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Historical occurrence of the Lesser White-fronted Goose *Anser erythropus* in the Atlantic flyway

Historisk förekomst av fjällgås Anser erythropus *i den atlantiska flyttningskorridoren*

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Abstract

The aim of this study was to discern, by the use of mainly published sources, if there once was one or more migration routes of the Lesser White-fronted Goose in the Atlantic flyway, or if all occurrence there can be explained by vagrancy. Available data were insufficient to delineate migration routes within the Atlantic flyway, south of the former breeding range. Regular occurrence at frequently checked sites, and numbers involved as well, especially in the 1960's, strongly indicates, however, that such routes have existed. The species was still migrating through South Sweden and wintering in north-western Europe in low numbers when releases started in Swedish Lapland. So, there is no scientific basis to state that these released Lesser White-fronted Geese follow an unnatural migration route. Instead, it is more than likely that they revived a traditional route.

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The increasingly fragmented breeding range of the Lesser White-fronted Goose *Anser erythropus* extends from northern Fennoscandia to eastern Siberia (Uspenski 1965, Vinogradov 1990, Morozov 1995, 1996, 2000, Morozov & Kalyakin 1997, Syroechkovsky Jr 1996, 2000, Lorentsen et al. 1999, Aikio et al. 2000, Artyukhov & Syreochkovsky Jr 1999, Morozov & Syroechkovsky Jr 2002, Mineev & Mineev 2004). In the Western Palearctic, the population crashed in the 1940's or early 1950's, maybe especially during WWII (Lorentsen et al. 1999), and it is currently estimated at 8,000–13,000 birds (Delany et al. 2007). The Fennoscandian population declined from more than 10,000 birds in the early 20th century (Norderhaug & Norderhaug 1984), or even tens of thousands (Merikallio 1915), to 60–90 pairs in 1980 (Norderhaug & Norderhaug 1982) and about 20 pairs in 2006 (Øien et al. 2007). In Sweden, the breeding population was estimated at about 10 pairs in 1988 (von Essen 1991), and in 1994, it was considered close to extinction (von Essen 1996). Norderhaug & Norderhaug (1984) believed "that the main causes for the decline must be sought along the migratory route and in the wintering quarters".

The main migration route of the Fennoscandian Lesser White-fronted Goose before the decline went through Finland, the Baltic States and Hungary to unknown wintering grounds, presumably in the eastern Mediterranean (Sterbetz 1968, 1982, Owen 1980, Norderhaug & Norderhaug 1984). In the International Action Plan for this species, identification of key sites along the migration routes and during winter was determined to be the most essential action (Madsen 1996). Satellite telemetry studies demonstrated that some of the remaining Fennoscandian birds still followed the Central European flyway during their migrations between the breeding grounds and the wintering areas in Greece, regularly staging in north-west Russia, Lithuania, Poland, eastern Germany, Hungary, Estonia and Finland (Aarvak et al. 1996, Lorentsen et al. 1998, Øien et al. 1999, Pynnönen & Tolvanen 2001).

In 1976, the Swedish Association for Hunting and Wildlife Management decided to start captive-breeding of Lesser White-fronted Geese, with the intention of releasing birds in Swedish Lapland to support the remnants of the original population (von Essen 1982). In this project, Lesser White-fronted Goose eggs were bred by semi-domestic Barnacle Geese *Branta leucopsis*, known to winter

in the Netherlands. During moult of the Barnacle Geese and before the goslings fledged, the Lesser White-fronted Geese were released together with their foster-parents in an area in Swedish Lapland, where the species was a common breeding bird in the 1930's and 1940's (Swanberg 1936, Curry-Lindahl 1959), and breeding proved still in 1979 (von Essen 1996). In autumn, the families migrated to the wintering sites of the foster-parents (von Essen 1996, 1999). During the period 1981–99, a total of 348 Lesser White-fronted Geese were released (Andersson & Larsson 2006). The reinforced population was estimated at about 100–120 individuals in 2005 (Koffijberg et al. 2005, Andersson 2006).

From the very beginning the Swedish Lesser White-fronted Goose project encountered severe criticism, especially from Denmark, for introducing a new migration route, by the foster-parents guiding the released individuals to areas not having been used by wintering Lesser White-fronted Geese in historical times (Madsen 1983, Meltofte 1987). This criticism has persisted despite the fact that no supporting evidences ever have been presented (e.g. Aarvak et al. 2001, Ullman 2002, SOF 2002, UNEP WCMC 2003, Lindell 2004a, 2004b, Engström 2007). And, it is the more remarkable as it contradicts earlier statements, that the species was regularly wintering in Western Europe (e.g. Schlegel 1877, Alphéraky 1904, Hartert 1912–1921, Lönnberg 1915, Uspenski 1965). Despite the Lesser White-fronted Goose is *critically endangered* according to the Swedish Red List (Gärdenfors 2005), the knowledge about wintering grounds of the Swedish birds restricts to three ring recoveries, in France, Greece and east of Sea of Azov, of birds supposedly heading for/being in their wintering quarters (Fransson & Petterson 2001).

