

9. Annexes

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

Annex 1

Additional biological information

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

	<p>grounds in the first half of July and arrived on Kolguev Island, north-west Russia in mid-July, where it remained for about one month, presumably to moult. Of two other individuals in this study that undertook moult migration, one went as far as the Taimyr Peninsula in Russia. (Aarvak & Øien 2003).</p> <p><u>Staging</u></p> <p>Autumn migration is more protracted than spring migration. Birds may remain at autumn staging sites into early winter in mild seasons. Spring migration typically appears to last from the second half of February until the end of May, but there are again significant annual variations related to weather conditions.</p> <p><u>Wintering</u></p> <p>Satellite tracking and field observations suggest that birds typically reach their wintering grounds in the second half of November, remaining into late February or the first half of March, according to prevailing weather conditions.</p>	<p>shallow on the opposite bank giving way to wet grassland and willow shrubs (Mineev & Mineev, 2004). In the Polar Urals and Yamal Peninsula nests were located on rocky river cliffs and in dwarf birch tundra on watershed slopes close to rivers, and sometimes in mountain foothills. (V. Morozov, pers. comm.)</p> <p>In Siberia, nests are usually sited amongst vegetation, grass or dwarf shrub heath, often on snowfree patches available early in the season, such as rock outcrop or prominent hummock; often in proximity to open water or extensive marshy area (Dementiev & Gladkov 1952, reported by Fox 2005).</p> <p><u>Moulting</u></p> <p>In August 2000, a brief field survey was conducted of the area of Kolguev Island, north-west Russia, used in 1997 by a presumably moulting satellite-tracked goose of the Fennoscandian population. The area was characterised by low-lying, flat tundra, dissected by ponds and small river valleys with slow-flowing streams. Vegetation was dominated by shrub (dwarf birch <i>Betula</i> and willows <i>Salix</i>) and tussock tundra with palsa mires (Strøm et al. 2001). According to studies in the Bolshezemelskaya tundra and Yamal Peninsula, moulting areas occur on riverine areas with flood-plain meadows and dense bushes/shrubs</p>
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		<p>(Morozov, 1999).</p> <p><u>Staging</u></p> <p>The Valdak Marshes in northern Norway, which constitute the most important known staging area for the Fennoscandian population, consist of extensive salt and brackish marshes (Aarvak & Øien 2001). In the Varangerfjord area, the other known staging site in northern Norway, the favoured feeding habitat is low-growth coastal meadow (Tolvanen et al. 1998). Coastal meadows are also used in Lithuania, (Nemunas Delta), Estonia (especially Matsalu) and Finland (Bothnian Bay). Research in the latter area showed that 90% of the diet was composed of grasses and that <i>Phragmites australis</i> and <i>Festuca rubra</i> were preferred. The species also selected large, natural meadows. Continued mowing and grazing of these meadows therefore benefits conservation of the species (Markkola et al. 2003).</p> <p>Staging birds in Hortobágy, Hungary, between 1996 and 2000, were found to use mainly short, grazed grassland and stubble of wheat and maize fields (Tar 2001). Fishponds are used by these birds for roosting (Tar 2004).</p> <p>The major autumn staging grounds in the Kustanay region of north-west Kazakhstan include freshwater lakes and other wetlands and surrounding grasslands. Lake Kulykol is the most</p>
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		<p>important known roosting lake (e.g. Yerokhov et al. 2000; Tolvanen et al. 2004). During periods when key lakes such as Kulykol have little or no fresh water, migrating Lesser White-fronts are concentrated on small freshwater reservoirs (e.g. Batpackol), with fringing reed marshes and surrounding grain and vegetable cultivation. In some autumns (e.g. 2003) significant numbers of Lesser White-fronts stop on the saline lake Khack, northern Kazakhstan, which has extensive, shallow aquatic zones (S. Yerokhov, pers comm).</p> <p>Autumn staging areas on the north-west Black Sea coast of Ukraine include freshwater, salt and brackish lakes and other wetlands and surrounding grasslands and winter wheat fields. Shagani, Alibay and Burnas lakes, in the Dniester delta, form the most important known roosting area (e.g. Rusev et al. 2002).</p> <p><u>Wintering</u></p> <p>The wintering grounds are only partially known, but include shallow bays, lakes and wetland complexes (freshwater, brackish water and saltwater wetland types) and surrounding cultivated land and semi-natural grassland in Azerbaijan, Bulgaria, Greece, Iran, Iraq Romania, Syria, Ukraine, Uzbekistan.</p>
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Annex 2

Listing by Range State of the most recent data available concerning status, numbers and trends of Lesser White-fronted Goose (source: see References column)

Range State	Breeding Season						Passage and Wintering					Baseline Population ³	References
	No. of breeding pairs	Quality ¹	Year(s) of Estimate	Trend ²	Quality ¹	Year(s) of Estimate	No. of individuals staging (S) or wintering (W)	Quality ¹	Year(s) of Estimate	Trend ²	Quality ¹		
Armenia	0	GO	1987-2005	N/A	N/A	N/A	1-26	MI	1995	N/A	N/A	1	
Azerbaijan													
Bulgaria							10 -120	GE	1998; 2005	F	GE		Petkov, Oien, Aarvak, 1999; National Ornithological database BSPB/BirdLife Bulgaria, N. Petkov, pers. comm.
Estonia							50 (S)	GO	1998-2004		GO	10,000	Baseline population of birds estimated in the middle of 1960s (Onno, 1965)
Finland	0-5												
Germany	x	x	x	x	x	x	20-50	±	1990-2005	±	±		Mooij 2000, Mooij & Heinicke 2005
Georgia													
Greece													
Hungary							40-60 (S)	GO	2000-2004	1	GE		Tar 2001, Tar 2004
Iran, Islamic Republic of													
Iraq													
Kazakhstan							6910	GE	1999	0	GE	6389	Yerokhov et all, 2000
Lithuania													
Netherlands ⁴													
Norway	20-30	GE	2005	-1	GE	1990 - 2005							Aarvak & Øien in Fennoscandian Cons. Proj. report 2001-2003 +

