



NORWEGIAN DIRECTORATE
FOR NATURE MANAGEMENT



DN-report 4-2011

Norwegian action plan for the Lesser White-fronted Goose *Anser erythropus*

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EKSTRAKT:

Denne handlingsplanen presenterer mål og tiltak for forvaltning av dverggås *Anser erythropus*. Hovedmålet med planen er å sikre at dverggåsa ikke forsvinner som norsk og nordisk hekkefugl. På lengre sikt er målet en bestand på minst 1000 individer i Fennoskandia.

Foreslalte tiltak omfatter blant annet fortsatt kontinuerlig forvaltning, kartlegging og overvåking av raste- og hekkeområder i Norge, reproduksjonsfremmende tiltak, økt forskningsaktivitet, økt samarbeid mellom nasjonale myndigheter for å hindre utilsikret felling langs trekk ruta og utarbeide en gjennomførbarhetsanalyse for avl.

ABSTRACT:

This action plan present goals, actions and other measures for the management of the Lesser White-fronted Goose *Anser erythropus* in Norway. The main goal for the action plan is to stop further decline in the population.

Measures proposed in this plan include continued management, mapping and monitoring of important habitats both breeding and staging grounds, securing reproduction in core breeding grounds in Norway, continued and increased research activities, increased cooperation between countries, completion of a feasibility study to determine the possible establishment of a captive population for restocking of the wild Fennoscandian population.

EU-LIFE and Natura 2000.

The Directorate for Nature Management, Norway (DN) was a project partner in the EU LIFE-Nature Project LIFE05 NAT/FIN/000105. The duration of the project was 1 April 2005 – 31 March 2009 and was funded by the EU-LIFE –Nature fund and the partners of the project.

The objective of the project was to improve and monitor the conservation status of the Lesser White-fronted Goose (*Anser erythropus*, LWfG) at the most important breeding, staging and wintering sites along the European flyway of the critically endangered Fennoscandian LWfG breeding population.



Foreword

The Lesser White-fronted Goose is critically endangered. The species may disappear as a breeding bird in Fennoscandia within a few years. In both Fennoscandia as well as elsewhere within the rest of its range, the species has undergone a negative population development. This has resulted in a reduction in population size, and the species no longer occurs in historically important sites in Fennoscandia. The reasons for the negative population trend are many, and different factors are appropriate in different parts of the population's range. This entails that no single measure will provide results. In order that to reverse the negative population development to a positive one, a number of different measures need to be implemented, both in Norway as well as in other range states.

In recent years, increasing awareness (both nationally and internationally) has helped to build the foundations to prevent the extinction of the Fennoscandian population of Lesser White-fronted Goose. Key knowledge has also been greatly improved. This provides better grounds for correct management, and prioritising of measures. Establishing and operating of a species action plan is an important step towards identifying measures, delegating responsibility, and controlled achievement of goals. This action plan is, therefore, a document for use in both future work tasks and the use of administrative and economic resources.

A Norwegian action plan for the species has little value if it only focuses on measures within Norway. Norway has been also been active at an international level for many years. The establishment of an international Single Species Action Plan (SSAP) for the Lesser White-fronted Goose in 2008 was therefore an important basis for international negotiations, and for measures both in Norway and the rest of the distributional area. Between 2005 – 2008, Norway participated in an EU-LIFE project with a view to safeguarding the European migration route for Lesser White-fronted Geese. The current Norwegian action plan was also part of that work.

The species inclusion on the 2006 Norwegian Red List (as Critically Endangered – CR) leads to a need for visible focus and a secure guarantee of measures needing implemented to improve the situation.

Extensive work on improving our knowledge, in particular thanks to the Norwegian Ornithological Society (NOF/BirdLife Norway), provides the basis for the measures and guidelines which are detailed in the action plan. For information about the species and further details see NOF-report 3-2008, which is included as an appendix to this action plan.

The action plan also anticipates that both national authorities, voluntary organisations and international fora work towards a common goal to provide the Lesser White-fronted Goose with better conditions in the future.

Yngve Svarte
Director of Species Management Section

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Summary

The fate of the Lesser-white-fronted goose is uncertain. Despite various management actions the population is still declining, and it is clear that further efforts are needed both on the local, national and international scale. The species is now non-existent in a large number of previously important breeding and staging areas in Norway. There is a multitude of underlying causes which have resulted in the present status of the population. These cannot be addressed one by one, but must be coordinated. In several cases previously important areas are not available to the geese, or their value is diminished due to changes in the general land use, and increased disturbance. Different negative causes are present in different areas. Therefore it is not possible to single out one line of action that will bring the population back from the abyss. On the contrary, several state governments and stakeholders will have to make a coordinated and broad scale effort to be able to affect population positively.

Luckily, the population of Lesser White-fronted geese has been on the receiving end of a dramatic increase in interest in the last few years. This gives both management authorities and other stakeholders a better opportunity to target effective measures towards stopping the population decrease, and slowly turn the situation for the Lesser White-fronted goose.

In Norway, the use of national action plans are widely used for defining and focusing management actions. The national action plan for the Lesser White-fronted goose in Norway aims to give all parties a tool to allocate work-load, and define the administrative and economic strength that is necessary to ensure that Norway does it's part of the joint effort to restore a viable population of the species.

Contents of the plan

The plan has an overall short-term goal to stop further decline in the population. This should be achieved within a 5-year perspective. In a longer perspective the population should be brought back to a minimum of 1000 individuals.

As Norway still holds a significant number of the breeding pairs left in Fennoscandia, the plan clearly states the responsibility Norway has at the moment. The plan also gives specific national actions to be

carried out irrespectively of the implementation of management actions in other countries. The planned actions are comprehensive, both with regard to local, regional and national involvement of bodies, and in tasks to be carried out. The main focus will be on:

- Continued conservation of habitats, both currently in use and of former historical value
- Continued and increased monitoring efforts in staging and breeding grounds
- Securing reproduction in core breeding grounds in Norway.
- Continued and increased research activities to unveil more information on demographic factors and more information on breeding, staging and wintering grounds.
- Continued and new awareness campaigns
- Increased cooperation between countries and management bodies
- Completion of a feasibility study to determine the possible establishment of a captive population for restocking of the wild Fennoscandian population
- Implementing restrictions on actions/disturbance adverse to the Lesser White-fronted goose in staging and breeding areas

Implementing these actions is a national responsibility, and will be continuously adjusted according to monitoring results and scientific knowledge. The management authorities in Norway will have to take the costs of these actions.

The Lesser White-fronted goose will not be saved by actions in Norway alone. The flyway range states are all necessary elements in a joint effort to hinder a further population decline, and to restore the population. The national action plan for Norway fully recognizes and supports the value of the International Single Species Action Plan for the lesser White-fronted goose as the main document and guidelines for a multilateral approach between range states. The Norwegian plan also strongly supports the necessity of a strong secretariat under African-Eurasian Waterfowl Agreement (AEWA) coordinating and facilitating multilateral approaches.

The plan also focus on the bilateral work between states, and especially between Norway, Sweden and Finland. The Nordic countries have a history of close and coordinated effort to achieve our common goals, and this will be a specific challenge

in the conservation of the Lesser White-fronted goose. The plan also points to the possibility of including the Lesser White-fronted goose into other bilateral environmental agreements, as an additional financing mechanism, and to raise the interest of other parties.

It is recognized that management actions in Norway must be supplemented by actions in other range states, partly because some of the main mechanism behind the population decline occur in staging and wintering areas outside Norway. The plan therefore outlines the use of "seed-funds" made available to the AEWA-secretariat if an action in a range state is viewed as beneficial or more effective to the overall aims in the National plan for Norway, than actions in Norway alone.

The plan also allows for a possible establishment of a captive population for future management options if the conservation of the current wild population fails.

The plan is implemented immediately by the Directorate for Nature Management. Actions such as monitoring and area conservation efforts are kept running continuously. The implementation of predator control in breeding areas will be subject to an annual evaluation. Other more long term aspects will be reviewed after the first 5 year period. The plan is also considered to be dynamic, and new measures may be implemented directly without revision of the plan. Considering the increase in knowledge in the last few years, it is expected that better monitoring and experience with listed management actions will give further indications as how to target effective measures.

The Norwegian national action plan for Lesser White-fronted goose is long overdue. This does not mean that actions have been put on wait in Norway. The finalisation of the international action plan combined with the results from the joint Lesser White-fronted goose LIFE-project, has paved the way for a more effective and targeted plan.

1 Introduction

Up until the middle of the last century, the Lesser White-fronted Goose was common throughout Fennoscandia, with a population of over ten thousand birds. Following a severe population decline, the Lesser White-fronted Goose was protected in Norway in 1970. The reasons for the serious decline are many, and not only related to the situation in Norway. A combination of a number of factors throughout the species' range has contributed to the decline. The effects have resulted in considerably focus upon this population, and the species has in recent years featured in several international protection measures. As the species migrates through several countries, the Lesser White-fronted Goose has been treated in several estimates of its' status both nationally as well as internationally.

In Norway, the Lesser White-fronted Goose is one of five bird species with status Critically Endangered (CR) on the Norwegian Red List, wherein 230 species are considered according to the degree of threat. The other four species in the same category are Corn Crake, Ortolan Bunting, Barred Warbler and Common Guillemot.

During migration the Lesser White-fronted Goose occurs in several countries. Few of these are signatories to the various agreements concerning the Lesser White-fronted Goose, although almost all these countries have obliged to protect the species through one or more of these agreements (the only exceptions are Russia and Iraq).

In autumn 2008, an international action plan was adopted for the species at the 4th Meeting of the Parties of the Waterbird Agreement - Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA) Footnote 1 -, see Single Species Action Plan for Lesser White-fronted Goose (SSAP) Footnote 2. As recommended in that plan, the parties of the Waterbird Agreement shall develop their own national action plans, based upon the international action plan. This current Norwegian action plan is a result of this.

The Norwegian Ornithological Society (NOF/BirdLife Norway) has played a central role in work to monitor the population in Norway, has carried out projects in several countries, and exercised a considerable amount of effort relating to the conservation of the species both nationally and internationally. Norway

has also been an active participant in an EU-LIFE project for the species “Conservation of the Lesser White-fronted Goose on the European Migration Route” in the period 2005 – 2009. The project was directed by WWF-Finland in close cooperation with nine other bodies, including NOF/BirdLife Norway and the Norwegian Directorate for Nature Management (DN). Important goals for the project have included identifying important breeding areas and safeguarding these, removal of major threats (in particular illegal hunting), as well as population monitoring. The project has focused on sites in Norway, Finland, Estonia, Hungary and Greece. Satellite tracking has been used to follow Fennoscandian geese, national action plans have been developed in Finland, Estonia and Norway, habitat management has been conducted at staging sites in Estonia and Hungary, and not least information about the species and monitoring work on the Fennoscandian population has been produced. The Norwegian action plan is also part of the same project.

The Norwegian Directorate for Nature Management has pursued the work on Lesser White-fronted Geese in Norway as well as in other countries for a number of years, and has also financed international work on the species. In 2008 and 2009 the directorate has financed a full-time post for following up international work on the species. The post is located at the secretariat of the Waterbird Agreement (AEWA). In order to ensure a broad international commitment, a reference group will be established to oversee the work on the international action plan. The group will comprise of representatives from countries within the distributional range as well as experts on the species. In addition, a working group has been established regarding captive breeding and restocking of Lesser White-fronted Geese. The group includes representatives from Norway, Finland and Sweden. Germany has status as observer

in the group and also houses the Secretariat of the Waterbird Agreement. The first meeting of the group was held in Bonn in May 2008, and the second meeting at Nordens Ark in southern Sweden in September 2009.

2 Measures implemented

A joint assessment of relevant measures in relation to conflicts and protection of geese was completed in 1996 (*Handlingsplan for forvaltning av gjess i Norge* (DN-Rapport 1996-2)). Both the plan itself as well as the international measures proposed followed the recommendations in the at that time valid international action plan Footnote 3. The Lesser White-fronted goose was also considered here, with the following aims defined:

Main aims:

- Lesser White-fronted Geese shall be managed as a particularly vulnerable and demanding species, and consideration of the species' continued survival in Norway requires both special attention and specific measures at both individual and habitat level.
- Norway ought to actively work towards the aims defined in the international action plan for the Lesser White-fronted Goose.
- It is important to protect both existing as well as former staging, breeding and moulting areas for the geese.

Objectives:

- That a clearly defined monitoring programme is established that shall provide annual overviews over population status and development in Norway.

Table 1. Protection status for the Fennoscandian population of Lesser White-fronted Goose.

	Status
Norwegian Red List	Critically threatened (CR), C1
IUCN 2008	Globally threatened - Vulnerable (VU) A2bcd+3bcd+4bcd
BirdLife International	Species requiring global conservation measures
EU Bird Directive	Annex 1: Protected
Waterbird Convention	Column 1: Species requiring species action plan
Bern Convention	List 1: protection of both species and its living quarters

- Habitat damage in both current as well as former known areas used by Lesser White-fronted Geese must be avoided.
- Release of captive birds and manipulation of migration routes must be avoided.
- Release of captive birds and manipulation of migration routes is not permitted in Norway. This is assessed in the light of such measures in Finland and Sweden and recommendations in the action plan.
- Consideration needs to be made regarding restrictions in important areas for Lesser White-fronted Geese. Such may include area protection measures, access restrictions, a ban on fishing and a ban on fish stocking.
- An active effort shall be made to map migration routes, staging areas and wintering areas for birds that breed and/or stage in Norway.
- The staging area at Skjåholmen in Finnmark must be given suitable protection status and access restrictions at Valdak Marshes (Valdakmyra) ought to be enforced during autumn migration.
- Protection of breeding areas in Finnmark should be considered.
- An examination of historical material and a check on source material must be undertaken to provide information on areas formerly used by Lesser White-fronted Geese.

Practical measures:

- Areas of special importance, including all known staging areas, must be taken care of via protection measures in accordance with the game and conservation laws. Other potential areas, including former known staging areas, ought to be secured through the Planning and Building Act, in order to maintain their value and function in the event that the negative population development should be reversed.
- There is an urgent need for speedy and effective following up of the measures suggested in the action plan for the Lesser White-fronted Goose.
- Information about the Lesser White-fronted Goose shall be spread via relevant channels in order to improve awareness about the species.

Responsibility:

- The Directorate for Nature Management (DN) is responsible for the establishment and coordination of a national monitoring programme, as well as an examination of older information material.
- The County Governors offices are responsible for following up monitoring, as well as in suggesting special measures in relation to securing valuable areas.

Measures suggested in 1996 have received considerable focus, and have been followed up as regards management. This has, however, not been enough to prevent a continued population decline, especially due to a continued high mortality among adult geese. Experience from monitoring as well as concrete evidence indicates that illegal hunting or misidentification at staging and wintering areas is a strong influencing factor.

Securing of breeding areas, as well as a reduction of negatively influencing factors there, are considered of paramount importance in improving both adult survival as well as high reproductive production.

Since the targets and measures were presented in 1996, knowledge on Lesser White-fronted Geese has improved considerably, and this in turn provides an even better basis for directing measures, both those formerly implemented as well as new measures. The Norwegian Ornithological Society (NOF/BirdLife Norway) has, in an examination of currently available information (see attached document), identified elements of the negative factors that together have led to the population decline. In future, management authorities must increasingly decide which measures can be carried out from the Norwegian side alone and which are Norwegian responsibility, and which measures require cooperation with other countries and other bodies outside Norway. Such measures need to be carried out as soon as possible and as quickly as possible. It shall also be possible to simultaneously quantify the effects of these measures.

As the Lesser White-fronted Goose is a migratory species, a number of factors influence the remaining population such as varying conditions along parts of the migratory route, and different management regimes throughout the distributional range. NOF have, in Figure 1, identified the most important factors which together have led to a population reduction. These factors are grouped according to

reduced adult survival, reduced production, habitat reduction and negative genetic influences. Some of these influences are relatively easy to alter, whereas others may be related to global climate change.

Climate change may have an important effect on tundra vegetation, which for Lesser White-fronted Geese means changes in available food and loss of suitable sites. In future, the effects of climate

change will be unpredictable and measures will need to be dynamic in order to address the situation together with other concrete protection measures. The development of new measures and increased efforts must therefore focus upon quick actions and achievement of goals.

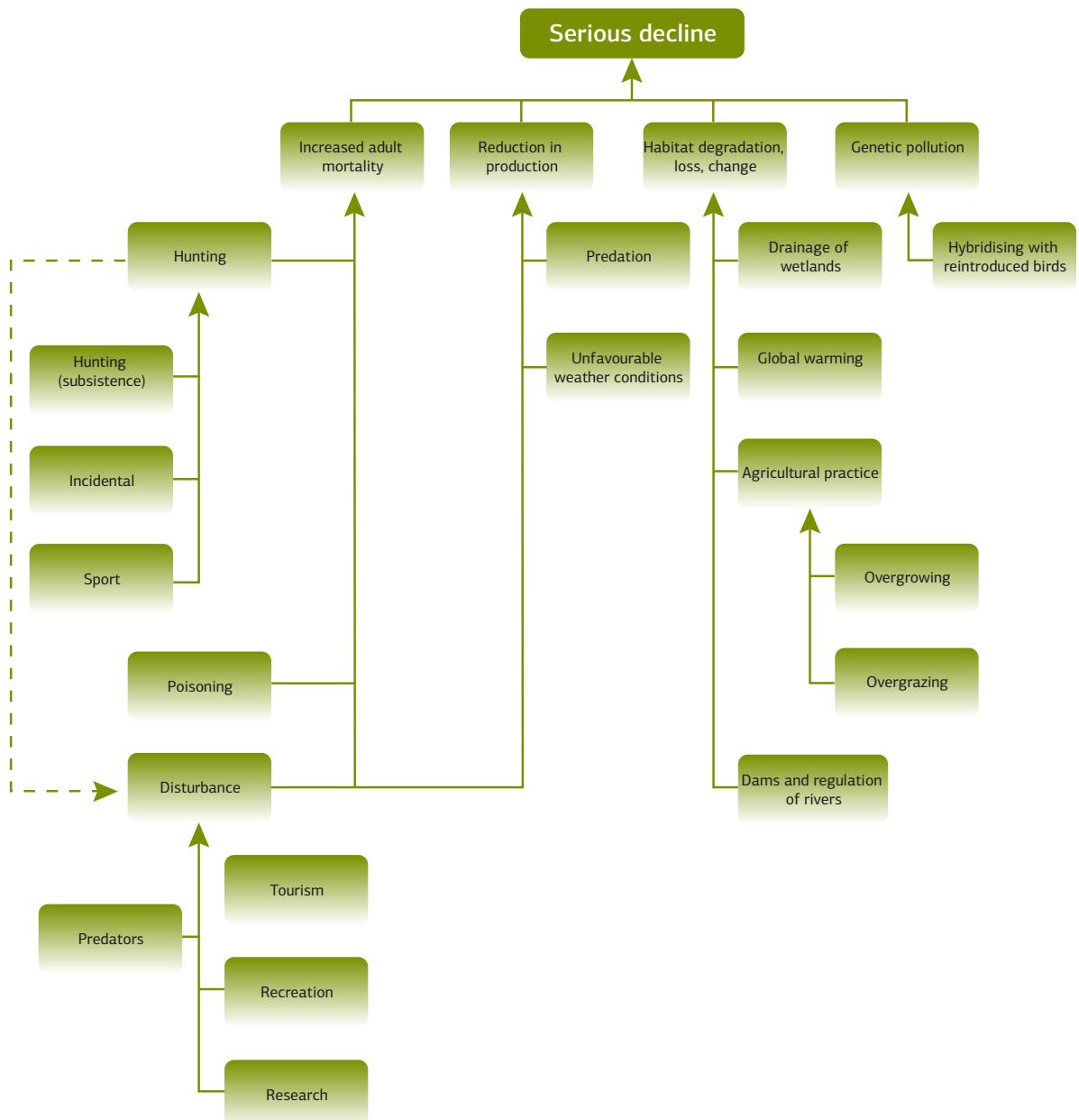


Figure 1. Flow chart of threats throughout the range of the Fennoscandian population of Lesser White-fronted Geese. See attached report for details.

3 Aims and priority measures

The main objective for managing the Lesser White-fronted Goose and its living quarters is to ensure that the Lesser White-fronted Goose does not disappear as a breeding bird in Norway and the Nordic countries.

The population decline shall be stopped by 2015. In the long term the goal is a population of at least 1000 individuals in Fennoscandia.

Bearing in mind the current factors threatening the Lesser White-fronted Goose population, it is necessary to focus upon measures to prevent a continuing population decline and to prevent that the remaining population dies out. Such an event would result in a situation where it would be virtually impossible to reestablish the Fennoscandian breeding population and its' traditional migration routes.

The main objective of the action plan is to safeguard the wild Fennoscandian population, which today is the last remaining fragment of a former larger and more widely distributed population.

In accordance to the international action plan, we must stop and reverse the negative population trend. The goal is to establish a population of at least 1000 individuals in Fennoscandia, such that the species is less vulnerable to external influences that determine the species existence as a breeding bird in Fennoscandia, with traditional migration routes.

3.1 Measures within Norway

Owing to the fact that Norway and the Kola Peninsula are the only areas in Fennoscandia with a remaining population of breeding Lesser White-fronted Geese, Norway has a special responsibility in safeguarding the species. National priority measures with focus on the Norwegian responsibility, as well as the role of the Norwegian authorities are therefore central in ensuring that the common aims are met. Measures in Norway can be implemented with own resources and national laws. It is therefore important to address national measures in particular. Achievement of national aims can, at a later stage, be used in relation to international priorities, and to support how measures in Norway influence other countries and vice versa. In order

to succeed, work on Lesser White-fronted Geese in Norway requires enough resources, both in terms of manpower and finances. Initially, the project period covers 5 years, but must be seen in the context that the expected time perspective may be 20 years in order to reach the objectives, due to the great need for measures in other countries along the flyway and in the wintering areas.

The defined national objectives of stopping the population decline and the long term objective of an increase in population size to 1000 individuals shall be achieved through the following measures:

- Securing breeding and staging areas against damage and disturbance.
- Revision of hunting regulations to prevent unintentional killing.
- Measures to reduce predation at breeding and staging areas.
- Establish information systems and identify gaps in knowledge and resources.
- Establish a national monitoring programme for the Lesser White-fronted Goose.



Red Fox is a potential predator on breeding Lesser White-fronted Geese and attempts to reduce Red Fox numbers have been carried out since 2007.

Photo: Morten Ekker / DN

Details of each of the different measures

- Securing breeding and staging areas against damage and disturbance.

Establish a management plan for staging and breeding areas. Factors to be considered are restrictions on access, area management and monitoring of nature types in terms of development and quality. Furthermore the staging and breeding areas must be protected against increasing activities and encroachment. All breeding and staging areas in Norway should be protected either through the national wildlife laws or regulation of access under the Game Act. Suitable measures will be considered based upon local conditions. Areas formerly used for either breeding or staging should be considered as to whether suitable for protection and singled out against development in accordance to the Planning and Building Act.

The living quarters for the population are also under threat in Norway. Two factors are important:

1. Breeding, staging and other areas which may have an important function for Lesser White-fronted Geese need to be safeguarded against changes in management or fragmentation. Examples of activities which can create problems include building of holiday cabins, roads or other technical installations such as power lines.

Existing technical installations in relevant areas should be mapped and a plan be made to remove or modify these, based upon presumed effect on Lesser White-fronted Geese. The plan should be developed in cooperation with the relevant authorities.

2. Access restrictions are an important tool to avoid disturbance in areas that have a central function for the population. Disturbance during the breeding season from, amongst others, tame reindeer and activities relating to reindeer management could have fatal consequences for reproductive production. The same applies to activities such as fishing, hunting, motorised traffic and tourism. During the critical period when they build up their condition in spring, Lesser White-fronted Geese are extremely vulnerable to this type of disturbance. Displacement caused by disturbance from safe staging sites to sites that are less safe, may also result in increased mortality from illegal hunting, often as a result of poor knowledge on identification of quarry and non-quarry species.

Establishment of access restrictions should be established in protected areas where there are no such previous restrictions. In areas without any form for protection, access restrictions must be considered in connection with proposals for protection or other safeguarding of sites. Landing with seaplanes and helicopters ought to be avoided, and use of motorised transport (e.g. ATVs) within staging and breeding areas when Lesser White-fronted Geese might be present should also be avoided.

Key resources to help achieve the objectives outlined above include the law on biodiversity (area protection, priority species, and access restrictions). Cooperation with landowners, reindeer managers and other key interest groups is also central towards meeting these objectives. Wardening needs to be increased to enforce restrictions.

