

France as a staging and wintering area for Greylag Geese *Anser anser*

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Abstract

France is traditionally a staging area for Greylag Geese *Anser anser* migrating from northwest Europe to wintering sites in Spain, though increasing numbers have wintered in France over the last three decades. This paper considers sightings within France of neck-banded individuals marked elsewhere in Europe since the 1980s, to determine the origin of Greylag Geese staging and now wintering in the country. The geese included in this study were all caught in summer during the annual moult, either as family groups or in non-breeding flocks. Most sightings of neck-banded geese were from western France, and most birds identified were from breeding areas in the Nordic countries or to a lesser extent in the Netherlands. The Lac du Der area in northeast France was found to be a wintering area for an introduced population of Greylags established southwest of Stockholm in Sweden, and the geese wintering on the Camargue in southern France were recruited mainly from central Europe. Numbers wintering in France have increased in line with the general increase in the European Greylag Goose population, whereas numbers on passage in France have not increased in the same way, possibly due to a northward shift in the winter distribution of Greylags across Europe. The numbers wintering in France are, however, still small compared to other areas along the flyway.

Key words: breeding origin, colour-marked, France, Greylag Geese, neck bands staging, wintering.

Traditionally, Greylag Geese *Anser anser* breeding in west and northwest mainland Europe have migrated along the west coast of Europe to winter in Spain, originally mainly at the Marismas of Guadalquivir in the southwest part of the country (Andersson *et al.* 2001; Nilsson *et al.* 1999 and references therein). Geese migrating from Sweden staged for short periods in the Netherlands, whereas those from Norway used migratory sites in both Denmark and the Netherlands, often for longer periods (Andersson *et al.* 2001). France has been primarily a transit country for Nordic Greylag Geese on their way to Spain, with one noticeable exception (see below). This was the general pattern of movement along the flyway during the 1980s, when studies of the Nordic-breeding Greylag Geese commenced (Andersson *et al.* 2001).

Since the 1980s, the picture has changed radically. The population has increased markedly from *c.* 200,000 geese in the early 1990s to 610,000 by 2009 (Fox *et al.* 2010). During the same period, there have been significant changes in the migration patterns. The Greylag Geese now winter much further north than previously, with wintering sites established in the Netherlands and south Sweden (Nilsson 2006). Changes have also occurred in the timing of migration, with spring migration starting earlier in more recent years (Fouquet *et al.* 2009; Pistorius *et al.* 2006).

Large numbers of Greylag Geese pass through France during autumn and spring, particularly in west-central France (Fouquet *et al.* 2009). The Greylag Goose therefore is an important species for French hunters; the most recent estimate of an annual hunting

bag is of *c.* 21,000 birds in the 1998/99 hunting season, although some White-fronted Geese *Anser albifrons* and Bean Geese *Anser fabalis* were probably included in this total (Yésou 2000; Schricke & Yesou 2001). A Greylag Goose research programme was initiated in France in 2011, to determine the origin of the birds occurring in the country (Schricke 2011). This paper analyses re-sightings data for individual birds marked by the different Greylag Goose neck-banding programmes in Europe, recorded on the www.geese.org website, to determine the origins of the geese staging in France. Regional and seasonal variations in the re-sightings data are also analysed, to determine which geese are staging and which are overwintering in the country. Mid-winter counts of the species are presented to determine changes over time in the importance for France for the Greylag Geese. Goose hunting is a major activity in France and the Greylag Goose is an important quarry species. A thorough knowledge of the movements of the geese in the country therefore is required for proper management of this resource, particularly in relation to the European Union regulations of hunting of migratory species at a time when migration phenology and wintering habits are changing.