Range State	Breeding Season						Passage and Wintering					Baseline Population ³	References
	No. of breeding pairs	Quality ¹	Year(s) of Estimate	Trend ²	Quality ¹	Year(s) of Estimate	No. of individuals staging (S) or wintering (W)	Quality ¹	Year(s) of Estimate	Trend ²	Quality ¹		
													I.J. Øien and T. Aarvak pers comm. 2005
Poland													
Romania													
Russian Federation Note: data for Western main population only	3000	ME	2004	F	ME	2004	8000-11000	MI	2000-2004	F	ME	10000-15000	Morozov, Syroechkovski, 2002; Morozov, Syroechkovski, in press)
Sweden ⁴	10-15	GO	2004	+1	GO	2004	70-90 (S)	GO	2004	+1	GO	Not known	Andersson 2004, von Essen 1996
Sweden ⁴													
Syria													
Turkey													
Ukraine							2000-5000	ME	1994-2004	F			Rusev et al. 2002; Rusev 2004. Andryushenko Yu.A. et al. Distribution and number of bird species wintering in the coastal areas of Lake Syvash and the Azov Sea. Wintering bird census on Azov-Black Sea coast of Ukraine. pp3-13

Notes to Table:

¹ **Quality:** **GO = Good (Observed)** based on reliable or representative quantitative data derived from complete counts or comprehensive measurements.
GE = Good (Estimated) based on reliable or representative quantitative data derived from sampling or interpolation.
ME = Medium (Estimated) based on incomplete quantitative data derived from sampling or interpolation.
MI = Medium (Inferred) based on incomplete quantitative data derived from indirect evidence.
P = Poor/suspected not based on quantitative data, but reflects 'best guess' derived from circumstantial evidence.
U = Unknown no information on quality available.

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

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

⁴ Reintroduced birds.

Supporting information to use in conjunction with the table

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

(a) Principal Range States

Azerbaijan

Vernacular name: Ahgash gaz

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

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

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

Bulgaria

Vernacular name: Malka belochela gaska

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

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

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

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

Estonia

Vernacular name: Väike-laukhani (Estonian)

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

Finland

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

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

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

Germany

Vernacular name: Zwerggans

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

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

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

Greece

Vernacular name: Navdchva (transliteration)

Lake Kerkini, Lake Mitrikou (also known as Lake Ismaris) and the Evros Delta (all listed as Special Protection Areas, Ramsar Sites and Important Bird Areas) are key staging and wintering sites for the Fennoscandian population. Though 1,630 were counted in the Evros Delta in 1963 (Handrinos 1991), numbers are now far lower. Between 1980 and 1990 counts varied between 30 and 150 individuals (Aarvak *et al.*, 1996, 1997), while a maximum of 71 individuals (for Lake Kerkini, Lake Mitrikou and the Evros Delta combined) was recorded in the winter of 1998/1999 (Lorentsen *et al.* 1998). More recently, 30 LWfGs were seen at Lake Kerkini in November 2005.

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

Hungary

Vernacular name: Kis lilik

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

Iran, Islamic Republic of

Vernacular name: Ghaze pishani sepide Kuchak

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

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

Iraq

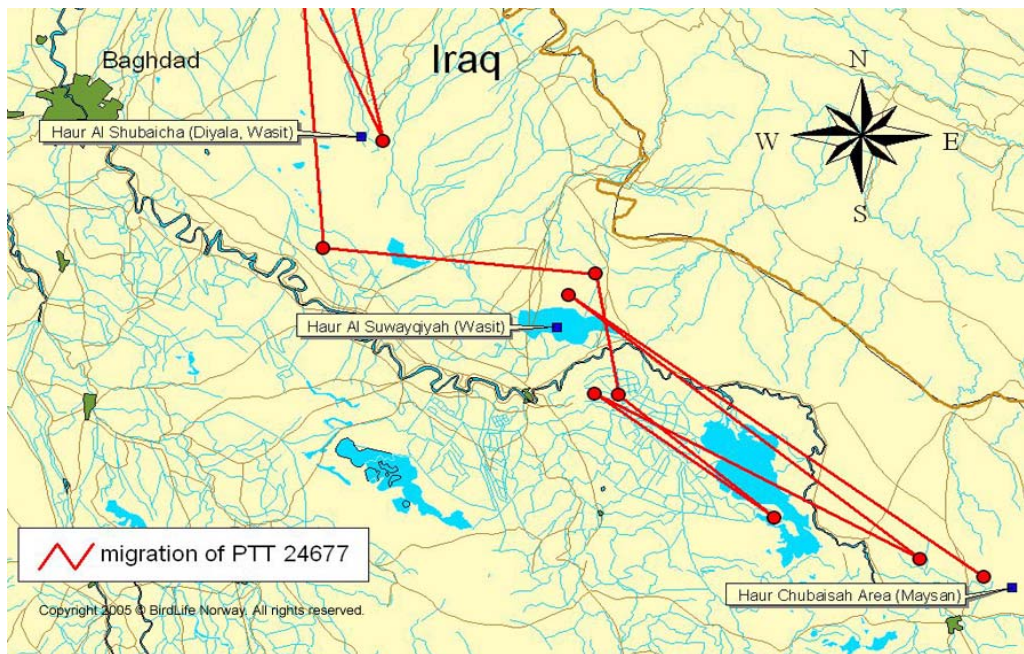
Vernacular name: *[to be added]*

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

A satellite-tagged bird of the Western main subpopulation, ringed in the Polar Ural region of northern Russia in August 2004, was tracked to Iraq during the winter of 2004/2005, providing the first proof of recent years that the species continues to winter in Iraq and the first detailed evidence of the sites used. The bird stayed in the country from at least 24 November until the last transmission from Iraq on 15 March. Spring migration began sometime soon after this date, as the next transmission, on 26 March, was from Dagestan, in southernmost Russia. During its stay of almost four months in Iraq the bird was recorded primarily from the lakes/wetlands and lowlands of the Tigris river basin (see Map 2).

Map 2. Locations of satellite-tracked Lesser White-fronted Goose in Iraq, November 2004 to March 2005. The three locations marked Haur Al Shubaicha, Haur Al Suwayqiyah and Haur Chubaisah are all listed by BirdLife International as Important Bird Areas, refs. IQ017, IQ020 and IQ030, respectively. This map was last updated on 10 March; by 15 March the bird had returned to Haur Al Suwayqiyah, the location of the last data transmission

from Iraq. Source: *World BirdWatch* magazine, ©BirdLife International. See also: www.piskulka.net/Satellite_tracking.htm



