and North-west China. Historical data suggest that the Taiga Bean Goose was once much more abundant and commonly occurred across a much wider area than today in Central Asia in winter. Interestingly, six Taiga Bean Geese marked in the Netherlands in winter 1960–1985 were reported shot in subsequent seasons in the Central Asian wintering areas, suggesting that individual birds breeding in Western Siberia changed their wintering areas between Western Europe and Central Asia.

2.4 Habitat Use

The use of different habitats by Taiga Bean Geese during the breeding and non-breeding season is briefly presented here, and a more detailed description is given in Appendix 2.

2.4.1 Breeding season

There are no studies of nesting and brood habitat selection by Taiga Bean Geese (i.e. studies comparing the use and availability of different habitat types), neither at the home range level nor at the landscape scale. Nevertheless, available literature contains many descriptions of the use of different habitats during the breeding season which potentially reflect the breeding habitat requirements and preferences shown by Taiga Bean Geese.

Breeding areas throughout the range are mostly characterised by a mosaic of open and wooded mires, rivers, lakes or ponds, and taiga forests. In Finland and Sweden in the Central management unit, the highest densities of breeding geese have been observed in areas dominated by mesotrophic aapa flark mires (Pirkola & Kalinainen 1984a, b, Väisänen et al. 1998, Nilsson et al. 1999; see also Eriksson & Henricsson 1990). In such habitat, the mosaic water bodies provide safety from mammalian predators especially during the brood rearing and moulting period, as well as preferred plant dietary items which are available in wetlands and wooded habitats (Pirkola & Kalinainen 1984a). Taiga Bean Geese nest not only in open but also in wooded habitats, which is unique among the geese of the Western Palearctic (Cramp & Simmons 1977). Russian authors emphasize the importance of wetlands bordering lakes and small taiga and forest rivers as breeding habitats especially in the Eastern management units (Râbicev 2001, Golovatin & Pashalnyj 2004, Poyarkov 2008).

2.4.2 Non-breeding season

During the non-breeding season in Sweden, Taiga Bean Geese mostly feed on agricultural land and roost on lakes or lake ice (e.g. Nilsson & Persson 1984). Field choice varies over the season and between locations depending on the availability of different food sources. In late autumn, Taiga Bean Geese staging in Southern Sweden prefer fields with sugar beet and potato waste residues over other feeding habitats and foods including winter cereals, grasslands and waste grain on stubble fields (Nilsson & Kampe-Persson 2013). Later in the season however, winter cereals become the most utilized food source.

In other parts of Europe staging and wintering Bean Geese show similar food preferences (for references, see Nilsson & Kampe-Persson 2013). Other winter feeding habitats reported in Denmark and Poland include e.g. grasslands, wet meadows and maize stubble fields (Parslow-Otsu & Kjeldsen 1992, Rosin et al. 2012). In spring, permanent pastures with sprouting grass, winter cereal fields and potato fields, in this order of preference, constitute the main feeding habitats for Taiga Bean Geese in Southern Sweden (Nilsson & Kampe-Persson 1984, 2000, Nilsson & Kampe-Persson 2013). Spring is a critical season as geese need to build up fat and nutrient deposits for migration and breeding. Although it is not known to what extent Taiga Bean Geese are capital versus income breeders, there is no doubt that the prelude to egg laying and incubation places substantial demands on the energetic and nutrient stores of breeding females which need to be accumulated prior to nesting.

However, detailed studies on the habitat and food selection especially during the pre-breeding season are scarce. Nonetheless, Taiga Bean Geese of the Central sub-population mostly stage on agricultural habitats (including grassland) in spring (Nilsson et al. 1999, Zimin et al. 2007). In contrast, in Northwest Siberia the extensive natural wetlands at Dvuobje constitute the most important spring staging area for the Eastern 1 and 2 sub-populations of Taiga Bean Geese (Lebedeva 1979, Sirin 2012), where they feed on the highly productive graminoid vegetation associated with temporary water bodies known as “sors”, swamps and flood-plain lakes (Rozenfeld & Strelnikov 2011).

As most goose populations staging and wintering in Europe have increased substantially in numbers during past decades (Fox & Madsen 1999, Fox et al. 2010), the large aggregations of geese attracted by the favourable conditions offered by modern farming landscapes may create major local conflict by grazing and trampling of crops and pastures. Agricultural conflict where Taiga Bean Geese have been specifically involved in the range states during non-breeding season is discussed in Appendix 2.

2.5 Population Dynamics and Status

2.5.1 Productivity

Data on the breeding performance of the Taiga Bean Goose, including breeding propensity (i.e. the proportion of pairs actually attempting breeding), clutch size, egg survival, and hatching and fledging success, as well as the key factors affecting them are scarce or lacking. The only data on the proportion of adults breeding is that of Golovatin (2010), which estimated that c. 40% of Taiga Bean Geese present in the Yamalo-Nenets region attempted to breed. Data on breeding success in Finland date back to the 1970s and 1980s (Pirkola & Kalinainen 1984a), prior to the period of decline, when the mean clutch size was 5.2 eggs (range 2–8), similar to clutch sizes reported by other authors (e.g. von Haartman et al. 1963, Waaramäki 1970, Golovatin & Pashalnyj 2004, Poyarkov 2008). Out of 103 nests found, eight nests were subsequently confirmed to have been destroyed (Pirkola & Kalinainen 1984a). One nest was destroyed by flood, one incubating female was killed presumably by a Brown Bear *Ursus arctos*, and

six nests were predated, although nest losses were potentially higher than 8 out of 103, because adequate checks were lacking for most nests. In any case, these data are inadequate for assessing current nest loss rates or change over time.

During the brood rearing period (i.e. before fledging), Pirkola & Kalinainen (1984a) recorded 12 incidents of goslings being taken or attempts to prey on adults by Golden Eagle (*Aquila chrysaetos*). Based on prey remains and pellets collected at nest sites, the Bean Goose is an infrequent prey of the Golden Eagle in summer, with approximately 2-4 Bean Geese per 100 identified prey items (Sulkava et al. 1999). In Central Finnish Lapland, Bean Geese constituted 1.5% of prey in the diet of White-tailed Eagles (*Haliaeetus albicilla*) during the nesting period of the latter (Sulkava et al. 1997).

Furthermore, there are scattered observations of Brown Bear, Red Fox (*Vulpes vulpes*), Raccoon Dog (*Nyctereutes procyonoides*) and American Mink (*Neovison vison*) preying on Taiga Bean Goose goslings (Pirkola & Kalinainen 1984a, E. Väyrynen pers. comm.). Golovatin (2010) reported that 60% of hatched Taiga Bean Goose goslings in the Yamalo-Nenets region survived to fledge. However, despite all of these observations, it is impossible to estimate the overall rates of predation on eggs or goslings, the relative significance of the various predators involved and their impact on the dynamics of the population.

Age ratio counts of autumn or winter flocks (providing estimates of the annual proportion of juveniles in the population) have been carried out only occasionally. There is, however, a long time series on the annual percentages of juveniles in the Taiga Bean Geese wintering in the Netherlands (collected by L. M. J. van den Bergh/SOVON Vogelonderzoek Nederland/ Ganzenwerkgroep Nederland; see Hustings et al. 2009). Unfortunately, there is some doubt about the usefulness of this dataset, because the sample size (total number of individuals counted for the age ratio estimate) was relatively low in some years (e.g. only 191 birds counted in winter 1989/90; Ganzenwerkgroep Nederland/België 1992).

These samples would have been even lower and likely unrepresentative of the population as a whole during the period when the overall peak numbers of Taiga Bean Geese in the Netherlands declined to an average of 600 birds in the 1990s and to 200 birds after 2000 (Koffijberg et al. 2011). Furthermore, the age ratio counts were conducted mainly in winter (see e.g. Ganzenwerkgroep Nederland/België 1990), when most young Taiga Bean Geese have completed their moult and hence are difficult to separate from adults (T. Heinicke unpubl.).

Among autumn staging Taiga Bean Geese in Sweden, there were 19.3 and 23.4% of juveniles in 1993 and 1994, respectively (L. van den Bergh unpubl., cited in Nilsson et al. 1999), and similar percentages of around 20% were recorded in other parts of the range in the 1970s through 1990s (van Impe 1981, Pirkola & Kalinainen 1984a, Nilsson et al. 1999). More recently, 17.2-36.9% of juveniles were recorded in Sweden in September and October 2009-2013 (T. Heinicke unpubl., Fig. 3), suggesting that the juvenile percentages fluctuate from year to year at a similar level to that during previous decades.

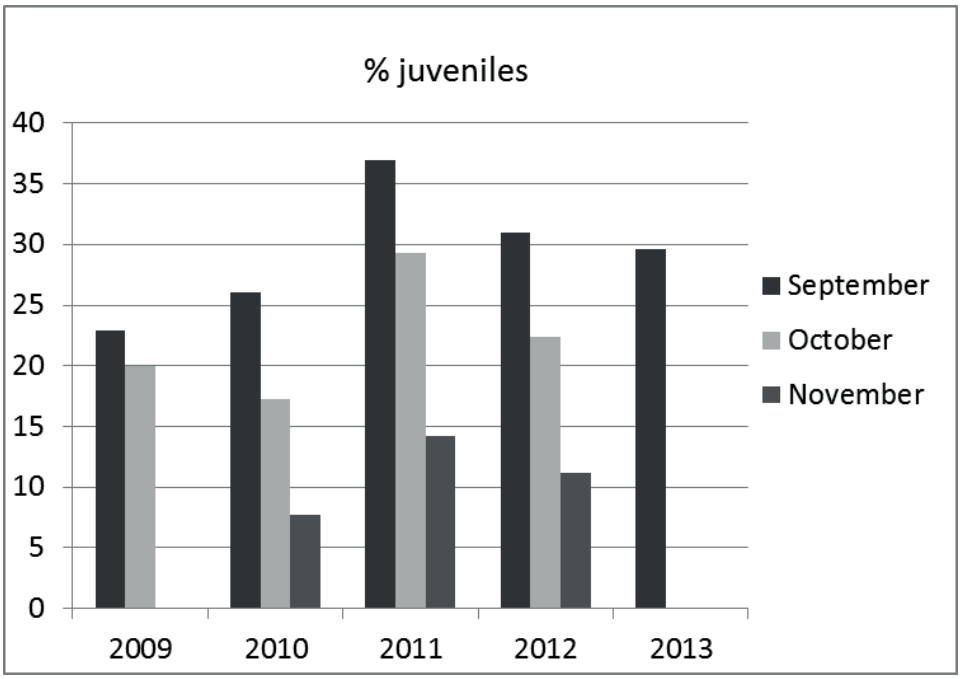


Figure 3. Percentage of juveniles recorded in special age ratio counts on flocks of autumn staging Taiga Bean Geese in Central and Southern Sweden in 2009–2013. Sample size (total number of individuals counted for each estimate): 1,999-6,710 in September, 1,538-3,938 in October and 757-3,565 individuals in November (T. Heinicke unpubl.).

Data on brood sizes (as indications of relative breeding success) are scarcer and collected using different methods, which makes comparisons difficult. In general, the reported brood sizes vary in the range of 1-4 goslings/family group (Pirkola & Kalinainen 1984a, Golovatin & Pashalnyj 2004, Poyarkov 2008, V. Slodkevitch & V. Yakovlev unpubl.). The mean brood sizes in family groups of Taiga Bean Geese staging in Sweden in the autumns of 2009-2013 were 2.2-2.7 (T. Heinicke unpubl.).

2.5.2 Survival

There is little information about annual survival rates of Taiga Bean Geese. The return rate of Bean Geese (not differentiated between subspecies, since today most Bean Geese in Finnmark are Tundra Bean Geese, Aarvak & Øien 2009) marked "as young moulting birds" with leg rings and wing tags in Finnmark, Northern Norway, was estimated at 0.77 (Tveit 1984), based on recoveries without correcting for reporting or mark retention rates. The combined re-sighting and recovery data based on a total of 430 Taiga Bean Geese marked in Finnish breeding areas during 1981-1994 were analysed using modern modelling techniques to reveal age-specific annual survival rates, which suggested adult survival rates of 53-84% (S. Aikio & A. Paasivaara unpubl., Figure 4).

The survival rates for breeding-aged birds (three years or more) were therefore somewhat below 70–80% generally reported for adults of other *Anser* species (see Fox et al. 2010). Using return rates (i.e. not correcting for reporting rates and marker loss) annual survival rates for Taiga Bean Geese banded in Northern Sweden in spring 2007-2009 were 0.67–0.86, but for those banded in North-east Germany in October 2007 were much lower, 0.36–0.58 (T. Heinicke unpubl.).

The relative contribution of natural and hunting mortality to overall Taiga Bean Goose mortality is not known. The annual natural mortality rate in adult geese is low, generally c. 0.05-0.10 (Larsson et al. 1988, Ebbinge 1991, Francis et al. 1992a, Gauthier et al. 2001, Frederiksen et al. 2004) but hunting

mortality can make a substantial difference to survival if such mortality is additive. The high prevalence of embedded shot pellets (Jönsson et al. 1985, Kenntner et al. 2009) suggests that the hunting pressure on Taiga Bean Geese is relatively high and therefore hunting is probably an important cause of mortality.

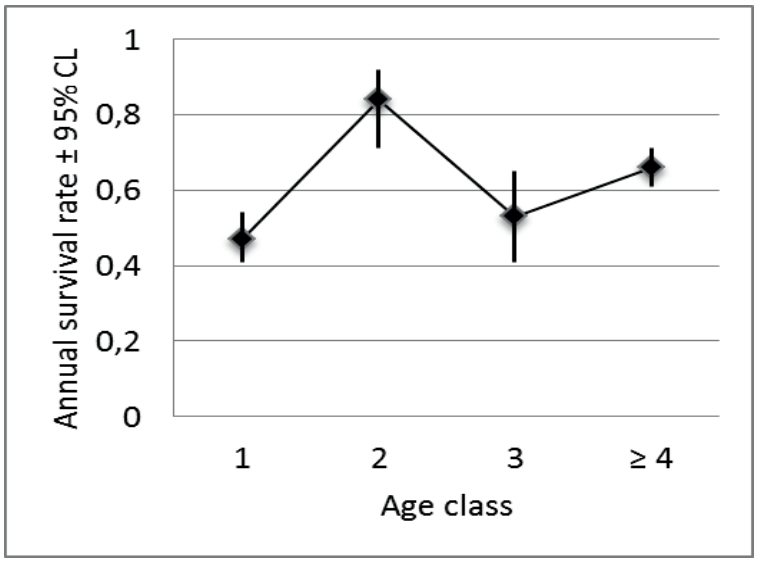


Figure 4. Annual survival rates (diamonds) with 95% confidence limits (vertical bars) of Taiga Bean Geese by age class based on the re-sightings and recoveries of birds fitted with neck and leg bands in Northern Central Finnish breeding areas in July 1981–1994 by the Finnish Game and Fisheries Research Institute (n = 430, 320 goslings and 110 adults). The data until 1996 were analysed using Barker's (1999) joint live mark-recapture-re-sighting and dead recovery model, which estimated mean annual reporting probability at 0.24 (95% confidence limits 0.20–0.29; S. Aikio & A. Paasivaara unpubl.).

2.5.3 Population size and trend

2.5.3.1 Goose counts

The Taiga Bean Goose is one of the few goose populations in Europe showing a declining trend (e.g. Mooij 2011). The wintering population size was estimated at 100,000 birds in the mid-1990s, 70,000–90,000 around 2005 and 63,000 in 2009 (Fox & Madsen 1999, Delany & Scott 2006, Fox et al. 2010, Nilsson 2013). Most of these estimates are based on mid-January counts conducted within the framework of the International Waterbird Census (IWC). The data quality code (range 0-5) for the Taiga Bean Goose estimate in 2009 was 4, i.e. good coverage for more than 50% of the total estimate (Fox et al. 2010).

In the report by Wetlands International on the conservation status of migratory waterbirds within the AEWA Agreement Area, the quality of the estimate for the Taiga Bean Goose in 2009 was ranked as "expert opinion" (Nagy et al. 2012). "Expert opinion" means that the estimate is based on incomplete survey and monitoring data and that the population size has been estimated employing expert opinion for extrapolating from available data. Thus, *"urgent attention needs to be paid to improving count coverage before we can be truly confident of the current population size, distribution and trends"* for the Taiga Bean Goose, as stated in Fox et al. (2010).

Due to the failure to differentiate between the two subspecies, some estimates may include unknown numbers of Tundra Bean Geese. However, the occurrence of Tundra Bean Geese in larger numbers in areas where Taiga Bean Geese used to winter, for example in Southern Sweden, is probably a fairly new

phenomenon (Kampe-Persson 2011, L. Nilsson unpubl.). Recently, the numbers of wintering Tundra Bean Geese have increased in North-western Europe and declined in Central Europe (e.g. Faragó 2010, Devos & Kuijken 2012, Mitchell 2012). However, Heinicke & de Jong (2013) argue that there is no strong evidence for a recent major increase of Tundra Bean Geese in Central and Southern Sweden.

Counts conducted in Europe in winter 2014/15 yielded a total of c. 52,600 Taiga Bean Geese (Table 2), suggesting that the winter population size has further declined.

Table 2. Counts of Taiga Bean Geese in Europe in the winter of 2014/15. The 7,605 Bean Geese without subspecies designation in Southern Sweden were observed in areas where Tundra Bean Geese are rarely seen. Thus most of them were probably Taiga Bean Geese and the total estimate for Sweden is approximately 35 000 birds.

Country	**Area**	**Period**	**Number of Bean Geese**			**Reported by**
			Taiga	**Tundra**	**Unidentified**	
Sweden	S Sweden	Jan 2015	27,498	4,820	7,605	Leif Nilsson
Denmark	N Jutland	Jan 2015	3,100	-	-	Anthony D. Fox
	SE Denmark	Jan 2015	3,600	-	-	
Germany	Mecklenburg-Vorpommern	Jan 2015	8,130	-	-	Thomas Heinicke
	Brandenburg	Jan 2015	1,470	-	-	
Poland	NW Poland	Jan 2015	1,015	-	-	Thomas Heinicke
The United Kingdom	Slamannan, Scotland	Nov 2014	214	-	-	Carl Mitchell
	Norfolk, E England		32	-	-	
The Netherlands	Noord-Brabant	Dec 2014–Feb 2015	16	-	-	Kees Koffijberg

2.5.3.2 Estimates of numbers of breeding birds

There are few regular count data available to inform upon the size and changes in local breeding abundance of the Taiga Bean Goose breeding population, and the available figures should be considered as "guestimates". The total Swedish breeding population is estimated at 850 (655-1,045) pairs, with roughly 250 pairs belonging to the Western and 600 to the Central management unit, (Ottosson et al. 2012). Summer counts on the fixed routes of the Swedish Bird Survey suggest that the number of Taiga Bean Geese have decreased significantly since 1998, though it must be noted that the mean number of individuals observed per year was only 15 (Green & Lindström 2015).