Methods

The analyses presented in this paper are based on observations of neck-banded Greylag Geese from different countries recorded in the www.geese.org database, downloaded in August 2012. The geese were mainly marked on the breeding areas, where families were driven into net traps when the

adults were moulting and before the young were fledged. Some moulting non-breeding geese were also caught in the same areas. In Norway the geese were caught mainly by hand-net from a boat during moult (at which time they are skilled at diving), both at breeding areas along the coast and at the non-breeders' moult sites (Andersson *et al.* 2001). Neck-banding of the geese in the Nordic countries commenced in 1984 (Andersson *et al.* 2001), where 7,142 Greylags have been neck-banded up to and including 2011: 3,642 in Norway and *c.* 3,500 in south Sweden. In addition, 3,546 Greylag Geese have been marked in the Netherlands since 1990, giving a total of 134,000 records reported to www.geese.org. The www.geese.org database also included sightings of 991 Greylags neck-banded in Germany (16,014 observations) and 358 from the Czech Republic (2,413 observations since marking started in 1995) which were used in this analysis. Data from the German marking programme in www.geese.org are mainly for birds neck-banded from 2000 onwards; geese were marked earlier, from 1980, but these earlier sightings are not yet available in the database. Seven Greylag Geese have also been neck-banded in the Camargue, France.

Recoveries mainly of shot birds with metal rings, reported to the French ringing centre at the National Museum of Natural History in Paris and to the Swedish ringing centre, were also included in the analyses.

When the analysis was conducted the database included 207,000 observations of neck-banded Nordic geese, with a further 152,000 sightings of geese marked elsewhere. On analysing the data, only one sighting of

each marked individual was included per area and season (*i.e.* over the whole of a successive autumn, winter and spring period).

Variation in the numbers and distribution of Greylag Geese wintering in France was determined from the international waterbird censuses (IWCs), which have been carried out in France and other European countries in mid January each year since the mid 1960s (Wetlands International 2006). National coordinators work with a network of professional and amateur counters to determine the number of waterbirds at key wetlands, and these IWC data are then collated by Wetlands International for determining the trends and status of a species at the population level. Further details of the goose count programme in France, which is coordinated by the Ligue pour la Protection des Oiseaux, with the collaboration of the Office National de la Chasse et de la Faune Sauvage, are provided by Deceuninck *et al.* (2013).

Results

Distribution and numbers

According to the mid-January counts, Greylag Geese wintering in France congregate at some tens of sites, with 86 sites recorded holding geese in January 2012 (Deceuninck *et al.* 2013). A few sites (5–7) account for more than half of the total numbers counted in January: Camargue (5,700 birds in 2012), Lac du Der (2,823), Baie de l'Aiguillon (1,961), Etangs de Moselle (1,468), and Lacs de la Forêt d'Orient (1,455) (Fig. 1). The geese occur mainly along Atlantic coasts and in the northeast part of the country, with the Camargue being the