The aim of this study was to discern, by the use of mainly published sources, if there once was one or more migration routes of the Lesser White-fronted Goose in the Atlantic flyway, or if all occurrence there can be explained by vagrancy.

Results

Observations up to 1980

In South Sweden, first and foremost in the provinces of Västergötland, Halland and Skåne, occasional individuals were seen annually, most of the time together with staging Taiga Bean Geese *Anser fabalis fabalis* (SOF 1978). At Veselången in Västergötland, 3–4 individuals were seen annually in 1972–1975, but whether the species staged there also before and/or after this period is unknown (Alatalo et al. 1985). At Kungsbackafjorden in Halland, 1–7 individuals, both singles and families, were seen annually, in both autumn and spring, 1956–1976 (Lennerstedt 1962, Unger 1967, Alström et al. 1979). Even though this haunt was known since long, at least among the locals, the geese were never checked before 1956 (Lennerstedt 1962). During studies of visible migration through Kalmar Sound in 1958–1961, the species was recorded in three of the four years (Edberg 1960, 1961, 1965); the largest flock was of 14 south-migrating individuals on 14 October 1960. Occurrence along the coast of the Baltic Sea was reported also by Nilsson (1858). As from 1928, the species frequently was reported from the Scanian bean goose haunts, with up to at least 14 individuals in a single year in the 1970's (Swanberg 1929, 1931, Rudebeck 1939, Nordqvist 1947, Mathiasson 1958, Ulfstrand 1959, Curry-Lindahl 1959, Markgren 1963, Norderhaug & Norderhaug 1984, Huyskens 1986, Ekberg & Nilsson 1994, Kampe-Persson unpubl.). Studies of visible migration at Falsterbo during the period 1942–1980 (Kjellén 2002) did not result in any observations of this species however (Rudebeck 1950, Ulfstrand et al. 1974, www.skof.se/fbo/).

The Lesser White-fronted Goose rarely was recorded in southern Norway (Haftorn 1971). In Denmark, on the other hand, there were 40 accepted records up to 1980 (Pedersen 1984, Boertmann et al. 1986). Also some hunting statistics are available for Denmark, where the Lesser White-fronted Goose was a legal quarry up to 1966 (Weitemeyer 1973). The open season ranged the whole year up to 1953, 1 August–15 June in 1954/55, and 1 August–31 December during the years 1955–1966 (Tommy Asferg in litt.). Goose hunters that replied on special questionnaires in 1961, 1965 and 1966 had in these years shot nine, two and 16 Lesser White-fronted Geese, respectively (Fog 1977). If hunters that did and those that did not reply on these questionnaires bagged geese with similar species compositions, which seems fair to assume as 45–54% of the bagged geese were accounted for, these numbers corresponded to total bags of this species of 20, four and 33 birds, respectively. Assuming a retrieval rate of 75% (Owen 1980), the latter figures correspond to an average annual hunting kill during these three years of 25 birds, and of no less than 44 in 1966. Seven of the reported individuals in 1966 were shot in Bornholm (Weitemeyer 1973), an island in which the species had been hunted also earlier (Seier 1932, Madsen 1942, Christensen et al. 1973).

In December 1945, Peter Scott started careful

checks of the flocks of wintering Russian White-fronted Geese *Anser albifrons albifrons* at Slimbridge in Gloucestershire (Davis & Scott 1946). From then on, 1–6 Lesser White-fronted Geese were recorded in Great Britain during almost every single winter up to 1980, above all in Gloucestershire. The species was regularly found also in flocks of wintering Taiga Bean Geese, in Norfolk in 1949–1967 and in South-west Scotland in 1954–1960 (Davies 1949, Watson 1955, Smith 1974). In Great Britain, there were 29 records in the 1960's, 24 in the 1970's, and a total of 99 up to 1979 (Vinicombe 2006).