Nevertheless, this is the only available quantitative trend estimate of changes in the local breeding abundance of the Taiga Bean Goose. In Norway, the very small number of breeding pairs (< 50 pairs) has decreased, at least in Nord-Trøndelag where birds belong to the Western management unit (Follestad 1994). An "educated guess" for the breeding population in Finland belonging to the Central management unit is 1,700-2,500 pairs (Väisänen et al. 2011). Anecdotal evidence from hunters and bird-watchers supports the view that the Finnish breeding population has declined since the early 1990s.

The numbers of Taiga Bean Geese breeding in Western Siberia have also decreased, probably since the 1990s (Golovatin 2005). However, estimates for the population size there are contradictory, and it is

impossible to differentiate the numbers of Taiga Bean Geese between the Eastern 1 and 2 management units. Estimates from 1997 suggested that thousands of pairs of Taiga Bean Geese bred in the northern taiga between the Nadym and Taz Rivers in the Yamalo-Nenets region (Kupriânov & Kupriânova 1997).

In Khanty-Mansi, the total number of Taiga Bean Geese, including non-breeding birds, was estimated at 7,000 individuals (Red Data Book of KHMAO-Yugra 2003). On the other hand, there are recent estimates that suggest the total Western Siberian stock numbers only 800-3,000 individuals, including non-breeders (Èktova & Zamâtin 2010). During the autumn counts throughout Western Siberia in 2014, the total number of Taiga Bean Geese migrating over the area was estimated at 2,060 birds (S. Rozenfeld unpubl.). Historical data suggest that the number of Taiga Bean Geese wintering in Central Asia have substantially decreased, but it is unclear whether this decline has been caused by a decline in the overall sub-population size or a major shift in wintering areas (Heinicke 2009).

A summary of the numbers and trends of Taiga Bean Geese in the range states is given in Table 3 and a more detailed analysis in Appendix 3.

*Table 3. Estimated numbers and trends of Taiga Bean Geese in the range states. * = data unspecified for subspecies, N/A = not available.*

Range state	Breeding		Staging		Wintering		Source
	Pair number	**Trend**	**Number**	**Trend**	**Number**	**Trend**	
Russia	(5,000–10,000)	decreasing	N/A	N/A	–	–	1, 2
Finland	1,700–2,500	decreasing	40,000–60,000* (spring)	unknown	–	–	3, 4, 5
Sweden	655–1,045	decreasing	45,000–55,000 (autumn)	stable	8,000–42,000	increasing	6, 7, 8
Norway	≥ 20	decreasing	≥ 200 (spring & autumn)	increasing*	20–80	stable	9, 10
Denmark	–	–	N/A	N/A	6,498–18,922 (2004–2011)	stable	11
Germany	–	–	N/A	N/A	12,100–52,000 (2005–2013)	decreasing	12
Poland	–	–	≥ 5,000 (autumn)	N/A	273–3,800 (2004–2013)	N/A	12
United Kingdom	–	–	–	–	300–400	decreasing	13, 14
Estonia	–	–	9,000–18,000* (spring)	stable	–	–	15, 16
Latvia	–	–	unknown	unknown	–	–	–
Lithuania	–	–	≤ 5,000*	increasing*	–	–	17
Netherlands	–	–	–	–	c. 200	decreasing	18

Range state	Breeding		Staging		Wintering		Source
	Pair number	Trend	Number	Trend	Number	Trend	
Belarus	–	–	100–800	decreasing*	very rare	–	19
Ukraine	–	–	100,000–200,000* (spring)	unknown	very rare	–	20
Kazakhstan	–	–	unknown	unknown	dozens	decreasing	21

Sources: 1. Golovatin (2005); **2**. Mooij & Zöckler (1999); **3.** Valkama et al. (2011); **4.** Väisänen et al. (2011); **5.** Pöyhönen (1995); **6**. Ottosson et al. (2012); **7.** Nilsson & Månsson (2012), Nilsson (2014); **8.** Green & Lindström (2015); **9.** Follestad (1994); **10.** I J. Øien, M. Günther & R. Kolstrøm (unpubl.); **11.** Pihl, S. et al. (2013); **12.** T. Heinicke (unpubl.); **13.** Mitchell et al. (2010); **14.** C. Mitchell & D. Stroud (unpubl.); **15.** Sepp (2011); **16.** I. Ojaste (unpubl.); **17.** Švažas et al. (1997), S. Švažas (unpubl.); **18.** Koffijberg et al. (2011); **19.** P. Pinchuk & K. Panteley (unpubl.); **20.** G. Gavris & V. Domashlinets (unpubl.); **21.** Yerokhov (2012).

3. Threats

3.1 General Overview

The summary of the relative importance of perceived threats facing the Taiga Bean Goose sub-populations/management units (Table 4) has been derived from national assessments (Appendix 3). Legal and illegal harvest is considered to have a significant effect on both adult survival and reproductive rates. Note, however, that there are probably differing perceptions of risks between stakeholders. Hence, this cannot be considered a full risk assessment but an impression of the actual or potential threats that the Framework for Action needs to consider. In reality, the extent of the various factors adversely affecting reproductive rate and habitat availability remains largely unknown.

The following key is used to assess the importance of threats:

Critical	a factor causing, or likely to cause, very rapid declines and/or extinction;
High	a factor causing, or likely to cause, rapid decline leading to depletion;
Medium	a factor causing, or likely to cause, relatively slow, but significant, declines;
Low	a factor causing, or likely to cause, fluctuations;
Local	a factor causing, or likely to cause, negligible declines in small parts of the population;
Unknown	a factor that is likely to affect the species but it is unknown to what extent.

Table 4. Summary of the relative importance of threats to the subpopulations of the Taiga Bean Goose by Management Unit. Threats considered having critical or high importance are highlighted in bold. A more detailed assessment of threats is given in Appendix 3.

Consequences on vital rates or habitat availability	**Threats**	**Western**	**Central**	**Eastern 1**	**Eastern 2**
		Relative importance			
Reduced survival rate of adults	***Legal harvest***	Unknown	**High**	**Critical**	**Critical**
	Illegal harvest *(incl. misidentification)*	Medium	Low	**High**	**High**
	Predation	Medium	Unknown	Low	Unknown
	Poisoning	Unknown	Local	Unknown	Unknown
	Collisions on power lines and wind turbines	Unknown	Local	Local	Unknown
Reduced reproductive rate	***Legal harvest*** *(hunting mortality of successful breeders, disruption of pair bonds)*	Unknown	Medium	**Critical**	**Critical**
	Egg and gosling collection	Unknown	Unknown	Unknown	Unknown
	Human disturbance	Medium	Medium	**Critical**	**Critical**
	Natural predation of eggs and goslings	Medium	Unknown	Unknown	Unknown
	Inter-specific competition	Low	Unknown	Unknown	Unknown
	Decrease in spring food availability from agricultural land	Unknown	Unknown	Unknown	Unknown
Reduced distribution due to past and ongoing habitat loss, fragmentation, degradation or conversion	*Forestry*	Unknown	Medium	Unknown	Unknown
	Peat mining	Unknown	Local	Unknown	Unknown
	Infrastructure and industrial development in breeding areas	Unknown	Low	Unknown	Unknown
	Infrastructure development in staging and wintering areas	Local	Local	Medium	Unknown
	Displacement due to inter-specific competition	Local	Unknown	Local	Unknown

Consequences on vital rates or habitat availability	Threats	Western	Central	Eastern 1	Eastern 2
		Relative importance			
	Displacement due to human disturbance	Local	Local	Medium	**High**
	Overgrazing by reindeer	Unknown	Unknown	Unknown	Unknown
	Agricultural intensification (drainage, burning)	Unknown	Local	Local	Unknown
	Abandonment of agricultural land	Unknown	Local	Local	Unknown

3.2 Hunting

The Bean Goose is a quarry species in all of the Taiga Bean Goose range states except in Norway, the Netherlands and the UK (Table 5). The species was protected in the UK in 1981, in the Netherlands in 2000 and in Norway in 2002. The estimation of bag sizes for the Taiga Bean Goose is complicated by the fact that none of the available bag statistics differentiate between the two subspecies.

The bag size in Russia is unknown, but is assumed to include many thousands of Taiga Bean Geese. Russia and Ukraine are the only range states with an open season where bag limits are applied. In Russia, geese are hunted in both spring and autumn; the open season in spring lasts ten days within given time frames (see Appendix 4). In the Yamalo-Nenets region, the mean bag per hunter during the spring season was estimated at 1-6 geese, without identification of species (V.V. Belinskij & M. Novikov pers. comm.), amounting to c. 10,000 geese bagged annually in Yamalo-Nenets and Khanty-Mansi (V.V. Belinskij pers. comm.).

A major problem with spring hunting is that it risks the disproportionate harvest of the potentially fittest birds - likely to be the future breeding pairs - which tend to arrive first along the flyway and especially to the breeding areas. Furthermore, statutory hunting regulations are set without having adequate regard to the patterns of migration and breeding among geese. Taiga Bean Geese arrive in Western Siberian breeding areas on average between 19 April and 6 May, while the main quarry species, Tundra Bean and White-fronted Geese (*Anser albifrons*), arrive 8-30 days later (Golovatin & Pashalnyj 2004, E. Strelnikov & D. Zamâtin pers. comm., S. Rozenfeld unpubl.). Hence, in the Yamalo-Nenets region, for instance, the spring hunting season in mid-May coincides with the incubation period of Bean Geese.

In Finland, the estimated mean annual bag was 6,500 Bean Geese prior to the introduction of hunting restrictions in 2010, after which the estimated annual bag has been 3,300-5,100 (Finnish Game and Fisheries Research Institute 2014). Hunting was restricted by postponing the opening of the hunting season for the Bean Goose from the statutory 20 August to September or October, especially in the southern and central parts of the country. In 2013, for instance, the season opened on 1 September in the northern, 10 September in the central and 1-10 October in the southern parts of Finland. In the 2014/15 hunting season, the hunting of Bean Geese was totally banned in Finland.

In Sweden, the estimated annual bag has been mostly 3,000-4,000 Bean Geese during the 2000s (Svenska Jägareförbundet 2013a), with a long-term mean of 3,600 over the last twenty years (N. Liljebäck pers. comm.), although this estimate does not include unknown numbers of Bean Geese shot to prevent damage to crops (see Appendix 4).

In Denmark, the estimated annual Bean Goose bag has slightly increased since the early 1990s, albeit with considerable variation between years. During 2007/08–2011/12 the annual bag was 200-4,900, (average c. 1,600, Christensen et al. 2013). The bag is likely to include an increasing contribution from Tundra Bean Geese in Southeast Denmark due to changes in the temporal and geographical hunting regulations which came into force in 2014 to further reduce the taking of Taiga Bean Geese.

The Danish Hunting Law requires a review of huntable species every three years which includes changes to the status of quarry populations where these are shown not to be able to support sustainable hunting. During an earlier cycle of review, protection was conferred on Bean Geese in the North Jutland region and in the municipalities of Viborg and Skive covering the core staging and wintering habitat of Taiga Bean Geese in Jutland. This was extended in 2011 to include an even larger area of the North and Mid Jutland regions. From 2014, hunting of Bean Geese will only be allowed in three south-eastern municipalities and with a shorter open season than before (see Appendix 4).

In Estonia, the annual bag was on average 1,275 Bean Geese during 2006–2011 (Estonian Environment Agency). There are no recent species-specific data for Bean Geese from Poland and Latvia (Table 5), however, Hirschfeld & Heyd (2005) estimated the annual bag for the Bean Goose in 2002 and 2003 at 13,812 birds in Poland and 445 in Latvia.

Taiga Bean Geese are shot for reasons of crop protection in Sweden, Estonia and Germany even though much of the agricultural damage is caused by other, more numerous goose species with which they associate (see Appendix 2). In parts of Southern Sweden, it is permitted to shoot Bean Geese in order to prevent damage to winter cereals and un-harvested crops in winter (2.5 months) and autumn (2 months), outside the normal open season or area (Svenska Jägareförbundet 2013b).

In Estonia, Bean Geese cause damage mainly inland on the mainland, and protective shooting is practiced during the open season in autumn (A. Leito pers. comm.). In Germany, Bean Geese are shot to prevent crop damage in Brandenburg (estimated at 500–1,000 annually), Mecklenburg-Vorpommern (400–800), Niedersachsen (unknown), Sachsen-Anhalt (800–1,000 annually), Sachsen (less than 100), and in Schleswig-Holstein (less than 1,000) (J. Mooij pers. comm.). It is unknown how many of these Bean Geese are Taiga Bean Geese. The risk of shooting Taiga Bean Geese is highest in Mecklenburg-Vorpommern and Brandenburg (J. Mooij pers. comm.).

As most of the Bean Geese present in Finland and Sweden during hunting seasons are Taiga Bean Geese (e.g. Pöyhönen 1995, Kampe-Persson 2011), most of the Bean Geese shot in the two countries are probably Taiga Bean Geese. In Denmark, the proportion of Taiga Bean Geese shot is unknown, but current restrictions on the timing and distribution of the hunt increasingly concentrates hunting on Tundra Bean Geese. In Estonia, the Bean Goose bag is likely to consist mainly of Tundra Bean Geese, since their proportion of all Bean Geese staging in Estonia is ca. 70% (Burghers et al. 1991, A. Leito pers. comm.). In Latvia, the average annual goose bag of 1,760 birds in 2008–2012 was estimated to include approximately 300 Taiga Bean Geese (J. Vīksne pers. comm.). In Ukraine, it is thought that no more than 100 Bean Geese are shot annually (G. Gavris pers. comm.). In the Yamalo-Nenets region, the Bean Goose bag for the season 2013 was estimated to comprise just 0.6% of Taiga Bean Geese (S. Rozenfeld unpubl.). To conclude, thousands of Taiga Bean Geese are probably harvested annually in

Russia, Finland and Sweden, while in Denmark the annual harvest is estimated at c. 1,000, and no more than a few hundred Taiga Bean Geese per annum are harvested in each of the other range states with an open season for the Bean Goose. Except for Denmark, the available bag statistics do not indicate any clear trend in the bag size during the last two decades.

Table 5. Availability of bag statistics and recent bag sizes for the Bean Goose, without separation of subspecies, and "guestimates" of the numbers of Taiga Bean Geese in the bag of the various range states. Statistics given in parentheses refer to unspecified data ("geese").

Range state	Annual statutory bag statistics	Annual bag size		Period
		Total	Taiga Bean Geese	
Russia	No	Unknown	1,000s	–
Finland	Yes	3,975	1,000s	2010–2013
Sweden	Yes	3,105	1,000s	1995–2010
Denmark	Yes	200–4,900	c. 1,000	2007/08–2011/12
Germany	Yes	5,050 in Mecklenburg-Vorpommern	c. 300–500	1995/96–2010/11
		5,939 in Brandenburg		1995/96–2011/12
Poland	(Yes)	(9,578)	100s	(2012/13)
Estonia	Yes	1,275	100s	2006–2011
Latvia	Yes	938	c. 300	2013
Lithuania	Yes	130	100s	2012/13
Belarus	Yes	4,000	100s	2010–2012
Ukraine	(No)?	(5,500)	100	(2002)[a]
Kazakhstan	No	?	?	?

[a] Extra open season for geese in spring 2002.

The data from two recent wing survey schemes suggest that the hunting bags of Bean Geese tend to be biased towards adults (including subadults, i.e. older than first winter). Visual inspection of the wings (n = 98) forwarded by Finnish hunters between 2005 and 2011 suggested that two thirds of Bean Geese harvested in Finland were adults (Väänänen 2010 and unpubl.). Similarly, of 290 Bean Goose wings collected from hunters in Estonia between 2007 and 2012, 61% were from adults (I. Ojaste unpubl.).

The overall impact of hunting on the population dynamics of the Bean Goose has not been studied. In general hunting mortality seems to be mostly additive to natural mortality in geese (Ebbinge 1991, Francis et al. 1992b, Gauthier et al. 2001, Fox et al. 2006). Mooij (2010) suggested that the annual harvest rate of Bean Geese in the Western Palearctic was 16.7%, rising to 20.9% when crippling loss was included. However, these figures remain tentative because of uncertainties associated with the estimation of true bag size and crippling rate.

3.3 Illegal Harvest

Much of illegal harvest throughout the range is considered to occur because of the misidentification of goose species (see Appendix 3). Actual poaching, including the harvest of moulting birds outside of the season, is considered a serious concern in the conservation and management of the Eastern 1 and 2 sub-populations in Western Siberia (Rozenfeld 2013c). There is a general ignorance of, and disregard for the hunting regulations by hunters. Due to limited resources available to the hunting authorities, hunting controls are poorly enforced. Compliance with seasonal bag limits on hunters as applied at present is difficult to achieve by the hunting authorities, and therefore goose experts recommend substituting seasonal bag limits with daily ones together with local adjustments to hunting dates which can be more easily enforced on the spot (Rozenfeld 2013c).

3.4 Human Disturbance

Human disturbance is considered to be a medium to high threat to the Taiga Bean Goose, especially in the two Eastern breeding sub-populations (Table 4, Appendix 3). In Western Siberia, disturbance caused by boating and aviation activities is increasing particularly at the breeding sites (Rozenfeld 2013a, b). This traffic is associated with spring hunting and the oil and gas industry which is rapidly expanding in the region. In August prior to the autumn migration, geese congregate on their traditional stopover sites in the Ob River valley in Western Siberia. Human activity is rapidly increasingly in this area, resulting in much greater disturbance to geese at a time when the accumulation of energy and nutrient resources for investment in autumn migration may have fitness consequences (S. Rozenfeld unpubl.). In the Western and Central management units, traffic on forest roads, berry picking, hiking and other recreational activities may cause further disturbance at breeding and moulting sites.