Kazakhstan

Vernacular name: Shikyldak kaz

The lakes and agricultural land of the Kustanay region of north-west Kazakhstan are known as a major staging area for Lesser White-fronted Geese, in both spring and autumn. During the period 1997-2000, spring migration in this region lasted for 35-45 days and usually occurred in the second half of April and May. Autumn migration was more protracted, lasting 70-75 days between late August/early September and the beginning of November. Birds roost on lakes and disperse over cultivated land during the day to feed. (Yerokhov et al. 2001). Lake Kulykol is the most important roosting lake during autumn migration. About 5,000 individuals were estimated (based on sample counts over five days) in the area in late September/early October 2002. During the period 1996-2000, the highest estimates, based on random sampling of the staging goose flocks, were c. 8,000 – 12,000 individuals (Tolvanen & Pynnönen 1997, Tolvanen & al. 1999). The highest direct count was 1,050 individuals. Significantly lower numbers were observed in autumn 2003, most likely reflecting the very low water level in the lake that year. Smaller, but still remarkable numbers (c. 1,000 individuals) were counted in the Kurgaldzhino–Tengiz area in the autumn of 1998 (Tolvanen & al. 1999). Colour-marked individuals ringed in northern Norway and northern Russia were recorded at Kulykol in autumn 2002 and autumn 2003, respectively, showing that birds from both the Fennoscandian and Western main subpopulations occur in Kazakhstan (Aarvak et al. 2004a). This has also been confirmed by satellite telemetry (Lorentsen et al 1998; Øien et al 1999; Karvonen & Markkola 1997). There is also a staging area further east in Kazakhstan: the lake areas surrounding the huge lake Tengiz, as indicated by the movements of a Lesser White-front satellite tagged in the Taymyr peninsula in 1998 (Øien et. al. 1999).

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

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

Lithuania

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

In July 2000, Lesser White-fronted Goose was included in category 4 of the Lithuanian Red Data Book. Lack of information concerning the species' occurrence in Lithuania precluded its inclusion in a higher category. According to a 1998 Government Decision, a fine of approximately EUR86 (applying April 2005 exchange rates) is applied if a category 4 Red Data Book species is killed. There were no records in 2000. (Stoncius, 2004).

Netherlands

Vernacular name: Dwerggans

The reintroduced Swedish population migrates to wintering grounds in The Netherlands. Birds have been recorded regularly from sites in Friesland, Noord-Holland, Zuid-Holland and Zeeland (e.g. van Roomen et al 2003). The Dutch Government has recently commissioned a study of the distribution and numbers of Lesser White-fronted Geese in The Netherlands. It is expected that this review will be published during 2005 (E. Osieck pers comm). The population currently numbers some 90–100 individuals (T. Larsson pers comm).

Norway

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

The current estimate for the Fennoscandian population (excluding the Kola Peninsula) is 20–30 pairs (Tolvanen et al. 2004b). The breeding areas of these birds are not known at present, and some these birds may breed in Finnish and/or Swedish Lapland. Northern Norway also has a key spring and autumn staging area for Lesser White-fronted Goose, namely the Valdak Marshes (e.g. Aarvak & Øien 2004). Other important Norwegian sites include the Varangarfjord area, the Tana River valley and Høyholmen. Statistical analysis of data from monitoring in the Valdak Marshes indicate that numbers of geese utilising the area in spring decreased by between 3% and 4% annually from 1993 to 2003. The estimated overall decrease since monitoring began in 1990, up to and including 2003, was 36% (Aarvak & Øien 2004), showing the precarious situation of the population.

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

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

Poland

Very scarce migrant and winter visitor, possibly less frequent recently (Tomialojc, 1990). As

part of the flyway of the migrating Fennoscandian population, Poland supports a few staging Lesser White-fronted Geese. Some of the geese satellite-tagged in 1995 were tracked flying over Poland. One bird tagged in 1997 spent the winter in Poland and eastern Germany (Øien & Aarvak, 2001; Aarvak & Øien 2003), but little additional information is available. The wetland areas and fishponds are likely of higher importance than the areas in eastern Germany. However, resources to begin monitoring and survey work have been lacking (T. Aarvak & I.J. Øien, pers. comm.). The Odra valley (between Küstrin and Gartz) and the Warthe valley hold important night-time roost sites for geese, including Lesser White-fronts, which feed on German territory during the day (T. Heinicke, pers. comm.).

On 14 January 2006, two wintering Lesser White-fronted Geese were watched at close range near Rus (Biebrza Valley) (T. Kulakowski *per* Y. Tsougrakis/LWfG LIFE Project, reported on <http://www.piskulka.net/>).

Romania

Vernacular name: Gârliia mica

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

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

Russian Federation

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

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

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

Within European Russia the population was estimated to be about 500 to 1,000 birds in 1990 (Morozov 1995). A more recent review summarised the population for the European tundra at the same level (Morozov & Syroechkovski, 2002). Low numbers and a declining trend have been noted for the Bolshezemelskaya tundra, though little habitat change has been observed over 15 years (Morozov, 1999). European Russia still holds a viable population of Lesser White-fronted Geese, although the distribution area has contracted, particularly in the Polar

Ural region (Morozov, 1999). The most recent data suggest that the Polar Ural population has fluctuated in line with the decreases noted in other parts of the European tundra. Despite a viable breeding population and no obvious changes in the condition of the breeding area the population of European Russia has decreased in size and range (Morozov 2003). Although satellite telemetry has recently tracked one bird to Iraq the wintering grounds of 80% of the Western main population are unknown. Satellite tracking has also reconfirmed the importance of the Samur Delta (Syroechkovskiy 2005). The Taimyr Peninsula is one of the key breeding areas for the Western main population.

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

The species is listed in the Russian Red Data Book

Sweden

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

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

Since 1977 a captive-breeding and reintroduction programme has resulted in the establishment of a free-flying population in Swedish Lapland. These birds migrate to The Netherlands, following the flyway of Barnacle Goose (*Branta leucopsis*) foster parents. The reintroduced population stages on the Swedish coast of the Gulf of Bothnia at additional inland areas in southern Sweden. The population is currently estimated to be 90-100 birds, with 10-15 breeding pairs (T. Larsson/Swedish Environmental Protection Agency, pers. comm.) No releases of birds into the wild have been made since 1999, following the

discovery of introgressed genes of Greater White-fronted Goose (*Anser albifrons*) among the captive stock (Andersson, 2004).

Syria

Vernacular name: *[to be added]*

Vagrant, with three records up to 1995.

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

Turkey

Vernacular name: Küçük sakarca

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

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

Other records since 1980 as follows:

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

Source: BirdLife Turkey, pers. comm.

Turkmenistan

Vernacular name: *[To be added]*

“The species stages through in small numbers but is regarded as nearly extinct (Vasiliev and Gauzer, 2001a). Scott and Rose (1996) mapped two minor wintering sites (< 1% of flyway

population) on the Iranian border but no further details have been traced. In March 1999, about 400 individuals were recorded in the International Waterbird Census (Markkola, 2000).”