In Germany, the species was regarded as a regular but rare migrant and winter guest in the 19th and first half of the 20th century (Naumann 1842, Niethammer 1938, Bauer & Glutz von Blotzheim 1968). Also in the Netherlands, the species was regarded as a regular guest in small numbers in the 19th century (Schlegel 1877, Snouckaert von Schauburg 1908), and rare in 1900–1968, with a total of 41 records during the years 1908–1968, and at least 26 during 1969–1980 (Eykman et al. 1941, Kist et al. 1970, Van Impe 1982, van den Berg & Bosman 1999). Overall, historical data suggest that small numbers were present in December–February (Koffijberg et al. 2006). According to goose catchers, they did not appear to associate with Greater White-fronted Geese *Anser albifrons*, but arrived together with bean geese (Blaauw 1923). In Belgium, the species seems to have been a traditional winter guest in small numbers. Since regular goose counts started in the winter 1959/1960, single birds, pairs and/or families were found annually (Huyskens 1981, De Smet 2005). The largest group was made up of two families, totalling eight individuals, in the winter 1974/1975. Winter searches directed at this species in the Flemish polders were regularly rewarded with sightings. In France, the Lesser White-fronted Goose was regarded as rare, with a total of ten records up to 1980 (Dubois et al. 2001).

Regarding Spain, the available material is extremely scanty (Persson 2000a). Three kinds of geese were reported to occur at Laguna de la Nava in the Duero Basin (Madoz 1849). In the Guadalquivir Marismas, three goose species were reported to occur in the second half of the 19th century (Chapman & Buck 1893). The Greylag Goose *Anser anser* was the principal one, followed by the less numerous Tundra Bean Goose *Anser serrirostris*. The Lesser White-fronted Goose occurred as well, as Lord Lilford possessed individuals hunted in the province of Seville, and he had also seen one individual together with Greylag Geese. Francisco Bernis (1966) knew about only three sporadic captures of Lesser White-fronted Geese in Iberia, lending the species status of being very rare (Bernis 1972). One adult bird was captured in the Guadalquivir Marismas in 1971 (Hidalgo & Rodríguez 1972).

Observations after 1980

The reinforced Swedish population has developed a migration route between the Lapland breeding grounds and the Dutch wintering quarters, where most birds are found at eight stop-over sites along the Swedish east coast (Andersson et al. 2004). The largest numbers are found at Hudiksvall in the province of Hälsingland in early autumn (Fagerström 1992, Andersson 2007), from where 77 individuals were reported 28 August–7 September 2004, 76 on 1 September 2006 and 78 on 30 August–6 September 2007. The species is observed in small numbers also outside these sites, usually 1–2 birds, and rarely more than four (Report system for Birds, data base of the Swedish Ornithological Society).

In Denmark, there were 399 observations of 1–15 birds up to 30 April 2008 (DOFbasen, data base of Dansk Ornitologisk Forening; downloaded 30 June 2008). Several of the observed birds originated from the Swedish reinforcement project. In Great Britain, there were 19 records in the 1980's, ten in the 1990's and three in the first five years of the 2000's (Vinicombe 2006).

Analysis of 547 Lesser White-fronted Goose observations in Germany from the period 1980–2004 showed that the species was still a regular migrant, which could be found in small numbers at the most important goose haunts (Johan Mooij & Thomas Heinicke in prep.). Only about one third of the observed individuals could be identified as birds belonging to the reinforced Swedish population, and these were only observed at Barnacle Goose sites along the North Sea coast of Lower Saxony and Schleswig-Holstein (Heinicke & Mooij 2005). Most of the others were observed among staging Russian White-fronted Geese and bean geese in the eastern part of the country, where a flock numbering 28 birds was seen 18–19 November 1999 (van den Bergh 2000).

After that the Swedish reinforcement project was launched, numbers increased in the Netherlands, especially since the mid-1990's, to about 120 individuals in recent winters (Koffijberg et al. 2006). Traditional staging and wintering sites have been established in six areas, supporting 87% of all ob-

servations (N=2500) during the period 1989–2005. Highest numbers were observed from mid-October to mid-March. Of fifty-one records of unmarked birds during the period 1976–1989, which were checked by Commissie Systematiek Nederlandse Avifauna, no one was from October, the month when the Swedish birds usually arrive (van den Berg & Bosman 1999). In Belgium, on the other hand, at least 19, 15 and 12 individuals were recorded during the winters 1995/1996, 1996/1997 and 1997/1998, without any released Swedish bird ever having been recorded in the country (De Smet 2005). All Lesser White-fronted Geese in Belgium were seen together with Russian White-fronted Geese. The short span of time within which the records fell, 1 December–21 March, indicated a wild origin (De Smet 2005). In France, there were a total of four records during the period 1981–1997 (Dubois et al. 2001).