- Revision of hunting regulations to prevent unintentional killing.

Wardening at staging and breeding areas needs to be increased. Plan for wardening at staging and breeding areas will be established with the State Nature Inspectorate (Statens Naturoppsyn - SNO) and the department of environment at the County Governors' office.

Ban on hunting in relevant areas. Hunting of other wildfowl species, and in particular in relation to hunting of geese and the effect or potential conflict regarding protection of the Lesser White-fronted Goose, needs to be assessed and measures put in place. Introduction of hunting bans in areas used by Lesser White-fronted Geese. Due to the risk of unintentional shooting of Lesser White-fronted Geese, a ban on hunting of Greylag Geese in inland areas of Finnmark was enforced, following a revision of shooting seasons for the period 2007 – 2012. At the same time, a ban was also enforced on hunting of Pink-footed Geese throughout Finnmark. In order to improve the effectiveness of policing of the ban on goose hunting, a ban on all wildfowl hunting ought to be enforced on the inner part of the Porsanger Fjord between 20th August – 15th September.

End of spring hunting. There is a need to evaluate whether spring duck hunting in Kautokeino municipality can continue in parts of the main breeding area for Lesser White-fronted Geese within the municipality. Spring hunting which creates conflicts with Lesser White-fronted Geese must cease. Wardening of relevant areas and at relevant times must be intensified. As regards illegal hunting in

spring and unintentional killing of Lesser White-fronted Geese internationally, Norway should, on a legal basis, seek to end the traditional spring hunting of ducks.

- Measures to reduce predation at breeding and staging areas.

Provide the State Nature Inspectorate (SNO) with enough resources to carry out predator control in the breeding areas, in particular towards Red Fox and Great Black-backed Gull. Control of Red Fox numbers was undertaken for the first time in 2007 in and around the core breeding area in Finnmark.

- Establish information systems and identify gaps in knowledge and resources.

There is a great need, both nationally as well as international, for improved information about the Lesser White-fronted Goose, in particular directed towards those that come in direct contact with the species. There are needs to provide better information at both national and international levels. In Norway, it is particularly important that interested parties dealing with the protection of Lesser White-fronted Geese work together following a common strategy, and with continuous exchange of information. It is important that measures implemented are widely agreed upon amongst all parties, and that drafting and prioritising of measures and measurement of effects are firmly rooted among parties.

Produce a national action plan

The Norwegian authorities shall produce a national action plan in 2009.

Support the production of an international action plan

The Norwegian authorities shall support the production of the new international action plan as approved in October 2008.

Need for more international information

The Norwegian authorities shall support information campaigns along the international flyway and in the wintering areas. Measures may include local arrangements, production of printed material, training of personnel etc.

Produce a Norwegian brochure

The Norwegian authorities shall produce a brochure aimed at hunters and the general public, with special focus on measures necessary to protect the Lesser White-fronted Goose in Norway.

Establish a national website

The Norwegian authorities will, in collaboration with relevant information systems, highlight bilateral / multilateral cooperation and national activities. The website www.piskulka.net will contribute to an increased flow of information multilaterally and information regarding work on the Lesser White-fronted Goose will be continually updated.

Mapping / monitoring of breeding sites

Mapping and monitoring of former and potentially new breeding sites both in Norway and elsewhere in Fennoscandia (including the Kola Peninsula in Russia) shall continue in order to improve population estimates and assessments of the situation.

The Norwegian authorities shall continually assess the need for new studies and look at these in relation to the objective of increasing the wild population of Lesser White-fronted Geese. Such studies may be on predator – prey relationships, mapping and monitoring of vegetation over a period of time or studies around reindeer grazing and the effects on Lesser White-fronted Geese.

- Establish a national monitoring programme for the Lesser White-fronted Goose.

Norwegian monitoring of spring and autumn migration shall continue at today's current level. Monitoring will provide data on reproductive success and on survival. Intensify monitoring of breeding sites to monitor traffic and other types of disturbances. Continue mapping and monitoring of former and potential new breeding sites in Norway to improve population estimates and assess the situation.

3.2 Measures in other countries and international cooperation

It is unrealistic for Norway alone to achieve the long-term objective of establishing a Fennoscandian population of at least 1000 Lesser White-fronted Geese without investing considerable resources on measures outside the country boundaries. It is also unrealistic to stop the population decline without efforts in other countries to reduce the factors threatening the population along the migration routes.

Norway must therefore actively work together with authorities and organisations in other countries,

such that resources are utilised as effectively as possible, and the effect of measures are as effective as possible in relation to the short-term objective of preventing a continued population decline, and the long-term increase in size of the population.

Within the framework of international cooperation, Norway must focus on forming strategic alliances with authorities in other countries where these have better possibilities to influence the situation than Norway. Countries which are particularly important cooperative partners are Sweden, Finland, Estonia, Russia, Kazakhstan, Hungary, Ukraine, and Greece. With the exception of Sweden, these countries are used by migrating Lesser White-fronted Geese from the current Fennoscandian population. Other countries may also be important, dependent upon which areas Lesser White-fronted Geese use in the future.

The defined international objective of stopping the population decline and the long-term objective of increasing the population to at least 1000 individuals shall be achieved through the following measures:

- Work to restrict hunting in areas used by Lesser White-fronted Geese, strengthen cooperation with other countries and other organisations.
- Carry out a population viability analysis in 2010.
- Contribute to printing, distribution and implementing of the international action plan in other countries.
- Produce a brochure on protection of Lesser White-fronted Geese, translated into various languages.
- Contribute towards the continuance and further development of an international website about the Lesser White-fronted Goose.
- Ensure that information about the Lesser White-fronted Goose and projects are included in bilateral environmental cooperative ventures.
- Improve national and international cooperation.
- In cooperation with Sweden and Finland, create an ex-situ conservation measure by establishing common breeding material from Lesser White-fronted Geese in case of the need for captive releases.
- Develop a monitoring programme as the primary source of data on Lesser White-fronted Geese from the whole of the distributional range within 2013.

Details of each of the different measures

- Work to restrict hunting in areas used by Lesser White-fronted Geese, strengthen cooperation with other countries and other organizations.

Contribute to reducing threats from illegal hunting and improve wardening in protected areas along migration routes. Norwegian authorities must contribute financially towards work to improve wardening, educating and spread of information in important staging and breeding areas along the international migration routes for Lesser White-fronted Geese.

Reduce illegal / unintentional killing along the migration routes. Norwegian authorities must contribute to projects where international hunting organizations (CIC/FACE) work together with local hunting organisations, both to improve training of hunters and improve legal requirements for hunters in East-European countries to reduce illegal / unintentional killing.

Improve wardening and management of protected areas internationally. Norwegian authorities must contribute towards improving the establishment of protected areas, improve manpower in existing protected areas, improve education of personnel and improve enforcement of both hunting regulations and conservation / protection laws. This applies in the main to countries outside the EU, and in particular Russia, Kazakhstan and Azerbaijan.

- Carry out an analysis of survival in 2010.

Norwegian authorities shall continually consider the need for new studies and see these in relation to the goal of increasing the wild population of Lesser White-fronted Geese.

Study of long-term survival. A survival analysis (Population Viability Study – PVA) carried out as soon as possible.

In relation to the PVA, complete a feasibility study for rearing and releasing of Lesser White-fronted Geese.

- Contribute to printing, distribution and implementation of the international action plan in other countries.

Support the production of an international action plan. Norwegian authorities shall support the production of the new international action plan as approved in October 2008.

- Produce a brochure on protection of Lesser White-fronted Geese, translated into various languages.

There is a need for more international information. Norwegian authorities shall support information campaigns along the international migration routes and on the wintering grounds. Measures may include local arrangements, production of printed material, training of personnel etc.

- Contribute towards the continuance and further development of an international website about the Lesser White-fronted Goose.

Norwegian management authorities will, in close cooperation with relevant information systems, highlight bilateral / multilateral cooperation and national activities, according to the CHM-mechanism Footnote 4 which shall ensure that information is easily available to the relevant parties.

- Ensure that information about the Lesser White-fronted Goose and projects are included in bilateral environmental cooperative ventures.

Contribute to improved knowledge about migration routes and the problems encountered along the migration routes. Norwegian authorities must contribute to projects which improve knowledge on migration routes, population situation and which threats are involved.

Improve Norwegian aid development agreements. Where relevant, contribute such that Norwegian cooperation in the environmental sector is safeguarded, and improve work on Lesser White-fronted Geese in relevant countries. This applies in particular to the current agreement on the environment between Norway and Russia.

Set up a national working group. To improve coordination of the Norwegian work, both nationally and internationally, a new national working group shall be formed. The group will comprise representatives from the County Governor's Office in Finnmark (Fylkesmannen i Finnmark), the Norwegian Ornithological Society (NOF/BirdLife Norway) and the Directorate for Nature Management (DN).

- Improve national and international cooperation.

There is a need to improve both national and international cooperation in order to maximize efforts. There is a special need to implement measures internationally, and that this has as broad a participation as possible from both relevant countries, national and international hunting organisations, and the authorities in the relevant areas (including protected areas) along migration routes and on the wintering grounds. As part of this work, consideration needs be made on the effect of climatic change on Lesser White-fronted Geese.



Stabbursnes Nature Reserve including Valdak Marshes was established in 1983. The aim of protection is to conserve a wetland area of international importance as staging and migration area for a number of species of ducks, geese and wading birds. Here we see monitoring of Lesser White-fronted Geese in action. Photo: Morten Ekker / DN

Improve international cooperation. Norwegian authorities must contribute such that the international action plan of the Secretariat of the Waterbird Agreement receive enough resources and at a high enough level that they can make a real contribution towards work on, amongst others, reduction of illegal hunting and improve management of existing protected areas along the migration routes.

- In cooperation with Sweden and Finland, create an ex-situ conservation measure by establishing common breeding material from Lesser White-fronted Geese in case of the need for captive releases.

In both Sweden and Finland, Lesser White-fronted Geese bred from captive stock have been released into the wild. Several of these individuals have hybridised with (Greater) White-fronted Geese and Greylag Geese and today these present a genuine threat due to the risk of mixing with the wild Fennoscandian population. In Sweden, the migration route

has been manipulated such that these birds now migrate to Western Europe. The Directorate for Nature Management (DN) has always argued against the strategy of manipulating of the migration route, and in 2005 the Scientific Committee of the Bonn Convention made a statement that future work shall focus on the existing wild population and advised against further release of birds with a manipulation of their migration route. Both the international and the Norwegian action plans are based upon such advice. Any new conservation strategy with breeding and release to improve the Fennoscandian population must take place in close cooperation with Sweden and Finland, as regards both planning and implementation such that the population can be strengthened across national boundaries.

Feasibility study on capture and breeding. In agreement with IUCNs guidelines on reintroduction, Norwegian authorities shall carry out a feasibility study on captive breeding from wild Fennoscandian



The use of satellite transmitter has given a better insight into migration routes, population situation and threats along the migration routes. Photo: Morten Ekker / DN

birds. The study shall take into account recommended methods for collection of material, and how such birds would be used in a release programme. Dependent upon the results and recommendations from the study a plan on collection and captive breeding shall be considered. This shall function as a reserve for either strengthening of the wild population or for use in release programmes. An alternative is the possibility to use birds captured in Western Russia as the basis of a captive population.

Establishment of breeding station and breeding programme. Establishment of a breeding station, a plan for building up a captive stock, and control of the genetic make-up shall be considered.

Consideration of strengthening the wild population. A continual assessment on the need to strengthen the wild population, and if necessary a reintroduction.

Increased international cooperation. Norway shall participate in meetings of the international committee on reintroduction of Lesser White-fronted Geese (Committee for Lesser White-fronted Goose captive breeding, reintroduction and supplementation in Fennoscandia), together with Finland, Sweden, Germany and the Secretariat of the Waterbird Agreement. Norway shall furthermore participate in the international steering group of the international action plan for the Lesser White-fronted Goose.

- Develop a monitoring programme as the primary source of data on Lesser White-fronted Geese from the whole of the distributional range within 2013.

Via the Norwegian monitoring programme, improved knowledge be made available on migration routes, alternative and potential new breeding and staging areas throughout the distributional range, as well as work on a complete annual report on monitoring along the migration route.

Table 2. Overview of relevant measures in Norway

Theme	Aim	Measure	Responsibility	Time scale
Illegal / accidental hunting in Norway	Improve awareness of LWfG among hunters	Review hunting regulations to prevent accidental shooting. Improve wardening in inner Porsanger Fjord and other areas where Fennoscandian LWfG occur during shooting season	DN, SNO	Activity in progress
Illegal / accidental along migration route	Improve awareness of LWfG among hunters and hunting associations in Europe in order to prevent shooting. Follow-up of international action plan by Norwegians.	Norwegian involvement to reduce illegal hunting along migration routes. Information and cooperation with European hunting associations, BirdLife partners and others	DN, NOF, others	Activity in progress
Disturbance and encroachment on staging and breeding grounds in Norway	LWfG is given priority above all other activities in relevant areas in Norway	Access restrictions, ban on physical encroachment, provision of protective measures, assessment as to how tame reindeer affect LWfG, suitable measures evaluated according to local conditions	DN, County Governor of Finnmark, SNO	Activity in progress, wardening
Disturbance and encroachment on staging and breeding grounds along migration routes	Contribute via cooperation and following up the international action plan	Contribute via cooperation based upon international work on conservation of IBAs (important bird areas) for LWfG	DN, County Governor of Finnmark, NOF	Activity in progress

Theme	Aim	Measure	Responsibilty	Time scale
Predation on breeding grounds	Predators on LWfG shall be controlled at staging and breeding sites	Continued increased focus on removal of Red Foxes as well as Great Black-backed Gulls	DN, County Governor of Finnmark, SNO	Activity in progress
Ex-situ conservation	Secure genetic material during reduction in population	Build up a captive population together with Swedish and Finnish authorities. Contribute to a feasibility study for capture and breeding in accordance with IUCN's guidelines for reintroductions	DN	As required
Areal change	A dynamic areal change which protects the living quarters of LWfG	Establish protected sites on breeding and staging grounds	DN, County Governor of Finnmark	As required
Climatic effects	A dynamic and coordinated management which on a "better safe than sorry" principle manages LWfG in Norway	Relevant measures implemented as required	DN	Activity in progress
Knowledge limitations	A complete management regime based upon knowledge of the species	Secure information on LWfG both in Norway as well as along the migration routes	DN, NOF, others	Activity in progress
General	Monitoring programme and development of information systems	Norwegian monitoring during spring and autumn migration shall continue at today's level. Monitoring of breeding areas in order to control access and other forms of disturbance shall be increased. Recording of historical breeding sites shall be started. Development of joint information channel where all parties work following a common strategy, and with continual exchange of information. Measurement of effects of measures shall be assessed and implemented	DN, NOF, others	Activity in progress

FOOTNOTES:

1. Agreement on the Conservation of African-Eurasian Migratory Waterbirds, under the Bonn Convention on Conservation of Migratory Species of 23rd June 1979.
2. 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.
3. Madsen, J. 1996. International Action Plan for the Lesser White-fronted Goose (*Anser erythropus*). In: Herredia, B., Rose, L. & Painter, M. (eds.): Globally threatened birds in Europe. Council of Europe Publishing. Pp. 67- 78. An evaluation of relevant measures to address conflicts and conservation of geese was produced in 1996: *Handlingsplan for forvaltning av gjess i Norge*. (DN report 1996-2, in Norwegian).
4. Clearing House Mechanism. Exchange mechanism under the convention on biodiversity (CBD). An exchange mechanism shall contribute towards making information and experience available between parties. Each country shall have it's own CHM which shall promote the country's activities and resources for exchange of knowledge, experience and technology. At present the Directorate for Nature Management has developed a pilot which can be found on the European Environmental Agency (EEA) server. The aim is to make an internet portal where one can find information on work on biodiversity in Norway under management, research, voluntary organisations and businesses.

Enclosure for the Action plan:

Lesser White-fronted Goose in Norway

Status of knowledge and proposal
for National Action Plan

Norwegian Ornithological Society,
Report 3-2008.



A flock of Lesser White-fronted goose ready for a dangerous passage to wintering grounds. Photo: Morten Ekker / DN

Lesser White-fronted Goose in Norway

Status of knowledge and
proposal for National Action Plan



Ingar Jostein Øien & Tomas Aarvak

Norsk Ornitologisk Forening



NOF report 3-2008

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Front page: The male Lesser White-fronted Goose "Imre" which was shot in Volgograd (former Stalingrad) in Russia in 2006. Photo: Morten Ekker.

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FOREWORD

The Lesser White-fronted Goose population in Fennoscandia experienced a dramatic decline throughout the past century, and was protected in Norway in 1970. A more active interest in the species in the mid-1980's led to an increase in protection measures, both in terms of dimensions as well as intensity. Today, Norway has a leading role for the global management of the Lesser White-fronted Goose.

The Lesser White-fronted Goose is at present the Norway's most critically threatened vertebrate species and Norway is the only country in Western Europe with a naturally occurring breeding population. The species is categorised as critically endangered on the Norwegian red list, and as vulnerable (VU) on the international red list, and is thus considered by IUCN to be globally threatened with extinction. This presents a special responsibility for safeguarding the Norwegian breeding population, both in Norway, along the migration routes as well as in the wintering quarters.

Over many years, a considerable amount of effort has been directed towards improving key knowledge on the species as a contribution to protection measures both in Norway as well as within the whole distribution range. The Norwegian Ornithological Society (NOF/BirdLife Norway) has played a central role in these processes. This work has been carried out in close cooperation with the Norwegian Directorate for Nature Management (DN), and such cooperation has made it possible to present the current contribution towards a national action plan which shall be in place by late 2008. We hope that the forthcoming action plan shall make an important contribution towards removing the Lesser White-fronted Goose from the category of "critically endangered".

As opposed to many other threatened species in Norway, the situation for the Lesser White-fronted Goose cannot be improved by protective measures in Norway alone. The population occurs in the country for around four months in the summer, whereas it occurs in other countries with a responsibility for its management during the rest of the year. This means that the Norwegian involvement cannot be limited to just Finnmark where the species breeds, but must also include other countries such as Russia, Kazakhstan, Hungary, Greece, Lithuania, Estonia, Finland and Sweden. Protective measures in Norway need to be coordinated with measures in these other countries, and information gathered in Norway be used as a basis for recommendations about management measures in other countries requires both political and economic cooperation across political boundaries.

Successful safeguarding of the Lesser White-fronted Goose is a large, complex and unique challenge for management authorities in Norway. The critical situation requires that we must act quickly.

This current proposal to an action plan has received valuable input from a Norwegian working group which was established for this purpose in 2005 through an EU-LIFE project for safeguarding the Lesser White-fronted Goose along its European migratory route. In addition to the authors, the following persons and institutes have been involved in the working group: Torkjell Morset (State Nature Inspectorate, SNO, Finnmark), Gry Ingebretsen (Stabburnes Nature Centre and Museum, Porsanger), Stig Sandring (County Governor's Office in Finnmark), and Morten Ekker (Directorate for Nature Management, DN). We thank all for their contributions and for good cooperation throughout the whole process.

Valdak, May 2008

Tomas Aarvak

Project responsible

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SAMMENDRAG

Dverggåsa *Anser erythropus* er globalt trua og oppført som sårbar (Vulnerable) av IUCN og som kritisk utrydningstruet i den norske rødlista. Arten er langdistansetrekker og hekker nå diskontinuerlig i den sub-arktiske sonen fra det nordlige Fennoskandia til øst-Sibir. Det er i dag kun Norge og Russland som sikkert har hekkebestander av ville dverggjess. Raste- og overvintringsområdene er bare delvis kjent. Den globale bestanden har gjennomgått en rask bestandsnedgang gjennom hele det forrige århundret. Bestandsnedgangen har vært fulgt av fragmentering av hekkeutbredelsen, og gitt grunn til å frykte at arten vil utryddes hvis den negative trenden ikke reverseres. På global skala er hardt jakttrykk og habitattap antatt å være de største trussel faktorene.

Tre dverggåsbestander er utsiktet som egne bevaringsenheter:

- Den fennoskandiske bestanden (som hekker i Norge og som tidligere hekket i Finland, Sverige og på Kolahalvøya i Russland).
- Den vestrussiske hovedbestanden (hekker i nordlige Russland fra Kaninhalvøya til vestlige deler av Taymyr).
- Den østrussiske hovedbestanden (hekker fra østlige Taymyr og østover til Chukotka, og som overvintrer i Kina).

Den fennoskandiske bestanden gjennomgikk en dramatisk tilbakegang gjennom hele det forrige århundret, og tilbakegangen fortsetter. Kun 15-20 hekkepar er tilbake, hvorav de fleste finnes innenfor et begrenset område på Finnmarksvidda. Dette forslaget til nasjonal handlingsplan omhandler den fennoskandiske bestanden, men siden denne bestanden har et komplekst trekkmonster, som medfører at deler av bestanden trekker sammen med den vestrussiske hovedbestanden på høsten, vil dette forslaget også berøre den vestrussiske hovedbestanden. I Norge har Norsk Ornitoligisk Forening (NOF) overvåket den fennoskandiske bestanden siden 1990, og resultatene fra overvåkingen, samt resultater fra FoU-aktiviteter som har vært gjennomført som et samarbeid mellom NOF og WW-Finland siden 1994, har dannet grunnlaget for dette forslaget. I perioden 2005-2008, har Norge (representert av NOF og Direktoratet for naturforvaltning (DN)) deltatt i et LIFE-EU prosjekt for bevaring av dverggås langs den europeiske trekruta, og hvor den endelige nasjonale handlingsplanen for dverggås publisert av DN er et av underprosjektene.

Alt tyder på at de viktigste faktorene som medvirker til en fortsatt tilbakegang både i antall og utbredelse for dverggjessene (både for den fennoskandiske og den vestrussiske hovedbestanden) er de som forårsaker dødelighet hos voksne fugler. Det er også klart at disse faktorene virker primært langs trekkrutene og i vinterkvarterene. Selv om dverggåsa ikke er jaktabar, i det minste på papiret, i alle landene den opptrer, er det jakt som anses som den viktigste dødelighetsfaktoren, og den viktigste trussel faktoren som en nasjonal handlingsplan for dverggås må takle.

Målet for en nasjonal handlingsplan for dverggås i Norge må være å restituere den fennoskandiske dverggåsbestanden til en fordelaktig bevaringsstatus. Planforslaget tar også stilling til bestanden som stammer fra fangenskapsfugler som er brukt for å gjeninnføre dverggås til Sverige, og som trekker til Nederland, hvor de overvintrer. Grunnet den genetiske sammensetningen av disse fuglene, er denne bestanden ansett som en mulig trussel mot den fennoskandiske bestanden.

Resultatene som kreves for å nå dette målet er:

- 1: Overlevelsen forbedres.
- 2: Videre tap og degradering av habitat stoppes.
- 3: Hekkeseksess holdes på høyest mulig nivå.
- 4: Unngå innblanding av fremmede gener (fra andre gåsearter) til den fennoskandiske bestanden; enten som effekt av videre utsettingsprosjekter eller fra allerede utsatte fugler.
- 5: Kunnskapgrunnlaget utvides.
- 6: Informasjon om dverggåsas status kommunisert til alle interessenter.

SUMMARY

The Lesser White-fronted Goose *Anser erythropus* is globally threatened, being recognised as Vulnerable by IUCN, and ranked as *Critically Endangered* within Norway. The Lesser White-fronted Goose is a long-distance Palearctic migrant, currently breeding discontinuously in the sub-arctic zone from northern Fennoscandia to eastern Siberia. At present, only Norway and Russia have breeding populations of wild Lesser-White-fronted Geese, and the wintering/staging areas and migration routes are only partially known. The global population has declined rapidly since the middle of the 20th century. The decrease in numbers has been accompanied by fragmentation of the breeding range, giving rise to fears that the species will become extinct unless the downward trend is halted and reversed. Overhunting and habitat loss are considered to be the main threats.

Three subpopulations of wild Lesser White-fronted Geese can be recognised:

- Fennoscandian population (at present breeding almost exclusively in Norway, and formerly also in Sweden, Finland and the Kola Peninsula in north-westernmost Russia).
- Western main population (breeding in northern Russia to the west of the Taimyr Peninsula).
- Eastern main population (breeding from the Taimyr Peninsula eastwards and wintering in China).