Ukraine

Vernacular name: Mala guska

Little has been known about the status of migrating or wintering Lesser White-fronted Geese in Ukraine. Indeed the first recent record was in 1995 (Rusev et al. 1996). Between 1998 and 2005, more detailed counts were conducted in the Azov-Black Sea region, with a peak number of 579 birds in winter 1999/2000 in Crimea and 1,000 in winter 2000-2001 in the vicinity of the Ukrainian-Moldovan border around the Dniester delta and Dniestrovsky liman (Rusev, 2004). Between 1998 and 2000, more detailed counts were conducted in Crimea, with a peak number of 579 birds in winter 1999/2000. A survey was planned for the whole Crimean peninsula in January/February 2002, but this period immediately followed a spell of severe weather, with heavy snowfall and temperatures as low as -28C; consequently only a few Lesser white-fronted Geese were observed. Aarvak et al. 2004b.

Uzbekistan

Vernacular names: Chinqiroc G'oz, Korag'oz

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

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

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

(b) Status in other AEWA/EU countries

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

Afghanistan

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

Albania

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

Armenia

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

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

Austria

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

Belarus

250 migrants recorded using the Pripyat floodplain in 1995.

Belgium

Almost annual observations of birds from the Swedish reintroduction programme.

Bosnia & Herzegovina

Rare winter visitor.

Croatia

Rare and irregular winter visitor.

Czech Republic

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

Cyprus

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

Denmark

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

Egypt

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

France

Rare vagrant.

Georgia

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

Ireland

Rare vagrant, with just one record.

Israel

Vagrant; four records 1927–1994.

Italy

Irregular winter visitor and passage migrant.

Jordan

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

Kuwait

Vagrant.

Latvia

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

Macedonia, Former Yugoslav Republic of

Has reportedly occurred in the past, but details lacking.

Moldova

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

Oman

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

Serbia & Montenegro

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

Spain

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

Switzerland

Vagrant, with no records since the 19th century.

United Kingdom

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

Annex 3a

List of Important Bird Areas (IBAs) of significance for Lesser White-fronted Goose, alphabetically by country; (note that Russian IBAs of importance for the east Siberian population are not included; source: data provided by BirdLife International, March 2005)

Country	International site name	Area (ha)	Year	Location (lat/long)	Season	Min	Max
Armenia	Lake Sevan	150000	1995		unknown	0	26
Azerbaijan	Kizil Agach Bay	132500	?		non-breeding	0	1058
Belarus	Mid-Pripyat	90447	1995		passage	50	250
Estonia	Põhja-Liivimaa	23457	1997		passage	0	44
Estonia	Väinameri	279557	1998		passage	11	50
Finland	Käsivarsi fjelds	220078	1996		breeding	0	1
Finland	Oulu region wetlands	81781	1997		passage	50	50
Finland	Sammutinjätkä-Vaijoenjämä	51750	1996		breeding	0	0
Georgia	Javakheti Plateau	200000	1996		passage	0	0
Georgia	Kolkheti	150000	1998		non-breeding	0	0
					wintering/passage/non-breeding		
Germany	At least 18 sites SN : Sites for vagrants must be deleted						
Greece	Evros delta	19000	1988		non-breeding	0	116
Greece	Lake Kerkini	12000	1996		passage	12	110
Greece	Lake Mitrikou (Ismarida)	6500	1997		non-breeding	20	0
Greece	Nestou delta and coastal lagoons	22000	?		non-breeding	0	26
Greece	Porto Lagos, Lake Vistonis, and coastal lagoons (Lakes of Thrace)	15300	1990		non-breeding	0	40
Hungary	Hortobágy	136300	1996		passage	70	450
Iran, Islamic Republic of	Anzali Mordab complex	15000	1977		non-breeding	32	
Iran, Islamic Republic of	Dez river marshes and plains	20000	1974		non-breeding	190	
Iran, Islamic Republic of	Gomishan marshes and Turkoman steppes	20000	1977		non-breeding	1773	
Iran, Islamic Republic of	Hilleh river delta	42600	1975		non-breeding	21	37
Iran, Islamic Republic of	Incheh Borun lake and marshes	50	1973		non-breeding	36	
Iran, Islamic Republic of	Karun river marshes	2500	1977		non-breeding	590	
Iran, Islamic Republic of	Lake Alagol, Lake Ulmagol and Lake Ajigol	1540	1974		non-breeding	150	

Iran, Islamic Republic of	Lake Bakhtegan, Lake Tashk and Kamjan marshes	338000	1972	non-breeding	90	
Iran, Islamic Republic of	Lake Maharlu	21600	1975	non-breeding	40	102
Iran, Islamic Republic of	Miankaleh Peninsula and Gorgan Bay	97200	1977	non-breeding	4900	
Iran, Islamic Republic of	Seyed Mohalli, Zarin Kola and Larim Sara	1600	1977	non-breeding	359	
Iran, Islamic Republic of	Shur Gol, Yadegarlu and Dorgeh Sangi lakes	2500	1977	passage		175
Iran, Islamic Republic of	Shur Gol, Yadegarlu and Dorgeh Sangi lakes	2500	1977	non-breeding	70	
Iraq	Haur Al Hawizeh	250000	1965	non-breeding		
Iraq	Haur Al Suwayqiyah	50000	1973	non-breeding	70	
Iraq	Haur Chubaisah area	42500	1965	non-breeding		
Kazakhstan	Kulykol Lake	8300	1994	passage	879	5482
Kazakhstan	Koybagar –Tontegyr Lake group	160000	2002	passage	72	1440
Kazakhstan	Lebyasje Lake	2350	2002	passage	13	506
Kazakhstan	Bozshakol Lake	3500	1997	passage	45	1442
Kazakhstan	Batpakkol Lake	650	2000	passage	7	1500
Kazakhstan	Khack Lake	5520	2003	passage	41	870
Kazakhstan	Zhaksy-Zharkol Lake	1000	2004	passage	-	257
Norway	Inner part of Porsanger fjord	2000	2005	non-br (during br season)	40	60
Norway	Varangerfjord	60000	2005	passage	0	10
Romania	Vladeni fish-ponds	1200	1996	passage	30	46
Russia (European)	Arski fish-ponds	1000	1995	passage	200	300
Russia (European)	Berkubinski forest	500	1997	passage	500	1000
Russia (European)	Bulgarski	25000	1990	passage	10	20000
Russia (European)	Central Forest Biosphere Reserve and adjacent areas	63680	1994	passage	20	200
Russia (European)	Curonian (Courish) Bay	4300	1999	passage	20	0
Russia (European)	Dadynskiye lake	45000	1996	passage	10	300
Russia (European)	Delta of the River Don	53800	1997	passage	30	50
Russia (European)	Flood-plain of Kotorosl' and Ust'e rivers	4200	1997	passage	43	0
Russia (European)	Kamsko-lkski area	100000	1988	passage	10	20
Russia (European)	Kargopol' area	175000	1996	passage	1	1000
Russia (European)	Koporski Bay	6000	1997	passage	15	30
Russia (European)	Kulaksay lowland	5000	1997	passage	200	350
Russia (European)	Kuloy river	150000	1999	passage	2000	3000

