

International Single Species Action Plan for the Conservation of the Lesser White-fronted Goose (Western Palearctic Population)

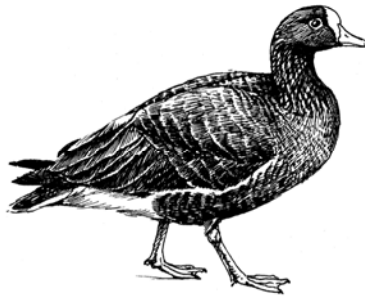
Anser erythropus



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

**International Single Species Action Plan for the
Conservation of the Lesser White-fronted Goose
(Western Palearctic population)**

Anser erythropus



AEWA Technical Series No. 36

October 2008

*Prepared with financial support from: the Ministry of the Environment of Finland;
the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety;
the Directorate for Nature Management of Norway; and
the Swedish Environmental Protection Agency*

Compiled by: Tim Jones¹, Kirsten Martin², Boris Barov³ & Szabolcs Nagy⁴

¹ DJEnvironmental, Harpers Mill, Sterridge Valley, Berrynarbor, Ilfracombe, EX34 9TB, UK

² UNEP/AEWA Secretariat, Hermann-Ehlers-Str. 10, 53113 Bonn, Germany

³ Birdlife International, European Division, Avenue de la Toison d'Or 67, 1060 Brussels, Belgium

⁴ Wetlands International, Bornsesteeg 69, Wageningen, the Netherlands

Email: tim.jones@djenvironmental.com, kmartin@unep.de, boris.barov@birdlife.org, szabolcs.nagy@wetlands.org

With contributions from: Tomas Aaravak, Sigute Alisauskiene, Hamid Amini, Åke Andersson, Maria Mihaela Antofie, Luba Baylan, Anna Belousova, Patrice Blanchet, Marie Björklund, Gerard Boere, Preben Claussen, Akram Eissa Darwich, Sergey Dereliev, Bart Ebbsing, Morten Ekker, Henri Engström, Martin Fichtler, Per Hansson, Thomas Heinicke, Baz Hughes, Esko Jaakkola, Hadhema Jwad, Lauri Kahanpää, Kees Koffijberg, Elena Kreuzberg, Robert Lacy, Petri Lampila, Torsten Larsson, Teemu Lehtiniemi, Szabolcs Lengyel, Monika Lesz, Anna-Carin Lundqvist, Juha Markkola, Juha Merila, Jean-Yves Mondain-Monval, Johann Mooij, Vladimir Morozov, Khairbek Mussabayev, Micheal O'Briain, Ingar J. Øien, Peter Örn, Matti Osara, John O'Sullivan, Maria Panayotopoulou, Christiane Paulus, Nikolai Petkov, Minna Ruokonen, Ivan Rusev, Eldar Rustamov, Oliver Schall, Wolfgang Scholze, Per Sjogren-Gulve, Sergey Sklyarenko, Øystein Størkersen, David A. Stroud, The Swedish Ornithological Society/BirdLife Sweden, Sami Timonen, Petteri Tolvanen, Maire Toming, Yannis Tsougrakis, Gerard van Dijk, Marko Valker, Seppo Vuolanto, Sergey Yerokhov.

Milestones in the Production of the Plan

- Initial expert workshop: 31 March – 2 April 2005, Lammi, Finland
- First draft: Version 1.0, April 2005, presented to experts for technical review
- Recommendation arising from the 13th Meeting of the Scientific Council of the Bonn Convention, 18 November 2005
- Second Draft: Version 2.0, February 2006, presented to experts
Version 2.1, May 2006, presented to selected international experts
Version 2.2, July 2006, presented to the Range States
- Negotiation mission by AEWA Secretariat: January 2007 (Finland, Germany, Norway, Sweden), preliminary agreement achieved in November 2007
- 'Committee for captive breeding, reintroduction and supplementation of Lesser White-fronted Geese in Fennoscandia' established, initial meeting: 7-8 May 2008, Bonn, Germany
- Third draft: Version 3.0, May 2008, presented to Range States
Version 3.1, August 2008, presented to the 4th Meeting of the Parties to AEWA in September 2008, adopted with final amendments

Geographical Scope

This International Single Species Action Plan requires implementation in the following countries regularly supporting Lesser White-fronted Geese of the Western Palearctic Population: Azerbaijan, Bulgaria, Estonia, Finland, Germany, Greece, Hungary, Iraq, Islamic Republic of Iran, Kazakhstan, Lithuania, Netherlands, Norway, Poland, Romania, Russian Federation, Sweden, Syrian Arab Republic, Turkey, Turkmenistan, Ukraine and Uzbekistan.

Reviews

This International Single Species Action Plan should be revised in 2013. An emergency review shall be undertaken if there are sudden major changes liable to affect the Western Palearctic Population.

Credits

Thanks go to Gerard Boere, Sergey Dereliev, Bert Lenten, David Stroud, the European Commission and the French EU Presidency 2008 for their invaluable guidance, coordination and constructive criticism during the preparation and consultations of this Action Plan.

Recommended Citation: Jones, T., Martin, K., Barov, B., Nagy, S. (Compilers). 2008. International Single Species Action Plan for the Conservation of the Western Palearctic Population of the Lesser White-fronted Goose *Anser erythropus*. AEWA Technical Series No.36. Bonn, Germany.

Picture on the cover: © Ingar Jostein Øien

Drawing on the inner cover: © Pavel Prochazka/BirdLife International

Printing kindly sponsored by the Directorate for Nature Management of Norway.

CONTENTS

Foreword by Mr. Bert Lenten, Executive Secretary, Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA).....	3
Preface and Note.....	4
Executive Summary.....	6
1. Biological Assessment.....	9
1.1. General Information.....	9
1.2. Taxonomy	10
1.3. Population Development.....	11
1.4. Distribution throughout the Annual Cycle.....	15
1.5. Survival and Productivity, Life Cycle and Habitat Requirements	19
2. Available Key Knowledge.....	21
3. Threats	27
3.1. Background	27
3.2. Overview of Species Threat Status	27
3.3. Description of Threats.....	28
4. Policies and Legislation Relevant for Management	42
4.1. International Conservation and Legal Status	42
4.2. Member States' / Contracting Parties' Obligations.....	42
4.3. National Policies, Legislation and Ongoing Activities	45
4.4. Site and Habitat Protection and Research	45
4.5. Recent Conservation Measures	45
5. Framework for Action	48
5.1. Lesser White-fronted Goose Action Plan Goal, Purpose, and Results	48
6. Activities by Result.....	53
7. Implementation	60
8. References.....	62
9. Annexes	I

Foreword by Mr. Bert Lenten, Executive Secretary, Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA)

During their life cycle, migratory waterbirds cover considerable distances in order to find the best ecological conditions and habitats for feeding, breeding and raising their young. However, migration is a perilous journey, presenting a wide range of threats. Only a small number of birds are actually threatened by natural events: it is sad but true that human activities are the source of most dangers migrating birds are exposed to. Flying over long distances means crossing many international borders and entering different political areas with their own environmental policies, legislation and conservation measures. It is clear that international cooperation between governments, NGOs and other stakeholders is needed along the whole flyway of a species in order to share knowledge and to coordinate conservation efforts. The necessary legal framework and instruments for such international cooperation are provided by international agreements such as the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA).

One of these coordinating instruments for the conservation of biological diversity is in the form of International Single Species Action Plans (SSAP). They are being developed to find out more about populations of species with an unfavourable conservation status throughout their entire range, to identify underlying threats and, more importantly, to list all necessary conservation measures in a systematic and structured way. This information is crucial to tackling the problems that have caused and are still causing decline of these species and to allow action to be taken to improve their status in the long term. Such International SSAPs can only be developed and effectively implemented in close cooperation with governments, intergovernmental organisations, NGOs and different user groups.

AEWA has initiated this International Single Species Action Plan for the Lesser White-fronted Goose as a revision and factual update of previous plans, in cooperation with BirdLife International. The technical drafting of the plan was carried out by Tim Jones of DJ Environmental; governmental consultations were carried out by Kirsten Martin of the AEWA Secretariat. After several years and a number of interim revisions the plan was adopted under Resolution 4.16 at the Fourth Session of the Meeting of the Parties to AEWA in Antananarivo, Madagascar, September 2008.

The current estimates of the Western Palearctic population of the Lesser White-fronted Goose range from 8,000 to 13,000 individuals. It has declined rapidly since the middle of the 20th century – with an average decrease rate of 30 - 49% in the period 1998 - 2008, mainly due to overhunting and habitat loss. The declines have given rise to fears that the species may become extinct unless the downward trend is halted and reversed. The aim of this SSAP is to restore the Western Palearctic population to a favourable conservation status throughout its range and to secure a population size of over 25,000 individuals for its Western main subpopulation and over 1,000 individuals for the Fennoscandian subpopulation.

I strongly urge the 22 Range States involved in the conservation of the Lesser White-fronted Goose to make every effort to implement this Action Plan, not only by transforming it into National Action Plans but also by working together to address the shared issues and threats causing the drastic population decline. I very much believe that if the measures described here are jointly implemented in reality, it will trigger the recovery of the population of this bird to a favourable conservation status.



Bert Lenten,
AEWA Executive Secretary

Preface

This International Single Species Action Plan for the Conservation of the Western Palearctic population of the Lesser White-fronted Goose (*Anser erythropus*) was commissioned to BirdLife International. The technical drafting of the plan was carried out by Tim Jones of DJ Environmental; governmental consultations were carried out by Kirsten Martin of the AEWA Secretariat.

The plan draws on the conclusions of the international ‘Workshop on Protection of Lesser White-fronted Goose’ held in Lammi, Finland, 31 March to 2 April 2005. It takes into account all inputs received in response to the circulation of the First Draft for technical review. A preliminary Second Draft (version 2.0) was circulated to Å. Andersson, G. Boere, B. Ebbsing, S. Nagy, I. Rusev and M. Toming in February 2006. Version 2.1 was prepared in May 2006 taking into account the feedback received. Version 2.2 was prepared in July 2006 and included a revised distribution map (Figure 1) plus further updates to tables 6, 7 and 8.

Version 2.2 was circulated to the Lesser White-fronted Goose Principal Range States for consultation in July 2006. No agreement on the draft plan was reached due to conflicting opinions regarding the supplemented/reintroduced population breeding in Sweden and wintering in the Netherlands. The AEWA Secretariat undertook a negotiation mission to Finland, Norway, Sweden and Germany and attained a preliminary compromise on the issue by November 2007. In 2008 the plan was technically updated and revised to include the compromise agreements. Following a first meeting and preliminary feedback by the newly established “Committee for captive breeding, reintroduction and supplementation of Lesser White-fronted Geese in Fennoscandia”, the draft Action Plan (version 3.0.) was again submitted in May 2008 for consultation with the governmental officials of the 22 Principal Range States. A final draft was prepared by August 2008 (version 3.1) and submitted for adoption by the Fourth Session of the Meeting of the Parties to AEWA. Final consultations at the AEWA Meeting of the Parties have led to this document which represents the Action Plan as it was adopted by the Fourth Session of the Meeting of the Parties to AEWA in September 2008.

The Action Plan follows the format for Single Species Action Plans approved by the AEWA 2nd Meeting of the Parties in September 2002.

Note

Action planning is a dynamic process, continually responding to the implications of new sources of data and information. In the drafting of this plan, a number of issues remain where opinions differ as to the interpretation of available information on the past and current status of the Lesser White-fronted Goose, including some which has become recently available.

This Action Plan has been adopted without prejudice to the further resolution of a small number of issues where there still remains a lack of international consensus.

Acknowledging the need for the urgent implementation of this Action Plan, and wishing to avoid further delay, it is envisaged that further discussion and review of the following issues will take place. Such reviews should ideally be undertaken by the end of 2009 and will include all data and information already provided by the Range States. The involvement of independent experts may prove helpful in this regard.

These include:

- the historical status of the species in Sweden and Germany;
- the past and present definition of flyways and sub-populations in north-west Europe; and
- the relative implications of differential mortality of adult and young birds.

References to these issues in this Action Plan should not necessarily be taken to represent a consensus of the Range States. Any future version of the Action Plan should take note of any new information arising from these reviews as well as any other relevant information.

Executive Summary

Lesser White-fronted Goose – a species under threat

The Lesser White-fronted Goose *Anser erythropus* is globally threatened, being recognised as Vulnerable by IUCN and ranked by BirdLife International as ‘SPEC 1’ within Europe, denoting a European species of global conservation concern. It is listed on Annex 1 of the European Council Directive on the conservation of Wild Birds (79/409/EEC, 2 April 1979), in Column A of the Action Plan under the African-Eurasian Migratory Waterbird Agreement (AEWA) and in Annex II ‘Strictly protected species’ of the Bern Convention.

Lesser White-fronted Geese are long-distance Palearctic migrants, currently breeding discontinuously in the sub-arctic zone from northern Fennoscandia to eastern Siberia. The wintering/staging areas and migration routes are only partially known.

Population and range decline

The global population of Lesser White-fronted Goose has declined rapidly since the middle of the 20th century. The decrease in numbers has been accompanied by fragmentation of the breeding range and is continuing to affect all populations, giving rise to fears that the species may go extinct. Overhunting and habitat loss are considered to be the main threats. BirdLife International estimates a decrease in numbers in the range of 30% to 49% during the period 1998–2008.

Four subpopulations can be recognised, three of which are surviving components of the species’ formerly more extensive breeding range:

- Fennoscandian population (breeding in the Nordic countries and the Kola Peninsula of north-westernmost Russia);
- Western main population (nesting in northern Russia to the west of the Taimyr Peninsula); and
- Eastern main population (nesting from the Taimyr Peninsula eastwards and wintering in China).

The fourth subpopulation has been created by the release of captive-bred birds within the former range of the Fennoscandian population in Sweden and by the establishment of a human-modified flyway. The Fennoscandian and Western main populations underwent significant declines during the 20th century and continue to decrease, due primarily to hunting pressure and habitat loss along migration routes and in the wintering areas. The supplemented/reintroduced population appears to be increasing slowly, but views differ markedly on the ethical and scientific merits of the conservation measures applied to this species and their potential implications (e.g. hybridisation risk with other species).

Scope of this Action Plan

This Action Plan deals with conservation of two of the three wild populations – namely the Fennoscandian population and Western main population – given that the Eastern main population does not occur within the AEWA Agreement Area or the territory of Member States of the European Union. The Eastern main population is therefore only mentioned when a global context or comparison is required. The Action Plan also takes into account the population derived from captive-bred birds and used for restocking in Swedish Lapland, migrating to winter in the Netherlands. According to previous agreements between the Fennoscandian Range States and in line with AEWA’s mission, the main focus of this plan is the conservation of the wild populations.

Principal Range States

Lesser White-fronted Geese occur regularly in at least 22 States within the European Union and/or AEWA Agreement Area. These are referred to as 'Principal Range States' in the Action Plan and have the major responsibility for its implementation. These states are listed below. The letters in brackets denote the relevant populations of Lesser White-fronted Goose (F = Fennoscandian; WM = Western main; R = supplemented/reintroduced):

EU Principal Range States

Bulgaria (F, WM)
Estonia (F)
Finland (F)
Germany (F, WM)
Greece (F)
Hungary (F)
Lithuania (F)
Netherlands (R)
Poland (F,WM)
Romania (WM)
Sweden (F,R)

Non-EU Principal Range States

Azerbaijan (WM)
Iraq (WM)
Islamic Republic of Iran (WM)
Kazakhstan (F,WM)
Norway (F)
Russian Federation (F,WM)
Syrian Arab Republic (WM)
Turkey (F,WM)
Turkmenistan (WM)
Ukraine (F,WM)
Uzbekistan (WM)

Threats

There is strong evidence that the most important factors driving the continued decline in numbers and fragmentation of the range of the Lesser White-fronted Goose (both the Fennoscandian and Western main subpopulations) are those that cause high mortality among fully grown birds. These factors operate primarily on the staging and wintering grounds, given that studies in the breeding range have failed to detect any adverse impacts that are of significant magnitude to explain the population crash. Although the species is legally protected, on paper at least, across virtually its entire range, hunting is considered to be the primary cause of mortality and the single most important threat that this Action Plan has to tackle. The loss and degradation of suitable habitat is currently considered to be an important but secondary threat to survival of full-grown birds. However, its significance as a likely driver for the historical declines and range changes during the 20th century should not be underestimated.

Focus and content of the Action Plan (see Chapter 5)

Action Plan Goal

To restore the Lesser White-fronted Goose to a favourable conservation status within the AEWA Agreement Area.

Action Plan Purpose

To stop and reverse the current population decline and range contraction.

Results required for delivering the Purpose and Goal

Result 1: Mortality rates are reduced

Result 2: Further habitat loss and degradation are prevented

Result 3: Reproductive success is maximised

Result 4: No introgression of DNA from other goose species into the wild population occurs as a result of further releases and DNA introgression from already released birds from captive breeding programmes is minimised

Result 5: Key knowledge gaps filled

Result 6: International cooperation maximised

For each Result, Objectively Verifiable Indicators, Means of Verification, Priority and Timescale are identified, in addition to the specific activities needed to achieve the desired Result (see Chapter 6).

Principles of Implementation

1. An International Lesser White-fronted Goose Working Group shall be established, consisting of governmental representatives of all Range States. The governmental representatives shall be free to bring in their own experts and to call on their support as required. The Working Group shall be chaired by the AEWA Secretariat (subject to additional, dedicated human and financial resources being made available to the Secretariat) and will operate in accordance with Terms of Reference to be developed by the AEWA Secretariat, approved by the Range States and endorsed by the AEWA Technical Committee.
2. The main priority for the conservation of the Lesser White-fronted Goose is the maintenance of the wild populations breeding in Fennoscandia and Russia.
3. The efficiency of conservation measures is to be assessed by the International Lesser White-fronted Goose Working Group.
4. Implementation and future modification of this International Single Species Action Plan – and all related decisions – shall be undertaken with transparency and accountability so that progress can be subject to scientific scrutiny at any time.
5. Each Range State shall consider support for ‘on-the-ground’ conservation measures, particularly along the Lesser White-fronted Goose flyway(s) that traverse(s) its territory.
6. Particular attention shall be paid to mortality due to hunting and urgent targeted measures shall be implemented to reduce the magnitude of this threat, the success of which shall be promptly and regularly reviewed and evaluated.
7. Supplementing wild populations with captive-bred birds shall be considered if other conservation measures are not as quickly efficient as needed and should populations continue to decline. As with any other captive breeding, reintroduction or supplementation initiatives this project will be subject to consideration and practical advice by the *Committee for captive breeding, reintroduction and supplementation of Lesser White-fronted Geese in Fennoscandia* (see below).
8. The SSAP should be regularly adapted and updated every 5 years.

1. Biological Assessment

1.1. General Information

The Lesser White-fronted Goose *Anser erythropus* is the smallest of the geese in the genus *Anser*. The species is globally threatened, being recognised as Vulnerable by IUCN – The World Conservation Union (IUCN, 2006), and ranked by BirdLife International as ‘SPEC 1’ within Europe, denoting a European species of global conservation concern (BirdLife International, 2004). It is listed on Annex 1 of the European Council Directive of April 2 1979 on the conservation of wild birds (79/409/EEC), in Column A of the Action Plan under the African-Eurasian Migratory Waterbird Agreement (AEWA) and in Annex II ‘Strictly protected species’ of the Bern Convention.

Lesser White-fronted Geese are long-distance Palearctic migrants, currently breeding discontinuously in the sub-arctic zone from northern Fennoscandia to eastern Siberia. The wintering/staging areas and migration routes are only partially known – see Figure 1.

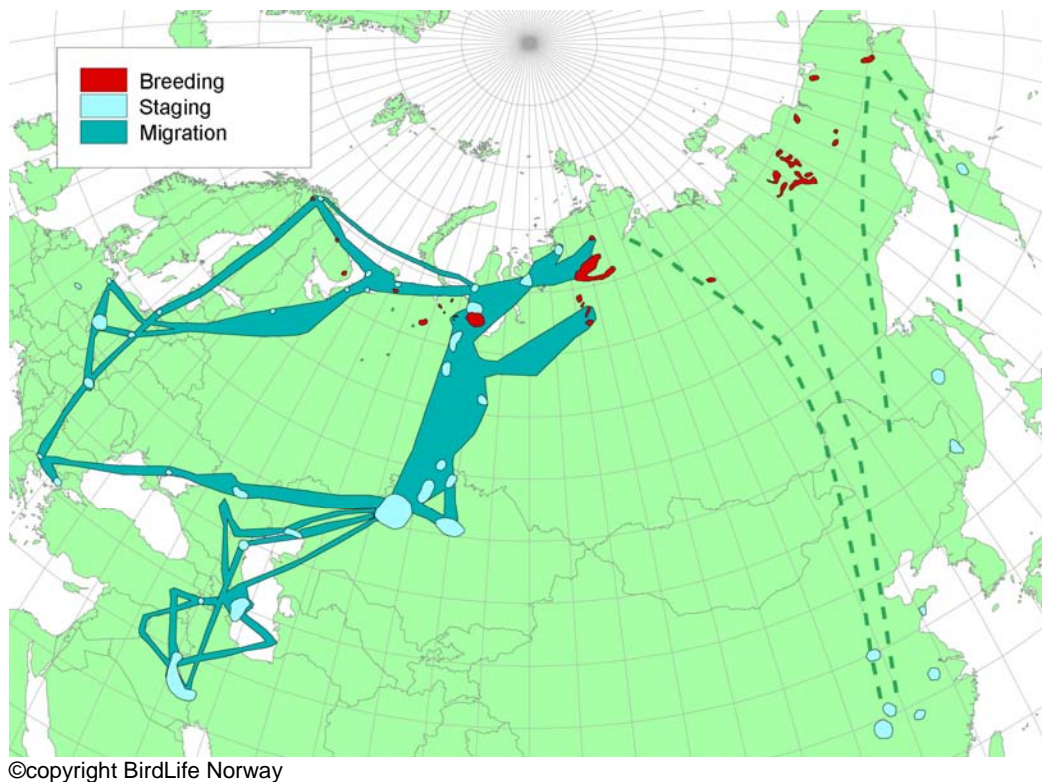


Figure 1. Global distribution of wild populations of Lesser White-fronted Goose for the period 2000–2005. Dashed lines show the linkages between breeding and wintering areas for the Eastern main population, but the precise migration routes followed are unknown.

Four subpopulations can be recognised, three of which (‘Fennoscandian’, ‘Western main’ and ‘Eastern main’ – see section 1.2 for further explanation) are surviving components of the species’ formerly more extensive breeding range (Fox 2005, Lorentsen et al. 1999). The fourth subpopulation has been created by the release of captive-bred birds within the former range of the Fennoscandian population in Sweden and by the establishment of a human-modified flyway. Two of the three wild subpopulations (‘Fennoscandian’ and ‘Western main’) underwent significant declines during the twentieth century and continue to decrease, due primarily to hunting pressure and habitat loss along migration routes and in wintering areas, though a lack of systematic count data makes calculation of reliable trends difficult for the Western main subpopulation. The supplemented/reintroduced population appears to be

increasing slowly and shows high adult survival rates, but views differ markedly in relation to the ethical and scientific merits of captive breeding, supplementation/reintroduction and flyway establishment or modification as conservation tools, particularly with regard to the desirable timing for applying such measures.

Among existing overview documents are the 1996 International Action Plan prepared for BirdLife International on behalf of the European Commission (Madsen 1996) and a synthesis report prepared for the Scientific Council of the Convention on Migratory Species (UNEP/WCMC 2003). Both of these documents have been fully taken into account in preparing the present Action Plan. An internet portal www.piskulka.net (operated by the Fennoscandian Lesser White-fronted Goose Conservation Project) provides regularly updated news, links and literature references for all matters concerning wild Lesser White-fronted Geese. The implementation and effectiveness of the 1996 Action Plan were evaluated as part of a 2004 review of species action plans for Europe's most threatened birds. This concluded that while implementation of the Lesser White-fronted Goose Action Plan had made significant progress within the EU, losses due to hunting remained high in non-EU countries, especially Kazakhstan and Russia (Nagy & Crockford 2004; see also Nagy & Burfield 2006 for a summary of 'lessons learned' for species action plans).

Lesser White-fronted Goose conservation has been regularly raised during international meetings held e.g. in Odessa, Ukraine (March 2004), Edinburgh, UK (April 2004) and Xanten, Germany (January 2007). A meeting exclusively dedicated to the Lesser White-fronted Goose took place in Lammi, Finland, in April 2005. The technical presentations and discussions have been drawn on in preparing this Action Plan.

1.2. Taxonomy

Phylum: Chordata

Class: Aves

Order: Anseriformes

Family: Anatidae

Tribe: Anserini (Vigors, 1825)

Species: *Anser erythropus* (Linnaeus 1758)

Synonym: *Anas erythropus* (additional synonyms may be found at <http://www.worldbirdinfo.net/>)

No subspecies are recognised. However, genetic studies (Ruokonen et al. 2004; Ruokonen & Lumme 2000) suggest that there are three distinctive populations in the wild that can be traced back to the last ice age and which should therefore be treated as three discrete management units for conservation purposes. This position is not accepted by some other stakeholders, who argue that these three populations are artefacts, resulting from recent fragmentation – due to adverse human impacts – of a once continuous population, though there is no published scientific evidence supporting this position. Recent studies show that there is a degree of genetic exchange between the Fennoscandian and Western main populations (Ruokonen et al. 2007), but still it is justified to treat these two populations as separate management units.

In this Action Plan the three populations/subpopulations are referred to for convenience as the:

- Fennoscandian population (breeding in the Nordic countries and the Kola Peninsula of north-westernmost Russia);
- Western main population (nesting in northern Russia to the west of the Taimyr Peninsula); and
- Eastern main population (nesting from the Taimyr Peninsula eastwards and wintering in China).

This Action Plan deals with conservation of two of the three wild populations – namely the Fennoscandian population and Western main population. Given that the Eastern main population does not occur within the AEWA Agreement Area or the territory of Member States of the European Union, it is only mentioned when a global context or comparison is required. The Action Plan also takes into account a fourth population, derived from captive-bred birds and used for restocking in Swedish Lapland (for population descriptions see chapter 1.3).

1.3. Population Development

Global population trend

The global population of Lesser White-fronted Goose has declined rapidly since the middle of the 20th century. The decrease in numbers has been accompanied by fragmentation of the breeding range and is continuing to affect all populations, giving rise to fears that the species will go extinct. Overhunting and habitat loss are considered to be the main threats (e.g. Madsen 1996; UNEP/WCMC 2003; Fox 2005). These and other threats are described in detail in section 3.3. The global population decline is continuing; BirdLife International estimates a decrease in numbers in the range of 30% to 49% during the period 1998–2008.

Global population estimate

The most recent estimate of the global mid-winter population is 28,000 to 33,000 individuals, derived from combining estimates for the two western populations (Fennoscandian and Western main) = 8,000 to 13,000 individuals, and the Eastern main population = 20,000 individuals (Delany et al. 2008, Delany & Scott 2006). This compares with previous published global estimates of 25,000 to 30,000 individuals (Lorentsen et al. 1999) and 22,000 to 27,000 (Delany & Scott 2002). The estimate for the Western main population is based on autumn surveys in the staging area in Kustanay region, north-west Kazakhstan (Tolvanen & Pynnönen 1998, Tolvanen & al. 2000). The estimate for the Eastern main population (14,000) published in Delany & Scott (2002) was an underestimate, because at the most important wintering site (East Dongting Lake nature reserve) alone, up to 16,600 individuals were counted in 2004 (Barter 2005). In spite of an increased population estimate owing to improving knowledge, both Eastern and Western main populations are considered to be declining (Delany & Scott 2006).

The crash in numbers and contraction in range of the Fennoscandian population is well documented (see below), but less detailed information is available for either the Western main or Eastern main populations, which breed in Russia.

Western main population

The known breeding areas are indicated in Figure 1. The most recent population estimate for the European tundra is 500 to 800 birds. Decreasing numbers and a contracting distribution have been noted within study areas in this region, even though no significant changes/impacts have been observed on the breeding grounds (Morozov & Syroechkovskiy, 2002). However there is a fundamental lack of baseline information; for example, Syroechkovskiy et al. (2005) underline the fact that the breeding grounds of some 8,000 birds of the subpopulation have yet to be located.

Fennoscandian population

The wild Fennoscandian population in the Nordic countries (i.e. excluding the unknown number of birds nesting in the Kola Peninsula of westernmost Russia – see below) was estimated in 2004 at only 20-30 breeding pairs and there has been a sustained, statistically

significant, negative trend in the population in the period 1990-2003¹ (Tolvanen et al. 2004b; Aarvak & Øien 2004). This continues a long-term decline, from an estimated 10,000 individuals in the early 20th century (Norderhaug & Norderhaug 1984). Breeding observations of the original wild population in Sweden were made in 1991. Footprints of adults and young were seen at a suitable locality in 1996 (Pääläinen & Markkola 1999), and a male showing breeding behaviour was seen in the same area in 1998 (A. Andersson, M. Björklund pers. comm.). In Finland, nesting was last confirmed in 1995 (Øien et al. 2001), though birds continue to be seen close to potential breeding areas virtually annually (P. Tolvanen pers. comm.). Figure 2 shows the overall trend in the Fennoscandian population over 25 years, but note that during the latter part of this period there was little organised searching for breeding birds in Finland and none in Sweden (P. Tolvanen pers. comm.). However, survey work in northern Sweden in 2005 generated two records for the spring migration period (end of April) and two records during the breeding season (June/July), but without any evidence of nesting (M. Björklund, pers. comm.). Figure 3 shows the contraction in range from the 1950s to the present day.

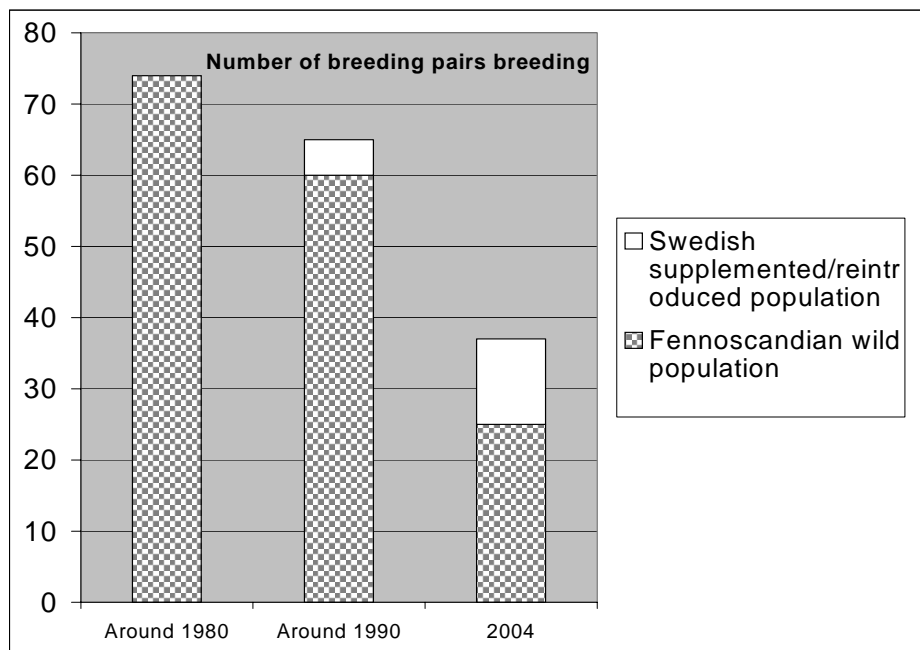


Figure 2. Trend in wild Fennoscandian Lesser White-fronted Goose numbers 1980 to 2004 (excluding birds nesting on the Kola Peninsula, Russia) and supplemented/ reintroduced Swedish population 1990 to 2004 (including supplemented/reintroduced birds from restocking programmes between 1990 and 1999). *Source:* based on A. Andersson 2005, BirdLife International 2004, Norderhaug & Norderhaug 1984; updated with information provided to the 2005 Lammi workshop by I.J. Øien.

¹ For the period 2001-2007, after a sharp decline between the years 2000 and 2001, the population seems to have been stable. There is no published reference for this to date.

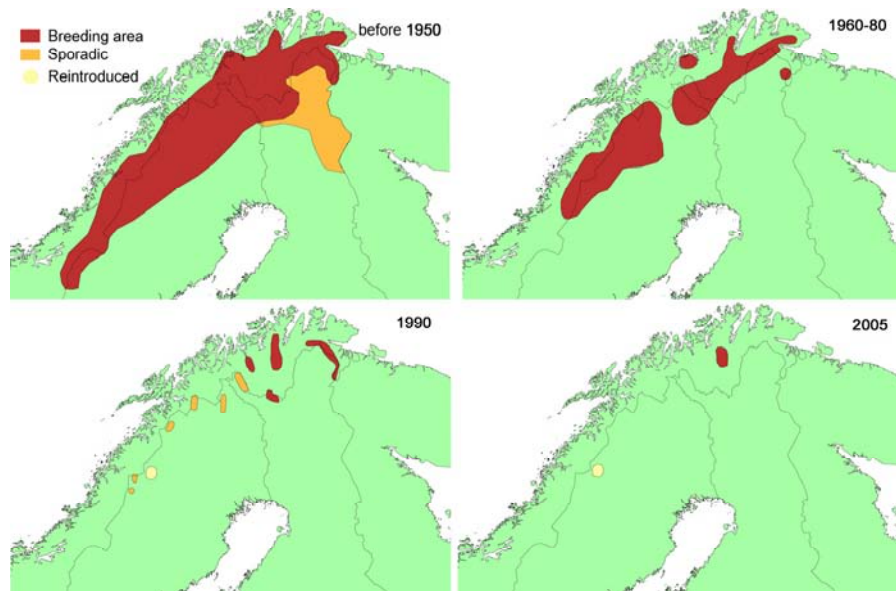


Figure 3. The breeding distribution of the Lesser White-fronted Goose in Fennoscandia before 1950 (above left), 1960-1980 (above right), at the beginning of the 1990s (below left; after von Essen *et al.* 1996), and in 2005 (below right).

At the Valdak Marshes, northern Norway, the most important staging area in Norway and in the Nordic countries to date, numbers of Lesser White-fronted Geese staging in spring decreased by more than one-third between 1990 and 2003 (Aarvak & Øien 2004). A decline of 65% between 2000 and 2003 was recorded at a second spring staging area, the Bothnian Bay coast of Finland (Markkola *et al.* 2004), though this probably also reflects changes in migration routes, as well as random effects such as weather conditions.

Aikio *et al.* (2000) concluded that the status (including precise breeding and moulting areas, numbers and trends) of birds nesting on the Kola Peninsula of north-westernmost Russia was unclear and that more detailed research was required. A field expedition in June 2001 gathered some additional information and the report on this work concludes: “it is still possible that the total Lesser White-fronted Goose breeding population of the whole Kola peninsula could be perhaps some tens of pairs, taking into account the huge area of potentially suitable and mostly intact breeding habitat” (Timonen & Tolvanen 2004).

Supplemented/Reintroduced population in Swedish Lapland

A Lesser White-fronted Goose captive-breeding programme was established in Sweden by Lambart von Essen in the late 1970s and the first releases into the wild took place in 1981 (e.g. von Essen 1996). The breeding stock was built up mainly with birds and eggs originating from waterfowl collections in the UK and continental Europe. During the period 1981 to 1999, 348 captive-bred and ring-marked Lesser White-fronted Geese were released in Swedish Lapland. Barnacle Geese *Branta leucopsis* were used as foster-parents and the supplemented/reintroduced Lesser White-fronted Geese followed their foster parents to wintering grounds in the Netherlands. The birds using this artificially established migration route, which avoided countries with unsustainably high hunting pressure, show a high survival rate. A total of 66 young fledged from breeding attempts in the release area between 1981 and 1999 (Tegelström *et al.* 2001). The number of fledglings reared between 1999 and 2007 ranged from 13 to 20 annually, with a total for the seven-year period of 136 fledglings from 51 broods (A. Andersson pers. comm). 120 geese of the supplemented/reintroduced population were recorded in the Netherlands during the winters of 2003-2005 (Koffibjerg *et al.* 2005).

In 1999, 30-40 Lesser White-fronted Geese of mostly Belgian origin were released in central Sweden and guided by ultra-light aircraft to Germany. Most were recaptured when they returned to the release site, but a few remained free-flying and have been observed in coastal areas of Finland (occasionally also in Denmark and Germany) mainly together with urbanised Barnacle Geese. No breeding by these birds has been reported (L. Kahanpää pers. comm.); there are recent observations of hybrid Barnacle and Lesser-White-fronted Geese in the urban population of Barnacle Geese in South-West Finland (T. Lehtiniemi pers. comm.).

No captive-bred geese were released during the period 2000–2004, following the discovery that some birds in the captive breeding stock were carrying genes of Greater White-fronted Goose *Anser albifrons* (A. Andersson 2004). Analysis of the nuclear genetic variation showed that the genetic differentiation between the wild Fennoscandian population and the captive breeding stock is three times as large as between the wild populations of Fennoscandia and Central Asia. Thus, the captive stock does not represent the original Fennoscandian population from a genetic perspective (Ruokonen et al 2007).

Finnish captive-breeding and reintroduction programme

In 1986 a captive breeding population was established in Finland (Markkola et al. 1999). Between 1987 and 1997 about 150 captive-bred Lesser White-fronted Geese were released in Finnish Lapland, but high mortality occurred and no breeding attempts were made by the reintroduced birds. This reintroduction programme did not aim to modify goose migration routes (Markkola et al. 1999). Releases were stopped from 1998 (Markkola et al. 1999), though Lesser White-fronted Geese continued to be bred in captivity.

In July 2004, three Lesser White-fronted Goslings were released contrary to the moratorium in northern Finland (together with their Barnacle Goose foster parents, the male of which was satellite-tagged). One of the young Lesser White-fronted Geese was sighted among Barnacle Geese in the Netherlands in December 2004, though not in the company of its foster parents, or of supplemented/reintroduced Swedish birds. There were plans to release between one and three similar families in 2005, subject to the outcome of a legal challenge over the legitimacy of the 2004 release, but a lack of suitable birds for release prevented this. (L. Kahanpää pers comm; see also the website of the Friends of the Lesser White-fronted Goose www.math.jyu.fi/~kahanpaa/Kotisivut/AnserErythropus/LWfG.html).

New captive-breeding and release initiative

A new international, German-based project aims to breed up to 400 Lesser White-fronted Geese in four years and to release them in Lapland. It is intended to use ultra-light aircraft as ‘foster parents’ to guide the birds from Swedish Lapland to wintering grounds in the Lower Rhine area of Germany. Intensive experimental work has already been conducted over the course of six years (source: Operation Lesser White-fronted Goose/Aktion Zwerggans, www.zwerggans.de).