The Fennoscandian population underwent significant declines during the twentieth century and continues to decrease, due primarily to hunting pressure and habitat loss. At present, only 15-20 breeding pairs are left, most of them breeding within a restricted core area in Finnmark County in Norway. This proposal for a National Action Plan deals with conservation of the Fennoscandian population, but as this population has a complicated migration system that allows part of the population to migrate along with the Western main population in autumn, this proposal also, to a certain degree, affects the Western main population. In Norway, the Norwegian Ornithological Society (NOF/BirdLife Norway) has monitored this population since 1990, and the results from the monitoring, as well as the results from research activities run jointly by NOF and WWF-Finland since 1994, have made the foundation for this proposal. In the period 2005-2008, Norway (represented by NOF and the Directorate for nature management (DN)) has participated in an EU-LIFE project for conservation of Lesser White-fronted Goose on the European migration route. A final National Action Plan published by DN is one of the sub-projects.

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. 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 goal of this proposal for a Norwegian National Action Plan for Lesser White-fronted Goose is to restore the species to a favourable conservation status in Fennoscandia. The proposal also takes into account the population derived from captive-bred birds and used for restocking in Swedish Lapland. Due to the genetic composition of these birds, they are considered a potential threat to the Fennoscandian population.

The results required for delivering this purpose and goal are:

Action result 1: Survival improved.

Action result 2: Further habitat loss and degradation is prevented.

Action result 3: Reproductive success is maximised.

Action 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.

Action result 5: Key knowledge gaps filled.

Action result 6: Information on the species' status communicated to all interested parties.

PROPOSAL OF GOALS FOR THE NATIONAL ACTION PLAN

Main aim

In a long-term perspective the Lesser White-fronted Goose occurs with a sustainable population within the species' natural range in Norway. In the short-term the Lesser White-fronted Goose is managed as a particularly vulnerable and demanding species, where consideration of the species' continued survival in Norway requires particular attention and specific measures at both individual and habitat levels within the populations' natural environs.

Objectives

- Both current and former staging, breeding and moulting areas for Lesser White-fronted Geese shall be conserved as good habitats for the species to accommodate a future expansion of the Norwegian population.
- Implementation of special restrictions in areas important for Lesser White-fronted Geese. Such measures should include protection status, access restrictions, control of predators, a ban on hunting and fishing, restocking with fish etc.
- Norway shall actively participate in work to achieve the aims of the new International Action Plan for the Lesser White-fronted Goose (prepared by AEWA) – both for Norway and other countries.
- With regard to our international duties as "maternity unit" for the Fennoscandian population of Lesser White-fronted Geese, the current monitoring programme which provides annual overviews of population status, shall continue.
- Activities in Norway that improve the key knowledge for other host countries shall be maintained; inclusive mapping of migration, staging and wintering areas for geese which breed and/or stage in Norway.
- Release of captive-bred birds and manipulation of migration routes are considered undesirable by Norway.
- Release of birds to strengthen the wild population may be necessary at some point – based upon international consensus.
- With regards to today's current situation with releases and manipulation of migratory routes in Sweden (as well as Germany), Norway shall encourage all European countries to ensure that the best option is to build up the current population and its natural migration routes,
- An examination of historical material and a check of existing source material will be carried out to secure information on areas formerly used by Lesser White-fronted Geese.

Essential measures

- Areas of particular importance, including all known breeding, moulting and staging areas must be secured through protective measures in accordance with the conservation laws (and the forthcoming law on biodiversity). Other potential areas, such as former staging areas, must be secured under, for example, the Planning Act to preserve their value and function when the population eventually begins to expand.
- Use of traditional methods must be supplemented with a more dynamic system to allow swift and necessary securing of new key areas.
- A swift and effective follow-up of measures suggested in the action plan for the Lesser White-fronted Goose needs to be guaranteed.

The objectives in this action plan could easily have been taken from Yngvar Hagen's classic book "Rovfuglene og viltplassen" (*Raptors and wildlife care*) from 1952:

"
In order to provide the answer, we shall attempt to use our previous knowledge – adapt this and perhaps exchange some of what we merely had thought of as accomplished facts, such that the facts are found to be otherwise. It doesn't help if we at some stage need to exchange a well-founded fact with an annoying doubt – if this leads to us seeing how things interact more clearly. It doesn't help if arguments are against us if we at the same time can think together more clearly, and we arrive at a more fundamental view of simple things. The immediate aim must be to gain greater insight. This will enable us to do what is right more often, and less likely to do what is wrong.

The more distant aims are we not always agreed upon. Some will seek a richer, living nature around them. Some will seek to preserve as much as possible of what is natural. Others will seek to achieve a greater economic gain from hunting either by better exploitation of available resources, or by getting more of us to exploit. Some are specialists, others are generalists.
"



The male Lesser White-fronted Goose "Imre", 2006

BACKGROUND

The Lesser White-fronted Goose is in critical danger of becoming extinct in Norway and Fennoscandia. In neighbouring Sweden and Finland the species is declared extinct as a breeding bird, whereas the Norwegian breeding population is at present 15 – 20 pairs, restricted to the county of Finnmark. These geese represent the core of the Fennoscandian population of Lesser White-fronted Geese and the remaining remnant of the population in Western Europe. Norway and Russia are the only countries in the world with breeding wild Lesser White-fronted Geese¹.

Up until the middle of the last century, the Lesser White-fronted Goose was a common species throughout Fennoscandia, with over 10,000 birds. Following a serious decline in numbers, the species was afforded protection in 1970, and in 1974 it was clear that the species was in danger. Magnar Norderhaug (who was at the time nature conservation officer in southern Norway, based at the Ministry of the Environment) posed the question in the title of an article in the journal *Norsk Natur* – *Is the Lesser White-front nearing extinction?*

The question is, unfortunately, still relevant, although since then a lot has been achieved in order to map the population and acquire the necessary information about migration routes and wintering quarters. When Georg Bangjord and Svein-Håkon Lorentsen from the Norwegian Ornithological Society (NOF) began to actively look closer at the Lesser White-fronted goose in the mid-1980's, little was known about the population, and it was almost impossible to implement measures to save it. Due to systematic monitoring carried out by NOF's Lesser White-fronted Goose project since 1990 and bilateral projects in Russia and Hungary² knowledge has been improved considerably, and parallel to this one has been able to start directing measures to preserve the species.

In 1996, the Directorate for Nature Management (DN) produced a management plan for geese, based primarily on a background of agricultural conflicts that increasing populations of Pink-footed and Barnacle geese were causing in parts of the country. The Lesser White-fronted Goose, which at that time was giving grave cause for concern, was also included in the same plan. Concurrently with Norway developing its own goose plan, The European Commission also prepared an action plan for the Lesser White-fronted Goose. In 2004 it was decided – following pressure from Sweden and Norway - to revise the plan under the auspices of the Bonn Convention (Waterbird Agreement – AEWA). This process is ongoing, and it is intended that all countries that support Lesser White-fronted Geese shall develop their own action plans as a contribution towards the realisation of an international plan. This current document is therefore in answer to this, and shall provide the basis for the national action plan which will be produced by the Directorate for Nature Management.

In 2005 Norway (with DN and NOF as partners) became engaged in an EU-LIFE project (led by Finland) with a view to securing the European migration route of the Lesser White-fronted Goose - see Figure 1). One of the Norwegian sub-projects within this project is to prepare a national action plan. A working group has been established composed of: Torkjell Morset (State Nature Inspectorate, SNO, Finnmark), Gry Ingebretsen (Stabburnes Nature Centre and Museum, Porsanger), Stig Sandring (County Governor's Office in Finnmark), and Morten Ekker (Directorate for Nature Management, DN). The working group held three meetings in the period 2006 – 2007, where the foundations of this document were laid. The EU-LIFE project will end in 2008, and within that year the Norwegian action plan shall be completed and approved. The Norwegian plan shall interact with similar plans for Finland and Estonia.

¹In Sweden, Lesser White-fronted Geese have been released in the Svaipa area in Northern Sweden. There are currently around 100 individuals, and this population is the subject of much debate regarding genetic structure, migration routes and wintering grounds. This proposal to a National Action Plan considers the Swedish released birds as a threat (page 40), and they are not considered as a natural element. ²NOF have carried out three projects on Lesser White-fronts through bilateral environmental agreements with Russia and Hungary.

Bevaring av dverggås langs den Europeiske trekk ruta



Dverggås
Anser erythropus
Gilljobás, Gálbbénnjunnečuonjus

Dverggåsa er en av de mest truede fugleartene i Europa. Den fennoskandiske bestanden, estimert til mere enn 10 000 individer tidlig på 1900-tallet, er nå redusert til mindre enn 30 hekkende par. De europeiske dverggjessene er kritisk truet, og det er et pressende behov for effektive bevarings tiltak både i hekkeområdene og langs trekk ruta for å redde dem.

Hovedtruslene for dverggjessene er:

1. Høy dadelighet pga. jakt
2. Tap og degradasjon av overvintringshabitat
3. Forstyrrelse: menneskelig aktivitet skremmer gjessene og presser dem ut i uikre og sub-optimale områder.
4. Negative faktorer i hekkeområdene som reduserer dverggjessenes hekkesuksess.



Dverggåsa (1) kjennetegnes best ved den hvite pannen og den gule øyningen, men dette er svært vanskelig å se på avstand. Den har et relativt markerte, kortere og tykkere hode- og halsparti enn de andre gåseartene i Porsangfjorden (grågås 4, sasdøg 3 og kornnebbgås 2), som den ellers er temmelig lik. Dverggåsa er, pga sin likhet med jaktabare gåsearter, svært utsatt for å bli forvekslet med disse og skutt. Langs trekkruten forveksles den helst med tundragås, som har den samme karakteristiske hvite pannen. På tegningen av flygende gjess ser vi en dverggås sammen med fire tundragjess. © Jari Kostet

Bevaring av dverggås langs den europeiske trekk ruta

Bevaring av dverggås langs den europeiske trekk ruta er en internasjonal naturverninitiativ, driftsmøntert av EU LIFE-Nature. I Norge drives prosjektet av Norsk Ornitolgiske Forening og Direktoratet for naturforvaltning i samarbeid med Fylkesmannen i Finnmark, Stabburernes naturhus og Statens naturoppsyn. I tillegg er det partnerorganisasjoner i landene Finland, Estland, Ungarn og Hellas.

Prosjekts mål er å forbedre bevaringsarbeidet for dverggjessene i de viktigste hekke-, raste- og overvintringsområdene for den europeiske trekkruta for å snu den negative bestandsutviklingen hos de fennoskandiske dverggjessene på følgende måter:

- Flere områder som benyttes av dverggjessene under trekket og i overvintringsområdene, samt den nøyaktige lokaliseringen av flere av hekkeområdene er fortsatt ukjente. Prosjektet ivarkeretter satellitt-
- telemetry og fargemerking av dverggjess for å lokalisere disse områdene. I hekkeområdene inne på Finnmarksvidda ønsker vi å kartlegge arealbruken hos gjessene for å kunne sikre et hensiktmessig vern av disse områdene.
- På rasteplassene og i vinterkvarterene har prosjektet som mål å eliminere trusselkommisjonene for dverggjessene hovedsakelig ved å:
 - aktivt bearbeide dverggjessenes beite- og hvileplasser for å holde gjessene i trygge områder med gode beteformid (i Estland og Ungarn)
 - spre informasjon til lokale jegere og landeiere gjennom en bevisstgjøringskampanje angående dverggås situasjon
 - utarbeide nasjonale handlingsplaner for bevaring av dverggåsa (i Norge, Finland og Estland)

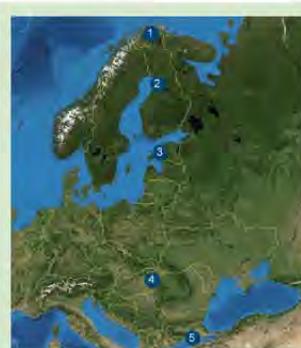
LIFE-prosjektet på dverggås i Norge

Den fennoskandiske dverggåsbestanden overvakes årlig både vår og hest ved Valdakmyra. Dverggjessene blir individuelt identifisert, og informasjon om årlig dadelighet og reproduksjon innsamles for å vurdere statusen for denne kritisk truede bestanden.

Et lite antall dverggjess vil gjennom EU-prosjektet bli fanget ved Valdakmyra for fargemerking og påmontering av miniatyr satellittsendre. Dette vil gi verdiful informasjon om overlevelsen av unge og voksne dverggjess. Satellittendermerkingen vil også gi informasjon om hekke- og myteområder, samt raste- og overvintringsområder som er avgjørende for å kunne ivksette nødvendige bevaringsstiltak for arten i disse områdene.

En nasjonal handlingsplan for dverggås vil bli utviklet i løpet av prosjektpérioden. Mange av områdene som planen skal ivksettes i (hekke- og myteområder) er fortsatt ukjente, og satellitt-telemetry er nødvendig for å identifisere dem. Kartlegging av dverggjessenes bruk av andre Porsangerfjord er en annen viktig tilgang for å lage en nasjonal handlingsplan for arten i Norge.

Under val-rasten (10 mai-5 juni) beter dverggjessene på feppesalgtras, og oppholder seg da nesten utelukkende inne i verneområdet ved Valdakmyra. Etter hekkingen, i midten av august, kommer de tilbake fra hekkplassen inne på Finnmarksvidda sammen med ungene. På denne tida spiser de mye bær, og de bruker da hele indre del av Porsangfjorden, både øyne og engene langs fjorden. De starter trekket sørover i begynnelsen av september.



Den europeiske trekk ruta

Prosjekts aktiviteter er koncentrert om følgende områder langs den europeiske trekk ruta:

1. Norge: Porsangfjorden, og hekkeområdene på Finnmarksvidda
2. Finland: Kysten av Bottenviken ved Oulu; mulige hekkeområder i finsk Lappland
3. Estland: Matsalu nasjonalpark
4. Ungarn: Hortobágy nasjonalpark
5. Hellas: Evrosdeltaet; Kerkinojean. Nestosdeltaet; Imeridaesjøen (også kalt Mirtoikousjøen)

I løpet av hosttrekket fra hekkeområdene på Finnmarksvidda har dverggjessene sitt første stoppested på Kanin-halvøya i Nord-Russland. Avhengig av den reproduktive suksessen, følger en variabel andel av fuglene den europeiske trekk ruta via De baltiske landene, Polen og Ungarn og videre sørover til vinterområdene i det nordlige Hellas.

På vårtrekket flyr dverggjessene fra Hellas, via det østlige Ungarn, vestkysten av Estland og den finske Bottenvikskysten til Valdakmyra i Porsanger. Kommer de i første halvdel av mai. Dette er det siste stoppestedet på vårtrekket før de starter hekkingen, og hit kommer de også med ungene for de startar på hosttrekket.

På vårtrekket flyr dverggjessene fra Hellas, via det østlige Ungarn, vestkysten av Estland og den finske Bottenvikskysten til Valdakmyra i Porsanger. Kommer de i første halvdel av mai. Dette er det siste stoppestedet på vårtrekket før de starter hekkingen, og hit kommer de også med ungene for de startar på hosttrekket.

Internasjonal koordinering av LIFE-prosjektet. WWF Finland, Lintulahdenkatu 10, FIN-00500 Helsinki. www.wwf.fi/wfg
Norsk Ornitolgiske Forening, Sandgate 30B, 7012 Trondheim. www.birdlife.no
Stabburernes Naturhus, 9710 Indre Billefjord. Tel. 78464711. www.museumsnett.no/stabburernes
Statens Naturoppsyn, Porsanger, Laatsaveien 9711 Lakselv. Tel. 75467020 / 916 22003. Torkjell.Morset@DIRNAT.NO
Fylkesmannen i Finnmark, Miljøverndavdelingen, Statens Hus, Damsveien 1, 9815 Vadso. Tel. 78950300. www.fylkesmannen.no



Figure 1. Information poster about the EU-LIFE project for preserving the Lesser White-fronted Goose along the European migration route.

Not least, there has been increased focus on threatened species in Norway, resulting in a more systematic effort within this field in recent years, and national action plans have become one of the main tools for, for example, securing an economic basis for work with preserving the most threatened species. The action plan for the Lesser White-fronted Goose has therefore a natural foundation.

Since 2001, the global duty to stop loss of biodiversity within 2010 has become an international slogan. For Norway, this ambition has resulted in more focus on the Lesser White-fronted Goose and our ability to preserve the species / population. There is probably no other reproducing animal species which presents such concrete challenges relating to the stop of loss of biodiversity on a global scale as the Lesser White-fronted Goose.

The Lesser White-fronted Goose is also listed under several conservation initiatives and an international action plan will provide answers to a number of challenges and expectations, both nationally and internationally. Due to the critical situation for the species, its complicated annual life cycle, and the various threats which together affect the small Norwegian breeding population over a wide geographical area, the work to save the Lesser White-fronted Goose is one of the greatest challenges Norway has to face in safeguarding a species threatened with extinction.

SPECIES FACTS

Introduction

This chapter summarises key knowledge relevant to managing the Lesser White-fronted Goose, both in Norway as well as internationally. A lot has been published during the past decade, mostly in the form of reports and popular scientific articles. Some of these are included in the literature list included in this plan. A comprehensive list of literature and an overview of scientific articles may be found at the international portal for the Lesser White-fronted Goose www.piskulka.net, which is run in collaboration between NOF (www.birdlife.no) and WWF-Finland (www.wwf.fi).

Taxonomy

Phylum: Chordata

Class: Aves

Order: Anseriformes

Family: Anatidae

Tribe: Anserini (Vigors, 1825)

Species: *Anser erythropus* (Linnaeus 1758)

Synonym: *Anas erythropus*, Linnaeus, 1758; *Anser finmarchus* Gunnerus, 1767; *Anser minutus* Naumann, 1842 (several synonyms can be found at www.worldbirdinfo.net)

There are no subspecies; although Ruokonen et al. (2004) state that the world population comprises three distinct populations which can be traced back to the last ice age. They conclude that these populations are separate management units (MU). These three populations are identified as follows:

- The Fennoscandian population (which breeds in Norway and which formerly bred in Finland, Sweden and the Kola Peninsula in Russia).
- The West Russian population (breeding in northern Russia from the Kanin Peninsula to western Taymyr).
- The East Russian population (breeding from eastern Taymyr and eastwards to Chukotka, and which winter in China).

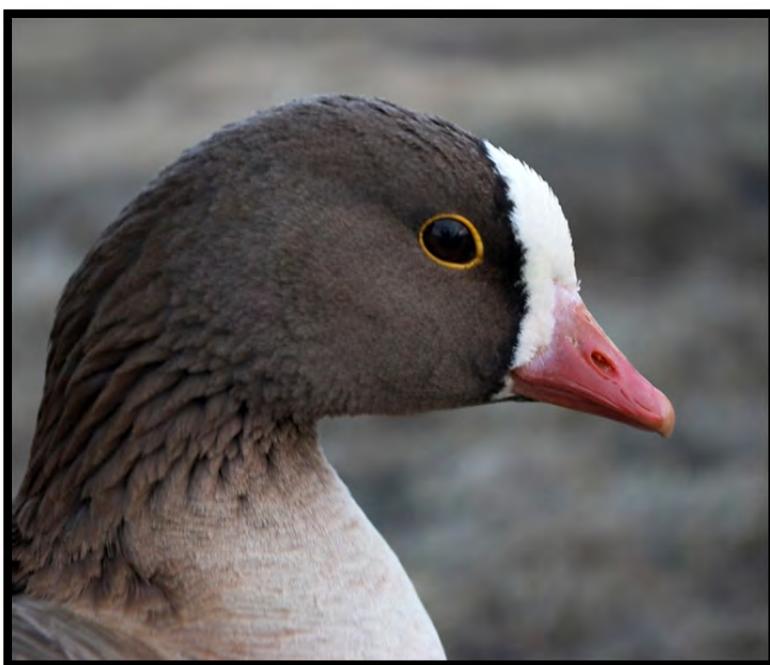
Description

The Lesser White-fronted goose *Anser erythropus*, is the smallest breeding goose in Europe. Due to its colouration, it belongs to the group of grey geese in the genus *Anser*. It weighs between 1700 and 2200 gram, with a wing-span of 120 – 135 cm. Together with the small size, the white patch on the forehead is a useful identification feature. The Sami herdsmen in the Varanger area of Norway call the species gálbbjenjunneçuonjis, meaning the goose with the

reindeer calf nose, reflecting the resemblance to the pale nasal area on young reindeer. Close up, one can also see a yellow ring around each eye. The species has a ringing “kee-yoo” or “kee-yoo-yoo” call which is unlike any call of the other Fennoscandian goose species. In the Enare area of Finland the locals call the species lavláčuonja, meaning the singing goose. The Norwegian name, dverggås, meaning the little goose, is an apt reference to the bird’s small size, whereas the Swedish name, fjällgås, meaning mountain goose, reflects the species preference for upland habitats during the breeding season.

In appearance, the Lesser White-fronted Goose can only be confused with the Greater White-fronted goose *A. albifrons*, although Greater White-front lacks the yellow eye-ring of the Lesser, and the white patch on the forehead does not extend as far back on the crown (Øien et al. 1999). Greater White-front does not breed in Fennoscandia, but occurs in small numbers in autumn and spring, as well as in winter. Both species have characteristic black bars on the belly which allow identification of individual geese (Øien et al. 1996).

According to hunters in Russia, the Lesser White-front is known to be more curious than other goose species. When hunters make a noise, such as splashing in water with oars, Lesser White-fronts often fly back in order to



investigate. From spring hunting of Lesser White-fronted Geese in Finnmark in the 1920's it is reported that geese often returned if one individual in a flock was shot. This resulted in hunters having several chances to shoot at the flock (Egvjenth 1927). Such behaviour may make Lesser White-fronts more vulnerable to hunting compared to other geese.

The picture shows the male Lesser White-fronted Goose "Imre" who was caught and fitted with a satellite tag in May 2006. The white forehead patch and yellow eye-ring are good field characteristics for the species. Photo: Ingar J. Øien

Genetical aspects

The Lesser White-fronted Goose is monotypic and without any subspecies (Cramp & Simmons 1977, Ruokonen et al. 2004). Morphologically there are no visible differences between individuals breeding in Fennoscandia in the west and those in Siberia in the east. Body size increases gradually from west to east, but this is an ecological, phenotypic adaptation, which is not directly governed by genes.

The fundamental importance of genetics has long been understood in the field of population ecology. Early ecological genetics concentrated on (amongst others) changes in frequency of characters through time, which was related to ecological factors and selection pressure. One of many classic examples is polymorphism in the moth *Biston betularia*. Molecular ecologists today increasingly use comparative results, particularly from genetic markers which have inherited sexually specific (mitochondrial DNA – mtDNA) or nuclear (core-DNA). With such comparisons one can identify sexual differences at individual or at population level. Mitochondrial-DNA can only be inherited from the mother, such that data on haplotypes can reveal the occurrence of hybridisation, but cannot reveal how widespread it is. The offspring of a pairing between a male Greater White-front and a female Lesser White-front will have the same haplotype (in an analysis of mtDNA) as the female, and will therefore be classed (based upon mtDNA) as a pure Lesser White-front. In order to analyse the relationship for males one has to look at core-DNA. A method known as RAPD can be used to look for species typical DNA patterns but, due to low repeatability, is little used. The most used method today is analysis of microsatellite-DNA (short, repeated sequences of DNA) which has a high repeatability and gives accurate estimates of population differences.



As part of NOF's Lesser White-fronted Goose project a number of geese have been captured at Valdak Marshes for ringing and marking with satellite transmitters. Blood samples are routinely collected from all geese caught for genetic analyses. Photo: Morten Ekker

Genetic research on wild Lesser White-fronted Geese based on mtDNA reveals a lack of clear phylogenetic structuring. There are two main groups, each with its own haplotype – an eastern (from Taymyr and eastwards) and a western (from Taymyr and westwards), but where both haplotypes occur at a low frequency in the opposite group. Compared to other goose species it has been shown that the Lesser White-front is a separate evolutionary significant unit (ESU) – a distinct species without any subspecies. In species management another important conception is the management unit (MU), which is a demographically distinct population with a significant divergence in frequency of alleles in core- or mitochondrial-DNA (Moritz 1994, 2002). Ruokonen et al. (2004) showed that a lack of a clear differences in allele frequency indicated that there is (or recently has been) enough exchange between Lesser White-fronted Geese from western, central and eastern parts of the distributional range to prevent evolutionary divergence, and also to prevent loss of genetic variance or inbreeding within the different populations. Therefore, the Fennoscandian population fulfills the requirements to be recognized as an independent management unit.