Russia (European)	Lake Ilmen' and adjoining marshy plain	250000	1993	passage	15	20
Russia (European)	Lake Manych-Gudilo	50000	1995	passage	13800	0
Russia (European)	Middle reaches of Bolshaya Rogovaya river	35000	1990	breeding	30	30
Russia (European)	Mouth of Samur river	7000	1996	passage	30	40
Russia (European)	Mouth of Svir river	65000	1996	passage	8	30
Russia (European)	Neman river Delta and the coast of the Curonian Bay	41000	1999	passage	20	0
Russia (European)	Novotroitskoye Reservoir	4000	1999	passage	0	20
Russia (European)	Petrocrepost Bay	49200	1999	passage	0	500
Russia (European)	Pinezhski Nature Reserve	51480	1995	passage	1	20
Russia (European)	Ptich'ye (Bird's) Lake	5000	1999	passage	0	20
Russia (European)	Sarpinskaya lake-system	450000	1999	passage	20	0
Russia (European)	Shalkaro-Zhetykolski lake system	81250	1996	passage	500	1500
Russia (European)	Sondugski Zakaznik and surroundings	35500	1995	passage	100	0
Russia (European)	Sources of the River Luga	49600	1997	passage	14	0
Russia (European)	Southern coast of Ladoga Lake	68000	1997	passage	15	20
Russia (European)	Sviyago-Kubninskaya forest-steppe	32000	1992	passage	0	200
Russia (European)	Torna - Shoina watershed	15000	1995	passage	1500	0
Russia (European)	Turali lake	2000	1997	passage	100	0
Russia (European)	Turalinskaya lagoon	250	1997	passage	4	15
Russia (European)	Unskaya bay	40000	1999	passage	200	0
Russia (European)	Valley of Sysola river	110000	1996	passage	50	150
Russia (European)	Yeyski salt-lakes	24000	1996	non-br (during br season)	500	500
Russia (European)	Zolotarevskaya	62000	1987	passage	35	0
Sweden	Lake Tjälmejaure-Laisdalen valley	22200	-	breeding	0	1
Sweden	River Umeälven delta	1500	2001	passage	1	5
Sweden	Sjaunja	208000	1996	breeding	0	5
Sweden	Taavavuoma	28400	-	breeding	0	1
Sweden	Vindelfjällen mountains (including Lake Tärnasjön)	550000	-	breeding	0	1
Turkey	Saros bay	1000	1986	non-breeding	25	0
Ukraine	Chauda	56000	1999	passage	580	580
Ukraine	Pivdennyj Bug river valley (Goloskiv village)	3000	1999	passage	20	70
Ukraine	Styr' river valley (Luchytsi village)	2400	1999	passage	40	140

Ukraine	Syvash Bay	245000	1998		passage	0	1000
Ukraine	Yagorlyts'ka and Tendrivs'ka Bays	72000	1999		passage	50	1000
Ukraine	Karkinitskiy and Dzarylgatskiy bay	87000			passage	50	100
Ukraine	Dniester delta	22000		winter, autumn, early spring		10	1000
Ukraine	Shagani, Alibay, Burnas lagoon	19000		winter, autumn, early spring		10	1000

Annex 3b

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

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

Nuthe-Nieplitz-Niederung (Brabdenburg)	52.15N 013.07E	5,599 ha	Completely SPA	1-4/year
Oderbruch (Brabdenburg)	52.38N 014.27E	25,993 ha	Partly SPA	5-10/year
Wulfener Bruch und Teichgebiet Osternienburg (Sachsen-Anhalt)	51.50N 011.58E	2,171 ha	Completely SPA	1-5/year
Drömling (Sachsen-Anhalt)	52.28N 011.07E	15,265 ha	Completely SPA	1-2/year
Elbaue und Teichgebiete bei Torgau (Sachsen)	51.36N 013.01E	14,357 ha	Completely SPA	1-2/year
Teiche bei Zschorna (Sachsen)	51.16N 013.43E	1,131 ha	Completely SPA	0-2/year
Ostfriesisches Wattenmeer, Dollart/Rheiderland (Niedersachsen)	53.42N 007.21E	121,620 ha	Partly IBA/Ramsar/SPA	1-5/year
Lower Rhine area (Nordrhein-Westfalen)	51.43N 006.14E	31,000 ha	Partly IBA/Ramsar/SPA	5-10/year
Schleswig-Holsteinisches Wattenmeer (Schleswig-Holstein)	54.28N 008.42E	278,000 ha	IBA/Ramsar/SPA	Scand.re-intr. 20-50/year
Norway				
Iesjavr'ri	coordinates withheld to prevent disturbance		Not protected	c.10 breeding pairs 1995
Høyholmen	coordinates withheld to prevent disturbance		Nature reserve	1-3 pairs (c.2000)
Tana River Valley	coordinates withheld to prevent disturbance		Not protected	1-3 pairs (c. 2000)
Ukraine				
Eastern Sivash		165000 ha	National, Ramsar site	last several years
Central Sivash		80,000 ha	National, Ramsar site	last several years
Yagorlitskiy bay		34,000 ha	National, Ramsar site	last several years
Karkinitiski and Dzarylgatskiy bay		87,000 ha	National, Ramsar site	last several years
Tendrovskiy bay		38,000 ha	National, Ramsar site	last several years
Dnepr delta		26,000 ha	National, Ramsar site	last several

				years
Tiligulski liman		26,000 ha	National, Ramsar site	last several years
Dniester delta		22,000 ha	National, Ramsar site	last several years
Shagani, Alibay, Burnas lagoon		19,000 ha	National, Ramsar site	last several years
Lake Sasik		21,000 ha	National, Ramsar site	last several years
Kiliskiy mouth-Danube delta		32,000 ha	National, Ramsar site	last several years
Lake Kartal		500 ha	National, Ramsar site	last several years
Lake Kugurluy		7,000 ha	National, Ramsar site	last several years

Sites of importance for Swedish reintroduced population

Sweden				
Hjälstaviken		820 ha		2000
Svensksundsviken		3,300 ha		2000
Västra Mälaren		30,481		2005
Ölands ostkust		10,490		2000

Turkey			Low/ Medium	Low				Medium/ Low	Medium/ Low	Medium/ Low
Turkmenistan			Low	Low				Low/None	Low/ None	Low/None
Ukraine			Medium	Low				Medium	Medium/ Low	Low
Uzbekistan			Low	Low				Low/None	Low/ None	Low/None

Reintroduced population

Netherlands			Medium	Low				High	High	High
Sweden	High	Medium	High	Medium	High	High	High	High	High	High

¹ **Level of available knowledge: High** – quantitative scientific studies; **Medium** - qualitative scientific studies; **Low** - anecdotal information.