On 20 October 2005 the Swedish Environmental Protection Agency decided to issue a permit to Aktion Zwerggans, subject to certain conditions being met (e.g. genetic screening of the birds with three different methods enabling joint conclusions), for: (a) the release in Västerbotten county of up to 25 Lesser White-fronted Geese in both 2006 and 2007; and (b) implementation of a pilot project on the use of ultra-light aircraft as a means of guiding the released geese on a new flyway through Sweden (and then through Denmark and north-west Germany to the Lower Rhine). However, plans modified in 2007 to use offspring from imported wild Lesser White-fronted Geese from Russia as the basis for a ‘genetically clean’ breeding stock were delayed due to time lags before the imported wild birds from Russia start to breed in captivity. Sweden has initiated changes to base its captive breeding programme exclusively on wild birds from Russia. The first shipment of eight wild birds was received in

2006; the second shipment of six birds was received in mid-February 2007. By May 2008, a total of 24 wild birds from Russia had been received.

In November 2005, the Scientific Council of the Convention on Migratory Species concluded, as part of its wider recommendation on Lesser White-fronted Geese (see pages 34–35 and Annex 9a), that: *“For the present, we do not support the introduction of Lesser White-fronted Geese into flyways where they do not occur naturally. We have borne in mind the powerful argument concerning the improved safety of birds in these flyways, as well as practical considerations, such as current proposals that could quickly be put into effect. However, we consider that modifying the natural behaviour of Lesser White-fronted Geese in this respect, as well as unknown ecological effects in the chosen new flyways, and other such considerations, make this technique inappropriate until such time as it may become essential, particularly when major disruption or destruction occurs of key components of the natural flyways. We do not believe that to be the case at present.”*

Following consultations in 2006 and 2007 between the German government, Aktion Zwerggans, the Fennoscandian range states and the AEWA Secretariat, it was agreed that implementation of the Aktion Zwerggans experimental pilot project would be postponed by three years to enable sufficient stock to be built up derived entirely from wild-caught Russian birds, or to seek international acceptance, in particular of the results of a genetic analysis of captive and wild Lesser White-fronted Geese conducted in the framework of the project (AEWA 2007; Annex 10); see also page 36. In May 2008 the first meeting of the Committee for captive breeding, reintroduction and supplementation of Lesser White-fronted Geese in Fennoscandia passed a joint recommendation underlining that the purity of captive German-bred birds can still not be guaranteed, yet it would need to be assured before any use of such birds could be endorsed. The use of wild-caught Russian birds was confirmed as the better way forward (Report from the 1st Meeting of the Committee for Captive Breeding, Reintroduction and Supplementation of Lesser White-fronted Geese in Fennoscandia).

1.4. Distribution throughout the Annual Cycle

The three wild subpopulations (see section 1.2) and the supplemented/reintroduced Swedish population have differing migration routes and wintering grounds, though there is known to be partial overlap in the case of the Fennoscandian and Western main populations. The main flyways are indicated in Figure 1.

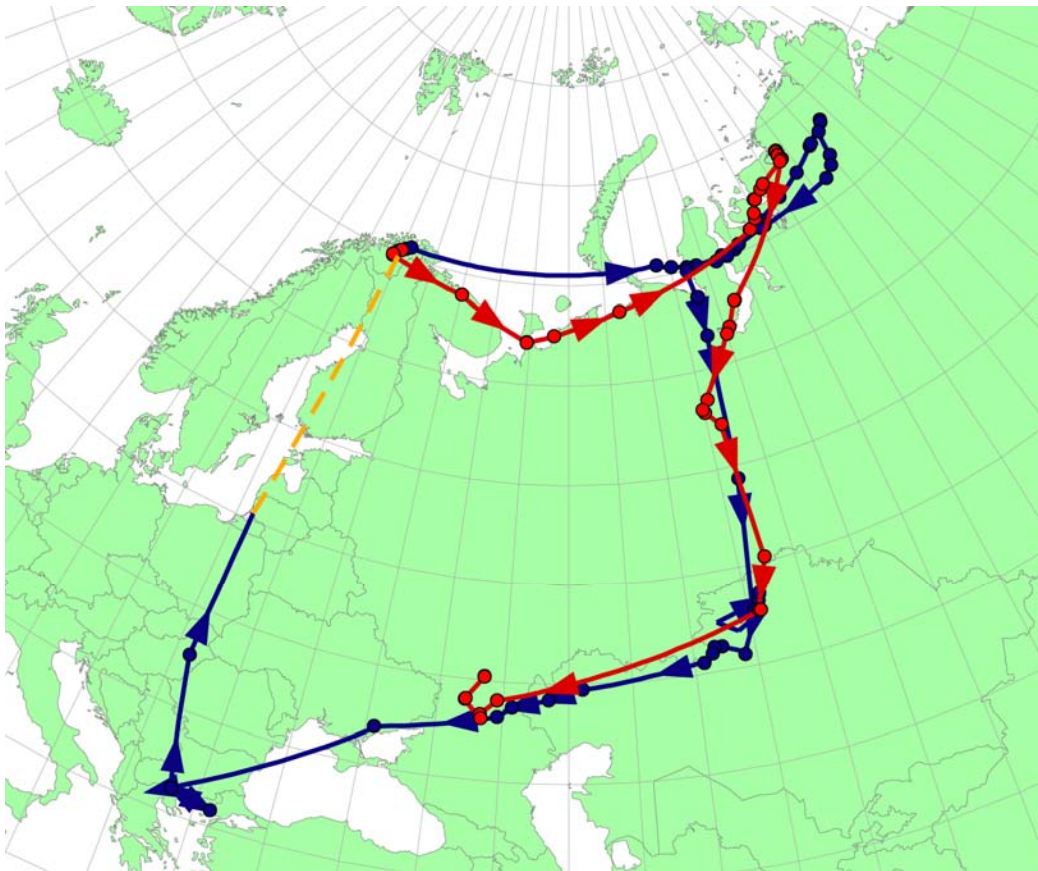
Fennoscandian population

Satellite tracking has shown that non-breeding birds from the small Fennoscandian population undertake an autumn migration eastwards to the Kanin Peninsula, Kolgujev Island (and even as far as the Taimyr Peninsula) in northern Russia (Aarvak & Øien 2003). Successful breeders moult on the breeding grounds, but then also undertake a migration eastwards to the Kanin Peninsula. There is subsequently a migratory divide, with some birds heading south-west, presumably through western Russia (Lake Ladoga region), western Estonia, Poland and eastern Germany, and then south-east, via a major staging area in Hungary (Hortobágy) and Greece (Lake Kerkini) to wintering grounds in north-east Greece (Evros Delta), adjacent to the Turkish border. There is also evidence that these birds visit the Turkish side of the Evros Delta and/or other sites in westernmost Turkey during the winter. Other birds migrate eastwards, crossing the Ural mountains, and then turning south through the Ob valley to north-west Kazakhstan and onwards to presumed Black Sea and Caspian Sea wintering areas, thought to be shared with the Western main population (Loretsen et al. 1998; Aarvak & Øien 2003). The most recent evidence from satellite tracking during 2006/2007 shows that all three Fennoscandian individuals that have been tracked this far south have undertaken an astonishing loop migration to the Greek wintering grounds via the Ob Valley, north-west Kazakhstan and the Black Sea, returning north through Hungary and the Baltic (LIFE Nature

project 2005–2008 *Conservation of the Lesser White-fronted Goose on European migration route* – see Figure 4).

The Lesser White-fronted Geese wintering on the Black Sea coast of Bulgaria and Romania, scattered among flocks of Greater White-fronted Geese, are thought to belong to the Western main population.

Known spring and autumn staging areas around the Baltic Sea and close to the breeding/moulting grounds are now monitored on a regular basis. Important spring staging sites in the region include the Nemunas Delta, Lithuania (revealed by satellite tracking in spring 2007), Matsalu, Estonia (Tolvanen 1999; Pynnönen & Tolvanen 2001; Tolvanen, Toming & Pynnönen 2004), the Bothnian Bay area, near Oulu in Central Finland (e.g. Markkola, 2001) and the Valdak Marshes, Porsangen Fjord, Norway. The major staging sites in autumn include the Valdak Marshes (Aarvak & Øien 2001).



©copyright BirdLife Norway

Figure 4. Satellite tracking of birds from the Fennoscandian population in 2006/2007 showing 'loop' migration to wintering sites in Greece, via Russian moulting grounds. The solid lines show the actual routes followed by two male birds ('Finn' in blue & 'Imre' in red) ringed and satellite tagged at the Valdak Marshes, northern Norway, in summer 2006. The dashed orange line shows Finn's projected route for the last part of his migration. The final satellite transmission was from the Nemunas Delta, Lithuania, in April 2007 but Finn was sighted back at the Valdak Marshes on 20 May.

Western main population

Ornithological field coverage is patchy at best in most of the countries used by the Western main population, while the areas and distances involved are sometimes vast and access is frequently difficult. Satellite tracking has provided vital clues, but significant gaps still remain in relation to the principal flyways/staging sites and the main wintering grounds.

Known staging areas for birds from the Western main population include: parts of the Ob river valley (the “Double Ob area”, Russia); the lakes and agricultural land of Kustanay Oblast, north-west Kazakhstan, where Lake Kulykol is of particular importance (Tolvanen & Pynnönen 1998; Tolvanen et al. 2001, Yerokhov et al. 2000); the Sultan-Aksuat lakes system in the western part of neighbouring Northern-Kazakhstan Oblast, (Yerokhov et al. 2005); and the Shalkar lakes on the border of the Orenburg area (Russia) and Aqtobe province (Kazakhstan) (<http://www.piskulka.net/Satellite%20tracking.htm>). The main wintering areas are unknown but thought to be around the northern Black Sea coast, the southern Caspian Sea, inland wetlands of Azerbaijan, and the inland wetlands of Iran and Iraq, especially the Mesopotamian Marshes. During the winter of 2004/2005, satellite tracking of one individual ringed and satellite-tagged in the Polar Urals region, northern Russia, in August 2004, has confirmed that at least some birds continue to winter in Iraq (Morozov & Aarvak 2004, Øien & Aarvak 2005; <http://www.piskulka.net/Satellite%20tracking.htm>). More recently still, satellite tracking of individuals ringed on the Putorana Plateau of Russia in July and August 2006 migrated south-west across the West Siberian depression, to staging areas in Kazakhstan. Subsequently two birds were tracked to the western shore of the Caspian Sea to the border area between Iran and Azerbaijan, one bird later reaching Iraq (<http://www.piskulka.net/Satellite%20tracking.htm>). An expedition located at least eight Lesser White-fronted Geese in eastern Syria (close to the border with Iraq) in February 2007, while over 50 were reported at a second site later in the month (<http://www.piskulka.net/Recent%20observations.htm>). Limited winter count data are available for sites in Uzbekistan that formerly held significant numbers of wintering Lesser White-fronted Geese.

Small numbers of vagrant Lesser White-fronted Geese occur regularly in Germany scattered among flocks of Greater White-fronts. There are indications that at least some of these birds may belong to the Western main population (Mooij & Heinicke in prep.), while satellite tracking in the 1990s showed that a bird from the Fennoscandian population have occurred in East Germany.

Supplemented/Reintroduced population

As described above, a human-modified flyway has now been established between the release area for captive-bred birds in Swedish Lapland and the Netherlands, crossing north-west Germany. There are sporadic records from other countries, often of individual birds mixing with flocks of other goose species, mostly Barnacle Geese. All released individuals have been colour-ringed, but as there have been no releases since 1999 and because the offspring of released birds are not ringed, the proportion of colour ringed birds in the population has gradually declined. Nevertheless, colour-ringing has enabled a relatively comprehensive picture of their movements to be established.

Summary by Principal Range State

Lesser White-fronted Geese occur regularly in at least 20 States within the European Union and/or AEWA Agreement Area (Table 1). These are referred to as ‘Principal Range States’ in the remainder of the Action Plan and have the major responsibility for its implementation. A country is listed as a Principal Range State where one or more Important Bird Area (IBA) for the Lesser White-fronted Goose has been identified within its territory. IBAs have themselves been identified on the basis of internationally accepted criteria published by BirdLife

International. In the case of countries where IBAs have not been formally identified, it is suggested that a Principal Range State *either* holds one or more sites where at least 15 staging/wintering individuals are recorded regularly (e.g. Uzbekistan) *or* where a combination of historical counts and recent satellite data provide strong evidence of the country's importance (e.g. Iraq, Syria, Azerbaijan, Lithuania). Lesser White-fronted Geese occur as vagrants or irregular visitors in many other countries. For further details, see Chapter 2 and Annex 2.

Table 1. Occurrence of Lesser White-fronted Geese in Principal Range States of the European Union and AEWA Agreement Area

Fennoscandian subpopulation			
EU Range States	Breeding	Staging	Wintering
Bulgaria	NO	YES	YES
Estonia	NO	YES	NO
Finland	[YES] (possibly extinct)	YES	NO
Germany	NO	YES	NO
Greece	NO	YES	YES
Hungary	NO	YES	YES (occasional)
Lithuania	NO	YES	NO
Poland ²	NO	YES (?)	YES (occasional)
Sweden	FORMERLY (wild population possibly extinct)	FORMERLY (wild population possibly extinct)	NO
non-EU Range States	Breeding	Staging	Wintering
Kazakhstan	NO	YES	NO
Norway	YES	YES	NO
Russian Federation	YES (Kola Peninsula only)	YES	NO
Turkey	NO	YES (?)	YES (?)
Ukraine	NO	YES	YES (?)
Supplemented/Reintroduced population			
Netherlands (EU)	NO	NO	YES
Sweden (EU)	YES	YES	NO
Western main subpopulation			
EU Range States	Breeding	Staging	Wintering
Bulgaria	NO	YES	YES
Germany ³	NO	YES (?)	NO (?)
Poland	NO	YES (?)	YES (?)
Romania	NO	YES (?)	YES (?)
non-EU Range States	Breeding	Staging	Wintering
Azerbaijan	NO	YES	YES

² The available information for Poland makes this country a 'borderline' case for listing as a Principal Range State. It is included here on a provisional and precautionary basis, but further discussion and data are required to clarify Poland's exact status.

³ Status unclear; though recorded annually, there is a mixture of birds from the supplemented/reintroduced population (most records in western Germany), vagrants from the Western main population and perhaps regular migrants from the Fennoscandian population in eastern Germany.

Islamic Republic of Iran	NO	YES (?)	YES
Iraq	NO	YES (?)	YES
Kazakhstan	NO	YES	NO
Russian Federation	YES	YES	NO
Syrian Arab Republic	NO	YES (?)	YES
Turkey	NO	YES	YES (?)
Turkmenistan	NO	YES (?)	YES (?)
Ukraine	NO	YES	YES
Uzbekistan	NO	YES	YES

(?) = uncertain and/or significant shortage of information

1.5. Survival and Productivity, Life Cycle and Habitat Requirements

The following is a brief summary of the key points influencing the Action Plan.

Survival and productivity

Rather good productivity and survival data are available for the Fennoscandian population and an elasticity analysis has been performed (Lampila 2001, Markkola & Lampila 2003), but patchy count data and the low number of ringing recoveries means that evidence for the Western main population is essentially anecdotal. Lampila (2001) demonstrated that low survival was the key factor determining the negative population development for Fennoscandian Lesser White-fronted Geese.

Further research has shown that the productivity of the Fennoscandian population has less annual variation than it is the case for other arctic geese (this may be because the species breeds further south than other arctic geese species). Survival of 1st calendar year (1cy) and 2nd calendar year (2-cy) birds is relatively poor. Modelling work indicates that increases in both adult and 1-cy/2-cy survival are required in order for the current population decline to be arrested and reversed. A very small increase in adult survival can have a greater impact on the overall population level than an apparently more significant increase in juvenile/immature survival. (J. Markkola, P. Lampila pers. comm; Markkola and Lampila 2003)⁴. Hunting pressure is considered the main cause of adult mortality.

In future productivity of Lesser White-fronted Geese could be assessed by counting the proportion of juvenile birds in autumn staging flocks at Porsanger Fjord, Norway (Fennoscandian population) and north-west Kazakhstan (Western main population). However, this requires a long-term, intensive and consistent effort. Calculating survival rates is more challenging still, since counts are required both in spring and in autumn. Such bi-annual counts are already done for the small Fennoscandian population, but would be a major undertaking for the Western main population.

More research is needed to compare the survival and productivity of the supplemented/reintroduced and wild populations.

⁴ A theoretic study using differently pre-defined age classes for demographic modelling currently assesses the potential impact of juveniles and 1-2-cy survival on population growth rate (P. S. Gulve pers. comm.). A PVA analysis on the basis of time-series data from annual bird counts is also underway in 2008 (pers. comm. Aaravak). The relative implications of differential mortality of adult and young birds will be subject to further examination, bearing in mind the central importance of reducing overall LWfG mortality.

Life cycle

Because Lesser White-fronted Geese are long-distance migrants, international cooperation is a prerequisite for effective conservation. Furthermore, as breeding occurs in the sub-arctic zone and wintering in semi-arid/arid zone countries, the annual life cycle is prone to the influence of weather, leading to substantial variation in productivity between years. Given that there are significant gaps in knowledge about the movements of the Western main population, there is a corresponding lack of detail concerning important aspects of the life cycle of these birds, whereas the Fennoscandian population is relatively well known.

Habitat requirements

Breeding occurs in sub-arctic tundra and forest-tundra, which in spite of extensive land-use and the imminent threats posed by climate change (see Chapter 3), has remained relatively unaltered (i.e. adverse impacts have been localised if the entire range is taken into consideration) during the period of the species' rapid decline. Wetlands (especially freshwater or brackish lakes and marshes), semi-natural grasslands and cultivated land are used on the staging and wintering grounds and all of these are known to have undergone considerable change in Europe and Central Asia during the last fifty years.

More detailed information on these elements of the biological assessment can be found in Annex 1.

2. Available Key Knowledge

Annex 2 contains a table showing the latest quantitative and qualitative data (and corresponding sources) available for each of the 'Principal Range States' (see section 1.4 for definition) as well as a country-by-country text summarizing the current state of knowledge in both 'Principal Range States' and 'Other EU/AEWA countries'. The Annex reflects the rapid (and ongoing) increase in the quantity and quality of 'Key Knowledge' about the species during the last ten years as a direct result of concerted field research and, especially, satellite tracking programmes. The following is a brief summary for the Principal Range States only; additional references/sources are cited in Annex 2.

Azerbaijan

Lesser White-fronted Geese formerly wintered in large numbers on the shores of the Caspian Sea (c. 25,000 as recently as the late 1970s/early 1980s), but significantly declined since then, with 1,500 to 7,000 birds estimated in 1996. The species' status over the next ten years was unclear, owing to a lack of systematic count data. However, it seemed likely that the country remained an important wintering site for the Western main population, given that in March 2001 large staging flocks were found in the Kyzyl Agach area (565 birds) and in the Ag-Gel Zapovednik (1,800 - 2,000 birds) (Heinicke & Ryslavy 2002). Such a conclusion has been reinforced by new information for the period 2006 to 2008.

A satellite-tagged bird staged in Azerbaijan for several days in November 2004 before wintering in Iraq, while a pair satellite-tagged in the Polar Ural region of Russia in August 2006 reached Azerbaijan in late October (via the Yamal Peninsula and Ob Valley, Russia; Kostanay region of north-west Kazakhstan, delta of the Ural River on the northern shore of the Caspian Sea). The male wintered in Azerbaijan, but the female's transmitter ceased working in mid-December. In addition, two birds satellite-tagged on the Putorana Plateau (Russia), also in summer 2006, staged in the border area between Iran and Azerbaijan in November, before moving to Iraq (<http://www.piskulka.net/Satellite%20tracking.htm>).

In January 2008 the most important goose wintering sites in the country, including those used by the satellite-tagged Lesser White-fronted Geese from the Polar Ural breeding grounds, were surveyed in the field. No Lesser White-fronted Geese were found at Hinar in the Mil Steppe, or at Lake Hadjinour in the foothills of the Greater Caucasus. At Kyzyl Agach Nature Reserve approximately 4,500 geese were counted, despite extremely harsh winter conditions. Lesser White-fronted Geese accounted for 50% of all geese observed. The percentage of juveniles (14%) indicates that the breeding season had been average (T. Aarvak).

Bulgaria (EU)

Lesser White-fronted Geese occur regularly in small numbers at goose staging and wintering sites on the Black Sea coast, notably Lakes Shabla and Durankulak, where up to 100 birds have been estimated for some years (Petkov, Oien, Aarvak, 1999). The species also occurs in the Danube floodplain, notably Lake Srebarna and there are sporadic observations in other parts of the country. The fact that the species is recorded during casual birdwatching at goose wintering sites suggests its regular presence and it is thought that up to 100-150 birds may stage and over-winter when large numbers of geese reach Bulgaria. It is thought that the Lesser White-fronted Geese wintering on the Black Sea coast, scattered among flocks of Greater White-fronted Geese, belong to the Western main population (S. Dereliev, N. Petkov, pers. comm.).

In 1998 satellite tracking has shown that birds from the Fennoscandian population migrate across Bulgaria to reach their Greek/Turkish wintering grounds (N. Petkov, pers. comm.). Small numbers of Lesser White-fronted Geese have also been recorded among Greater White-fronted Geese in Pyasachnik Reservoir (an IBA) located in the Maritza floodplain (Evros in

Greek). This site might be a staging area for birds of the Fennoscandian subpopulation wintering in the Evros delta; observations were made during the migration period (S. Dereliev pers comm).

Estonia (EU)

The Matsalu Bay region, Silma Nature Reserve and certain other sites in western Estonia (see e.g. Tolvanen et al. 2004a) are important spring staging areas for the wild Fennoscandian population. Up to 50 individuals have been counted in the region during recent springs, including colour-marked birds ringed at the Valdaik Marshes in Norway. Small numbers also occur regularly in autumn, though more information is needed for this period of the year.

Finland (EU)

No breeding of wild Fennoscandian birds has been confirmed since 1995; the current estimate for the breeding population is 0-5 breeding pairs (P. Tolvanen and J. Merillä, pers. comm., Väisänen & Lehtiniemi, 2004). A restocking programme was implemented between 1989 and 1998, but suspended due to concerns about the genetic structure of the captive breeding population (see Markkola et al. 1999; and page 13). Three Lesser White-fronted Goslings were released in 2004 in contravention of the moratorium on releases. The Bothnian Bay coast, close to Oulu, has been recognised as an important spring staging area and was formerly also an autumn staging area. Eleven different individuals were recorded in the region in spring 2007 (<http://www.piskulka.net/Recent%20sightings.htm>).

Germany (EU)

The species passes through Germany in small numbers. Niethammer (1938) stated that the Lesser White-fronted Goose was a regular migrant in the northern part of Germany, but in smaller numbers than Greater White-fronted Goose. Preliminary results from recent studies show that the species is still regularly observed in the northern part of the country with a frequency of 50-100 observations per year in past decades (Mooij 2000), though these figures include both wild and supplemented/reintroduced birds – see below. Data indicate that birds from more than one population migrate through Germany, with some vagrant individuals of the Western main population also wintering (Mooij & Heinicke in prep.). A bird of the wild Fennoscandian population tagged with satellite transmitters has been recorded in Mecklenburg-Western Pomerania and Saxony (eastern Germany) during autumn migration.

Birds from the Swedish supplementation/reintroduction programme have been recorded increasingly frequently. A programme has been proposed to modify the flyway of supplemented/reintroduced birds to a wintering site in the Lower Rhine area of North Rhine Westphalia but is currently ‘on hold’ in line with the January 2007 conclusions of the AEWA Secretariat’s negotiation mission (see pages 35-37).

Greece (EU)

The Lesser White-fronted Geese arrive in Greece by late October to early November and depart by early to mid March. Lake Kerkini, Lake Ismarida and the Evros Delta are key staging and/or wintering sites for the Fennoscandian population; Nestos delta is a key site as well but has less frequent observations (Kazantzidis, S. & Nazirides, T. 1999). For example, 54 Lesser White-fronted Geese were recorded at Lake Kerkini in November 2007 and 52 were recorded in the Evros Delta in early January 2004. One of the latter birds had been colour-ringed in northern Norway. In January 2005, eight colour-ringed individuals, ring-tagged at the Valdaik Marshes in Norway, were recorded in the Evros Delta (Didier Vangeluwe pers. comm., per T. Aarvak). Up to 40 Lesser White-fronted Geese were recorded from the Evros Delta in winter 2005/2006. The maximum count during winter 2006/2007 was 49 (in early March), while 54 was the peak count for winter 2007/2008 (also in March).

Individuals colour-ringed in Norway continue to be seen and a total of 14 colour-ringed individuals from the Fennoscandian population have been observed at Lake Kerkini and Evros delta between 1995 and 2008 (T. Aaravak, pers. comm.). Two satellite-tagged birds (caught at the Valdak Marshes in May 2006) reached the Greek wintering grounds via a moult migration to the Taimyr Peninsula, followed by autumn migration via the Yamal Peninsula, Ob Valley, north-west Kazakhstan and the northern shore of the Black Sea. The same individuals migrated north in spring 2007 via stop-overs in Hungary and Lithuania, demonstrating for the first time that at least some birds of the Fennoscandian population migrate to and from Greece by undertaking an enormous loop migration – see map Figure 4; for further details visit [http://www.piskulka.net/Recent observations.htm](http://www.piskulka.net/Recent%20observations.htm).

Hungary (EU)

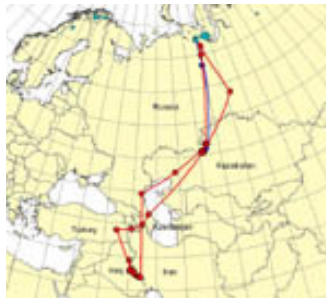
Although counts are far lower than the tens of thousands of birds recorded before the 20th century crash of the Fennoscandian population, Hungary – notably Hortobágy National Park – still supports significant numbers of staging Lesser White-fronted Geese, with maximum spring and autumn counts for 2006/2007 and 2007/2008 reaching 43 in April 2007 and 54 in September 2007. However, it is thought likely that the total number of individuals occurring each year in Hungary may well be higher than these figures suggest (see Annex 2).

Iran, Islamic Republic of

Several thousand birds wintered until the late 1970s, but since then only small flocks have been recorded – though coverage has been very sporadic and limited in extent. Satellite tracking of Russian-ringed birds confirmed that two individuals wintered either in Iran, or close to the Iranian border with Armenia, Azerbaijan and Turkey, during winter 2006/2007 ([http://www.piskulka.net/Satellite tracking.htm](http://www.piskulka.net/Satellite%20tracking.htm)).

Iraq

The Lesser White-fronted Goose formerly used to be a regular and numerous winter visitor. There is anecdotal information of a substantial decline in numbers but no quantitative data exists. A satellite-tagged bird equipped in northern Russia in July 2004, was tracked to Iraq during the winter of 2004/2005, providing the first proof of recent years that the species continues to winter in Iraq. A satellite-tagged individual ringed on Russia's Putonara Plateau in the summer of 2006 reached Iraq in early December, remaining there until the start of the spring migration in March 2007. A second bird spent the early part of the winter in northern Iran before moving to southern Iraq at the beginning of January 2007 – see Figure 5 below ([http://www.piskulka.net/Satellite tracking.htm](http://www.piskulka.net/Satellite%20tracking.htm))



© Goose, Swan and Duck Study Group of Northern Eurasia

Figure 5. Migration routes of Lesser White-fronted Geese satellite tagged on the Putonara Plateau, northern Russia, in the summer of 2006.

Kazakhstan

The lakes and agricultural land of the Kustanay region of north-west Kazakhstan are known as a major staging area for Lesser White-fronted Geese, in both spring and autumn. During the period 1996-2000, the highest estimates, based on random sampling of staging goose flocks, were c. 8,000 – 12,000 individuals (Tolvanen & Pynnönen 1998, Tolvanen & al. 1999). In addition, small flocks and individuals are recorded during autumn migration in central Kazakhstan (Tengiz-Kurgaldgin lakes system) and southern Kazakhstan (Syrdarya River and Aral Sea basins) – S. Yerokhov pers. comm. Colour-marking and satellite telemetry have shown that birds from both the Fennoscandian and Western main subpopulations occur in Kazakhstan.

Lithuania (EU)

Until 2006 there was a ‘missing’ (i.e. unidentified) spring staging site for birds from the Fennoscandian population somewhere between Hortobágy, Hungary and the next known site on the Estonian coast. Satellite telemetry of a bird tagged in northern Norway in May 2006 finally revealed the Nemunas Delta, on the coast of Lithuania, as the formerly unknown spring staging site (<http://www.piskulka.net/Satellite%20tracking.htm>). In April 2008, an adult individual was recorded in the area during a short survey (www.piskulka.net). Further field observations will be needed to confirm the frequency and level of usage of this extensive wetland, which is already designated as a Ramsar ‘Wetland of International Importance’. According to Stoncius & Markkola (2000), Lesser White-fronted Geese have been using the Nemunas Delta also as an autumn staging area, but no recent observations can confirm this.

Netherlands (EU)

Lesser White-fronted Geese were always rare in the Netherlands. In 1981 a supplementation/reintroduction project was set up in Swedish Lapland to guide the geese via a comparatively safer route to the North Sea countries. Nowadays every winter some 80-100 birds are seen in the Netherlands.

Birds have been recorded regularly from sites in Friesland, North-Holland, South-Holland and Zeeland. The majority are of Swedish origin. Koffijberg *et al.* estimated in 2005 that circa 96% of the originally supplemented/reintroduced Swedish birds may winter in the Netherlands.

Norway

The most recent published estimate for the Fennoscandian population (excluding the Kola Peninsula) is 20-30 breeding pairs in 2005, while field surveys of the core breeding area in summer 2006 and summer 2007 recorded 10-11 and 13 breeding pairs, respectively ([http://www.piskulka.net/Recent sightings.htm](http://www.piskulka.net/Recent%20sightings.htm)). There is one important staging area in northern Norway – the Valda Marshes. Another staging area is the Varangerfjord area, but the significance of this site has decreased during the last 10 years. Monitoring at both sites has shown a continued decline in numbers.

Poland (EU)

Lesser White-fronted Geese are recorded as very scarce migrants, possibly occurring less frequently in recent years (Tomialojc, 1990). As part of the flyway of the migrating Fennoscandian population Poland supports a few staging Lesser White-fronted Geese. Some of the geese satellite-tagged in 1995 and 2006 were tracked flying over Poland. The 2006 record involved a bird migrating north in spring, which, after leaving Hortobágy, Hungary, on 17/18 April, overflew north-east Poland during the morning of 18 April, before reaching the Nemunas Delta, Lithuania, in the afternoon of the same day (<http://www.piskulka.net/Satellite>

tracking.htm). One bird tagged in 1997 spent the winter in Poland and eastern Germany (Øien & Aarvak, 2001; Aarvak & Øien 2003), but little additional information is available.

Romania (EU)

An unknown number of Lesser White-fronted Geese, associating with Greater White-fronted Geese, pass through south-east Romania. The highest number recorded was 1,000 in 1989, though most experts have expressed serious doubt about the reliability of this figure. The Lesser White-fronted Geese wintering on the Black Sea coast of Bulgaria and Romania, scattered among the flocks of Greater White-fronted Geese, are thought to belong to the Western main population.

Russian Federation

The part of the Fennoscandian population nesting on the Kola Peninsula of northwesternmost Russia may number some tens of pairs. The Kanin Peninsula is thought to be a key autumn staging area for the whole Fennoscandian population.

A recent estimate put the breeding population for the European tundra (part of the Western main subpopulation) at 500 to 800 birds. Low numbers, a declining trend and contracting distribution have been noted, but with little habitat change. The wintering grounds of 80% of the subpopulation are unknown. Satellite telemetry has shown the Ob river valley to be a key flyway to the staging area in Kustanay region of Kazakhstan, and some staging areas are known from the eastern shores of the Sea of Azov. There are sporadic/anecdotal data from other possible staging areas. Recent satellite tracking has revealed individuals' wintering areas to include Azerbaijan, Iran and Iraq ([http://www.piskulka.net/Satellite tracking.htm](http://www.piskulka.net/Satellite%20tracking.htm)).

Sweden (EU)

Formerly breeding in large numbers, the wild population is now thought to be extinct. There have been no confirmed breeding records during the last 10 years, though there have been repeated although sporadic sightings in 1979 and 1982 (see section 1.3 and annex 2 for further information). Given the great extent and remoteness of suitable habitat, it is possible that a few nesting pairs remain. Since 1977 a captive-breeding and supplementation/reintroduction programme has resulted in the establishment of a free-flying population breeding in Swedish Lapland and wintering in the Netherlands, currently estimated to be 80-100 birds, with up to 15 breeding pairs. No releases have occurred since 1999, following the discovery of genes of Greater White-fronted Goose among the captive stock (Ruokonen et al. 2000, Ruokonen et al 2007, see also page 13). Nevertheless, the population continues to show a moderate rate of increase.

Syrian Arab Republic

Following the discovery of a Russian satellite-tagged Lesser White-fronted Goose wintering in eastern Syria, an expedition to the region was organised in February 2007 with the aim of visiting and researching three poorly known sites very close to the Iraq border. Unfortunately, the satellite-tagged bird departed for Iraq just prior to the expedition, but many significant findings were made nevertheless. The highlight was the discovery of at least eight, and probably many more, Lesser White-fronted Geese, suggesting that the Syrian Arab Republic may be an important wintering area for the Western main population ([http://www.piskulka.net/Satellite tracking.htm](http://www.piskulka.net/Satellite%20tracking.htm)). Further research is required to build on these observations and describe the situation of the species in Syria.

Turkey

Lesser White-fronted Geese are rare winter visitors, occurring regularly in very small numbers. A satellite-tagged bird of the Western main population ringed in northern Russia in August 2004, staged briefly in eastern Turkey in late November 2004 before wintering in Iraq, while another individual, tagged in the summer of 2006, spent part of the late autumn/early winter in the zone where Turkey borders Armenia, Azerbaijan and Iran ([http://www.piskulka.net/Satellite tracking.htm](http://www.piskulka.net/Satellite%20tracking.htm)). There have been four other records since 1980. Observations show that the Fennoscandian Lesser White-fronted Geese wintering in northern Greece, especially the Greek side of the Evros Delta, also use the Turkish side of the delta, and possibly other wetlands in westernmost Turkey.

Turkmenistan

It is thought that significant numbers of the Western main subpopulation may winter in Turkmenistan. 400 birds were recorded by the International Waterbird Census in March 1999. Regular counts of Lesser White-fronted Geese on the Eastern Caspian Sea Shore for 1979-2003 document a maximum number of 1,850 birds in November 1999 (Vasiliev *et al.* 2006), while 373 individuals were counted in 2003.

Ukraine

Occurs as a migrant and winter visitor, but there is a lack of systematic counts. Almost 600 birds were counted in Crimea in winter 1999/2000 and 1,000 birds in the Dniester delta, Odessa region (in the vicinity of the Ukrainian-Moldovan border), in the winter of 2001 (I. Rusev pers. comm.) A satellite-tagged pair caught in northern Norway in May 2006 migrated to the Fennoscandian population's Greek wintering grounds via Russia, Kazakhstan and the northern shore of the Black Sea, including the North-west Sea of Azov, where they were plotted in late October 2006 ([http://www.piskulka.net/Satellite tracking.htm](http://www.piskulka.net/Satellite%20tracking.htm)).

Uzbekistan

It is thought that some Lesser White-fronted Geese migrate along the shores of the Aral Sea. Recent publications have documented wintering sites close to the Afghanistan and Tajikistan border areas. The exact size of the wintering population is unknown, but surveys conducted between 2001 and 2005 suggest that numbers are small – perhaps no more than several hundred (Elena Kreuzberg, pers. comm.).

3. Threats

3.1. Background

The format for AEWA International Single Species Action Plans requires an assessment of the threats facing the Lesser White-fronted Goose global population as well as the three wild subpopulations (see Table 2), according to the following criteria:

Critical	a factor causing or likely to cause very rapid declines (>30% over 10 years);
High	a factor causing or likely to cause rapid declines (20-30% over 10 years);
Medium	a factor causing or likely to cause relatively slow, but significant, declines (10-20% over 10 years);
Low	a factor causing or likely to cause fluctuations ;
Local	a factor causing or likely to cause negligible declines ;
Unknown	a factor that is likely to affect the species but is not known to what extent.

A graphical representation – or ‘problem tree’ – of the threats affecting the species and how these threats are related to one another is also required.

The international expert ‘Workshop on the Protection of the Lesser White-fronted Goose’ held in Lammi, Finland, in 2005 reviewed the threats facing the species and provided the basis for these elements of the Action Plan.

3.2. Overview of Species Threat Status (see also Table 3, page 43)

The global population is currently estimated at 28,000 to 33,000 individuals (Delany & Scott, 2006). The following are the current internationally recognized threat status for the species at global and European levels:

2006/7 IUCN Global Red List category as evaluated by BirdLife International – the official Red List Authority for birds for IUCN: Vulnerable (IUCN 2006/7).

2006 IUCN Global Red List justification: “This species is listed as Vulnerable because it has suffered a rapid population reduction in its key breeding population in Russia, and equivalent declines are predicted to continue over the next 10 years. The small Fennoscandian population has undergone a severe historical decline.”

At European level, the species fulfils criterion C1 (population size estimated to number fewer than 2,500 mature individuals and an estimated continuing decline of at least 20% within five years or two generations, whichever is longer) for categorisation as ‘Endangered’.

BirdLife International species status: SPEC 1 – European species of global conservation concern (BirdLife International 2004).

Tolvanen et al. 1999 argued that the conservation status of the Lesser White-fronted Goose in Europe had been underestimated as a consequence of over-optimistic population assessments and due to a failure to calculate count thresholds that differentiate between the different Lesser White-fronted Goose subpopulations.

3.3. Description of Threats

The 1996 'International Action Plan for the Lesser White-fronted Goose' (Madsen, 1996) listed the following issues under the heading of "Threats and limiting factors":

- **Hunting** – unknown, probably high
- **Predation** – unknown, probably high
- **Disturbance and habitat loss on the breeding grounds** – unknown, probably low; helicopter disturbance locally high
- **Habitat loss on the staging/wintering grounds** – unknown

Madsen concluded "Probably the sharp [population] decline has been caused primarily by negative factors in the winter quarters, i.e. habitat loss and excessive hunting".