Human activity may affect goose behaviour in a range of different ways (see Hockin et al. 1992). During the nesting period, disturbance can affect the settlement of breeding birds, ultimately reducing nesting densities, impacting upon nest-site selection, as well as later brood rearing and reproductive success (see Madsen et al. 2009). Hence, the presence of forestry, recreational and other activities in Taiga Bean Goose nesting areas are all likely to affect nesting densities and reproductive output and potentially female survival. Human activity may directly result in nest abandonment or increased predation. Although there are few adequate studies of such effects, there are long-reported cases of the effects of investigators on the reproductive success of their own study species (e.g. MacInnes & Misra 1972, who showed that partial losses of goose clutches were rare in the absence of human disturbance). Nevertheless, it is clear that human activities prolong females' recess periods from the nest which expose eggs to greater predation and the risk of abandonment.

Post-nesting geese tend to moult their flight feathers in highly undisturbed locations (Fox et al. 2014), and being flightless they are highly susceptible to disturbance. This can be manifested in elevated energy expenditure incurred in fleeing from disturbance stimuli which may in turn affect feather growth, body condition and survival (Miller et al. 1994). Although published evidence is extremely limited, it is

assumed that persistent disturbance to moulting goose concentrations is likely to affect survival and lead to abandonment of such sites in subsequent years.

In the non-breeding areas, human disturbance can cause increased alertness and loss of feeding time, or more severe effects when birds are repeatedly flushed and displaced from optimal foraging areas. In the latter case, such disturbance can substantially adversely affect their energy budgets compared to an undisturbed state, for instance, by disturbance associated with regular agricultural activity (i.e. not deliberate scaring, Norriss & Wilson 1988) or aircraft and hunting disturbance (Belanger & Bedard 1989). It is well established that such persistent disturbance affects the settlement of feeding geese in response to distance from disturbance loci, such as roads (Mooij 1982, Madsen 1985, Keller 1990, Gill 1996).

Such continuous displacement caused by human activities results in an under-exploitation of resources otherwise available, which can be seen to equate to net or functional loss of habitat (see Fox & Madsen 1997). Potentially, however, such disturbance and displacement are only temporary and birds can adequately compensate their effects. Hence, a knowledge and understanding of the nature and response to disturbance can enlighten management solutions (e.g. through the establishment of disturbance free refuges).

3.5 Forestry

The importance of changes in structure to the boreal forest due to modern forestry practice is considered as a medium threat in the Central management unit. These changes include, for example, an increase in young successional stages of forests, the drainage of peatlands and the construction of forest road networks, all of which result in disturbance (see above), habitat loss, fragmentation and degradation that can be detrimental for a number of species, including Taiga Bean Geese. Drainage of pine, spruce and to a lesser extent open mires occurred extensively, particularly in the southern and central parts of Finland, during the 1960s and 1970s, so that nowadays c. 50% (4,7 million hectares) of all peatlands in Finland have been drained for forestry (Finnish Forest Research Institute 2000, 2013). At present, the overall area drained is no longer increasing; instead the focus of hydrological activity is now on ditch network maintenance. Forest roads make remote areas more easily accessible than in former times and may thereby increase general access, hunting pressure and disturbance on breeding areas. These changes to the boreal forest landscape have not only caused changes in physical habitats but also altered interspecific interactions, resulting for instance in elevated predation pressure especially from generalist predators, e.g. Red Fox, on ground-nesting birds (e.g. Kurki et al. 1998, Ludwig et al. 2008). The direct and indirect changes caused by forestry practices are assumed to have adversely affected the breeding population of the Taiga Bean Goose, but the magnitude of this impact is not currently known.

3.6 Predation

Predation of eggs, goslings and adults of the Taiga Bean Goose is considered to be of medium importance in the Western management unit. Although full grown Taiga Bean Geese may be potentially taken at any time in the annual cycle, the impact of predation is likely to be most prominent during the breeding season, when geese are most vulnerable, with the Golden and White-tailed Eagles, the Red Fox and the Brown Bear being probably the most important predators (see Chapter 2.5). The increase of eagle populations in Scandinavia (and Finland) during recent decades is attributed to their strict protection, while the increase in Brown Bear numbers (see Wikman 2009, Kindberg et al. 2011) in the breeding areas of Taiga Bean Geese is due to both conservation and hunting regulation. Nevertheless, the overall densities of the Golden and White-tailed Eagles and the Brown Bear are very low, and as

they are top predators, their populations will remain relatively sparse and their impact likely relatively low. The Red Fox is much more abundant, and judging from Finnish bag statistics, the Red Fox population has apparently increased during the 1970s and 1980s. This increase is commonly ascribed to improved food supply mediated by increased habitat fragmentation (see Chapter 3.5).

Since 1989, when the annual nationwide snow track counts of mammals were started in Finland, the Red Fox population has on average remained stable or slightly decreased in the breeding areas of the Taiga Bean Goose (Wikman 2009). In addition, there are observations of two alien mammalian predators, the Raccoon Dog and American Mink, preying upon Taiga Bean Goose goslings. The American Mink is present in the Western and both of these predators in the Central management unit, where they may pose a threat to the breeding success of geese. In Finland, the Raccoon Dog is relatively common, since the annual hunting bag of the species is nowadays estimated at c. 160,000 individuals (Finnish Game and Fisheries Research Institute 2014). However, because studies on the natural mortality of Taiga Bean Geese are completely lacking, the relative importance of different predators as well as the overall impact of predation on the population is unknown.

3.7 Infrastructure Development

Infrastructure and industrial development associated with oil and gas as well as mining industries may cause permanent physical loss of breeding, moulting, staging or wintering habitat. In Western Siberia, major changes in land use are occurring, mainly related to the expanding oil and gas industry. Intensive construction of roads, villages and infrastructure is occurring over very large areas, for instance in the Dvuobje area. Such development encourages the increase in accessibility of formerly remote and inaccessible areas, elevating disturbance and increasing the threat of oil and other contamination.

3.8 Other Threats

Natural vegetation succession on former pasture and agricultural grasslands due to land abandonment was recognised as a threat especially to the Eastern 1 and 2 sub-populations (see Appendix 3). This development is causing habitat degradation and ultimately loss of suitable habitat in staging areas.

Lead poisoning is also recognised as a potential factor reducing the survival of adult Taiga Bean Geese (see Appendix 3). Given the high prevalence of embedded shot pellets in Taiga Bean Geese (Jönsson et al. 1985, Kenntner et al. 2009) and the residue of shot remaining in wetlands and roost sites used by the birds as a source of grit, the risk of lead poisoning continues to be an issue. Most range states have introduced various types of bans on the use of lead ammunition: total ban for any hunting purposes in Denmark; any use for waterbirds is banned in Finland, Norway, Estonia, the Netherlands as well as in England and Wales in the United Kingdom; in all wetlands in Germany, Sweden and in Scotland in the United Kingdom, and in important wetlands (e.g. Ramsar sites) in Latvia and in England and Wales in the United Kingdom. In Ukraine, a government bill to ban the use of lead shot in wetlands of international importance has been submitted to the Parliament for adoption.

There are reports of extensive oil pollution in the wetlands of the Western Siberian breeding areas (see Appendix 3), which may pose a risk of oil contamination of geese, although its prevalence and role as a source of habitat loss and mortality remains unknown.

Though not addressed in Table 4 or Appendix 3, the consequences of natal philopatry (i.e. site fidelity) of Taiga Bean Geese are considered potentially important. According to studies on leg- and neck-banded birds conducted in Finland, Taiga Bean Geese show relatively high natal philopatry, with about half of

the birds returning to breed in their natal area (Saurola et al. 2013, E. Väyrynen et al. unpubl., A. Paasivaara unpubl.). This makes local Taiga Bean Goose breeding populations especially vulnerable to local overharvesting and habitat loss. Where local breeding populations are lost, such areas will not be readily re-colonised because of the high natal philopatry and the present unfavourable conservation status of the population throughout its range. Similarly, a slow re-colonisation rate is to be expected when new breeding habitat becomes available e.g. after the restoration of previously drained mires (see Finnish Forest Research Institute 2012).

A further potential threat not addressed in Table 4 or Appendix 3 is the impact of climate change. A modelling exercise projecting species' distributions on climatic scenarios suggests that the breeding range of the Bean Goose may contract considerably by the late 21st century (Huntley et al. 2007). On the other hand, climate change is probably already influencing the use of staging and wintering areas; e.g. the fact that Finnish Taiga Bean Geese no longer overwinter in the Netherlands or in Germany (Nilsson 2011) may be assigned to a warming winter climate. Tackling climate change directly is beyond the scope of any species action plan, but the potential direct and indirect effects on Taiga Bean Geese should be taken into account when planning and implementing conservation measures.

4. Knowledge Gaps and Research Needs

The participants of the stakeholder workshop identified significant knowledge gaps and hence research needs concerning the estimation of annual population size, demography, delineation flyways and hunting bags of the Taiga Bean Goose, and these knowledge gaps are evident from the previous chapters of this document as well. Table 6 summarises the estimated level and quality of available knowledge by management unit. The most serious knowledge gaps concern the sub-populations of the two Eastern management units, but there is much to improve with the Western and Central sub-populations as well.

Current mid-January counts are based on national waterbird monitoring programmes which do not necessarily focus on geese. For instance, there may be unknown wintering sites with birds beyond the coverage of mid-January counts, and sites where Taiga and Tundra Bean Geese are not sufficiently well separated. There is also need to substantially increase the current levels of birds caught and marked with neck and leg bands, to enhance the data on survival and reproductive rates and the factors affecting them, such as predation, possible competition from Whooper Swans (*Cygnus cygnus*) (Kampe-Persson et al. 2005) or habitat characteristics where these are especially scarce or lacking.

Systematically collected data on breeding distribution in recent years are available only for parts of the Western and Central management units (Finland and Sweden). Hunting bag statistics from the Eastern 1 and 2 management units are lacking and the impact of spring hunting and crippling on the Taiga Bean Goose population are not known. Finally, almost nothing is known about the rates of possible exchange of individuals between the management units. Activities envisaged to close these knowledge gaps are presented in Chapter 6 (Table 9).

It is hereby important to recognise that knowledge gaps should not be seen as a reason to stop the conservation process, but rather as issues of attention that need to be addressed in the implementation. AEWA Species Action Plans often need to set actions without having a complete scientific basis and understanding, and as stated in the AEWA Agreement (Article III, paragraph 2 [b)]), any use of migratory waterbirds shall be based on an assessment of the best available knowledge, thus accepting that there might be knowledge gaps.

Table 6. Estimated level and quality of available knowledge concerning the population size, demography, delineation of flyways (distribution) of the Taiga Bean Goose and hunting bags of Bean Goose by management unit.

Key:
Good = based on reliable or representative quantitative data;
Medium = based on incomplete quantitative data;
Poor = based on scattered observations or not based on quantitative data but reflects "best guess" derived from circumstantial evidence;
N/A = not available.

Subject		**Management Unit**			
		Western	**Central**	**Eastern 1**	**Eastern 2**
Population size and trend	Breeding	Poor	Poor	N/A	N/A
	Wintering	Medium	Medium	Poor	N/A
Demography	Survival	N/A	Poor	N/A	N/A
	Productivity	N/A	Poor	N/A	N/A
Delineation of flyways	Breeding areas	Medium	Medium	Poor	Poor
	Moulting areas	Poor	Poor	N/A	N/A
	Wintering areas	Good	Medium	Poor	Poor
	Staging areas	Good	Medium	Poor	N/A
Hunting bags	Annual bag size	N/A	Medium	N/A	N/A
	Separation of subspecies	N/A	Poor	N/A	N/A

5. Policies and Legislation Relevant for Management

A summary of international conservation and legal status of the Taiga Bean Goose population is given in Table 7.

5.1 Global Conservation Status

The Bean Goose is categorised as a species of Least Concern (LC) in the IUCN global Red List. This is because no distinction is made between the subspecies, and the much larger population of the Tundra Bean Goose is considered stable (IUCN 2013).

5.2 International Conventions, Agreements and Legislation

5.2.1 Convention on the Conservation of Wildlife and Natural Habitats (Bern Convention)

The aims of the Bern Convention are to conserve wild flora and fauna and their natural habitats, especially those species and habitats whose conservation requires the cooperation of several states, and to promote such cooperation. Particular emphasis is given to endangered and vulnerable species, including endangered and vulnerable migratory species.

The Bean Goose is listed on Appendix III of the Convention including protected fauna species. Any exploitation of wild fauna specified in Appendix III shall be regulated in order to keep the populations out of danger. Measures to be taken shall include *inter alia* closed seasons and/or other procedures regulating the exploitation; and temporary or local prohibition of exploitation, as appropriate, in order to restore satisfactory population levels. The Contracting Parties to the Bern Convention undertake to coordinate their efforts for the protection of the migratory species specified in Appendices II and III whose range extends into their territories. Contracting Parties shall also take measures to seek to ensure that the closed seasons and/or other procedures regulating the exploitation are adequate and appropriately disposed to meet the requirements of the migratory species specified in Appendix III.

5.2.2 Convention on the Conservation of Migratory Species of Wild Animals (CMS)

The Bean Goose is listed in Appendix II of CMS that refers to migratory species which have an unfavourable conservation status or would benefit significantly from international cooperation organised by tailored agreements. Range States are obliged to work towards maintaining populations in a favourable conservation status.

5.2.3 Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA)

AEWA is a regional intergovernmental agreement developed under the framework of the CMS and administered by the United Nations Environment Programme (UNEP). AEWA operates with a flyway approach for the conservation and management of migratory waterbird populations.

According to Article II of the Agreement: '*Contracting Parties shall take coordinated measures to maintain migratory waterbird species in a favourable conservation status or to restore them to such a status. To this end, they shall apply within the limits of their national jurisdiction the measures prescribed in Article III, together with the specific actions determined in the Action Plan provided for in Article IV...*' Any use of migratory waterbirds must be based on an assessment of the best available knowledge of their ecology and be sustainable for the species as well as for the ecological systems that support them.

The status of the Taiga Bean Goose population wintering in Europe (North-east Europe/North-west Europe) in Table 1 of the AEWA Action Plan is A3c*, i.e. Column A, population numbering between around 25,000 and around 100,000 individuals (Category 3) and considered to be at risk as a result of showing significant long-term decline (c). For those populations marked with an asterisk (*), hunting may continue on a sustainable basis within the framework of an international species action plan, through which Parties will endeavour to implement the principles of adaptive harvest management. The Taiga Bean Goose population wintering in Central Asia (West & Central Siberia/Turkmenistan to W China) is on Column A, Category 1c (i.e. populations numbering less than around 10,000 individuals), which implies that the population is strictly protected.

The range states of the Taiga Bean Goose are Parties to CMS with the exception of the Russian Federation, and to AEWA with the exception Belarus, Kazakhstan, Poland and the Russian Federation.

5.2.4 Ramsar Convention on Wetlands

The Ramsar Convention is an intergovernmental treaty that embodies the commitments of its member countries to maintain the ecological character of their Wetlands of International Importance and to plan for the sustainable use of all of the wetlands in their territories. The Convention requires that each Contracting Party designates at least one suitable wetland within its territory for inclusion in the List of Wetlands of International Importance. All the range states of the Taiga Bean Goose are Contracting Parties to the Ramsar Convention.

5.2.5 EU Directive on the Conservation of Wild Birds

The EU Birds Directive (2009/147/EC) relates to all species of naturally occurring birds in the wild state in the European territory of the Member States to which the Treaty applies. It covers the protection, management and control of these species and lays down rules for their exploitation. Member States shall take the requisite measures to maintain the population of the species at a level which corresponds in particular to ecological, scientific and cultural requirements, while taking account of economic and recreational requirements, or to adapt the population of these species to that level.

The Bean Goose is referred to in Annex II, Part A, of the Directive. These species may be hunted under national legislation in the geographical sea and land area where the Directive applies. Member States shall ensure that the hunting of these species does not jeopardise conservation efforts in their distribution area.

Table 7. Summary of international conservation and legal status of the Taiga Bean Goose population.

Global IUCN Red List status	CMS	AEWA	Bern Convention	EU Birds Directive
Least Concern[1]	Appendix II[1]	Column A, category 3c*[2] Column A, category 1c[3]	Appendix III[1]	Annex II/A[1]

[1] Applies to *Anser fabalis.*
[2] Applies to *Anser fabalis fabalis* (North-east Europe/North-west Europe).
[3] Applies to *Anser fabalis fabalis* (West & Central Siberia/Turkmenistan to W China).

5.3 National Laws, Policies and Ongoing Activities

Appendices 5-7 provide detailed information on the conservation status and hunting of Taiga Bean Geese, current management measures affecting them, and a summary of ongoing monitoring programmes and research activities in the range states. In summary, hunting on Bean Geese is allowed in at least eleven range states that support the Taiga Bean Goose. Spring hunting is practiced in Russia and Belarus, and special open seasons for protective hunting are effective in Sweden and Germany. Bag limits are applied only in Russia and in Ukraine (see Appendix 4).

Current management measures are mostly aimed at the regulation of hunting and habitat management. In a few range states there are working groups or forums for management. So far, a national action plan has only been prepared in Finland (see Appendix 5).

International goose counts conducted in January are an important part of the International Waterfowl Census (IWC) coordinated by Wetlands International. Due to the failure to separate the two subspecies, there is uncertainty about the extent to which the total count for Taiga Bean Geese reflects the reality, but steps continue to be taken to improve this situation. Indications of serious declines in the early 2000s demanded more reliable population estimates for the Taiga Bean Goose, and recent efforts have been made (especially in Germany and Sweden) for a better separation of the subspecies (see Appendix 6). Ringing and other studies are currently under way in Finland, Sweden, Norway, Germany and the United Kingdom in an effort to gain better information about flyway populations, links between areas used at different stages of the annual cycle and annual survival rates (see Appendix 6).

6. Framework for Action

6.1. Introduction

This International Single Species Action Plan focuses primarily on providing the tools and working models with which a biologically favourable conservation status can be achieved for the Taiga Bean Goose, whilst recognising the social, recreational and economic dimensions of wildlife-human interactions. The Action Plan serves as the agreed framework under which range states and stakeholders will cooperate towards the conservation and sustainable use of this species. Further, more precise measures and concrete actions – for example regarding possible hunting quotas and/or hunting bans – will be developed and agreed upon by the range states in a second step within the AEWA Taiga Bean Goose International Working Group whilst implementing the principles of adaptive harvest management.

6.2. Goal, Objectives, Results and Actions

The long-term **Goal** below is the ultimate conservation objective to which this Action Plan contributes. The stakeholder workshop requested the drafting group to define target population sizes for the sub-populations. The tentative targets below refer to winter population size and are based on a preliminary estimate that when the actions defined in this Plan are being implemented, the population will be able to grow at an annual rate of 3.5%.