There were at least 55 Spanish observations of 88 individuals in the winters 1986–2003, 15 in the Duero Basin, 38 in Doñana and two in other parts of the country (Persson 1995a, 1995b, Kampe-Persson 2004, and unpubl.). All sighted individuals in the Duero Basin and in Doñana were in flocks of Greylag Geese, chiefly Norwegian. On most occasions, 1–2 birds were seen, but there were also three observations of four birds, and one each of five and nine ones. In Doñana, many individuals pass the winter unnoticed, which complicates the evaluation of the data set. For instance, while available sightings in the winter 1985/1986 indicated a minimum number of five different birds, the number of individuals present that winter was estimated to be at least 15 (García et al. 1989). Conservative estimates of the number of Lesser White-fronted Geese reaching Doñana in each of the winters 1986–2002 fell in the range 1–20 individuals (Kampe-Persson 2004). Of birds recorded in Spain in the winters 1986–2003, one came from a project launched in 1999, where a French team, with the help of an ultra-light plane, guided 27 young Lesser White-fronted Geese from the release area in Sweden to the selected wintering area at Lower Rhine in Germany (Mooij 2001), two or three from the Finnish re-stocking project (Markkola et al. 1999) and at least the same number from the Swedish reinforcement project. The vast majority were unmarked however; for instance, none of the nine hunted birds was marked (Persson 2004, and unpubl.). If escapes had been involved, quite a few birds should have been sighted in autumn in the large flocks of Baltic Greylag Geese, which arrived in Spain significantly earlier than their Norwegian counterparts (Persson 1993), but none was ever found. Lesser White-fronted Geese occurring in Spain were most likely of a mixed origin (Persson 2000b); the native Fennoscandian population, the Russian populations and descendants of birds released in Sweden. Officially, however, all birds recorded in Spain were regarded as vagrants from naturalised populations abroad (Clavell et al. 2005), notwithstanding no such populations exist.

Discussion

Occurrence

When evaluating data sets of the kind dealt with here, it is always a delicate task to determine whether the observations represent a migration pattern or simply vagrancy. That Lesser White-fronted Geese are feeding together with other species at staging or wintering sites do not necessarily mean that they have arrived together with them (Tar 2004). And, when groups of Lesser White-fronted Geese migrate together with more numerous species, it can just be that these species are heading for the same staging or wintering area. Besides, observations of singles or small groups staging among other species can be traces of a migration route passing that area.

To use the lack of reports of wintering flocks as a justification to count the Lesser White-fronted Goose as a mere vagrant in the Atlantic flyway is to jump to conclusions. In general, little attention was paid to this species before the population decline, and in most cases, field work did not start until well after the population had crashed (Norderhaug & Norderhaug 1984). At the three sites in South Sweden where this species was recorded during a number of years, regular checks started in 1956, 1958 and 1972, respectively. In western Finland, marked decreases in the number of observed Lesser White-fronted Geese were noted between the 1950's and the 1960's (Soikkeli 1973). At Pori, for instance, the recorded number of staging and migrating birds in spring declined from more than 1,000 individuals in 1953 to a total of only 13 during the years 1967–1970. In autumn, the decline occurred earlier, and only three individuals were seen in the 1960's. These data indicate that the field work in South Sweden may have started too late to record any real numbers of migrating Lesser White-fronted Geese. The same applies to the Danish goose hunting questionnaires.

The Lesser White-fronted Goose was often confused with the Greater White-fronted Goose (for a summary, see Mooij et al. 2007). Furthermore, this

species is hard to spot and count, also by experienced observers today, when occurring in flocks of other goose species, especially the Greater White-fronted Goose (Davis & Scott 1946, Sterbetz 1968, Owen 1980, Van Impe 1982, Øien et al. 1999, Tolvanen et al. 1999a, 1999b, Persson 2000a, De Smet 2005, Vangeluwe 2005, Vinicombe 2006). However, also when occurring in single-species flocks, the species can be hard to spot, owing to a well developed ability of concealment (Gábor Kovács pers comm., Gerard Ouweneel pers. comm.). Earlier, when there were much fewer ornithologists than today, less well equipped with binoculars, telescopes and field guides, without access to hides and observation platforms, and often lacking means of transport, it is more than likely that quite a number of geese haunts, especially the least accessible ones, were never visited. Also in regions and countries very well covered by ornithologists today, flocks of geese stage and winter without being checked by any bird-watcher (Kampe-Persson 2007, and unpubl., Arnoud van den Berg pers. comm., Berend Voslamber pers. comm.). So, to base statements about occurrence solely on the lack of positive reports from ornithologists and hunters is a highly questionable method of proceeding.