In Sweden and Finland, and also to an extent in Germany and France, various attempts at reintroduction and translocation of Lesser White-fronted Geese are in progress. These schemes have been heavily criticised since the mid-1980's as these projects have no control over genetic impacts. This will be discussed in more detail in the chapter on negatively influencing factors: genetic contamination (see page 40).

Population development and distribution

Global distribution

The Lesser White-fronted Goose nested previously across the whole of northern Eurasia, from northern Fennoscandia to the north-eastern parts of Siberia (Cramp & Simmons 1977). In the latter part of the last century both total numbers as well as breeding range were reduced dramatically. New observations reveal that there are now only a few pairs on the Kola Peninsula in western Russia which are likely to belong to the Fennoscandian population (Timonen & Tolvanen 2004). Lesser White-fronts have apparently disappeared from eastern Taymyr and southern Novaya Zemlya and the population is also reduced in areas east of the Taymyr Peninsula. In areas furthest east, around Anadyr Bay, Lesser White-fronts are now completely absent. Southern Taymyr and the Abyiskaya lowlands are today the core breeding area for Lesser White-fronts (see Figure 2).

At present the Lesser White-fronted Goose breeds in six more or less discrete geographical areas (see for example Morozov & Syroechovski 2002):

1. Fennoscandia (northern parts) and the Kola Peninsula; 20 – 25 pairs.
2. Tundra between the White Sea to the Urals (Malo & Bolshezemelskaya tundra + the Ural Mountains); 250 – 400 pairs.
3. Yamal Peninsula (southern parts); 350 – 500 pairs.
4. Taymyr Peninsula (southern parts); 1000 – 1500 pairs.
5. Putorana Mountains (south of Taymyr); 150 pairs.
6. North-eastern parts of Siberia (Indigirka, Abyiskaya lowlands in Yukatia); 1050 – 1850 pairs.

Outside Fennoscandia, the sizes of populations in other breeding areas are insufficiently known. Although the serious decline in Fennoscandia has been known for some time, it is only recently that information has been available from the populations in the most important breeding areas in Russia. There are several unknown breeding areas in northern Russia, as well as areas that have not been investigated thoroughly in recent times, including Gydan, Taymyr, large parts of Yakutia and Chukotka.

Counts from staging sites in north-eastern Kazakhstan are likely to be fairly representative for the populations breeding between Fennoscandia and Taymyr and the Putorana Mountains. Here, numbers counted during autumn migration vary between 8000 and 11000 individuals. Winter counts from China in recent years are also considered representative for the whole eastern Russian population breeding between eastern Taymyr and all the way to Chukotka. In China, around 12000 to 17000 Lesser White-fronted Geese winter within a relatively limited area along the Yangtze River (in Hunan Province).

The entire world population in autumn (assuming 30 – 40% juveniles) is therefore between 20000 – 25000 individuals.

The dramatic population decline is also evident from the winter quarters. During the 1930's there were 30000 – 50000 Lesser White-fronted Geese around the southern parts of the Caspian Sea (Bauer & Glutz von Blotzheim 1968). By the mid-1970's this population had been reduced by 90% (Norderhaug & Norderhaug 1984). Formerly important wintering sites, such as in Armenia, are today no longer visited by Lesser White-fronts, although between 1500 – 7000 individuals still winter in Azerbaijan (Patrikeev 2004).

Before 1900, the Lesser White-fronted Goose was a very common species in Caucasus. S. Alphéraky wrote the following about the species in his book on geese:

"Many times I saw them together on the river Mius, in the Armenian steppes between the river Sambek and the Don mouths, and I shall never forget their innumerable flocks covering, in late autumn, the sand-flats of the Mius estuary, and then flying to feed, partly to the neighbouring corn-fields, partly to the high grass of the steppe. I could never even approximately count the number of separate flocks appearing in autumn, in such continuous streams did they pass, one after another, whichever way I looked, filling the air with such loud cries that, even now, after many years, the ring of them still haunts my ears".

Alphéraky, 1905

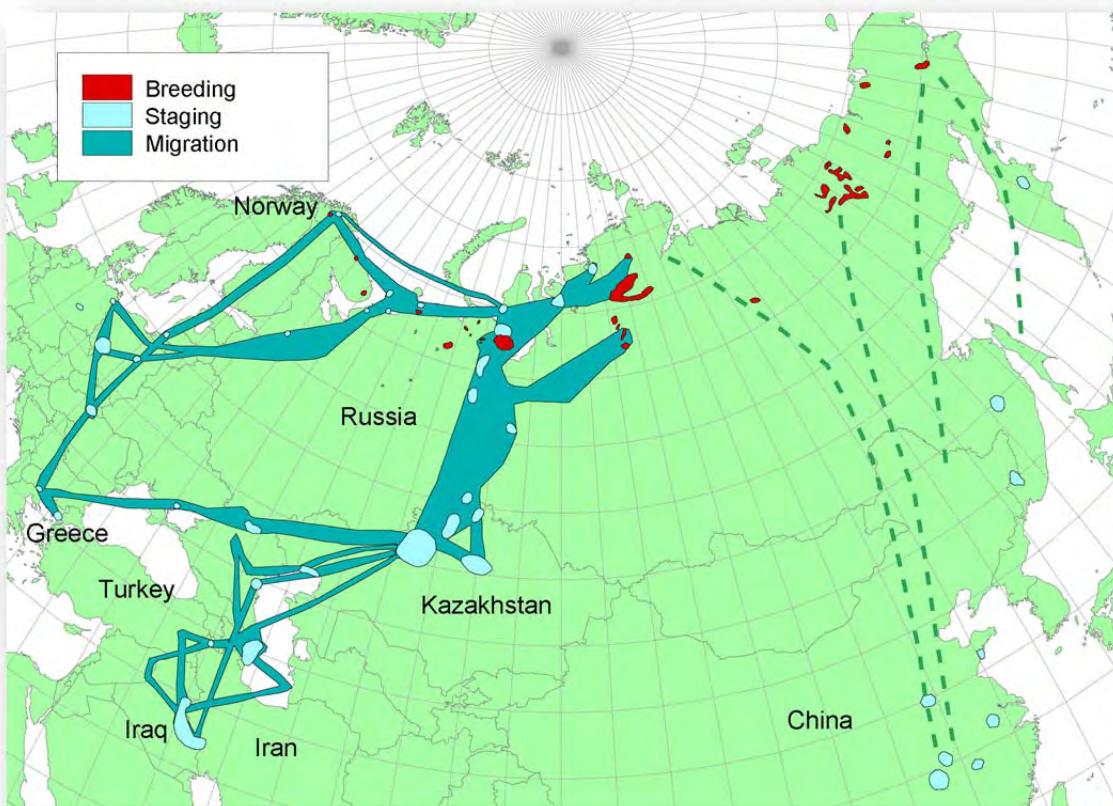


Figure 2. Global distribution of the Lesser White-fronted Goose in the years 2000 – 2005. Dark blue shows known migration routes identified via satellite-telemetry, whereas important staging areas are shown in pale blue. Dotted lines show links between breeding and wintering sites, but where the exact migration routes are unknown.

Traditional occurrence in Norway

Early the previous century, the Lesser White-fronted Goose was a common species in the bird communities in the upland areas from Nord-Trøndelag / Jämtland and northwards. The population was centered on the Finnmark Plateau and neighbouring parts of Finnish Lapland. J.B. Barth wrote in 1881: “*This species breeds in more or less the same areas as the Bean Goose, that is to say the waters and rivers in Finnmark. It appears even more so to reside in the eastern parts of the area known as East-Finnmark*” (Barth 1881).

There is virtually no information regarding the former population in Norway. In order to obtain a picture of the former situation, we need to look at historical information from the neighbouring countries of Sweden and Finland. Then, as today, this represented a distinct subpopulation – the Fennoscandian. It is clear that both population size and distribution were more extensive than at present. As an example, Merikallio (1920) wrote about the staging areas in the Bothnian Bay: “*The total number of migrating birds must at least be in the order of tens of thousands*”. From estimates from Siivonen (1949), as well as studies undertaken by Merikallio in the late 1930’s, the original Finnish population is estimated at between 6000 – 10000 individuals.

Information from Norway is, as previously stated, rather sparse as regards previous population estimates. Collett (1921) stated that the geese were present “in numbers” several places, and from the Borgefjell area there are reports of moulting flocks of several hundred birds in the early 20th Century (Haftorn 1971). The size of the original population in Finnmark is also little known, but the Lesser White-front is described as numerous, and found at all suitable sites in the early 1990’s (Haftorn 1971). The original Fennoscandian population was probably of over 10000 individuals prior to the decline.

Dramatic decline in numbers and distribution in Fennoscandia

Since the 1940's the Fennoscandian population of Lesser White-fronted Geese has experienced a dramatic decline, both in numbers and in distribution (see Figure 3). Whereas the Finnish population was estimated in the order of several thousand individuals in the late 1930's, Merikallio estimated as early as in 1955 that the population was reduced to 200 birds and Soikkeli (1973) confirmed that the total number of Lesser White-fronts migrating through Finland had declined dramatically in the period 1950 – 1960. Norderhaug & Norderhaug (1984) estimated the entire Fennoscandian population to be around 60 – 90 breeding pairs at the end of the 1970's, in addition to a non-breeding element of 40 – 110 birds.

Counts at staging sites in the 1980's suggests a further reduction, and such a reduction is documented for staging sites in the Bothnian Bay near Oulu in Finland in the 1990's (Markkola et al. 2004). Between 2001 – 2003 only between 9 and 17 individuals were recorded in spring (Markkola et al. 2004), and in the period 2005 – 2007 just 7 – 10 individuals (EU-LIFE interim report 2007). In 1976 the Swedish population was estimated to be fewer than 100 pairs (Ulfstrand & Högstedt 1976). Today, it would appear that there are no longer naturally occurring breeding Lesser White-fronts in Sweden, although odd pairs may breed from time to time.

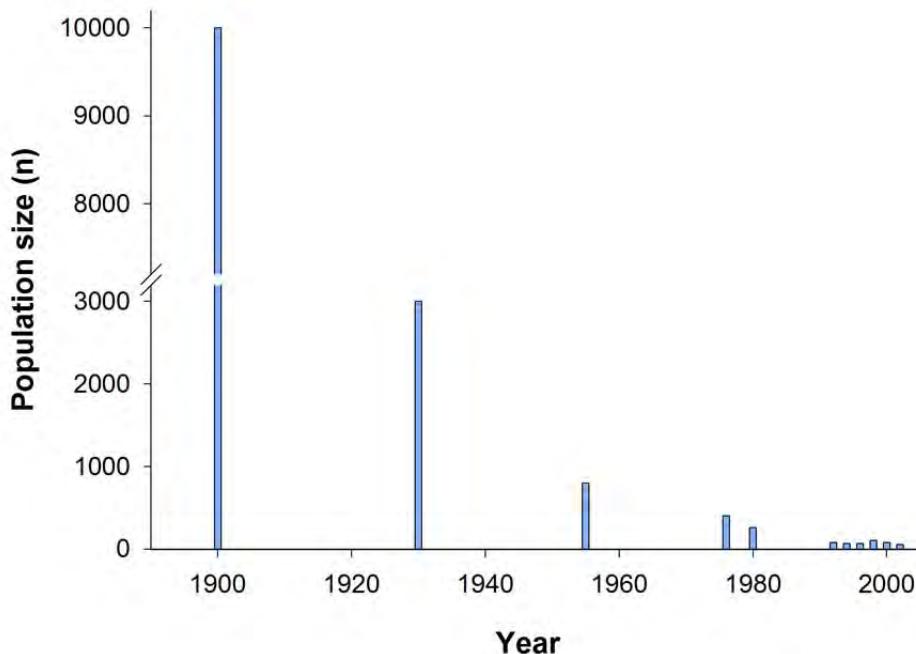


Figure 3. Historical trend for Lesser White-fronted Geese in Fennoscandia (after Siivonen 1949, Soikkeli 1973, Norderhaug & Norderhaug 1984 & Aarvak & Timonen 2004).

From formerly being a common breeding bird in northern Fennoscandia with a wide distribution, today's population utilises less than 1% of the former range. Changes in distribution and the current breeding areas in Fennoscandia are shown in Figure 4. Since the turn of the century the Fennoscandian population has only a small core area left where 90 – 95% of the remaining Lesser White-fronts breed. It is in this core area that NOF, together with SNO and WWF-Finland have monitored the small remnant population in 2006 – 2008.

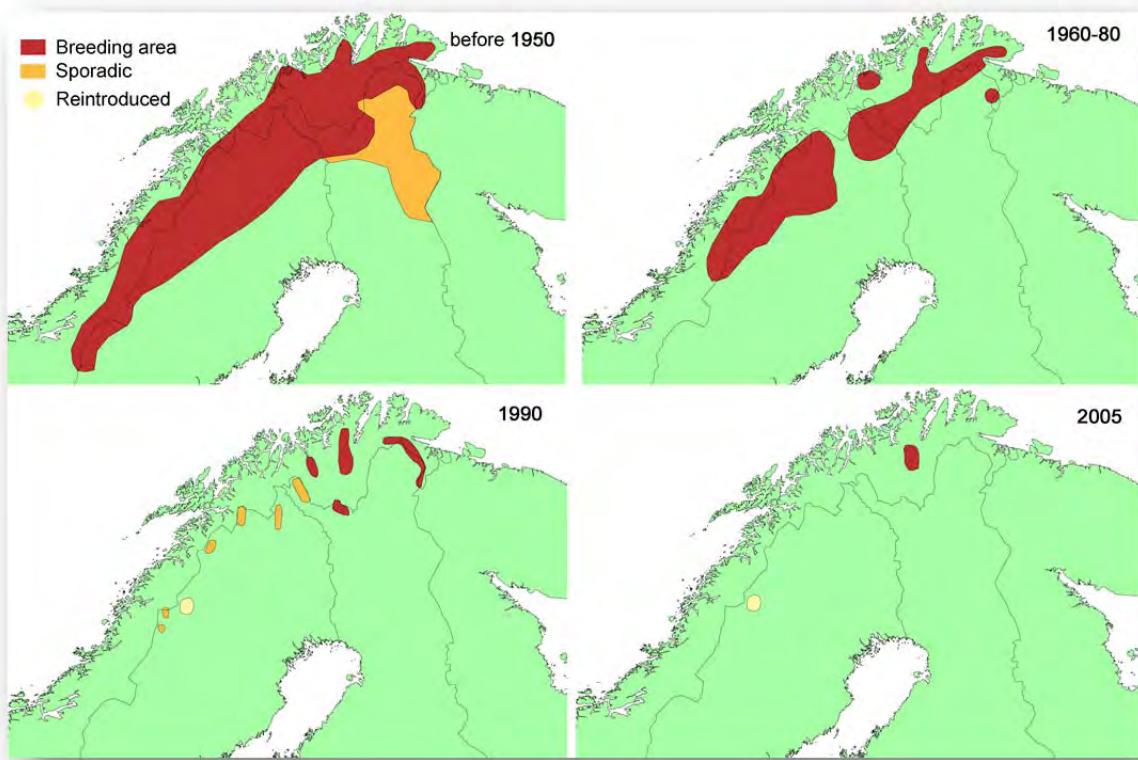


Figure 4. Breeding distribution of the Lesser White-fronted Goose in Fennoscandia before 1950 (upper left), 1960 – 1980 (upper right), early 1990's (lower left), and in 2005 (lower right).

Monitoring of numbers in Norway in recent times

Recent data is available from four important staging areas in Norway used by Lesser White-fronted Geese before and after nesting. Two of these staging areas were used up until the late 1980's by a small subpopulation in Nordland (Øien & Aarvak 1993). This subpopulation is now considered to be extinct, and no Lesser White-fronts have been observed at these two sites since the late 1980's.

The third staging site in Norway is on the island of Skjåholmen in the Varanger Fjord, where between 5 – 10 pairs staged between 1990 and 1997 (Aarvak et al. 1997). This staging site was "rediscovered" in 1994 by following the track of a male Lesser White-fronted Goose from Finnish Lapland which had been fitted with a satellite transmitter. Meanwhile local residents already knew that the geese used the island. Since year 2000, the species has not been recorded here annually, despite intensive monitoring. As an example, 7 Lesser White-

fronts were seen there on 23rd August 2003, following two years without any being observed (Kaartinen & Pynnonen 2004).

The fourth, and without doubt most important, staging site is at Valdak Marshes (Valdakmyra) within the Stabburnes Nature Reserve by the Porsanger Fjord in Finnmark.



Staging area for Lesser White-fronted Geese at Valdak Marshes, viewed from the south. Photo: Ingar J. Øien 2007.

In order to monitor population development for the remaining Norwegian population, the number of geese using this staging site has been recorded in both spring and in autumn. Estimates from NOF's monitoring project show that the current Norwegian population is only 15 - 20 pairs, and that the total Fennoscandian population is no more than 20 -25 pairs (Øien & Aarvak 2007). The total number of staging birds at Valdak Marshes has declined considerably in recent decades. Since 1990, when NOF began intensive monitoring, there is detailed information on this development (see for example Figure 5).

Between 1990 and 2000 there were 25 – 30 pairs and between 7 – 10 young geese in the area during the spring staging period (Øien & Aarvak 2007). The number of pairs remained stable during this period, although there was a slight tendency towards further population decline (total -14.5%, -1.6 per year, p= 0.24 for a significant negative trend). Between 2000 and 2001 there was a decline of about 1/3 (34.9%) in the spring staging population. Total numbers observed during monitoring during spring fell from 60 – 70 individuals to 40 – 50 individuals. Since 2001 numbers staging in spring have stabilized at this level (0% change in the period 2001 – 2006, p=0.61). Of these 40 – 45 birds the total number of adult birds within established pairs has varied between 9 and 18 (Øien & Aarvak 2007).

The total in spring 2007 was 30% lower compared to in 2006. This was not due to decline in population numbers, but reflects a large spring tide corresponding with the main staging period for Lesser White-fronts. This resulted in many viewpoints normally used by White-tailed eagles being inundated by water, and many of the eagles used the area normally used by Lesser White-fronted Geese as viewpoints. This in turn pushed Lesser White-fronts away from the area monitored at Valdak Marshes. A peak of 24 White-tailed Eagles was noted perched within the marsh.

Looking at the whole monitoring period between 1990 and 2007, the population has halved (-53.0%, -4.4 annually, p=0.007, or 47.1%, -3.9% annually, p=0.015 for the years 1990 – 2006). If one excludes 2007, then the reduction between 2000 and 2001 represents as much as 74% of the whole decline since 1990. With only 10 – 15 existing reproductive pairs, the population is close to extinction.

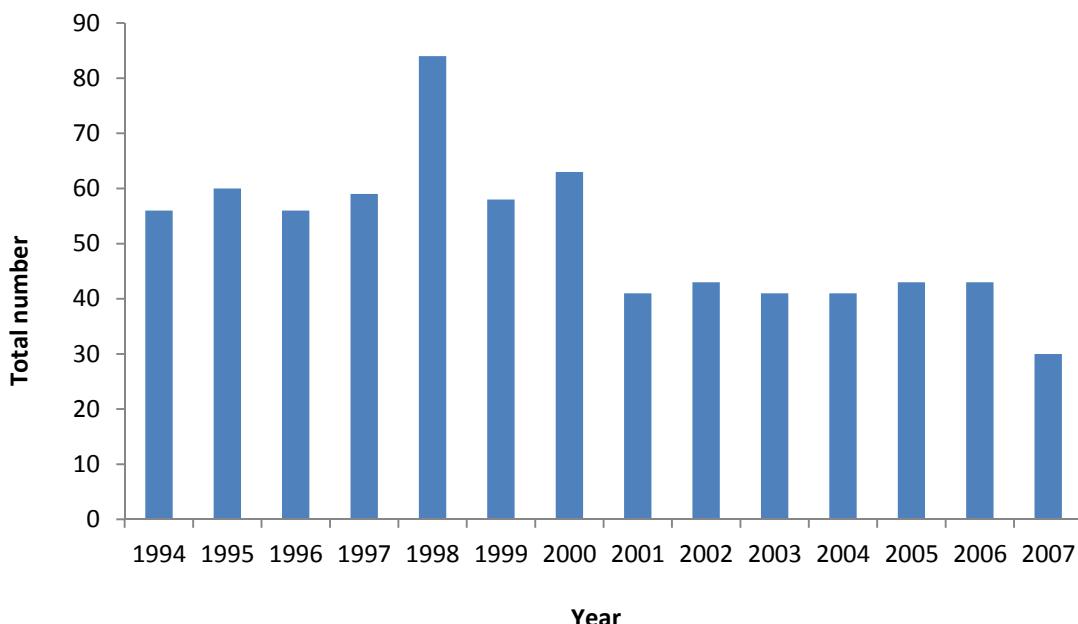


Figure 5. Numbers of Lesser White-fronted Geese at Valdak Marshes in Finnmark 1994 – 2007.

Migration route and annual cycle of the Norwegian population

As the Lesser White-fronted Goose is a migratory species, knowledge of its migration patterns and site use are vital in order to expose reasons for the population decline and to implement measures to counteract this. Satellite tracking is a relatively new technological method (for small animals moving long distances) which in many ways has revolutionized work towards safeguarding the Lesser White-fronted Goose. In conjunction with standard ringing and use of colour-ring combinations, data is available on population movements which allow specific measures to be directed towards conserving the species at all key sites along the migration route.

The **spring migration** of Lesser White-fronted Geese within Fennoscandia was relatively well known at the beginning of the previous century. As opposed to other Fennoscandian goose species, Lesser White-fronts have a distinctly easterly migration pattern. Merikallio (1920) wrote: “*The species migrates each spring and autumn over the Uleborg area, and nowhere else in Fennoscandia is the Lesser White-fronted Goose so numerous*”. Hortling (1929) wrote that Lesser White-fronted Geese arrived in

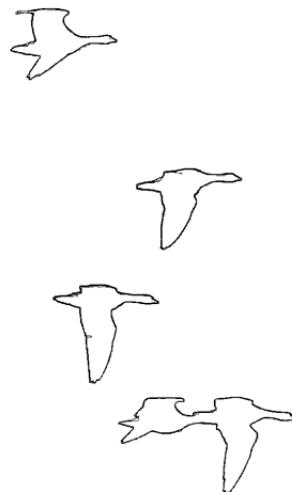
Finland from the south-west over the Bay of Finland. From there, migration continued along the Finnish west coast. A small number migrated along a broad front inland, and later altered their course towards the north-east to the White Sea.

At the regular staging site on and around the island of Hailuoto at the mouth of the River Oulujoki in the Bothnian Bay, spring migration occurs between 7th and 23rd May, with a peak around 18th May. In addition, Lesser White-fronted Geese also use saltmarshes at Liminganlahti and Säärenperä as regular staging areas during spring. Normally, the first Lesser White-fronted geese arrive at Valdak Marshes in Porsanger Fjord in mid-May. The migration here culminates between 22nd and 26th May, and is over in the first week of June.

Lesser White-fronted Geese arrive at the **breeding areas** in the willow region of Finnmark after staging at Valdak Marshes in late May. With the aid of satellite telemetry and follow-up studies in 2005 – 2007, a core breeding area has been localised in central Finnmark, where between 10 and 13 pairs are present during the breeding season. Even during the period that the geese are staging at Valdak Marshes, they make regular flights to the breeding areas, probably to check the amount of snow. Egg-laying commences around 20th – 25th May for the first pairs, and some of these pairs commute between the breeding area and Valdak Marshes during the egg-laying period. In this way, they can utilize the nutrient rich *Pucinella phryganodes* to the full. After -around one month of incubation, eggs hatch at the end of June. Successful pairs become flightless (moult) on the breeding grounds at the same time that the young develop. Moult usually starts in mid-July, and lasts about three weeks. After the moult period, in mid-August, Lesser White-fronts and their offspring return to the Porsanger Fjord, where they remain for three weeks before commencing autumn migration.

As part of the work to map the migration routes of Lesser White-fronted Geese, a number of birds were fitted with satellite transmitters at the Valdak Marshes in 1995, 1997 and 2006. These studies have shown that immature birds (one- and two-year olds) and birds that fail early during the breeding season due to egg predation, begin the **autumn migration** from the breeding grounds before the successful breeders start to moult, in late June. Satellite telemetry studies have shown that these individuals gather at sites in northern Russia (including the Taymyr Peninsula) where they moult together with Russian birds (Aarvak & Øien 2003).

In Finland, Lesser White-fronted Geese have not been observed at staging sites during the autumn migration since the late 1960's (Markkola 1990). Lesser White-fronted Geese which bred in northern Finnish Lapland in the 1990's staged at Skjåholmen in Varanger after moulting. After this, they followed birds breeding in Finnmark on the autumn migration.