² **Level of available knowledge: High** – comprehensive IBA data available, and good knowledge of Lesser White-fronted Goose status and distribution; **Medium** – IBA programme completed, and basic knowledge of Lesser White-fronted Goose status and distribution; **Low** – IBA programme completed, but poor knowledge of Lesser White-fronted Goose status and distribution; **None** – IBA programme not yet completed, and poor knowledge of Lesser White-fronted Goose.

Annex 5

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

Range State	Status in National Red Data Book ¹	Legal Protection from Killing	Year of Protection Status	Penalties for Illegal Killing or Nest Destruction	Opening/ Closing Dates of Hunting Season	Annual Bag Size	Highest Responsible National Authority
Armenia	Not protected ²	None	None	None	August – February	N/A	Ministry of Nature Protection of Armenia
Azerbaijan	?	?	?	?	?	?	?
Belarus	?	?	?	?	?	?	?
Bulgaria	Endangered (1985) to be revised using IUCN criteria by 2007	Protected under the Biodiversity Act	Protected since 1962	none	1 October – 31 January	unknown	Ministry of Environment and Water
Estonia	No	Yes	Protected since 1994	Penalty for illegal killing 1280 euro per bird	LWfG not hunted, general goose hunting period from 20 August till 30 November	None	Ministry of Environment
Finland	Critically endangered	Yes	1969	Yes	No season	0-5	Ministry of Environment
Georgia	?	?	?	?	?	?	?

¹ National Red List status may differ from current global Red List status, but has legal significance in many countries.

² Armenia: the Red Data Book of Armenia was published in 1987, but Lesser White-fronted Goose was first documented later that year and so is not listed. However, because the species is extremely rare in the country and classified as globally threatened by IUCN, it does not appear on the list of birds that may be hunted. Its future inclusion in the Red Data Book of Armenia is anticipated.

Range State	Status in National Red Data Book ¹	Legal Protection from Killing	Year of Protection Status	Penalties for Illegal Killing or Nest Destruction	Opening/Closing Dates of Hunting Season	Annual Bag Size	Highest Responsible National Authority
Germany	None	Protected species	1979	Theoretically high, practically none	No hunting season	Unknown but several	Federal Ministries for Environment and Agriculture
Greece	?	?	1979	?	?	?	Ministry of Environment, Physical Planning & Public Works
Hungary	threatened (highest status)	Strictly protected	1982	c. EUR 1,000 per individual	No hunting season	N/A	Department of Environment and Water, Nature Protection Office
Iran, Islamic Republic of	?	?					
Iraq	?	?					
Kazakhstan	Endangered	Excluded from list of waterfowl quarry species, 1999	2002	USD 1500	First Saturday in September until lakes freeze	10 per hunting season	Forest and Hunting Committee, Ministry of Environment Protection
Latvia	?	?	?	?	?	?	?
Lithuania	?	?	?	?	?	?	?
Moldova	?	?	?	?	?	?	?
Netherlands ³	?	Full legal protection	?	?	?	N/A	?
Norway	Directly threatened	Full legal protection	1971	Unknown (determined by	Starts 21 August for	0-5?	Directorate for Nature

³ Reintroduced population

Range State	Status in National Red Data Book ¹	Legal Protection from Killing	Year of Protection Status	Penalties for Illegal Killing or Nest Destruction	Opening/ Closing Dates of Hunting Season	Annual Bag Size	Highest Responsible National Authority
				judge on case-by-case basis, but so far no examples of prosecution)	geese in general. Closes 23 December		Management
Poland	?	?	?	?	?	?	?
Romania	?	?	?	?	?	?	?
Russian Federation	Vulnerable	Yes	1983?	RUB 10800 (= EUR 30) for 1 individual or 1 egg. For 1 nest: RUB 10,800 x 3 + RUB 10,800 for each egg	Varies according to region	Unknown	Ministry of Nature Resources
Sweden	Critically endangered	Full legal protection	1938?	Yes	-	0	Swedish Environ. Protection Agency
Syria	?	?	?	?	?	?	?
Turkey	?	?	?	?	?	?	?
Turkmenistan	Listed	Protected by law	?	?	?	?	Ministry of Nature Protection
Ukraine	?	Proposed for inclusion in Red Data Book	Proposed 2005	-	Second Saturday of August until end of January	100	Ministry of Environment
Uzbekistan	Listed	Protected by law	2003	75 minimum monthly wages	Second half of August – end of January	5 birds/day; no annual bag limit	State Committee for Nature Protection

¹ Reintroduced populations in France and Italy included but self-sustaining populations not yet established.

Annex 6

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

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

Range State	Breeding Season					Non-breeding Season				
	No. IBAs where Lesser White-fronted Goose Breeds ¹	% Pop. in IBAs ²	% Pop. in SPAs ³	% Pop. in Ramsar Sites	% Pop. in National Protected Areas ⁴	No. IBAs with Lesser White-fronted Goose	% Pop. in IBAs	% Pop. in SPAs ³	% Pop. in Ramsar Sites	% Pop. in National Protected Areas
Iran, Islamic Republic of						13	?	0 (does not apply)	?	?
Iraq						3	?	0 (does not apply)	?	?
Kazakhstan						7	85	0 (does not apply)	5-10	60
Lithuania										
Netherlands ⁵						?	?	?	?	?
Norway	0	0	0	0	unknown	2	70-90%	0	20-80%	20 – 50%
Romania						1	?	?	?	?
Russian Federation (European part)	?	?	?	?	?	36	?	0 (does not apply)	?	?
Sweden ⁵	2	100	100	90	100	5	75	75	75	75
Syria										
Turkey						?	?	0 (does not apply)	?	?
Turkmenistan						?	?	0 (does not apply)	?	?

Range State	Breeding Season					Non-breeding Season				
	No. IBAs where Lesser White-fronted Goose Breeds ¹	% Pop. in IBAs ²	% Pop. in SPAs ³	% Pop. in Ramsar Sites	% Pop. in National Protected Areas ⁴	No. IBAs with Lesser White-fronted Goose	% Pop. in IBAs	% Pop. in SPAs ³	% Pop. in Ramsar Sites	% Pop. in National Protected Areas
								apply)		
Ukraine						8	80	0 (does not apply)	50	20
Uzbekistan								0 (does not apply)		

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

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

³ European Union members only.

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

⁵ Reintroduced population.