Long-term Goal:

To restore and maintain the population at the favourable conservation status of around 165,000-190,000 birds (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). Targets for the next 20 years in each of the management units:

- Western: 4,000 birds
- Central: 60,000 birds
- Eastern 1 & 2: 30,000 birds.

The **Purpose** of this Action Plan, is to stabilise the overall population size as well as the numbers in each sub-population at least at their current levels within 5 years, and to enable the sub-populations to start to recover and increase within 10 years.

To achieve the purpose of this Plan and the long-term goal, the following objectives have been established in consultation with national authorities and key stakeholders.

Objectives:

1. Increase survival rate of adults.
2. Increase reproductive rates.
3. Stop ongoing loss, fragmentation and degradation of habitats, and restore lost, fragmented and degraded habitats.

The following Results need to be achieved with a set of actions to reach the Objectives, the Purpose and the Long-term Goal (the first digits 1–3 of numbering refer to Objectives 1–3 respectively)**:**

1.1 Legal harvest does not jeopardize an increase of adult survival rates.

1.2 Illegal harvest is reduced to non-significant levels.

1.3 Impact of huntable native predators on breeding and moulting areas is reduced.

1.4 Impact of alien predators on breeding and moulting areas is reduced.

1.5 Lead poisoning is minimised.

1.6 Poisoning and contamination from oil on breeding areas is minimised.

2.1 Disturbance on breeding and spring staging areas is reduced.

2.2 Inter-specific competition on spring staging areas is reduced.

3.1 Impact of forestry works is reduced.

3.2 Grassland habitats on spring staging areas are restored and maintained.

3.3 Breeding and staging habitats are not further lost due to oil and gas developments.

3.4 Impact of agriculture on natural Taiga Bean Goose habitats is minimised.

Actions to be taken in relevant range states to achieve the required results with the priorities, time frames and responsible bodies are shown in Table 8. Timescales are attached to each action using the following criteria:

- **Immediate**: to commence within the next year
- **Short**: to commence within the next 3 years
- **Medium**: to commence within the next 5 years
- **Long**: to commence within the next 10 years
- **Ongoing**: an action that is currently being implemented and should continue
- **Rolling**: an ongoing action that is evolving and changing in response to changes in need and expectation.

Adjustments to the actions being implemented will be required depending on how the status of the species evolves in the various management units as identified in the Action Plan. Such possible adjustments will be considered and decided upon within the AEWA Taiga Bean Goose International Working Group.

Table 8. Actions to be taken on the basis of the Objectives (1–3) and expected Results (1.1. –3.4.) for the Taiga Bean Goose International Single Species Action Plan framework, including relevant range states and management units, priority, timescale and responsible bodies for each action.

Objectives	Results	International/National actions	Relevant range states	Relevant management units	Priority	Timescale	Responsibility
1. Increase survival rate of adults	1.1. Legal harvest does not jeopardise an increase of adult survival rates	1.1.1. Develop and implement international **a**daptive harvest management framework. Obey the principles of sustainable harvest management and decision-making framework for harvest management as described in the revised AEWA Guidelines for sustainable harvest of migratory waterbirds[3] adopted by MOP6. Obtain accurate estimates of (sub) population size, and robust demographic and harvest data.	RU, FI, SE, NO, DK, EE, LV, LT, UA, BY, PL, DE, NL	W, C, E 1&2	Essential	Immediate Rolling	Relevant national authorities
		1.1.2. Develop and implement an international framework for resolving agricultural conflict which includes the Taiga Bean Goose, including the use of non-lethal methods	SE, DE	W, C	Medium	Short	Relevant national authorities; Board of Agriculture
		1.1.3. Raise awareness amongst hunters on the need and ways to reduce crippling	RU, FI, SE, NO, DK, EE, LV, LT, UA, BY, PL, DE, NL	W, C, E 1&2	Medium	Short Rolling	Hunting organisations
	1.2. Illegal harvest is reduced to non-significant levels	1.2.1. Strengthen enforcement on persecution through intentional poisoning, harvest of moulting birds and shooting outside of season	RU, FI, SE, NO, DK, EE, LV, LT, UA, BY, PL, DE, NL	W, C, E 1&2	High	Immediate Rolling	Policing institutions; Hunting organisations;

[3] http://www.unep-aewa.org/en/publication/aewa-conservation-guidelines-no-5-guidelines-sustainable-harvest-migratory-waterbirds-ts

Objectives	Results	International/National actions	Relevant range states	Relevant management units	Priority	Timescale	Responsibility
							Relevant national authorities
		1.2.2. Raise identification skills and awareness of the status of different goose species amongst hunters	RU, FI, SE, NO, DK, EE, LV, LT, UA, BY, PL, DE, NL	W, C, E 1&2	High	Short Rolling	Hunting organisations; Relevant national authorities; NGO's
	1.3. Impact of huntable native predators in breeding and moulting areas is reduced	1.3.1. Maintain and strengthen predator control measures in breeding and moulting areas	FI, NO, SE	C	Medium	Ongoing Rolling	Hunting organisations; Relevant national authorities
	1.4. Impact of alien predators in breeding and moulting areas is reduced	1.4.1. Maintain and strengthen alien predator control and eradication measures in breeding and moulting areas	FI	C	Medium	Ongoing Rolling	Hunting organisations; Relevant national authorities; Environmental agencies
	1.5. Lead poisoning is minimised	1.5.1. Comply with AEWA provisions on the phasing out of lead ammunition for hunting in wetlands	EE, LV, LT, UA, DE, UK	C, E 1&2	High	Ongoing	Relevant ministries and agencies
	1.6. Oil poisoning and contamination in breeding areas is minimised	1.6.1. Minimise oil pollution by strengthening enforcement of rehabilitation of oil stations	RU	E 1&2	Medium	Rolling	Ministry of natural resources and relevant agencies
2. Increase reproductive rates	2.1. Disturbance in breeding and spring staging areas is reduced	2.1.1. Introduce seasonal reserve protection at key staging and breeding areas	RU	E 1&2	Essential	Immediate	Regional authorities
		2.1.2. Involve local stakeholders in the voluntary reduction of human access to key breeding areas in critical periods	FI, SE	C	Medium	Ongoing	Local authorities

Objectives	Results	International/National actions	Relevant range states	Relevant management units	Priority	Timescale	Responsibility
	2.2. Interspecific competition in spring staging areas is reduced	2.2.1. Maintain the unharvested-fields-for-birds programme within the Common Agricultural Policy (CAP) of the European Union	SE	C	Medium	Ongoing	Ministry of Agriculture; Local authorities
3. Stop ongoing loss, fragmentation and degradation of habitats, and restore lost, fragmented and degraded habitats	3.1. Impact of forestry works is reduced	3.1.1. Continue the adaptation of forestry operations to take into account wildlife, in particular Taiga Bean Goose	FI, SE, RU	C	High	Ongoing	Relevant ministries Industry
		3.1.2. Continue restoring mires used by Taiga Bean Geese that have been affected by past drainage	FI	C	High	Ongoing	Relevant ministries and agencies
	3.2. Grassland habitats in spring staging areas are restored and maintained	3.2.1. Maintain grassland restoration as part of CAP, in agricultural policies and actions to restore suitable grasslands as feeding habitat in key staging areas.	SE, RU	C, E 1&2	Low	Ongoing	Ministry of Agriculture; Local and Regional authorities
	3.3. Breeding, staging and wintering habitats are not further lost due to oil and gas or renewable energy developments	3.3.1. Take account of Taiga Bean Goose breeding, staging and wintering habitats in the planning of new oil and gas and renewable energy developments	RU, FI, SE, DK, PL, DE	E 1&2	Medium	Rolling	Relevant ministries and agencies
	3.4. Impact of agriculture on natural Taiga Bean Goose habitats is minimised	3.4.1. Restore wet grassland habitats in staging and wintering areas	DE, DK, PL	W, C, E 1&2	Medium	Long	Regional authorities

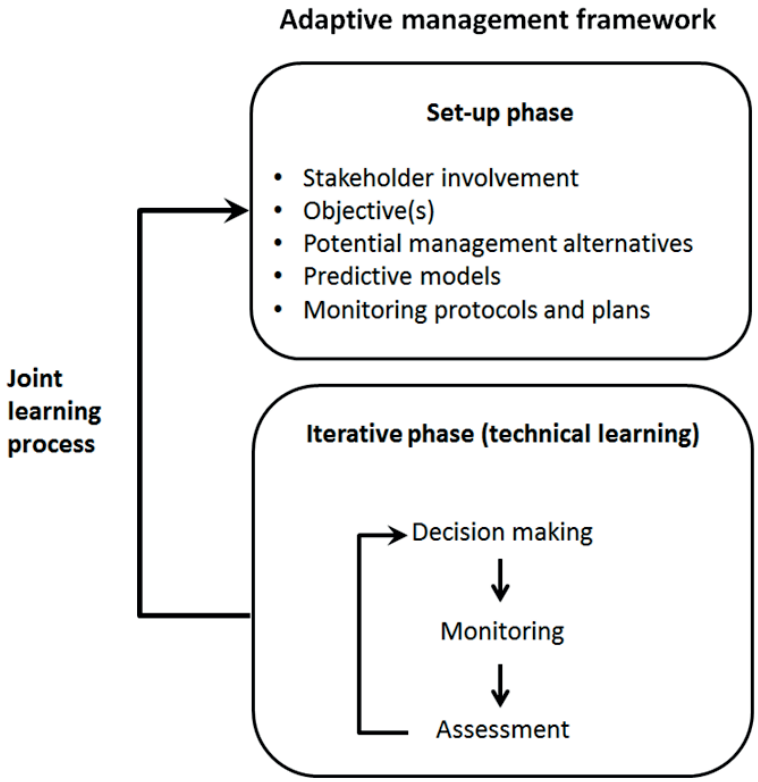
6.3. Ensuring Sustainable Use Through Adaptive Harvest Management

From the summarised threats in Table 4, it is evident that the unfavourable conservation status of the Taiga Bean Goose is due to the current unfavourable balance between annual reproductive success and annual mortality, which results in a negative population growth rate. In Table 8, the Action Plan outlines actions which can be implemented to elevate reproductive success (e.g. through predator control, minimising pollution, reduction of disturbance and habitat restoration), but also recognises that the most urgent and likely most effective actions for a long-lived species such as the Taiga Bean Goose concern the reduction of avoidable annual mortality. In such species, changes in adult survival generally contribute more to population growth rates than similar changes in productivity (e.g. Sæther & Bakke 2000).

For this reason, and to fulfil the goal of ensuring that hunting conforms to the long term sustainability of the population at the specified levels, particular emphasis is placed upon action 1.1.1. in Table 8, namely the development and implementation of an international Adaptive Harvest Management (AHM) framework which coordinates the process at supra-national level through the AEWA Taiga Bean Goose International Working Group following the adoption of this Plan. The key objective of the AHM is to adjust harvest levels to reflect the current status of the population in a way that current harvest does not jeopardise future harvest opportunities (Figure 5; see Appendix 7). However, the AHM is not necessarily a tool to maximise harvest; it is an efficient tool to guide any process where uncertainties prevail about the system dynamics, delineation of management units and impact of harvest (more information on the principles of adaptive harvest management processes are presented in Appendix 7).

The implementation of the AHM framework relies upon the outputs of work currently being undertaken: for instance, assessing the survival rates of Taiga Bean Geese from past capture-mark-recapture data, assessing the effects of stopping hunting in Jutland, Denmark on population trends of geese wintering there and developing models of survival in relation to differential hunting levels. All these research activities are ongoing and will contribute to the development of the adaptive management process under the framework of the Plan. This part of the process will be coordinated by all range states and stakeholders in the International Working Group to be established for the implementation of the Plan (see Chapter 7 and Appendix 8 for more details).

Figure 5. Graphical representation of the operational steps in the adaptive management process (adapted from Williams et al. 2009). For a more detailed presentation of the process, see Appendix 7.



6.4. Suggested Monitoring and Research Activities

Table 9 shows a list of monitoring and research activities required to close key knowledge gaps (Table 6) and particularly to provide the basic demographic and harvest data needed for modelling to support an effective application of Adaptive Harvest Management. The international monitoring scheme for the Taiga Bean Goose should be integrated with the International Waterbird Census as appropriate. An international neck-banding and neck-band monitoring scheme is needed both to generate survival rate estimates and to refine the delineation of flyways. Active searching for and reading of neck bands should be included in the fieldwork both for productivity estimates in autumn and population estimates in winter.

One interesting option regarding productivity in the Central management unit is whether the results of the annual late-summer censuses on forest grouse chick production in Finland (Lindén et al. 1996) could provide a useful index of productivity in sympatric Taiga Bean Geese. The analysis of the stable hydrogen isotope ratios in feathers of Taiga Bean Geese obtained throughout the annual cycle is expected to contribute substantially to our understanding of the geographical origin of the sample birds and the relationships between breeding, staging, moulting and wintering areas. This method is based on the fact that the deuterium isotope of hydrogen becomes more depleted the further inland into continental Eurasia one travels.

Immediate priority is given to analysing available data from ring recoveries and re-sightings of neck-banded birds and from satellite tracking to fill knowledge gaps with regard to deriving more robust estimates of survival and reproductive rates, population size, flyways and hunting bags.

Table 9. Key monitoring and research activities required to improve the level and quality of knowledge concerning the population size, demography (survival and productivity), delineation of flyways (distribution) and hunting bags of the Taiga Bean Goose.

Subject	**Monitoring or research activity**	**Key points of activity**	**Season/interval**	**Responsibility**
Population size and trend	Integrated international monitoring scheme	Improved coordination; Extension of coverage; Separation of subspecies; Recruitment and training of counters	Mid-January/biannual	National Authorities; Aarhus University; Wildfowl & Wetlands Trust (WWT)
Survival	International neck-banding and neck-band monitoring scheme	Increasing the number of birds marked; Training of observers	Mainly winter & staging/annual	National Authorities; Aarhus University; WWT
Productivity	Productivity monitoring scheme	Juvenile percentage; Family flock size; Training of counters	September–November/annual	National Authorities; Aarhus University; WWT
Delineation of flyways	International neck-banding and neck-band monitoring scheme; Telemetry study; Stable isotope analysis of feathers	Increasing the number of birds marked; Collection of feather samples.		National Authorities; Aarhus University; WWT
Hunting bags	Advanced bag reporting systems	True bag sizes; Separation of subspecies (picture, feather sample)	Hunting season/annual	National authorities

7. International Coordination of Action Plan Implementation

Appropriate organisational and management structures are vital to the successful and coordinated implementation of the Action Plan. To this end, an inter-governmental AEWA Taiga Bean Goose International Working Group (AEWA TBG IWG) consisting of designated government representatives and national experts from all range states as well as experts from the international conservation and hunting communities will be convened by the UNEP/AEWA Secretariat following the adoption of the plan.

The IWG will coordinate and guide the implementation and further development of the actions foreseen in the Action Plan, including Adaptive Harvest Management. Under the framework of the Action Plan and the International Working Group, range states are encouraged to establish National Working Groups and to develop and adopt National Action Plans for the Taiga Bean Goose. Guidelines for the establishment of the IWG and National Working Groups are presented in detail in Appendix 8.

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Appendix 1 – Provisional Flyway Management Units Suggested for the Taiga Bean Goose

Introduction

This analysis attempts to relate the available knowledge of approximately where Taiga Bean Geese breed, stage and overwinter to how birds move between them (Figures A-C), as the basis for a framework that helps to identify flyway management units that share common breeding, staging and wintering areas. This process is fundamental to the implementation of the Action Plan, because if it proves that these separate management units show differing population dynamics and trends, the definition of these discrete units will help to define spatially explicit management actions, their priority and urgency. These actions may differ between the different management units because of contrasting pressures on their numbers in the different units.

The delineation of the provisional management units presented here is based on combining data from various sources. These include data from GPS-based telemetric studies; recoveries and re-sightings of neck-banded birds and from the recoveries of leg rings; from regular goose counts and special Taiga Bean Goose counts (conducted by Thomas Heinicke in Sweden, Denmark, Germany and Poland) and aerial monitoring of staging geese (conducted by Sonia Rozenfeld in Western Siberia); data from bird observation online portals from Sweden (www.artdata.slu.se), Norway (www.fugler.no), Denmark (www.dofbasen.dk) and Finland (www.tiira.fi) and www.geese.org; Bird Ringing Center of Russia; other published and unpublished observations on the occurrence of Taiga Bean Geese throughout the range and the annual cycle.

The observations on the colour-ringed Taiga Bean Goose goslings reared in captivity and released in Central Sweden in 1974–1991 (von Essen 1982, Svensson et al. 1999) were excluded from the present scrutiny. However, the available data are far from comprehensive, and thus the delineation is subject to updating and change, based on new scientific evidence.

Western Management Unit

Breeding

The breeding range of the Western sub-population encompasses northern boreal landscapes along the central and southern parts of the Scandinavian Mountain Range (Mellquist & von Bothmer 1982, Follestad 1994, Svensson et al. 1999, Ottosson et al. 2012; Fig. A). The range has contracted and fragmented since the early 1900s (Mellquist & von Bothmer 1984) so that three relatively small breeding areas are known at present: in Western Central Sweden (northern Dalarna), further north in South-west Västerbotten, Northern Sweden, and in Central Norway (Nord-Trøndelag).

However, the exact boundaries of each breeding occurrence are unclear, and it is possible that the Central Swedish breeding area extends to an adjacent area (Hedmark) in Eastern Norway. Observations of successful breeding have been reported from each of the three areas in the 2000s (Grund 2014, A. de Jong & I. Vahlström unpubl.).

Moulting and moult migration

Several concentrations of moulting Taiga Bean Geese were discovered in Southern Västerbotten in Swedish Lapland in the 1980s and 14 concentrations during a helicopter search in 2008, when over one hundred individuals were counted in the largest flocks (Eriksson & Henricsson 1990, Nilsson et al. 2008). Since 2012, new moulting sites have been discovered in the area during targeted ground surveys (A. de Jong unpubl.). These birds probably belong to the local breeding population, and even geese breeding in Central Sweden and Central Norway are thought to moult in nearby sites (L. Griffin & C. Mitchell unpubl.). However, a case of

moult migration was evidenced in 2013, when two Taiga Bean Geese fitted with transmitters moved 100 km from Nord-Trøndelag to one of the known moulting sites in Vilhelmina, Swedish Lapland (J.E. Østnes unpubl.).