The autumn migration from Porsanger (for successful breeders and their young) normally begins during the last days of August or the first week of September. This migration goes first to the Kanin Peninsula in northern Russia. Here the migration splits into two. Some Lesser White-fronts migrate along a western route which is via eastern Hungary to the Evros Delta between Greece and Turkey, whereas others head eastwards before turning south along the great Ob Valley east of the Ural Mountains in Russia and continuing to the steppe areas in northern Kazakhstan (Lorentsen et al. 1998).

The male Lesser White-fronted Goose “Finn” was one of three adults fitted with a satellite transmitter during spring 2006.

Photo: Ingar J. Øien

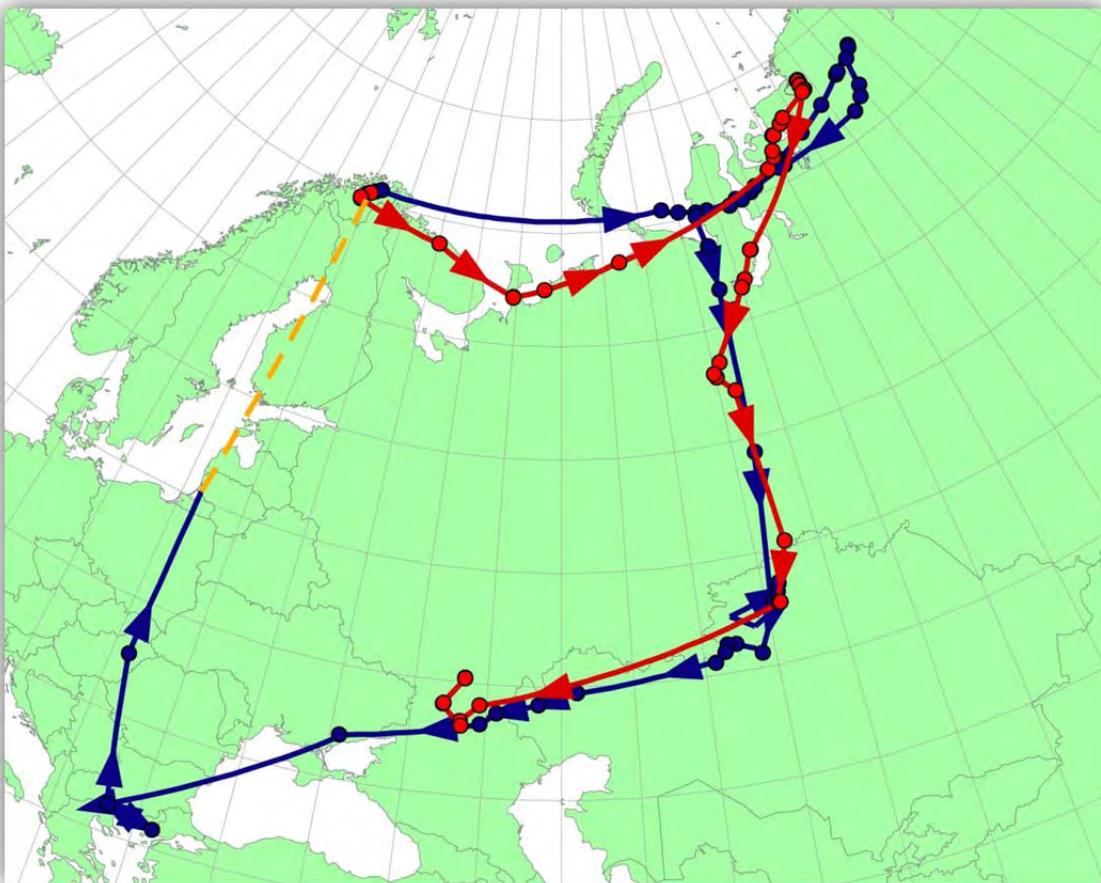


Figure 6. Satellite tracking of the Fennoscandian population of Lesser White-fronted Geese in 2006 – 2007 revealed that the migration route for failed breeders went to wintering quarters in Greece via moulting grounds in northern Russia. The solid line shows the route followed by two males (“Finn” in blue, “Imre” in red), which were marked at Valdak Marshes in Finnmark in May 2006. The dotted orange line shows the presumed route taken during the last part of “Finn’s” migration cyclus.

The route onwards from Kazakhstan was, until recently, only known for Russian Lesser White-fronts staging in Kazakhstan in autumn, and these have their final winter destination in Mesopotamia in Iraq. Therefore it was, up until 2006, assumed that areas from Azerbaijan on the south-west coast of the Caspian Sea to Mesopotamia in Iraq were also winter quarters for Norwegian Lesser White-fronts that followed the easterly autumn migration route.

Following the use of GPS satellite transmitters mounted on two male Lesser White-fronted Geese at Valdak Marshes in 1996, it has been discovered that failed breeders migrate along the eastern route, moult in northern Russia, and stage in Kazakhstan in October, but use a previously unknown route southwards from Kazakhstan. Rather than fly south towards the Caspian Sea, these birds turned south-westwards towards the Volgograd area in Russia, eventually arriving in Greece to join the Norwegian geese that had followed the western route (see Figure 6). These new results show, against previous assumptions, that the two migratory routes for Fennoscandian Lesser White-fronted Geese are not entirely separate (Øien et al. 2007).

Lesser White-fronted Geese arrive at the **wintering quarters** in Greece in November. Up until Christmas, the geese spend their time around Lake Kerini in northern Greece, before moving mid-winter to the Evros Delta. Lesser White-fronts may be absent from the Evros Delta for longer periods during winter, and it is at present unknown where the alternative wintering sites are.



The Lesser White-fronted Goose pair "Finn" and "Nieida", both of which were caught at Valdak Marshes in May 2006, here photographed in the Evros Delta on 5th January 2007. The colour rings are clearly visible. Note also the antenna and satellite tag on the back of the male (right), which is also visible. Photo: Didier Wangeluve.

Spring migration northwards from Greece begins at the end of January, and the first stop is the open grasslands around Hortobágy national park in Hungary. This same area is also very important for Lesser White-fronted Geese (which have young) during the autumn migration. Birds leave this area in mid-April. Important staging sites in spring are found at Matsalu in Estonia and probably also in the Nemunas Delta on the border between Lithuania and the Russian enclave of Kalingrad. During the end of April / beginning of May the birds continue on migration to staging grounds around Oulu in the Bothnian Bay (Finland) before arriving at Valdak Marshes in mid-May.

Migration route of the western Russian main population

Knowledge about the migration of the western Russian main population has improved considerably in the last 4 – 5 years due to the use of satellite transmitters (see Figure 7). Lesser White-fronted Geese have been caught both in Polar-Ural (European Russia), on the Yamal Peninsula and in the Putorana Mountains on the Taymyr Peninsula (see Morozov & Aarvak 2004, Øien & Aarvak 2004, Øien & Aarvak 2005a, 2005b, Øien et al. 2005). A common factor for all these key breeding areas is that all of these travel along the Ob Valley during autumn migration to

north-western parts of Kazakhstan (including the Kustanay region). From here, migration continues along the north side of the Caspian Sea, via Dagestan, eastern Turkey, Azerbaijan, and northern Iran to wintering areas in Mesopotamia in Iraq (Figure 2 & 7). A number of Lesser White-fronted Geese (1500 – 7000) overwinter in Azerbaijan under suitable conditions (Patrikeev 2004).

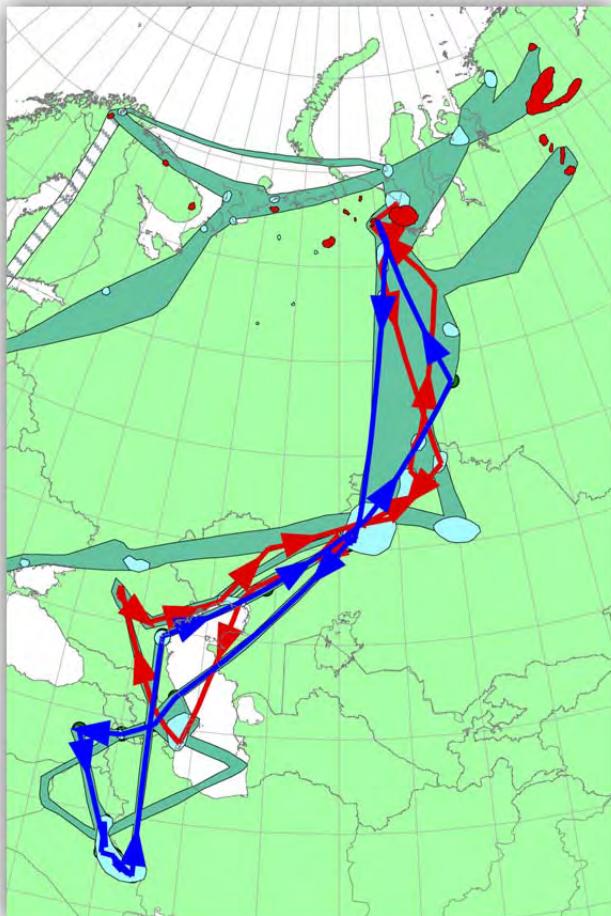


Figure 7. Breeding areas (red), migration routes (dark green), staging areas (pale blue) and known wintering grounds (dark blue) for the western Russian main population. The red line shows the path taken by a goose fitted with a satellite transmitter in the breeding area in Polar-Ural in 2004 – 2005. The blue line shows the path taken in 2006 – 2007 by another goose marked in the same area.

Migration route of the eastern Russian main population

Lesser White-fronted Geese breeding in eastern parts of Siberia, east of Taymyr, migrate in the opposite direction, towards south-east. One main route is south-east along the Lena Valley, and southwards over the mountainous area at Stanovoi, continuing along the Amur to wintering grounds in south-western China, where the Dongting Lake and the Poyang Lake by the Yangtze River are the most important. The sub-population in the very east probably migrates south along the east coast of the Kamchatka Peninsula (Figure 2). For information regarding migration routes of the east Siberian breeding population, refer to Aarvak et al. 1997.

Food and habitat choice

During the breeding season, Lesser White-fronted Geese normally use the willow belt in the uplands, especially in areas with wetland systems with streams and still-flowing waters. It is typical to use rich willow vegetation where the geese can hide themselves and where the nest can be hidden from predators.

Choice of breeding site has been studied in northern Finland and in Norway. It was found that Lesser White-fronted Geese prefer areas with a minimum distance to the nearest road of at least 20 km, although holiday cabins and footpaths were not actively avoided. The only positive correlation with presence of Lesser White-fronted Geese in the breeding areas was the occurrence of *Carex rostrata* (Friberg 1997).

Data from studies using GPS-based satellite transmitters show that male Lesser White-fronted Geese can feed a considerable distance from the nest site during the incubation period, and that individuals from several pairs use the same grazing sites. This suggests that Lesser White-fronts do not have strong feeding territories during breeding. The two males that were tracked using GPS-tags in 2006 failed however during breeding attempts, such that one cannot discount that feeding territories are stronger for pairs that are successful in producing offspring (NOF, unpublished data).

Data on food choice has been collected during project work at a breeding site on the border between Grane and Hattfjelldal municipalities in Nordland (Svanholm 1988) and at a site in Rana municipality (Nettelbladt 1992). Lesser White-fronted Geese normally feed along the shoreline, and grazed plants were studied from these sites. In the Grane / Hattfjelldal area, 12 different plant species were found to have been grazed by Lesser White-fronted Geese; *Equisetum palustre*, *Phleum alpinum*, *Deschampsia caespitosa*, *Eriophorum scheuchzeri*, *Eriophorum angustifolium*, *Scirpus caespitosus*, *Carex bigelowii*, *C. nigra*, *C. juncella*, *Polygonum viviparum*, *Leontodon autumnalis* and *Taraxacum spp.* (Lorentsen & Spjøtvoll 1990). Nine species were recorded as having been grazed by Lesser White-fronts from the breeding area in Rana municipality; *Equisetum palustre*, *Polygonum viviparum*, *Salix lanata*, *Petasites frigidus*, *Luzula multiflora frigid*, *Juncus arcticus*, *Eriophorum ustifolium*, *Deschampsia caespitosa* and *Carex aquatilis* (Nettelbladt 1992).

At the staging site at Valdak Marshes in Porsanger, the geese feed in spring almost exclusively on fresh shoots of *Puccinellia phryganodes*. In some springs, late snow-melt may mean that this species is covered in snow and ice, and geese then instead feed on *Hippuris tetraphylla*, which grows in saltmarsh pools. During autumn, the diet is more diversified to include *Empetrum nigrum*, *Festuca rubra* and *Elymus arenarius* (Aarvak et al. 1996).

In Finland, diet has been studied during spring staging on the island of Hailuoto in the northern part of the Bothnian Bay. Here the diet was composed of 9 different taxa out of around 40 available species. 99.9% of these were Monocotyledons, mainly various grass species (88.7%), of which *Festuca rubra* (43%), *Phragmites australis* (30%), and *Calamagrostis stricta* (13%) were preferred, whereas other species were avoided. Lesser White-fronted Geese actively chose meadows that were on average five times larger than an average-sized meadow in Finland. Active use of the meadows (grazing by cattle etc.) is favourable for geese as *Festuca* and particularly *Triglochin* are positively influenced by moderate grazing intensity (Markkola et al. 2003).



Puccinellia phryganodes. Photo: Tomas Aarvak

Reproduction

Lesser White-fronted Geese are sexually mature at two years old, but most do not first breed until they are three years old, i.e. once they are full-plumaged (with complete adult plumage).

Lesser White-fronts in Fennoscandia breed mainly in the willow belt in the uplands, but also in the upper part of the birch zone. There are also historical records of breeding in coniferous areas, including in Varanger and Porsanger. Lesser White-fronts prefer areas with a mosaic of large and small, water bodies, streams, and marshy areas, and can also regularly breed on small islands.

Both in Finnmark and further eastwards within its range, the Lesser White-fronted Goose starts egg-laying at the end of May and early June. The earliest and latest dates for complete clutches from collections in European museums are (respectively) 23rd May (Sør-Varanger in 1893) and 26th June (Falkelv, Vadsø in 1922). Most usual is at the end of May.

The nest is built in an area free from snow, from shoreline and up to several hundred metres inland from water bodies. The nest is constructed from dried plant material and down, and often close to willow or birch scrub. The eggs are glossy and creamy white, are usually laid at 48 hour intervals, and are incubated by the female for 25 – 28 days (Haftorn 1971), whilst the male stands vigilantly on guard nearby.

Clutch size varies from 1 to 7 eggs, with an average from Fennoscandia of 4.4 (100 clutches collected between 1855 and 1990).

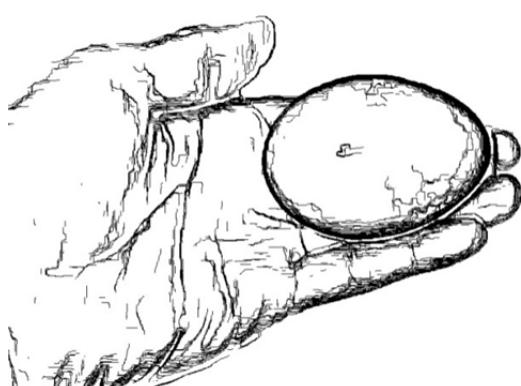
Brood size recorded later in summer, but still in the breeding area, is around 4.3 young per brood (45 broods observed between 1857 and 1989). It would be reasonable to assume that average family size should decline more between egg stage and the stage of small young due to predation, accidents, lack of available food etc. However, in the case of birds and mammals, factors influencing family size are not evenly distributed. Young and inexperienced birds lay smaller clutches than older and more experienced individuals, and it is also the youngest that more easily lose (part of) their clutch or brood at an early stage. The total number of families will also be reduced from the start of egg-laying and up until the young are independent at one year old, but this is difficult to measure.

After moulting is completed on the breeding grounds, and the young have fully-developed flight feathers and flying abilities, they leave for the first stop on the autumn migration. In the case of the Fennoscandian population, this is Valdak Marshes and the inner part of Porsanger Fjord. Annual autumn monitoring of production of young shows an average brood size of 3.2 young (117 broods recorded between 1994 and 2007). The observed average brood size for each season, and the total number of young produced each year (as observed at Valdak) are shown in Figures 8 and 9 respectively. There is no trend towards either smaller or larger broods during the monitoring period 1994 – 2007 ($r^2=0.18$, $p=0.48$, $n=14$).

In order to distinguish between good and poor breeding seasons, we have defined a “good year” as one where production was better than average production for all years plus one standard deviation. Similarly “poor years” are defined as those where production was poorer than average production for all years, minus one standard deviation (see for example van Impe 1996). Using this definition between good and poor years, Lesser White-fronted Geese have experienced four good, eight medium and two poor breeding seasons in the period 1994 to 2007. This is the same pattern that emerged for Greater White-fronted Geese and Tundra Bean Geese *Anser fabilis rossicus* between 1964 and 1995, where both species had more good seasons than poor ones (van Impe 1996).



Clutch of eggs from the core breeding area in 1995. Photo: Tomas Aarvak



Due to difficulties in measuring production during a breeding season, it is usual among geese to estimate the proportion of young in winter at the same time as counts are made of population size. There is no such data available for Lesser White-fronted Geese, but taking into account population size in spring and known brood size we can estimate the expected proportion of young in the population in autumn. For the years 1994 – 2007 this gives an average of 34.0% (3 – 53%). In comparison the proportion of young varies between 27 – 34 % in Greater White-fronted geese (*A.a. albifrons*), 19 – 33% in Taiga Bean geese (*A.f. fabilis*), 9 – 14 % in Tundra Bean geese (*A.f. rossicus*), 6 - 30% in Pink-footed geese (*A. brachyrhynchus*) from Svalbard and an average of 17% for Icelandic Greylag geese (*A. anser*) (Madsen et al. 1999).

In order to look more closely at breeding success we have divided data into two periods based upon trend data which shows that the main portion of the decline in the population since 1990 was due to the huge reduction in numbers between 2000 and 2001.

On average the Lesser White-fronts produced 8.3 broods with 3.0 young per brood in the period 1994 – 2006. Neither the average number of broods per annum nor the average brood size was significantly different in the two periods 1994 – 2000 and 2001 – 2006. There is neither significant downward trend in brood size nor any significant difference in average number of young per annum for these two periods. For the period as a whole the total number of young produced per annum has fallen by -53% (-6.1 per annum), but this trend is not significant. This reflects the reduction in number of breeding pairs rather than a change in production. On the other hand the number of successful breeding pairs increased by 73% from the period 1994 – 2000 (32.8%) to 2001 – 2006 (56.8%). This may be explained by the choice of migration route, dependent upon whether or not a pair has young. If the pair has young, they then migrate along the relatively safe route through Europe, whereas those without young migrate along the much more perilous route through Russia and Kazakhstan. Therefore, there is a selection where pairs with poorer breeding success have higher mortality (Figure 12).

To date, there is no detailed analysis as to what determines production and the final breeding result, although body condition of adult birds (dependent upon environmental factors during migration and on level of disturbance), snow cover and predation from Red Foxes are important factors which will be dealt with in more depth in the chapter on threats.



Staging flock of Lesser White-fronted Geese at the Valdak Marshes in August 2007. Photo: Ingar J. Øien

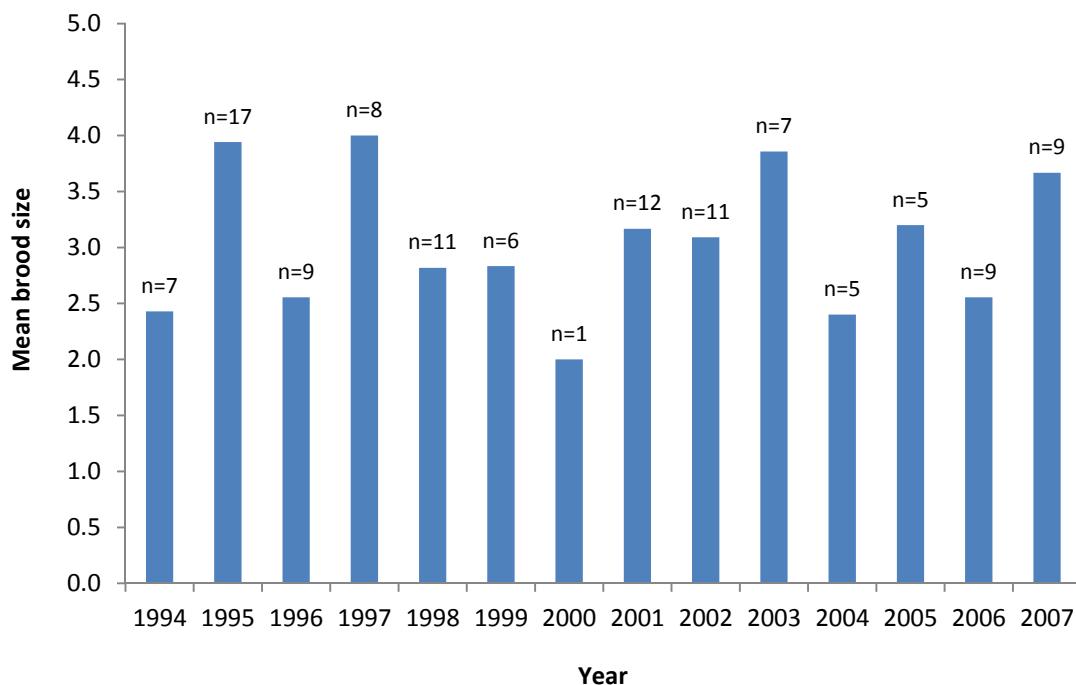


Figure 8. Mean brood size for Lesser White-fronted Geese observed at Valdak Marshes during autumn staging 1994 - 2007.

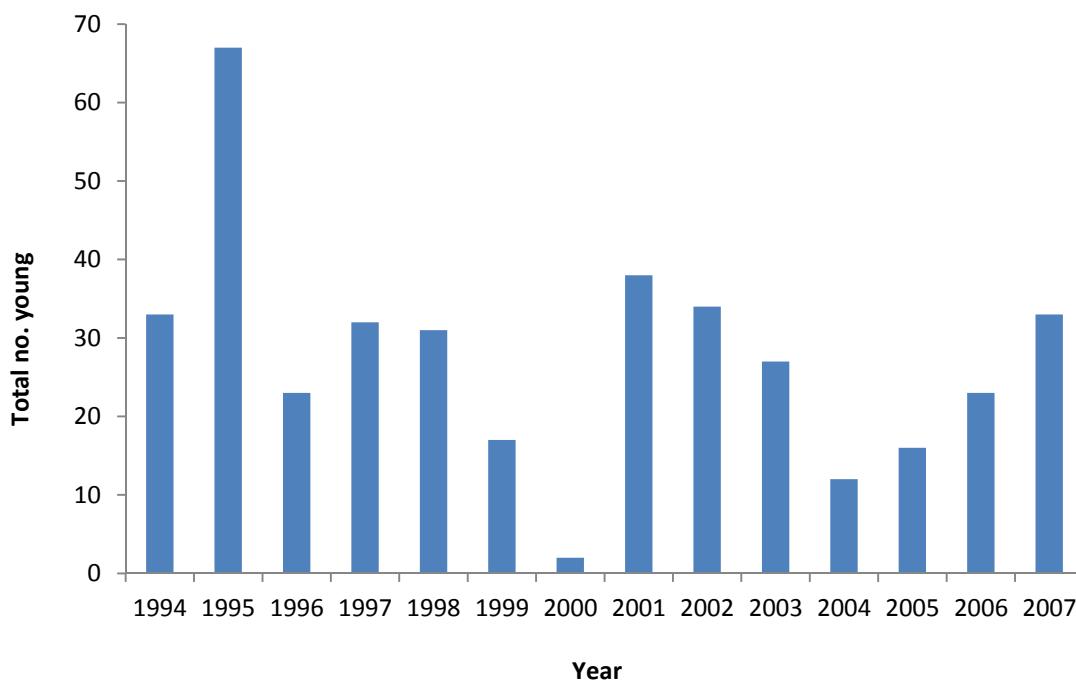


Figure 9. Total number of young observed during autumn staging at Valdak Marshes 1994 – 2007.

Survival

Survival of Lesser White-fronted Geese has only been estimated for the population staging at Valdak Marshes in Porsanger municipality. There are several models to estimate survival. A rough method is based upon the difference in number of adults and young that returns from one year to the next. The data on young and adults from Valdak Marshes between 1993 and 2006 gives a mortality rate (rate of return-1) of -17.3% ($SD=0.195$, $n=13$), in other words a survival rate of 82.7%.