More recently, the 'Report on the status and perspective of the Lesser White-fronted Goose *Anser erythropus*' prepared for the Convention on Migratory Species (UNEP World Conservation Monitoring Centre, 2003) concluded that "Exploitation by man is the most severe threat throughout the region and affecting all flyways. Most severe is the hunting practised in Russia, China and Kazakhstan [...]. More than 95% of the Lesser White-fronted Goose population is being affected [...]. These three countries are not Parties to CMS, leading to difficulties in the implementation of international action"⁵.

There is strong evidence that the most important factors driving the continued decline in numbers and fragmentation of range of the Lesser White-fronted Goose (both the Fennoscandian and Western main subpopulations) are those that cause high mortality among fully grown birds. It is also clear that these factors operate primarily on the staging and wintering grounds, given that studies in the breeding range have failed to detect any adverse impacts that are of significant magnitude to explain the population crash. Although the species is legally protected, on paper at least, across virtually its entire range, hunting is considered to be the primary cause of mortality and the single most important threat that this Action Plan has to tackle. The loss and degradation of suitable habitat are currently considered to be an important but secondary threat to survival of full-grown birds. However, their significance as a likely driver for the historical declines and range changes during the 20th century should not be underestimated.

Because of the dramatic decline of population numbers, there is a view that the species is likely to have suffered significant loss of genetic diversity, which might threaten reproductive success and ultimately viability of the wild populations. However, a study conducted by Ruokonen et al. (2004) suggested that there is probably a regular influx of male birds from the western main population into the Fennoscandian population, ensuring gene flow between the populations and thereby reducing or eliminating the possible harmful effects of inbreeding. This would be in conformity with the hypothesis that birds from the small Fennoscandian population are increasingly likely to pair with birds from the Western main population where the two populations' flyways overlap. Furthermore, recently published research suggests that genetic variability in the Fennoscandian population is as high as in the Russian population. Thus, despite its small size, the Fennoscandian population shows no signs of inbreeding (Ruokonen et al. 2007).

In recent years, concern has been raised about the potential for supplemented/reintroduced Lesser White-fronted Geese originating from captive-bred stock to introduce alien genes, notably those of Greater White-fronted Goose and Greylag Goose *Anser anser*, into the wild Fennoscandian and Western main populations. This issue is dealt with in detail on pages 33–37.

⁵ By 2008, the Republic of Kazakhstan had meanwhile joined CMS.

The completion of a fully comprehensive threat assessment is limited by the fact that knowledge of the species' numbers, distribution and movements is still far from complete. Further details of each of these issues are provided below.

(a) Threat factors causing high mortality of fully grown birds⁶

Hunting

Breeding grounds

Importance: Medium

Illegal spring hunting occurs in many areas of the Russian breeding grounds. Illegal round-ups of moulting birds also occur in Russia.

In one of the municipalities where breeding occurs in Norway, spring hunting of ducks is legal. However, both geese (probably including some Lesser White-fronted Geese) and swans are also shot during this period, albeit illegally. Spring hunting therefore poses an additional threat to the Fennoscandian population and should be stopped (T. Aarvak, pers. comm.).

Staging/wintering grounds

Importance: Critical

Hunting has a critical impact on the species as whole; it is thought that more than 95% of the global population is affected by over-hunting (UNEP/WCMC, 2003). Within the AEWA area, hunting pressure is extremely high in both the Russian Federation and Kazakhstan. Over-hunting in China is also a key threat to the East Asian population (UNEP/WCMC, 2003). Hunting pressure arises from several sources, including subsistence hunters and sport hunters. The latter category also involves 'hunting tourism' whereby hunters (generally from richer western countries) pay to hunt desirable quarry species, often in eastern countries where hunting controls may be poorly enforced. It should be underlined that Lesser White-fronted Goose is officially protected by hunting legislation throughout virtually its entire range. Illegal hunting (whether subsistence or sport) is therefore the key issue. In many cases, it must however be assumed that accidental shooting is also a reason for high mortality, when hunters mix up Lesser White-fronted Geese with the very similar 'look alike' species, the Greater White-fronted Goose *Anser albifrons*, an important legal quarry species (when birds are in flight it is even difficult for experienced ornithologists to separate the species). Additionally it should be noted that spring hunting of geese and waterfowl is still legal and widely practiced in Russia and other ex-Soviet countries. There are high levels of ignorance and/or disregard of the applicable hunting laws more broadly.

High hunting pressure has been observed at many locations in Russia and Kazakhstan. The loss in Kazakhstan of birds fitted with satellite transmitters and rings has supported the anecdotal evidence that hunting pressure is especially high here (UNEP/WCMC, 2004).

Indirect pressure as a result of hunting includes disturbance caused by hunting for other species and may lead to loss of condition, thereby contributing to adult mortality. This type of disturbance has occurred, for example, at traditional autumn staging areas in Finland (UNEP/WCMC, 2004) even though the Lesser White-fronted Goose itself is strictly protected under the Finnish Nature Conservation Act. Heavy hunting pressure is common in the coastal wetlands along the western shore of the Black Sea where Lesser White-fronted Geese winter. In December 2007, an adult Lesser White-fronted Goose, colour-ringed in Norway, was found shot inside the Lake Kerkini Wildlife Refuge in Greece (www.piskulka.net).

There are indications that Lesser White-fronted Geese are being accidentally shot by goose hunters at Porsangen Fjord in Norway during the birds' autumn staging period. *A. albifrons*

⁶ While this section focuses on the AEWA Agreement Area, key threats to the Eastern main population are mentioned briefly to provide an appropriate global context for the species as a whole.

does not occur in this area (only *A. anser*, *A. erythropus* and *A. fabalis*), and only *A. anser* is legal quarry. Nevertheless, it appears that two juveniles were killed in autumn 2005.

The supplemented/reintroduced Swedish-Dutch population is not subject to significant hunting pressure and this has been one of the main arguments used in favour of reintroduction/restocking and flyway modification projects.

Poisoning

Staging/wintering grounds

Importance: Local

There is anecdotal evidence from Bulgaria of both Lesser and Greater White-fronted Geese being killed unintentionally as a secondary impact of rodenticide use on agricultural land, though it is unclear whether the initial poisoning occurred on Bulgarian or Romanian territory. It is known that poisoned bait is used in China specifically to kill geese, including Lesser White-fronted Geese of the Eastern main subpopulation, but there is no evidence to date of intentional poisoning of geese as a crop protection measure within the EU and/or AEWa Agreement Area. In Germany, in autumn 2004, about 300 geese (mainly Bean Geese *Anser fabalis* and Greater White-fronted Geese *Anser albifrons*) were poisoned by rodenticides in Thuringia. In the same autumn it was also reported that about 40 Common Cranes *Grus grus* were found dead, poisoned by rodenticides, in Mecklenburg-Western Pomerania, in the same area as used by large numbers of wintering geese. The use of such poisons is legal in Germany as long as the poison is concealed, but this is clearly difficult to enforce (J. Mooij pers. comm.)

Human disturbance

Staging/wintering grounds

Importance: Medium

This is considered to be a significant factor throughout the staging and wintering range. The deliberate scaring of birds feeding on agricultural land and natural meadows is the most widespread and serious form of human disturbance other than that associated with hunting pressure (UNEP/WCMC, 2004). Such disturbance may lead to loss of condition and increased adult mortality, with birds less able to survive winter or the rigours of long-distance migration. In Hungary, disturbance by birdwatchers and farmers is at times a problem; for example, birdwatchers looking for Lesser White-fronted Geese or other species in the grassland feeding areas scare birds away from protected sites to surrounding arable land, where they are vulnerable to being hunted (S. Lengyel, pers. comm.).

Generic issues that may increase adult mortality

Generic issues that may increase adult mortality are those factors that pose a potential risk to geese and other birds in general, but for which no significant adverse impacts relating specifically to Lesser White-fronted Geese are known. Among those issues are:

- wind turbines,
- high-tension power lines
- and bird disease.

(b) Threat factors causing reduced reproductive success**Human disturbance**Breeding grounds**Importance: Local**

Tourism development and increasing use of helicopters and all-terrain vehicles threaten some parts of the breeding range of the Fennoscandian population (UNEP/WCMC, 2004). The impacts of off-road vehicles, aircraft, road construction and power-line installation in the core breeding area of the Fennoscandian population are discussed by Øien & Aarvak 2004. It is also important to consider that ornithological/conservation research could be an additional potential source of disturbance on the breeding grounds, unless very strictly controlled.

PredationBreeding grounds**Importance: Local**

Studies suggest that the breeding success and juvenile production of the Lesser White-fronted Goose is broadly comparable to other goose species and that predation rates cannot explain the rapid population declines recorded. The expansion of Red Fox *Vulpes vulpes* and Great Black-backed Gull *Larus marinus* may elevate the predation threat for the Fennoscandian population and supplemented/reintroduced Swedish population, while (as for other geese) predation may be higher in years when small mammal prey is less abundant.

There is anecdotal evidence that disturbance by White-tailed Eagles *Haliaeetus albicilla* and Golden Eagles *Aquila chrysaetos* may be having a significant impact on the small Fennoscandian population of Lesser White-fronted Goose (M. Ekker, T. Aarvak pers. comm.). American Mink *Mustela vison* have spread throughout Scandinavia and may also contribute to higher predation (T. Lehtiniemi, pers. comm.).

Generic issues that may decrease reproductive success (i.e. those factors that pose a potential threat to geese and other birds in general, but for which no significant adverse impacts relating specifically to Lesser White-fronted Geese are known; all are therefore assumed to be of 'Low' importance)

- Poor weather – poor weather conditions during the summer may lead to virtually complete breeding failure among tundra-nesting species. Effects may include late-lying snow delaying access to nest sites; loss of condition among breeding adults; and/or poor survival of goslings and juveniles.
- Similarly poor weather on the wintering grounds, with deep snow cover, may result in no foraging areas being available to geese, thereby leading to poor body condition, while unusually dry weather in autumn can mean that grass/cereal crops are in poor condition during the winter, again resulting in poor foraging for geese.

(c) Threat factors causing habitat loss/degradation/conversion**Agricultural intensification**Staging/wintering grounds**Importance: High**

Extensive areas of grassland and wetland in the staging and wintering areas have been converted for agricultural use. In particular, there was large-scale conversion of steppe grassland to cultivation during the second half of the twentieth century in the Central Asian staging/wintering grounds, including for the production of crops such as cotton that do not provide suitable feeding for geese. Within Europe, agricultural intensification resulted in the loss and degradation of staging/wintering areas in Greece.

However the relationship between agricultural intensification and the use of land by geese is complex. For example, in recent decades new goose wintering areas have been identified in Tajikistan, Turkmenistan and Uzbekistan, where irrigated fields are used for the production of wheat and rice. These sites provide suitable goose staging/wintering habitat, but are subject to high hunting pressure (both legal and illegal). Nevertheless, there have been notable increases in goose numbers. For example, during the mid-1980s the total number of wintering geese in Uzbekistan was assessed at only 5,000 individuals, whereas the current estimate (for known sites only) is 200,000 to 300,000 individuals (E. Kreuzberg, pers. comm.). Wheat fields in Kazakhstan also provide important feeding areas (P. Tolvanen, T. Heinicke pers. comm.).

Construction of dams and other river regulation infrastructure, wetland drainage

Staging/wintering grounds

Importance: High

The environmental disaster in the Aral Sea basin, owing largely to the misguided diversion of inflow for intensive irrigation, included the destruction of former key staging areas in Uzbekistan (Madsen, 1996; UNEP/WCMC, 2004; E. Kreuzberg pers. comm.). Large areas of the Mesopotamian Marshes were deliberately drained under the former Iraqi regime, while the Tigris and Euphrates rivers (and associated wetlands) in Iraq have suffered from reduced flow due to the construction of dams in upstream countries such as Turkey. Concentration of birds into remaining wetlands is likely to make them more vulnerable to hunting. The current international programme for restoring/reflooding of large areas of the Mesopotamian Marshes is likely to benefit the species considerably. Around key staging areas in Kazakhstan, such as Lake Kulykol, much of the inflow from spring floodwater is diverted to dams that provide water for hay meadows and cattle grazing (S. Yerokhov, pers comm). A comparable situation is found in the formerly extensive coastal and inland wetlands of Azerbaijan that were drained for agriculture. The remaining wetlands cover only a small fraction of the previous area and suffer severe water management problems – e.g. lack of water and pollution by pesticides (T. Heinicke pers. comm.). In Ukraine, damming and regulation of the Dniepr and Dniester rivers have caused reduced flow to the extensive meadows in the Dniester delta and along the Lower Dnepr valley (I. Rusev pers. comm.).

Climate change

Breeding grounds

Importance: Unknown

Global warming, predicted to be rapid in polar regions, is likely to have a significant impact on the sub-Arctic tundra ecosystem of the Lesser White-fronted Goose' breeding grounds (even though high-Arctic habitats and species are generally considered those most at risk). Possible consequences of climate change include direct habitat loss, but also more subtle and indirect adverse impacts such as the breakdown of food chains and the expansion of the range of Red Fox *Vulpes vulpes*. The most likely effect of the increasing temperature is a change in feeding conditions through altered vegetation. Whether this would be positive or negative is unknown. Changing feeding conditions affects production and mortality directly. Earlier snow melt could lead to decreased clutch predation by predators such as foxes, since they have to search through much larger areas. In years with late snowmelt, the availability of nest sites is low, thereby increasing the predation pressure. Late snow may also be relevant for spring hunting in Russia. In such conditions, the geese have fewer feeding areas available and birds are likely to be more vulnerable to hunters.

Staging and wintering grounds**Importance: Unknown**

Global warming is also likely to have impacts on the staging and wintering areas. For example, increasingly mild winters might mean that geese remain further north than usual in some years, or have access to higher quality food items, thereby increasing survival and reproductive success. Shifting rainfall patterns could potentially lead to long-term shifts in migration routes and wintering areas (e.g. in arid zones of Central Asia global warming may favour growth of wild cereals in early winter, providing suitable staging sites in remote desert/semi-desert areas (E. Kreuzberg pers. comm). Conversely, in other cases, there might be a shift to crops that do not provide food for geese e.g. cotton, grape vines). However, the fact that the species winters largely in and around semi-arid/arid-zone wetlands, which naturally undergo both significant year-to-year fluctuations and long-term cyclic variations, may make anthropogenic climate change impacts difficult to detect.

Land abandonmentStaging and wintering grounds**Importance: Medium**

Abandonment of traditional agricultural land-management practices is a strong trend in many countries of central and eastern Europe and Central Asia (e.g. Kazakhstan), and has been a significant factor in parts of Fennoscandia. In some cases, such as the decline in mowing of coastal and sub-alpine meadows at staging sites around the Baltic Sea, this may lead to deterioration and loss of key Lesser White-fronted Geese feeding habitat due to the progressive encroachment of shrubs and trees. However, the situation has improved markedly in the Baltic region over the last ten years and most actual and potential staging meadows are managed by grazing/mowing thanks to EU agri-environmental payments (J. Markkola, pers. comm.). In Kazakhstan, the period from 1955 to 1990 was one of intensive grain production and the littoral and near-littoral areas of all key lakes were regularly cultivated and sown with grain. During the last 10 to 15 years, however, much of this land has been abandoned and the distances to the main goose feeding areas have increased to 10-20 km or more (S. Yerokhov, pers comm). In Sweden, hay cutting in Norbotten county has declined from 200,000 ha in 1927 to about 1,000 ha nowadays. Most of the land formerly managed for hay was located along the river-valley migration routes once used by Lesser White-fronted Geese (M. Björkland, pers comm).

OvergrazingBreeding grounds**Importance: Local**

Over-grazing of tundra vegetation by semi-domestic Reindeer *Rangifer tarandus* may threaten the quality of breeding habitat for the Fennoscandian population, though impacts appear to vary from country to country. For example, data from the Swedish county of Norbotten do not indicate any increase in overall reindeer numbers during the period when the Lesser White-fronted Goose population crashed (M. Björkland & S. Gylje, pers comm), while in Finland, reindeer numbers doubled between the 1970s and 1990s and the adverse effects on vegetation can clearly be demonstrated (T. Lehtiniemi/BirdLife Finland, pers. comm.).

Pollution of wetlands/waterbodiesStaging and wintering grounds**Importance: Local**

Point-source and/or diffuse pollution of wetlands and water bodies may be a locally important cause of habitat degradation, but there are few if any documented cases that relate specifically to Lesser White-fronted Geese.

(d) Potential genetic introgression of White-fronted Goose, Barnacle Goose and/or Greylag Goose DNA into the wild Fennoscandian population from captive-bred, supplemented/reintroduced birds.

Genetic studies have shown that a proportion of individuals within the captive breeding populations used for the Finnish and Swedish supplementation/reintroduction programmes are carrying DNA of other goose species, notably the Greater White-fronted Goose⁷ (Ruokonen et al. 2000, Ruokonen 2001, Ruokonen et al. 2007). The percentage of captive-reared birds carrying alien genes in the Swedish captive stock was estimated at 36% (Ruokonen et al. 2007). Combining his breeding notes and genetic data, Tegelström assumed that the proportion of released birds carrying alien genes may be somewhat lower, at around 5-10% (unpublished data). It has been concluded that the occurrence of alien genes arose through hybridisation in captivity because no signs of hybridisation have been found in the wild populations of Lesser or Greater White-fronted Geese (Ruokonen et al. 2004). There is a risk that released birds carrying DNA from other goose species could pair and breed with wild Lesser White-fronted Geese, thereby causing introgression of alien genes into the wild Fennoscandian population. Given that the Fennoscandian and Western main populations partially overlap outside the breeding season, contamination of Western main birds could also occur. There is not full consensus among Lesser White-fronted Goose stakeholders concerning the significance of this risk.

The status of the free-flying, supplemented/reintroduced population has been the subject of particular controversy. Some experts have argued that all these individuals must be caught and taken back into captivity to protect the genetic status of wild birds. The Swedish authorities among others, have countered that their free-flying supplemented/reintroduced population should be maintained, noting *inter alia* that it constitutes the only genetic link with the original wild population in Sweden. The latter position appeared to be strengthened by a 2005 decision of the High Administrative Court in the Netherlands, ruling that Special Protection Areas should be established for wintering birds from the supplemented/reintroduced Swedish population.

Nevertheless, a moratorium was passed outlining that further releases of captive-bred birds are formally suspended until birds from the captive-breeding stock that have been confirmed as carrying alien genes have been removed and until full genetic purity can be assured through utilisation of new birds from wild origin for breeding (though one Lesser White-fronted Goose family was released in Finland in 2004 in spite of the moratorium), though it is not possible to identify (and therefore to remove) all birds carrying such genetic material. The expert workshop held in Lammi, Finland in 2005, agreed that any future releases should only be based on genetically 'clean' stock, preferably derived from the wild due to the technical impossibility of identifying all birds carrying alien DNA.

The Swedish authorities opened discussions with their Russian counterparts with a view to obtaining wild birds to build up a new captive-bred population from which future releases could be made. While movements of wild birds were suspended for a time owing to EU restrictions on bird movements in response to the spread of the H5N1 strain of avian influenza (T. Larsson pers. comm.), the first shipment of eight wild birds from Russia was received in 2006. The second shipment of six birds was received in mid-February 2007. By May 2008, a total of 24 wild birds from Russia had been received.

The IUCN Guidelines for Reintroductions, issued in 1995 by the IUCN Species Survival Commission (SSC), have no formal legal status but are generally regarded as the most authoritative internationally published guidance on species reintroductions (IUCN 1998). While the need for conformity with the IUCN Guidelines has been cited by both proponents and opponents of Lesser White-fronted Goose reintroduction initiatives, the guidance actually

⁷ Lesser White-fronted Goose individuals found to be carrying genes of Greylag Goose *Anser anser* have never been used for supplementation and/or reintroduction in Sweden (T. Larsson, pers comm).

does not extend to the more controversial aspects of the Lesser White-fronted Goose supplementation/reintroduction programmes, namely the possible introgression of alien DNA into the wild population and modification of flyways.

Given the lack of detailed internationally accepted guidance, the compilers of the Action Plan undertook (at the Lammi Workshop) to submit a dossier on the issue for review by the Scientific Council of the Convention on Migratory Species (CMS) with a request that the Council should provide independent, authoritative advice on the future of supplementation/reintroduction programmes for Lesser White-fronted Goose.

Taking into account the views expressed at the Lammi Workshop, as well as at earlier meetings and in relevant publications, and drawing on the first draft of this Action Plan, a dossier was transmitted by BirdLife International to the CMS Secretariat in July 2005. Some stakeholders felt that the dossier was incomplete and/or did not accurately represent the actual situation. In such cases, the stakeholders concerned were encouraged to provide the Scientific Council with additional information. Thirteen such contributions were taken into account by the Scientific Council in preparing its conclusions and recommendations, finalised in November 2005 at the 13th Meeting of the CMS Scientific Council, Nairobi, Kenya, 18 November 2005 (attached as Annex 9a; additional independent comments by Dr Robert C. Lacy are appended as Annex 9b).

The following are the Scientific Council's conclusions (numbered for clarity, but otherwise quoted verbatim):

1. "It is desirable to have a wide genetic diversity among wild Lesser White-fronted Geese.
2. There appears to be no undisputed answer at present to the question of whether the Fennoscandian population (as represented by the birds breeding in Norway) is genetically distinct from the nearest breeding birds to the east, in northern Russia. Given the uncertainty, we take the cautious approach that there might be a potentially valuable genetic distinction, and that we should not deliberately interfere with it (for instance, by boosting the Fennoscandian population with wild birds from elsewhere), unless or until such interference may become inevitable.
3. Given the small size of the wild Fennoscandian population, if possible, a captive breeding population of birds from this source should be established and maintained as a priority. We recognise that there are risks involved in taking eggs and/or young birds from the wild population, but that careful use of a known surplus (that is, those birds that would have died or been killed in their first winter) may be a practical conservation option.
4. We consider that every effort should be made to conserve the Fennoscandian birds down their traditional migration routes into southeastern Europe and the Caspian/Central Asian region. We recognise that this is a major challenge. We endorse the current LIFE project that aims to safeguard the birds and their habitats along the western route. It is our opinion that all appropriate efforts should also be made to conserve the wild populations of the species in its other flyways.
5. We consider that doubts do remain about the genetic make-up of the existing free-flying birds, originally introduced into the wild in Fennoscandia, and which winter in the Netherlands. It does seem to us that not all, but a large part, of the scientific community will never be completely satisfied concerning the level of genetic contamination from the Greater White-fronted Goose *Anser albifrons* and other species, which many will regard as impossible to eliminate. Despite genuine efforts to improve the genetic purity of existing captive flocks we consider that these flocks are not to be regarded as potential sources for release to the wild.
6. Given the possibility that the above-mentioned free-flying birds, or their descendants, may pose a risk to the genetic make-up of the wild Fennoscandian population, the Scientific Council is of the opinion that these birds should be caught or otherwise

- removed from the wild. We do not say this lightly, nor underestimate the practical and other difficulties involved. We recommend that a feasibility study be undertaken as a matter of urgency.
7. We believe that there is nothing against establishing a group in captivity of purebred Lesser White-fronted Geese from the wild, western Russian stock, and it may well prove valuable to have such a group in the future. However, we do not believe that it is appropriate to release such birds to the wild now or in the immediate future.
 8. For the present, we do not support the introduction of Lesser White-fronted Geese into flyways where they do not occur naturally. We have borne in mind the powerful argument concerning the improved safety of birds in these flyways, as well as practical considerations, such as current proposals that could quickly be put into effect. However, we consider that modifying the natural behaviour of Lesser White-fronted Geese in this respect, as well as unknown ecological effects in the chosen new flyways, and other such considerations, make this technique inappropriate until such time as it may become essential, particularly when major disruption or destruction occurs of key components of the natural flyways. We do not believe that to be the case at present. We give due weight to arguments about the continuing decline of the very small Fennoscandian population, and to the estimates of how long it may continue to be viable, but we are not persuaded that such a fact alone is enough to justify radical action.
 9. We consider that it would be appropriate to re-examine the issues once more in five years.”

The additional independent comments by R. Lacy included a replenishment or ‘dilution’ approach to the introgression of alien genes, whereby pure-bred birds (i.e. without alien genes) could be introduced into the population identified as carrying alien genes (see Annex 9b).

The Scientific Council’s conclusions were not acceptable to all Range States and preliminary negotiations concerning this section of the draft Single Species Action Plan (July 2006 version) failed to reach a consensus. In January 2007 the AEWa Secretariat undertook a series of consultations with representatives of the governments of Finland, Germany, Norway and Sweden, with the aim of securing a joint compromise on a way forward for this element of the Action Plan (AEWA 2007; Annex 10 to this SSAP). The following are the verbatim conclusions of the negotiation mission, as drafted by the AEWa Secretariat and supported by the parties (governments) concerned. They constitute the basis for dealing with issues of captive breeding, reintroduction and supplementing (‘supplementation’) of the Fennoscandian population in the framework of the SSAP.

1. “The parties agree that the main priority for the conservation of the Lesser White-fronted Geese is the preservation of the wild populations breeding in Fennoscandia and Russia and that the work on the SSAP and any decisions should follow the code of transparency and accountability so that they can be subject to scientific scrutiny at any time. The parties will be considering support for conservation on the ground along their flyways. Particular attention shall be paid to mortality due to hunting and urgent targeted measures should be implemented to reduce the magnitude of this threat, the success of which shall be promptly and regularly reviewed and evaluated. Supplementation with captive-bred birds should be considered if other conservation measures are not as quickly efficient as needed and should populations continue to decline. As with any other captive breeding, reintroduction or supplementation initiatives this project will be subject to consideration by the Committee for captive breeding, reintroduction and supplementation of Lesser White-fronted Geese in Fennoscandia (*see conclusion 3 below*). The efficiency of conservation measures is to be assessed by the International Lesser White-fronted Goose Working Group (*see conclusion 2 below*).

2. The parties agree that an International Lesser White-fronted Goose Working Group should be established, consisting of governmental representatives of all Range States, who would be free to bring in their own experts and use their support. The working group will be chaired by the AEWA Secretariat (*chairmanship would be possible only if additional support staff, such as a coordinator for the SSAP, and supplementary budget are made available to the Secretariat*) and will operate in accordance with ToR developed by the AEWA Secretariat, approved by the Range states and endorsed by the AEWA Technical Committee.
3. The parties agree on the establishment of a Committee⁸ for captive breeding, reintroduction and supplementation of Lesser White-fronted Geese in Fennoscandia, consisting of governmental representatives of Sweden, Finland and Norway, who would be free to bring in their own experts and use their support. The Committee will be chaired by the AEWA Secretariat (*chairmanship would be possible only if additional support staff, such as a coordinator for the SSAP, and supplementary budget are made available to the Secretariat*) and will operate in accordance with ToR developed by the AEWA Secretariat, approved by the three states and endorsed by the AEWA Technical Committee.
4. The parties agree that a captive stock of wild Fennoscandian birds should be established, subject to the conclusions of a feasibility study. The long-term future of all captive breeding programmes will be reviewed by the Committee for captive breeding, reintroduction and supplementation of Lesser White-fronted Geese in Fennoscandia.
5. The parties agree that the Swedish captive breeding programme could carry on as long as it is based on wild birds only. The long-term future of all captive breeding programmes will be reviewed by the Committee for captive breeding, reintroduction and supplementation of Lesser White-fronted Geese in Fennoscandia.
6. The parties agree that the current free-flying flock, breeding in Sweden and wintering in the Netherlands, will remain in the wild, subject to genetic screening and refinement, i.e. removal of apparent hybrids, which will be undertaken following the conclusion of a feasibility study. Furthermore the dilution with purebred birds is considered a 'principally viable option'. The long-term future of all reintroduction and supplementation programmes will be reviewed by the Committee for captive breeding, reintroduction and supplementation of Lesser White-fronted Geese in Fennoscandia taking full account of, amongst others, the success of conservation actions, including revival of the wild Fennoscandian population, and other pertinent factors. Decisions regarding the Swedish free-flying population should also take into account the conclusions of the independent review and evaluation of available Lesser White-fronted Goose genetic studies (*see conclusion 8 below*).
7. The parties agree that the implementation of the pilot experimental project of the NGO 'Aktion Zwerggans' will be postponed for three years. As with any other captive breeding, supplementation or reintroduction initiatives this project will be subject to consideration by the Committee for captive breeding, reintroduction and supplementation of Lesser White-fronted Geese in Fennoscandia.
8. The parties agree that a review and evaluation of the existing genetic Lesser White-fronted Goose studies by (an) independent expert(s) with proper scientific expertise and experience (ideally in molecular DNA analysis of birds, conservation genetics

⁸ The parties agreed that this Committee will operate as a subgroup of the International Working Group for the implementation of this Action Plan.

and statistical proficiency) should be undertaken⁹. This work will be commissioned by the AEWA Secretariat to (an) independent expert(s) selected by the Secretariat too. The conclusions of this independent evaluation will be submitted to the Committee for captive breeding, reintroduction and supplementation of Lesser White-fronted Geese in Fennoscandia and the International Lesser White-fronted Goose Working Group for their consideration.”

(e) Knowledge limitations

Current knowledge of Lesser White-fronted Goose is limited in several areas that have crucial relevance for the successful implementation of comprehensive conservation measures. Among the key factors where current information is inadequate are:

- Locations of key staging and wintering sites for the Western main population (identifying new sites but also filling data gaps for known Lesser White-fronted Goose sites – including IBAs – where recent information is lacking or fragmentary).
- Current status of the species in several key countries, including Azerbaijan, Belarus, Iran, Iraq, Lithuania, Poland, Russia (Ob valley and Dagestan), Syrian Arab Republic, Turkmenistan, Ukraine, and Uzbekistan.
- Extent of hunting and poaching at different staging/wintering sites.
- Extent and effectiveness of protected area management at nationally and/or internationally designated sites of importance for Lesser White-fronted Goose (this restriction applies to significant parts of the range beyond Europe).
- Extent and effectiveness of enforcement of hunting regulations at key sites, whether or not they are formally designated as protected areas.
- Extent of threat to the species from poisoning
- Location of breeding sites of remaining wild Fennoscandian population.
- Location of breeding grounds of a large part of the Western main population.
- Degree of exchange between populations.
- PVA analyses needed urgently for both the Swedish and Norwegian population.
- Impacts of land/habitat management on Lesser White-fronted Goose and identification of desirable management practices.

Table 2a. Relative importance of threats to wild subpopulations of Lesser White-fronted Goose.

Threat	Fennoscandian population	Western main population	Eastern main population ¹⁰
(a) Factors causing increased adult mortality			
Hunting	Critical	Critical	Critical
Poisoning	Unknown	Local	High

⁹ In the report of its January 2007 negotiation mission the AEWA Secretariat referred to the significant accumulated body of LWfG genetic studies, but noted certain discrepancies (or even contradictions) in some of the studies' conclusions, leading to differing views of implied conservation strategies. The Secretariat therefore suggested that all available studies should be reviewed and evaluated by an independent, appropriately experienced scientific expert (or team of experts). In the Secretariat's opinion, such a review could help to unify stakeholders around a consensus view and assist with designing future conservation action.

¹⁰ This Action Plan focuses on Lesser White-fronted Goose in the AEWA Agreement Area and the territory of Member States of the European Union (i.e. the Fennoscandian and Western main subpopulations) and is not giving detailed consideration to the Eastern main subpopulation. However, threats to the latter population are shown here for completeness and to underline that certain key threats are applicable to all subpopulations.

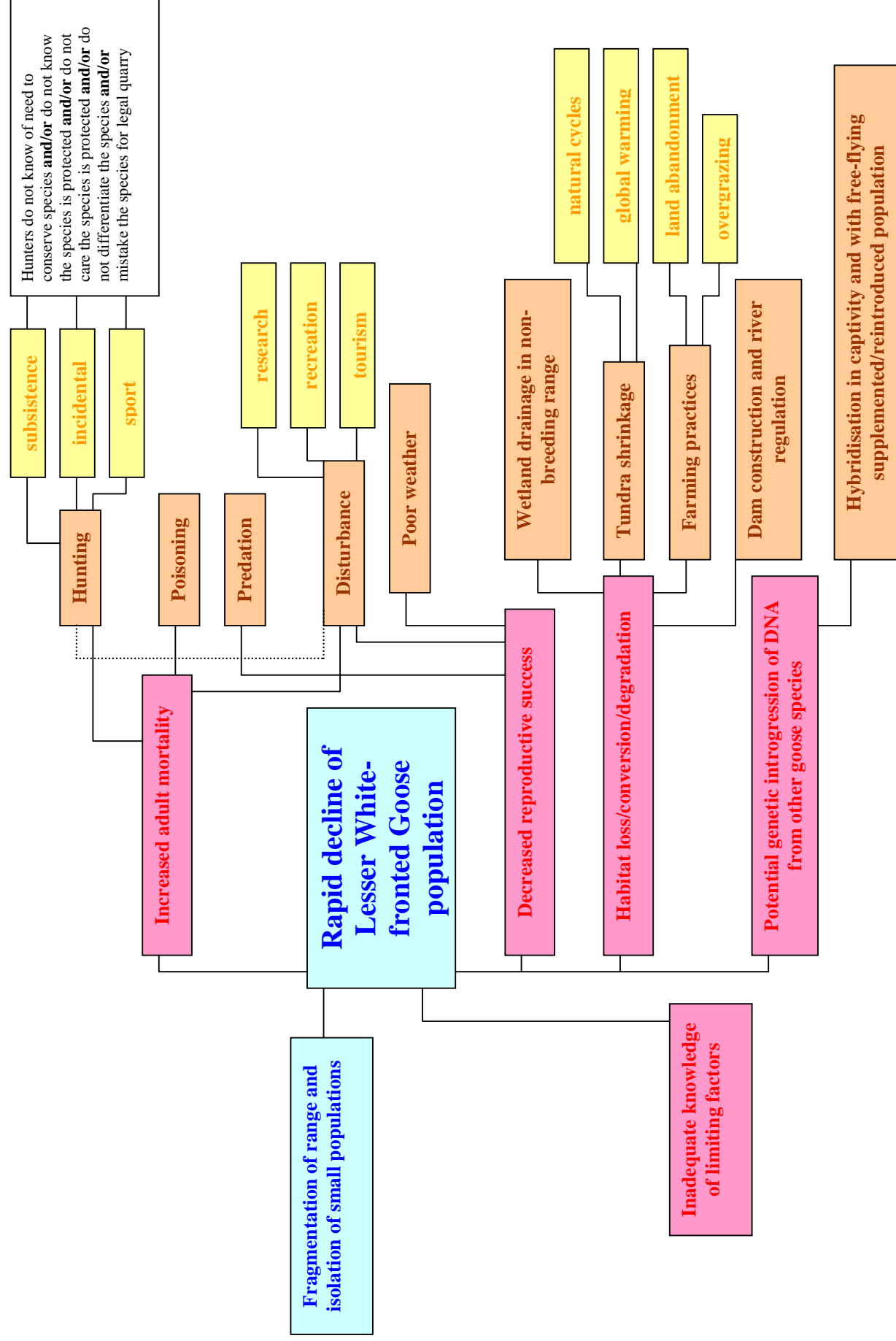
Human disturbance	Medium	Medium	?
(b) Factors causing reduced reproductive success			
Human disturbance	Local?	Local	Local
Predation	Local?	Local	Local
Genetic impoverishment	Low	Unknown	Unknown
(c) Factors causing habitat loss/degradation/conversion			
Agricultural intensification	High formerly; now probably Low	High	High
Construction of dams and other river regulation infrastructure, wetland drainage	Medium?	High	High
Climate Change	Unknown	Unknown	Unknown
Over-grazing	Local	Unknown?	Unknown?
Land abandonment (incl. declining grain production, loss of hay meadows, scrub/forest encroachment)	Locally high	High	Unknown?
Pollution of wetlands/waterbodies	Unknown?	Unknown?	Unknown?
(d) Potential genetic introgression of DNA from other goose species into wild population	Potential risk exists	Potential risk exists	?
(e) Knowledge limitations	Fundamental gaps	Fundamental gaps	Fundamental gaps

Table 2b. Relative importance of threats to supplemented/reintroduced population of Lesser White-fronted Goose¹¹.

Threat	Supplemented/Reintroduced population (Sweden/ Netherlands)
(a) Factors causing increased adult mortality	
Hunting	Low
Poisoning	Low
Human disturbance	Local
(b) Factors causing reduced reproductive success	
Human disturbance	Unknown
Predation	Local
(c) Factors causing habitat loss/degradation/conversion	
Agricultural intensification and wetland drainage	Low
Construction of dams and other river regulation infrastructure	Low
Climate Change	High
Over-grazing	Unknown
Land abandonment	Local
Pollution of wetlands/waterbodies	Low
(d) Genetic introgression of DNA from other goose species into supplemented/reintroduced population and potential for entry into wild population	Theoretical risk exists
(e) Knowledge limitations	Fundamental gaps

Overleaf is a 'problem tree' diagrammatic representation of the key threat factors described above.

¹¹ See Annexes 9a and 10 for details of: (a) Conclusions of the CMS Scientific Council in November 2005 regarding the supplemented/reintroduced population; (b) the consensus compromise reached in 2007 as a result of the negotiation mission conducted by the AEWA Secretariat.



4. Policies and Legislation Relevant for Management

4.1. International Conservation and Legal Status

Table 3 (see page 43) shows the international conservation and legal status of Lesser White-fronted Goose under both European and global instruments/mechanisms.

4.2. Member States'/Contracting Parties' Obligations

Table 4 (page 44) summarises the applicability of EU and intergovernmental instruments to the Principal Range States (see section 1.4 for definition) for Lesser White-fronted Goose, as of 19 February 2008¹². It is notable that in several of these Range States (Iran, Iraq, Kazakhstan, Russian Federation, and Turkmenistan) rather few of the instruments are currently applicable. Details of the relevant provisions of these instruments and policies are provided in Annex 8.

¹² According to information posted on the websites of the relevant treaty secretariats on this date.

Table 3. Summary of the international conservation and legal status of Lesser White-fronted Goose, *Anser erythropus*.

Global Status ¹³	European Status	SPEC ¹⁴ category	EU Birds Directive ¹⁵	Bern Convention ¹⁶	Bonn Convention ¹⁷	AEWA ¹⁸	CITES ¹⁹
Vulnerable	Endangered ²⁰	SPEC 1	Annex I	Appendix II	Appendix I	N Europe & Siberia/Black Sea & Caspian A 1a 1b 2	Not listed in CITES Appendices

¹³ Source: 2007 IUCN Red List of Threatened Species (criteria A2bcd+3bcd – see <http://www.redlist.org/>)

¹⁴ Species of European Conservation Concern

¹⁵ European Council Directive on the Conservation of Wild Birds (79/409/EEC, 2 April 1979)

¹⁶ Convention on the Conservation of European Wildlife and Natural Habitats, Bern, 1979

¹⁷ Convention on Migratory Species, Bonn, 1979

¹⁸ Agreement on the Conservation of African-Eurasian Migratory Waterbirds

¹⁹ Convention on International Trade in Endangered Species of Wild Flora and Fauna, 1973

²⁰ Source: application of IUCN Red List criteria (2001 version), criterion C1

Table 4. Summary of applicability of major international conservation instruments to Principal Ranges States for Lesser White-fronted Goose Anser erythropus²¹. Note: the EU/European Community is also a party to AEWa, CMS, Bern and CBD (see foot of table).