Autumn migration

Taiga Bean Geese neck-banded in Swedish Lapland mostly stage in the area around Lake Östen and Lake Ymsen in Southern Central Sweden in autumn (www.geese.org). Birds from the breeding area in Central Sweden mostly stage in Akershus, South-east Norway, and North-west Jutland, Denmark (Parslow-Otsu 1991, Bregnballe et al. 2003, L. Griffin & S. Rix unpubl.).

Wintering

Swedish breeding Taiga Bean Geese (c. 300–400) of the Western management unit winter in two main areas in Britain (Parslow-Otsu 1991, Fransson & Pettersson 2001, Mitchell et al. 2010) so that part of the birds from Central Sweden winter in Scotland and the birds from Västerbotten, Northern Sweden, in Norfolk. The rest of the birds from both breeding areas as well as those from Central Norway winter mainly in North-west Jutland in Northern Denmark (Parslow-Otsu & Kjeldsen 1992, Bregnballe et al. 2003). A small number of birds may even stay in the southernmost parts of Sweden and Norway throughout mild winters (Follestad 1994, I.J. Øien, T. Aarvak & A. Espelien unpubl., www.geese.org). Taiga Bean Geese arrive in North-west Jutland in September through October.

Spring migration

Taiga Bean Geese wintering in Scotland return to their breeding grounds in Central Sweden via staging areas in North-west Jutland, Denmark, from which they depart in March through April (Parslow-Otsu 1991, Bregnballe et al. 2003). From the spring staging sites in South-east Norway and in South-west Sweden they then take inland routes along both sides of the Scandinavian Mountain Range (L. Griffin & S. Rix unpubl., J.E. Østnes unpubl., www.artdata.slu.se).

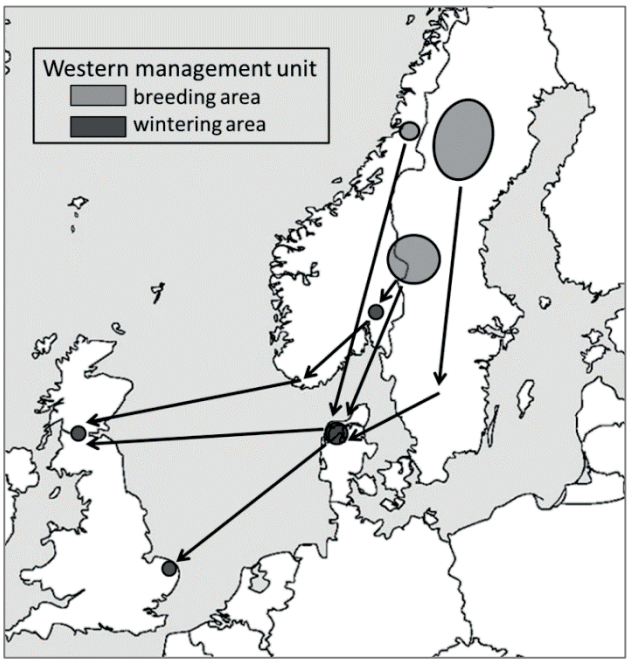

Figure A. The provisional Western Management Unit of the Taiga Bean Goose.

Central Management Unit

Breeding

Knowledge of the present breeding distribution in Finland, Northern Norway and northernmost Sweden comes from Bird Atlas surveys and also from transect surveys and point counts in Sweden (Follestad 1994, Svensson et al. 1999, Valkama et al. 2011, Ottosson et al. 2012). However, because migratory data on birds breeding in Northernmost Sweden are scarce, the border between the Western and the Central sub-populations in northern Sweden is unclear. Systematically collected data on breeding distribution are not available for the Russian part of the Central sub-population, however, Taiga Bean Geese are known to breed in the southern parts of the Kola Peninsula, in Karelia south to the Suoyarvsky and Olonets regions (near Lake Ladoga) and in the Arkhangelsk district in the Mezen' river basin (Burgers et al. 1991, Mooij & Zöckler 1999, Poyarkov 2008, A. Artem'ev & Û. Logvinov pers. comm.; Figure. B).

Much of the breeding range of the Taiga Bean Goose here apparently overlaps the distribution of minerotrophic "aapa" mires (von Haartman et al. 1963, Pirkola & Kalinainen 1984a). Aapa mires are widespread in the northern and middle boreal forest subzones, the central parts of which are characterised by typical "ribbed" patterns of narrow transverse strings, broad flarks and pools (Kobyakov & Jakovlev 2013).

The major distributional gap in the northern parts of European Russia (see Figure 2 in the main text), where areas are thought to support very low breeding densities, has been ascribed to increased human activity in the area (Mooij & Zöckler 1999) but could also be explained by the scarcity of suitable habitat. In Arkhangelsk Oblast there are aapa mires especially in the west and north-east, but they are less common than e.g. in the "aapa-province" of Northern Karelia (Kobyakov & Jakovlev 2013).

Moulting and moult migration

Adults with broods moult in their breeding areas, and the moulting groups usually constitute less than 20 individuals (von Haartman et al. 1963, Waaramäki 1970, Pirkola & Kalinainen 1984a). In contrast, many non-breeders and failed breeders from Northern Finnish and Swedish breeding areas migrate around mid-June to the Kola Peninsula or Novaya Zemlya to moult, as shown by satellite tracking, neck-band recoveries and other observations (Pirkola & Kalinainen 1984a, Nilsson et al. 2010, Paasivaara 2012 and unpubl., Saurola et al. 2013; Fig. B). Moulting flocks also occur in Finnmark, Northern Norway, where Tveit (1984) marked 600 subadult Bean Geese at two moulting areas in 1969-1972, unfortunately without reference to subspecies. By contrast, only a few relatively small moulting groups were found during aerial searches in Northernmost Sweden in 1970s or in 2008 (Nilsson et al. 2008).

Autumn migration

Autumn migration of Taiga Bean Geese takes place in Finland during late August to late October, peaking in the second half of September (Pöyhönen 1995, Pessa et al. 2004a). Finnish satellite-tracked geese departed breeding or moulting areas mostly in September (Paasivaara 2012). Family groups start migration earlier than non-breeders and failed breeders (Pessa et al. 2004a). Taiga Bean Geese breeding in Northern Central Finland migrate south along the eastern coast of the Gulf of Bothnia, but generally Bean Geese disperse throughout Finland in autumn, making fewer or no stops compared to spring (Pessa et al. 2004a, Paasivaara 2012). Geese from Russia are thought to migrate south of the Baltic in autumn, but since no birds have been ringed in the Kola Peninsula, Karelia or in Arkhangelsk district, their precise migration routes are not known (Nilsson et al. 1999, Heinicke 2010b).

Breeding Taiga Bean Geese neck-banded in Northern Finland arrive at Southern Swedish staging areas in September and especially October (Nilsson 1984, 2000 and 2011, Nilsson & Pirkola 1991, Nilsson & Månsson 2012). Taiga Bean Geese have established new important staging areas in recent decades (Nilsson 2000, 2011, 2013). In the late 1970s, most Taiga Bean Geese used Scania, but later Lake Tåkern became the most important autumn staging site, a role now being taken over by Kvismaren and Östen, areas formerly only used in spring. Taiga Bean Geese also stay longer further north in Southern Sweden since 2000, arriving at former staging areas in Scania with the first autumn frosts. Such behavioural changes can be explained by the expansion in the area of autumn-sown cereals and availability of harvest waste in northern parts of Southern Sweden where they also avoid hunting in Southernmost Sweden (Nilsson 2000).

Wintering

Taiga Bean Geese breeding in Finland and Northernmost Sweden (and possibly geese breeding in the Russian parts of the Central management unit) winter mainly in Scania, Southernmost Sweden, and Southeastern Denmark (Nilsson et al. 1999, Nilsson 2011, Paasivaara 2012, Saurola et al. 2013). These geese previously moved further south to Western Germany and the Netherlands during cold winter periods (Nilsson 1984, Nilsson & Pirkola 1991, Nilsson et al. 1999), but since 2000, they have not moved beyond Denmark (Nilsson 2011). This kind of modification in movement pattern is called "short-stopping" and generally assigned to climate change. Numbers of Taiga Bean Geese wintering in the Netherlands declined from an average of 17,850 geese in the mid-1980s to 200 during the 2000s (Koffijberg et al. 2011), during which time numbers wintering in northern parts of South Sweden have slightly increased.

Spring migration

In Southern Sweden, Taiga Bean Geese usually start spring migration in March, when they are observed all the way from Scania to the province of Uppland, Eastern Sweden (Nilsson 2011), starting nowadays earlier than prior to 2000, probably due to advancing springs, with spring staging in the Ume River Delta also advanced in the 2000s compared to the 1970s (Nilsson & Persson 1984, L. Nilsson unpubl.).

Taiga Bean Geese migrate from South Swedish and possibly Danish wintering areas through Southern Sweden to the provinces of Närke, Västmanland, Södermanland and Uppland. Those breeding in Northernmost Sweden and part of birds from Finnish and neighbouring Russian breeding areas migrate along the west coast of the Gulf of Bothnia (Nilsson & Persson 1984, Nilsson & Pirkola 1991, Nilsson et al. 2010). The two most important spring staging areas in Northern Sweden are in the districts of Umeå (Ume River Delta and Bråns jön) and Luleå (Alvik and Ersnäs) (Nilsson & Persson 1984, Heinicke 2010a).

Most birds breeding in Finland and Westernmost Russia migrate from Södermanland and Uppland in Sweden over the Gulf to South-western Finland (Lampio 1984, Nilsson 1984, Nilsson et al. 1999, Nilsson 2011, Paasivaara 2012), where the most important staging sites are located in Pori, Kristiinankaupunki and Kauhajoki, and further north in the district of Oulu (e.g. Liminka, Lumijoki, Siikajoki and Tyrnävä) along the Bothnian Bay (Pessa et al. 2004b), where spring migration has advanced ten days between the 1970s and 2001-2004 (Pessa et al. 2004b). The migration patterns of the Northern Norwegian breeding birds are not known. Taiga Bean Geese staging in Olonets, Karelia, are thought to nest east or north-east to Karelia, and possibly in the Arkhangelsk district (Zimin et al. 2007).

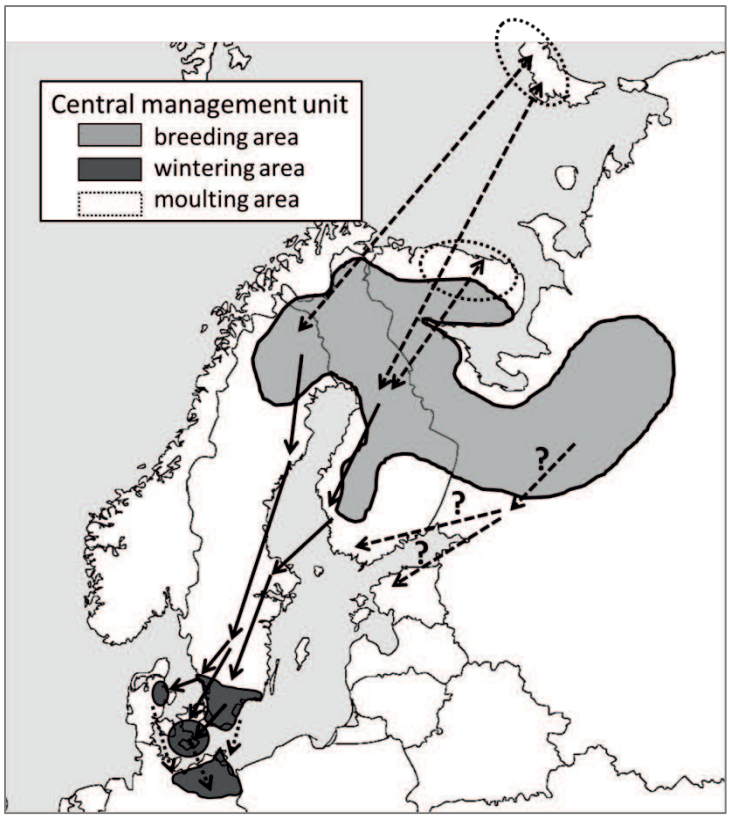

Figure B. The provisional Central Management Unit of the Taiga Bean Goose. The dashed two-way arrows indicate linkages between breeding areas and known moulting areas in Novaya Zemlya and the Kola Peninsula.

Eastern 1 Management Unit

Breeding

Taiga Bean Geese belonging to the Eastern 1 sub-population breed in two distinct areas, in the upper Pechora region in South-eastern Komi west to the Ural Mountains, and in Western Siberian lowlands including at least the Ob River basin and the northern parts of Tûmen Oblast in the south (Lebedeva 1979, Burgers et al. 1991, Vartapetov 1998, Mooij & Zöckler 1999; Fig. C). There are aapa mires in the Pechora region in South-eastern Komi (Gajzer et al. 2011), however, in some parts of Russia, Taiga Bean Geese are not so dependent upon aapa mires for breeding habitat (Râbicev 2001, Golovatin & Pashalnyj 2004, Poyarkov 2008).

Moulting and moult migration

Little is known about the moult and moult migrations of Russian Taiga Bean Geese. In the Yamalo-Nenets and Khanty-Mansi regions, geese moult solitarily or in groups of 4-14 individuals, with the maximal size of the moulting group recorded being 25 birds (Golovatin & Pashalnyj 2004). In Yamalo-Nenets, known moulting areas are the Pyakolsky Reserve as well as Pur, Taz and Nadym river basins, and in Khanty-Mansi the Yougansky State Reserve.

Autumn migration

In Western Siberia, Taiga Bean Geese mostly migrate south through Dvuobje via a network of extensive wetlands associated with tributaries of the Lower Ob River, although Bean Geese also migrate along the Taz, Pur and Nadym rivers east of the Dvuobje area (Strelnikov & Strelnikova 1998, S. Rozenfeld unpubl.). In North-west Europe geese from Russia migrate south of the Baltic in autumn (Lebedeva 1979, Nilsson et al. 1999, Heinicke 2010b).

Wintering

Taiga Bean Geese from the Eastern 1 sub-population winter principally in North-east Germany and North-west Poland (Lebedeva 1979, Nilsson et al. 1999, Heinicke 2010b) and possibly in lower numbers in Southern Sweden (L. Nilsson unpubl.) and in the Netherlands (Koffijberg et al. 2011).

Spring migration

The spring migration routes for Taiga Bean Geese wintering in Germany and Poland are not well known, but they are mainly thought to trace their autumn migration routes (Lebedeva 1979, Skyllberg et al. 2008, Heinicke 2010b). Grassland fields in the Olonets region (east of Lake Ladoga) are vital spring staging areas (up to 14,000 birds, but these are not separated from Tundra Bean Geese, which constitute 95% of the hunting bag, perhaps because Taiga Bean Geese pass through before the start of the season, Artem'ev et al. 2010, S. Rozenfeld unpubl.).

Taiga Bean Geese breeding in the Yamalo-Nenets region and Khanty-Mansi, skirt the Polar Urals in the north (Strelnikov & Strelnikova 1998). The extensive Lower Ob River valley wetlands at Dvuobje constitute the most important spring staging area in NW Siberia for both Bean Goose subspecies (Rozenfeld & Strelnikov 2011, Sirin 2012). Bean Geese concentrate in the Ob Valley near the Irtysh River mouth before dispersing to breeding areas between the Ob and Irtysh rivers, and in Pur, Nadym and the Taz River basins (Lebedeva 1979), with eight major known spring goose stop-over sites in the Pur River basin, Yamalo-Nenets Autonomous Region (Krivenko et al. 1999).

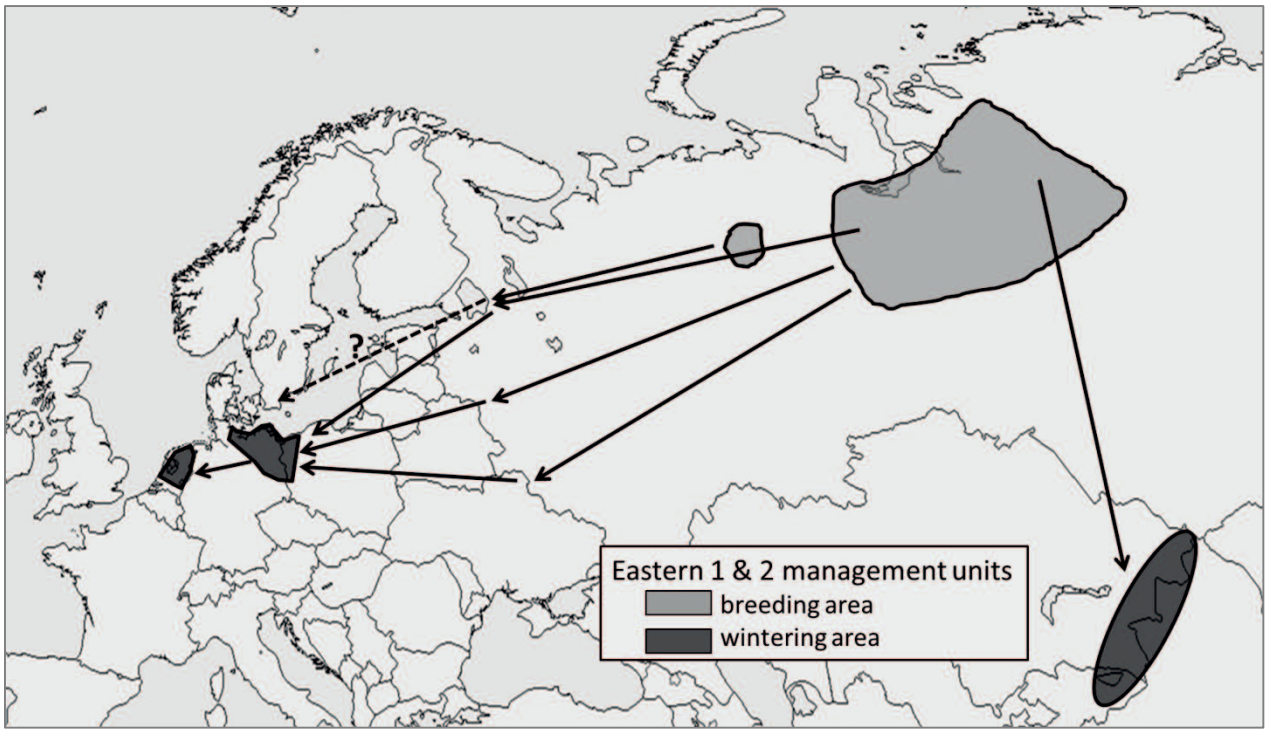

Figure C. The provisional Eastern 1 and 2 Management Units of the Taiga Bean Goose.