Average survival of young measured using this method (between autumn in the first year to spring the next year) is 30.5% for the years 1994 – 2006, where the "year" with best survival was between 2005 and 2006 at 62.5%.

Rough annual survival ≈ return rate

$$R = \sum 1 - [(R_y - R_{y+1})/R_y],$$

where R_y = no. adults + young (2nd cal.yr.) and R_{y+1} = total adults following year

A better method is based upon capture - recapture analyses. Between 1995 and 2006 a total of 50 Lesser White-fronted Geese have been captured and colour-ringed at Valdak Marshes. Of these birds, 25 adults have been used to estimate survival, using the programme *Mark* (version 4.3). But, as the data material is sparse (with only a couple of geese marked each year) it has not been possible to examine variation in survival over time or catchability. With these restrictions in mind, then survival of Lesser White-fronted Geese at Valdak is as low as 71.4% ($SE=5.8\%$), in other words an annual mortality of 26.8%. This is a much higher estimate than that based upon number of adults plus young between years, although within the value of estimated standard deviation. In Figure 10 we have illustrated the difference between annual return rate (rough mortality), estimated survival (capture – recapture) and maximum theoretic survival in a goose population without any hunting.

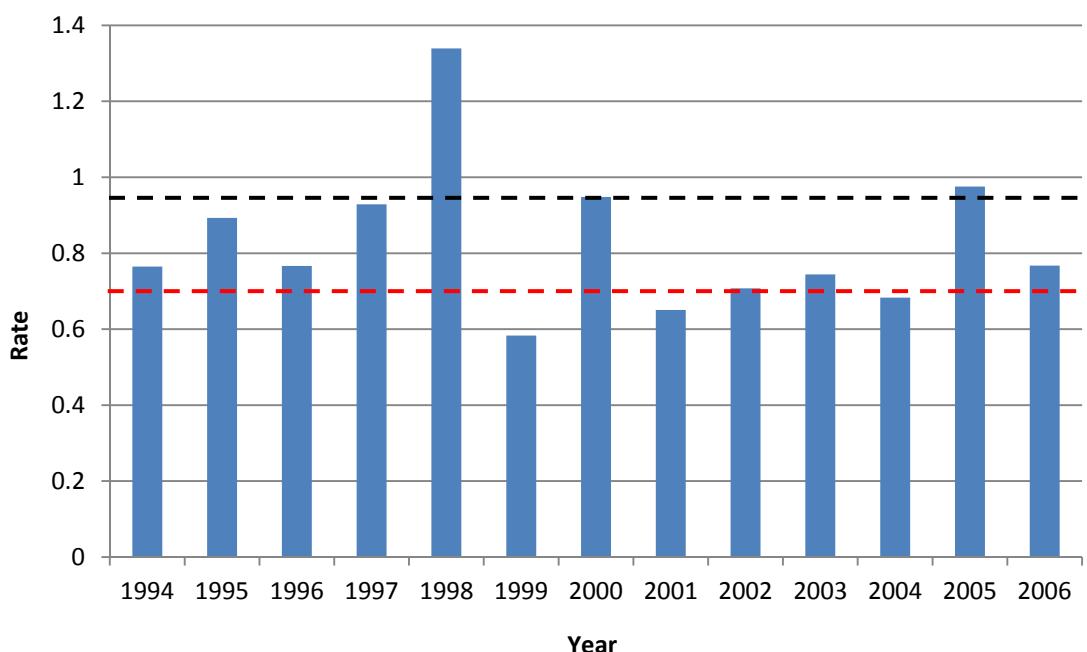
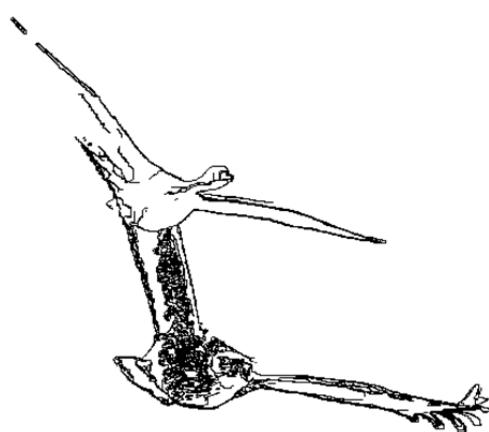


Figure 10. Annual return rate (=rough mortality) for adult Lesser White-fronted Geese at Valdak. The black dotted line represents a "maximum" natural survival of 95%, whereas the red dotted line shows the average estimated survival of 71.4% for the period 1995 – 2006.

As with the factors determining reproduction, there is at present no detailed analysis as to what influences mortality in Lesser White-fronts. Based upon recoveries and satellite telemetry it is, however, clear that the most important factor responsible for high mortality in Fennoscandian Lesser White-fronted Geese is illegal hunting taking place along the migration route and in the wintering quarters.

As hunting is much more extensive in Russia and Kazakhstan, it is expected that birds migrating via these two countries are exposed to a higher risk of mortality. One would therefore expect that in a year following a breeding season with poor production of young (measured as proportion of successful breeding pairs) that there would then be a decline in the proportion of Lesser White-fronts that return to Valdak as they have moulted in northern Russia and followed the long migration route via Russia and Kazakhstan, thus being more exposed to greater hunting pressure (see chapter on **Annual cycle**). Statistically, there was no such significant relationship ($\chi^2 = -0,142$, $p=0,659$, $n=12$). An explanation for this may be that the increased mortality along the eastern migration route was compensated by the birds following the easterly route being accompanied by new individuals from the eastern populations. In other words, there may have been an increase in immigration into the Fennoscandian population. Alternatively, there is no difference in mortality between the western and eastern migration routes, something which would mean that there is still widespread illegal hunting along the westerly route. That route also involves a relatively long stay in western Russia (Kanin Peninsula and the Onega – Ladoga area).

Compared to other goose species, survival of adult Lesser White-fronts is low. This is remarkable, as the Lesser White-fronted Goose is protected from hunting, as opposed to other *Anser* species. Between 1995 and 2006 at least 27% of all Lesser White-fronts marked with satellite tags were confirmed as having been shot, although the probable level was 47% (7 of 15 individuals). Survival for adult Taiga Bean geese is around 72%, Svalbard-breeding Pink-footed geese 71 – 85%, Greater White-fronted geese 70 – 75% and Greylag geese in north-west Europe 68 – 83 % (Madsen 1999).



Lesser White-fronted goose, shot illegally in Kazakhstan.
Photo: Tomas Aarvak.

PROTECTION STATUS

Legal protection

The Lesser White-fronted Goose was afforded total protection in Norway on 15th May 1970, under the provisions of the law on common hunting seasons (Law on Hunting). Up until then, there was no regulation on hunting or trapping of Lesser White-fronts. In Sweden and Finland the species was protected from hunting in 1964 and 1969, respectively.

National red list status

Lesser White-fronted Goose is included on the Norwegian Red List (Kålås et al. 2006) according to the following criteria:

Red list category 2006: CR (Critically Endangered)

Red list category (IUCN): C1

Red list category 2006 (extended, applied in Norway): C1

Documentation of criteria: The species is considered as CR on the global red list³. The Norwegian breeding population is currently below 100 reproducing individuals. The Lesser White-fronted Goose project has documented an alarming decline during the past decade. The species is placed in category CR based upon criteria C1 (Kålås et al. 2006).

International red list status

Global: Vulnerable (IUCN 2007)

Europe: Endangered (according to IUCN's criteria from 2001, criteria C1)

SPEC: SPEC 1

EU Birds Directive: Annex I

Bern Convention: Appendix II

Bonn Convention: Appendix I

AEWA: A 1a 1b 2 (N Europe & W Siberia/Black Sea & Caspian

CITES: Not listed

What is a red list?

A red list is a list of plants and animals which are in some way threatened with extinction or exposed to considerable or serious population reduction. A list may also include species which are increasing, but from a previously greatly reduced population. The red list also contains species that are naturally rare (Kålås et al. 2006). The purpose of such red lists is to direct focus towards threatened species, not just at a national level, but also towards regional and local authorities, sectors and voluntary organisations. The principal aim is to prevent species from disappearing from Norway. The red list is, therefore, important in relation to conservation management and during planning of encroachments on nature. There are both national and global red lists. The Norwegian list is the responsibility of the species data-bank (Artsdatabanken). The red list can be found at www.artsdatabanken.no/. Information on international work on threatened species and red lists may be found at www.iucnredlist.org/.

³Here there is an error regarding the criteria documentation for the Norwegian red list, as the Lesser White-fronted Goose has been included as Vulnerable (VU) on IUCN's global red list.

EU Habitats directive

Under the EU Habitats Directive (Habitats Directive, 92/43/EEC, 1992), article 22(b) may be relevant in relation to introduction / reintroduction of Lesser White-fronted Geese:

“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.”

EU Birds Directive

The EU Birds Directive (Council Directive, 79/409/EEC, 1979): Lesser White-fronted Goose is listed under Annex 1 in 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 in relation to introduction / reintroduction of Lesser White-fronted Geese:

“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”.

Table 1. Summary of international status of the Lesser White-fronted Goose

Global status ¹	European status	SPEC ² category	EU Bird Directive ³	Bern Convention ⁴	Bonn Convention ⁵	AEWA ⁶	CITES ⁷
Vulnerable	Endangered ⁸	SPEC 1	Annex I	Appendix II	Appendix I	N Europe & W Siberia / Black Sea & Caspian Sea A 1a 1b 2	Not listed under CITES Appendix

¹ Source: 2004 IUCN Red List of Threatened Species (criteria A2bcd+3bcd – see <http://www.redlist.org/>)

² Species of European Conservation Concern

³ Directive on the Conservation of Wild Birds, 79/409/EEC

⁴ Convention on the Conservation of European Wildlife and Natural Habitats, Bern, 1979

⁵ Convention on Migratory Species, Bonn, 1979

⁶ Agreement on the Conservation of African-Eurasian Migratory Waterbirds, 1995

⁷ Convention on International Trade in Endangered Species of Wild Flora and Fauna, 1973

⁸ Source: application of IUCN Red List criteria (2001 version), criterion C1

Action plans

Since the publication of the first action plan for the Lesser White-fronted Goose in 1996, at the same time as the national goose action plan in Norway, Greece has been the only country to produce a national action plan for Lesser White-fronts. This was published in 1999 (Savas & Nazirides 1999). In Sweden, a national action plan has been under preparation since 2004 but, due to discussions as to how to treat the introduced population in Sweden which is composed of birds with genes from other goose species, this plan has not yet been finalised.

Below is a selection of some of the more important points in the Norwegian action plan for all goose species and from the international action plan for the Lesser White-front.

National action plan for geese in Norway - 1996

The Norwegian Directorate for Nature Management published a national action plan for geese in 1996 "Handlingsplan for forvaltning av gjess i Norge" (Direktoratet for naturforvaltning 1996). The following were defined for the Lesser White-fronted Goose:

Main aim:

- The Lesser White-fronted Goose shall be managed as a particularly vulnerable species, and consideration to the species' continued survival in Norway requires special attention and particular measures at individual and habitat level.
- Norway ought to work actively to achieve the aims outlined in the international management plan for the Lesser White-fronted Goose.
- It is important to preserve both existing and former staging, breeding and moulting areas for the geese.

Objectives:

- Establishment of a clearly defined monitoring programme which provides annual overviews on population status and development in Norway.
- Damage to habitat in both current and formerly known sites for Lesser White-fronted Geese must be avoided.
- Release and manipulation of migration routes must be avoided.
- Release of captive birds and manipulation of migration routes is not permitted in Norway. This is assessed in the light of such measures in Finland and Sweden and recommendations in the action plan.
- Consideration needs to be made regarding restrictions in important areas for Lesser White-fronted Geese. Such may include area protection measures, access restrictions, a ban on fishing and a ban on fish stocking.
- An active effort shall be made to map migration routes, staging areas and wintering areas for birds that breed and/or stage in Norway.
- The staging area at Skjåholmen in Finnmark must be given suitable protection status and access restrictions at Valdak Marshes (Valdakmyra) ought to be enforced during autumn migration.
- Protection of breeding areas in Finnmark should be considered.
- An examination of historical material and a check on source material must be undertaken to provide information on areas formerly used by Lesser White-fronted Geese.

Practical measures:

- Areas of special importance, including all known staging areas, must be taken care of via protection measures in accordance with the game and conservation laws. Other potential areas, including former known staging areas, ought to be secured through the planning and building act in order to maintain their value and function in the event that the negative population development should be reversed.
- There is an urgent need for speedy and effective following up of the measures suggested in the action plan for the Lesser White-fronted Goose.
- Information about the Lesser White-fronted Goose shall be spread via relevant channels in order to improve knowledge about the species.

Responsibility:

- The Directorate for Nature Management (DN) is responsible for the establishment and coordination of a national monitoring programme, as well as an examination of older information material.
- The County Governors offices are responsible for following up of monitoring, as well as in suggesting special measures in relation to securing valuable areas.

International action plan for the Lesser White-fronted Goose – 1996

The first international action plan for the Lesser White-fronted Goose, written by Jesper Madsen, was published in 1996 by the "Council of Europe". This plan, as with the forthcoming international plan, unfortunately only covers AEWA's geographical area, such that the eastern Russian main population is not included. Even so, this was an important plan that described the following important main points:

Threats and limiting factors

- Hunting – unknown, probably high
- Predation – unknown, probably high
- Disturbance and loss of breeding habitat – unknown, probably low; disturbance from helicopters locally high
- Loss of staging and wintering areas - unknown

Conservation priorities

- Locate and assess key areas - essential
- Increased use of international conventions to protect the species together with direct cooperation between countries within the species' distributional range - high
- Increase amount of protection for species and key sites - high
- Reduce hunting pressure - high
- Manage habitats and prevent loss of staging and wintering areas - high
- Monitor the remaining population and carry out research on species biology - high
- Raise public awareness about the species, particularly towards hunters and landowners - high

Appendix 1 of the action plan recommends the following conservation measures in Norway:

- Promote the best possible protection for the remaining breeding, spring staging and autumn staging areas from damage (negative impacts) and tourism.
- Promote regulations necessary for helicopter traffic at Porsanger Fjord.
- Annual population monitoring during staging in spring and autumn, as well as the breeding population.

The entire plan can be downloaded from the following address:

http://ec.europa.eu/environment/nature/conservation/wildbirds/action_plans/per_species_en.htm

International action plan for the Lesser White-fronted Goose - 2008

This plan, prepared by BirdLife International for AEWA, unfortunately only covers AEWA's geographical area, such that the eastern Russian main population is not included. The plan describes the following important main points:

Threats:

- Hunting in breeding areas – importance: medium
- Hunting on staging and wintering grounds – importance: critical
- Poisoning – importance: local
- Human disturbance on breeding grounds – importance: medium
- Predation on breeding grounds – importance: local

- Intensification of agriculture on staging and wintering grounds – importance: high
- Construction of dams, regulation of water levels and drainage of wetlands – importance: high
- Climate change – importance: unknown
- Land abandonment on staging and wintering grounds – importance: medium
- Overgrazing on breeding grounds – importance: local
- Pollution of wetlands on staging and wintering grounds - importance: local
- Genetic introgression of DNA from Greater White-fronted, Barnacle or Greylag Geese from released captive-bred Lesser White-front hybrids
- Key knowledge limitations

Conservation priorities:

- Reduce mortality
- Prevent further loss and degradation of habitat
- Maximise breeding success in Norway and Russia
- No introgression of DNA from other goose species via released captive-bred Lesser White-front hybrids
- Improve key knowledge
- Maximise international cooperative conservation



A pair of Lesser White-fronted Geese (male on left). During spring the main food is the salt tolerant plant Puccinellia phryganodes. Photo: Ingar J. Øien.

THREATS AND CHALLENGES

The description of threats in this chapter is based upon the same structure used in the International action plan for the Lesser White-fronted Goose (AEWA 2008). The description itself is adjusted to focus on the Fennoscandian population, although we have found it appropriate to describe the full picture of threats (flyway level) as conservation measures must take into consideration all factors within the population's range area / flyway. Due to the fact that new information has come to light since the main foundation work for AEWA-SSAP, some supplementary information is contained within the text. Table 2 shows a simplified presentation of how the various threats are weighted in relation to consequences and probability in different parts of the Lesser White-front's range (flyway).

AEWA-SSAP has a starting point in the international action plan of 1996 (Madsen 1996) and the listing used under "Threats and limiting factors":

- Hunting
- Predation
- Disturbance and loss of habitat on the breeding grounds
- Loss of habitat on staging / wintering grounds

Table 2. Relative importance of threats on wild populations of Lesser White-fronted Goose

Threats resulting in	Populations		
	Fennoscandian	West Russian main	East Russian main ⁴
(a) increased mortality			
Hunting	critical	critical	critical
Pollution	unknown	local	high
Human disturbance	medium	unknown	unknown
(b) reduced breeding success			
Human disturbance	local?	local	local
Predation	high?	local	local
Genetic impoverishment	low	unknown	unknown
(c) loss and damage to habitat			
Intensification of agriculture	formerly high; now considered low	high	high
Damming and regulation of rivers	medium?	high	high
Climate change	unknown	unknown	unknown
Overgrazing	local	unknown?	unknown?
Land abandonment	locally high	high	unknown?
Pollution of water sources	unknown?	unknown?	unknown?
(d) genetic introgression			
(e) knowledge limitation			
	danger present	danger present	?
	fundamental	fundamental	fundamental

⁴The present proposal for a National Action Plan for Lesser White-fronted Goose deal with AEWA

UNEP - World Conservation Monitoring Centre (WCMC) (2003) produced a report on status and perspectives for the Lesser White-fronted Goose for the 12th meeting of the Scientific Council of the Convention of Migratory Species (CMS) in 2004. The report divides real and potential threats upon the following structure:

- Habitat damage/loss (with points on concrete threats in China, Greece, Uzbekistan and Fennoscandia).
- Exploitation. Direct and accidental (with points on the hunting situation in Bulgaria, China, Greece, Kazakhstan and Russia).
- Other threats (with points on predation, human activities and themes specially related to China and Norway).

The report concludes that human exploitation is the most serious threat within the region – which affects all three migratory routes. Most serious are hunting practices in Russia, China and Kazakhstan. Over 95% of the world population of Lesser White-fronted Geese is influenced by hunting in these areas.

In recent years, updated knowledge has become available including new information on migration routes and much of this was drafted during an international conservation workshop held at Lammi in Finland between 31st March and 2nd April 2005 as the basis for the new international action plan.

Description of threats

As a lead in the development of the new international action plan for the Lesser White-fronted Goose, an international workshop was held at Lammi, Finland between 31st March and 2nd April 2005, in order to, amongst others; produce a joint description of threats as a basis for the action plan. Factors which cause increased adult mortality are most important in influencing population development. These factors (hunting and habitat change) occur mainly at staging and wintering sites, and are described in more detail in the international action plan. NOF's Lesser White-front project has followed this process, and has been the major source of information towards the international plan. There are beliefs that the dramatic population decline (of the Fennoscandian population) has led to a considerable reduction in genetic diversity. Such effects are undocumented. On the contrary, there are indications that the genetic diversity within the population is high, as a result of a relatively large proportion of influx of males from the western Russian main population (see for example Ruokonen et al. 2004).

The international action plan has also addressed the problem related to the "reintroduction" of Lesser White-fronted Geese, in particular in Sweden but also to some extent in Finland. This discussion has, in many ways, resulted in laming direct conservation efforts. This topic has also been raised by the Norwegians, both internationally via the Lesser White-fronted Goose group of Wetlands International, as well as bilaterally towards the Swedish authorities. An important point which has been the subject of much discussion has been the issue of revealing genetic contamination from other species, as well as the manipulation of migration routes. The main threat relates to possible genetic effects on the Fennoscandian population as the Swedish population of geese from captivity has expanded. The Scientific Council of CMS viewed the problem (Appendix A: see also http://www.cms.int/bodies/COP/cop8/cop8_meeting_report.htm), and are in complete agreement with the view from the Norwegians (Direktoratet for naturforvaltning 2004).

Despite the fact that a lot of new and important information has become available in recent years, lack of information on some issues is still a major, critical issue in order to evaluate the threats facing the whole population. Based upon available information, the new international action plan has focused on the following main threats:

- Threats that increase adult mortality
- Threats that reduce breeding success
- Threats leading to negative changes in habitat
- Potential genetic introgression with other species in the Fennoscandian population from introduced birds bred in captivity

Threats causing increased adult mortality

Hunting

Hunting on spring staging, breeding and moulting grounds

Illegal spring hunting takes place in many areas that are central staging areas for the Fennoscandian Lesser White-fronted Goose population in Russia (Kanin Peninsula, Kolgujev, Kalingrad and others). On Kolgujev Island hunters, both local and visiting, shoot between 7000 and 10000 geese. Hunting commences in early spring and continues throughout the summer (Zolto et al. 2001). Catching of moulting Lesser White-fronts is believed to still be considerable in Russia.

In Norway there has been an experimental arrangement with spring duck hunting in Kautokeino municipality. This is a much debated form of hunting, based upon Sami traditions. The arrangement will be reviewed once the new law on biodiversity is in place. SNO in Finnmark County have observed that spring hunting also occurs in part of the core breeding area for Lesser White-fronts in Kautokeino. This represents a threat as it is well known that geese are shot illegally during spring duck hunting. In Karesuando in Sweden, Norwegian hunters regularly purchase Bean Goose decoys.

Hunting on staging / wintering grounds

Hunting pressure is considered to be extremely high in Russia and

Kazakhstan, and the negative effects

are to some extent well documented through satellite tracking of Lesser White-fronted Geese, as well as from counts on the wintering grounds. Out of the total number of geese shot in these areas, the proportion of shot Lesser White-fronted Geese in hunting bags corresponds with the proportion found in goose flocks. Hunting takes place both as subsistence hunting and sport hunting (including tourism). To a great extent shooting of Lesser White-fronts occurs due to misidentification (as Greater White-fronts), although local ignorance of laws and hunting regulations is also an extensive problem – probably in combination with a lack of both information and lack of wardening.

Heavy hunting pressure also disturbs geese, thereby using energy reserves unnecessarily, which may result in poorer body condition and increased adult mortality. Recent information suggest that the Evros Delta, between Greece and Turkey, and which is an important wintering site for the Fennoscandian population of Lesser White-fronts, is also prone to extensive hunting bordering, and even within, the protected area.

There is also evidence to indicate loss of Lesser White-fronts at staging sites in Norway (Finnmark). In autumn 2005, two juveniles disappeared during staging and hunting is considered as a likely cause. There are now hunting restrictions for the inner parts of the Porsanger Fjord – in particular for goose hunting.

Poisoning

Poisoning on staging / wintering grounds

Poisoning is documented as a threat in some staging and wintering areas. This method is used to capture geese in China (Gang 2001, Markkola 2000), whereas in other places there is a risk of secondary poisoning from rodent eradication in farming areas (for example in Bulgaria).

Disturbance

Disturbance on staging / wintering grounds

Human disturbance is considered a major problem, throughout the range of the Lesser White-fronted Goose. It has been proven that human disturbance, both accidental as well as deliberate, has considerable negative consequences upon body condition and therefore also upon production and survival (Madsen 1995, Claassen 2006). In some areas, such as Hortobàgy, Hungary, can scaring from ornithologists and from farmers result in

Torrade bryster av		
	1. TIUR	2. LAP-GAAS
niglands vigt	4,1 kg	
brystlets	1,8	2 kg
—	0,7	0,6
Löaret		0,3
		0,15

Value of meat from Capercaillie, Lesser White-fronted Goose and Willow Grouse in the 1920's. From Evjenth, 1927.

Lesser White-fronts moving to areas where they are more exposed to hunting. This problem has received focus during the EU-LIFE project.

Human disturbance at staging sites in Finnmark is also thought to influence adult survival. In addition, disturbance on the breeding grounds may lead to nest abandonment. This will in turn result in birds leaving Norway earlier than successful breeders and then moulting in Russia. These would then later follow the eastern migration route along the Ob Valley and northern Kazakhstan to the Black Sea coast, then onwards to Greece. This route is known to be extremely risky due to the extent of hunting.

Research activities (capture for marking) during spring staging at Valdak Marshes will also in the same way affect adult survival unless one applies stringent rules in advance of capture.