Principal Range State for Lesser White-fronted Goose	Member State bound by EU Directives and policies	Beneficiary of EU European Neighbourhood Policy ²²	Party to AEWa	Party to CMS	Party to Bern	Party to CBD	Party to Ramsar
Azerbaijan	No	Yes	No	No	Yes	Yes	Yes
Bulgaria	Yes	No	Yes	Yes	Yes	Yes	Yes
Estonia	Yes	No	Yes	Yes	Yes	Yes	Yes
Finland	Yes	No	Yes	Yes	Yes	Yes	Yes
Germany	Yes	No	Yes	Yes	Yes	Yes	Yes
Greece	Yes	No	Not ratified	Yes	Yes	Yes	Yes
Hungary	Yes	No	Yes	Yes	Yes	Yes	Yes
I. R. of Iran	No	No	No	Yes	No	Yes	Yes
Iraq	No	No	No	No	No	No	Yes
Kazakhstan	No	No	No	Yes	No	Yes	Yes
Lithuania	Yes	No	Yes	Yes	Yes	Yes	Yes
Netherlands	Yes	No	Yes	Yes	Yes	Yes	Yes
Norway	No	No	Yes	Yes	Yes	Yes	Yes
Poland	Yes	No	No	Yes	Yes	Yes	Yes
Romania	Yes	No	Yes	Yes	Yes	Yes	Yes
Russian Fed.	No	Strategic Partnership	No	No	No	Yes	Yes
Sweden	Yes	No	Yes	Yes	Yes	Yes	Yes
Syrian A. R.	No	Yes	Yes	Yes	No	Yes	Yes
Turkey	Candidate	No	No	No	Yes	Yes	Yes
Turkmenistan	No	No	No	No	No	Yes	No [Oct 08 ->]
Ukraine	No	Yes	Yes	Yes	Yes	Yes	Yes
Uzbekistan	No	No	Yes	Yes	No	Yes	Yes
EU/EC	N/A	N/A	Yes	Yes	Yes	Yes	No

²¹ As per information posted on the websites of the relevant treaty secretariats in October 2008.

²² Source: http://ec.europa.eu/world/enp/documents_en.htm

4.3. National Policies, Legislation and Ongoing Activities

Annex 5 provides a table summarising the national protection status of the species in each Range State. The general picture is one of a high level of legal protection – at least on paper – in most of the key countries. This suggests that the main challenge is one of implementation and enforcement of conservation legislation.

4.4. Site and Habitat Protection and Research

Annex 3a provides a listing of Important Bird Areas known to be of significance for the Lesser White-fronted Goose. Annex 3b is a listing of additional sites, as provided by reviewers of the first draft of this Action Plan (in all cases the sites were listed by nationals of the countries concerned), but this will need further development to ensure that it includes only those sites that are of real importance for the species' conservation, rather than sites that are used only occasionally by vagrants etc.

Annex 6 provides a table, by Range State, of site protection measures. While the Fennoscandian population is well covered by site protection designations (at least along the westernmost flyway) this is not the case for the Western main population, which lacks adequate site protection in many Range States. In some cases there is insufficient information available for assessing the adequacy of site/habitat protection measures.

4.5. Recent Conservation Measures

Table 5 summarises the mechanisms and institutional arrangements for the Principal Range States (see section 1.4 for definition), while Annex 7 provides additional information concerning recent and ongoing conservation measures in each country.

*Table 5. Summary of mechanisms and institutional arrangements for conservation of the Lesser White-fronted Goose *Anser erythropus*.*

Country	National Action Plan for Lesser White-fronted Goose?	National Working Group for Lesser White-fronted Goose?	National Monitoring Programme for Lesser White-fronted Goose?	Monitoring Programme in protected Areas?	Routines for Informing the Responsible Authorities Regarding Nesting Areas and Nest Sites?
Azerbaijan	No	No	No	No	N/A
Bulgaria	No	No	Partial	No	N/A
Estonia	In prep (2008)	Yes	Yes	Yes	N/A
Finland	In prep (adoption in 2008)	Yes	Yes	Yes	(Yes)
Germany	No	Yes	Yes	Yes	N/A
Greece	No (lacks ratification since 1999)	No	Yes	Yes	N/A
Hungary	No	Yes	Yes	Yes	N/A
Iran, Islamic Republic of	No	No	No	?	N/A

Country	National Action Plan for Lesser White-fronted Goose?	National Working Group for Lesser White-fronted Goose?	National Monitoring Programme for Lesser White-fronted Goose?	Monitoring Programme in protected Areas?	Routines for Informing the Responsible Authorities Regarding Nesting Areas and Nest Sites?
Iraq	No	No	No	No	N/A
Kazakhstan	No	No	No	No	N/A
Lithuania	No	No	No	No	N/A
Netherlands	?	N/A	Yes	Yes	N/A
Norway	Review in prep (2008)	Yes	Yes	Yes	Yes
Poland	No	No	No	?	N/A
Romania	No	No	Partial	No	N/A
Russian Fed.	No	Yes	Partial	Partial	?
Sweden	In prep	Yes*	Yes*	Yes*	Yes
Syrian Arab Republic	No	No	No	Yes	N/A
Turkey	No	No	No	Partial	N/A
Turkmenistan	No	Yes	No	Yes	N/A
Ukraine	No	Yes	No	No	N/A
Uzbekistan	No	No	No	No	N/A

* Applies mainly to supplemented/reintroduced population

Transboundary EU LIFE Project – Fennoscandian population

An international project '*Conservation of the Lesser White-fronted Goose on European migration route*', funded by the EU's LIFE mechanism, is underway between April 2005 and March 2009. The project is led by WWF Finland, with nine additional partners in Estonia, Finland, Greece, Hungary and Norway. For further information see <http://www.wwf.fi/lwfg>. The aim of the project is to improve and monitor the conservation status of the species at the most important breeding, staging and wintering sites along the European flyway by:

- Locating the most important breeding areas, and securing favourable conservation status of these areas
- Eliminating the most important threats (high mortality due to hunting and poaching, loss of feeding and roosting habitats, and human disturbance)
- Monitoring the population and effects of the project actions

The project is focusing on the following sites:

- Norway – Porsangen Fjord and Varangerfjord; breeding grounds in Finnmark
- Finland – Hailuoto/Liminganlahti area, Bothnian Bay coast, Finnish Lapland
- Estonia – Matsalu National Park, Nigula
- Hungary – Hortobágy National Park
- Greece – Evros Delta, Lake Kerkini, Nestos Delta, Lake Mitrikou

Specific project activities include:

- Catching, colour ringing and satellite tracking of Fennoscandian Lesser White-fronted Geese

- Preparing National Action Plans for the species in Estonia, Finland and Norway.
- Restoring and managing of Lesser White-fronted Goose habitat – Haeska Islets, Matsalu Bay, Estonia
- Providing safe feeding and roosting areas by habitat management in Hortobágy National Park, Hungary
- Raising public awareness, especially amongst hunters, landowners and farmers – Estonia, Hungary, Greece
- Monitoring the Fennoscandian population and the effect of LIFE Project actions – Norway, Finland, Estonia, Hungary, Greece

5. Framework for Action

5.1. Lesser White-fronted Goose Action Plan Goal, Purpose, and Results

This section identifies and defines the **Goal**, the **Purpose**, and **Results** of the *Action Plan* and describes **indicators** and **means of verification** for monitoring its implementation and effectiveness.

The Goal is the ultimate conservation objective to which this Action Plan contributes, namely **restoration of Lesser White-fronted Goose to a favourable conservation status**. The Purpose refers to the actual role of the Action Plan itself, namely **to stop and reverse the current population decline**. The Results are the changes required for this Purpose to be realised.

A priority has been assigned to each Result, according to the following scale:

- Essential:** a Result that is needed to prevent further large declines in the population that could lead to the species' extinction.
- High:** a Result that is needed to prevent a decline of more than 20% of the population within 20 years.
- Medium:** a Result that is needed to prevent a decline of less than 20% of the population within twenty years.
- Low:** a Result that is needed to prevent local population declines or which is likely to have only a small impact on the population across the range.

However, owing to the strongly contrasting sizes of the subpopulations, some refinement of these categories should be applied in practice. Hence, an Action may be 'High' for a given subpopulation, even if the overall impact on the global population size would place it in the 'Low' category. In the case of the Lesser White-fronted Goose, unless such considerations are taken into account, all actions for the Fennoscandian subpopulation would automatically become 'Low' priority.

Timescales are attached to each Result 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.
- Completed:** an action that was completed during preparation of the action plan.

The Results and Objectively Verifiable Indicators have been selected to address the challenges set out in Chapter 3, in particular:

- to eliminate mortality of birds due to biologically unsustainable hunting pressure – in spite of the legal protection afforded to the species across most of its range;
- to ensure that all of the key sites, including roosting and feeding sites, used by Lesser White-fronted Geese are adequately protected and managed;
- to minimize disturbance and predation on the breeding grounds, thereby helping to maximize productivity;
- to prevent further anthropogenically caused introgression of DNA from other goose species into the wild population of Lesser White-fronted Geese;
- to fill the still-significant knowledge gaps concerning the species' numbers and movements.

Table 6. Action Plan Goal and Purpose

	Objectively Verifiable Indicator	Means of Verification
<p>Action Plan GOAL To restore the Lesser White-fronted Goose to a favourable conservation status within the AEW A Agreement Area</p>	<p>Neither of the wild populations in the Agreement Area qualifies as 'threatened' according to the IUCN Red List criteria because the Western Main population exceeds 25,000²³ individuals, the Fennoscandian population exceeds 1,000²⁴ individuals and neither population is declining. Breeding range is stable or expanding. Adequate managed and protected habitat is available at all the key sites along the species' flyways.</p>	<p>Conservation Status Assessment of Migratory Waterbirds, Wetlands International, and/or Assessments by the International Lesser White-fronted Goose Working Group established to coordinate implementation of this Action Plan.</p>
<p>Action Plan PURPOSE To stop and reverse the current population decline and range contraction.</p>	<p>Neither the Western Main population nor the Fennoscandian population is declining. A 5-year moving average of the finite rate of population increase (λ_{t+5}) is above 1.0.</p>	<p>For the westernmost flyway: counts of spring flocks at Matsalu Bay, Estonia, at Porsangerfjord, Norway; counts of spring and autumn flocks at Hortobágy, Hungary. For the main flyway: counts of autumn flocks in Kustanay oblast, Kazakhstan, covering a large-enough area to avoid effects of local fluctuations caused by year-to-year variations in location and extent of suitable roosting/feeding sites.</p>

²³ Figure derived from the AEW A Action Plan Table 1. This is necessary for a species not to be listed as Column A species.

²⁴ Figure derived from the IUCN Red List criterion D for small populations of a species classified 'globally vulnerable': D. Population very small or restricted in the form of either of the following (1) Population size estimated to number fewer than 1,000 mature individuals or (2) Population with a very restricted area of occupancy (typically less than 20 km²) or number of locations (typically five or fewer) such that it is prone to the effects of human activities or stochastic events within a very short time period in an uncertain future, and is thus capable of becoming Critically Endangered or even Extinct in a very short time period.

Table 7. Action Plan Results

Result	Objectively Verifiable Indicator	Means of Verification	Priority	Timescale
Result 1: Mortality rates are reduced	A 5-year moving average of the number of individuals at regularly monitored spring staging sites	Counts of flocks at Hortobágy/Hungary, at Matsalu Bay/Estonia, at Porsangerfjord/Norway, in the Evros Delta/Greece and in Kustanay oblast/Kazakhstan in spring.	Essential	Medium / long
Result 2: Further habitat loss and degradation is prevented	All Important Bird Areas and other key sites for Lesser White-fronted Goose are protected and managed with the aim of achieving 'Favourable Conservation Status'.	Natura 2000 database up-dated with monitoring data. National government reports to the European Commission, CMS, CBD, AEW A, Ramsar Convention and Bern Convention. Periodic independent assessments to be carried out by national BirdLife partners as part of their IBA Monitoring Programme.	High	Long
Result 3: Reproductive success is maximised	Five-year running mean of juveniles reaches 25-30% for both Fennoscandian and Western main populations.	Counts of autumn flocks at Matsalu Bay, Estonia and north-west Kazakhstan in October.	Medium	Long

<p>Result 4: No introgression of DNA from other goose species into the wild population occurs as a result of further releases and DNA introgression from already released birds from captive breeding programmes is minimised</p>	<p>Any future release of captive-bred birds involves only individuals reared from wild-caught stock.</p> <p>Apparent hybrid geese are removed from existing free-flying introduced flock, subject to findings of a feasibility study.</p>	<p>National reports from governments.</p> <p>Reports from International Working Group (and captive-breeding sub-group).</p> <p>Papers published in peer-reviewed scientific journals.</p> <p>Review and evaluation of existing studies on the species' genetics is conducted by independent scientific expert.</p> <p>Long-term future of all captive breeding programmes is reviewed by a specialist Sub-group of the International Working Group.</p>	<p>High</p>	<p>Short</p>
<p>Result 5: Key knowledge gaps filled</p>	<p>Knowledge gaps filled by 2015</p>	<p>Monitoring & expedition reports</p> <p>Papers published in peer-reviewed scientific journals.</p>	<p>Essential</p>	<p>Medium</p>

<p>Result 6: International cooperation maximised</p>	<p>All Lesser White-fronted Goose Range States are parties to the key international conservation agreements.</p> <p>The International Lesser White-fronted Goose Working Group (and sub-group on captive breeding, supplementation and reintroduction) is established and operating effectively.</p> <p>National Action Plans, based on this SSAP, are established, implemented and progress shared with other Range States via the International Working Group.</p>	<p>Status of Contracting Party lists issued by relevant agreements.</p> <p>Progress reports by the AEWA Secretariat.</p> <p>Reports and assessments issued by the International Working Group (once established)</p>	<p>Essential</p>	<p>Short / Ongoing</p>
---	--	--	------------------	------------------------

6. Activities by Result

Result 1: Mortality rates are reduced

The most important and most urgent activities under this Action Plan are those aimed at halting the currently unsustainable (and mostly illegal) hunting pressure on Lesser White-fronted Geese:

1. Ensure that, in principle, hunting legislation affords adequate protection to Lesser White-fronted Goose;
2. Ensure that sufficient human and financial resources are allocated for enforcement of hunting legislation, and that these resources are deployed to control and manage hunting effectively and sustainably;
3. Ensure that sufficient human and financial resources are allocated for identifying the traditional flyway and stop-over sites, and making that flyway safe for the geese.
4. Ban goose hunting at all key sites for Lesser White-fronted Goose (as listed in Annex 3 to this Action Plan) during the period when Lesser White-fronted Geese are usually present, given the difficulty of reliably distinguishing goose species in flight (especially the near impossibility of separating Greater and Lesser White-fronted Geese, even from relatively close range and in good light);
5. Plant lure crops to direct Lesser White-fronted Goose away from areas where hunting pressure is known to be high and towards refuge zones;
6. As far as possible, redirect hunting from adults to juveniles in areas where Greater and Lesser White-fronted Geese occur together away from key sites.
7. Implement obligatory training as outlined by the Hunting Charter of the Bern Convention (Nov 2007) for hunters particularly in Eastern European countries.
8. Carry out an information campaign to engage local and European hunting organisations and nature protection NGOs.
9. Upgrade level of protection from illegal hunting within existing protected areas through training and improved enforcement.

These actions are applicable in all Range States, but especially in those countries of the staging and wintering range where hunting pressure is known to be particularly high, e.g. Kazakhstan, Russian Federation, Ukraine.

In addition to these measures, it has been suggested that efforts should continue to establish a safer migration route, while giving the highest possible priority to the protection needs of the existing wild population (see Result 4 below). However, the November 2005 recommendation of the Scientific Council of the Convention on Migratory Species, combined with the conclusions of the January 2007 AEWA Secretariat negotiation mission (see pages 34–37 for details), mean that proposals have been deferred for at least three years (i.e. 2010 or later) to enable sufficient captive-reared stock derived exclusively from wild-caught birds to be built up.

Result 2: Further habitat loss and degradation is prevented

Measures to halt and reverse habitat loss and degradation, and to maximise positive site management, will serve to underpin increased survival of full-grown birds achieved through the hunting-control measures outlined above.

1. Ensure that all key sites for Lesser White-fronted Goose (breeding, staging and wintering) are afforded appropriate protected area status at national and international levels, including classification as Special Protection Areas in EU Member States;

2. Ensure that all key sites for Lesser White-fronted Goose have a management plan that addresses the conservation requirements of Lesser White-fronted Goose and that is resourced, implemented, monitored and periodically updated;
3. Monitor habitat quality in the breeding range to ensure that any anthropogenic pressures, including the potential impacts of climate change, are identified as early as possible;
4. Take measures to restore and/or rehabilitate Lesser White-fronted Goose roosting and feeding habitat in the staging and/or wintering range.

These actions are applicable in all of the Range States.

Result 3: Reproductive success is maximised

1. Avoid infrastructure development and other sources of human disturbance, including recreation/tourism liable to have an adverse impact on the know core breeding areas;
2. Take measures to avoid overgrazing and nest trampling if/where this is known to be a problem;
3. Take measures, where feasible, to minimise predation, where this is shown to be a significant limiting factor;
4. Take measures to eliminate waterbird hunting on the breeding grounds (Russian Federation and Norway) and in all staging areas close to the breeding grounds (Fennoscandia, Russian Federation).

These actions are applicable in the few Range States that share the species' entire breeding range, namely Finland, Norway, Sweden and Russian Federation.

Result 4: No introgression of DNA from other goose species into the wild population occurs as a result of further releases and introgression from already released birds from captive breeding programmes is minimised.

As set out in Chapter 3, there has been a lack of consensus among Lesser White-fronted Goose stakeholders on the use of captive breeding, supplementation/reintroduction, and flyway modification as valid conservation tools to be integrated with measures directed at conservation of the surviving wild population. Proponents have argued that all efforts to date have failed to stop or reverse the decline of the Lesser White-fronted Goose and that supplementation/reintroduction is the only assured means of securing the species' survival, citing the high adult survival rates achieved through diverting the flyway through 'safe' countries. Opponents have argued that introduction in areas that do not form part of the species' natural range is scientifically and ethically unsound and believe that efforts and resources should be devoted to conservation of the wild Fennoscandian population as long as it continues to exist, with supplementation/reintroduction remaining an option if all other measures fail. They also highlight the risk of introgression of DNA from other goose species into the wild population, following the discovery of such DNA among the captive breeding stock.

As detailed in Chapter 3 (pages 34–35), the Scientific Council of the Convention on Migratory Species presented a series of conclusions and recommendations on these issues in November 2005. The full text of the Scientific Council's statement, together with relevant comments made by Dr Robert C. Lacy, can be found in Annexes 9a and 9b, respectively.

The Scientific Council's findings proved controversial and the AEWA Secretariat conducted a series of consultations with the key Range States in 2007 resulting in an agreement between the parties concerned. The conclusions set out in this agreement form the basis of the Single Species Action Plan's approach to this issue. They are detailed on pages 35-37 and in Annex 10. The following is a summary only of the key points agreed by the parties:

- The main priority for the conservation of the Lesser White-fronted Goose is the preservation of the wild populations breeding in Fennoscandia and Russia and that the work on the SSAP and any decisions should follow the code of transparency and accountability so that they can be subject to scientific scrutiny at any time. Particular attention shall be paid to mortality due to hunting and urgent targeted measures should be implemented to reduce the magnitude of this threat, the success of which shall be promptly and regularly reviewed and evaluated.
- An International Lesser White-fronted Goose Working Group should be established, consisting of governmental representatives of all Range States, who would be free to bring in their own experts and use their support. The group will be chaired by the AEWA Secretariat.
- A Committee for captive breeding, reintroduction and supplementation of Lesser White-fronted Geese in Fennoscandia should be established under the auspices of the International Lesser White-fronted Goose Working Group.
- The long-term future of all captive breeding programmes will be reviewed by the Committee for captive breeding, reintroduction and supplementation of Lesser White-fronted Geese in Fennoscandia.

In the meantime:

- A captive stock of wild Fennoscandian birds should be established, subject to the conclusions of a feasibility study.
- The Swedish captive breeding programme should continue as long as it is based on wild birds only.
- The current free-flying flock, breeding in Sweden and wintering in the Netherlands, will remain in the wild, subject to genetic screening and refinement.
- The implementation of the pilot experimental project of the NGO 'Aktion Zwerggans' will be postponed.
- A review and evaluation of relevant and published studies on Lesser White-fronted Goose genetics should be undertaken by an independent expert with adequate scientific expertise and experience.

Result 5: Key knowledge gaps filled

Knowledge gaps represent a significant constraint. The following activities are priorities for further research:

1. Locate sources of possible financial support for further conservation-oriented research;
2. Use a combination of satellite tracking and field surveys to locate the key breeding grounds for the bulk of the Western main population;
3. Assess the hunting pressure at key sites and identify any factors that may make Lesser White-fronted Geese more vulnerable to being shot than other goose species;
4. Use a combination of satellite tracking and field surveys to locate the key breeding, staging and wintering sites for the Fennoscandian population;
5. Conduct a Population Viability Assessment (PVA) for the remaining wild Fennoscandian population;

6. Use a combination of satellite tracking and field surveys to locate the key staging and wintering grounds for the bulk of the Central Asian population;
7. Undertake further field surveys of suitable breeding habitat and staging areas on the Kola Peninsula to update the estimate for the Fennoscandian subpopulation;
8. Establish an effective network of coordinated counts in the wintering grounds (or main staging areas if wintering areas are not known), to monitor overall population trends as accurately as possible;
9. Evaluate spatial use patterns at the habitat level to identify areas where hunting directly threatens Lesser White-fronted Geese and to direct local conservation efforts (e.g. planting of 'lure' crops) to hunting-free refuges and corridors;
10. Conduct diet and habitat use studies particularly for Lesser White-fronted Goose wintering sites
11. Continue to refine genetic knowledge and the techniques deployed for genetic assessments;
12. Develop a strategy for genetic management of the species both in the wild and in captivity based on previous agreements such as the 2007 AEWA negotiation mission and the findings of the CMS Scientific Council in 2005;
13. Assess the current status of key sites for the Lesser White-fronted Goose with regard to the species' ecological requirements, taking into account protected area status, habitat quality, conservation management and active threats.
14. Increase knowledge of breeding site fidelity for males and females and exchange with other populations;
15. Undertake studies on predation by the White-tailed Eagle;
16. Investigate the importance of small mammal cycles on reproduction of Lesser White-fronted Goose.

These activities apply to all Range States and non-Range States, since international cooperation, including financial and technical support, will not be limited to the countries where additional research is actually conducted.

Result 6: International cooperation maximised

Table 4 shows the current applicability of key international cooperation instruments to Lesser White-fronted Goose Range States. There are currently significant gaps. These gaps should be rectified in order to maximise international cooperation for the effective implementation of this Action Plan and wider measures that are likely to benefit Lesser White-fronted Goose conservation.

This activity is addressed to the following Range States:

- **AEWA:** Azerbaijan, Greece (signatory but entry-into-force is pending ratification), Islamic Republic of Iran, Iraq, Kazakhstan²⁵, Russian Federation, Turkey, Turkmenistan
- **Bern Convention:** Russian Federation
- **CBD:** Iraq
- **Ramsar Convention:** Turkmenistan (joining in October 2008)
(Note: under the current provisions of this Convention, there is no mechanism for the EU/EC to become a Contracting Party)

²⁵ Iran and Kazakhstan are Parties to the Convention on Migratory Species (CMS). Although not parties to AEWA they are therefore committed to implementation of this Action Plan through the CMS. Other states within the AEWA Agreement Area that are parties to CMS and which are in the process of adhering to AEWA share a similar obligation.

Table 8. National activities by Range States required to deliver each Action Plan Result

Result	National activities and applicable Principal Range States ²⁶	Implementation Responsibility
Result 1: Mortality rates reduced	<ul style="list-style-type: none"> • Ensure by 2010 that, in principle, hunting legislation affords adequate protection to Lesser White-fronted Goose (ALL²⁷); • Ensure that sufficient human and financial resources are allocated for enforcement of hunting legislation and that these resources are deployed to control hunting effectively (ALL); • Ensure that sufficient human and financial resources are allocated for identifying the traditional flyway and stop-over sites, and making that flyway safe for the geese (ALL); • By 2010, ban goose hunting at all key sites for Lesser White-fronted Goose (as listed in Annex 3 to this Action Plan) during the period when Lesser White-fronted Geese are usually present, given the difficulty of reliably distinguishing goose species in flight (ALL); • By 2010 establish no hunting zones (covering both roosting and feeding sites) at all Lesser White-fronted Goose IBAs, SPAs and Ramsar sites (ALL); • Plant lure crops to direct Lesser White-fronted Goose away from areas where hunting pressure is known to be high and towards refuge zones (ALL); • Redirect hunting from adults to juveniles in areas where Greater and Lesser White-fronted Geese occur together away from key sites (Russia, Kazakhstan). • Implement obligatory training as outlined by the Hunting Charter of the Bern Convention (Nov 2007) for hunters particularly in Eastern European countries (signatories to the Bern Convention, European Commission); • Carry out an information campaign to engage local and European hunting organisations and nature protection NGOs (Norway, EU member states) • Upgrade level of protection from illegal hunting within existing protected areas through training and improved enforcement (European Commission, ALL) 	Column to be completed by Range States

²⁶ Defined in Chapter 1.4

²⁷ This indicates that the corresponding activity needs to be implemented by all Range States.

Result 2: Further habitat loss and degradation is prevented	<ul style="list-style-type: none"> • Ensure that all key sites for Lesser White-fronted Goose (breeding, staging and wintering) are afforded appropriate protected area status at national and international levels, including classification as Special Protection Areas in EU Member States (ALL); • Ensure that all key sites for Lesser White-fronted Goose have a management plan that: (a) addresses the conservation requirements of Lesser White-fronted Goose and (b) is resourced, implemented, monitored and periodically updated (ALL); • Monitor habitat quality in the breeding range to ensure that any anthropogenic pressures, including the potential impacts of climate change, are identified as early as possible (Finland, Norway, Russia, Sweden); • Take measures to restore and/or rehabilitate Lesser White-fronted Goose roosting and feeding habitat in the staging and/or wintering range (ALL).
Result 3: Reproductive success is maximised	<ul style="list-style-type: none"> • Avoid infrastructure development and other sources of human disturbance, including recreation/tourism liable to have an adverse impact on the known core breeding areas (Finland²⁸, Norway, Russia, Sweden); • Take measures to avoid overgrazing and nest trampling if/where this is known to be a problem (Finland, Norway, Russia, Sweden); • Take measures, where feasible, to minimise predation, where this is shown to be a significant limiting factor (Finland, Norway, Russia, Sweden); • Take measures to eliminate waterbird hunting on the breeding grounds (Russia, Norway) and in all staging areas close to the breeding grounds (Finland, Norway, Russia, Sweden).
Result 4: No introgression of DNA from other goose species into the wild population occurs as a result of further releases and introgression from already released birds from captive breeding programmes is minimised	<ul style="list-style-type: none"> • Establish a special website to serve as a 'clearing house' for information on this issue. • Ensure that any future release of captive-bred birds involves only individuals reared from wild-caught stock. • Remove any apparent hybrid geese from the existing free-flying introduced flock, subject to findings of a feasibility study (Sweden). • Conduct a review and evaluation of existing studies of Lesser White-fronted Goose genetics; to be carried out by an independent, appropriately experienced scientific expert or group of experts (specialist Sub-group of the International Lesser White-fronted Goose Working Group). • Review long-term future of all captive breeding programmes (specialist Sub-group of the International Lesser White-fronted Goose Working Group).

²⁸ Finland and Sweden are included as there remains a possibility that the original or wild population is not extinct and/or habitat could be recolonised.

Result 5: Key knowledge gaps filled	<ul style="list-style-type: none"> • Locate sources of possible financial support for further conservation-oriented research; • Use a combination of satellite tracking and field surveys to locate the key breeding grounds for the bulk of the Western main population; • Assess the hunting pressure at key sites; • Use a combination of satellite tracking and field surveys to locate the key breeding, staging and wintering sites for the Fennoscandian population; • Conduct a Population Viability Assessment (PVA) for the remaining wild Fennoscandian population; • Use a combination of satellite tracking and field surveys to locate the key staging and wintering grounds for the bulk of the Central Asian population; • Undertake further field surveys of suitable breeding habitat and staging areas on the Kola Peninsula to update the estimate for the Fennoscandian subpopulation; • Establish an effective network of coordinated counts in the wintering grounds (or main staging areas if wintering areas are not known), to monitor overall population trends as accurately as possible; • Evaluate spatial use patterns at the habitat level to identify areas where hunting directly threatens Lesser White-fronted Geese and to direct local conservation efforts (e.g. planting of 'lure' crops) to hunting-free refuges and corridors; • Continue to refine genetic knowledge and the techniques deployed for genetic assessments; • Develop a strategy for genetic management of the species both in the wild and in captivity based on previous agreements such as the 2007 AEWA negotiation mission and findings of the CMS Scientific Council in 2005; • Assess the current status of key sites for Lesser White-fronted Goose with regard to the species' ecological requirements, taking into account protected area status, habitat quality, conservation management and active threats. • Increase knowledge of breeding site fidelity for males and females and exchange with other populations; • Undertake studies on predation by the White-tailed Eagle; • Investigate the importance of small mammal cycles on reproduction of the Lesser White-fronted Goose.
Result 6: International cooperation maximised	<p>Achieving this result requires action (as of May 2008²⁹) by the following Range States:</p> <p>AEWA: Azerbaijan, Estonia, Islamic Republic of Iran, Iraq, Kazakhstan, Russian Federation, Turkey, Turkmenistan</p> <ul style="list-style-type: none"> • CMS: Azerbaijan, Iraq, Russian Federation, Turkey, Turkmenistan • Bern Convention: Russian Federation • CBD: Iraq • Ramsar Convention: Turkmenistan is planning to join in October 2008 <p>(Note: under current provisions there is no mechanism for the EU/EC to become a Contracting Party)</p>

²⁹ Derived from lists of parties posted on the websites of the relevant Treaty Secretariats in May 2008.

7. Implementation

Principles of implementation

The following ‘principles’ have been drawn up from the conclusions of the AEWA Secretariat’s negotiation mission in January 2007:

- An International Lesser White-fronted Goose Working Group shall be established, consisting of governmental representatives of all Range States. The governmental representatives shall be free to bring in their own experts and to call on their support as required. The Working Group shall be chaired by the AEWA Secretariat (subject to additional, dedicated human and financial resources being made available to the Secretariat) and will operate in accordance with Terms of Reference to be developed by the AEWA Secretariat, approved by the Range States and endorsed by the AEWA Technical Committee.
- The main priority for the conservation of the Lesser White-fronted Goose is the maintenance of the wild populations breeding in Fennoscandia and Russia.
- The EU, including all its Member States and candidate countries, shall continue to treat this species with a high degree of concern, in particular by ensuring prompt compliance with EU Directives and the rulings of the European Court of Justice from all EU member states.
- The efficiency of conservation measures is to be assessed by the International Lesser White-fronted Goose Working Group.
- Implementation and future modification of this International Single Species Action Plan – and all related decisions – shall be undertaken with transparency and accountability so that progress can be subject to scientific scrutiny at any time.
- Each Range State shall consider support for ‘on-the-ground’ conservation measures, particularly along the Lesser White-fronted Goose flyway(s) that traverse(s) its territory.
- Particular attention shall be paid to mortality due to hunting and urgent targeted measures shall be implemented to reduce the magnitude of this threat, the success of which shall be promptly and regularly reviewed and evaluated.
- Supplementing wild populations with captive-bred birds shall be considered if other conservation measures are not as quickly efficient as needed and should populations continue to decline. As with any other captive breeding, reintroduction or supplementation initiatives this project will be subject to consideration and advice by the Committee for captive breeding, reintroduction and supplementation of Lesser White-fronted Geese in Fennoscandia (see below).
- The timeframe for the implementation of the plan is 5 years from the date of formal adoption. After 5 years the SSAP should be updated and an evaluation of the conservation results should be carried out.

Immediate steps required

Immediate steps towards the implementation of this SSAP include:

- Explicit endorsement by Range States of this International Single Species Action Plan;
- Establishment of the International Lesser White-fronted Goose Working Group referred to above;
- Establishment of a Sub-group (under the auspices of the International Lesser White-fronted Goose Working Group) dedicated to the issues of captive breeding, reintroduction and supplementing of wild populations in Fennoscandia (as agreed by the parties to the AEWA Secretariat negotiation mission in January 2007);

- Establishment of a national Lesser White-fronted Goose taskforce (or similar group) in each Range State;
- Establishment and resourcing of the position of 'Lesser White-fronted Goose Single Species Action Plan Co-ordinator' within the AEWA Secretariat;
- Coordinated reporting and information sharing through the International Working Group and/or the AEWA Secretariat, as appropriate;
- Preparation within one year of a National Action Plan for each Range State, in co-operation with the International Working Group and relevant National Taskforce, and based on this International Single Species Action Plan (see *AEWA Conservation Guidelines No. 1*);
- Implementation of National Action Plans, including through allocation of adequate and appropriate resources;
- Review of the International and National Action Plans at least every five years;
- Maintaining and further developing research and monitoring programmes for supporting and assessing implementation of the International Single Species Action Plan.

8. References

The following is a listing of those publications cited in the text of this *Action Plan*. For a more comprehensive species bibliography, comprising some 250 references in all, see:

[www.piskulka.net/Scientific articles.htm](http://www.piskulka.net/Scientific%20articles.htm) (formal scientific literature) and

[www.piskulka.net/General publications.htm](http://www.piskulka.net/General%20publications.htm) ('grey' literature)

- Aarvak, T. & Øien, I.J.** 2001. Monitoring of staging Lesser White-fronted Geese at the Valda Marshes, Norway, in 2000. In: Tolvanen, P., Øien, I.J. & Ruokolainen, K. (eds.). 2001. Fennoscandian Lesser White-fronted Goose conservation project. Annual report 2000. *WWF Finland Report No. 13 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-2001*: pp 17–22.
- Aarvak, T. & Øien, I.J.** 2003. Moults and autumn migration of non-breeding Fennoscandian Lesser White-fronted Geese *Anser erythropus* mapped by satellite telemetry. *Bird Conservation International* 13: pp 213–226.
- Aarvak, T. & Øien, I.J.** 2004. Monitoring of staging Lesser White-fronted Geese at the Valda Marshes, Norway, in the years 2001–2003. In: Aarvak, T. & Timonen, S. (eds.). 2004. Fennoscandian Lesser White-fronted Goose conservation project. Report 2001–2003. *WWF Finland Report No. 20 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-2004*: pp 19–24.
- Aarvak, T., Øien, I. J. & Nagy, S.** 1996. *The Lesser White-fronted Goose monitoring programme. Annual report 1996*. Norwegian Ornithological Society NOF Rapportserie report No. 7-1996.
- Aarvak, T., Øien, I. J., Syroechkovski Jr, E. E. & Kostadinova, I.** 1997. *The Lesser White-fronted Goose monitoring programme. Annual report 1997*. Norwegian Ornithological Society NOF Rapportserie report No. 5-1997.
- Aarvak, T., Arkiomaa, A., Tolvanen, P., Øien, I. J. & Timonen, S.** 2004a. Inventories and catching attempts of Lesser White-fronted Goose *Anser erythropus* at Lake Kulykol, Kazakhstan, in 2002 and 2003. In: Aarvak, T. & Timonen, S. (eds.). 2004. Fennoscandian Lesser White-fronted Goose conservation project. Report 2001–2003. *WWF Finland Report No. 20 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-2004*: pp 36–40.
- Aarvak, T., Grinchenko, A., Nordenswan, G., Popenko, V. & Pynnönen, J.** 2004b. Survey of wintering Lesser White-fronted Geese in Crimea, Ukraine in 2002. In: Aarvak, T. & Timonen, S. (eds.). 2004. Fennoscandian Lesser White-fronted Goose conservation project. Report 2001–2003. *WWF Finland Report No. 20 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-2004*: pp 47–49.
- Abuladze, A.** 2004. The occurrence and protection status of the Lesser White-fronted Goose in Georgia. In: Aarvak, T. & Timonen, S. (eds.). 2004. Fennoscandian Lesser White-fronted Goose conservation project. Report 2001–2003. *WWF Finland Report No. 20 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-2004*: p 52.
- AEWA** 2007. Final report from the Lesser White-fronted Goose negotiation mission in January 2007. AEWA Secretariat, Bonn. Unpublished report.
- Aikio, E., Timonen, S., Ripatti, N. & Kellomäki, E.** 2000. The status of Lesser White-fronted Goose in the Kola Peninsula, north-western Russia. In: Tolvanen, P., Øien, I.J. & Ruokolainen, K. (eds.). 2000. Fennoscandian Lesser White-fronted Goose conservation project. Annual report 1999. *WWF Finland Report No. 12 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-2000*: pp 41–42.
- Andersson, A.** 2004. The reintroduction of the Lesser White-fronted Goose in Swedish Lapland – a summary for 2000–2003. In: Aarvak, T. & Timonen, S. (eds.). 2004. Fennoscandian Lesser White-fronted Goose conservation project. Report 2001–2003. *WWF Finland Report No. 20 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-2004*: pp 51–52.
- Andersson, A.** 2005. *Swedish reintroduction project, history and results*. Paper presented to Workshop on Protection of Lesser White-fronted Goose, Lammi, Finland, 31 March – 2 April 2005.
- Andersson, A-C, Ruokonen, M. & Tegelström, H.** 2005. *Genetic composition of the captive Lesser White-fronted Goose stocks in Sweden*. Paper presented to Workshop on Protection of Lesser White-fronted Goose, Lammi, Finland, 31 March – 2 April 2005.
- Barter, M.** 2004. Winter bird surveys in the Lower Chang Jiang (Yangtze) River basin, China. In: Aarvak, T. & Timonen, S. (eds.). 2004. Fennoscandian Lesser White-fronted Goose conservation project. Report 2001–2003. *WWF Finland Report No. 20 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-2004*: p52.
- van den Bergh, L.** 2000. Observations of Lesser White-fronted Geese in central Europe in autumn 1999. In: Tolvanen, P., Øien, I.J. & Ruokolainen, K. (eds.). 2000. Fennoscandian Lesser White-fronted Goose conservation project. Annual report 1999. *WWF Finland Report No. 12 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-2000*: p 60.
- BirdLife International.** 2004. *Birds in Europe: population estimates, trends and conservation status*. BirdLife International, Cambridge, UK.