Eastern 2 Management Unit

Breeding

Knowledge about the flyway of the Eastern 2 sub-population is very scarce (Figure C). For instance, the boundaries of the breeding range are not known, but it is thought to extend to the Yenisei River valley in the east and to 60º latitude in the south (Mooij & Zöckler 1999, Heinicke 2009).

Moulting and moult migration

The moulting patterns and key moulting sites are not known.

Autumn migration

The Lake Zajsan seems to be an important autumn staging area (Heinicke 2009), but otherwise the autumn migration patterns are not known.

Wintering

Taiga Bean Geese from the Eastern 2 sub-population winter in South-east Kazakhstan, east Kyrgyzstan and North-west China (Heinicke 2009). The disappearance of Bean Geese from South-east Kazakhstan when lakes and reservoirs freeze suggests that their final wintering sites are situated somewhere in North-west China.

Spring migration

The spring migration patterns and key stop over sites are not known.

Appendix 2 – Habitat Use

Breeding Season

Western sub-population/management unit

In Nord-Trøndelag, Central Norway, the breeding habitat of Taiga Bean Geese comprises a large number of small lakes and ponds in a mire/forest landscape below the tree limit. The forest is mainly semi-open alpine mountain birch (*Betula pubescens czerepanovii*) forest. Some of the mires are covered by willow (*Salix* species) thicket above a field layer of sedges (*Carex* species; J.E. Østnes pers. comm.). In South-west Västerbotten, Northern Sweden, the occurrence of Taiga Bean Geese is associated with flark and mixed patterned aapa mires, and valley and sloping mires (Eriksson & Henricsson 1990).

Hay-making practiced on mires in Sweden (and Finland) until around the 1950s probably created suitable breeding and foraging habitat for Taiga Bean Geese here. The decline of the breeding range in central parts of Sweden has been attributed to the cessation of hay-making (Mellquist & von Bothmer 1984). For this reason, re-establishment of traditional hay-making practices to extend the current area of available habitat has been suggested as a potential contribution to habitat restoration on the breeding areas.

Central sub-population/management unit

The breeding home range of the Taiga Bean Goose typically includes a complex of open wet mires, different kinds of wooded mires and forests, ponds and small streams. In Finland and Sweden, the highest densities of breeding geese have been observed in areas dominated by mesotrophic flark aapa mires (Pirkola & Kalinainen 1984a, b, Väisänen et al. 1998, Nilsson et al. 1999; see also Eriksson & Henricsson 1990). In such habitat, mosaic water bodies provide safety from mammalian predators especially during the moulting period, and preferred plant food supplies are available in wetlands and wooded habitats (Pirkola & Kalinainen 1984a).

The home ranges of breeding pairs are often 2,000 hectares or larger in size (Pirkola & Kalinainen 1984a, b, Paasivaara 2012). Breeding pairs show dispersed spacing patterns during nesting, although they are apparently non-territorial, with home ranges overlapping and neighbouring pairs sometimes nesting less than 100 m apart from each other (Waaramäki 1970, von Haartman et al. 1963, Pirkola & Kalinainen 1984a). In spite of the apparent general preference for open mires, 73% of the 96 nests found in Finland in 1971-1980 were in Scots pine (*Pinus sylvestris*) or Norway spruce (*Picea abies*) mire, mineral-soil forest or other wooded habitat and only 27% in treeless mire (Pirkola & Kalinainen 1984a).

Nesting in wooded habitats is unique among indigenous geese of the Western Palearctic (Cramp & Simmons 1977). Some nests in wooded habitats were situated several hundreds of metres away from the nearest open mire. Other authors have reported on similar nesting habitat observations (e.g. von Haartman et al. 1963, Waaramäki 1970).

In Southern Varanger, North-east Norway, as well as in an adjacent area in Northern Finnish Lapland, breeding habitats comprise mires, ponds and lakes, with the Scots pine being the dominant tree species at lower and mountain birch at higher altitudes. It is also possible that some Taiga Bean Geese breed here above the tree line (R. Karvonen pers. comm.). In South-western Karelia where aapa mires are scarce or lacking, Taiga Bean Geese breed along the sides of small rivers (Poyarkov 2008). In Arkhangelsk Oblast, Taiga Bean Geese were reported to breed in forest tundra and taiga (Lebedeva 1979, Û. Logvinov pers. comm.).

During the first weeks after hatching, broods are encountered mostly in wooded habitats, especially in spruce mires with small streams, and only rarely in the ponds of open mires (Pirkola & Kalinainen 1984a). In July,

however, moulting parents with their broods move to open mires, particularly to their wettest parts. Broods of a local breeding population tend to congregate, but the congregations are not very stable (Waaramäki 1970, Pirkola & Kalinainen 1984a). During this period, geese feed mainly on *Scheuchzeria palustris*, *Carex* species and *Menyanthes trifoliata*.

In August when moulting is over, broods again commonly visit wooded habitats and feed there on berries of *Empetrum* species and *Vaccinium myrtillus*. *Equisetum* species are important food plants in spring and early autumn (Pirkola & Kalinainen 1984a). Feeding on berries in late summer is common also in Swedish Lapland (L. Nilsson unpubl.).

Eastern 1 & 2 sub-populations/management units

The main breeding habitats in Yamalo-Nenets and Khanty-Mansi include raised bogs, woodlands, taiga lakes and open habitats bordering small rivers (Râbicev 2001). Taiga Bean Geese tend to nest in upstream areas of tributaries inaccessible by motor boats even during spring flood and hence in areas mostly undisturbed by humans (Golovatin & Pashalnyj 2004). Nests are found in open and sometimes in wooded habitat, and as in Finland, some nests are located far away from the nearest water body.

Non-breeding Season

Western sub-population/management unit

In North-western Jutland, the geese exploit natural wetlands within the Hansted and Vejlerne Nature Reserves, but also roost on a range of lakes throughout the area, flying out to feed on agricultural grasslands, wet meadows and pastures where they create little agricultural conflict (Parslow-Otsu & Kjeldsen 1992). The other Jutland flock tends to feed on pastures created on cut-over peatland areas (Lille Vildmose Reserve where they roost on flooded former peat cuttings) and valley bottom flooded pasture (Nørreådalen), after exploiting stubble fields in autumn, where they constitute no threat to agriculture. In Scotland, Bean Geese tend to feed on managed pastures throughout their stay (late September until **the** end of February) and in Norfolk, they feed on rough pastures (Allport 1991).

Central sub-population/management unit

Staging and wintering Taiga Bean Geese tend to use traditional roosting and feeding areas (Nilsson & Persson 1984, 1991a, 2000, Nilsson & Kampe-Persson 2013). In Southern Sweden, Bean Geese mostly roost on small lakes, and in winter on lake ice or on shallow coastal bays. Distances between roosts and feeding areas on agricultural land depend on the availability of fields with suitable food in autumn and spring and on the availability of snow-free feeding fields in winter, but usually the distances were less than 10 km (Nilsson & Persson 1984). In the district of Oulu, Western Finland, staging Bean Geese roost on coastal bays and feed on the nearby fields (Pessa 1993).

The foraging habitat varies over the season. In autumn, Bean Geese staging in Southern Sweden mostly fed on waste grain on stubble fields, sugar beet and potato spill and winter cereals; in places they also fed on carrot and rape (Nilsson & Persson 1984, 1991b, 2000). Bean Geese showed clear preference for sugar beet and potatoes (i.e. foods with high energy content), over autumn-sown cereals and grassland. During the last 20 years, sugar beet fields have become the most important feeding sites for autumn staging Bean Geese in South-western Scania, and Bean Geese clearly benefit from increasing field size, increasing sugar beet cultivation and mechanical harvesting (Nilsson & Kampe-Persson 2013). However, there is marked local variation in the use of different food sources, mostly depending on their availability. In winter, when sugar beet and potatoes

became unavailable, Bean Geese mostly fed on winter cereals and grassland, but frequented un-harvested fields with oats where available in both autumn and spring (Nilsson & Persson 1984, 1991b). Grassland was used especially during mild periods of late winter weather. Recently in South-western Scania the use of sugar beet fields has increased while that of grassland has declined (Nilsson & Kampe-Persson 2013). During mild winter periods and in early spring, geese move from South-west to North-east Scania where there is more of the preferred habitat, sprouting grassland, available for this time of the year (L. Nilsson unpubl.).

In Denmark, Taiga Bean Geese mainly fed on winter cereals, seed grass and waste sugar beet, or on pastures, stubble fields and winter cereals, depending on local agricultural practices (Nilsson et al. 1999). Many of the wintering resorts in SE Denmark are on former cutover raised mires, wet meadows and pasture where there is little conflict with farming interests. In the Netherlands, Taiga Bean Geese usually grazed on marshy pastures in river valleys, and to a lesser extent on maize stubble, sugar beet and potatoes (Nilsson et al. 1999).

In spring, permanent pastures with new grass growth constitute the main feeding habitat for Bean Geese in Southern Sweden (Markgren 1963, Nilsson & Persson 1984, 1991b, 2000, Nilsson & Kampe-Persson 2013). However, the area of grassland has declined and that of winter wheat has increased significantly in Southern Sweden since the late 1960s, and hence winter wheat has become an important food source for Bean Geese in spring (Nilsson 2000).

Staging Bean Geese in South-western Finland are often found on flooded fields or other seasonal wetlands (Pöyhönen 1995). In more northern staging areas in Finland and Sweden, they frequently staged on stubble fields of cereals and hay and grassland (Lampio 1984, Nilsson & Persson 1984). Spring is a critical season as geese need to build up fat and nutrient reserves for migration and breeding, but detailed studies on the habitat and food selection of Bean Geese, especially during pre-breeding season, are scarce. Nonetheless, Taiga Bean Geese of the Central management unit mostly stage on agricultural habitats in spring (Nilsson et al. 1999). In Olonets on the eastern side of the Lake Ladoga, Russian Karelia, spring staging Bean Geese feed on grassland, stubble fields, clover, winter rye, sprouting crops of other cereals and burned fields with new sprouting vegetation (Artem'ev et al. 2010).

Eastern 1 & 2 sub-populations/management units

In Germany and Poland, stubble fields with waste grain and maize were probably the most important feeding habitats, and additionally Taiga Bean Geese were observed feeding on sugar and fodder beet and potato spill, winter cereals and rape, and grazing on pastures (Nilsson et al. 1999). A recent study on the habitat preferences of *Anser* geese in Poland showed that Bean Geese selected maize stubbles and tended to avoid winter cereals and pastures in autumn (Rosin et al. 2012).

In Western Siberia, the extensive natural wetlands of Dvuobje in the Lower Ob River valley (e.g. Sirin 2012) constitute their most important spring staging area (Lebedeva 1979). Dvuobje includes a network of tributaries, marshes, meadows, lakes, wooded islands and permanent and seasonal water bodies called "sors" (Rozenfeld & Strelnikov 2011, Sirin 2012). Bean Geese prefer to feed in highly productive graminoid vegetation in "sors", swamps and flood-plain lakes. In such habitats *Agrostis stolonifera* and *Ranunculus reptans* dominate in the low-lying, often fully flooded parts. Along the shores, *Agrostis straminea, Beckmannia syzigachne, Arctophila fulva* and *Senecio congestus* are plentiful and also grazed by Bean Geese. Sometimes geese graze on flooded plains which provide extensive flat areas with *Arctophila fulva* and *Agrostis spp*., and at the outlets of channels where "sor" wetlands occur, comprising abundant *Agrostis stolonifera* and *Puccinellia spp*. complex, *Rumex spp*. and underwater vegetation (Rozenfeld & Strelnikov 2011).

Agricultural Conflict

Most goose populations staging and wintering in Europe have substantially increased in numbers during past decades (Fox & Madsen 1999, Fox et al. 2010), while many natural wetland habitats traditionally used by geese during the non-breeding period have been drained and converted into agricultural land (Mooij 2011). The large aggregations of geese attracted by the favourable conditions offered by modern farming landscapes may create major conflict because of the extent of local damage by grazing and trampling of crops and pastures, and consequently, recent agricultural conflicts have escalated (e.g. Hake et al. 2010). Table A below summarises data on agricultural conflict where Taiga Bean Geese have been specifically involved.

Governmental subsidies to either prevent damage or compensate for losses are paid to farmers in many European states. In Sweden, Estonia and Germany, the measures to prevent crop damage include protective shooting. In some range states like Finland, Denmark, the United Kingdom and the Netherlands, crop damage caused by Bean Geese does not occur or is negligible. This is mainly because the geese are not present when the crops are most vulnerable to damage, or they tend to forage on natural and semi-natural habitats where they feed on native wetland species or on pasture swards with rough mixed native grasses where damage is not possible (K. Koffijberg & A.D. Fox pers. comm.). Overall, the present numbers of Taiga Bean Geese only really create conflict by causing important local damage to crops in Sweden and Estonia (see Table A).

Table A. Agricultural conflict caused by Taiga Bean Geese in the range states and management measures taken to alleviate the conflict. The range states, in which the importance of conflict is considered medium or high and/or protective shooting is practiced, are highlighted in bold.

Range state	Relative importance of conflict	Crops affected	Management measures
Russia	Non-existent	–	–
Finland	Non-existent	–	–
Sweden	**Medium[a]**	**Carrot, autumn-sown and winter cereal, pasture grass**	**Accommodation fields, scaring, protective shooting, compensation for damage**
Norway	Low	*No information*	–
Denmark	**Non-existent to low[a]**	**Grass ley**	**Unnecessary, problems arise where Taiga Bean Geese associate with other species that may affect agricultural interests**
Germany	Non-existent	–	Protective shooting
Poland	Low to medium	Winter cereal	–
United Kingdom	Low	Grass ley	Management agreements with farmers/land managers for key feeding areas
Estonia	**Medium[a]**	**Cereal, rape, grass ley**	**Compensation for damage, protective shooting**
Latvia	Low[a]	Cereal, rape, grass ley	Field guarding by using ecologically sound methods
Lithuania	*No information*	*No information*	*No information*
Netherlands	Non-existent	–	–
Belarus	Non-existent	–	–
Ukraine	Non-existent to low[a]	Winter cereal	–
Kazakhstan	Non-existent	–	–

[a] Refers to mixed species assemblies including Bean Geese.

Appendix 3 – National Significance and Relevance of Threats facing the Taiga Bean Goose Population

The following codes are used to assess the relative importance of threats assigned by individual range states: 1 = critical, 2 = high, 3 = medium, 4 = low, 5 = local, 6 = unknown. TBG = Taiga Bean Goose, RU = the Russian Federation, FI = Finland, SE = Sweden, NO = Norway, DK = Denmark, DE = Germany, NL = the Netherlands, UK = the United Kingdom, EE = Estonia, LV = Latvia, BY = Belarus, UA = Ukraine. National threats assessments were not obtained from Poland, Lithuania and Kazakhstan.

Factors	Drivers	Root causes	RU	FI	SE	NO	DK	DE	NL	UK	EE	LV	BY	UA
Reduced survival rates of adults	Legal harvest (W 5, C2, E(1&2)-1)	Overharvest	1	1	2			2						6
		High rate of crippling	1	6	3-4						4	5		
		Increased hunting success (decoys, bait)	1	2	5						3	5	2	6
		Easier access to breeding and formerly remote staging areas	1	2									2	3
		Lack of enforcement or ignorance of hunting regulations	1	4	4		5					4	2	2
		Lack of appropriate regulations	1	3									2	2
		Increased goose hunting activity	3	2	3				3		2	4	2	6
		Spring hunting	1										1	
		Introduction of protective shooting for geese (crop damage control)			3-4									
	Illegal harvest (W 5, C3, E(1&2)-1)	Misidentification of TBG	2	3	4	5	5			4	3	3		
		Misuse of protective shooting allowance			4		5							
		Harvest of moulting birds (adults and goslings)	3											
		Harvest outside of the season	1	6	4	3				4			3	2
	Natural predation (Golden and White-tailed Eagles, gulls, Raven, foxes,	Increasing populations of predators		6	4	3	6	4			4	4		6
		Changes in the availability of alternative prey		6	4									
		Decrease in hunting activity on predators		6	5		5				3			4

Factors	Drivers	Root causes	RU	FI	SE	NO	DK	DE	NL	UK	EE	LV	BY	UA
	Brown Bear) (All6)													
	Predation by alien species (Raccoon Dog, American Mink) (All6)	Increasing populations of predators		6	3-4	4					3			
	Rodenticide poisoning (E (1)-5)	Misapplication of rodenticides												
	Lead poisoning (All6)	Use of lead shot in wetlands not phased out yet in some range states			4							5	6	6
		Accumulated lead shot in the environment		5	6		6				6	6	6	6
	Oil poisoning (E3)	Oil pollution of wetlands in breeding areas	3											
	Collision with powerlines and wind turbines (W5, C5, E(1)-5)	Powerlines and wind turbines built or being built in close proximity of TBG habitats (outside of breeding areas)		5	5		6	4	5	4	5	5	6	
Reduced reproductive rate	Legal harvest (C2, E(1&2)-1)	Shooting of successful breeders in autumn hunting on breeding areas	1	2										
		Disturbance (carry over effects)	1	3	4		6				3			
		Disruption of pair bonds		3	4		6							
	Egg and gosling collection (E (1&2)-5)	Subsistence of local communities	5											
	Human disturbance (W4, C3, E (1&2)-2)	Increased access to breeding and spring areas (e.g. recreation, motorboats, oil developments, forestry)	1	3	5	3							3	2

Factors	Drivers	Root causes	RU	FI	SE	NO	DK	DE	NL	UK	EE	LV	BY	UA
	Predation of eggs and goslings (W6, C4, E (1&2)-6)	Increase in populations of native and alien predator species		6	4	3								
		Increased predation success due to habitat structure change		3	6									
	Inter-specific competition on breeding areas (W6, C6)	Increasing population of Whooper Swans or Canada Geese		6	6	4								
	Inter-specific competition on spring staging areas (C6)	Increase in the populations of Canada Goose, Greylag Goose, Whooper Swan		6	6									
	Decrease in food availability in or loss of spring and pre-breeding staging areas close to the breeding areas (W5, C5, E (1&2)-5)	Hydropower developments												
		Decrease in management of grasslands	1	6	3									
	Feeding on agricultural crop food (All6)	Change in the kind of food available (grass to grain and potatoes /sugar beet)		6			6		5					
Reduced distribution due to past and ongoing habitat loss,	Forestry (W4, C3, E (1&2)-5)	Drainage of aapa mires specifically and peatlands in general		3	5									
		Forest roads (Facilitating forest work operations)		3	4									
		Site preparation for afforestation		6	5									

Factors	Drivers	Root causes	RU	FI	SE	NO	DK	DE	NL	UK	EE	LV	BY	UA
fragmentation, degradation or conversion	Peat mining (All5)	Energy		4	5									
		Horticulture		5	5									
	Mining industry	Disturbance in or displacement from breeding or staging areas	3	5										
	Oil developments (E (1&2)-3)	Disturbance in or displacement from breeding and staging areas	3											
	Hydropower development (C6)	Flooding of habitat	5											
	Cessation of grassland management (land abandonment) (staging areas) (W3, C2, E (1&2)-2)	Natural vegetation succession on pasture and agriculture grasslands	1	6			5			4			3	3
	High densities of reindeer herds (E (1&2)-5)	Habitat deterioration due to overgrazing	6	6										
	Agriculture (W5, C5, E (1&2)-3)	Drainage of peatlands		5						4			5	
		Wet grassland loss					5	2		4	5			6
	Spring fires on staging sites (C5, E (1&2)-5)	Deliberate burning for grassland management and improvement of grass for fodder	1	6									5	6
	Loss of feeding habitats in wintering and pre-breeding areas (W5, C5, E(1&2)-5)	Wind turbines			5		6	3		4	3			6
		Cereal fields abandonment (economically unviable)	1	5	3									
		Scaring by farmers to reduce crop damage					5	2-3	5					
		Infrastructure development on wintering grounds (roads)			5			4						

Factors	Drivers	Root causes	RU	FI	SE	NO	DK	DE	NL	UK	EE	LV	BY	UA
	Functional loss of feeding and roosting sites in wintering, staging and moulting areas (W5, C5, E(1&2)-5)	Inter-specific competition with Canada and Greylag Goose		6	6	5	6	5						
		Disturbance by hunting and fisheries, fireworks at roost sites	2	6	5		5	4	3		4		2	4
		Disturbance by berry picking, recreation and fishermen on moulting sites		6	4									

Appendix 4 – Conservation and Hunting of the Taiga Bean Goose under National Legislation by range state

Table summarising national conservation status, hunting status and seasons and responsible authority for the Bean Goose, without separation of subspecies, in the range states. P = protected, Ho = huntable and open season declared, R = regionally protected.