Annex 7

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

Range State	Research and Conservation Efforts over the Last Ten Years
Armenia	No research or conservation efforts have been undertaken in relation to the species in Armenia.
Azerbaijan	Data from international satellite tracking; sporadic field observation/counts of wintering birds. No systematic national programme in place.
Belarus	None known.
Bulgaria	<p>Research expeditions by BSPB/NOF teams in 1996 and 1998, monitoring of wintering geese in the area of Shabla and Durankulak Lakes for more than 10 years by BSPB/BirdLife Bulgaria team. Recent field observations of wintering geese have been funded by The Wildfowl & Wetlands Trust (UK) and have allowed searching for LWFG, but additional targeted research is needed to identify current numbers on staging and wintering in Bulgaria.</p> <p>A buffer zone has been proposed around foraging grounds beside Durankulak Lake, but proposal is pending in the Ministry of Environments and Waters; Public awareness activities by BSPB in wintering areas and advocacy to maintain the hunting season closing date of 31 January. There is an NGO project to buy foraging grounds around Durankulak Lake to protect them from hunting pressure and land transformation. BSPB has assisted the Ministry of Agriculture and Forestry in developing the national agri-environmental scheme with specific compensation of farmers to sustain land suitable for safe foraging by wintering geese – due to start in 2007.</p>
Estonia	Annual monitoring of staging LWfG since 1999. Constant conservation activities of coastal meadows
Estonia	Annual monitoring of staging LWfG.
Finland	Annual monitoring of staging LWfG.
Georgia	None known.
Germany	Survey and efforts to influence hunting at key sites owned by ornithological societies and/or private individuals
Greece	
Hungary	regular monitoring activity (for marked birds, on space use), some habitat management actions started, awareness-raising campaign
Iran, Islamic Republic of	Data from international satellite tracking; sporadic field observation/counts of wintering birds. No systematic national programme in place.
Iraq	Data from international satellite tracking; sporadic field observation/counts of wintering birds. No systematic national programme in place.
Kazakhstan	Annual autumn migration monitoring in Kustanay Region. Implementation of two GEF projects on key Lesser White-

Range State	Research and Conservation Efforts over the Last Ten Years
	fronted Goose sites.
Lithuania	None known.
Moldova	None known.
Norway	Annual monitoring of pre-breeding numbers in spring staging grounds and annual monitoring of production in autumn staging grounds. Surveys for breeding areas, colour-ringing programme, mapping of migration and wintering sites through satellite tracking.
Poland	None known.
Romania	None known.
Russian Federation	Creation of Russian Goose Group and, withing this, Working Group on LWfG (1995); inventory of present breeding areas of LWfG in European Russia, Yamal, Taimyr, Yakutia and Chukotka (1995-2005); searching for breeding areas in Yakutia and Chukotka (2000-2005); monotoring breeding populations in the Polar Urals and Yamal Peninsula; organization of both Russian and international expeditions for surveys, banding and satellite tagging LWfG in Yamal (1997-1998), Taimyr (1997-1998) and the Polar Urals (1999-2002, 2004); monitoring migration population in Manych-Gudilo Lake (2000-2002); survey of spring migration in Amur Oblast (2002); start of monitoring of migration in Kurgan Oblast, Western Siberia (2005); attempts to stop spring hunting in some regions; collection of samples for genetic study (1995-2004); recomendation for changing status category in Red Data Book of Russian Federation (from Rare to Vulnerable).
Sweden	Breeding ecology, genetics, migration routes, monitoring of population & reproduction, captive breeding & reintroduction, site protection
Syria	Data from international satellite tracking; sporadic field observation/counts of wintering birds. No systematic national programme in place.
Turkey	None known.
Turkmenistan	None known.
Ukraine	None known.
Uzbekistan	Since 2000 to 2005 the regular winter censuses were conducted in Uzbekistan, but only in 2000 – aerial. The wetlands and water-reservoirs survey from the banks with modern telescopes allowed to identify the Lesser White Fronted Geese in the following sites: Aydar lake (beginning of March 2001), valley of Amudarya river near Termez town (closely to Afghanistan border), Karakyr lake and Tudakul lake – winter censuses. On the hunting bag assessment the Lesser White-fronted Geese are known from Chardara water-reservoir, Aydar lake, Karakyr lake, lakes of Karshi steppe. All observers note that the flocks of the LWFG are very small (from several individuals to several tens) and observed very

Range State	Research and Conservation Efforts over the Last Ten Years
	rare in comparison with other geese.

Annex 8

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

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

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

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

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

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

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

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

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

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

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

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

(a) Establish a system of protected areas or areas where special measures need to be taken to conserve biological diversity;

(c) Regulate or manage biological resources important for the conservation of biological diversity whether within or outside protected areas, with a view to ensuring their conservation and sustainable use;

(d) Promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings;

(f) Rehabilitate and restore degraded ecosystems and promote the recovery of threatened species, inter alia, through the development and implementation of plans or other management strategies”.

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

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

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

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

Article 8 states that:

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

Articles 9.1 and 9.2 state that:

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

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

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

- the populations which are or have been subject to the exceptions and, when practical, the number of specimens involved;*
- the means authorised for the killing or capture;*
- the conditions of risk and the circumstances of time and place under which such exceptions were granted;*

- *the authority empowered to declare that these conditions have been fulfilled, and to take decisions in respect of the means that may be used, their limits and the persons instructed to carry them out;*
- *the controls involved.”*

Article 10.1 provides that:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(g) Asia–Pacific Migratory Waterbird Conservation Strategy

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

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

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

Articles 2.1 and 2.2

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

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

Article 3.1

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

Article 4.1

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

Article 5.1

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

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

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

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

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

Common Agriculture Policy

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

- the establishment of a special fund, the European Agricultural Fund for Rural Development (EAFRD), separate from the normal CAP mechanisms, with simpler financial rules;
- a requirement for European and national strategy documents;
- three priority axes for spending (I – improving the competitiveness of the agricultural and forestry sector; II – land management including animal welfare; and III – diversification of the rural economy and the quality of life in rural areas), with detailed measures under each axis;
- a requirement that a minimum of 25% of Community support for each rural development programme is spent on axis II (land management), and that a minimum of 15% is committed to each of the other two axes;
- the existing LEADER (funding for local action groups in rural communities) financial instrument to be ‘mainstreamed’ within the RDR and a minimum 7% of funding for LEADER within rural development programmes;
- a mechanism for revising the designation of Less Favoured Areas; and

- the creation of a ‘European Observatory of Rural Territories’ to collect and disseminate information and best practice.