- Delany, S. & Scott D.** 2006. *Waterbird Population Estimates* (4th edition). Wetlands International, Wageningen, the Netherlands.
- Delany, S., Dodman, T., Scott S., Martakis, G. & Helmink, T.** February 2008. *Report on the Conservation Status of Migratory Waterbirds in the Agreement Area* (Fourth Edition, Final Draft). Wetlands International, Wageningen, the Netherlands.
- von Essen, L.** 1996. Reintroduction of Lesser White-fronted Goose (*Anser erythropus*) in Swedish Lapland (1981-1991). *Gibier Faune Sauvage* 13: pp1169-1180.
- Evans, M. I.** (ed.) 1994. *Important Bird Areas of the Middle East*. BirdLife International, BirdLife Conservation Series 2. Cambridge, UK.
- Fox, A.D.** 2005. Lesser White-fronted Goose *Anser erythropus*. In: Kear, J. (ed.). 2005. *Ducks, Geese and Swans*. Volume 1: pp 286–289. Oxford University Press, UK.
- Handrinos, G. I.** 1991. The status of geese in Greece. *Ardea* 79: pp 175-178.
- Heinicke, T. & Ryslavy, T.** 2002. Bird Observations in Azerbaijan – Report of an ornithological survey from 24th February to 11th March 2001. Unpublished report to the Michael Succow Foundation for the Protection of Nature. 46 pp.
- IUCN.** 1998. *IUCN Guidelines for re-introductions*. Prepared by the IUCN/SSC Specialist Group on Re-introductions. IUCN Gland, Switzerland and Cambridge UK.
- IUCN.** 2006. *2006 IUCN Red List of Threatened Species. A Global Species Assessment*. IUCN, Gland, Switzerland.
- Kazantzidis, S. & Nazirides, T.** 1999: *National Action Plan for the Lesser White-fronted Goose* (*Anser erythropus* Linnaeus 1758). LIFE Nature Project B4-3200/96/499. WWF Greece, Hellenic Ornithological Society, Society for the Protection of Prespa.
- Karvonen, R. & Markkola, J.** 1998. Satellite follow-up of the Yamal Lesser White-fronted Goose Sibyako (the mother). In: Tolvanen, P., Ruokolainen, K., Markkola, J. & Karvonen, R. (eds.). 1998. Finnish Lesser White-fronted Goose Conservation Project. Annual report 1997. *WWF Finland Report No. 13 & Norwegian Ornithological Society, NOF Rapportserie Report 9*: pp 36-37.
- Koffijberg, K., Cottaar, F., & van der Jeugd, H.** 2005. Pleisterplaatsen van Dwergganzen *Anser erythropus* in Nederland. *SOVON-informatierapport 2005/2006*. SOVON Vogelonderzoek Nederland, Beek-Ubbergen.
- Kreuzberg-Mukhina & Markkola, J.** 1999. New information about wintering White-fronted Geese in Uzbekistan. In: Tolvanen, P., Øien I.J. & Ruokolainen, K. (eds). 2000. Fennoscandian Lesser White-fronted Goose conservation project. Annual report 1999. *WWF Finland Report No. 12 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-2000*: p 57.
- Lampila, P.** 1998. Monitoring of wintering Lesser White-fronted Geese *Anser erythropus* in northeastern Greece, 8 January – 8 April, 1997. In: Tolvanen, P., Ruokolainen, K., Markkola, J. & Karvonen, R. (eds.). 1998. Finnish Lesser White-fronted Goose Conservation Project. Annual report 1997. *WWF Finland Report No. 13 & Norwegian Ornithological Society, NOF Rapportserie Report 9*: pp 7–8.
- Lampila, P.** 2001. Adult mortality as a key factor determining population growth in Lesser White-fronted Goose. In: Tolvanen, P., Øien, I.J. & Ruokolainen, K. (eds.). 2001. Fennoscandian Lesser White-fronted Goose conservation project. Annual report 2000. *WWF Finland Report No. 13 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-2001*: pp 45–47.
- Lorentsen, S.-H., Øien I.J. & Aarvak.** 1998. Migration of Fennoscandian Lesser White-fronted Geese *Anser erythropus* mapped by satellite telemetry. *Biological Conservation* 84: pp 47–52.
- Lorentsen, S.-H., Øien I.J., Aarvak, T., Markkola, J., von Essen, L., Farago, S., Morozov, V., Syroechkovskiy Jr, E., & Tolvanen, P.** 1999. Lesser White-fronted Goose *Anser erythropus*. In: Madsen, J., Cracknell, G. & Fox, A.D. (eds.) *Goose populations of the Western Palearctic. A review of status and distribution. Wetlands International Publication No 48*. Wetlands International, Wageningen, the Netherlands & National Environmental Research Institute, Rønde, Denmark: pp 44-161.
- McCarthy, E.** 2007. *Handbook of Avian Hybrids of the World*. Oxford University Press. New York.
- Madsen, J.** 1996. *International Action Plan for the Lesser White-fronted Goose (Anser erythropus)*. BirdLife International, Cambridge, UK, on behalf of the European Commission.
- Markkola, J.** 2001. Spring staging of Lesser White-fronted Geese on the Finnish Bothnian Bay coast in 2000. In: Tolvanen, P., Øien, I.J. & Ruokolainen, K. (eds.). 2001. Fennoscandian Lesser White-fronted Goose conservation project. Annual report 2000. *WWF Finland Report No. 13 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-2001*: pp 12–16.
- Markkola, J.** 2005. *Review of the global protection and major threats of the Lesser White-fronted Goose*. Paper presented to Workshop on Protection of Lesser White-fronted Goose, Lammi, Finland, 31 March – 2 April 2005.
- Markkola, J. & Lampila, P.** 2003. *Elasticity and perturbation analysis of the endangered Nordic Lesser White-fronted Goose, Anser erythropus, population*. Unpublished manuscript.

- Markkola, J., Niemelä, M. & Rytönen S.** 2003. Diet selection of Lesser White-fronted Geese *Anser erythropus* at a spring staging area. *Ecography* 26: pp 705–714.
- Markkola, J., Luukkainen, A. & Leinonen, A.** 2004. The spring migration of the Lesser White-fronted Goose on Bothnian Bay coast, Finland in 2001–2003. In: Aarvak, T. & Timonen, S. (eds.). 2004. Fennoscandian Lesser White-fronted Goose conservation project. Report 2001–2003. *WWF Finland Report No. 20 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-2004*: pp 14–18.
- Markkola, J., Timonen, S. & Nieminen, P.** 1999. The Finnish breeding and restocking project of the Lesser White-fronted Goose: results and the current situation in 1998. In: Tolvanen P., Øien, I.J. & Ruokolainen, K. (eds.). 1999. Fennoscandian Lesser White-fronted Goose conservation project. Annual report 1998. *WWF Finland Report No. 10 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-1999*: pp 47–50.
- Mineev, O.Y. & Mineev M.N.** 2004. Distribution of Lesser White-fronted Goose in the Malozemelskaya Tundra in northern Russia. In: Aarvak, T. & Timonen, S. (eds.). 2004. Fennoscandian Lesser White-fronted Goose conservation project. Report 2001–2003. *WWF Finland Report No. 20 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-2004*: pp 44–46.
- Mooij, J.H.** 2000. Ergebnisse des Gänsemonitorings in Deutschland und der westlichen Paläarktis von 1950 bis 1995. *Die Vogelwelt* 121: pp 319–330.
- Mooij, J.H.** 2001. Reintroduction project for the Lesser White-fronted Goose (*Anser erythropus*) by help of ultra-light aircraft. *Casarca* 7: pp 137–149.
- Mooij, J.H. & Heinicke, T.** (in prep.): Occurrence and Protection of the Lesser White-fronted Goose *Anser erythropus* in Germany.
- Mooij, J.H. & Scholze, W.** 2001. Flugbegleiter für Zwerggänse. *Der Falke* 48: pp 100–107.
- Morozov, V. & Aarvak, T.** 2004. Wintering of Lesser White-fronted Geese breeding in the Polar Urals. *Casarca* 10: pp 156–162.
- Morozov, V.V. & Syroechkovski Jr, E.E.** 2002. Lesser White-fronted Goose on the verge of the millennium. *Casarca* 8: pp 233–276. (In Russian with English summary).
- Nagy S. & Burfield I.** 2006. Saving Europe's most endangered birds: lessons to be learned from implementing European Species Action Plans. In: Boere G.C, Galbraith C.A. & Stroud D.A. (eds.). 2006. *Waterbirds around the world*. The Stationery Office, Edinburgh, UK.
- Nagy S. & Crockford N.** 2004. *Implementation in the European Union of species action plans for 23 of Europe's most threatened birds*. Report to the European Commission. BirdLife International. Wageningen, the Netherlands.
- Norderhaug A. & Norderhaug M.** 1984. Status of the Lesser White-fronted Goose *Anser erythropus* in Fennoscandia. *Swedish Wildlife Research/Viltrevy* 13: pp 171–185.
- Øien I.J. & Aarvak, T.** 2004. New threats to the core breeding area of Fennoscandian Lesser White-fronted Geese. In: Aarvak, T. & Timonen, S. (eds.). 2004. Fennoscandian Lesser White-fronted Goose conservation project. Report 2001–2003. *WWF Finland Report No. 20 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-2004*: p 54.
- Øien I.J. & Aarvak, T.** 2005. A wild goose chase across Central Asia to the Middle East. *World Birdwatch* June 2005 27.2: pp 24–26.
- Øien I.J., Tolvanen, P., & Aarvak, T.** 2001. Status of the core breeding area for Lesser White-fronted Geese in Norway. In: Tolvanen, P., Øien, I.J. & Ruokolainen, K. (eds.). 2001. Fennoscandian Lesser White-fronted Goose conservation project. Annual report 2000. *WWF Finland Report No. 13 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-2001*: pp 24–25.
- Øien I.J., Tolvanen, P., Aarvak, T., Litvin, K. & Markkola, J.** 1999. Survey and catching of Lesser White-fronted Geese at Taimyr Peninsula 1998: preliminary results on autumn migration routes mapped by satellite telemetry. In: Tolvanen, P., Øien, I.J. & Ruokolainen, K. (eds.). 1999. Fennoscandian Lesser White-fronted Goose conservation project. Annual report 1998. *WWF Finland Report No. 10 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-1999*: pp 37–41.
- Pääläinen, J. & Markkola, J.** 1999. Field work in Lapland in 1998. In: Tolvanen P., Øien, I.J. & Ruokolainen, K. (eds.). 1999. Fennoscandian Lesser White-fronted Goose conservation project. Annual report 1998. *WWF Finland Report No. 10 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-1999*: pp 35–36.
- Persson, H.** 2000. Occurrence of the Lesser White-fronted Goose in Spain, up to 1999. In: Tolvanen, P., Øien, I.J. & Ruokolainen, K. (eds.). 2000. Fennoscandian Lesser White-fronted Goose conservation project. Annual report 1999. *WWF Finland Report No. 12 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-2000*: pp 51–52.
- Persson, H.** 2004. Lesser White-fronted Geese shot in Spain in the winters 1985/86–2000/01. In: Aarvak, T. & Timonen, S. (eds.). 2004. Fennoscandian Lesser White-fronted Goose conservation project. Report 2001–2003. *WWF Finland Report No. 20 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-2004*: p 50.
- Pynnönen, J. & Tolvanen, P.** 2001. Monitoring of Lesser White-fronted Geese in western Estonia in spring 2000. In: Tolvanen, P., Øien, I.J. & Ruokolainen, K. (eds.). 2001. Fennoscandian Lesser White-fronted

- Goose conservation project. Annual report 2000. *WWF Finland Report No. 13 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-2001*: pp 10–11.
- Randler, C.** 2006. Behavioural and ecological correlates of natural hybridization in birds. *Ibis* 148: pp 459–467.
- van Roomen M.W.J., van Winden E.A.J., Koffijberg K., Kleefstra R., Ottens G., Voslammer B. & SOVON Ganzen- en zwanenwerkgroep** 2003. Watervogels in Nederland in 2001/2002. *SOVON-monitoringrapport 2004/01, RIZA-rapport BM04/01*.
- Ruokonen, M.** 2001. Phylogeography and conservation genetics of the Lesser White-fronted Goose (*Anser erythropus*). *Acta Univ. Oul. A* 360. Ph.D. thesis.
- Ruokonen M., Andersson A.-C. & Tegelström H.** 2007. Using historical captive stocks in conservation. The case of the Lesser White-fronted Goose. *Conservation Genetics* 8: pp 197–207.
- Ruokonen, M., Kvist, L., Aarvak, T., Markkola, J., Morozov, V., Øien I.J., Syroechkovskiy Jr, E., Tolvanen, P., & Lumme, J.** 2004. Population genetic structure and conservation of the Lesser White-fronted Goose *Anser erythropus*. *Conservation Genetics* 5: pp 501–512.
- Ruokonen, M., Kvist, L., Tegelström, H. & Lumme, J.** 2000. Goose hybrids, captive breeding and restocking of the Fennoscandian populations of the Lesser White-fronted Goose (*Anser erythropus*). *Conservation Genetics* 1: pp. 277–283.
- Ruokonen, M. & Lumme, J.** 2000. Phylogeography and population genetic structure of the Lesser White-fronted Goose. In: Tolvanen, P., Øien I.J. & Ruokolainen, K. (eds). 2000. Fennoscandian Lesser White-fronted Goose conservation project. Annual report 1999. *WWF Finland Report No. 12 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-2000*: pp 51–52.
- Rusev I.T., Korzukov A.I., Formaniyik O.A. & Panchenko P.S.** 2002. Wintering waterbirds in NW coast of the Black sea in 2000–2001 year. In: Monitoring Wintering Birds in Azov-Black Sea Region. Odessa, Kiev. pp 54–74.
- Rusev I.T.** 2004. Geese of the Dniester delta. In: *Report of the 8th Annual Meeting of the Goose Specialist Group*, 5–10 March 2004, Odessa, Ukraine. pp 105–108.
- Stoncius, D.** 2004. Lesser White-fronted Goose protected in Lithuania. In: Aarvak, T. & Timonen, S. (eds.). 2004. Fennoscandian Lesser White-fronted Goose conservation project. Report 2001–2003. *WWF Finland Report No. 20 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-2004*: p 48.
- Stoncius, D. and Markkola, J.** 2000. New Lesser White-fronted Goose data from Lithuania. In: Tolvanen, P., Øien I. J. & Ruokolainen K. (eds.) *Fennoscandian Lesser White-fronted Goose conservation project. Annual report 1999*. *WWF Finland Report No. 12 and Norwegian Ornithological Society NOF Rapportserie report No. 1-2000*.
- Strøm, H., Gavrilov, M.V., & Goryaev, J.** 2001. Field survey at the Lesser White-fronted Goose moulting area on Kolguev island, north-west Russia, August 2000. In: Tolvanen, P., Øien, I.J. & Ruokolainen, K. (eds.). 2001. Fennoscandian Lesser White-fronted Goose conservation project. Annual report 2000. *WWF Finland Report No. 13 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-2001*: pp 26–29.
- Syroechkovskiy, E.E, Jr** 1996. Present status of the Lesser White-fronted Goose (*Anser erythropus*) populations in Taimyr and some peculiarities of the system of species migrations in the Western Palearctic. *Casarca* 2: pp 71–112.
- Syroechkovskiy, E.E, Jr, Litvin, K. & Morozov, V.** 2005. *Status and conservation of Lesser White-fronted Goose in Russia*. Paper presented to the Workshop on the protection of the Lesser White-fronted Goose, Lammi, Finland, 31 March – 2 April 2005.
- Tar, J.** 2001. The occurrence and protection of Lesser White-fronted Goose in Hortobágy, Hungary in the period 1996–2000. In: Tolvanen, P., Øien, I.J. & Ruokolainen, K. (eds.). 2001. Fennoscandian Lesser White-fronted Goose conservation project. Annual report 2000. *WWF Finland Report No. 13 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-2001*: pp 34–36.
- Tar, J.** 2004. Migration of Lesser White-fronted Goose in Hungary and protection of their Hungarian staging sites. In: Aarvak, T. & Timonen, S. (eds.). 2004. Fennoscandian Lesser White-fronted Goose conservation project. Report 2001–2003. *WWF Finland Report No. 20 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-2004*: pp 33–35.
- Tegelström, H., Ruokonen, M. & Löfgren, S.** 2001. The genetic status of the captive Lesser White-fronted Geese used for breeding and reintroduction in Sweden and Finland. In: Tolvanen, P., Øien, I.J. & Ruokolainen, K. (eds.). 2001. Fennoscandian Lesser White-fronted Goose conservation project. Annual report 2000. *WWF Finland Report No. 13 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-2001*: pp 37–39.
- Timonen, S. & Tolvanen, P.** 2004. Field survey of Lesser White-fronted Goose on the Kola Peninsula, north-western Russia, in June 2001.
- Tolvanen, P.** 1999. A spring staging area for Lesser White-fronted Geese recovered in Matsalu, Estonia. In: Tolvanen P., Øien, I.J. & Ruokolainen, K. (eds.). 1999. Fennoscandian Lesser White-fronted Goose conservation project. Annual report 1998. *WWF Finland Report No. 10 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-1999*: pp 15–18.

- Tolvanen, P., Eskelin, T., Aarvak, T., Eichhorn, G., Øien, I.J. & Gurtovaya, E.** 2000. Monitoring the autumn staging of Lesser White-fronted Geese in Kazakhstan, October 1999. In: Tolvanen P., Øien, I.J. & Ruokolainen, K. (eds.). 2000. Fennoscandian Lesser White-fronted Goose conservation project. Annual report 1999. *WWF Finland Report No. 12 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-2000*: pp 43–50.
- Tolvanen, P., Litvin, K. & Lampila, P.** 1999. Monitoring the autumn staging of Lesser White-fronted Geese in north-western Kazakhstan, October 1998. In: Tolvanen P., Øien, I.J. & Ruokolainen, K. (eds.). 1999. Fennoscandian Lesser White-fronted Goose conservation project. Annual report 1998. *WWF Finland Report No. 10 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-1999*: pp 42–46.
- Tolvanen, P. & Pynnönen, P.** 1998. Monitoring the autumn migration of Lesser White-fronted Goose *Anser erythropus* and other geese in NW Kazakhstan in October 1996. In: Tolvanen, P., Ruokolainen, K., Markkola, J. & Karvonen, R. (eds.). 1998. Finnish Lesser White-fronted Goose Conservation Project. Annual report 1997. *WWF Finland Report No. 13 & Norwegian Ornithological Society, NOF Rapportserie Report 9*: pp 19–20.
- Tolvanen, P., Pynnönen, J. & Ruokolainen, K.** 1998. Monitoring of Lesser White-fronted Goose *Anser erythropus* on Skjåholmen (Varangerfjord, Finnmark, Norway) in 1995–1997. In: Tolvanen, P., Ruokolainen, K., Markkola, J. & Karvonen, R. (eds.). 1998. Finnish Lesser White-fronted Goose Conservation Project. Annual report 1997. *WWF Finland Report No. 13 & Norwegian Ornithological Society, NOF Rapportserie Report 9*: pp 27–28.
- Tolvanen, P., Aarvak, T. & Bragina, T.** 2001. Conservation work for the wetlands and monitoring the autumn staging of Lesser White-fronted Goose in the Kustany region, north-west Kazakhstan, in 2000. In: Tolvanen, P., Øien, I.J. & Ruokolainen, K. (eds.). 2001. Fennoscandian Lesser White-fronted Goose conservation project. Annual report 2000. *WWF Finland Report No. 13 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-2001*: pp 30–31.
- Tolvanen, P., Toming, M. & Pynnönen, J.** 2004a. Monitoring of Lesser White-fronted Geese in western Estonia 2001–2003. In: Aarvak, T. & Timonen, S. (eds.). 2004. Fennoscandian Lesser White-fronted Goose conservation project. Report 2001–2003. *WWF Finland Report No. 20 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-2004*: pp 9–13.
- Tolvanen, P., Karvonen, R., Pynnönen, P. & Leito, A.** 2000. Monitoring of Lesser White-fronted Geese in western Estonia in 1999. In: Tolvanen P., Øien, I.J. & Ruokolainen, K. (eds.). 2000. Fennoscandian Lesser White-fronted Goose conservation project. Annual report 1999. *WWF Finland Report No. 12 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-2000*: pp 18–21.
- Tolvanen, P., Aarvak, T., Øien I.J. & Timonen, S.** 2004b. Introduction. In: Aarvak, T. & Timonen, S. (eds.). 2004. Fennoscandian Lesser White-fronted Goose conservation project. Report 2001–2003. *WWF Finland Report No. 20 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-2004*: pp 14–18.
- UNEP World Conservation Monitoring Centre (WCMC).** 2003. *Report on the status and perspective of the Lesser White-fronted Goose Anser erythropus*. UNEP-WCMC, Cambridge, UK.
- Vangeluwe, D.** 2004. The entire European breeding population of Lesser White-fronted Goose wintering in the Evros Delta, Greece? In: Aarvak, T. & Timonen, S. (eds.). 2004. Fennoscandian Lesser White-fronted Goose conservation project. Report 2001–2003. *WWF Finland Report No. 20 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-2004*: pp 14–18.
- Vangeluwe, D.** 2005. The Drana marshes (Evros Delta, Greece), a question of survival for the European population of *Anser erythropus*. With data on the occurrence and ecology of the Red-breasted Goose *Branta ruficollis*. Unpublished report for the project “LIFE 00 NAT/GR/7198 “Restoration and conservation management of Drana lagoon in Evros Delta”.
- Väisänen, R.A & Lehtiniemi, T.** 2004. Bird population estimates and trends for Finland. In BirdLife International: *Birds in Europe: population estimates, trends and conservation status* (BirdLife Conservation Series No. 12). Wageningen, the Netherlands.
- Vasiliev, V.I., Gauzer, M.E., Rustamov, E.A., Belousova, A.V.** 2006. The Lesser White-fronted Goose *Anser erythropus* in the south-east Caspian region of Turkmenistan. *Waterbirds around the world / A global overview of the conservation, management and research of the world's waterbird flyways*. Edinburgh, UK: The Stationery Office. pp. 629–632.
- Yerokhov, S.N.** 2004. New spring observations of Lesser White-fronted Geese migrating across south and south-east regions of Kazakhstan. In: Aarvak, T. & Timonen, S. (eds.). 2004. Fennoscandian Lesser White-fronted Goose conservation project. Report 2001–2003. *WWF Finland Report No. 20 & Norwegian Ornithological Society, NOF Rapportserie Report No. 1-2004*: p 53.
- Yerokhov S.N., Beryozovikov N.N., Kellomaki E.N. & Ripatti N.L.** 2000. Lesser White-fronted Goose and other geese species in Kazakhstan during migration. *CASARCA 6. Bulletin of the goose and swan study group of Eastern Europe and North Asia*, pp 123–159 (in Russian).
- Yerokhov, S.N., Beryozovikov, N.N., Kellomaki, E.N. & Ripati, N.L.** 2001. The Lesser White-fronted Goose in Kazakhstan: numbers, locations and main features of its ecology in seasonal migration periods. In: Patterson, I. (ed.) 2001. *GOOSE2001*, 6th Annual Meeting of the Goose Specialist Group of Wetlands

International, Roosta, Estonia, 27 April–2 May 2001. Proceedings; Abstracts of Papers and Posters. *Wetlands International Goose Specialist Group Bulletin No.9, Supplement 2001*.

Yerokhov, S.N., Kellomaki E.N., Beryozovikov N.N. & Ripatti N.L. 2005. Main results of the autumn monitoring of Lesser White-fronted Geese and other geese number on the Kustanay Region, Kazakhstan in 2002-2004. *CASARCA 10*. Bulletin of the goose and swan study group of Eastern Europe and North Asia, pp 280-283 (in Russian).

9. ANNEXES

Annex 1	Additional biological information.....	II
Annex 2	Listing by Range State of the most recent data available concerning Status, numbers and trends of Lesser White-fronted Goose.....	VI
Annex 3a	List of Important Bird Areas (IBAs) of significance for Lesser White-fronted Goose.....	XXIII
Annex 3b	List of additional sites of possible significance for Lesser White-fronted Goose, as identified by reviewers of the first draft of this Action Plan.	XXVII
Annex 4	Level of available knowledge from principal Range States on habitat use, diet and occurrence of Lesser White-fronted Goose in Important Bird Areas and Protected Areas.....	XXX
Annex 5	Protection of Lesser White-fronted Goose under national legislation by Range State	XXXII
Annex 6	Site (and habitat) protection for Lesser White-fronted Goose in Principal Range States	XXXVI
Annex 7	Research and conservation efforts for Lesser White-fronted Goose over the last ten years	XXXIX
Annex 8	Details of provisions on principal international legal instruments relevant to the conservation of Lesser White-fronted Goose	XLII
Annex 9a	Conclusions of the CMS Scientific Council, November 2005.	XLIX
Annex 9b	Additional independent comments by Dr Robert C. Lacy, November 2005. ...	L
Annex 10	Final Report of the AEWA Secretariat's negotiation mission in January 2007.....	LV

Annex 1

Additional biological information

Survival and productivity	Life cycle	Habitat requirements
<p>Almost half of the 15 wild Fennoscandian geese tagged or ringed in Finland/Norway in 1995 and 1996 were shot or probably shot (Markkola, 2005; Aarvak et al. 1997). The major known causes of death of released captive-bred birds 1980-1998 were shooting and predation (by mink, Goshawk <i>Accipiter gentilis</i>, Golden Eagle <i>Aquila chrysaetos</i>, White-tailed Eagle <i>Haliaeetus albicilla</i>, fox and dogs). Collision with power lines was also recorded (Markkola, 2005).</p> <p>An analysis by Lampila (2001), underlined that adult mortality and changes in the rate of adult mortality are key factors determining population trends for Lesser White-fronted Goose.</p> <p>Mean brood size observed at Valdak Marshes (first autumn staging site for the Fennoscandian population) between 1994 and 2000 was 3.2 juveniles (Aarvak & Øien, 2001).</p>	<p><u>Breeding</u></p> <p>Generally arrives on breeding grounds from early May to late June and departs between mid-August and September (Madsen 1996). Breeding behaviour and pre-nesting activity little studied (Fox 2005). Single brood, clutch size 4-6 (exceptionally 1-8), incubation by female for 25-28 days in the wild, starting mostly during early June. Pairs form in 2nd or 3rd year. (Fox 2005).</p> <p><u>Moult</u></p> <p>Non-breeding Fennoscandian and Russian birds undertake moult migration, while breeding birds moult on the breeding grounds. Syroechovskiy (1996) found that breeding birds in Taimyr moulted during the first week of August, while non-breeding birds moulted during the last 10 days of July. In the Polar Urals and Yamal Peninsula (Western Siberia) breeding birds moult on the breeding grounds from mid-July until the first 10 days of August (V. Morozov, pers. comm.)</p> <p>In 1997 a satellite-tracked bird of the Fennoscandian population left the breeding grounds in the first half of July and arrived on</p>	<p><u>Breeding</u></p> <p>Breeds in the forest tundra and southern tundra belts of northern Eurasia, with a preference for bush tundra interspersed with bogs and lakes (UNEP/WCMC 2003). Breeding habitat requirements are different in different parts of the distribution range.</p> <p>A wetland system on the mountain plateau of Finnmark (northern Norway) constitutes the core known breeding area for the species in Fennoscandia (Øien et al. 2001). A field survey of part of the Kola Peninsula, north-westernmost Russia, in June 2001 found small numbers of Lesser White-fronts in an area of mainly treeless tundra with many lakes, ponds, rivers and streams and no permanent human settlement (Timonen & Tolvanen 2004).</p> <p>In the basins of the Velt and Neruta rivers, in the Malozemel'skaya Tundra region of Arctic northern Russia, nest sites were located on river banks with herb vegetation, mosses, willow (<i>Salix</i>) shrubs and dwarf birch (<i>Betula nana</i>) sometimes with large mounds and sand-clay outcrops. The river bottom was usually stony, often with a wide, sandy</p>

	<p>Kolguev Island, north-west Russia in mid-July, where it remained for about one month, presumably to moult. Of two other individuals in this study that undertook moult migration, one went as far as the Taimyr Peninsula in Russia. (Aarvak & Øien 2003).</p> <p><u>Staging</u></p> <p>Autumn migration is more protracted than spring migration. Birds may remain at autumn staging sites into early winter in mild seasons. Spring migration typically appears to last from the second half of February until the end of May, but there are again significant annual variations related to weather conditions.</p> <p><u>Wintering</u></p> <p>Satellite tracking and field observations suggest that birds typically reach their wintering grounds in the second half of November, remaining into late February or the first half of March, according to prevailing weather conditions.</p>	<p>shallow on the opposite bank giving way to wet grassland and willow shrubs (Mineev & Mineev, 2004). In the Polar Urals and Yamal Peninsula nests were located on rocky river cliffs and in dwarf birch tundra on watershed slopes close to rivers, and sometimes in mountain foothills. (V. Morozov, pers. comm.)</p> <p>In Siberia, nests are usually sited amongst vegetation, grass or dwarf shrub heath, often on snowfree patches available early in the season, such as rock outcrop or prominent hummock; often in proximity to open water or extensive marshy area (Dementiev & Gladkov 1952, reported by Fox 2005).</p> <p><u>Moulting</u></p> <p>In August 2000, a brief field survey was conducted of the area of Kolguev Island, north-west Russia, used in 1997 by a presumably moulting satellite-tracked goose of the Fennoscandian population. The area was characterised by low-lying, flat tundra, dissected by ponds and small river valleys with slow-flowing streams. Vegetation was dominated by shrub (dwarf birch <i>Betula</i> and willows <i>Salix</i>) and tussock tundra with palsa mires (Strøm et al. 2001). According to studies in the Bolshezemelskaya tundra and Yamal Peninsula, moulting areas occur on riverine areas with floodplain meadows and dense bushes/shrubs (Morozov, 1999).</p>
--	---	--

		<p><u>Staging</u></p> <p>The Valdak Marshes in northern Norway, which constitute the most important known staging area for the Fennoscandian population, consist of extensive salt and brackish marshes (Aarvak & Øien 2001). In the Varangerfjord area, the other known staging site in northern Norway, the favoured feeding habitat is low-growth coastal meadow (Tolvanen et al. 1998). Coastal meadows are also used in Lithuania, (Nemunas Delta), Estonia (especially Matsalu) and Finland (Bothnian Bay). Research in the latter area showed that 90% of the diet was composed of grasses and that <i>Phragmites australis</i> and <i>Festuca rubra</i> were preferred. The species also selected large, natural meadows. Continued mowing and grazing of these meadows therefore benefits conservation of the species (Markkola et al. 2003).</p> <p>Staging birds in Hortobágy, Hungary, between 1996 and 2000, were found to use mainly short, grazed grassland and stubble of wheat and maize fields (Tar 2001). Fishponds are used by these birds for roosting (Tar 2004).</p> <p>The major autumn staging grounds in the Kustanay region of north-west Kazakhstan include freshwater lakes and other wetlands and surrounding grasslands. Lake Kulykol is the most important known roosting lake (e.g. Yerokhov et al. 2000; Tolvanen et al. 2004). During periods</p>
--	--	--

		<p>when key lakes such as Kulykol have little or no fresh water, migrating Lesser White-fronts are concentrated on small freshwater reservoirs (e.g. Batpackol), with fringing reed marshes and surrounding grain and vegetable cultivation. In some autumns (e.g. 2003) significant numbers of Lesser White-fronts stop on the saline lake Khack, northern Kazakhstan, which has extensive, shallow aquatic zones (S. Yerokhov, pers comm).</p> <p>Autumn staging areas on the north-west Black Sea coast of Ukraine include freshwater, salt and brackish lakes and other wetlands and surrounding grasslands and winter wheat fields. Shagani, Alibay and Burnas lakes, in the Dniester delta, form the most important known roosting area (e.g. Rusev et al. 2002).</p> <p><u>Wintering</u></p> <p>The wintering grounds are only partially known, but include shallow bays, lakes and wetland complexes (freshwater, brackish water and saltwater wetland types) and surrounding cultivated land and semi-natural grassland in Azerbaijan, Bulgaria, Greece, Iran, Iraq Romania, Syria, Turkmenistan, Ukraine, Uzbekistan.</p>
--	--	---

Annex 2

Listing by Range State of the most recent data available concerning status, numbers and trends of Lesser White-fronted Goose

(source: see References column)

Range State	Breeding Season				Passage and Wintering				Baseline Population ³	References
	No. of breeding pairs	Quality ¹	Year(s) of Estimate	Trend ²	Quality ¹	No. of individuals staging (S) or wintering (W)	Year(s) of Estimate	Trend ²	Quality ¹	
Armenia	0	GO	1987-2005	N/A	N/A	1-26	1995	N/A	N/A	1
Azerbaijan										
Bulgaria						10 -120	1998-2005	F	GE	Petkov, Oien, Aarvak, 1999; National Ornithological database BSPB/BirdLife Bulgaria, N. Petkov, pers. comm.
Estonia						50 (S)	1998-2004	-1	GO	Baseline population of birds estimated in the middle of 1960s (Onno, 1965)
Finland	0-5	GE	2008	0	GE	10 (S)	2008	-2	GO	Finnish National Action Plan for the Lesser White-fronted Goose, 2008, final draft submitted to Ministry of Environment for adoption
Germany						20-50	1990-2005	±	±	Mooij 2000, Mooij & Heinicke 2005
Georgia										
Greece						(39)38-54(71)	1999-2008	0	GO	Kazantzidis & Nazirides 1999, Lorentsen 1999, Vangeluwe 2005, LIFE-Naure project unpublished data
Hungary						40-60 (S)	2000-2004	1	GE	Tar 2001, Tar 2004
Iran, Islamic Republic of										
Iraq										
Kazakhstan						6910	1999	0	GE	Yerokhov et al, 2000
Lithuania										
Netherlands ⁴										
Norway	20-30	GE	2005	-1	GE					Aarvak & Øien in Fennoscandian

Range State	Breeding Season					Passage and Wintering				Baseline Population ³	References
	No. of breeding pairs	Quality ¹	Year(s) of Estimate	Trend ²	Quality ¹	No. of individuals staging (S) or wintering (W)	Quality ¹	Year(s) of Estimate	Trend ²	Quality ¹	
Poland			2005				GO	2005-2007	0	?	Cons. Proj. report 2001-2003 + I.J. Øien and T. Aarvak pers comm. 2005
Romania											Polish Avifaunistic Commission (Tadeusz Stawarczyk)
Russian Federation Note: data for Western main population only	3000	ME	2004	F	ME	8000-11000	MI	2000-2004	F	ME	Morozov, Syroechkovski, 2002; Morozov, Syroechkovski, in press)
Sweden ⁴	15	GO	2007	+1	GO	80-100 (S)	GO	2007	+1	GO	A. Andersson 2008, von Essen 1996
Syrian Arab Republic						8-62?	P	2007	?		Kullberg 2007
Turkey											
Turkmenistan						115-330 (W)	GO	1980-2003	?	?	Vasiliev <i>et al.</i> 2006
Ukraine						2000-5000	ME	1994-2004	F		Rusev <i>et al.</i> 2002; Rusev 2004. Andryushenko Yu.A. <i>et al.</i> Distribution and number of bird species wintering in the coastal areas of Lake Syvash and the Azov-Black Sea coast of Ukraine. pp3-13

Notes to Table:

Quality: GO = Good (Observed)
GE = Good (Estimated)
ME = Medium (Estimated)
MI = Medium (Inferred)
P = Poor/suspected
U = Unknown

based on reliable or representative quantitative data derived from complete counts or comprehensive measurements.
based on reliable or representative quantitative data derived from sampling or interpolation.
based on incomplete quantitative data derived from sampling or interpolation.
based on incomplete quantitative data derived from indirect evidence.
not based on quantitative data, but reflects 'best guess' derived from circumstantial evidence.
no information on quality available.

² **Trend** in the last 10 years: **+2** Large increase of at least 50%; **+1** Small increase of 20-49%; **0** Stable, with overall change less than 20%; **-1** Small decrease of 20-49%; **-2** Large decrease of at least 50%; and **F** Fluctuating with changes of at least 20%, but no clear trend.

³ **Baseline population**: earliest population figure available for breeding or non-breeding populations.

⁴ **Supplemented/Reintroduced birds**.

Supporting information to use in conjunction with the table

The following is a summary of the most up-to-date information available on the status and trends of Lesser White-fronted Goose in each country, divided into Principal Range States (i.e. those countries that are known regularly to support breeding, moulting, staging or wintering Lesser White-fronted Geese) and other countries of the AEWa Agreement Area and European Union (i.e. where the species is currently a rare visitor or vagrant).

(a) Principal Range States

Azerbaijan

Vernacular name: Ahgash gaz

UNEP/WCMC 2004 summarised the species status as: “A winter visitor recorded from the coast, Kizil Agach and the Kura River lowlands (Lorentsen *et al.*, 1999; Shelton, 2001). A total of 1,085 individuals were counted in a survey conducted in 1996 and it was suggested that the wintering population varied between 1,500 and 7,000 (Aarvak *et al.*, 1996; Paynter, 1996). About 25,000 birds were reported in 1978, 1980 and 1982/83 but the numbers steadily declined in subsequent winters (Morozov and Poyarkov, 1997; Tkachenko, 1997)”.

The species' present status is unclear, owing to a lack of systematic count data. However, it seems likely that the country may remain an important wintering site for the Western main population, given that in March 2001 large staging flocks were found in the Kyzyl Agach area (565 birds) and in the Ag-Gel Zapovednik (1,800 - 2,000 birds). In both cases the Lesser White-fronts were observed in mixed flocks with Greater White-fronted and Greylag Goose feeding on meadow vegetation. A calling bird was heard at Lake Shorgel and 6 individuals were seen at Divichi Lima, indicating that these areas may also be important sites for that species (Heinicke & Ryslavý 2002).