Range state	Status in national Red Data book	Hunting status	Statutory open season	Regional open season	Responsible national authority
Russia	Least Concern (federal Red Data book) Protected (in regional Red Data books of 9 federal subjects)	Ho, R[a]	10 days in spring (federal, with division to zones in large subjects) [b] Last Saturday of August–31.12. (federal) [b]	By decision of the governors of subjects in the time frame indicated in the federal rules	Ministry of Natural Resources and Environment
Finland	Near Threatened	Ho	20.08.–31.12.[c]	–	Ministry of Agriculture and Forestry
Sweden	Near Threatened	Ho, R	01.10.–31.12.	01.09.–31.10. in parts of S Sweden[d] 01.01.–15.3. in Southernmost Sweden[d]	Ministry of Agriculture
Norway	Vulnerable	P	–	–	Ministry of the Environment
Denmark	–	Ho, R	01.09.–30.11.	–	Ministry of the Environment
Germany	–	Ho, R	01.11.–15.01.	Mecklenburg-Vorpommern and Brandenburg: 15.09. - 31.10.[d] and 01.11.–15.01.	Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (conservation) Ministry of Food and Agriculture (hunting) [e]
Poland	–	Ho	01.09.–21.12./31.01.	01.09.–31.01. in W Poland 01.09.–21.12. in other parts of Poland	Ministry of the Environment

Range state	Status in national Red Data book	Hunting status	Statutory open season	Regional open season	Responsible national authority
United Kingdom	?	P	–	–	?
Estonia	Least Concern	Ho	10.9.–30.11.	–	Ministry of the Environment
Latvia	–	Ho	15.9.–30.11.	–	Ministry of Environment
Lithuania	?	Ho	01.9.–15.12.	–	Ministry of Environment
Netherlands	–	P	–	–	Ministry of Economic Affairs; Provinces
Belarus	–	Ho	2nd Saturday of March–2nd Sunday of May 3rd Saturday of September–2nd Sunday of December	–	Ministry of Natural Resources and Environmental Protection
Ukraine	–	Ho	Ca. 10.8.–24.11.[f]	–	Ministry of Ecology and Natural Resources
Kazakhstan	?	?	?	?	?

[a] Huntable in 74 out of 83 federal subjects; daily or seasonal bag limits.

[b] Exact dates vary between federal subjects.

[c] Restrictions on open season since 2010, total ban in 2014/15.

[d] Only to prevent crop damage under the provisions of the EU Birds Directive.

[e] State authorities: Ministry for Agriculture, Environment and Consumer Protection in Mecklenburg-Vorpommern; Ministry of Environment, Health and Consumer Protection (conservation) and Ministry for Infrastructure and Agriculture (hunting) in Brandenburg.

[f] Hunting allowed on three days (+ one day for those hunting with dogs) a week; daily bag limits.

Appendix 5 – Current National Management Activities affecting the Taiga Bean Goose

Range state	National Action Plan	Regulation of hunting	Habitat management and food provisioning	Site safeguard	Other
Russia		Spring waterfowl hunting ban in six key areas in Yamalo-Nenets, 2013–2014; eight are in progress for spring hunting season 2015			Creation of a regional and federal strategy for the wise use of waterfowl resources Changes in hunting law and regulations
Finland	Draft Management Plan for the Finnish Bean Goose population (2013)	Restrictions on open season since 2010, total ban in 2014/15	Restoration of drained mires Establishment and restoration of rural wetlands Supplemental feeding with grain		
Sweden			Wetland restoration Cereal fields left un-harvested (subsidies to farmers)		Compensation programmes for large infrastructure projects Local arenas for sustainable natural resource management
Norway	N/A	N/A	N/A	N/A	N/A
Denmark		Regional hunting bans into force in 2004, 2011 and 2014 Shortened open season since 2014	Wetland restoration at Lille Vildmose has created managed grassland feeding areas and safe roosts (flooded former peat cutting areas)	A number of EU Special Protection Areas, Ramsar Sites and Nature reserves support staging and wintering Taiga Bean Geese	
Germany		Hunting ban at major roosts			
Poland		Restrictions on open season within SPAs	Wetland restoration	Winter roost and part of feeding grounds protected through SPAs	

Range state	National Action Plan	Regulation of hunting	Habitat management and food provisioning	Site safeguard	Other
United Kingdom			Management agreements with farmers managed by Scottish Natural Heritage (Scotland)	Winter roost and part of feeding grounds protected through SPA (Scotland) Winter roost and feeding grounds protected through reserve (Norfolk)	Management through local group (Bean Goose Action Group, Scotland)
Estonia					National Goose Working Group
Latvia	N/A	N/A	N/A	N/A	N/A
Netherlands				Important winter roost sites in Natura 2000 areas protected (Drenthe, Groningen, Noord-Brabant)	

Appendix 6 – Ongoing Monitoring Programmes and Research Activities

Range state	Programme or activity	Start/years	Season/interval	Separation of subspecies	Responsibility
Russia	Monitoring of staging geese in Olonets	1997	Spring/annual	No	Karelian Scientific Centre, Russian Academy of Sciences (RAS)
	Aerial monitoring of staging geese in W Siberia	2010–2013 2013–2014 2014	Autumn Spring/project-based Summer & autumn	Yes	Goose, Swan and Duck study group (RGG), Severtsov Institute of Ecology and Evolution, RAS
	Regional programme for the study of Taiga Bean Goose in Yamal	2014	Spring-summer/ annual	Yes	Interregional expeditional centre "Arctica"
Finland	General monitoring of migrating and staging geese ("Tiira")	2006	Spring–autumn/annual	Yes, since 2010	BirdLife Finland
	Finnish Bird Atlas survey	1974–1979 1986–1989 2006–2010	Breeding		Finnish Museum of Natural History
	Population ecological study (satellite tracking, age and subspecies composition of bag by wing survey, analysis of neck-band data)	2011			Natural Resources Institute Finland (formerly Finnish Game and Fisheries Research Institute)
Sweden	National Goose Counts	1977/78	X, XI and I/annual	Yes, in winter, partial in autumn	Lund University
	Monitoring of staging geese in N Sweden	2005	Spring/annual	Yes, since 2005	Swedish University of Agricultural Sciences (SLU)
	Swedish Bird Survey	Not known	Breeding/annual		Department of Biology, Lund University
	Neck-banding and satellite-tracking study	2005			SLU (previously Lund University)

Range state	Programme or activity	Start/years	Season/interval	Separation of subspecies	Responsibility
Norway	General monitoring	Not known	Spring–winter/annual	No	NOF-BirdLife
	Monitoring and neck-banding of staging and moulting geese in Finnmark	2002	spring–summer /annual	Yes	NOF-BirdLife
	Breeding population study (including satellite tracking) in Nord-Trøndelag	2010	breeding		NT-University college, NOF-BirdLife, Lund University
Denmark	National monitoring programme NOVANA	Not known	mid-January /annual	Yes, since 2005	Aarhus University
	Improved monitoring programme	2014/15	Monthly counts	With workshops to improve indent. skills	Aarhus University
	Annual sampling of age ratios	2014/15	Winter from arrival	With workshops to improve skills	Aarhus University
	Neck-banding project in Jutland	2014/15	Winter from arrival	Yes	Aarhus University
	Other projects to support definition of management units and flyway action plan	2014/15	Winter from arrival	Yes	Aarhus University
Germany	National waterbird and goose counts			No	Federation of German Avifaunists (DDA)
	Special Taiga Bean Goose counts in NE Germany	2003/04	mid-January /every 2nd year	Yes, since 2003/04	T. Heinicke
	Regional Taiga Bean Goose counts on Rügen and in Lower Odra	2003/04	mid-November and mid-January /annual	Yes, since 2003/04	T. Heinicke
	Neck-banding project in Lower Odra	2007	Autumn /annual?	Yes, since 2007	T. Heinicke
	Identification workshops	Not known	Not known	Not known	T. Heinicke

Range state	Programme or activity	Start/years	Season/interval	Separation of subspecies	Responsibility
Poland	Monitoring of staging and wintering geese	1991–1997, 2012	Autumn, winter and spring /annual?	Not known	Chief Inspectorate of Environmental Protection, Polish Society for Nature Protection Salamandra?
United Kingdom	Monitoring of staging and wintering geese	Not known	Monthly /annual	Yes	Scottish Natural Heritage, Natural England
	Ringing, telemetry and age count study in Scotland	2011		Yes	Scottish Natural Heritage, Bean Goose Action Group, The Wildfowl & Wetlands Trust
Estonia	Monitoring programme for geese, swans and cranes	Not known	Spring /geese counted every 3rd year	No	Estonian Environment Agency
Netherlands	Observation online portal (www.geese.org)	Not known		Not known	Alterra Wageningen UR & Sovon Vogelonderzoek Nederland
Belarus	Single site monitoring at Pripyat River	1995	Migration /annual?	No?	Not known
Ukraine	Monitoring of staging geese	Not known	Autumn, winter and spring /annual?	No?	Not known

Appendix 7 – Adaptive Management Framework: A Brief Guide and its Application in the Context of the International Single Species Action Plan for the Conservation of the Taiga Bean Goose

Source: Adopted and further developed from the International Species Management Plan for the Svalbard Pink-footed Goose

Introduction

As a tool for resource and habitat management, Adaptive Management is a relatively new concept, which is gaining popularity amongst the conservation community (Salafsky et al. 2001). However; there are many different interpretations of what it actually means in practice and degrees of success in its application. This document is intended as a brief guide, outlining some of the fundamental concepts and principals of adaptive management and the implications for the International Single Species Action Plan for the Taiga Bean Goose, following the examples of International Species Management Plan for the Svalbard Pink-footed Goose (Madsen & Williams 2012).

What is Adaptive Management?

"*An approach to managing natural systems that builds on learning – based on common sense, experience, experimenting and monitoring – by adjusting practices based on what was learned*" (Bormann et al. 1999).The above quote encompasses many of the fundamental elements of adaptive management. In essence, adaptive management is seen to be 'learning by doing' and adapting management actions based on what is learnt (Williams et al. 2009).

Common sense and experience contribute to sound decisions but what differentiates adaptive management is that it requires the incorporation of scientific method into a management framework. It is not 'trial and error' or 'learn-as-you-go' management (Aldridge et al. 2004, Williams et al. 2009). An adaptive approach requires regular monitoring of both the system and its response to management strategies, to adapt and improve them by undertaking an iterative cycle of: planning, modelling, implementation, monitoring, reviewing outcomes and adapting plans (Salafsky et al. 2001, Williams et al. 2009, McCook et al. 2010). The process is intended to systematically test assumptions in order to adapt and learn (Salafsky et al. 2001). The USDOI Technical Guide to Adaptive Management (Williams et al. 2009) offers a succinct overview:

"*An adaptive approach involves exploring alternative ways to meet management objectives, predicting the outcomes of alternatives based on the current state of knowledge, implementing one or more of these alternatives, monitoring to learn about the impacts of management actions, and then using the results to update knowledge and adjust management action*s."

Moreover, adaptive management provides a decision framework for making good decisions where there is uncertainty about an ecological system and the impact of management plans. It requires a formal and structured process to reduce these uncertainties, through iterative learning that improves management over time (Williams et al. 2009). This function of learning and adapting is enhanced through a participatory approach that necessitates partnerships between scientists, resource/conservation managers and other stakeholders, learning together how to create and maintain a sustainable resource system (Williams et al. 2009).

Experience in the United States has shown that local knowledge of managing habitats and resources is a vital source of learning that can contribute significantly in developing successful management actions and best practices (Aldridge et al. 2004). Adaptive management necessitates long term collaboration throughout the

iterative learning cycle. This promotes cooperative decision-making where there is uncertainty, thereby increasing management effectiveness and the achievement of agreed-upon outcomes (Salafsky et al. 2001, Williams et al. 2009).

Learning from management outcomes is an essential component of adaptive management, which is necessary in the face of uncertainty. Two subtly different forms of adaptive management have been described, differentiated by their emphasis on learning through management actions (Salafsky et al. 2001, Aldridge et al. 2004, Prato 2006, Williams et al. 2009). These are 'passive' or 'active' adaptive management.

Both forms utilise management interventions in learning process, but they differ slightly depending on their emphasis between explicitly considering different management options to achieve management objectives and learning. Passive adaptive management primarily focuses on the achievement of management objectives with long-term monitoring and learning (if any) informing a gradually evolving management strategy; typically learning is an unplanned by-product of management actions and feedback mechanisms (Salafsky et al. 2001, Aldridge et al. 2004, Williams et al. 2009).

Active adaptive management involves the active pursuit of learning, through experimental management that focuses directly on learning and the achievement of management objectives (Williams et al. 2009). Active adaptive management has similarly been described as deliberately manipulating management strategies for information outcomes as well as environmental outcomes (McCook et al. 2010). Active adaptive management proactively accelerates learning over time but it does require greater investment. Deliberate experimentation requires suitable replication and controls and is more expensive to implement, monitor and evaluate (Salafsky et al. 2001, Williams et al. 2009).

Integral to adaptive management is the use of models. They serve as expressions of ecological understanding, as engines for deductive inference, and as articulations of resource response to management and environmental change (Williams et al. 2009). They are intended as contrasting expressions of how a resource system works, comparing alternative courses of action and predicting responses to these actions. They enable management actions to be evaluated and adapted through the comparison of model predictions against monitoring data over time (Salafsky et al. 2001, Williams et al. 2009). The use of good models is regarded as the foundation for a learning framework that assimilates current knowledge and is able to review and refine it (Salafsky et al. 2001).

Models can capture a shared understanding of an ecological system and bring different perspectives together from scientists, managers and other stakeholders. This collaborative approach places emphasis on the joint assessment of what is known about the system being managed and facilitates an interdisciplinary approach to understanding through monitoring and assessment (Nichols et al. 2007, Williams et al. 2009). Furthermore, models must be understandable and actionable, often the simplest are the most effective and useful in reality (Salafsky et al. 2001). Accordingly, data collection should be focused on precisely the information expected to be most useful to the management decision, based on a sound biological understanding of the system, and the models focused on hypotheses about how the managed system responds to management actions (Nichols et al. 2007). Table B presents the operational steps in an Adaptive Management Framework as described by the USDOI Technical Guide, which also offers this guidance.

"*Adaptive management requires a much more open process of decision- making, in which stakeholders are directly engaged and decision-making authority is shared among them. It also requires that objectives, assumptions, and the other elements of the decision-making process be explicit, and therefore amenable to analysis and debate. Finally, it requires a strong commitment by managers to the necessary monitoring and assessment that underlie adaptive management, not as marginal activities but as essential elements of the process*" (Williams et al. 2009).

Table B. Operational steps in the adaptive management process (adapted from USDOI Technical Guide to Adaptive Management, Williams et al. 2009). The present Action Plan covers the first steps in the Set-up phase.

Set-up phase

- *Step 1 – Stakeholder involvement*
  - Ensure stakeholder commitment to adaptively manage the enterprise for its duration
- *Step 2 – Objectives*
  - Identify clear, measurable, and agreed-upon management objectives to guide decision-making and evaluate management effectiveness over time
- *Step 3 – Management actions*
  - Identify a set of potential management actions for decision making
- *Step 4 – Models*
  - Identify models that characterise different ideas (hypotheses) about how the system works
- *Step 5 – Monitoring plans*
  - Design and implement a monitoring plan to track resource status and other key resource attributes

Iterative phase

- *Step 6 – Decision making*
  - Select management actions based on management objectives, resource conditions, and enhanced understanding
- *Step 7 – Follow-up monitoring*
  - Use monitoring to track system responses to management actions
- *Step 8 – Assessment*
  - Improve understanding of resource dynamics by comparing predicted vs. observed change in resource status
- *Step 9 – Iteration*
  - Cycle back to Step 6 and, less frequently, to Step 1

The application of Adaptive Management in a European context

It has been commented that an adaptive management approach could not be usefully implemented for waterfowl management in Europe, as is believed that variation between the nations needing to be involved would preclude agreement on a framework for management, along with any proposed objectives and management actions (Nichols et al. 2007). One of the most successful and often referred to examples of adaptive management in action, is the Adaptive harvest management of North American waterfowl.

Increasingly, adaptive management is being applied in a wider sociological-ecological context as a means of guiding improved systems of natural resource management using a variety of management options. Well-known examples are the adaptive management programmes of the Colorado River/Glen Canyon (Glen Canyon Dam Adaptive Management Program), the Great Barrier Reef and the International Species Management Plan for the Svalbard Pink-footed Goose (Great Barrier Marine Park, McCook et al. 2010, Madsen & Williams 2012).