A large discrepancy between actual occurrence and number of birds seen was manifested in the Central European flyway during the 20th century. Despite the fact that the main migration route of the Fennoscandian Lesser White-fronted Goose passed the Baltic States in both autumn and spring, only small numbers were ever seen. Also parts of the Russian population must have passed this area, as numbers were reported to amount to about 10,000 birds still in the late 1960's (Kumari 1971). Maybe all Lesser White-fronted Geese staging in Hungary in autumn had arrived along this route; about 80,000–120,000 staged in the eastern part of the country in the decades before the decline (Sterbetz 1982). In Estonia, the species was a scarce but regular visitor during spring and autumn migration until the 1960's, but there was not a single record in the 1970's (Leibak et al. 1994). Up to 43–51 birds were found during the last few springs of the century (Pynnönen & Tolvanen 2001). In Latvia, there were only nine records of altogether 15 birds during the entire century (Latvijas putni, data base of the Latvian Ornithological Society; downloaded 30 June 2008). There were four unconfirmed observations of flocks as well; about 100 birds on 29 September 1984, 90 birds on 22 September 1958, four birds on 20 October 1991 and 43 birds on 4 October 1996 (Celmiņš et al. 1993, Aarvak et al. 1997). In most Lithuanian publications, the species was characterised as a very rare and irregular migrant, with only several single birds or small flocks recorded (Ivanauskas 1959, Valius 1980, Nedzinkas 1990). During intensive surveys in the late 1980's and in the early 1990's, however, flocks of up to 200–230 birds were recorded in autumn, but only single birds in spring (Švažas et al. 1997). Discrepancies of this kind, manifested in their most extreme form when perceived occurrence is based exclusively on official records, must be kept in mind when evaluating data from the Atlantic flyway.

Migration during the night might explain the lack of observations in some areas along the migration routes of this species. When covering long distances geese are known to migrate in both daylight and darkness (Ogilvie 1978). And, as the Lesser White-fronted Goose has relatively longer and narrower wings than the Greater White-fronted Goose (Naumann 1842, Schiøler 1925, Hortling 1929, Øien et al. 1999) it is well shaped for long-distance migration (Kipp 1958, Mönkkönen 1995, Lockwood et al. 1998). The normal in the Baltic Greylag Goose is, for instance, to start long-distance migrations during the night, the prenuptial one around midnight (Kampe-Persson 2002, and unpubl.). Also Lesser White-fronted Geese left their breeding grounds at dusk or in darkness (Rosenius 1937).

The surprising account by Nilsson (1858) was probably caused by a confusion of species (see Jägerskiöld & Kolthoff 1926). This author reported two white-fronted goose species to occur in Scandinavia, of which one, "the true mountain goose", bred there. The breeding species migrated over South Sweden in autumn (September and October) and in spring (March and April), partly along the coast and partly along watercourses in the inland. It was mostly seen in smaller flocks. The other species, said to migrate mainly eastwards, was at times found in the southern part of the peninsula, along the shores of the Baltic Sea, but also hunted inland. This account can hardly be taken as prove of regular migration of the Lesser White-fronted Goose over South Sweden however, even though it cannot fully be ruled out that it, in fact, refers to this species.

The Danish hunting statistics, on the other hand, evidence the occurrence of migrating Lesser White-fronted Geese in the Atlantic flyway. Such a high hunting kill as reported by Fog (1977) cannot be ascribed solely to vagrancy, as the size of the Fennoscandian population was low already in the 1960's. By using the "guesstimate" of Norderhaug & Norderhaug (1984) of 160–260 birds in the pre-breeding population, assuming that the

rate of decline was the same in the 15 years up to 1980 as was observed among spring-staging Lesser White-fronted Geese at the Valdak Marshes during the period 1990–2003 (3.4% annually, Aarvak & Øien 2004) and that the proportion of juveniles in the autumn population was 35% (Aarvak & Øien 2004), an estimate of the post-breeding Fennoscandian population of 415–670 birds can be calculated for the mid-1960's. In such case, 7–11% of the Fennoscandian population was killed by hunters in Denmark in 1966.

Today's Lesser White-fronted Goose is exposed to excessive hunting along its main migration routes (Riihimäki 1999, Lampila 2001, Tolvanen et al. 2004, Øien et al. 2007). In the 1960's, the species may have experienced something similar in Denmark. It can be that the Danish hunting pressure was so high that it put a temporary end to the migration of the Lesser White-fronted Goose along the Atlantic flyway. In such case, only remnants of the former numbers might have followed this route, up to the Swedish releases started.