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

Water Framework Directive

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

European Neighbourhood Policy (ENP)

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

(j) IUCN Guidelines for Reintroduction

These *Guidelines*, published in 1995 by the IUCN Species Survival Commission (SSC), have no legal status but are generally regarded as the most authoritative international guidance available concerning species reintroductions in general. As a component on actions being taken in response to a complex international conservation challenge, Lesser White-fronted Goose reintroductions should be compatible with IUCN/SSC guidance.

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

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

The objectives of a re-introduction may include: to enhance the long-term survival of a species; to re-establish a keystone species (in the ecological or cultural sense) in an ecosystem; to maintain and/or restore natural biodiversity; to provide long-term economic benefits to the local and/or national economy; to promote conservation awareness; or a combination of these.”

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

Annex 9a

Conclusions of the CMS Scientific Council, November 2005.

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

Annex 9b

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Annex 10

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

1) Main priority for the conservation of the LWfG

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

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

2) Coordination of the implementation of the SSAP

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

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

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

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

4) Swedish captive breeding programme

Sweden required support for the continuation of their captive breeding programme. At the meeting Sweden agreed to carry on its captive breeding programme only with birds from the wild (captured in Russia), while the existing captive stocks, from which birds were introduced into the wild in the past, will no longer be considered for any conservation action. The birds of that stock are still kept, but are not bred. The first shipment of eight wild birds from Russia was received in 2006 and another group of six birds was expected in mid-February this year.

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

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

5) Swedish free-flying flock

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

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

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

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

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

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

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

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

At the meeting Sweden accepted the option of providing offspring of Russian wild birds from the new captive stock, which is being currently built up. This would require some

postponement of the project, by at least three years, because no birds will be available earlier. Sweden was agreeable with the postponement of this pilot project.

Both Norway and Finland welcomed this compromise.

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

The German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety initiated a consultation in March with representatives of the NGO “Aktion Zwerggans” and the main sponsor of the pilot project Allianz Environmental Foundation. As a result of this consultation, it was agreed that the project will be postponed by three years and during this period it will seek international acceptance and in particular of the results of Dr. Wink’s genetic analysis of captive and wild LWfG conducted in the framework of the project.

7) Other issues

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

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

The AEW Secretariat would like to make an additional point, which as we understood from our post-mission talks is also supported by other people from the four parties. By now it has accumulated a significant amount of genetic studies dedicated to the LWfG

from various scientists, notably most publications and work, yet unpublished, produced by Andersson, Ruokonen, and Wink. However, conclusions of some of these studies seem to be to some extent discrepant or may be even contradictory to each other and thus leading to rather different views implying different conservation strategies. Therefore, we suggest that all available studies should be reviewed and evaluated by an independent population geneticist (or a team) with proper scientific expertise and experience (ideally in molecular DNA analysis of birds, conservation genetics and statistical proficiency). We believe that the conclusions of such an independent evaluation may help to unite the stakeholders around shared views and will be helpful in designing future conservation action.

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

1. The parties agree that the main priority for the conservation of the LWfG is the preservation of the wild populations breeding in Fennoscandia and Russia and that the work on the SSAP and any decisions should follow the code of transparency and accountability so that they can be subject to scientific scrutiny at any time. The parties will be considering support for conservation on the ground along their flyways. Particular attention shall be paid to mortality due to hunting and urgent targeted measures should be implemented to reduce the magnitude of this threat, the success of which shall be promptly and regularly reviewed and evaluated. Supplementation with captive-bred birds should be considered if other conservation measures are not as quickly efficient as needed and should populations continue to decline. As with any other captive breeding, reintroduction or supplementation initiatives this project will be subject to consideration by the Committee for LWfG captive breeding, reintroduction and supplementation in Fennoscandia (*see conclusion 3 below*). The efficiency of conservation measures is to be assessed by the International LWfG Working Group (*see conclusion 2 below*).
2. The parties agree that an International LWfG Working Group should be established, consisting of governmental representatives of all Range States, who would be free to bring in their own experts and use their support. The group will be chaired by the AEWA Secretariat (*efficient chairmanship would be possible only if additional support staff (coordinator for the SSAP) and supplementary budget are made available to the Secretariat*) and will operate in accordance with ToR developed by the AEWA Secretariat, approved by the Range states and endorsed by the AEWA Technical Committee.
3. The parties agree on the establishment of a Committee for LWfG captive breeding, reintroduction and supplementation in Fennoscandia, consisting of governmental representatives of Sweden, Finland, and Norway, who would be free to bring in their own experts and use their support. The Committee will be chaired by the AEWA Secretariat (*efficient chairmanship would be possible only if additional support staff (coordinator for the SSAP) and supplementary budget are made available to the Secretariat*) and will operate in accordance with ToR developed by the AEWA Secretariat, approved by the three states and endorsed by the AEWA Technical Committee.
4. The parties agree that a captive stock of wild Fennoscandian birds should be established, subject to the conclusions of a feasibility study. The long-term future of

all captive breeding programmes will be reviewed by the Committee for LWfG captive breeding, reintroduction and supplementation in Fennoscandia.

5. The parties agree that the Swedish captive breeding programme could carry on as long as it is based on wild birds only. The long-term future of all captive breeding programmes will be reviewed by the Committee for LWfG captive breeding, reintroduction and supplementation in Fennoscandia.
6. The parties agree that the current free-flying flock, breeding in Sweden and wintering in the Netherlands, will remain in the wild, subject to genetic screening and refinement, i.e. removal of apparent hybrids, which will be undertaken following the conclusion of a feasibility study. Further on the dilution with purebred birds is considered a principally viable option. The long-term future of all reintroduction and supplementation programmes will be reviewed by the Committee for LWfG captive breeding, reintroduction and supplementation in Fennoscandia taking full account of, amongst others, the success of conservation actions, including revival of the wild Fennoscandian population, and other pertinent factors. Decisions regarding the Swedish free-flying population should also take into account the conclusions of the independent review and evaluation of available LWfG genetic studies (*see conclusion 8 below*).
7. The parties agree that the implementation of the pilot experimental project of the NGO “Aktion Zwerggans” will be postponed by three years. As with any other captive breeding, supplementation or reintroduction initiatives this project will be subject to consideration by the Committee for LWfG captive breeding, reintroduction and supplementation in Fennoscandia.
8. The parties agree that a review and evaluation of the existing genetic LWfG studies by an independent expert(s) with proper scientific expertise and experience (ideally in molecular DNA analysis of birds, conservation genetics and statistical proficiency) should be undertaken. This work will be commissioned by the AEWA Secretariat to an independent expert(s) selected by the Secretariat too. The conclusions of this independent evaluation will be submitted to the Committee for LWfG captive breeding, reintroduction and supplementation in Fennoscandia and the International LWfG Working Group for their consideration.

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

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