A satellite-tagged bird of the Western main subpopulation, ringed in the Polar Ural region of northern Russia in August 2004, staged in Azerbaijan for several days in November 2004 before continuing its migration, via eastern Turkey, to winter in Iraq. (source: [www.piskulka.net/Satellite tracking.htm](http://www.piskulka.net/Satellite%20tracking.htm))

Bulgaria (EU)

Vernacular name: Malka belochela gaska

A 1996 survey estimated the total number of Lesser White-fronts in Bulgaria as 30-40 (Aarvak *et al.* 1996), whereas Petkov *et al.* (1999) estimated a total of 100 birds.

Lesser White-fronts occur regularly in small numbers at traditional goose staging and wintering sites on the Black Sea coast, notably at Lake Shabla and Lake Durankulak, both of which are Ramsar Sites and Important Bird Areas. However, recent count data are inadequate for these sites to qualify as IBAs for Lesser White-fronted Goose (S. Nagy/BirdLife International, pers comm), hence they are not listed in Annex 3. The last adequate count was conducted in 1998 by a BirdLife Bulgaria/BirdLife Norway team, which estimated some 100 birds present in the area of Shabla and Durankulak Lakes. In recent years there has been no targeted count or research for this species. Goose counts are made only during the morning when the birds leave roosting sites and this does not allow identification of LWfG among the tens of thousands Greater White-fronts. However, casual birdwatchers regularly report the species (e.g. in February/March 2005, some 3 to 5 birds were identified in a flock of 1,200 Greater White-fronts at Durankulak Lake), suggesting that over 100 may occur when flocks

of over 50-60 000 Greater White-fronts occur in the Shabla/Durankulak region (N. Petkov, pers.comm).

Lake Srebarna in the Danube floodplain is an important autumn staging site for Greater White-fronted Goose, but small numbers of Lessers probably occur regularly among them. In 2003, three Lesser White-fronted Geese were found dead at Srebarna among 123 dead Greater White-fronted Geese; it is thought the birds had been poisoned by rodenticides, either in Bulgaria or neighbouring Romania. Other potentially important sites include Mandra-Poda, Lake Burgas and Lake Atanasovo – all close to the southern coastal city of Burgas and all Ramsar sites and listed by BirdLife International as Important Bird Areas. Up to 120,000 Greater White-fronted Geese occur in this area in winter (though such high numbers are exceptional) and there are occasional records of Lessers, though the difficulties of close observation mean that many could be missed. Small numbers of Lessers have been recorded among Greater White-fronted Geese in Pyasachnik Reservoir (an IBA) located in the Maritza floodplain (Evros in Greek). This site might be a staging area for birds of the Fennoscandian subpopulation wintering in the Evros delta; observations were made during the migration period. (S. Dereliev pers comm).

Estonia (EU)

Vernacular name: Väike-laukhani (Estonian)

Before the 20th century crash of the Fennoscandian population, a major migration route passed through north-western Estonia. The species used to be a regular passage migrant until the 1970s. However, during the period 1970-1984 there were no verified observations. Since 1985, small numbers, including some birds from the supplemented/reintroduced Swedish population, have again been recorded and for a time it was presumed that all these birds derived from the Swedish supplementation/reintroduction programme. However, since 1996 it has become clear that the Matsalu Bay region of western Estonia remains an important spring staging area for the wild Fennoscandian population and it is thought that small numbers also occur regularly in autumn, though more information is needed for the autumn period (Tolvanen *et al.* 2004). Most recently, in late September and early October 2005, two or three Lesser White-fronted Geese were seen in coastal meadows at Haeska, Ridala, while up to 14 were seen together at the same site during spring migration in May 2005 (reported by multiple observers on <http://www.piskulka.net/>).

Finland (EU)

Vernacular names: Kiljuhanhi (Finnish); Gilljobás (Lappish/Sami)

WCMC/UNEP 2004 states: “No breeding of wild Fennoscandian birds has been confirmed since 1995, and the current breeding population is estimated at 0 – 5 pairs (Pääläinen and Timonen, 2000; Øien *et al.*, 2001). However, single birds have been observed in the former breeding areas almost annually. A restocking programme was under way between 1989 and 1998. More than 150 geese were released in northern Finland (von Essen *et al.*, 1996; Tolvanen *et al.*; 1997; Markkola *et al.*; 1999; Kellomäki and Kahanpää, 2003). Due to the danger of interbreeding between the introduced stock and the genetically distinct wild population, the Finnish Ministry for the Environment and the Finnish Lesser White-fronted Goose Project, led by WWF Finland, decided to stop the restocking programme in 1998 (Tolvanen *et al.*, 2000c; Tegelström *et al.*, 2001).”

The Bothnian Bay coast, close to Oulu, is recognised as an important spring staging area, though a decline of 65% was recorded between 2000 and 2003 was recorded, possibly reflecting changing migration routes as well as a further decrease in the overall wild Fennoscandian population (Markkola & Luukkonen 2004).

Germany (EU)

Vernacular name: Zwerggans

The species regularly passes through Germany in small numbers. Since 1990, 30-100 observations of Lesser White-fronted Geese have been reported annually. The great majority of birds were observed in the northern part of Germany. Important sites are listed in Section 4.4. Birds of the wild Fennoscandian population tagged with satellite transmitters have been recorded in Mecklenburg-Western Pomerania and Brandenburg during autumn migration (Lorentsen *et al.* 1998, Aarvak & Øien 2003). At most German sites, Lesser White-fronted Geese are observed in the company of Greater White-fronted Geese *Anser albifrons* and are thought most likely to belong to one of the wild populations. Data indicate that birds from more than one subpopulation migrate through Germany, with some individuals of the Western main population also wintering, especially in Brandenburg, Saxony, Saxony-Anhalt and North Rhine-Westphalia (Mooij & Heinicke in prep.). Birds from the Swedish supplementation/reintroduction programme, typically associating with Barnacle Geese, have been recorded increasingly frequently in Lower Saxony and Schleswig-Holstein (a total of 29 individuals was recorded in mid-November 1999; van den Bergh 2000), and there is a handful records for Brandenburg and Mecklenburg-Western Pomerania. There is one record of a bird from the Finnish reintroduction project in Mecklenburg-Western Pomerania (Mooij & Heinicke in prep.).

Under the title of ‘Operation Lesser White-fronted Goose’ (*Aktion Zwerggans*) a programme is currently being developed to lead supplemented/reintroduced birds, using microlight aircraft, from a former breeding site in Swedish Lapland to a traditional wintering area in the Lower Rhine area of North Rhine-Westphalia.

The species is fully protected in Germany but Greater White-fronted Geese are still hunted in places and both species occur in mixed groups (Lorentsen *et al.*, 1998).

Greece (EU)

Vernacular name: Nanochina (transliteration)

The Lesser White-fronted Geese arrive in Greece by late October to early November and depart by early to mid March. Lake Kerkini, Lake Ismarida (also known as Lake Mitrikou) and the Evros Delta (all listed as Special Protection Areas, Ramsar Sites and Important Bird Areas) are key staging and wintering sites for the Fennoscandian population. Nestos Delta (also listed as Special Protection Area, Ramsar Site and Important Bird Area) is also a wintering site with less regular sightings. Though 1,630 birds were counted in the Evros Delta in 1963 (Handrinos 1991), numbers are now far lower. Between 1980 and 1990 counts varied between 30 and 150 individuals (Aarvak *et al.*, 1996, 1997), while a maximum of 71 individuals (for Lake Kerkini, Lake Ismarida and the Evros Delta combined) was recorded in the winter of 1998/1999 (Lorentsen *et al.* 1999). More recently, a maximum of 52 Lesser White-fronted Geese were seen at Lake Kerkini in November 2005 (T. Naziridis/LIFE-Nature project, reported on <http://www.piskulka.net/>).

52 Lesser White-fronted Geese were recorded using the salt marshes around the Drana Lagoon in the Evros Delta of north-east Greece, in early January 2004. One of these birds had been colour-ringed in northern Norway in May 2004 (Vangeluwe, 2004). This indication that the Evros Delta is a key wintering area for the wild Fennoscandian population was confirmed when eight Lesser White-fronts ringed at the Valdak Marshes (Norway) were seen in the Evros Delta in January 2005 (D. Vangeluwe per T. Aarvak, pers. comm.). Between November 2005 and January 2006, up to 40 Lesser White-fronts were seen in the same area of the Evros Delta as in 2005. At least five of these birds carried colour rings (Y. Tsougrakis

& D. Vangeluwe/ LIFE-Nature Project, reported on <http://www.pikulka.net/>). During the winters of 2006/2007 and 2007/2008 a satellite-tagged and colour-ringed pair was observed at Lake Kerkini and Evros Delta. In total 14 colour-ringed individuals from the Fennoscandian population have been observed at Lake Kerkini and Evros Delta between 1995 and 2008 (T. Aaravak, pers. comm.). In early March 2008 54 individuals were recorded in Evros Delta (E. Makriyanni/LIFE-Nature project, reported on <http://www.piskulka.net/>).

Hungary (EU)

Vernacular name: Kis lilik

Although counts are far lower than the tens of thousands of birds recorded before the 20th century crash of the Fennoscandian population, Hungary – notably Hortobágy National Park – continues to support significant numbers of staging Lesser White-fronted Geese. In autumn, the first birds arrive at Hortobágy fishponds in the first half of September and numbers usually peak in the second half of October, after which there tends to be a slow decrease, with Lesser White-fronts dispersing with flocks of White-fronted Geese *Anser albifrons*. Most have generally left for their wintering grounds by mid-November, but departure may be delayed in mild seasons and a few individuals occasionally over-winter successfully, as was the case in the winter of 2000/2001, when four colour-ringed individuals, first observed in September 2000, were still present on 24 January 2001. The highest autumn counts for the years 2001 and 2002 were 59 and 49 respectively. Similar numbers occur during spring migration, typically from mid-February to the second half of March. In 2001 and 2002 the peak spring counts were 32 and 54 individuals (Tar 2004). However, unlike in Estonia, Finland and Norway, birds have not been recorded and identified individually in Hungary, and annual numbers of individuals are based mostly on the largest direct simultaneous counts from one site. This suggests that the total number of individuals occurring each year in Hungary may well be higher than the above figures indicate.

Iran, Islamic Republic of

Vernacular name: Ghaze pishani sepide Kuchak

WCMC/UNEP 2004 states: “In the early 1970s, between 4,500 and 7,500 birds wintered in Iran, mainly in Miankaleh protected region, but these disappeared suddenly in the late 1970s and, since then, only small flocks have been observed in the country (Scott and Rose, 1996). Regular large flooding events in the area, due to the rising of the water level in the Caspian Sea, as well as hardening winters, may be leading to a redistribution of the wintering population in this country and Azerbaijan (Lorentsen *et al.*, 1999).”

The Iranian portion of the Mesopotamian marshes (see Iraq) is also a potentially important wintering area, but there is no direct evidence to support this.

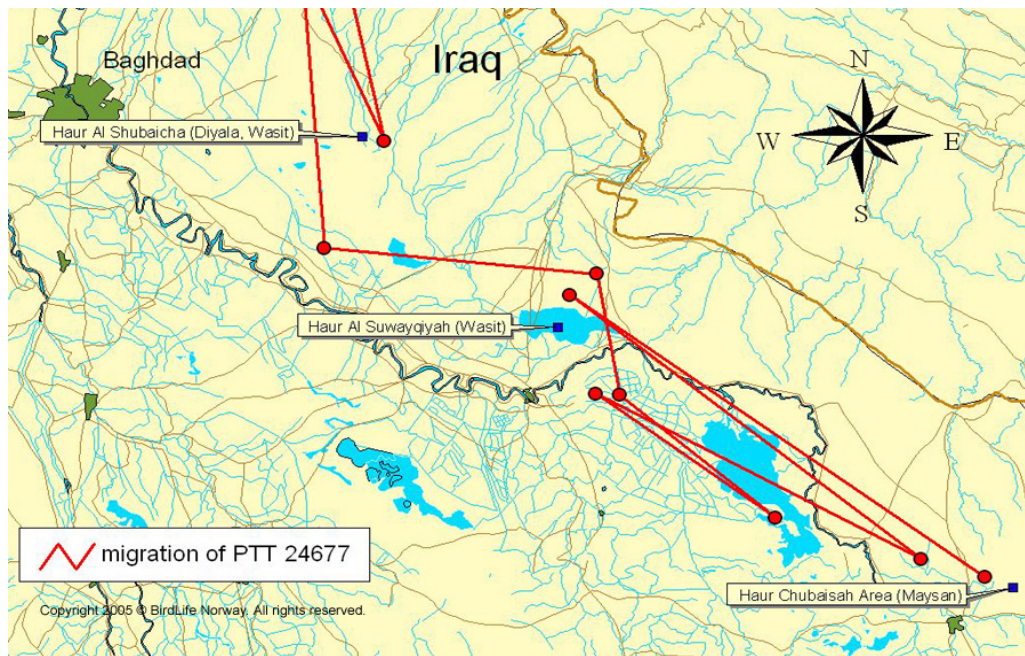
Iraq

Vernacular name: [information missing]

Evans 1994 records the species as formerly widespread and numerous, but currently the species is only present in small numbers.

A satellite-tagged bird of the Western main subpopulation, ringed in the Polar Ural region of northern Russia in August 2004, was tracked to Iraq during the winter of 2004/2005, providing the first proof of recent years that the species continues to winter in Iraq and the first detailed evidence of the sites used. The bird stayed in the country from at least 24 November until the last transmission from Iraq on 15 March. Spring migration began

sometime soon after this date, as the next transmission, on 26 March, was from Dagestan, in southernmost Russia. During its stay of almost four months in Iraq the bird was recorded primarily from the lakes/wetlands and lowlands of the Tigris river basin (see Map 2).



Map 2. Locations of satellite-tracked Lesser White-fronted Goose in Iraq, November 2004 to March 2005. The three locations marked Haur Al Shubaicha, Haur Al Suwayqiyah and Haur Chubaisah are all listed by BirdLife International as Important Bird Areas, refs. IQ017, IQ020 and IQ030, respectively. This map was last updated on 10 March; by 15 March the bird had returned to Haur Al Suwayqiyah, the location of the last data transmission from Iraq. Source: World BirdWatch magazine, ©BirdLife International. See also: [www.piskulka.net/Satellite tracking.htm](http://www.piskulka.net/Satellite%20tracking.htm)

Kazakhstan

Vernacular name: Shikyldak kaz

The lakes and agricultural land of the Kustanay region of north-west Kazakhstan are known as a major staging area for Lesser White-fronted Geese, in both spring and autumn. During the period 1997-2000, spring migration in this region lasted for 35-45 days and usually occurred in the second half of April and May. Autumn migration was more protracted, lasting 70-75 days between late August/early September and the beginning of November. Birds roost on lakes and disperse over cultivated land during the day to feed. (Yerokhov et al. 2001). Lake Kulykol is the most important roosting lake during autumn migration. About 5,000 individuals were estimated (based on sample counts over five days) in the area in late September/early October 2002. During the period 1996-2000, the highest estimates, based on random sampling of the staging goose flocks, were c. 8,000 – 12,000 individuals (Tolvanen & Pynnönen 1997, Tolvanen & al. 1999). The highest direct count was 1,050 individuals. Significantly lower numbers were observed in autumn 2003, most likely reflecting the very low water level in the lake that year. Smaller, but still remarkable numbers (c. 1,000 individuals) were counted in the Kurgaldzhino–Tengiz area in the autumn of 1998 (Tolvanen & al. 1999). Colour-marked individuals ringed in northern Norway and northern Russia were recorded at Kulykol in autumn 2002 and autumn 2003, respectively, showing that birds from both the Fennoscandian and Western main subpopulations occur in Kazakhstan (Aarvak et al.

2004a). This has also been confirmed by satellite telemetry (Lorentsen et al 1998; Øien et al 1999; Karvonen & Markkola 1997). There is also a staging area further east in Kazakhstan: the lake areas surrounding the huge lake Tengiz, as indicated by the movements of a Lesser White-front satellite tagged in the Taymyr peninsula in 1998 (Øien et. al. 1999).

Three individuals were recorded in south-east Kazakhstan (about 100km west of Almaty) in March 2003, indicating possible spring staging in this region of birds arriving from wintering areas further south (Yerokhov 2004), though it appears unclear which breeding population was involved.

The species is included in the national Red Data Book and legally protected.

Lithuania (EU)

Vernacular name: Mažoji žąsis

There is a lack of information on the species' status, but it can be assumed that birds of the Fennoscandian population pass through Lithuania regularly during both spring and autumn migration. Flocks of up to 800 birds were recorded from the Nemunas Delta and Kurshiu Lagoon prior to the 1960s. Subsequently, only very small numbers were recorded, until 1995, when up to 230 staging birds were observed in the Nemunas Delta and small flocks were also recorded at coastal sites in the autumns of 1996 and 1997 (Stoncius and Markkola 2000).

In July 2000, Lesser White-fronted Goose was included in category 4 of the Lithuanian Red Data Book. Lack of information concerning the species' occurrence in Lithuania precluded its inclusion in a higher category. In July 2005 the species was deleted from the list of the Red Data Book.

Netherlands (EU)

Vernacular name: Dwerggans

Lesser White-fronted Geese were always rare in the Netherlands. In 1981 a supplementation/reintroduction project was set up in Swedish Lapland to guide the geese via a comparatively safer route to the North Sea countries (to the Netherlands). Nowadays every winter some 80-100 birds are seen in the Netherlands.

Birds have been recorded regularly from sites in Friesland, Noord-Holland, Zuid-Holland and Zeeland (e.g. van Roomen et al 2003).

The SOVON report 2005/06 (Koffijberg *et al.* 2005) describes an increase from ca 20 individuals around 1990 to ca 120 from 2003/04 onwards. Average peak numbers vary from 50 individuals near Anjum to 5 elsewhere. 87% of all observations of Lesser White-fronts took place at 6 core sites. The majority of birds sighted are of Swedish origin. Koffijberg *et al.* (2005) estimated that 96% of the supplemented/reintroduced Swedish birds winter in the Netherlands. Two breeding attempts are recorded, possibly of birds with feral origin.

Norway

Vernacular name: Dverggås (Norwegian); Gilljobás (Lappish/Sami)

The current estimate for the Fennoscandian population (excluding the Kola Peninsula) is 20-30 pairs (Tolvanen et al. 2004b). The breeding areas of these birds are not known at present, and some these birds may breed in Finnish and/or Swedish Lapland. Northern Norway also has a key spring and autumn staging area for Lesser White-fronted Goose, namely the Valdak Marshes (e.g. Aarvak & Øien 2004). Other important Norwegian sites include the Varangarfjord area, the Tana River valley and Høyholmen. Statistical analysis of data from

monitoring in the Valdaak Marshes indicate that numbers of geese utilising the area in spring decreased by between 3% and 4% annually from 1993 to 2003. The estimated overall decrease since monitoring began in 1990, up to and including 2003, was 36% (Aarvak & Øien 2004), showing the precarious situation of the population.

Birds from the Swedish restocked population are regularly observed in Nordland county, where wild Fennoscandian White-fronts used to breed.

The maximum count at the Valdaak Marshes during the spring migration of 2005 was 29 birds. During autumn migration a total of 32 Lesser White-fronts staged at the site, of which 16 were juveniles. This confirms that breeding success in 2005 was relatively poor (BirdLife Norway/Norwegian Lesser White-fronted Goose Project, reported on <http://www.piskula.net/>).

Poland (EU)

Scarce migrant and winter visitor, possibly less frequent recently (Tomialojc, 1990). As part of the flyway of the migrating Fennoscandian population, Poland hosts a few staging Lesser White-fronted Geese. Some of the geese satellite-tagged in 1995 were tracked flying over Poland. One bird tagged in 1997 spent the winter in Poland and eastern Germany (Øien & Aarvak, 2001; Aarvak & Øien 2003), but little additional information is available. The wetland areas and fishponds are likely of higher importance than the areas in eastern Germany. Resources to begin monitoring and survey work have been lacking (T. Aarvak & I.J. Øien, pers. comm.). The Polish Avifaunistic Commission has recorded observations of Lesser White-fronts since 1951, and more regular data is available for the period of 2005 to 2007 (Monika Lesz, pers. comm.). The Odra valley (between Küstrin and Gartz) and the Warthe valley hold important night-time roost sites for geese, including Lesser White-fronts, which feed on German territory during the day (T. Heinicke, pers. comm.).

On 14 January 2006, two wintering Lesser White-fronted Geese were watched at close range near Rus (Biebrza Valley) (T. Kulakowski *per* Y. Tsougrakis/Lesser White-fronted Goose LIFE Project, reported on <http://www.piskulka.net/>). For the years 2005, 2006 and 2007, between 12 and 16 birds have been recorded annually from the six monitoring sites of the Polish Avifaunistic Commission (Monika Lesz/Tadeusz Stawarczyk, pers. comm.).

Romania (EU)

Vernacular name: Gârliia mica

WCMC/UNEP 2004 states: “An unknown number of Lesser White-fronted Geese, associated with Greater White-fronted Geese, annually pass through Romania in the Dobrogea area in the south-east. Confusion with *A. albifrons* is likely. For the same reason, similar records have been deleted in Bulgaria. A survey on 1-2 December 1996 failed to locate any Lesser White-fronted Geese (Aarvak *et al.*, 1997). The birds that pass through are part of the flocks that remain in eastern Bulgaria in the winter, and the percentage of Lesser White-fronted Geese is supposed to be similar to that in Bulgaria. Since Greater White-fronted Geese are intensively hunted it is likely that Lesser White-fronted Geese are also shot annually. It is classified as rare according to the Red List issued by Biosphere Reserve Danube Delta 2000 (Romania country report to CMS, 2002)”

Several experts have indicated that they doubt the 1989 figure of 1,000 quoted above.

Russian Federation

Vernacular name: Piskulka (transliteration from Russian); Gilljobás (Lappish/Sami)

The following section is based on information presented in UNEP/WCMC 2004, updated by V. Morozov in 2005 (pers. comm.)

Aikio et al. (2000) concluded that the status (precise breeding and moulting areas, numbers and trends) of birds nesting on the Kola Peninsula of north-westernmost Russia was unclear and that more detailed research was required. A field expedition to the Lake Enzero area in June 2001 gathered some additional information and the report on this work concludes: "it is still possible that the total Lesser White-fronted Goose breeding population of the whole Kola peninsula could be perhaps some tens of pairs, taking into account the huge area of potentially suitable and mostly intact breeding habitat" (Timonen & Tolvanen 2004). Satellite telemetry and marking programmes and field surveys (Tolvanen 1998) suggest that the Kanin Peninsula may be a key autumn moulting/staging area for the whole Fennoscandian breeding population (Lorentsen *et al.*, 1998)

Within European Russia the population was estimated to be about 500 to 1,000 birds in 1990 (Morozov 1995). A more recent review summarised the population for the European tundra at the same level (Morozov & Syroechkovski, 2002). Low numbers and a declining trend have been noted for the Bolshezemelskaya tundra, though little habitat change has been observed over 15 years (Morozov, 1999). European Russia still holds a viable population of Lesser White-fronted Geese, although the distribution area has contracted, particularly in the Polar Ural region (Morozov, 1999). The most recent data suggest that the Polar Ural population has fluctuated in line with the decreases noted in other parts of the European tundra. Despite a viable breeding population and no obvious changes in the condition of the breeding area the population of European Russia has decreased in size and range (Morozov 2003). Although satellite telemetry has recently tracked one bird to Iraq the wintering grounds of 80% of the Western main population are unknown. Satellite tracking has also reconfirmed the importance of the Samur Delta (Syroechkovskiy 2005). The Taimyr Peninsula is one of the key breeding areas for the Western main population.

Satellite telemetry has shown the Ob river valley to be a key flyway. A network of waterbodies within the Kuma-Manych Basin are used as stopover sites both in spring and autumn, with a maximum of 13,800 birds recorded in 1995 (Bliznyuk, 2000). In the Nizheneye Dvuobye, within Yamalo-Nenets and Khanty-Mansi Autonomous Districts, the birds use the flooded meadows, floodplains and scrub along the Ob River during autumn. Many thousands of individuals have occurred in the east of Chelyabinsk region during autumn migration (Zakharov and Migun, 1997; Gordienko, 2001), while in spring hundreds of birds have been observed with a maximum of 500-800 recorded (Korovin, 1997). Some staging areas are also known from the eastern shores of the Sea of Azov. (Lorentsen *et al.*, 1999; Morozov & Syroechkovski, 2002). Artiukhov (2003) noted that the Lesser White-fronted Goose comprised 0.5% of all geese migrating through the Bryansk Oblast in spring, but there have been no records in autumn since about 1980. Bulgakov and Grishanov (2000) recorded 100 Lesser White-fronted Geese migrating through Kaliningrad in spring 2000. Some individuals were recorded in spring between 1987 and 2002 in the north of European Russia: on the Faustovo floodplain, Moscow Oblast; on Oka river flood-plain in Ryazan' Oblast; at the Rybinsk reservoir in Yaroslavl Oblast; near to St. Petersburg in Leningrad Oblast; in Kargopol District in Arkhangelsk Oblast; and on Olonets fields in the Republic of Karelia (Morozov & Syroechkovski, 2002).

The species is listed in the Russian Red Data Book

Sweden (EU)

Vernacular name: Fjällgås (Swedish); Gilljobás (Lappish/Sami)

Formerly bred in large numbers, but wild population now thought to be extinct and there have been no breeding records during the last 10 years. However, the historical spring flyway was probably from Finland across the Baltic Sea/ Bay of Bothnia and along the Swedish coastline. There were important staging areas at some places along the coast in northern Sweden and the flyways then followed the river valleys into the country's interior and the breeding areas in the mountains (fjällen). There are still occasional observations of Lesser Whitefronts along the northern Swedish coastline and along the rivers of northernmost Sweden, as shown by spring/summer records of five individuals in Norbotten county in 2005. These birds almost certainly originate from the Fennoscandian population and not from the supplemented/reintroduced population, though, as yet, there are no studies to confirm this. The supplemented/reintroduced birds use more southerly flyways in Sweden. The possibility that a few pairs from the wild Fennoscandian population still breed in Sweden cannot be excluded (M. Björkland, pers comm).

Since 1977 a captive-breeding and supplementation/reintroduction programme has resulted in the establishment of a free-flying population in Swedish Lapland. These birds migrate to the Netherlands, following the flyway of Barnacle Goose (*Branta leucopsis*) foster parents. The supplemented/reintroduced population stages on the Swedish coast of the Gulf of Bothnia and at additional inland areas in southern Sweden. Å. Andersson estimates the current size of the supplemented/reintroduced population at 80-100 birds with 15 breeding pairs (Å. Andersson, pers. comm.). No releases of birds into the wild have been made since 1999, following the discovery of introgressed genes of Greater White-fronted Goose (*Anser albifrons*) among the captive stock (Å. Andersson, 2004).

The Swedish Environmental Protection Agency considers that observations of one Lesser White-fronted Goose with four young (1979), and of ten Lesser White-fronts without rings (1982) in Lapland (Å Andersson, unpubl. data) could indicate a possibility that a nesting pair of wild origin had remained before the supplementations/reintroductions started in 1981.

Syrian Arab Republic

Vernacular name: Al-Owaza Alramadeya, or Al-Owaza Al Garaa Al Saghera
الأوزة الرمادية / الأوزة الغراء الصغيرة

Vagrant, with three records up to 1995.

Following the discovery of a Russian satellite-tagged Lesser White-fronted Goose wintering in eastern Syria, an expedition to the region was organised in February 2007 with the aim of visiting and researching three poorly known sites very close to the Iraq border. Unfortunately, the satellite-tagged bird departed for Iraq just prior to the expedition, but many significant findings were made nevertheless. The highlight was the discovery of at least eight, and probably many more, Lesser White-fronts, suggesting that the Syrian Arab Republic may be an important wintering area for the Western main population (http://www.piskulka.net/Satellite_tracking.htm). Further research is required to build on these observations and describe the situation of the species in Syria.

Turkey

Vernacular name: Küçük sakarca

Rare winter visitor, occurring regularly in European Turkey in very small numbers, notably at Saros Körfezi (=‘Saros bay’, recognised by BirdLife International as an Important Bird Area, ref. TR101). It is thought that some birds are overlooked owing to poor ornithological coverage of this part of the country and it is likely that the actual distribution of occurrences is wider than presently known.

A satellite-tagged bird of the Western main subpopulation, ringed in the Polar Ural region of northern Russia in August 2004, staged briefly at Haçlı Lake (an Important Bird Area, ref. TR084) in eastern Turkey in late November 2004 before spending the winter in Iraq. (source: www.piskulka.net/Satellite%20tracking.htm#results).

Other records since 1980 as follows:

- Three birds at Bafa Gölü, Aegean coast (IBA ref. TR021) on 24 December 1986
- Twelve birds at Seyfe Gölü, Inner Anatolia (IBA ref. TR053) on 6 April 1990; it is thought that the species is likely to occur regularly at this site and at the adjacent Tuz Gölü, where tens of thousands of geese winter regularly but there are no regular surveys in place to identify and count them at roost sites
- A single bird at the Büyükçekmece Istanbul (IBA ref. TR003) on 23 January 1993
- Three birds at the Göksu Delta, on the Mediterranean coast (IBA ref. TR073) on 24 January 1993, with two birds present there on 29 December 1997
- On 1 March 1997, a flock of 63 arrived on the Greek side of the Evros Delta from Turkey (Lampila 1998).

Source: BirdLife Turkey, pers. comm.

Turkmenistan

Vernacular name: Kichi sakar gaz

Irregular migrant and wintering bird on the Turkmen Sea Shore. The distribution is irregular with observations fluctuating widely during recent years. Average sightings are 330 individuals sighted in November, and circa 115 individuals sighted in the month of January, the average number of all wintering birds is 165 (Vasiliev *et al.* 2006). Lesser White-fronted Geese have only occasionally and rarely been reported to occur at inland water sources.

From 1975 to 2003 the maximum number of birds counted was 1850 individuals in November 1999, while in 1982 only 2 birds were seen and no observations were made in the years 1976-1978. 1986/7 and 1992-1996. However most wetlands in the country possess suitable habitat hence it cannot be ruled out that the species occurred unreported.

The most important sites are Turmenbashy, Balkan, Mihkailovskiy and Severo-Cheleken Cay holding more than 50% of all winter counts. The lower basin of the Atrek Delta, formerly equally important for Lesser White-fronted Geese, has lost its value due to drainage of the area. Vasiliev *et al.* (2006) provide further information.

Ukraine

Vernacular name: Mala guska

Little has been known about the status of migrating or wintering Lesser White-fronted Geese in Ukraine. Indeed the first recent record was in 1995 (Rusev *et al.* 1996). Between 1998 and

2005, more detailed counts were conducted in the Azov-Black Sea region, with a peak number of 579 birds in winter 1999/2000 in Crimea and 1,000 in winter 2000-2001 in the vicinity of the Ukrainian-Moldovan border around the Dniester delta and Dniestrovsky liman (Rusev, 2004). Between 1998 and 2000, more detailed counts were conducted in Crimea, with a peak number of 579 birds in winter 1999/2000. A survey was planned for the whole Crimean peninsula in January/February 2002, but this period immediately followed a spell of severe weather, with heavy snowfall and temperatures as low as -28°C; consequently only a few Lesser white-fronted Geese were observed. Aarvak et al. 2004b.

Uzbekistan

Vernacular names: Chinqiroc G'oz, Korag'oz

This paragraph based on UNEP/WCMC 2004 has been updated with new information from Elena Kreuzberg-Mukhina (pers. comm.).

Some Lesser White-fronted Geese migrate along the shores of the Aral Sea; Uzbekistan is therefore of importance for migrating/staging birds from the Western main subpopulation. Taking together the southern Aral region and lakes Dengizkul and Aydarkul, the migrating and wintering population has previously been estimated at 200 to 2,000 individuals (Red Data Book of Uzbekistan, 2003). However, recent publications have also documented important wintering sites close to the Afghan and Tajikistan border areas in the provinces of Kashkadarya and Surkhandarya (Kreuzberg-Mukhina & Markkola, 2000; Kreuzberg-Mukhina & Lanovenko, 2003). From assessments made by hunters, numbers of small geese in Surkhandarya were estimated to be approximately 2,000 to 4,000, though there are doubts about the reliability of these statistics because of confusion between Lesser and Greater White-fronts (Kreuzberg-Mukhina & Markkola, 2000). Actual winter counts from Kashkadarya and Surkhandarya have been as follows: 144 birds during the winter of 2001, none in 2002, 63 in 2003 and 30 at lake Karakyr in January 2005, while the overall wintering population is estimated as being between several hundreds and several thousands*, based on responses from local hunting inspectorates and hunters themselves during winter 2004/2005 (E. Kreuzberg-Mukhina pers comm). The species is listed in the 2003 Red Data Book of Uzbekistan as 'Vulnerable, declining' in view of its global status (Kreuzberg-Mukhina 2003).

The expansion of irrigation has led to the creation of artificial wetlands (e.g. water storage reservoirs, waste-water discharge areas), several of which, including lake Karakyr, are of importance for Lesser Whitefronts. On the other hand, it is highly likely that the collapse of the Aral Sea ecosystem, due to massive water diversions for irrigated agriculture, has led to the complete loss and/or severe degradation of former staging and wintering grounds.

(b) Status in other AEW/EU countries

The following is a summary of the information provided in UNEP/WCMC 2004, which should be consulted for references to original sources. In the case of AEW/EU countries not listed in either section (a) or (b) there are no known records of Lesser White-fronted Goose.

Afghanistan

The only information available is for neighbouring regions of Turkmenistan and Uzbekistan (E. Kreuzberg, pers comm).

Albania

Very common in 1940s, but very rare by 1960s. No recent observations.

Armenia

The species was first documented in Armenia in 1987, when a wounded individual was collected by V. Hakobyan and kept at Yerevan Zoo for almost a year. Data supplied in the Handbook of the Birds of Armenia (M.S. Adamian, D. Klem, Jr. 1999), including records of 50 individuals in 1984 and 16 individuals in 1986, are unproven (V. Ananian, N. Margaryan, M. Ghasabyan, pers comm.) The species is a migrant and winter visitor (?), occurring mostly at Lake Sevan and wetlands of the Ararat Plains. Records of this bird were made at Lake Sevan in 1995: 1 bird observed in November and 1 observed in December. There have been no records since 1995 (V. Ananian, N. Margaryan, pers. comm.).

Given that satellite telemetry has recently confirmed autumn staging at sites in eastern Turkey and Azerbaijan, further research might also demonstrate regular migration through Armenia, including at Lake Sevan, where 26 birds were recorded in 1995.

Austria (EU)

Irregular passage migrant with three records 1980–1999, including six birds at roost in the Lake Neusiedl area in early November 1999 (van den Bergh, 2000). On 14 January 2006 six adults were seen among Greater White-fronts, also in the Lake Neusiedl region (Source: Dr. J. Laber *per* P. Tolvanen, reported on <http://www.piskulka.net/>).

Belarus

250 migrants recorded using the Pripyat floodplain in 1995.

Belgium (EU)

Almost annual observations of birds from the Swedish supplementation/reintroduction programme.

Bosnia & Herzegovina

Rare winter visitor.

Croatia

Rare and irregular winter visitor.

Czech Republic (EU)

Rare and irregular stop-over migrant on the lakes of southern Moravia, with wintering records from the same area in late 1950s/early 1960s.

Cyprus (EU)

One recent record (2003) of three birds at one site.

Denmark (EU)

Rare migrant, with 55 individuals recorded between 1950 and 1998; records since the 1980s are most likely of birds from the supplemented/reintroduced Swedish population.

Egypt

Vagrant. Formerly a rare winter visitor, but no recent records.

France (EU)

Rare vagrant.

Georgia

Vagrant or very rare and irregular migrant and/or wintering species occurring in small numbers. Since 1972, 26 records involving a minimum of 102 individuals at 12 sites, mostly lakes in the eastern part of the country. 19 of the 26 records were during January or February. (Abuladze 2004).

Ireland (EU)

Rare vagrant, with just one record.

Israel

Vagrant; four records 1927–1994.

Italy (EU)

Irregular winter visitor and passage migrant.

Jordan

One record of 2–3 birds at one site during winter 1993/1994.

Kuwait

Vagrant.

Latvia (EU)

The species is a rare migrant in Latvia, with single individuals seen on migration. A flock of 90 was observed in September 1958 and, more recently, a flock of 43 was seen on 4 October 1996 (Aarvak et al., 1997).

Macedonia, Former Yugoslav Republic of

Has reportedly occurred in the past, but details lacking.

Moldova

Rare passage migrant recorded from the Lower Prut Laks/Lower Dniester. During the day, geese fly from/back to roost in the Ukrainian Ramsar site Dniestrovsky liman to feeding areas in agricultural fields in Moldova. For example, in winter 2001, 150 birds were seen feeding on Moldovan winter wheat fields (I. Rusev, pers. comm.)

Oman

A single record, involving one bird, for winter 1993/1994.

Serbia & Montenegro

In 1973, reported as a rare winter visitor and passage migrant.

Spain (EU)

In recent years, small numbers of wintering/staging Lesser White-fronted Geese have been recorded, notably from the Doñana area in Andalucía but also from Villafáfila in Castilla-León. With the exception of one individual, all records in Spain fall within the period typical for wintering Norwegian Greylag Goose (*Anser anser*) and most sightings have been of birds within flocks of Greylag Geese. Two or three of these individuals originated from the Finnish reintroduction scheme, but nothing is known about the origins of the other birds, which were mainly unmarked. It is possible that they belong to the supplemented/reintroduced Swedish/Dutch population, to the wild Fennoscandian population, or even from further east (Persson, 2004.) though this is considered unlikely by some other experts.

Switzerland

Vagrant, with no records since the 19th century.

United Kingdom (EU)

Vagrant, though 89 records for the period 1958 to 2000.