Despite there is not a single recovery connecting an observed bird to a specific part of the breeding range, Fennoscandia was the most likely area of origin for all but a few Lesser White-fronted Geese that occurred in South Sweden and Denmark before the launch of the Swedish reinforcement project. Vagrants may have arrived together with Taiga Bean Geese from the entire Fennoscandian range (Tveit 1984, Nilsson 1984, Nilsson & Pirkola 1991). As shown in the Greylag Goose, members of a local subpopulation can develop a migration tradition of their own, with wintering quarters situated well apart of all con-specifics (Kampe-Persson 2002). So, even though the southern part of the Scandinavian range (for maps, see Haftorn 1971, Norderhaug & Norderhaug 1984) was the most likely area of origin for the migrants, they could have come from all parts of the Fennoscandian breeding range. The Russian White-fronted Goose was regarded as a regular but rare guest during migration in southernmost Sweden and as an occasional visitor in the rest of the country (SOF 1978). This distribution pattern was confirmed during mid-monthly counts in 1977/1978–1979/1980 (Nilsson 1982). In Denmark, the Russian White-fronted Goose was a regular but rare guest during migration, numbering some hundreds in October and November in the late 1960's (Fog 1977). Of that reason, it seems unlikely that more than occasional Lesser White-fronted Geese should have arrived as vagrants together with its greater relative.

Migration routes

Lesser White-fronted Geese seen among Taiga Bean Geese at the Swedish west coast might have followed them to Great Britain, where such mixed flocks were found in Norfolk and south-west Scotland. Neck-collaring have demonstrated that these Taiga Bean Geese, at least partly, originated from the southernmost part of the Scandinavian breeding range (Parslow-Otsu 1992). If also the Lesser White-fronted Geese originated from the southern part of its Scandinavian breeding range, flocks may have occurred in Great Britain only before ornithologists started to look for them, as breeding in that part of the range supposedly ceased before 1940 (Persson 1943, 1946, Curry-Lindahl 1959, Svensson et al. 1999). Some Lesser White-fronted Geese may have wintered in north-west Jutland, which is another wintering area for this Taiga Bean Goose sub-population (Parslow-Otsu & Kjeldsen 1992). For North Jutland, Møller (1978) lists only two records of Lesser White-fronted Goose, but he reports several unconfirmed records as well.

Whether or not the birds that migrated along the Swedish east coast were heading to sites in the Netherlands, as the Lesser White-fronted Geese of today do, are not known. Birds recorded at Kalmar Sound and those shot in Bornholm were maybe heading for staging areas in the eastern parts of Germany and Hungary. Such a migration route has not been described but may have existed.

That a minor migration route passed through Denmark was reported already by Schiøler (1925) and Fog (1964). Bearing the large numbers hunted in the 1960's in mind, the autumn-staging population of that time ought to have been of at least the same size as the Fennoscandian population of today. Some of the birds that staged in Denmark may have wintered on the British Isles, but the majority probably continued to wintering quarters in either the Netherlands/Belgium or Spain. Migratory legs of up to 1280 km during autumn migration were found by Aarvak & Øien (2003), wherefore Spain could have been reached with one stop-over, in case the distance was too great for a non-stop flight.

The Lesser White-fronted Goose has a long tradition of wintering in the Netherlands and Belgium, in the 19th century more than in the 20th, and is still occurring in low numbers (Schlegel 1877, van den Berg & Bosman 1999, De Smet 2005, Koffijberg et al. 2005). Thanks to differences in arrival patterns, Swedish birds arriving earlier than the others, in mid to late October (Lorentsen et al. 1999), it is possible to determine the origin of most unmarked

individuals also today. A Siberian origin has been assumed as most Lesser White-fronted Geese occur together with Greater White-fronted Geese (De Smet 2005). However, they can as well have arrived on their own from Fennoscandia, and joined their greater relative in the Netherlands or Belgium. If these countries, besides wintering birds, formerly also were used by staging Lesser White-fronted Geese cannot be revealed today.

If the Lesser White-fronted Goose was a regular wintering bird in Spain, its wintering quarters were most likely situated in steppe areas in the central or north-central part of the country, where large numbers of geese wintered (Bernis et al. 1964). When these geese attracted the attention of scientists in the early 1960's, the major decline had already occurred, and only a few thousand wintering Tundra Bean Geese remained (Bernis 1964). Some decades earlier, the wintering geese in the Duero Basin had numbered hundreds of thousands, mainly Tundra Bean Geese and Norwegian Greylag Geese. Despite the short time that had elapsed, it was not possible in the early 1960's to tell how many individuals there had been of each species, nor which species that had been the most numerous one (see Persson & Urdiales 1995). In that context, it is more than likely that substantial numbers of Lesser White-fronted Geese could have passed unnoticed in these multitudes, especially as hunting was of little significance (Bernis et al. 1964). Still in the 1990's, flocks of 100 Lesser White-fronted Geese could have spent an entire winter in Spain unnoticed (pers. obs.). Lesser White-fronted Geese that occurred in Greylag Goose flocks had most likely arrived together with them from the Netherlands (cf. Andersson et al. 2001), while those, if any, that occurred in flocks of Tundra Bean Goose probably had arrived together with that species from Germany. Direct migration from the Pannonic area cannot be fully ruled out, however, notwithstanding that the Lesser White-fronted Goose migration in Hungary followed a narrow route east of the River Tisza (Sterbetz 1982).