Other factors that may lead to increased adult mortality

The international action plan has pointed out the following factors which are known to affect geese and other large birds in general, and which may also apply to Lesser White-fronted Geese, despite lack of documentation:

- Windmills
- Power lines. Geese are, together with swans and ducks, amongst those groups of birds known to collide with overhead cables (Lislevand 2004).
- Disease



Greater and Lesser White-fronted Geese occur in large concentrations on drying lakes in the steppes of Kazakhstan. Photo: Ingar J. Øien

Illegal hunting is the most important single negative factor for the Lesser White-fronted Goose in Fennoscandia

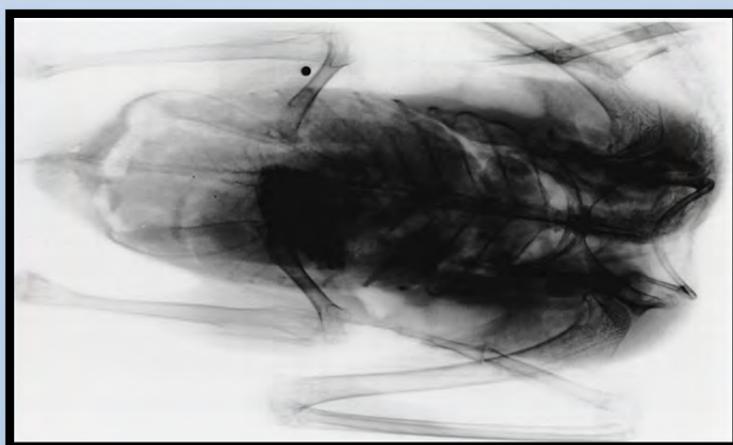
The Lesser White-fronted Goose is fully protected from hunting throughout its range. Despite this, NOF's Lesser White-fronted Goose project continues to receive recoveries of Lesser White-fronts that have been shot, both at unprotected staging sites as well as from protected areas where hunting is not permitted. Three known individuals who met such a fate were:

- Lesser White-fronted Goose colour-ringed red-white-blue at breeding site in Finnmark in 1995, and shot in the Ob Valley in Russia 9th September the same year.
- Lesser White-fronted Goose named "Imre" (colour-ringed red-green right leg) was fitted with satellite tag 23rd May 2006. Shot near Volgograd (formerly Stalingrad) autumn the same year.



Facsimile from VG 14.11.2006

- The male Lesser White-fronted Goose named "Mannu" was ringed at Valdak Marshes on 23rd May 2006, and shot at Lake Kerkini in Greece. The bird was found dead on 12th December that year, and obducted in Finland. The shotgun pellet visible in the upper part of the photograph below had gone through the body, causing fatal internal bleeding.



Factors reducing breeding success

Disturbance

Disturbance on breeding grounds

All forms of disturbance, here including tourism, use of aeroplanes, helicopters and quad bikes (ATV) are considered to pose a threat on the breeding grounds of the Lesser White-fronted Goose in Finnmark (nest abandonment). Research activities may also pose a threat and caution needs to be exercised.

Predation

Predation on the breeding grounds

Breeding success and production of young in Lesser White-fronted Geese is quite similar to that in other goose species, and predation is unlikely to be the main reason for the population decline. However, there is reason to believe that the expansion of Red Foxes in the uplands has resulted in increased depredation levels (eggs and young), **and** the lack of regular peaks in rodent numbers may have led to increased predation of Lesser White-fronts in Finnmark. In addition, other species of predators can depredate Lesser White-front nests (as well as adult geese). As the Lesser White-fronted goose population is currently very weak, then only a few instances of predation could prove drastic in terms of population development. As discussed under the sections on increased adult mortality and disturbance – predation at an early stage in the breeding cycle (pre-moult) could trigger migration to Taymyr and have a double effect both with reduced productivity and increased adult mortality.

In Sweden, it was shown in the reintroduced population that egg predation from Red Foxes can lead to total breeding failure in a small, restricted population of Lesser White-fronted Geese. This was illustrated in 1995, when a late spring resulted in ice on upland water bodies in mid-June, which made it easy for Red Foxes to cross the ice to the breeding islands (von Essen 1996).

It is also likely that egg depredation from Red Foxes led to breeding failure in the Fennoscandian Lesser White-front population in 2000. In Northern Finland the Forest and Park Service (Metsähallitus) annually control Red Fox numbers in former breeding areas in preparation for the return of the Lesser White-fronted Goose as a breeding species (Matti Mela pers.comm.).

An understanding as to how control measures affect Red Foxes is essential in order to manage the population. In Great Britain, the most effective control measures are removal of individuals before breeding (winter / spring) combined with removal from dens early in the breeding season. In order to have greatest effect it is also important to control immigration by Red Foxes into the area (Rushton et al. 2006).

In 2008 SNO started culling Red Foxes from the core breeding area in Finnmark.

Other factors that may reduce breeding success

See also the point about increased adult mortality / disturbance which in general is also relevant.

- Climate change may also have consequences for the population, both directly and indirectly. One direct effect is of poor weather during the breeding season leading to a dramatic reduction in breeding success in tundra-breeding species due to late snow melt delaying access to prime breeding sites. Poor condition in adult birds may lead to aborted breeding attempts or reduced survival of young. In a similar manner, availability of insects, which may be important food for newly hatched young, is negatively affected by cold and wet weather. An indirect effect of climate change was observed in spring 2007 when the high tide (which may be related to climate) resulted in large numbers of White-tailed Eagles using Valdak Marshes and thereby disturbing Lesser White-fronted Geese (possible effect on body condition).
- Climate change will also affect availability of food plants along the migration route as well as on the wintering grounds.

Negative habitat changes

Agricultural intensification on staging / wintering grounds

Changes in agriculture along the migration route (southern Europe / Asia) have resulted in negative changes in habitat and poorer feeding conditions. The amount of naturally occurring steppe and wetland habitats for which

Lesser White-fronted Geese are dependent upon has become considerably reduced, for example in Greece (Vangeluwe 2005).

Dams / river regulation / drainage on staging / wintering grounds

Changes in formerly important staging and wintering areas as a consequence of various forms of encroachment (drainage / cotton planting) in for example Uzbekistan and Mesopotamia (Iraq) have reduced / damaged important habitats for Lesser White-fronted Geese. Geese (several species) have smaller feeding areas and this leads to increased mortality due to increased exposure to hunting. Changes in water regimes which reduce staging habitats also affect areas important for the Fennoscandian population (such as Lake Kulykol in Kazakhstan) (Aarvak et al. 2004).

Climatic changes on breeding grounds

Global warming is expected to be first noticeable in northern latitudes and is predicted to lead to considerable consequences for sub-arctic ecosystems and therefore also the breeding grounds for Lesser White-fronted Geese. Zöckler & Kostin (2000) calculated that 28% of Lesser White-fronted Goose breeding habitat will be lost in the period 2070 – 2099, based upon the HadCM2Gsa1 model. In addition to direct reduction in habitat, a more complex effect is expected in the form of a collapse of the food chain and a further expansion in range of Red Foxes. The most likely effects are changes in food availability (vegetation), which may negatively affect reproduction and survival. Changes in timing of snow-melt may also have an effect. Late snow-melt would make depredation by Red Foxes easier due to a restriction in available nesting sites for Lesser White-fronted Geese.

Climatic changes on staging / wintering grounds

Global warming is also likely to have consequences on staging and wintering areas as natural steppes, on which Lesser White-fronted Geese feed, dry out to become semi-deserts. Lesser White-fronted Geese are particularly vulnerable for this as they are habitat specialists which, during migration as well as on the wintering grounds, use almost exclusively natural steppes and not cultivated land. The adaptation to feeding on cultivated land has probably been the key factor enabling other goose populations in both Western Europe and in America to expand in numbers. The higher energy values have compensated for high hunting pressure (see for example Jeffries et al. 2006).

Land abandonment on staging / wintering grounds

Structural changes in land-use, including cessation of grazing and resultant overgrowing pose a threat in some areas. This has been apparent on a large scale in recent years, and is currently increasing in the Baltic States amongst others. Overgrowing in important staging areas (fields and meadows) will clearly have negative effects on Lesser White-fronted Geese.

Large areas of natural grassland and wetlands on the staging and wintering grounds have been cultivated. Cultivation of natural steppes in Central Asia was particularly extensive in the latter half of the past century. In the Lesser White-fronted Goose wintering area in Greece, intensive land-use has resulted in loss and degradation of winter habitat.

Overgrazing on breeding grounds

Overgrazing of tundra vegetation by tame reindeer can threaten habitat quality on the breeding grounds of the Fennoscandian population. It is at present unclear if this may explain some of the decline in the Lesser White-front population. In Sweden, no increase in the number of tame reindeer was recorded when the Lesser White-fronted Goose population collapsed (M. Björklund pers. comm.), whereas in Finland numbers of tame reindeer doubled between 1970 and 1990, with a clear negative effect upon the vegetation (T. Lehtiniemi/BirdLife Finland). The same is also true for several former Lesser White-front breeding sites in Finnmark.

Water pollution on staging / wintering grounds

Incidental or more widespread pollution of wetlands and water sources may be a considerable negative factor on a local basis both at staging and wintering sites. The Lesser White-fronted Goose is not especially vulnerable to oil pollution, although this may occur, and owing to the size of the population and its protection status the Lesser White-front is one of only few species specifically mentioned in a memorandum between the Directorate of Nature Management (DN) and the Norwegian Food Safety Authority (Mattilsynet) regarding oil pollution (dated 17.01.2008). DN recommends that Lesser White-fronted Geese shall be rehabilitated in the event of damage from oil. In addition it is stated “*that each single individual is considered important towards the species survival and the threshold for unnecessary suffering is high*”.

Genetic contamination

The wild population of the Lesser White-fronted Goose in Fennoscandia is exposed to potential genetic contamination from other goose species from introduced Lesser White-fronts bred in captivity.

This real threat has been stressed time and again by Norwegians and has led to a great deal of discussion, in particular between Sweden, Finland and Norway. The Directorate of Nature Management (DN) have written to the Swedish Environmental Protection Agency (Naturvårdsverket) expressing concerns and requiring that Sweden alter their management strategy (Direktoratet for naturforvaltning 2004). The potential threat arises from an expanding population of released captive-bred geese in Sweden (composed of Lesser White-fronted Geese contaminated by genetic material from Greater White-fronted and Greylag Geese), which could mix with the remnant population of Lesser White-fronts in Fennoscandia. Ruokonen et al. (2007) revealed during a genetic study that the Swedish captive-bred Lesser White-fronts were unsuitable for release into the wild. These birds have formed the basis for the introduced Swedish population.

A lot of work has been involved in this dialogue and parallel to this genetic studies have been carried out to clarify the situation. The Swedish introduced population, which currently breeds in the Svaipa area in Finnish Lapland, is considered a potential threat: both due to genetic contamination, alteration of migratory route and spread of disease. This topic is dealt with in more detail in the international action plan (AEWA 2008).

Lesser White-fronted Geese released in Sweden occasionally hybridise with Barnacle geese used as foster parents in the Swedish reintroduction project. Photo: Kalle Rainio/Tarsiger.com



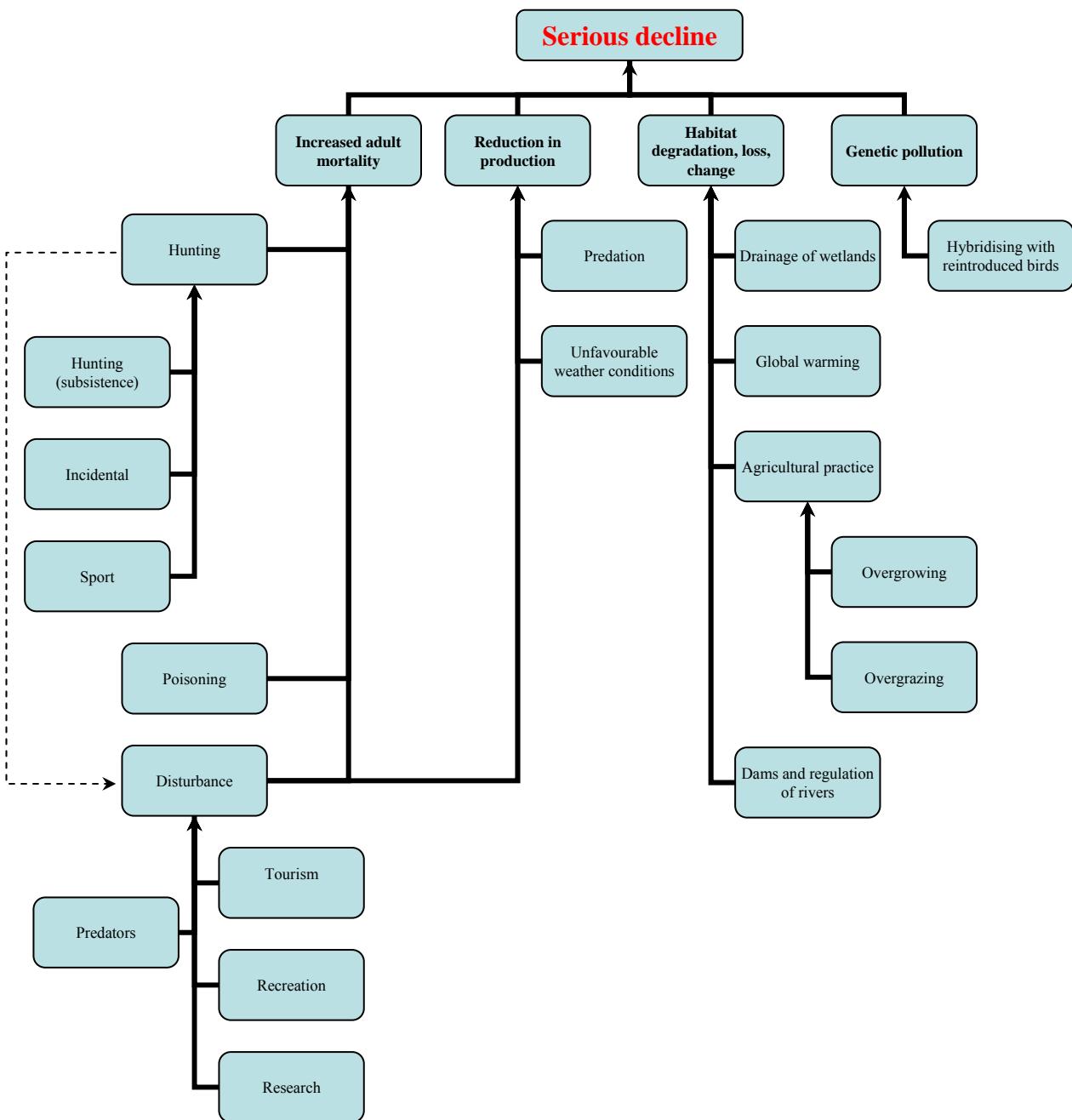
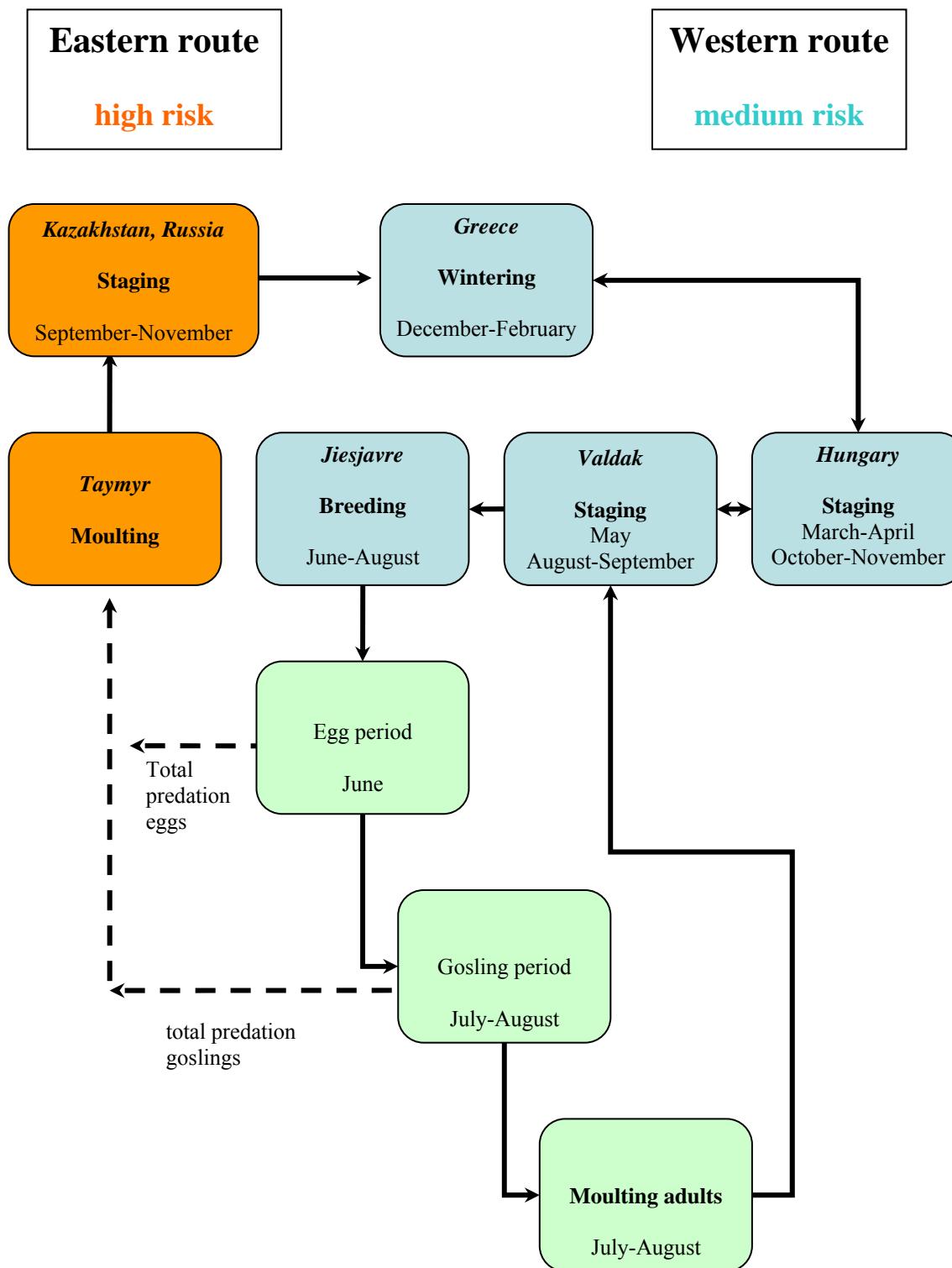
Figure 11. Flow chart over threats to the Lesser White-fronted Goose in Fennoscandia

Figure 12. Simplified flow chart of annual cycle of the Lesser White-fronted Goose. To simplify the diagram, staging areas in Finland and Lithuania (spring) and Russia (autumn staging along the eastern route) have been omitted. The main focus is on the difference in breeding success between individuals using the western and eastern migratory routes. In the flow chart the consequences of depredation are not only reduced production but also increased mortality in geese migrating eastwards.



MEASURES

Parallel to the development of the proposed national action plan, in recent years, systematic work has been implemented towards various protective measures. This includes concrete, direct measures such as regulation of hunting, as well as more long-term and indirect work such as improving the key knowledge and international cooperative work (through project cooperation and dialogue) – which is completely necessary in order to achieve the goal of preserving the Lesser White-fronted Goose as part of the Norwegian fauna.

Conservation measures implemented in Norway

- Access restrictions during the staging period for the Lesser White-fronted Goose at Valdak Marshes between 1st May and 30th June, imposed since 1983, and between 10th August and 20th September, imposed since 2002.
- Annual monitoring of the population at Valdak Marshes each spring since 1990, and each autumn since 1994 (timing of migration, population estimate, disturbance, condition, production, mortality, ringing).
- Conservation measures in known breeding and moulting areas including Jiesjavre – this as part of a conservation plan for mires in Finnmark, which is now in its final phase.
- Introduction of a hunting ban on Bean and Pink-footed Geese in Finnmark to reduce the risk of accidental shooting of Lesser White-fronts.
- Mapping of breeding grounds, migration routes and wintering grounds for the Fennoscandian Lesser White-front population with the aid of satellite telemetry and follow-up surveys in the field since 1994.
- Removal of Red Foxes from the core breeding area for Lesser White-fronts since 2007.
- Various information campaigns:
Internet:
 - Net exhibition "The final journey" (Siste trekk) at <http://www.stabbursnes.no/>
 - web site of the Norwegian Ornithological Society (NOF) <http://www.birdlife.no/prosjekter/dverggaas.php>
 - International web portal www.piskulka.net

Brochure: Information brochure with map of vulnerable areas for goose species in Finnmark.

Media: A number of newspaper articles in both local and national newspapers, as well as interviews by media.
Production of TV documentary "The last Lesser White-fronted Goose" ("Den siste dverggåsa") in 1996.

International conservation measures implemented

- Establishment of a nature reserve (Shoininskiy Zakaznik) on the Kanin Peninsula in western Russia in 1997.
- Information campaign directed towards hunters – production of posters and stickers in six languages which have been distributed in Azerbaijan, Kazakhstan, Russia, Bulgaria, Hungary and Belarus since 1997.
- In 2005, a project was started in the Komi Republic, European Russia, to map, monitor and protect the population found in the tundra areas of Malosemelskaya and Bolsjesemelskaya.
- EU-LIFE project 2006-2008 with a number of monitoring, management and protection measures in Finland, Estonia, Hungary and Greece in addition to Norway (www.wwf.fi/wfg).
- Mapping of Lesser White-fronted Geese in Dongting and Poyang Lakes in China in 1998.
- Monitoring in spring and autumn in the Kustanay area of Kazakhstan 1996 – 2000.
- Mapping of migration routes and wintering quarters of the western Russian main population with the aid of satellite telemetry since 1997.



In line with the analysis of threats in the previous chapter we describe here measures related to the main threats.

Following up of existing implemented measures and need for new measures

Management measures

Result 1: Adult mortality from hunting eliminated and reduction in other causes of adult mortality

The most important measures to reduce adult mortality are related to reducing / preventing hunting pressure on Lesser White-fronted Geese.

1. Ensure that national and local hunting regulations provide sufficient protection for Lesser White-fronted Geese.
2. Ban on hunting in inner parts of Finnmark (to improve gosling and adult survival). Ensure sufficient wardening in areas where hunting regulations are in place to enhance the effect of hunting regulations. This applies in particular to inner parts of Porsangerfjord.
 - Establish a dynamic wardening system to accommodate changes in area use in relation to this problem.
3. Secure sufficient manpower and economic resources in order to map the Lesser White-fronted Goose's migration routes, staging grounds, and wintering grounds such that these are safe for Lesser White-fronts.
 - Stop / restrict hunting that can affect Lesser White-fronts along migration routes – with a focus on core areas – including Kanin Peninsula (Russia), Ob Valley (Russia), Kustanay (Kazakhstan), Volograd region (Russia), Sea of Azov (Ukraine), Evros Delta (Greece / Turkey), Nemunas Delta (Lithuania / Kalingrad).
 - Support and contribute towards speeding up the process started by WWF-Finland to establish a nature reserve in the Kustanay area of Kazakhstan.
 - Support continuation of the project started in 2005 to map, monitor and preserve the population in the tundra areas of Malosemelskaya and Bolsjezemelskaya in Komi / Nenets in European Russia.
 - Obtain funding to finance further work in Russia, Kazakhstan and Ukraine with the main focus upon providing solutions towards concrete conservation problems in the core area for (in the first phase) the Fennoscandian Lesser White-fronts. Main aim: establish protected areas and ensure enforcement of protective legislation at concrete key sites (Kanin Peninsula, Ob Valley, Kustanay, Volgograd, north-eastern Sea of Azov). In order to strengthen conservation work it is necessary to build up competence and acquire manpower to carry out the necessary measures.
4. A 22kV power line which currently crosses the core breeding area in Finnmark should be replaced with a ground cable along the stretch between Gjerdeåsen in the west and Vuorjeseaibbus in the east. As an immediate temporary measure the cable must be marked along this stretch. Wildfowl are known to be particularly vulnerable to collisions with power lines (Lislevand 2004).

Result 2: Prevention of further loss of habitat

Measures to stop and reverse degradation and loss of natural habitat for the Lesser White-fronted Goose, as well as maximal positive management of core areas, which will also contribute towards increased adult survival through hunting regulations listed above.

1. Ensure that all key areas for Lesser White-fronts (breeding, staging and wintering grounds) are afforded sufficient protective status at national and international levels.
 - Establishment of a nature reserve (with appropriate access restrictions) in the core breeding area in Finnmark, where protection of Lesser White-fronts is given highest priority.
 - Impose dynamic protection measures in other breeding and moulting areas which may still be active: e.g. Coaskoavi, Jæggas, Mathisdalen, Luostejok, Bunkalæksjì and others.
2. Ensure that all key areas for Lesser White-fronts are included in a management plan which points out necessary protective measures, which are provided with the necessary resources, are actively implemented, and are updated at regular intervals.