Annex 3a

List of Important Bird Areas (IBAs) of significance for Lesser White-fronted Goose, alphabetically by country; (note that Russian IBAs of importance for the east Siberian population are not included; source: data provided by BirdLife International, March 2005³⁰)

Country	International site name	Area (ha)	Year	Location (lat/long)	Season		Min	Max
Armenia	Lake Sevan	150000	1995		unknown		0	26
Azerbaijan	Kizil Agach Bay	132500	?		non-breeding		0	1058
Belarus	Mid-Prityat	90447	1995		passage		50	250
Estonia	Põhja-Liivimaa	23457	1997		passage		0	44
Estonia	Väinameri	279557	1998		passage		11	50
Finland	Käsivarsi fjelds	220078	1996		breeding		0	1
Finland	Oulu region wetlands	81781	1997		passage		50	50
Finland	Sammuntinjänkä-Vaijoenjänkä	51750	1996		breeding		0	0
Georgia	Javakheti Plateau	200000	1996		passage		0	0
Georgia	Kolkheti	150000	1998		non-breeding		0	0
Germany	At least 18 sites SN : Sites for vagrants must be deleted							
Greece	Evros delta	19000	1988		non-breeding		0	116
Greece	Lake Kerkini	12000	1996		passage		12	110
Greece	Lake Mitrikou (Ismarida)	6500	1997		non-breeding		20	0
Greece	Nestou delta and coastal lagoons	22000	?		non-breeding		0	26
Greece	Porto Lagos, Lake Vistonis, and coastal lagoons (Lakes of Thrace)	15300	1990		non-breeding		0	40
Hungary	Hortobágy	136300	1996		passage		70	450
Iran, Islamic Republic of	Anzali Mordab complex	15000	1977		non-breeding		32	
Iran, Islamic Republic of	Dez river marshes and plains	20000	1974		non-breeding		190	
Iran, Islamic Republic of	Gomishan marshes and Turkoman steppes	20000	1977		non-breeding		1773	

³⁰ Site data has been researched and selected specifically for Anser erythropus in 2005, additional data and information may be found in Annex 3b. The latest species-specific IBA information will be available as of mid 2009 via the "Critical Site Network Tool" currently being developed in the framework of the Wings over Wetlands (WOW) UNEP-GEF African-Eurasian Flyways Project. The CSN Tool will bring together information from the main existing databases related to waterbirds in the African-Eurasian region. For more information see: www.wingsoverwetlands.org

Iran, Islamic Republic of	Hilleh river delta	42600	1975	non-breeding	21	37
Iran, Islamic Republic of	Incheh Borun lake and marshes	50	1973	non-breeding	36	
Iran, Islamic Republic of	Karun river marshes	2500	1977	non-breeding	590	
Iran, Islamic Republic of	Lake Alagol, Lake Ulmagol and Lake Ajigol	1540	1974	non-breeding	150	
Iran, Islamic Republic of	Lake Bakhtegan, Lake Tashk and Kamjan marshes	338000	1972	non-breeding	90	
Iran, Islamic Republic of	Lake Maharlou	21600	1975	non-breeding	40	102
Iran, Islamic Republic of	Miankaleh Peninsula and Gorgan Bay	97200	1977	non-breeding	4900	
Iran, Islamic Republic of	Seyed Mohalli, Zarin Kola and Larim Sara	1600	1977	non-breeding	359	
Iran, Islamic Republic of	Shur Gol, Yadegarlu and Dorgeh Sangi lakes	2500	1977	passage		175
Iran, Islamic Republic of	Shur Gol, Yadegarlu and Dorgeh Sangi lakes	2500	1977	non-breeding	70	
Iraq	Haur Al Hawizeh	250000	1965	non-breeding		
Iraq	Haur Al Suwayqiyah	50000	1973	non-breeding	70	
Iraq	Haur Chubaisah area	42500	1965	non-breeding		
Kazakhstan	Kulykol Lake	8300	1994	passage	879	5482
Kazakhstan	Koybagar –Tontegyr Lake group	160000	2002	passage	72	1440
Kazakhstan	Lebyasje Lake	2350	2002	passage	13	506
Kazakhstan	Bozshakol Lake	3500	1997	passage	45	1442
Kazakhstan	Batpakkol Lake	650	2000	passage	7	1500
Kazakhstan	Khack Lake	5520	2003	passage	41	870
Kazakhstan	Zhaksy-Zharkol Lake	1000	2004	passage	-	257
Norway	Inner part of Porsanger fjord	2000	2005	non-br (during br season)	40	60
Norway	Varangerfjord	60000	2005	passage	0	10
Romania	Vladeni fish-ponds	1200	1996	passage	30	46
Russia (European)	Arski fish-ponds	1000	1995	passage	200	300
Russia (European)	Berkubinski forest	500	1997	passage	500	1000
Russia (European)	Bulgarski	25000	1990	passage	10	20000
Russia (European)	Central Forest Biosphere Reserve and adjacent areas	63680	1994	passage	20	200
Russia (European)	Curonian (Courish) Bay	4300	1999	passage	20	0
Russia (European)	Dadynskiye lake	45000	1996	passage	10	300
Russia (European)	Delta of the River Don	53800	1997	passage	30	50
Russia (European)	Flood-plain of Kotorosl' and Ust'e rivers	4200	1997	passage	43	0

Russia (European)	Kamsko-Ilski area	100000	1988	passage	10	20
Russia (European)	Kargopol' area	175000	1996	passage	1	1000
Russia (European)	Koporski Bay	6000	1997	passage	15	30
Russia (European)	Kulaksay lowland	5000	1997	passage	200	350
Russia (European)	Kuloy river	150000	1999	passage	2000	3000
Russia (European)	Lake Ilmen' and adjoining marshy plain	250000	1993	passage	15	20
Russia (European)	Lake Manych-Gudilo	50000	1995	passage	13800	0
Russia (European)	Middle reaches of Bolshaya Rogovaya river	35000	1990	breeding	30	30
Russia (European)	Mouth of Samur river	7000	1996	passage	30	40
Russia (European)	Mouth of Svir river	65000	1996	passage	8	30
Russia (European)	Neman river Delta and the coast of the Curonian Bay	41000	1999	passage	20	0
Russia (European)	Novotroitskoye Reservoir	4000	1999	passage	0	20
Russia (European)	Petrorepost Bay	49200	1999	passage	0	500
Russia (European)	Pinezhski Nature Reserve	51480	1995	passage	1	20
Russia (European)	Ptich'ye (Bird's) Lake	5000	1999	passage	0	20
Russia (European)	Sarpinskaya lake-system	450000	1999	passage	20	0
Russia (European)	Shalkaro-Zhetykolski lake system	81250	1996	passage	500	1500
Russia (European)	Sondugski Zakaznik and surroundings	35500	1995	passage	100	0
Russia (European)	Sources of the River Luga	49600	1997	passage	14	0
Russia (European)	Southern coast of Ladoga Lake	68000	1997	passage	15	20
Russia (European)	Sviyago-Kubninskaya forest-steppe	32000	1992	passage	0	200
Russia (European)	Torna - Shoina watershed	15000	1995	passage	1500	0
Russia (European)	Turali lake	2000	1997	passage	100	0
Russia (European)	Turalinskaya lagoon	250	1997	passage	4	15
Russia (European)	Unskaya bay	40000	1999	passage	200	0
Russia (European)	Valley of Sysola river	110000	1996	passage	50	150
Russia (European)	Yeyski salt-lakes	24000	1996	non-br (during br season)	500	500
Russia (European)	Zolotarevskaya	62000	1987	passage	35	0
Sweden	Lake Tjälmejaure-Laisdalen valley	22200	-	breeding	0	1
Sweden	River Umeälven delta	1500	2001	passage	1	5
Sweden	Sjaunja	208000	1996	breeding	0	5

Sweden	Taavavuoma	28400	-	breeding	0	1
Sweden	Vindelfjällen mountains (including Lake Tärnasjön)	550000	-	breeding	0	1
Turkey	Saros bay	1000	1986	non-breeding	25	0
Ukraine	Chauda	56000	1999	passage	580	580
Ukraine	Pivdennyj Bug river valley (Goloskiv village)	3000	1999	passage	20	70
Ukraine	Styr' river valley (Luchytsi village)	2400	1999	passage	40	140
Ukraine	Syvash Bay	245000	1998	passage	0	1000
Ukraine	Yagorlyts'ka and Tendrivs'ka Bays	72000	1999	passage	50	1000
Ukraine	Karkinit'skiy and Dzarylgatskiy bay	87000		passage	50	100
Ukraine	Dniester delta	22000		winter, autumn, early spring	10	1000
Ukraine	Shagani, Alibay, Burnas lagoon	19000		winter, autumn, early spring	10	1000

Annex 3b

List of additional sites of possible significance for Lesser White-fronted Goose, as identified by reviewers of this Action Plan.

Site name	Coordinates	Area	National/ international protected area status	LWfG count, month & year
Armenia				
Armash fish ponds	Lat. N 39.75/ Lon E 44.78	2,795 ha	Not protected	0
Metsamor River System	Lat. N 40.01/ Lon. E 44.20	unknown	Not protected	1, December, 1987
Lake Arpi	Lat. N 41.06/ Lon. E 43.62	2,000 ha	Not protected	0
Finland				
Pori region fields	--	SW Finland	Not protected	1 (April 2001, April 2005)
Kristiinankaupunki	--	SW Finland	Not protected	1 (April 2003, April 2004)
Germany				
Vorpommersche Küsten- und Boddenlandschaft	54.26N 012.54E	203,810 ha (only 64,380 ha land)	Partly Ramsar/SPA	0-3/year
Greifswalder Bodden	54.13N 013.31E	103,155 ha (only 33,670 ha land)	Partly SPA	0-2/year
Putzarder See, Galenbecker See, Brohmer Berge	53.39N 013.45E	31,510 ha	Partly Ramsar/SPA	0-11/year
Spreewald	51.57N 013.53E	47,344 ha	completely SPA	1-4/year
Mittlere Havelniederung	52.28N 012.40E	41,874 ha	Partly SPA	2-4/year
Unteres Odertal	52.59N 014.09E	11,779 ha	Completely SPA, partly Ramsar	1-4/year
Märkische Schweiz	52.33N 014.05E	17,863 ha	Completely SPA	5-20/year
Niederung der Unteren Havel, Schollener und Gülper See	52.02N 012.16E	16,775 ha	Completely Spa, partly Ramsar	2-5/year
Niederung Rangsdorfer See/Prierowsee	52.15N 013.27E	4,879 ha	Partly SPA	1-4/year
Nuthe-Nieplitz- Niederung	52.15N 013.07E	5,599 ha	Completely SPA	1-4/year
Oderbruch	52.38N 014.27E	25,993 ha	Partly SPA	5-10/year
Wulfener Bruch und Teichgebiet Osternienburg	51.50N 011.58E	2,171 ha	Completely SPA	1-5/year

Drömling	52.28N 011.07E	15,265 ha	Completely SPA	1-2/year
Elbaue und Teichgebiete bei Torgau	51.36N 013.01E	14,357 ha	Completely SPA	1-2/year
Teiche bei Zschorna	51.16N 013.43E	1,131 ha	Completely SPA	0-2/year
Ostfriesisches Wattenmeer, Dollart/Rheiderland	53.42N 007.21E	121,620 ha	Partly IBA/Ramsar/SPA	1-5/year
Lower Rhine area	51.43N 006.14E	31,000 ha	Partly IBA/Ramsar/SPA	5-10/year
Schleswig-Holsteinisches Wattenmeer	54.28N 008.42E	278,000 ha	IBA/Ramsar/SPA	Scand.re-intr. 20-50/year
Norway				
Iesjavr'ri	coordinates withheld to prevent disturbance		Not protected	c.10 breeding pairs 1995
Høyholmen	coordinates withheld to prevent disturbance		Nature reserve	1-3 pairs (c.2000)
Tana River Valley	coordinates withheld to prevent disturbance		Not protected	1-3 pairs (c. 2000)
Syrian Arab Republic				
Al-Baath Lake	38.38 E 35.52 N	100 ha	IBA (B1i)	?
Buhayrat al-Assad	38.07 E 36.00 N	70000 ha	IBA (A1, A4iii, B1i, B2, B3)	?
Sabkhat al-Jabbul	37.29 E 36.03 N	15000 ha	IBA (A4iii, B1i, B2, B3), Ramsar Site, SPA	?
Euphrate River Valley	39.30 E 35.48 N	?	IBA (A1, B2, B3), Ramsar Site, SPA	?
Turkmenistan				
Turkmenbashi Bay	53.22 E 39.47 N	267124 ha	IBA (A1, A4i, A4iii), Nature reserve, Ramsar site	1968 (2008)
Esenguly coast	?	18724 ha	Nature reserve	1932
Khan-khovuz rsv.	61.19 E 37.10 N	19032 ha 39032 ha	IBA (A1, A4iii)	last several years
Zeit rsv.	65.6 E 37.32 N	65488 ha 85488 ha	IBA (A1, A4i, A4iii)	last several years
Ukraine				
Eastern Sivash		165000 ha	National, Ramsar site	last several years
Central Sivash		80,000 ha	National, Ramsar site	last several years

Yagorlitskiy bay		34,000 ha	National, Ramsar site	last several years
Karkinitiski and Dzarylgatskiy bay		87,000 ha	National, Ramsar site	last several years
Tendrovskiy bay		38,000 ha	National, Ramsar site	last several years
Dnepr delta		26,000 ha	National, Ramsar site	last several years
Tiligulski liman		26,000 ha	National, Ramsar site	last several years
Dniester delta		22,000 ha	National, Ramsar site	last several years
Shagani, Alibay, Burnas lagoon		19,000 ha	National, Ramsar site	last several years
Lake Sasik		21,000 ha	National, Ramsar site	last several years
Kiliski mouth-Danube delta		32,000 ha	National, Ramsar site	last several years
Lake Kartal		500 ha	National, Ramsar site	last several years
Lake Kugurluy		7,000 ha	National, Ramsar site	last several years

Sites of importance for the Swedish supplemented/reintroduced population

Site name	Coordinates	Area	National/ international protected area status	LWfG count, month & year
Sweden				
Hjälstaviken		820 ha		2000
Svensksundsviken		3,300 ha		2000
Västra Mälaren		30,481 ha		2005
Ölands ostkust		10,490 ha		2000
River Umeälven delta		1,500 ha		2001
Vindelfjällen mountains (incl. Lake Tämäsjön)		550,000 ha		--
Taavavuoma		28,400 ha		--
Sjaunja		208,000 ha		1996
Lake Tjalmejaure-Laisdalen valley		22,200 ha		2007

Annex 4

Level of available knowledge from principal Range States on habitat use, diet and occurrence of Lesser White-fronted Goose in Important Bird Areas and Protected Areas. Cells with dark shading represent periods when the species is assumed to be absent from the relevant Range State.

	Breeding		Non-breeding		Site Protection - Breeding			Site Protection – Non-breeding		
Range State	Habitat Use ¹	Diet ¹	Habitat Use ¹	Diet ¹	No. IBAs with Lesser White-fronted Goose ²	% of Pop. in IBAs ²	% of Pop. in Protected Areas ²	No. IBAs with Lesser White-fronted Goose ²	% of Pop. in IBAs ²	% of Pop. in Protected Areas ²
Azerbaijan			Low	Low				Low/None	Low/ None	Low/None
Bulgaria			Medium	Low				Medium	Medium	Medium
Estonia			High	Medium				High	High	High
Finland	High	High	High	High	High	High	High	High	High	High
Germany			Medium	Low				High	Medium	Medium
Greece			Medium	Low				High	High	High
Hungary			High	Medium				High	High	High
Iran, Islamic Republic of			Low	Low				Low/None	Low/ None	Low/None
Iraq			Low	Low				Low/None	Low/ None	Low/ None
Kazakhstan			Medium	Low				Medium	Medium	Medium
Lithuania										
Norway	High	High	High	High	High	High	High	High	High	High
Poland			Low	Low				Low	Low	Low
Romania			Medium	Low				Medium	Medium	Medium
Russian Federation	High	Medium	Medium	Low	Medium/ Low	Medium/ Low	Medium/ Low	Medium/ Low	Medium/ Low	Medium/ Low
Syrian Arab Republic			Low	Low				Low	Low	Low
Turkey			Low/ Medium	Low				Medium/ Low	Medium/ Low	Medium/ Low
Turkmenistan			Medium	Low				Medium	Low/	Low/Medium

Annex 5

Protection of Lesser White-fronted Goose under national legislation, by Range State.

Range State	Status in National Red Data Book ³¹	Legal Protection from Killing	Year of Protection Status	Penalties for Illegal Killing or Nest Destruction	Opening/ Closing Dates of Hunting Season	Annual Bag Size	Highest Responsible National Authority
Armenia	Not protected ³²	None	None	None	August – February	N/A	Ministry of Nature Protection of Armenia
Azerbaijan	Not protected	?	?	?	?	?	?
Belarus	Near threatened	?	?	?	During the spring and autumn when flying	?	?
Bulgaria	Endangered (1985) to be revised using IUCN criteria by 2007	Protected under the Biodiversity Act Hunting regulated by hunting act (passed first reading in parliament, decided early Dec)	Protected since 1962	none	1 October – 31 January proposed til end feb. in new sub-hunting act	unknown	Ministry of Environment and Water
Estonia	No	Yes	Protected since 1994	Penalty for illegal killing 1280 euro per bird	LWfG not hunted, general goose hunting period from 20 August till 30 November	None	Ministry of Environment
Finland	Critically	Yes	1969	Yes	No hunting	0 (-1)	Ministry of

³¹ National Red List status may differ from current global Red List status, but has legal significance in many countries.

³² Armenia: the Red Data Book of Armenia was published in 1987, but Lesser White-fronted Goose was first documented later that year and so is not listed. However, because the species is extremely rare in the country and classified as globally threatened by IUCN, it does not appear on the list of birds that may be hunted. Its future inclusion in the Red Data Book of Armenia is anticipated.

Range State	Status in National Red Data Book ³¹	Legal Protection from Killing	Year of Protection Status	Penalties for Illegal Killing or Nest Destruction	Opening/Closing Dates of Hunting Season	Annual Bag Size	Highest Responsible National Authority
	endangered				season		Environment
Georgia	?	Protected (by 'law of red list' and red book of 2003)	?	?	?	?	Ministry of Environmental Protection and Natural Resources
Germany	None	Protected species	1979	Theoretically high, practically none	No hunting season	Unknown but several	Federal Ministries for Environment and Agriculture
Greece	Endangered (1992), to be revised in 2008	Yes Ministerial Decision 414985/1985 "Measures for the management of wild birds"; Law 1650/1986 "Protection of the Environment"	1985	Imprisonment up to 2 years and a fine of up to EUR 30.000	No hunting of LWfG. 15 Sept – 10 Feb for <i>Anser albifrons</i>	N/A	Ministry of Environment, Physical Planning & Public Works; Ministry of Rural Development and Food
Hungary	threatened (highest status)	Strictly protected	1982	c. EUR 1,000 per individual	No hunting season	N/A	Department of Environment and Water, Nature Protection Office
Iran, Islamic Republic of	?	?					
Iraq	Vulnerable	?					
Kazakhstan	Endangered	Excluded from list of waterfowl quarry species, 1999. Full legal protection since 2002	2002	USD 1500	N/A	N/A	Forest and Hunting Committee, Ministry of Agriculture of Kazakhstan
Latvia	?	?	?	?	?	?	?

Range State	Status in National Red Data Book ³¹	Legal Protection from Killing	Year of Protection Status	Penalties for Illegal Killing or Nest Destruction	Opening/ Closing Dates of Hunting Season	Annual Bag Size	Highest Responsible National Authority
Lithuania	None	Not listed as a quarry species	--	--	No hunting season	None	Ministry of Environment
Moldova	?	?	?	?	?	?	?
Netherlands³³	?	Full legal protection (policy of chasing away with shots is currently evaluated)	?	?	--	N/A	?
Norway	Directly threatened	Full legal protection	1971	Unknown (determined by judge on case-by-case basis, but so far no examples of prosecution)	Starts 21 August for geese in general. Closes 23 December	0-5?	Directorate for Nature Management
Poland	None	Full legal protection	1995	Judge on case-by-case basis	-	0	Ministry of Environment
Romania	?	Protected (law on hunting fund and protection of game)	1996	?	None (mid Aug to 28 Feb for A. albifrons)	?	Ministry of Environment and Sustainable Development
Russian Federation	Vulnerable	Yes	1983?	RUB 10800 (= EUR 30) for 1 individual or 1 egg. For 1 nest: RUB 10,800 x 3 + RUB 10,800 for each egg	Varies according to region	Unknown	Ministry of Nature Resources
Sweden	Critically endangered	Full legal protection	1938?	Yes	-	0	Swedish Environ. Protection Agency

³³ Supplemented/Reintroduced population

Range State	Status in National Red Data Book ³¹	Legal Protection from Killing	Year of Protection Status	Penalties for Illegal Killing or Nest Destruction	Opening/ Closing Dates of Hunting Season	Annual Bag Size	Highest Responsible National Authority
Syrian Arab Republic	?	Full legal protection (Hunting law No. 152 from 23/07/1970 has been revised and is expected to come into effect from autumn 2008)	1994-2006 (extended to 2011 if not updated before)	Unknown	-	N/A	Ministry of Local Administration and Environment – General Commission for Environmental Affairs; Ministry of Agriculture and Agrarian Reform
Turkey	?	?	?	?	?	?	?
Turkmenistan	Listed	Protected by law	1999	Small or not applied	Starts 15 August, closes at the end of February for geese in general	?	Ministry for Nature Protection
Ukraine	?	Proposed for inclusion in Red Data Book	Proposed 2005	-	Second Saturday of August until end of January	100	Ministry of Environment
Uzbekistan	Listed	Protected by law	2003	75 minimum monthly wages	Second half of August – end of January	5 birds/day; no annual bag limit	State Committee for Nature Protection

³¹ National Red List status may differ from current global Red List status, but has legal significance in many countries.

Annex 6

Site (and habitat) protection for Lesser White-fronted Goose in Principal Range States. Shaded cells represent periods when the species is assumed to be absent from the relevant Range State. The breeding season includes estimates of breeding and resident bird numbers and the non-breeding season includes estimates of staging and wintering bird numbers.

Range State	Breeding Season				Non-breeding Season					
	No. IBAs where Lesser White-fronted Goose Breeds ¹	% Pop. in IBAs ²	% Pop. in SPAs ³	% Pop. in Ramsar Sites	% Pop. in National Protected Areas ⁴	No. IBAs with Lesser White-fronted Goose	% Pop. in IBAs	% Pop. in SPAs ³	% Pop. in Ramsar Sites	% Pop. in National Protected Areas
Azerbaijan						1	>50%?	0 (does not apply)	?	>50%?
Bulgaria						0	?	?	?	?
Estonia						2	ca 40 ind. from Fennoscandian population	ca 40 ind. from Fennoscandian population	ca 40 ind. from Fennoscandian population	ca 40 ind. from Fennoscandian population
Finland	(1-2)	100	100	0	100	1	100	100	(part of 1)	100
Germany						1	?	?	?	?
Greece						5	100	100	100	100
Hungary						2	90-100	90-100	90-100	100
Iran, Islamic Republic of						13	?	0 (does not apply)	?	?

Range State	Breeding Season					Non-breeding Season				
	No. IBAs where Lesser White-fronted Goose Breeds ¹	% Pop. in IBAs ²	% Pop. in SPAs ³	% Pop. in Ramsar Sites	% Pop. in National Protected Areas ⁴	No. IBAs with Lesser White-fronted Goose	% Pop. in IBAs	% Pop. in SPAs ³	% Pop. in Ramsar Sites	% Pop. in National Protected Areas
Iraq						3	?	0 (does not apply)	?	?
Kazakhstan						7	85	0 (does not apply)	5-10	60
Lithuania										
Netherlands⁵						?	?	?	?	?
Norway	0	0	0	0	unknown	2	70-90%	0	20-80%	20 – 50%
Poland						?	?	?	?	?
Romania						1	?	?	?	?
Russian Federation (European part)	?	?	?	?	?	36	?	0 (does not apply)	?	?
Sweden⁵	2	100	100	90	100	5	75	75	75	75
Syrian Arab Republic						4 (likely)	?	0	?	?
Turkey						?	?	0 (does not apply)	?	?

Turkmenistan								25 (Potential IBAs)	80-90%	0 (does not apply)	50-80%	50-60%
Ukraine								8	80	0 (does not apply)	50	20
Uzbekistan										0 (does not apply)		

¹ Estimates of the number of IBAs where the species breeds or spends the non-breeding season were obtained from the BirdLife International World Bird Database (data extracted March 2005) and/or from national experts.

² Estimates of the % of the population present in the IBA suite of an individual country provided by national experts.

³ European Union members only.

⁴ National protected areas: Only includes areas which meet the IUCN definition of a protected area: "an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means."

⁵ Supplemented/Reintroduced population.

Annex 7

Research and conservation efforts for Lesser White-fronted Goose over the last ten years.

Range State	Research and Conservation Efforts over the Last Ten Years
Armenia	No research or conservation efforts have been undertaken in relation to the species in Armenia.
Azerbaijan	Data from international satellite tracking; sporadic field observation/counts of wintering birds. No systematic national programme in place.
Belarus	None known.
Bulgaria	Research expeditions by BSPB/NOF teams in 1996 and 1998, monitoring of wintering geese in the area of Shabla and Durankulak Lakes for more than 10 years by BSPB/BirdLife Bulgaria team. Recent field observations of wintering geese have been funded by The Wildfowl & Wetlands Trust (UK) and have allowed searching for LWFG, but additional targeted research is needed to identify current numbers on staging and wintering in Bulgaria. A buffer zone has been proposed around foraging grounds beside Durankulak Lake, but proposal is pending in the Ministry of Environments and Waters; Public awareness activities by BSPB in wintering areas and advocacy to maintain the hunting season closing date of 31 January. There is an NGO project to buy foraging grounds around Durankulak Lake to protect them from hunting pressure and land transformation. BSPB has assisted the Ministry of Agriculture and Forestry in developing the national agri-environmental scheme with specific compensation of farmers to sustain land suitable for safe foraging by wintering geese – due to start in 2007.
Estonia	Annual monitoring of staging LWFG since 1999. Constant conservation activities of coastal meadows.
Finland	Annual monitoring of spring staging areas on the Finnish Bothnian Bay coast and in northern Finnish Lapland. Surveys of potential breeding areas in Lapland. Research on population genetics. Management of the coastal meadows in the spring staging area on the Finnish Bothnian Bay coast. Public awareness work in Finland and abroad, mainly directed for hunters. Ecological research at spring staging areas and breeding grounds. Population elasticity analysis for the Fennoscandian population. EU LIFE Nature project “Conservation of the Lesser White-fronted Goose in Finland” in 1997-1999. International (Finland, Norway, Estonia, Hungary, Greece) EU LIFE Nature project “Conservation of <i>Anser erythropus</i> on European migration route” 2005-2009. Other international conservation work included e.g. several satellite tracking projects; a WWF project for the conservation of the Kostonay wetlands in Kazakhstan (2000-2003); field surveys of breeding, staging and wintering areas in Russia, Kazakhstan, Estonia, Lithuania, Ukraine, China; active participation in international co-operation and meetings on the species.
Georgia	None known.
Germany	Survey and efforts to influence hunting at key sites owned by ornithological societies and/or private individuals
Greece	(a) Monitoring at Kerkini Lake, Evros Delta and less intensively at Lake Ismarida and Nestos Delta from October until March for the

Range State	Research and Conservation Efforts over the Last Ten Years
	years 2005/2006 until 2007/2008 (LIFE 05 NAT/FIN/000105 “Conservation of the Lesser White-fronted Goose on the European migration route”). (b) Monitoring at Evros Delta 2001-2005 (LIFE 00 NAT/GR/7198 “Restoration and conservation management of Drana lagoon in Evros Delta”. (c) Monitoring at Kerkini Lake, Evros Delta, Lake Ismarida and Nestos Delta 1997-1999 (LIFE Nature B4-3200/96/499 “Conservation of <i>Phalacrocorax pygmaeus</i> and <i>Anser erythropus</i> in Greece”). (d) Awareness campaigns with printed material, meetings with farmers and hunters, presentations at schools etc. (e) National action plan published in 1999 but not officially ratified or implemented.
Hungary	regular monitoring activity (for marked birds, on space use), some habitat management actions started, awareness-raising campaign
Iran, Islamic Republic of	Data from international satellite tracking; sporadic field observation/counts of wintering birds. No systematic national programme in place.
Iraq	Data from international satellite tracking; sporadic field observation/counts of wintering birds. No systematic national programme in place.
Kazakhstan	Annual autumn migration monitoring in Kustanay Region. Implementation of two GEF projects on key Lesser White-fronted Goose sites.
Lithuania	None known.
Moldova	None known.
Norway	Annual monitoring of pre-breeding numbers in spring staging grounds and annual monitoring of production in autumn staging grounds. Surveys for breeding areas, colour-ringing programme, mapping of migration and wintering sites through satellite tracking.
Poland	The Polish Avifaunistic Commission monitors Lesser White-fronted Geese since 1951. Basic information is published once to twice a year in ‘Notaki Ornitologiczne’. A full record of sightings is available for the years 2005, 2006 and 2007 (pers. comm. M. Lesz and T. Stawarczyk).
Romania	None known.
Russian Federation	Creation of Russian Goose Group and, within this, Working Group on LWfG (1995); inventory of present breeding areas of LWfG in European Russia, Yamal, Taimyr, Yakutia and Chukotka (1995-2005); searching for breeding areas in Yakutia and Chukotka (2000-2005); monitoring breeding populations in the Polar Urals and Yamal Peninsula; organization of both Russian and international expeditions for surveys, banding and satellite tagging LWfG in Yamal (1997-1998), Taimyr (1997-1998) and the Polar Urals (1999-2002, 2004); monitoring migration population in Manych-Gudilo Lake (2000-2002); survey of spring migration in Amur Oblast (2002); start of monitoring of migration in Kurgan Oblast, Western Siberia (2005); attempts to stop spring hunting in some regions; collection of samples for genetic study (1995-2004); recommendation for changing status category in Red Data Book of Russian Federation (from Rare to Vulnerable).
Sweden	Breeding ecology, genetics, migration routes, monitoring of population & reproduction, captive breeding &

Range State	Research and Conservation Efforts over the Last Ten Years
	supplementation/reintroduction, site protection
Syrian Arab Republic	Data from international satellite tracking; sporadic field observation/counts of wintering birds. No systematic national programme in place. Updating of the national hunting legislation is expected to be finalised in autumn 2008. Awareness raising programme at a LWFG observation site "Improving the conservation status of globally threatened birds at Jabul Ramsar wetland through promoting and implementing sustainable hunting practices". Swiss-funded project "Biodiversity conservation through eco-tourism" encourages eco-tourism to support conservation objectives. Syria participated in project "Building capacity for sustainable hunting of migratory birds in north Africa and the Middle East".
Turkey	None known.
Turkmenistan	Between 1977 and 2007 annual winter censuses were conducted at a total of 14 sites, usually in late November and early December. From 1975 to 1991 46 surveys were carried out on the Caspian seashore, and 54 surveys in the delta of the Atrek River. Of the 36 wetland surveys, 14 sites had LWFG sightings.
Ukraine	None known.
Uzbekistan	From 2000 to 2005 the regular winter censuses were conducted in Uzbekistan, but only in 2000 – aerial. The wetlands and water-reservoirs survey from the banks with modern telescopes allowed to identify the Lesser White Fronted Geese in the following sites: Aydar lake (beginning of March 2001), valley of Amudarya river near Termez town (closely to Afghanistan border), Karakyr lake and Tudakul lake – winter censuses. On the hunting bag assessment the Lesser White-fronted Geese are known from Chardara water-reservoir, Aydar lake, Karakyr lake, lakes of Karshi steppe. All observers note that the flocks of the LWFG are very small (from several individuals to several tens) and observed very rare in comparison with other geese.

Annex 8

Details of provisions on principal international legal instruments relevant to the conservation of Lesser White-fronted Goose.

(a) European Council Directive on the Conservation of Wild Birds (Council Directive 79/409/EEC, 2 April 1979)

Lesser White-fronted Goose is listed in Annex I of the Directive. According to the text of the Directive: *“The species mentioned in Annex I shall be the subject of special conservation measures concerning their habitat in order to ensure their survival and reproduction in their area of distribution.*

Member States shall classify in particular the most suitable territories in number and size as special protection areas for the conservation of these species, taking into account their protection requirements in the geographical sea and land area where this Directive applies.”

Article 11 may be relevant to introduction/reintroduction of Lesser White-fronted Geese since it states that:

“Member States shall see that any introduction of species of bird which do not occur naturally in the wild state in the European territory of the Member States does not prejudice the local flora and fauna”.

(b) European Council Directive on the Conservation of natural Habitats and of Wild Fauna and Flora (‘Habitats Directive’, 92/43/EEC, 21 May 1992)

Article 22(b) may be relevant to introduction/reintroduction of Lesser White-fronted Geese since it states that:

“Member States shall ensure that the deliberate introduction into the wild of any species which is not native to their territory is regulated so as not to prejudice natural habitats within their natural range or the wild native flora and fauna and, if they consider it necessary, prohibit such introduction. The results of the assessment undertaken shall be forwarded to the committee for information.”

(c) Convention on Biological Diversity (Biodiversity Convention, Rio de Janeiro, 1991)

Article 8 of the Convention on Biological Diversity (Biodiversity Convention) states that:

“Each Contracting Party shall, as far as possible and as appropriate:

- (a) Establish a system of protected areas or areas where special measures need to be taken to conserve biological diversity;*
- (c) Regulate or manage biological resources important for the conservation of biological diversity whether within or outside protected areas, with a view to ensuring their conservation and sustainable use;*
- (d) Promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings;*
- (f) Rehabilitate and restore degraded ecosystems and promote the recovery of threatened species, inter alia, through the development and implementation of plans or other management strategies”.*

(d) Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention, 1979)

Lesser White-fronted Goose is included in Annex II ‘Strictly protected species’ of the Convention, as last revised on 1 March 2002. Article 6 of the Convention states that:

“Each Contracting Party shall take appropriate and necessary legislative and administrative measures to ensure the special protection of the wild fauna species specified in Appendix II. The following will in particular be prohibited for these species:

- a. all forms of deliberate capture and keeping and deliberate killing;*
- b. the deliberate damage to or destruction of breeding or resting sites;*
- c. the deliberate disturbance of wild fauna, particularly during the period of breeding, rearing and hibernation, insofar as disturbance would be significant in relation to the objectives of this Convention;*
- d. the deliberate destruction or taking of eggs from the wild or keeping these eggs even if empty;*
- e. the possession of and internal trade in these animals, alive or dead, including stuffed animals and any readily recognisable part or derivative thereof, where this would contribute to the effectiveness of the provisions of this article.”*

Article 8 states that:

“...in cases where, in accordance with Article 9, exceptions are applied to species specified in Appendix II, Contracting Parties shall prohibit the use of all indiscriminate means of capture and killing and the use of all means capable of causing local disappearance of, or serious disturbance to, populations of a species, and in particular, the means specified in Appendix IV.”

Articles 9.1 and 9.2 state that:

“Each Contracting Party may make exceptions from the provisions of Articles 4, 5, 6, 7 and from the prohibition of the use of the means mentioned in Article 8 provided that there is no other satisfactory solution and that the exception will not be detrimental to the survival of the population concerned:

- for the protection of flora and fauna;*
- to prevent serious damage to crops, livestock, forests, fisheries, water and other forms of property;*
- in the interests of public health and safety, air safety or other overriding public interests;*
- for the purposes of research and education, of repopulation, of reintroduction and for the necessary breeding;*
- to permit, under strictly supervised conditions, on a selective basis and to a limited extent, the taking, keeping or other judicious exploitation of certain wild animals and plants in small numbers.”*

“The Contracting Parties shall report every two years to the Standing Committee on the exceptions made under the preceding paragraph. These reports must specify:

- the populations which are or have been subject to the exceptions and, when practical, the number of specimens involved;*
- the means authorised for the killing or capture;*

- *the conditions of risk and the circumstances of time and place under which such exceptions were granted;*
- *the authority empowered to declare that these conditions have been fulfilled, and to take decisions in respect of the means that may be used, their limits and the persons instructed to carry them out;*
- *the controls involved.”*

Article 10.1 provides that:

“The Contracting Parties undertake, in addition to the measures specified in Articles 4, 6, 7 and 8, to co-ordinate their efforts for the protection of the migratory species specified in Appendices II and III whose range extends into their territories.”

Article 11.2 (b) may be relevant to introduction/reintroduction of Lesser White-fronted Geese since it states that: *“each Contracting Party undertakes to strictly control the introduction of non-native species.”*

Recommendation No. 58 of the Bern Convention Standing Committee (adopted on 5 December 1997) concerns *“the reintroduction of organisms belonging to wild species and on restocking and reinforcing populations of such organisms in the environment”*. The Annex to the Recommendation contains guidelines, but these do not make explicit reference to genetic issues.

(e) Convention on Migratory Species (Bonn Convention, 1979)

As Lesser White-fronted Goose is included in Appendix I of the Convention on Migratory Species (Bonn Convention), the provisions of Articles III.4 to III.7 apply:

“III.4. Parties that are Range States of a migratory species listed in Appendix I shall endeavour:

- a) to conserve and, where feasible and appropriate, restore those habitats of the species which are of importance in removing the species from danger of extinction;*
- b) to prevent, remove, compensate for or minimize, as appropriate, the adverse effects of activities or obstacles that seriously impede or prevent the migration of the species; and*
- c) to the extent feasible and appropriate, to prevent, reduce or control factors that are endangering or are likely to further endanger the species, including strictly controlling the introduction of, or controlling or eliminating, already introduced exotic species.*

III.5. Parties that are Range States of a migratory species listed in Appendix I shall prohibit the taking of animals belonging to such species. Exceptions may be made to this prohibition only if:

- a) the taking is for scientific purposes;*
- b) the taking is for the purpose of enhancing the propagation or survival of the affected species;*
- c) the taking is to accommodate the needs of traditional subsistence users of such species; or*
- d) extraordinary circumstances so require; provided that such exceptions are precise as to content and limited in space and time. Such taking should not operate to the disadvantage of the species.*

III.6. The Conferences of the Parties may recommend to the Parties that are Range States of a migratory species listed in Appendix I that they take further measures considered appropriate to benefit the species.

III.7. The Parties shall as soon as possible inform the Secretariat of any exceptions made pursuant to paragraph 5 of this Article.”

(f) African–Eurasian Migratory Waterbird Agreement (AEWA, an Agreement of the Bonn Convention)

As Lesser White-fronted Goose is listed in Column A of the Action Plan under the African-Eurasian Migratory Waterbird Agreement, Range States should:

- (a) prohibit the taking of birds and eggs of those populations occurring in their territory;
- (b) prohibit deliberate disturbance in so far as such disturbance would be significant for the conservation of the population concerned;
- (c) prohibit the possession or utilization of, and trade in, birds or eggs, or any readily recognizable parts or derivatives of such birds and their eggs;
- (d) cooperate with a view to developing and implementing international single species action plans;
- (e) prepare and implement national single species action plans; and
- (f) phase out the use of lead shot for hunting in wetlands.

(g) Asia–Pacific Migratory Waterbird Conservation Strategy

Some of the Range States that are party to AEWA are also party to the Asia-Pacific Migratory Waterbird Conservation Strategy, which covers Lesser White-fronted Goose. Since the issues relating to conservation of the East Asian subpopulation are broadly similar to those affecting the Fennoscandian and Western main subpopulations, it is important that implementation of the two instruments is effectively coordinated in relation to Lesser Whitefronts.