In conclusion, the Lesser White-fronted Goose was regularly observed in the Atlantic flyway long before the Swedish reinforcement project was launched. At several sites, where regular checks started after WWII, the species was recorded annually during a long succession of years. Regarding Denmark in the 1960's, hunting statistics show that the number of hunted Lesser White-fronted Geese was large in relation to the size of the Fennoscandian population of the time. The recorded occurrence in the Atlantic flyway was similar to that in corresponding parts of the Central European flyway, where the main migration route of Fennoscandian birds went. Up to 1980, there were, in fact, five times as many records of this species in Denmark than in Latvia, and the difference was even larger between the Netherlands and Latvia. Of these reasons, one can with today's best knowledge not eliminate that the species' western migration route went along the Atlantic flyway also before the Swedish reinforcement project was launched.

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Sammanfattning

Fjällgåsens alltmer fragmenterade häckningsområde sträcker sig från norra Skandinavien till östra Sibirien. Efter kraftiga minskningar under det gångna seklet uppskattas världspopulationen idag till endast 28.000–33.000 fåglar. I Västpalearktis kraschade populationen under 1940-talet eller tidigt 1950-tal. Den fennoskandiska populationen minskade från drygt 10.000 individer, eller tiotu-

sentals, i början av 1900-talet till dagens cirka 20 par. Den svenska populationen uppskattades till cirka 10 par 1988 och 1994 antogs arten vara nära utrotning i Sverige. De främsta anledningarna till tillbakagången anses vara att söka längs med flyttningsvägarna och i vinterkvarteren. Ursprungligen gick den huvudsakliga flyttningsrutten för de fennoskandiska fjällgässen via Finland, Baltikum och Ungern till okända övervintringsområden. Satellitspårning har visat att denna centraleuropeiska flyttningskorridor utnyttjas av skandinaviska fjällgäss även idag.

Då det svenska fjällgåsprojektet startades valde man att som fosterföräldrar använda vitkindade gäss, vilka framförallt övervintrade i Nederländerna. Därmed skulle de utsatta fjällgässen ledas längs flyttningsvägar och till vinterkvarter som bedömdes erbjuda större chanser till överlevnad än de som majoriteten utnyttjade. Från första början har detta projekt kritiserats för att introducera en ny flyttningsrutt, genom att fosterföräldrarna påståtts leda de utsatta individerna till områden som inte utnyttjats av övervintrande fjällgäss i historisk tid. Denna kritik har fortsatt, trots att det aldrig presenterats minsta vetenskapliga bevis som stöder den. Detta är desto mer anmärkningsvärt, eftersom kritiken är oförenlig med tidigare uppgifter om att arten regelbundet övervintrade i Västeuropa.

Genom att utnyttja främst publicerade källor var denna undersöknings målsättning att ta reda på om det tidigare fanns en eller flera flyttningsrutter för fjällgås i den atlantiska korridoren, eller om all förekomst där kan förklaras som resultat av felflygningar.

I resultatdelen redovisas för de olika länderna i den atlantiska flyttningskorridoren data för två perioder, till och med 1980 samt efter 1980, dvs före och efter det att utsättningar började göras i Sverige. Redovisningen bygger på officiella fynd, övriga observationer, jaktstatistik samt generella uppgifter om rastning, flyttning och övervintring. I Danmark skickades en enkät ut till samtliga gåsjägare 1961, 1965 och 1966. Baserat på resultaten från dessa enkäter beräknades att i genomsnitt 25 fjällgäss om året dog till följd av jakt i Danmark.

Att utnyttja avsaknaden av rapporter om flockar vintertid till att räkna fjällgåsen som endast tillfällig gäst i den atlantiska flyttningskorridoren är att dra förhastade slutsatser. Generellt ägnades arten liten uppmärksamhet före tillbakagången, och i de flesta fall skedde inget fältarbete förrän långt efter det att populationen kraschat. Dessutom är fjällgåsen svår att upptäcka och räkna, även för erfarna observatörer idag, när den förekommer tillsammans med andra gäss, speciellt blåsgås. En väl utvecklad förmåga att hålla sig dold gör att arten är svårupptäckt även då den förekommer i mindre artrena flockar.