In Europe, it is this broader application of adaptive management that is envisaged to create a successful management framework to guide: agricultural conflict resolution, range and habitat conservation and recreational interests, including hunting, across a flyway of range states. The very inclusive nature of adaptive management would seem to lend itself to such a situation. The fact that it is now recognised as a potential approach in the case of Taiga Bean Goose is another considerable step forward following the example of the Svalbard Pink-footed Goose (Madsen & Williams 2012).

The comments above do highlight several points that are worthy of note for the International Single Species Action Plan for the Taiga Bean Goose. The success of any management framework is dependent on a mandate to take action; in the face of uncertainty (Prato 2006). This requires an institutional structure and framework with an agreed overarching goal along with clear objectives. There must also be sufficient institutional capacity and stability to ensure long-term collaboration in the iterative process of adaptive management.

The implementation of adaptive management can be facilitated by using pre-existing structures and processes and a variety of management actions may be instigated in different regional contexts. Nevertheless, stakeholders and implementing organisations must commit the necessary resources for monitoring and assessing the progress of management actions in achieving agreed objectives, over given time frames (Aldridge et al. 2004). The institutional structure should champion overall learning and the sharing of this knowledge, which is central to an adaptive management approach.

As noted above, adaptive management necessitates a structured approach and in the case of the International Single Species Action Plan for the Taiga Bean Goose, it is intended to follow the '9 Step Approach' as described by the USDOI Technical Guide to Adaptive Management (Williams et al. 2009). This is divided into two phases, with a set-up phase and an iterative phase as illustrated in the above diagram. Although these phases are considered separate, it is recognised that the learning process involves periodic reconsideration of all the adaptive management elements in order to take account of changing circumstances and to maintain stakeholder and political support. This maintains what is often referred to as the 'double-loop learning' cycle (Lee 1993, Nichols et al. 2007, Williams et al. 2009).

The framework document that this document accompanies, initiates this set-up phase as well as setting out a proposed management structure. It is the beginning of a long-term process that is envisaged to deliver an effective adaptive management framework for the Taiga Bean Goose population.

In summary, successful adaptive management requires the following key elements (Williams et al. 2009):

- **Stakeholder involvement**;
- **Agreed objectives**;
- **Management alternatives**;
- **Predictive models**; and
- **Effective monitoring programs**, which must all be integrated into;
- **An iterative learning cycle.**

These have been expanded upon slightly in the following pointers and it is hoped that they will continue to guide the development of the International Single Species Action Plan for the Taiga Bean Goose.

Pointers for Successful Adaptive Management

Stakeholder involvement: Broad stakeholder involvement is needed from the start and throughout the iterative cycle: setting objectives, implementation, monitoring, evaluation and adaptation. This helps build support and learning at all levels of involvement. In addition, this contributes to development of a 'learning organisation' that can capture the collective knowledge and learning of different groups and of individuals, which can be documented and used in the future (Salafsky et al. 2001). As adaptive management is a long-term process commitment, motivation, patience and a desire to learn are also required.

Agreed objectives: A clearly defined goal must be established along with specific, measurable, achievable, results-orientated and time fixed (SMART) objectives. These must be integrated with monitoring and evaluation systems to serve as metrics for assessing management performance. It must be recognised that objectives may change over time, based on changes in social values or in the understanding of system dynamics.

Management alternatives: A set of management options should be considered which can achieve management objectives as well as progress learning. Learning is promoted by a wide range of management alternatives, but hampered by alternatives that differ only marginally. Management actions should also be selected on the basis of their being able to help test and evaluate the systems dynamics that have been identified as being important. This facilitates learning in a systematic way and can involve treating management actions as experiments. The set of management alternatives may also evolve over time in response to new capabilities or constraint.

Predictive models: These should help facilitate an interdisciplinary approach to understanding the system's dynamics as well as predicting the outcomes of management actions. They should test the underlying hypothesis of management strategies and have explicit links between management actions and system dynamics, as well as being calibrated with the available information monitoring these system dynamics. The most effective models are often those that are simple, understandable and relevant to those who implement management actions.

Effective monitoring programs: Both monitoring and assessment should be designed to ensure that key system parameters are adequately measured and appropriately focused on the relevant performance indicators needed to gauge progress in meeting objectives and guide management decisions. Effective and useful monitoring is required for the hypothesis testing that leads to the reduction of uncertainty that is key to adaptive management. It requires commitment from managers, scientists, and other stakeholders in place to sustain an ongoing monitoring and assessment program.

Iterative Learning: Data collected as part of monitoring programmes needs to be analysed and assessed in order to evaluate management actions, improve ecological understanding and adapt management actions in response to what is learnt. This allows managers to determine systematically whether management actions are succeeding or failing to achieve objectives. It is the iterative cycle that over time leads to improved management. This must not be limited to the decision making, monitoring and assessment phase and should involve periodic, but less frequently, recycling through all components of the adaptive management framework, to allow for adjustments as stakeholder perspectives, institutional arrangements, and resource conditions evolve.

Finally, the iterative approach of adaptive management should promote 'institutional curiosity and innovation' whereby managers can question the efficiency, effectiveness and appropriateness of actions and value the learning that comes from trying new interventions and should not be inhibited by failures, recognising them as valuable source of learning on the continuing path to improvement (Salafsky et al. 2001).

Application of Adaptive Harvest Management for the Taiga Bean Goose

This Plan provides an overall framework for future conservation and management of the Taiga Bean Goose population. The practical actions to be taken on monitoring, habitat issues and the AHM at the population and management unit level will be discussed and decided by the range states in the International Working Group incorporating most recent information and analysis of existing data. Note that a temporary hunting ban applied to certain or all management units is a true option here.

It is recognised that the information of Taiga Bean Goose population size, survival, reproduction and harvest are scarce and the current situation does not allow the development of sophisticated models as in the management of Svalbard Pink-footed Goose. However, the adaptive approach gives the necessary tools and learning opportunities for effective management of the uncertainties to ensure the sustainability of the possible harvest. In the case of the Taiga Bean Goose, the assessment of sustainable harvest and models on population responses are foreseen to be rather crude and simple to start with. Learning through iterative decision making processes, future studies and analysis will allow the development of more sophisticated assessments and models. Nonetheless, a first approximation of sustainable harvest for Taiga Bean Geese wintering in Europe is already available and summarised as follows (Johnson 2015, see also Madsen et al. 2015):

"*We estimated sustainable levels of harvest for the Taiga Bean Goose (Anser fabilis fabilis) as part of the development of an international species management plan under the auspices of the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA). We emphasize that our estimates are a first approximation because detailed demographic information is lacking for Taiga Bean Geese. Our methods are intended to demonstrate how decision makers can explicitly account for management objectives, uncertainty, and degree of risk tolerance. Using allometric relationships, we estimated parameters of the theta-logistic population model. The estimates of the maximum intrinsic rate of growth was* r_{max} *= 0.150 (sd = 0.019) and the form of density dependence was estimated as* θ *= 3.77 (sd = 4.72), suggesting the strongest density dependence when the population is near carrying capacity. We estimated Potential Take Level in terms of both a constant harvest rate and an absolute harvest from a spring population of 50,000 birds. We used a management objective to maximize sustainable harvest, although the implications of other management objectives could easily be assessed. We accounted for uncertainty in demographic rates of Taiga Bean Geese, and examined levels of risk tolerance of 0.10, 0.25, and 0.50 on a scale of 0–1 (where 0 is completely risk-averse and 0.5 is risk-neutral; we did not examine risk-seeking behavior). The allowable harvest of taiga bean geese from a spring population size of 50,000 was less than 5,000 under all scenarios considered. The harvest prior to 2014 (when Finland closed their hunting season) appears to be higher than what we calculated as allowable. This does not necessarily mean, however, that the harvest was unsustainable. It does appear, however, that harvests in excess of 5,000 (from a population of 50,000) represent risk-seeking behavior, a population objective of less than that required for maximum productivity, or both*."

Finally, Figure D provides tentative outlines for the process of applying adaptive management for the Central management unit of the Taiga Bean Goose. The final working model will be decided during the implementation phase.

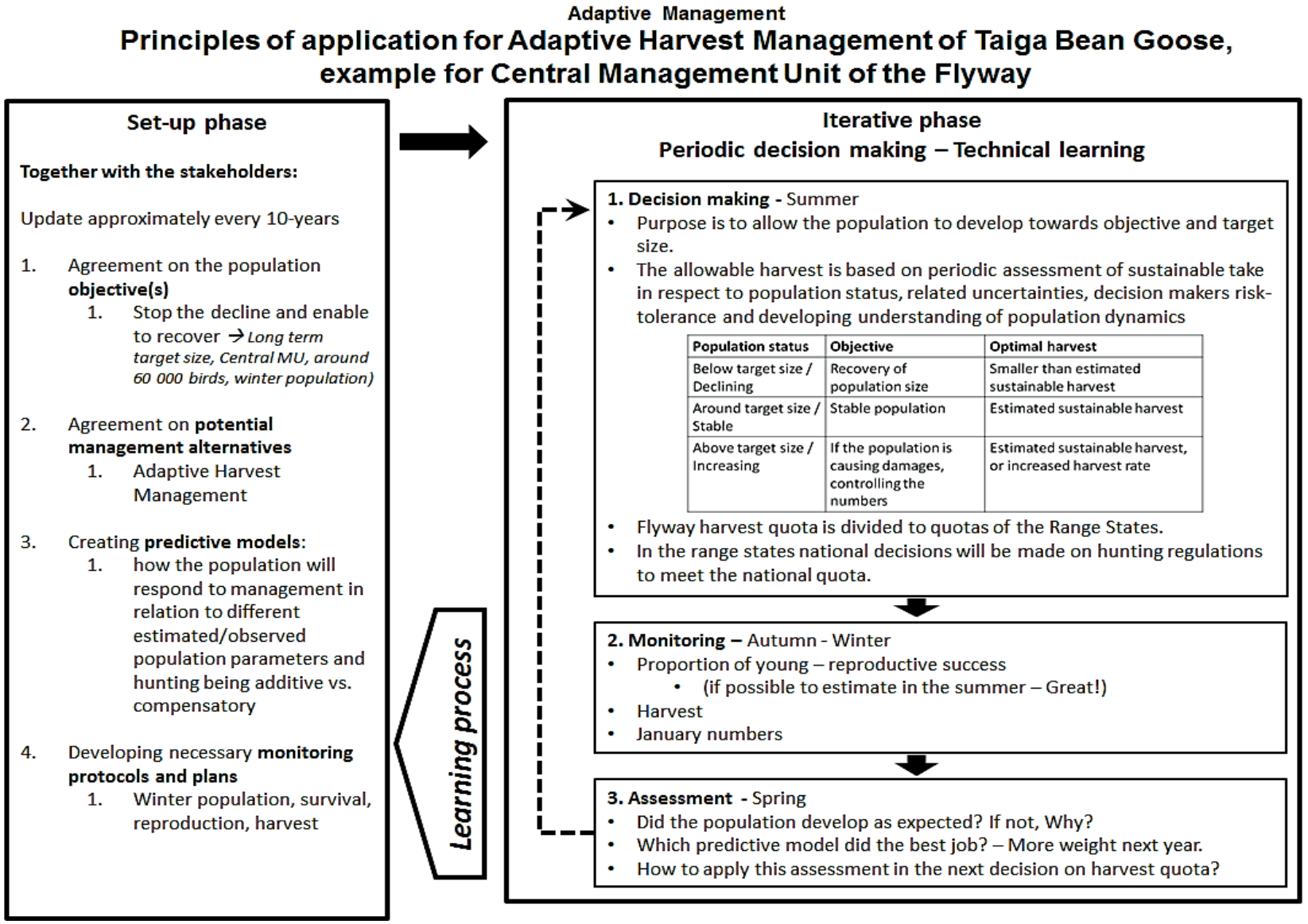

Figure D. Representation of tentative outlines for applying the Adaptive Harvest Management framework for the Central Management Unit of the Taiga Bean Goose.

Appendix 8 – Proposed Organisational Structure as Part of the Adaptive Management Framework

Source: The proposed organisational structure has been adopted from the International Species Management Plan for the Svalbard Population of the Pink-footed Goose.

The organisational structure is envisaged to be a three-layer set-up as follows:

1. Taiga Bean Goose (TBG) International Working Group

2. TBG National Working Groups (where deemed necessary by range states)

3. TBG Local Working Groups (where deemed necessary by range states)

TBG International Working Group

This is an international coordinating body that oversees and guides the overall adaptive management process for the Taiga Bean Goose International Single Species Action Plan, working in collaboration with national/regional responsible authorities, and, where implemented, national and local working groups.

The purpose of this group is the development, implementation and maintenance of the international action planning process. Following the adaptive management process, as outlined in Table B of Appendix 7, it will foster the acquisition of knowledge and understanding to guide action plans and actions, ensuring progress towards the overall goal and agreed objectives. It will need to periodically review the adaptive management process to take account of ecological, social and economic changes relating to Taiga Bean Geese, the circumstances that surround them and the goals and objectives for the plan.

The International Working Group will build the core group of committed members who will promote the integrated, multi-disciplinary and collaborative approach of adaptive harvest management. They should maintain an overview of the management process and its objectives, calling on specialists and other stakeholders through the iterative cycle. The International Working Group should act as a conduit for knowledge helping to facilitate others understanding and practice of adaptive management.

Role and responsibilities:

1. Support the continued development of the Action Plan at an international level, following the principals of adaptive management, to which national and local plans are expected to adhere; within the context of each range state's own national policies and plans. The International Species Action Plan is anticipated to be a long-term process with triennial interim targets depending on target achievements and the management options implemented (e.g. population size, hunting regulations and other management targets as agreed by the range states).
2. Guide, review and advise national action plans to ensure these are implemented and applied as part of an integrated process that promotes the International Species Action Plan objectives and helps achieve better management and learning.
3. Ensure adequate monitoring in order to effectively assess and evaluate the International Action Plan along with national and local plans.
4. Develop and maintain adaptive management models that are based on a sound biological understanding and are focused on hypotheses about how the managed system responds to management actions. These must be understandable, actionable and relevant to stakeholders.

5. Collate and maintain key data resources provided by national stakeholders. Develop and standardise these where appropriate and necessary e.g. bag statistics, proportion of suitable habitat used by TBG, measures of goose-human conflict and indicators of alternative recreational usage (eco-tourism) etc.
6. Undertake regular assessments and evaluations of national action plans and progress towards meeting the International Action Plan objectives. Review monitoring data and make policy and management recommendations where adaptation is needed e.g. international hunting quotas, agro-environmental schemes, spatial and habitat requirements and other recreational policies (eco-tourism).
7. Ensure sufficient commitment and funding is obtained from range states and international organisations to maintain a sustainable species management framework and the long-term collaboration required for successful adaptive management.
8. Facilitate the sharing of knowledge, learning and the adoption of best practices throughout the flyway range states by:

    a. Promoting and sharing the principals and practice of adaptive management;
    b. Arranging periodic scientific and stakeholder conferences and review meetings at an international level;
    c. Encouraging the active participation of national and local working groups to develop innovative proposals and alternative management actions in accordance with the International Action Plan objectives;
    d. Creating a documentation/knowledge store of plans and progress of international, national and local actions e.g. publishing of a 'TBG' outlook report or international action plan review; and
    e. Create a website for efficient retrieval and exchange of information.

Composition:

Official representatives:

- Representatives from all range states coming from relevant national/regional responsible authorities

Stakeholder representatives:

- International conservation organisation
- International hunting organisation
- International farming organisation

Experts:

- International/national Taiga Bean Goose experts

UNEP/AEWA Secretariat

Coordination – to be provided by a range state in consultation with the UNEP/AEWA Secretariat

Group size: 23–25 members (from 14 range states + 3 stakeholders + UNEP/AEWA Secretariat + 5–7 experts)

Meeting frequency: Meetings to accommodate annual review process (virtual or physical meetings as deemed necessary) dependent on management actions implemented by each range state.

Information structure

Web-based capacity for publishing policies, plans, scientific data and models and feedback mechanisms for stakeholders at all levels. This capacity may be restricted in some instances, with certain sections and information limited to operational groups. The overarching principal is to maintain transparency and accountability for the species action plan at international level that is open and available to all stakeholders as well as interested public.

TBG National Working Groups

TBG National Working Groups may be set up to develop, implement, oversee and review national plans that support the achievement of the International Action Plan goal and objectives, following the principals of adaptive management. Each range state may opt to implement these national groups as they see best to fit within existing management structures and institutional capacity. This will be a working group of representatives from all the key national stakeholders. It should promote cooperative decision making and long-term collaboration amongst its members.

Role and responsibilities:

1. Set up and support the development of national, and, where appropriate, local action plans, in accordance with the agreed International Species Action Plan, following the principals of adaptive management. Action plans need to be transparent and accountable to participating stakeholders.
2. Ensure sufficient participation and commitment from key national stakeholders. In addition, local stakeholders in conflict areas need to have a strong input to the development of local action plans to ensure their widespread acceptance.
3. Review, approve and coordinate local action plans that are deemed necessary.
4. Implement and maintain scientifically robust monitoring programmes as required by the TBG International Working Group. Collate and submit key monitoring and national resource data that are relevant to the assessment and evaluation of the International Species Action Plan.
5. Assess and evaluate national and local action plans and their progress towards meeting the International Action Plan objectives. Submit findings to the TBG International Working Group.
6. Facilitate the sharing of knowledge, learning and the adoption of best practices within and between range states by:

    a. Active stakeholder engagement throughout the adaptive management process along with appropriate review meetings at national level. Appropriate national representatives should attend international conferences and review meetings;
    b. Encouraging the active participation of local working groups to develop innovative proposals and alternative management actions in accordance with the International Species Action Plan objectives; and
    c. Sharing national documentation and assessments relevant to the International Action Plan.

Composition:

- Representative(s) of relevant national environmental/wildlife agency (convener and chair)
- National Taiga Bean Goose experts
- Representatives of national conservation organisations
- Representatives of national farming organisations
- Representatives of national hunting organisations

Group size: To be decided by national representatives.

Meeting frequency: To be decided by national representatives. Guided by the International Action Plan and its objectives and actions. Annual communications dependent on management actions in place within each range state.

Local TBG Working Groups

To be decided by range states but should follow the principals and structured decision-making process of the International Single Species Action Plan.

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