(h) Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar, 1979)

The Ramsar Convention provides for habitat conservation measures relevant to Lesser White-fronted Goose, for example according to:

Articles 2.1 and 2.2

“Each Contracting Party shall designate suitable wetlands within its territory for inclusion in a List of Wetlands of International Importance, hereinafter referred to as “the List”... The boundaries of each wetland shall be precisely described and also delimited on a map and they may incorporate riparian and coastal zones adjacent to the wetlands, and islands or bodies of marine water deeper than six metres at low tide lying within the wetlands, especially where these have importance as waterfowl habitat.”

“Wetlands should be selected for the List on account of their international significance in terms of ecology, botany, zoology, limnology or hydrology. In the first instance wetlands of international importance to waterfowl at any season should be included.”

Article 3.1

“The Contracting Parties shall formulate and implement their planning so as to promote the conservation of the wetlands included in the List, and as far as possible the wise use of wetlands in their territory.”

Article 4.1

“Each Contracting Party shall promote the conservation of wetlands and waterfowl by establishing nature reserves on wetlands, whether they are included in the List or not, and provide adequately for their wardening.”

Article 5.1

“The Contracting Parties shall consult with each other about implementing obligations arising from the Convention especially in the case of a wetland extending over the territories of more than one Contracting Party or where a water system is shared by Contracting Parties. They shall at the same time endeavour to coordinate and support present and future policies and regulations concerning the conservation of wetlands and their flora and fauna.”

(i) Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES 1973)

Lesser White-fronted Goose is not included in any of the appendices to this Convention.

(j) European Union policies and instruments not specifically dealing with species/habitat conservation but offering opportunities for enhanced management of Lesser White-fronted Goose habitats

The EU's principal nature conservation legislation is made up of the Birds and Habitats' Directives, some provisions of which are outlined above. The development of the 'Natura 2000' network of Special Protection Areas (SPAs) and Special Areas of Conservation (SACs) has been the main focus in recent years and has been supported by the EU's financial instrument for nature conservation LIFE-Nature. Both Natura 2000 and LIFE have made important contributions to Lesser White-fronted Goose conservation. However, there other EU policies and instruments that could be used to achieve potentially more significant progress at the landscape scale. Three are highlighted below.

Common Agriculture Policy

The partial reform of the CAP, including the introduction of the Rural Development Regulation (2000-2006) offers opportunities for “a prominent role [to] be given to agri-environment instruments to support the sustainable development of rural areas and to respond to society's increasing demand for environmental services”. Agri-environment measures represent the only compulsory rural development instrument that Member States MUST implement. 'Less Favoured Areas' compensation, wetland restoration, extensive farming, and reversion of arable land to grasslands are all management measures that could be targeted. The drawback to date has been the relatively small budget for the RDR in comparison with CAP market subsidies (10% versus 90%). In July 2004 the European Commission published its proposals for revision of the RDR to cover 2007 to 2013.

- the establishment of a special fund, the European Agricultural Fund for Rural Development (EAFRD), separate from the normal CAP mechanisms, with simpler financial rules;
- a requirement for European and national strategy documents;
- three priority axes for spending (I – improving the competitiveness of the agricultural and forestry sector; II – land management including animal welfare; and III – diversification of the rural economy and the quality of life in rural areas), with detailed measures under each axis;

- a requirement that a minimum of 25% of Community support for each rural development programme is spent on axis II (land management), and that a minimum of 15% is committed to each of the other two axes;
- the existing LEADER (funding for local action groups in rural communities) financial instrument to be 'mainstreamed' within the RDR and a minimum 7% of funding for LEADER within rural development programmes;
- a mechanism for revising the designation of Less Favoured Areas; and
- the creation of a 'European Observatory of Rural Territories' to collect and disseminate information and best practice.

BirdLife International, WWF and other NGOs have been scrutinizing these proposals for their potential to support conservation/environment objectives. They will be contacted in order to complete this section of the draft Action Plan.

Water Framework Directive

This requires that River Basin Management Plans be implemented for all major river basins in all Member States and, by implication, in Candidate Countries. WWF and the European Environment Bureau have produced extensive informal guidance on how conservation interests – especially wetland conservation – can be promoted through the WFD. The Common Implementation Strategy for the WFD (a joint initiative of the Commission and the Member States) provides further 'official' guidelines.

European Neighbourhood Policy (ENP)

This is the new policy instrument providing the framework for EU cooperation with neighbouring countries in the post-Enlargement European Union. Within the AEWA portion of the Lesser White-front range Action Plans (with sections on environment and sustainable development) have been, or are being, prepared for Moldova, Ukraine. The Russian Federation has the status of 'special partner' in the ENP.

(k) IUCN Guidelines for Reintroduction

These *Guidelines*, published in 1998 by the IUCN Species Survival Commission (SSC), have no legal status but are generally regarded as the most authoritative international guidance available concerning species reintroductions in general. The primary audience of these guidelines is the practitioners rather than decision makers in governments. Guidelines directed towards the latter group would inevitably have to go into greater depth on legal and policy issues. Such guidelines have however not been established to date (IUCN pers. comm.). As a component on actions being taken in response to a complex international conservation challenge, Lesser White-fronted Goose reintroductions should be compatible with IUCN/SSC guidance.

The *Guidelines* state the aims and objectives of reintroduction as follows:

"The principle aim of any re-introduction should be to establish a viable, free-ranging population in the wild, of a species, subspecies or race, which has become globally or locally extinct, or extirpated, in the wild. It should be re-introduced within the species' former natural habitat and range and should require minimal long-term management.

The objectives of a re-introduction may include: to enhance the long-term survival of a species; to re-establish a keystone species (in the ecological or cultural sense) in an ecosystem; to maintain and/or restore natural biodiversity; to provide long-term economic

benefits to the local and/or national economy; to promote conservation awareness; or a combination of these.”

Guidance is provided on Pre-project Activities (biological, socio-economic and legal); Planning, Preparation and Release Stages; and Post-release Activities.

Annex 9a

Conclusions of the CMS Scientific Council, November 2005.

1. “It is desirable to have a wide genetic diversity among wild Lesser Whitefronts.
2. There appears to be no undisputed answer at present to the question of whether the Fennoscandian population (as represented by the birds breeding in Norway) is genetically distinct from the nearest breeding birds to the east, in northern Russia. Given the uncertainty, we take the cautious approach that there might be a potentially valuable genetic distinction, and that we should not deliberately interfere with it (for instance, by boosting the Fennoscandian population with wild birds from elsewhere), unless or until such interference may become inevitable.
3. Given the small size of the wild Fennoscandian population, if possible, a captive breeding population of birds from this source should be established and maintained as a priority. We recognise that there are risks involved in taking eggs and/or young birds from the wild population, but that careful use of a known surplus (that is, those birds that would have died or been killed in their first winter) may be a practical conservation option.
4. We consider that every effort should be made to conserve the Fennoscandian birds down their traditional migration routes into southeastern Europe and the Caspian/Central Asian region. We recognise that this is a major challenge. We endorse the current LIFE project that aims to safeguard the birds and their habitats along the western route. It is our opinion that all appropriate efforts should also be made to conserve the wild populations of the species in its other flyways.
5. We consider that doubts do remain about the genetic make-up of the existing free-flying birds, originally introduced into the wild in Fennoscandia, and which winter in the Netherlands. It does seem to us that not all, but a large part, of the scientific community will never be completely satisfied concerning the level of genetic contamination from the Greater White-fronted Goose *Anser albifrons* and other species, which many will regard as impossible to eliminate. Despite genuine efforts to improve the genetic purity of existing captive flocks we consider that these flocks are not to be regarded as potential sources for release to the wild.
6. Given the possibility that the above-mentioned free-flying birds, or their descendants, may pose a risk to the genetic make-up of the wild Fennoscandian population, the Scientific Council is of the opinion that these birds should be caught or otherwise removed from the wild. We do not say this lightly, nor underestimate the practical and other difficulties involved. We recommend that a feasibility study be undertaken as a matter of urgency.
7. We believe that there is nothing against establishing a group in captivity of purebred Lesser Whitefronts from the wild, western Russian stock, and it may well prove valuable to have such a group in the future. However, we do not believe that it is appropriate to release such birds to the wild now or in the immediate future.
8. For the present, we do not support the introduction of Lesser Whitefronts into flyways where they do not occur naturally. We have borne in mind the powerful argument concerning the improved safety of birds in these flyways, as well as practical considerations, such as current proposals that could quickly be put into effect. However, we consider that modifying the natural behaviour of Lesser Whitefronts in this respect, as well as unknown ecological effects in the chosen new flyways, and other such considerations, make this technique inappropriate until such time as it may become essential, particularly when major disruption or destruction occurs of key components of the natural flyways. We do not believe that to be the case at present. We give due weight to arguments about the continuing decline of the very small Fennoscandian population, and to the estimates of how long it may continue to be viable, but we are not persuaded that such a fact alone is enough to justify radical action.
9. We consider it would be appropriate to re-examine the issues once more in 5 years.”

Annex 9b

Additional independent comments by Dr Robert C. Lacy, November 2005.

Comments on the genetic issues related to the new Action Plan for the Lesser White-fronted Goose (LWfG)

Robert C Lacy, PhD

Population Geneticist/Conservation Biologist
Chicago Zoological Society

Chair
IUCN/SSC Conservation Breeding Specialist Group

Committee on Evolutionary Biology
University of Chicago

I will preface my remarks by stating that I have not before been involved in any of the discussions or analyses of the LWfG or any related species. My comments below are in response to the set of documents sent to me by Sergey Dereliev of the UNEP/AEWA Secretariat.

My background is that I was trained as an evolutionary biologist, with work in population genetics, ecological genetics, and behavioural genetics. I have worked for the past 20 years as a conservation geneticist for the Chicago Zoological Society, with adjunct faculty positions at the University of Chicago and University of Illinois. My research has included: experimental studies of the effects of inbreeding and intercrossing on *Peromyscus* mice; analyses of the genetic changes and inbreeding effects that occur in captive breeding programs for wildlife species; development of statistical techniques for pedigree analysis and the management of breeding programs; and development of computer simulation models for population viability analysis for assessing threats to wildlife populations and testing the likely impacts of proposed management actions. I have taught short courses to wildlife managers and zoo biologists on the genetic management of endangered species. For the past 3 years, I have served as the chairman of the IUCN/SSC Conservation Breeding Specialist Group – the network of experts who provide technical assistance on matters related to use of captive breeding programs to serve species conservation, and related programs of intensive population management. I have provided advice to government agencies on the genetic management and recovery plans for whooping cranes, Puerto Rican parrots, and three penguin species, and also for many species of mammals (e.g., black-footed ferrets, beach mice, and Florida panthers in the USA, eastern barred bandicoots and Leadbeater's possums in Australia, and all five extant species of rhinoceros), and a few reptile and amphibian species.

It is not clear to me if the primary disagreement about the genetic issues related to conservation actions for the LWfG is due to different opinions about the genetic data and analyses, or to different interpretations of the implications of those data for conservation, or to both the data and the conservation implications. With respect to the data themselves, it seems to me that with the most recent molecular genetic analyses, the genetic characterization of the LWfG is becoming clear (although I expect that some of those involved in the debates may still disagree with parts of my description of the information now available).

The mitochondrial DNA data show that two divergent clusters (each with a primary common type and a number of variants that differ only by one or two mutations of likely recent origin) of mtDNA haplotypes occur in the wild populations of LWfG, and an additional two general

types occur in the birds in the captive breeding programs for the LWfG. The two general types (West and East) found in the wild LWfG both exist in all wild populations, but at different frequencies, although some sub-types (slight variants that would represent recent evolutionary changes) of the W and E types are unique to one region or the other. The other two general forms of mtDNA observed in the captive geese have been found to be typical of the Greater White-fronted Goose (GWfG) and the Greylag Goose. The sampling of LWfG from wild populations has been sufficiently extensive so that it is very unlikely that both the typical (E and W) LWfG and the typical GWfG forms of mtDNA are prevalent in the natural populations of LWfG (as could have occurred if both forms persisted in the LWfG from an ancestral population that preceded the evolutionary split between the LWfG and the GWfG). In addition, although the numbers of LWfG in the wild populations has been in decline, the numbers are not so low that it would have been possible that once common mtDNA haplotypes would have been lost from the wild populations but still persisted in non-hybridized captive flocks. Even if the wild populations had lost some mtDNA haplotypes that persisted in captive flocks, it is not plausible that all the types characteristic of the GWfG (and the Greylag Goose) would have been lost – loss of haplotypes from small wild populations would be expected to have been more random. Thus, the mtDNA data do show that the captive stocks of LWfG have been hybridized with two other species.

Mitochondrial DNA is inherited only from the maternal parent, so the data on mtDNA haplotypes can show that hybridization occurred, but not how much occurred. Birds labelled as LWfG would show mtDNA haplotypes characteristic of other species only if their maternal lineage (mother, grand-mother, etc.) descended from the other species. Breeding between a male GWfG (or a hybrid) and a female LWfG would not be detectable by this method. Variants of nuclear genes can be used to detect ancestry through the paternal side, and can be used to quantify the average amount of genetic ancestry in a hybrid population that descends from each source species. The RAPD technique can reveal species-typical DNA patterns. However, the technique relies on non-specific DNA probes (i.e., sequences of DNA that bind, with uncertain fidelity, to unknown numbers of genes in each species), so that the repeatability and interpretation of those data are often uncertain. For these reasons, most geneticists are willing to use RAPD data to suggest possible patterns, but are unwilling to use them to provide rigorous quantitative estimates of population parameters – such as the degree of divergence between two populations or extent of hybridization in a possibly mixed population.

Microsatellite DNA markers (sections of repeated short sequences of DNA) provide more repeatable and precise estimates of population differences, because – if proper precautions are taken – we can confirm that the variants at each scored locus are simple alleles that follow Mendelian inheritance. The recent work by Ruokonen et al. assessed 10 microsatellite loci – sufficient to document that a number of captive LWfG (including some that had a mtDNA haplotype typical of LWfG) contain evidence of GWfG ancestry. Considering both types of genetic evidence, at least 36% of the captive LWfG that were analyzed were shown to have some hybrid ancestry. The close evolutionary relationship and consequent overlap of nuclear genetic alleles prevented the researchers from quantifying the proportion of GWfG ancestry in the captive stocks, but the above numbers support the view of Ruokonen et al that the present captive stocks are “unsuitable for further reintroductions or supplementation.” Rigorous testing of the mtDNA and microsatellite DNA of captive birds (with, preferably, an increase in the number of microsatellite loci scored) could allow selection of birds in the captive stocks that have low probability of hybrid ancestry, but without at least 3-4 diagnostic nuclear loci (none are yet known) or good pedigree records (apparently not available for the captive stocks), it would not be possible to select a subset of captive birds that exclude all hybrid ancestry.

The combination of mtDNA and nuclear DNA data are now showing a clear pattern of moderate but not strong genetic divergence among wild populations of LWfG. The lack of

sharp discontinuities in the allele frequencies and the estimated numbers of migrants that would result in the observed differences in allele frequencies indicate that there is (or recently has been) enough movement of LWfG between eastern, central, and western parts of the species range to have prevented evolutionary divergence and also to have prevented extreme loss of genetic diversity and accumulated inbreeding within any population segment. Thus, the populations do not appear to be genetically isolated to the extent that they would be considered to be evolutionarily significant units or subspecies. The populations may have diverged partially with respect to traits adapted to local conditions, but the genetic mixing makes it unlikely that important adaptive differences have become “fixed” in (i.e., unique to) segments of the species range. Thus, dispersing or translocated *individuals* may have lower fitness because they may more often have genotypes best suited for a different habitat, but each *population* probably still contains the range of genetic variability necessary to adapt to local conditions.

The populations in Fennoscandia appear to have some reduction in genetic variation relative to more eastern populations, but there is not yet evidence of problems arising from inbreeding, and such problems would not be likely to accumulate rapidly, given the evidence for some genetic connections to the larger populations to the east. Thus, it does not seem to me that it is necessary at this time to release individuals in Fennoscandia in order to “rescue” the population from a lack of genetic diversity.

Although I do not think that the evidence suggests a current need to provide genetic rescue of the Fennoscandian population of LWfG, I do not agree with the suggestion that restoration of genetic variation should wait until the Fennoscandian population is extinct. Release of birds from other sources (whether from captive flocks of documented origin or translocations from other wild populations) may shift allele frequencies, but given the genetic closeness of the LWfG populations in different regions it is hard to see how such releases could disrupt local adaptations to the extent that it would damage the prospects for the population. Instead, the effects of such releases would be to restore genetic variants that could have been lost from the small population and to reverse local inbreeding. Moreover, the extent of disruption of any local adaptations would be greatest if the remnant population is allowed to become nearly extinct before genetic management was resumed. Waiting until the local population is extinct would actually ensure that any local adaptations that did exist would be lost, instead of remaining within a more variable gene pool that could continue to adapt to local conditions.

In contrast to the lack of evidence of notable genetic *isolation* of the Fennoscandia population, the extent of divergence of *frequencies* of genetic alleles does indicate that inter-population dispersal is rare enough that the populations are demographically independent (or nearly so) and should be considered to be separate conservation “management units.” Thus, the movement of individuals into the Fennoscandia population is not sufficient to provide significant demographic reinforcement of a declining population; nor reestablishment of a population following regional extirpation. This is especially so if, as suggested from the mtDNA patterns, most dispersal between regions is by males, with females being more philopatric. Dispersing males are as useful as are females for preventing genetic isolation and inbreeding, but they have little demographic impact. The fact that the population in Fennoscandia continues to decline is evidence that natural dispersal among regions is not sufficient to support that population if it is not protected as an independently vulnerable management unit.

There is a difference of opinion among the experts regarding whether the small and declining wild population in Fennoscandia is doomed to extinction if it is not supplemented. I have been involved with developing and assessing population viability models for a number of endangered species (but not for the LWfG). The probability of population recovery – after the causes of decline are removed – is a function of the population size, with very small populations being more likely to experience inbreeding depression, locally imbalanced sex

ratios and other difficulties in finding mates, vulnerability to disease epidemics or other local catastrophes, and other problems intrinsic to small populations. The size of population below which extinction becomes likely varies among species, based on life history, habitat characteristics, evolutionary history, and other factors. It is perhaps misleading to consider any given number to be a “critical” population size, as smaller populations are at greater risk, but there is no size below which a certainty of persistence changes to a certainty of extinction. However, for any given species and environment, the relationship between population size and extinction probability is amenable to analysis.

For relatively long-lived vertebrates (such as geese and most birds), I do not believe that the numbers that currently exist in the wild population of LWfG in Fennoscandia would allow classification of the population as either “doomed” or “safe”. (I.e., both sides of the debate seem to have overstated their case.) Many populations have recovered from even lower numbers, such as the whooping crane recovering steadily from a low of only $N=15$, after protective measures were implemented. However, the whooping cranes did suffer a significant loss of genetic diversity, and this is likely a cause of the observed high rate of genetic anomalies of development and high susceptibility to some diseases. If the current population of about 20-30 breeding pairs of LWfG is so low as to make damaging genetic impoverishment inevitable, then almost all captive populations of wildlife species would have to be considered to have no conservation value, as rarely are the captive stocks founded with more than 25-30 breeders. Fortunately, not very much genetic diversity is lost when a population goes through a bottleneck of about 20 pairs for one or a few generations. For example, 25 randomly breeding pairs would lose about 1% of its gene diversity (heterozygosity) per generation, allowing it to persist for 10 generations before it lost the 10% of gene diversity that has often been considered to be level of concern for stocks of wildlife or domesticated species. (Often, however, some pairs are much more productive than others, rather than there being a random distribution of breeding success, so actual losses of genetic diversity might be about twice this rate.)

On the other hand, we should not have confidence that the population of LWfG in Fennoscandia can recover without assistance. First, the current steady decline must be stopped, or else all other conservation actions will provide at best only temporary assistance. After stopping the decline due apparently to hunting mortality, the existing population may or may not be able to recover without supplementation. The persistence to today of apparently a single remnant male ivory-billed woodpecker and other examples of presumed species losses that have been avoided (or delayed) should not be taken to be evidence that that species or any species can recover from very low numbers. Florida panthers declined to perhaps only 10-20 breeding individuals for several generations, and the severe inbreeding effects were reversed only after intercrossing with another population. Black-footed ferrets had been presumed to have been rescued after a decline to only about 10 unrelated animals (and their offspring), but they are now showing declining reproductive success that most likely results from the inbreeding that occurred in the population bottleneck. The wild population of LWfG is approaching the level at which we might soon see dangerous effects of inbreeding, but the population should still be recoverable, especially if occasional natural or manipulated immigration from central and eastern populations occurs.

If a captive stock is used for supplementation of the wild LWfG, it would be wise (in light of the data discussed above) to initiate that stock with birds that are “pure” LWfG. Starting new stocks from birds captured in Fennoscandia or more eastern populations might be costly, but perhaps no more so than the extensive genetic testing that would be needed to derive a pure or largely pure population from existing captive stocks. In addition, existing captive stocks have not been managed to minimize genetic changes, so they may have adapted genetically to captivity in ways that include loss of species-typical breeding preferences that serve as isolating mechanisms. After a population is established, monitoring and genetic management of a captive population is not much more difficult or costly than maintaining a population

without attention to the pedigree, and can increase the genetic effectiveness of a breeding population several-fold relative to a stock that is not managed genetically. (I.e., a stock managed with the methods used for wildlife species in well managed breeding programs can lose genetic diversity as slowly as would an unmanaged population that is two or three times larger.)

Perhaps the most difficult issue facing the conservation and management authorities is to decide what to do with already released birds (and their descendants) that carry non-LWfG genes. It may not be possible to remove these birds or the hybridized genomes from the wild, especially if they have already further interbred with the remnant wild population. It is possible that species-isolating mechanisms have broken down in the hybrids, so that the released birds and their descendants might now provide a path for continued introgression of genes from GWfG into LWfG populations. Otherwise, the extent of introgression of non-LWfG genes into Fennoscandian populations is probably not so great that it will do long-term damage to the ecological and evolutionary future of LWfG in Fennoscandia. A very small amount of gene flow from closely related species is not an uncommon occurrence in natural populations. Future releases of documented LWfG, occasional immigration from central and eastern populations, and natural selection could all serve to slowly reduce the level of genetic contamination of the LWfG and restore the species to a genetically more natural condition.

Annex 10

Final Report of the AEWA Secretariat's negotiation mission in January 2007.

1) Main priority for the conservation of the LWfG

There was an overwhelming agreement between everyone involved in the discussions that the main priority for the conservation of the species should be oriented towards the wild populations breeding in Fennoscandia and Russia. There is a strong consensus that the draft SSAP should be revised and approved as soon as possible and large-scale activities on the ground in key areas for the wild populations should be launched as a matter of urgency and priority. Some of the countries are potentially interested in supporting the wild populations' conservation with necessary resources.

As suggested by Sweden, work on the SSAP should be performed and decisions should be taken in accordance with the commonly accepted scientific code. The work and the reasons for decisions should be accountable and transparent so that they can be subject to scientific scrutiny at any time. The same should apply to weaknesses and uncertainty in data, their analysis and interpretation.

2) Coordination of the implementation of the SSAP

As it is suggested by the current draft SSAP an International LWfG Working Group should be established. The AEWA Secretariat proposed that the members of this Group should be governmental representatives from all Range States who are free to bring in their own experts and use their support. It is proposed that the AEWA Secretariat will chair the Group. A detailed ToR for the Group will be developed by the AEWA Secretariat, approved by the Range States and endorsed by the AEWA Technical Committee. So far no party has expressed any objections to this proposal.

Norway has allocated NOK 250,000 to support a position of a Coordinator to be based in the AEWA Secretariat and invites Sweden and Finland to consider co-financing this post and make it full-time. Supervised by the AEWA staff, the Coordinator will be facilitating the Range States in the implementation of the SSAP. A similar approach proved to be very effective with other SSAPs. *(Note: It should be stressed that funds allocated by Norway for the position of a Coordinator for the SSAP will be enough to cover just a part-time position for one year. In order to secure continuous and quality service more funds will be necessary on annual basis in order to have in place a full-time position and optimal operational budget for a number of years. Unfortunately, the AEWA Secretariat with its current human and financial capacity cannot commit to provide coordination of implementation of the LWfG SSAP. As with regard to the chairmanship of the International LWfG Working Group, the AEWA Secretariat could efficiently fulfil this extra duty only if there is additional support staff at the Secretariat (the Coordinator for the SSAP) and supplementary budget for travel to meetings of the Working Group, if the latter take place outside of Bonn)*

3) Establishment of a captive breeding stock from wild Fennoscandian birds

Sweden again strongly called for the establishment of a gene bank from wild Fennoscandian birds in captivity. Sweden also offered to host the captive flock or to support Norway with expertise in setting up a breeding programme. Norway agrees to include a measure in the SSAP, which suggests the establishment of such a captive stock, subject to the conclusions of a feasibility study. They are considering options for doing that and would be interested in working with Sweden. Finland is in agreement.

4) Swedish captive breeding programme

Sweden required support for the continuation of their captive breeding programme. At the meeting Sweden agreed to carry on its captive breeding programme only with birds from the wild (captured in Russia), while the existing captive stocks, from which birds were introduced

into the wild in the past, will no longer be considered for any conservation action. The birds of that stock are still kept, but are not bred. The first shipment of eight wild birds from Russia was received in 2006 and another group of six birds was expected in mid-February this year.

Norway and Finland were not against the continuation of the Swedish captive breeding programme as long as it is entirely based on wild birds only.

As stressed by Sweden, using the available demographic data in a simple deterministic Population Viability Analysis (PVA) it becomes evident that the reproduction of the Fennoscandian (Norwegian) population is not enough to compensate for the annual mortality and prevent population from declining deterministically (unpublished). Conservation measures are urgently necessary to increase survival, i.e. decrease mortality, during the migration and overwintering period, which appear to be the bottlenecks for the trend of the Fennoscandian population. Some conservation measures are already ongoing, but more will be necessary, however, their quick success and efficiency are not guaranteed. In this respect, the captive breeding should be acknowledged and seriously considered as a strategy for securing the existence of the species in the wild through supplementation (or reintroduction).

5) Swedish free-flying flock

Currently there are approximately 70-90 free-flying birds, most or all of which are descendants of released individuals from the captive stock, birds of which were found to carry alien genes of the Greater White-fronted Goose. This flock breeds in the Swedish Lapland and winters in the Netherlands. The current draft of the SSAP suggests, following the CMS Scientific Council recommendation, that the free-flying flock should be captured or otherwise removed from the wild.

Sweden required no removal of the free-flying flock and acceptance of the release of purebred LWfG as a possible approach of reducing the potential risk of alien DNA introgression into the wild populations (so-called “dilution”). Sweden suggested that a discussion on the timing of such releases should be initiated in due time.

Sweden also pointed out, that seven Swedish wild birds were caught and were amongst the founders of the captive breeding stock. They estimated that the fraction of released captive-reared LWfG that might carry alien genes was 5-10% (*Finland stressed that this estimate is based on unpublished preliminary results and only a few individuals; they deem that a more relevant estimate, which was already published, would be 36%, based on the Swedish captive stock (see Ruokonen, M., A.-C. Andersson, H. Tegelström (2007). Using historical captive stocks in conservation. The case of the lesser white-fronted goose. Conservation Genetics 8: 197-207).*). According to the records, wild birds were seen in the area where the captive-reared birds were released a couple of years before the releases started in 1981 (one adult and four juveniles in 1979) and in June 1982 10 birds without rings were also seen (all released captive-bred birds from 1981 onwards were marked with colour rings). Further there are records of several more wild birds observed in areas and counties in northern Sweden different from where the releases took place.

During the course of the meeting Sweden accepted the proposal to undertake, as a matter of priority, a feasibility study for a refinement of the free-flying population. The aim will be to capture the free-flying birds, perform genetic analysis and remove from the wild the apparent hybrids, i.e. those birds, which have showed presence of any alien genes. It is however clear, that the currently available methods of analysis do not allow all hybrids to be revealed. Therefore, no complete refinement is possible, but the partial refinement will decrease the frequency of alien genes and alleviate the problem to some extent. For the actual capture of birds, Sweden may request support from Norway. Any actions with regard to the possible refinement should wait for the outcome of the feasibility study. As part of their study, Sweden will consider mapping breeding and moulting areas and migration routes through satellite

telemetry, as well as the financial implications and cost-effectiveness of the actions. In this respect, support from Norway may be requested too.

Norway agreed on the refinement option with the rest of the birds from the free-flying flock remaining in the wild. At the same time they required the establishment of a Committee for LWfG captive breeding, reintroduction and supplementation in Fennoscandia. This Committee should be a sub-set of the International LWfG Working Group, which includes governmental representatives of Sweden, Finland and Norway, who would be free to bring in their own experts and use their support. The AEWA Secretariat offered to chair that Committee. The Committee should act as a platform for agreed and coordinated action of the Fennoscandian countries with regard to the future of captive breeding and releases into the wild, taking full account of the development of the remaining wild Fennoscandian population. A ToR for the Committee will be developed by the AEWA Secretariat, approved by the three states (Sweden, Norway, and Finland) and endorsed by the AEWA Technical Committee. *(Note: Similarly to the International LWfG Working Group, the AEWA Secretariat would be in a position to efficiently chair the Committee for LWfG captive breeding, reintroduction and supplementation in Fennoscandia only if there is additional support staff at the Secretariat (the Coordinator for the SSAP) and supplementary budget for travel to meetings of the Committee, if the latter take place outside of Bonn)*

Finland also agreed with the compromise accepted by Sweden and strongly supported the establishment of the Committee for LWfG captive breeding, reintroduction and supplementation in Fennoscandia.

6) Pilot project for testing the method of reintroduction using ultra-light aircrafts

The German NGO “Aktion Zwerggans” has initiated the idea of leading captive-bred LWfG, by ultra-light aircraft, along a flyway parallel to the one of the current free-flying flock from the Swedish Lapland, but to the Lower Rhine area in North Rhine-Westphalia in Germany. This would be a pilot experimental two-year project. In 2005 the Swedish Environmental Protection Agency issued a permit, which allows “Aktion Zwerggans” to operate in Sweden on this pilot project. In the pilot project it is planned to use birds from existing captive stocks (the only available at the time when the permit was issued), but the permit requires them to be tested by three different methods for alien genes. However, no current method or even a combination of methods can guarantee that birds do not carry alien genes. It is also not guaranteed that during the flight no birds will deviate and escape into the wild, as it has happened in previous cases. Therefore, the risk of again releasing hybrid birds into the wild still exists.

At the meeting Sweden accepted the option of providing offspring of Russian wild birds from the new captive stock, which is being currently built up. This would require some postponement of the project, by at least three years, because no birds will be available earlier. Sweden was agreeable with the postponement of this pilot project.

Both Norway and Finland welcomed this compromise.

However, Sweden informed that they are not in a position to withdraw their permit, because they will be facing legal and economical consequences, which they would prefer to avoid. They expressed no opinion on if the German government could hold its permit, but highlighted that the project is valuable in providing an alternative and safer migration route and wintering site within the EU and in eliminating the risk of LWfG x Barnacle Goose pair-bonding in the new Swedish captive-bred LWfG.

The German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety initiated a consultation in March with representatives of the NGO “Aktion Zwerggans” and the main sponsor of the pilot project Allianz Environmental Foundation. As a result of this

consultation, it was agreed that the project will be postponed by three years and during this period it will seek international acceptance and in particular of the results of Dr. Wink's genetic analysis of captive and wild LWfG conducted in the framework of the project.

7) Other issues

A number of other points were raised, which concern the text of the SSAP. No objections were expressed to the proposed modifications:

- Reference to the BirdLife/EU evaluation of the 1996 Action Plan and conclusions of why the objectives were not achieved;
- Description of genetic impoverishment and inbreeding as a potential threat (*Note: A recent scientific publication suggests that genetic variability in the Fennoscandian population is as high as in the Russian population, thus despite its small size, the Fennoscandian population has no signs of inbreeding (Ruokonen, M., A.-C. Andersson, H. Tegelström (2007). Using historical captive stocks in conservation. The case of the lesser white-fronted goose. Conservation Genetics 8: 197-207); probable explanation of that could be found in another paper concluding that approximately half of the Fennoscandian males have mtDNA haplotypes that are otherwise found in Russian birds, thus suggesting that there is probably a regular influx of male birds from west Russia ensuring gene-flow, which is likely to reduce or eliminate possible harmful effects of inbreeding (Ruokonen, M., L. Kvist, T. Aarvak, J. Markkola, V. Morozov, I.J. Øien, E. Syroechkovsky Jr., P. Tolvanen, J. Lumme (2004). Population genetic structure and conservation of the lesser white-fronted goose (Anser erythropus). Conservation Genetics 5: 501-512);*);
- Quotations of the CMS Scientific Council recommendations should remain in the text and the SSAP should provide an audit trail of the process of negotiations and how the agreement over the SSAP was reached; a copy of the CMS Scientific Council recommendation should be appended to the SSAP;
- The SSAP should make a reference to Robert Lacy's proposal in his independent statement for the dilution approach (replenishing the free-flying flock with pure LWfG); a copy of the Robert Lacy's independent statement should be appended to the SSAP.

The AEWA Secretariat would like to make an additional point, which as we understood from our post-mission talks is also supported by other people from the four parties. By now it has accumulated a significant amount of genetic studies dedicated to the LWfG from various scientists, notably most publications and work, yet unpublished, produced by Andersson, Ruokonen, and Wink. However, conclusions of some of these studies seem to be to some extent discrepant or may be even contradictory to each other and thus leading to rather different views implying different conservation strategies. Therefore, we suggest that all available studies should be reviewed and evaluated by an independent population geneticist (or a team) with proper scientific expertise and experience (ideally in molecular DNA analysis of birds, conservation genetics and statistical proficiency). We believe that the conclusions of such an independent evaluation may help to unite the stakeholders around shared views and will be helpful in designing future conservation action.

Following the discussions with each party, the AEWA Secretariat would like to suggest the following eight conclusions, subject to final approval by the four parties, to be laid down in the final draft of the SSAP:

1. The parties agree that the main priority for the conservation of the LWfG is the preservation of the wild populations breeding in Fennoscandia and Russia and that the work on the SSAP and any decisions should follow the code of transparency and accountability so that they can be subject to scientific scrutiny at any time. The parties will be considering support for conservation on the ground along their flyways.

Particular attention shall be paid to mortality due to hunting and urgent targeted measures should be implemented to reduce the magnitude of this threat, the success of which shall be promptly and regularly reviewed and evaluated. Supplementation with captive-bred birds should be considered if other conservation measures are not as quickly efficient as needed and should populations continue to decline. As with any other captive breeding, reintroduction or supplementation initiatives this project will be subject to consideration by the Committee for LWfG captive breeding, reintroduction and supplementation in Fennoscandia (*see conclusion 3 below*). The efficiency of conservation measures is to be assessed by the International LWfG Working Group (*see conclusion 2 below*).

2. The parties agree that an International LWfG Working Group should be established, consisting of governmental representatives of all Range States, who would be free to bring in their own experts and use their support. The group will be chaired by the AEWA Secretariat (*efficient chairmanship would be possible only if additional support staff (coordinator for the SSAP) and supplementary budget are made available to the Secretariat*) and will operate in accordance with ToR developed by the AEWA Secretariat, approved by the Range states and endorsed by the AEWA Technical Committee.
3. The parties agree on the establishment of a Committee for LWfG captive breeding, reintroduction and supplementation in Fennoscandia, consisting of governmental representatives of Sweden, Finland, and Norway, who would be free to bring in their own experts and use their support. The Committee will be chaired by the AEWA Secretariat (*efficient chairmanship would be possible only if additional support staff (coordinator for the SSAP) and supplementary budget are made available to the Secretariat*) and will operate in accordance with ToR developed by the AEWA Secretariat, approved by the three states and endorsed by the AEWA Technical Committee.
4. The parties agree that a captive stock of wild Fennoscandian birds should be established, subject to the conclusions of a feasibility study. The long-term future of all captive breeding programmes will be reviewed by the Committee for LWfG captive breeding, reintroduction and supplementation in Fennoscandia.
5. The parties agree that the Swedish captive breeding programme could carry on as long as it is based on wild birds only. The long-term future of all captive breeding programmes will be reviewed by the Committee for LWfG captive breeding, reintroduction and supplementation in Fennoscandia.
6. The parties agree that the current free-flying flock, breeding in Sweden and wintering in the Netherlands, will remain in the wild, subject to genetic screening and refinement, i.e. removal of apparent hybrids, which will be undertaken following the conclusion of a feasibility study. Further on the dilution with purebred birds is considered a principally viable option. The long-term future of all reintroduction and supplementation programmes will be reviewed by the Committee for LWfG captive breeding, reintroduction and supplementation in Fennoscandia taking full account of, amongst others, the success of conservation actions, including revival of the wild Fennoscandian population, and other pertinent factors. Decisions regarding the Swedish free-flying population should also take into account the conclusions of the independent review and evaluation of available LWfG genetic studies (*see conclusion 8 below*).
7. The parties agree that the implementation of the pilot experimental project of the NGO “Aktion Zwerggans” will be postponed by three years. As with any other captive breeding, supplementation or reintroduction initiatives this project will be subject to

consideration by the Committee for LWfG captive breeding, reintroduction and supplementation in Fennoscandia.

8. The parties agree that a review and evaluation of the existing genetic LWfG studies by an independent expert(s) with proper scientific expertise and experience (ideally in molecular DNA analysis of birds, conservation genetics and statistical proficiency) should be undertaken. This work will be commissioned by the AEWA Secretariat to an independent expert(s) selected by the Secretariat too. The conclusions of this independent evaluation will be submitted to the Committee for LWfG captive breeding, reintroduction and supplementation in Fennoscandia and the International LWfG Working Group for their consideration.

All the four parties involved in the negotiations commented on the mission report and its conclusions circulated in late January (first draft), late May (second draft) and early July (third last draft) and their conclusions were incorporated as much as possible in this final report. This final report was agreed by representatives of the four parties.

The Secretariat is grateful for the good spirit of the negotiations earlier this year. We would like to thank you for your cooperation in this respect and we are looking forward to finalising the International Single Species Action plan and more importantly to starting its implementation with the aim to conserve the Lesser White-fronted Goose.



UNEP/AEWA Secretariat
UN Campus
Hermann-Ehlers-Str. 10
53113 Bonn
Germany
Tel.: +49 (0)228 815 2413
Fax: +49 (0)228 815 2450
aewa@unep.de
www.unep-aewa.org