Att ett fåtal fynd av en art inte med nödvändigtvis skall tolkas som att arten är sällsynt, eller sparsamt förekommande, visas med all tydlighet av data från den centraleuropeiska flyttningskorridoren. Trots att det huvudsakliga sträcket av fennoskandiska fjällgäss både höst och vår under 1900-talet gick via Baltikum, under de första decennierna omfattande mer än 10.000 individer, gjordes endast 9 fynd av totalt 15 fåglar i Lettland. En förklaring till den stora skillnaden mellan verklig förekomst och antalet sedda fåglar kan vara att sträcket huvudsakligen passerade nattetid. Arten registrerades något oftare i Estland och Litauen, men totalt sett var det endast en bråkdel som sågs även där. Dylika diskrepanser, visande sig i sin mest extrema form när underlaget utgörs av enbart officiella fynd, kan mycket väl gälla även för flertalet länder i den atlantiska flyttningskorridoren.

När fjällgäss ses rasta eller övervintra tillsammans med andra talrikare gåsarter behöver dessa inte nödvändigtvis ha anlänt till lokalen tillsammans. Enstaka individer och små grupper rastande bland andra arter är däremot ofta ett säkert tecken på att en flyttningsrutt passerar just där.

Tyvärr kan inte Sven Nilssons uppgift från 1800-talets mitt om att fjällgåsen flyttade över Sydsverige såväl höst (september och oktober) som vår (mars och april) tillmätas något större bevisvärde, ty sannolikt bygger den på en sammanblandning med blåsgås. Den danska jaktstatistiken däremot bevisar förekomsten av flyttande fjällgäss i den atlantiska flyttningskorridoren, ty redan på 1960-talet var den fennoskandiska populationen så liten att långt ifrån samtliga fjällgäss som sköts i Danmark kan ha utgjorts av felflugna fåglar. Jakttrycket i Danmark kan faktiskt ha varit så högt att det bringade flyttningen i denna korridor till ett tillfälligt stopp, varefter endast ett fåtal fjällgäss använde rutten fram tills dess att de svenska utsättningarna påbörjades.

Fennoskandien var sannolikt ursprunget för nästan samtliga fjällgäss som uppträdde i Sydsverige och Danmark innan de svenska utsättningarna inleddes. De fjällgäss som sågs tillsammans med taigasädgäss på Västkusten följde eventuellt dessa till Storbritannien, ty fjällgäss sågs regelbundet bland rastande taigasädgäss i Norfolk och sydvästra Skottland. Vart fjällgässen som sträckte genom Kalmarsund var på väg är inte känt. Nederländerna? En del av de fjällgäss som rastade i Danmark

kan ha övervintrat i Storbritannien, men majoriteten fortsatte sannolikt till antingen Nederländerna/Belgien eller Spanien.

I Nederländerna och Belgien finns en lång tradition av övervintring, men ifall länderna även utnyttjades av rastande fjällgäss går inte att avgöra. Ifall arten var en regelbunden övervintrare i Spanien fanns nog dess vinterkvarter i landets stäppområden, där tidigare hundratusentals gäss, framförallt tundrasädgäss och norska grågäss, övervintrade. När forskarna omkring 1960 började rikta sin uppmärksamhet mot dessa gåsskaror, hade antalet gäss redan minskat till några få tusen. Med tanke på att flockar på något hundratal fjällgäss fortfarande under 1990-talet med lätthet skulle ha kunnat övervintra oupptäckta i Spanien, kan stora antal ha undgått upptäckt i de forna gåsskarorna, och då speciellt eftersom jakt var av liten betydelse.

Sammanfattningsvis kan konstateras att fjällgåsen regelbundet sågs i den atlantiska flyttningskorridoren långt innan några fjällgäss sattes ut i Sverige. På flera lokaler, där regelbunden bevakning inleddes efter andra världskriget, observerades arten regelbundet under en lång följd av år. Beträffande Danmark på 1960-talet visar jaktstatistik att antalet fjällgäss som sköts var högt i förhållande till den då aktuella storleken av den fennoskandiska populationen. Fyndbilden i den atlantiska flyttningskorridoren liknar den i motsvarande delar av den centraleuropeiska flyttningskorriden, där den huvudsakliga flyttningsrutten för fennoskandiska fjällgäss antas ha gått fram. För perioden fram till och med 1980 finns det faktiskt fem gången så många fynd av fjällgås i Danmark som i Lettland, och skillnaden är ännu större mellan Nederländerna och Lettland. Av dessa skäl kan man med dagens bästa kunskap inte utesluta att fjällgåsens västra flyttningsrutt gick längs med den atlantiska flyttningskorridoren.