3. Monitor habitat quality at core sites for Lesser White-fronts in Norway, especially the breeding grounds, to ensure that human influence (including possible effects due to climatic change) are discovered as early as possible.
4. Actively support international work which contributes to securing Lesser White-front habitats in areas used along the migration route and in the winter quarters (such as through cooperative environmental agreements with Russia, China, new EU countries etc.).

Result 3: Maximise reproductive success

1. Avoid technical encroachment and other forms of human disturbance including recreation, tourism, and commercial activities that could have a negative effect upon the core breeding area in Finnmark.
 - Reduce human disturbance through regulation of helicopter and sea-plane traffic, sports fishing, commercial fishing, hunting and outdoor activities in general in the core breeding area. This must be included in the conservation process already started (conservation plan for mires in Finnmark). This must especially apply to motorized transport on land, as well as landing by sea-planes. Organised traffic in the core area must be avoided, such as fishing tourism, commercial activities and building of cabins (including tourist cabins).
2. Implement measures to prevent overgrazing from reindeer and trampling of nests if this presents a problem.
3. Implement measures to minimise predation where it is likely that this may be a limiting factor.
4. Reduce egg predation from Red Foxes (dominant egg predator), and also consider measures towards Great Black-backed gulls and Ravens if predation from those species is found to be a problem. An understanding as to how control measures affect the Red Fox population is essential in order to manage the population. In Great Britain, the most effective control measures are removal of individuals before breeding (winter/spring) combined with removal from dens early in the breeding season. In order to have greatest effect it is also important to control immigration by Red Foxes into the area (Rushton et al. 2006). If it is found that Great Black-backed gull and/or Raven are important predators of Lesser White-fronted Goose eggs then egg puncturing and removal of adult birds of these species might be a suitable temporary measure. Such “biological corrective warfare” is seen as necessary in a critical situation.
5. Implement measures to eliminate wildfowl hunting on the breeding grounds of the Lesser White-front, and at all staging areas close to the breeding grounds.
 - Reduce the possibility of accidental shooting (misidentification) during ordinary hunting: restrict duck and goose hunting at sites used by Lesser White-fronted Geese – especially the breeding grounds. This must be included in the conservation plan for mires in Finnmark.
 - Eliminate all possibilities for spring hunting of wildfowl in the core breeding area.
 - Implement a general ban on hunting (of ducks) in inner Porsanger Fjord during the period that Lesser White-fronted Geese are present in autumn to reduce the risk of accidental shooting. This will also make wardening easier, following the ban on goose hunting during the period Lesser White-fronts are present in inner Porsanger Fjord since 2007.
 - Strengthen wardening of hunting and access both in core breeding areas as well as the staging area in Porsanger Fjord.
6. Build up a captive population based upon individuals from the wild population in cooperation with Sweden and Finland, and possibly Russia.
 - Aims, framework and practical solutions for such a cooperative venture on the condition that there is a separate sub-plan and this must be followed up via the committee under AEWA-SSAP.
7. Consider strengthening the population by releasing birds at Valdak Marshes in spring.
 - As the point above, where a scientific analysis will be included in the aforementioned sub-plan.

Result 4: No mixing of genes from other goose species in the wild Fennoscandian population as a result of either future releases or form birds already released from captive breeding programmes.

1. Aims, framework and practical solutions for such a cooperative venture for strengthening the Fennoscandian Lesser White-fronted Goose population will depend upon a separate action plan and shall be followed up by the committee under AWEA-SSAP.

Research and monitoring measures

Result 5: Improving key knowledge

The costs and actual participants of results 5 and 6 are dealt with in the chapter "Administrative and economic consequences".

Gaps in knowledge are still a critical limiting factor for conservation work. The following activities are given priority for future research and monitoring:

1. Secure financial foundations for continuing conservation oriented research/monitoring.
2. Continue the ongoing monitoring project at Valdak Marshes in Porsanger which has taken place since 1990, and which focus on collecting annual data on population size, as well as demographic data on annual production, and survival of adults and young geese. This entails recording work throughout the staging periods in spring and autumn.
3. Assess hunting pressure in key areas for the Fennoscandian population of Lesser White-fronted Geese.
4. Use a combination of satellite tags and field recording to reveal breeding, staging and wintering grounds for the Fennoscandian and the western Russian main population.
5. Annual recording in core breeding area in Finnmark.
6. Carry out a Population Viability Assessment for the remaining Fennoscandian population.
7. Use a combination of satellite tags and field recording to reveal breeding, staging and wintering grounds for the Central Asian main population.
8. Continue field studies in suitable habitat on the Kola Peninsula in Russia to update the estimate for the Fennoscandian population.
9. Establish an effective network to coordinate counts in the wintering areas and important staging sites in order to monitor the population trend as accurately as possible.
10. Improve knowledge about site fidelity for males and females and exchange with other populations of Lesser White-fronts.
11. Investigate the importance of natural predation and disturbance at staging sites as well as the breeding area.
12. Investigate the importance of small mammal cycles and overgrazing by reindeer on reproduction in Lesser White-fronted Geese.
13. Carry out an analysis of consequences of using Norwegian versus western Russian Lesser White-fronted Geese to establish a captive population (gene bank). Is it possible, based upon what is currently known, to rear Lesser White-fronts in captivity without this having genetic consequences (see for example Ruokonen et al. 2007).
14. Investigate how the remaining Norwegian population could be strengthened by releasing young geese at Valdak Marshes during either spring or autumn migration.
15. Mapping of former breeding sites – new inventory based upon knowledge of the former range of the Lesser White-fronted Goose.
16. Investigate human activities in breeding and moulting areas in relation to slaughter waste, fish gutting etc. which may influence the size of populations of Red Fox, Great Black-backed Gull and Raven.
Investigate the effects of the many reindeer fences and how these may ease availability of prey (including carcasses) to predators such as Red Foxes.
17. Mapping of areal use in the core breeding area – both access on foot as well as motorised access.
18. Investigate the habitat requirements of the Lesser White-fronted Goose at staging sites and in winter quarters. Most goose populations in Western Europe have increased dramatically since the 1970s. This is mainly as a result of implementation of hunting restrictions and establishment of reserves. A limited, yet contributing factor has also been that most populations have altered their feeding habitat from natural types to intensively managed agricultural types. Has the Lesser White-fronted Goose failed to exploit these new habitats, and is it the only species still dependent upon natural wetlands and steppes?

19. Processing, analysis and publishing of collected monitoring data – reproduction, survival, habitat use, behaviour etc.
20. Mapping of movement of reindeer in the core breeding area.
21. Standardised monitoring of production of young, brood size and proportion of breeders in the Kustanay region in Kazakhstan ought to be carried out annually. The reason for this is to obtain better information on population dynamics, and it is necessary to have good data from other populations than just the Fennoscandian.
22. Inventory of historic breeding sites (Varanger, Jæggas, Mathisdalen, Luostejok, Bunkkalæksjì, etc.).

Result 6: Communicating information on the situation for the Lesser White-fronted Goose to relevant interests.

- Direct information to the general public via a national information centre at the Stabburnes Nature Center and Museum.
- Permanent updated version of the exhibition “The Last Migration” in Norwegian, Sami, English and “Kvensk” (a local language form); information booth with film show.
- Actively disseminate information on the situation for the Lesser White-fronted Goose to the media,
- Publish popular scientific articles.
- Scientific publication of results of research and monitoring.
- Continuation of the website www.piskulka.net which is run in cooperation between NOF and WWF-Finland.



ADMINISTRATIVE AND ECONOMIC CONSEQUENCES

The Lesser White-fronted Goose is a migratory species. The Norwegian breeding population is present in Norway for approx. four months of the year. As far as we know, the Lesser White-front occurs only in parts of Finnmark as remnants of its former range, and that, during spring and autumn, the population uses sites in Russia, Kazakhstan, Greece, Hungary, Lithuania, Estonia and Finland. The border between Greece and Turkey represents the wintering ground for the entire population. In order for conservation work to succeed, it is foreseen that Norwegian efforts are taken to include the total distributional range of the population.

Organisation – responsibility and roles

The international implications of such a migration pattern coupled with the fact that Norway works actively towards implementation of an international action plan, dictates that the Norwegian Directorate for Nature Management (DN), as the national management body, must have the main responsibility for following up the national action plan.

Even though the current national action plan has perspectives beyond national management, it still has a clearly directed focus on conservation measures in Norway. In order to secure the necessary degree of local rooting, we see it as appropriate that a reference group be established for DN for work in the future. As a basis for the preparation of the current plan a working group was established composed of representatives from NOF, SNO, The County Governor of Finnmark, Stabburnes Nature Centre and Museum and DN. Due to the special conservation importance of Finnmark for the Lesser White-fronted Goose it would be appropriate to extend the working group to include representation from Finnmarkseiendommen (a landowners association) and continue its commitment as a reference group for DN's conservation work.

Norwegian participation in the formal structure which will be established under the international action plan will need to comprise the management authority (DN) with the support of experts as required. Due to difficulties in coming to a consensus regarding reintroduction / introduction / strengthening of the population, a committee has been established to address these questions under the leadership of the secretariat of AEWA (Committee for Lwg captive breeding, reintroduction and supplementation in Fennoscandia). This group is additional to the working group responsible for following up the action plan itself (International Lwg Working Group).

The scientific monitoring and research activities in the final DN action plan will in future, as is the case today, be undertaken under NOF's Lesser White-fronted Goose project. A basic task which is vital to continue is the continual monitoring project focusing upon collection of annual data on population size and demographic factors such as annual production, survival of adult and young birds, as well as measuring the effects of conservation measures implemented under the national plan. Here, Norway is in a leading position as regards to level of competence and the development of a good working relationship between NOF and DN during the past 15 years.

Implementation of national measures beyond development and maintenance of fundamental knowledge will involve several bodies, such as SNO, Stabburnes Nature Centre and Museum, Finnmarkseiendommen and the County Governor of Finnmark. The participation of these institutes in the reference group opens up for a good dialogue and properly directed cooperation and implementation of this action plan.

Economy

Based upon the challenges that this proposal to an action plan has documented, a budget has been drawn up for work to conserve the population of Lesser White-fronts. The degree of achievement of goals will depend upon satisfactory economic frameworks. Conservation of the Lesser White-fronted Goose is now in a critical phase, and is one of the most visible international challenges which also require a high level of activity outside the boundaries of Norway. Therefore one of the goals defined is to establish conservation of the Lesser White-fronted Goose as a permanent part of the State Budget, at first in the whole period of this plan (2009 – 2013).

Table 4 provides an overview over important activities/measures related to conservation work on the Norwegian population of the Lesser White-fronted Goose both within Norway as well as along the migration routes. In total, the annual costs of necessary conservation work are estimated to be around 4.15 million NOK. Activities can also be grouped according to measures within and outside Norway as this may also have implications on budgets:

- *Activities/measures in Norway* – which will have great consequences in succeeding with conservation work at home, but which also have great value for other nations with responsibilities, aims and "rights" related to the population.
- *Activities/measures along the migration routes* – which are of crucial importance such that the species does not become extinct in Norway, and which are both a signal that Norway takes its responsibility seriously and which partly is a critically necessary contribution based upon (amongst others) lack of capacity and competence in these countries.



Representatives for the EU-LIFE project from Norway, Finland, Hungary and Greece visited the important wintering site for Lesser White-fronted Geese in the Evros Delta in Greece, November 2006. Photo: Morten Ekker

Table 4. Overview over important activities / measures related to conservation work on the Norwegian population of the Lesser White-fronted Goose in Norway and along the migration routes, including an estimate of costs (in 000s of NOK)

Activity	2009	2010	2011	2012	2013
Monitoring / mapping	900	900	900	900	900
Population monitoring (spring and autumn at Porsanger, Finnmark) ¹⁾	600				
Localising / monitoring of key sites (field studies) ²⁾	200				
Demographic monitoring with aid of colour ringing and video analyses ³⁾	100				
Conservation oriented research activities	600	600	600	600	600
Continuation of priority ecological studies as in IAP	200				
Processing, gathering and publishing of data gathered during 18 years ⁴⁾	200				
Satellite telemetry studies, mapping of migration and subsequent field studies	200				
Information campaign	500	500	500	500	500
Operation of international website www.piskulka.net and national reports	150				
Support of establishment and operation of information centre ⁵⁾	300				
General informative work	50				
Management	1200	1200	1200	1200	1200
Subsequent management of key Lesser White-front sites identified in Norway ⁶⁾	500				
Transfer of competence and support of mapping and monitoring of important staging / wintering areas and subsequent management of these (both along the European and the eastern migratory routes) ⁶⁾	700				
Strengthening / Nordic cooperation	250	250	250	250	250
Contribute to gene bank / collection / captivity of Lesser White-fronted Geese – Nordic cooperation with Sweden and Finland ⁷⁾	250				
International work / international action plan	700	700	700	700	700
International work / international action plan	200				
Support of international coordinator for the international action plan and development of GEF-project ⁸⁾	500				
Sum	4 150				

1) Valdak Marshes in Porsanger is the most important staging site in Europe, with 80% of the Fennoscandian population staging there.

Monitoring in spring provides a population estimate and monitoring in autumn provides information on annual production.

2) The core area for Lesser White-fronts in Fennoscandia is known, but we lack information on the breeding area for the remaining 20-25% of the population.

3) Important to identify which age categories have too high a mortality and where the losses occur. This is basic information enabling correct conservation measures.

4) Includes analyses on threat status, factors governing reproduction, genetic analyses etc.

5) In order to highlight what work is done, and to ensure continued support and priority by authorities, good information campaigns are important. A national centre for the Lesser White-fronted Goose is proposed at Stabburnes Nature Centre and Museum.

6) In several of these countries, Lesser White-fronts are only present during a short period in their annual cycle, and are not defined as either breeding or wintering, but as on passage during migration. Due to this, the species has not been afforded sufficient status of responsibility in these countries to allow implementation of necessary conservation measures.

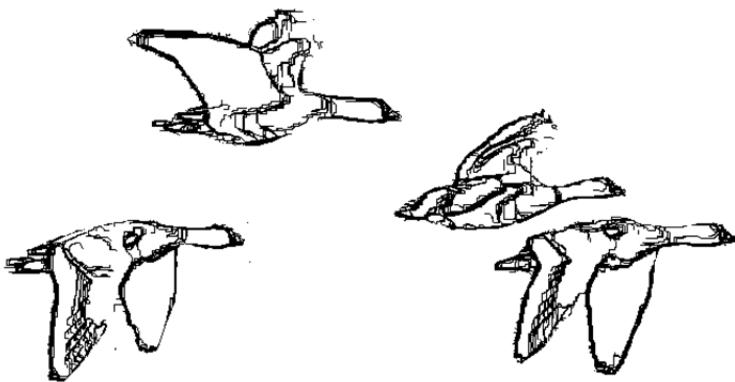
7) It is important to have an additional strategy to hand if conservation efforts do not produce the desired effects in the near future. This "Plan B" would need to gather genetic material from the wild population over time, and over time build up a living gene bank in captivity, such that the population may later be strengthened in accordance with international consensus and accepted conservation principles.

8) Due to large amount of activity surrounding various reintroduction projects which are not founded upon accepted conservation principles, there is a strong challenge for Norway to prevent such projects putting the population in even greater danger.

EVALUATION AND REVISION OF THE FORTHCOMING ACTION PLAN

This current draft action plan has been prepared as a proposal to an official national action plan for Norway. DN's final action plan will be an advisory tool for conserving the Lesser White-fronted Goose in Norway. Exchange of new information from monitoring and research projects will always lead to changes. In addition, the ability to follow up the action plan or the lack of such follow up work will result in a need to update the plan. Therefore, a continual evaluation of the action plan will be necessary. This will be formalized within the proposed national reference group.

The action plan for the Lesser White-fronted Goose ought to be revised after five years (2009 – 2013). Such a revision will be in phase with the revision of the international action plan, and will as such function as a national report. Such a time schedule should not, however, restrict changes / implementation of necessary measures which may appear during the period of the plan and which are not directly based upon the list of measures in the forthcoming plan.



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APPENDIX A

Recommendation from the Scientific Council in CMS (Convention of Migratory Species) considering release of captive bred Lesser White-fronted Geese in Europe.

UNEP/CMS/INF.8.5

ANNEX III

CMS Scientific Council 13, Nairobi, Kenya
Friday 18th November 2005

Lesser White-fronted Goose *Anser erythropus*: recommendation from the Scientific Council on unresolved issues

As noted in paper ScC.13/ Doc.9, produced for the Scientific Council, a workshop was held in Lammi, Finland, in April 2005 at which participants with a deep interest and involvement in the conservation of the Lesser Whitefront agreed to request the opinion of the Council on a number of issues, which have for some time seriously divided conservationists interested in a better future for this species.

In addition to the Council paper, also needing to be taken into account are the numerous representations that have been received by the CMS Secretariat from interested bodies and individuals as well as an independent review obtained by the CMS Secretariat from a professional population geneticist. (A list of these is given in Annex 1.)

At the 13th Meeting of the Scientific Council, consideration of this issue began with an introduction to the background by the CMS Secretariat. The Technical Officer of the African-Eurasian Waterbird Agreement then gave more detail of the history of efforts to conserve the species, including the introduction into the wild of birds of captive-bred origin. Further comments were then made by Scientific Councillors, some from the Range States directly involved, others not. In order for the Scientific Council to make progress and attempt to comment meaningfully on the key issues, the Chairman of the Scientific Council requested that the Appointed Councillor for Birds should make a review, concentrating in particular on drawing out the views of Councillors from Range States other than those involved in the intense discussions which have been going on surrounding this bird. Sweden was one of the Range States in the latter category.

The Councillor for Birds spoke to several Councillors, and was approached by others. A small working group assisted with identifying the key issues and determining the possible position of the Scientific Council.

It should be stated from the outset that some difficult and complex issues are involved in the conservation of the species. In some cases, a clear and undisputed scientific answer to a particular question does not appear possible, at least currently. Where such is the case, it has seemed appropriate to take a cautious approach, however always bearing in mind that the passage of time is an important consideration in the conservation of this particular species.

There is no doubt of the genuine intentions of the individuals on all sides of the argument. Indeed, it is the deeply held concern for the conservation of the species that has made for much of the controversy in the case. Nor is the scientific and professional integrity of those involved doubted. However, opinions of those involved do differ, and the Scientific Council is being asked to make decisions among them: this we do in good faith.

Our first conclusion is that it is desirable to have a wide genetic diversity among wild Lesser Whitefronts. We have read the arguments, and taken into consideration the known wintering ranges of the populations, and 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.

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Our second conclusion is that 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.

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.

We also 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.

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.

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.

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.

We consider that it would be appropriate to re-examine the issues once more in five years.

The conclusions set out above were approved by consensus at the Scientific Council meeting, on Friday 18th November 2005. The Chairman of the Scientific Council undertook to transmit them to those who had raised the matter with the Council.

ANNEX 1

List of representations that have been received by the CMS Secretariat (1-13)

1. Comments from Dr. Johan H. Mooij on the Scientific Council paper ScC.13/ Doc.9

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2. Comments from Prof. Dr. Juha Merila, Petteri Tolvanen, and Dr. Minna Ruokonen on the Scientific Council paper ScC.13/ Doc.9
3. Comments from Morten Ekker, Dr. Ingar J. Oien, and Tomas Aarvak on the Scientific Council paper ScC.13/ Doc.9
4. Information on the conservation genetics of the Lesser White-fronted Goose by Dr. Minna Ruokonen and Anna-Carin Andersson
5. Ruokonen, M., L. Kvist, H. Tegelstrom & J. Lumme (2000). Goose hybrids, captive breeding and restocking of the Fennoscandian populations of the Lesser White-fronted Goose (*Anser erythropus*). *Conservation Genetics* 1: 277-283.
6. Ruokonen, M., L. Kvist, T. Aarvak, J. Markkola, V. Morozov, I. J. Oien, 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.
7. Ruokonen, M., A-C. Andersson & H. Tegelstrom (manuscript). Using historical captive populations in conservation of currently threatened species. The case of the Lesser White-fronted Goose.
8. Report 2001/2002: Analyses of the captive populations of the Lesser White-fronted Goose, by Dr. Marina V. Kholodova
9. Review on the genetics of the Fennoscandian population of the Lesser White-fronted Goose, by Dr. Johan H. Mooij in cooperation with Prof. Dr. Allan Baker and Prof. Dr. Michael Wink
10. A new migration route for the Lesser White-fronted Goose, presentation by Dr. Johan H. Mooij at the workshop in Lammi, Finland, April 2005.
11. Protection of genetic biodiversity – conservation and management units with special reference to the Lesser White-fronted Goose, presentation by Prof. Dr. Juha Merila at the workshop in Lammi, Finland, April 2005.
12. Recommendations for a reintroduction program of Lesser White-fronted Geese *Anser erythropus*: A genetic perspective, information by Prof. Dr. Michael Wink
13. Comments on the genetic issues related to the new Action Plan for the Lesser White-fronted Goose, independent review by Dr. Robert C. Lacy

DN-reports

2011

- 2011-4: Norwegian action plan for the Lesser White-fronted Goose *Anser erythropus*
- 2011-3: Natur i endring
- 2011-2: Plan for kalking av vassdrag i Norge 2011-2015
- 2011-1: Utredning om havsil, med særlig fokus på dens betydning i økosystemet og behov for tverrsektorielle tiltak

2010

- 2010-6: Innlandsfiske
- 2010-5: Handlingsplan for dragehode *Dracocephalum ruyschiana* og dragehodeglansbille *Meligethes norvegicus*
- 2010-4: Handlingsplan for eremitt *Osmoderma eremita*
- 2010-3: Handlingsplan for mnemosynesommerfugl *Parnassius mnemosyne*
- 2010-2: Natur i endring
- 2010-1: Handlingsplan for Dvergålegras *Zostera nolteii*

2009

- 2009-8: Strategi for forvaltning av hjortevilt
- 2009-7: Handlingsplan for horndykker
- 2009-6: Handlingsplan for slåttemark
- 2009-5: Handlingsplan for hortulan *Emberiza hortulana*
- 2009-4: Handlingsplan for sinoberbille *Cucujus cinnaberinus*
- 2009-3: Handlingsplan for elvesandjeger *Cicindela maritima*
- 2009-2: Handlingsplan for dverggås *Anser erythropus*
- 2009-1: Handlingsplan for hubro *Bubo bubo*

2008

- 2008-4: Utredning om behov for tiltak for koraller og svampsamfunn
- 2008-3: Handlingsplan for åkerrikse *Crex crex*
- 2008-2: Handlingsplan mot mårhund *Nyctereutes procyonoides*
- 2008-1: Handlingsplan for stor salamander *Triturus cristatus*

2007

- 2007-4: Verneplan for Jan Mayen. Forslag til opprettelse av Jan Mayen naturreservat
- 2007-3: Forslag til nytt regelverk for motorferdsel i utmark og vassdrag – Høringsdokument
- 2007-2b: Climate Change – Nature Management Measures
- 2007-2: Klimaendringer – tilpasninger og tiltak i naturforvaltningen
- 2007-1b: Emerald Network in Norway – Final Report from the Pilot Project
- 2007-1: Emerald Network i Norge. Pilotprosjekt

2006

- 2006-3: Handlingsplan for elvemusling *Margaritifera margaritifera*
- 2006-2: Handlingsplan for damfrosk *Rana lessonae*
- 2006-1: Handlingsplan for rød skogfrue *Cephalanthera rubra*

2005

- 2005-1: Policy og retningslinjer for miljøforvaltningens samarbeid med nasjonalparksentrene

2004

Ingen utgitte rapporter i 2004

2003

- 2003-2: Handlingsplan for fjellrev
- 2003-1: Forvaltningsplan for Hardangervidda nasjonalpark med landskapsvernombråder

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The Norwegian Directorate for Nature Management has central, national tasks and responsibilities in managing the natural environment of Norway. These entail preserving biodiversity and paving the way for outdoor recreation and the use of resources provided by nature.

The Directorate is an advisory and executive agency under the Norwegian Ministry of the Environment. We are authorised to manage natural resources through various Acts and Regulations adopted by the Norwegian Parliament.

In addition to tasks fixed by law, the Directorate for Nature Management is also responsible for identifying, preventing and solving environmental problems. It works together with other authorities, and gives advice and information to the general public.