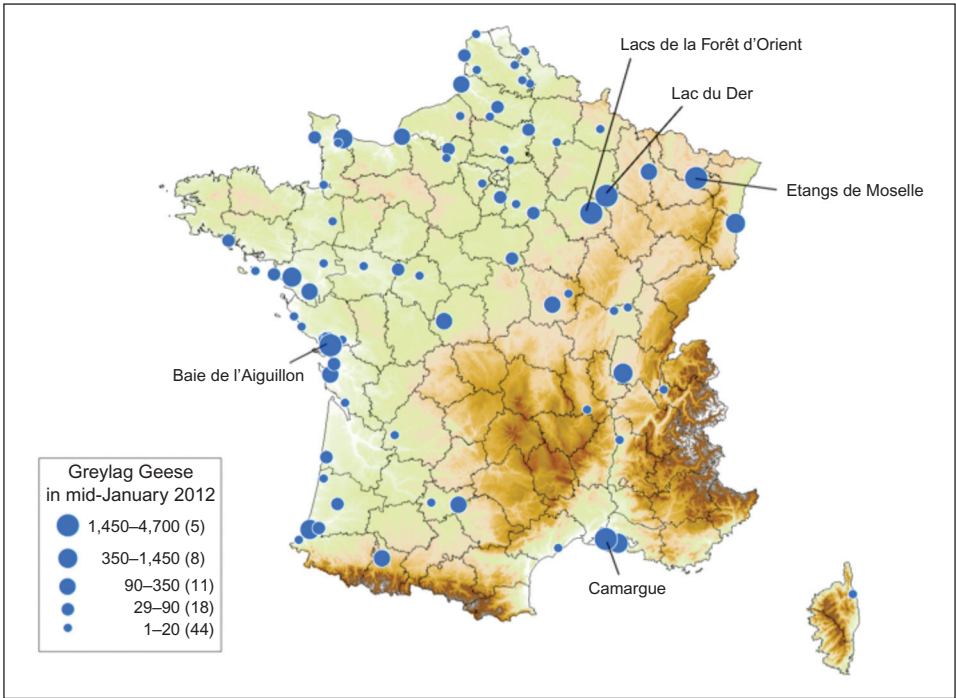


Figure 1. Distribution and numbers of Greylag Geese counted in France in mid-January 2012. The number of sites is given in parentheses. Map based on data from Deceuninck *et al.* (2013), courtesy of the Ligue pour la Protection des Oiseaux/Wetlands International.

only regular wintering site for Greylag Geese on the French Mediterranean coast.

As in most northwest European countries, numbers wintering in France are now much higher than at the beginning of the 1980s, with a peak count of 28,342 geese recorded in January 2011 (Fig. 2, from Deceuninck *et al.* 2013), with a long-term (1987–2012) increase at the 88 most important wetlands for waterfowl in France (Fouque *et al.* 2005; ONCFS unpubl. data).

Only a few hundred Greylag Geese wintered in the Camargue prior to the mid-1990s (100–200 birds between 1990 and 1994; Thibault *et al.* 1997), after which

numbers gradually increased to 1,300 individuals by January 2000 (Kayser *et al.* 2003), 3,000 in January 2006 (Kayser *et al.* 2008), 4,200 in 2008 and up to 5,700 in 2011 (M. Gauthier-Clerc, pers. comm.). The Camargue differs from most sites elsewhere in France in that it appears to recruit its wintering population from eastern Europe, as described below.

Origin of the staging and wintering Greylag Geese seen in France

The numbers of neck-banded Greylags from different countries, re-sighted in France and recorded in the www.geese.org

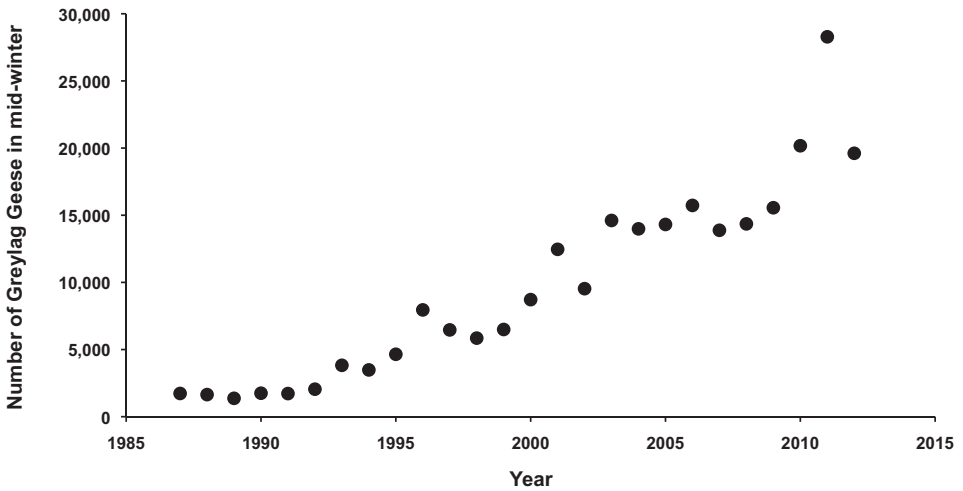


Figure 2. Number of Greylag Geese counted in France in mid-January over the period 1987–2012. Data from the Ligue pour la Protection des Oiseaux/Wetlands International (Deceuninck *et al.* 2013).

database, were 198 from Norway, 162 from Sweden excl. Södermanland, 219 from Södermanland in Sweden (introduced population), 19 from the Netherlands, 5 from Germany and 9 from the Czech Republic. The majority (95%) of 614 neck-banded Greylag Geese seen in France therefore came from Norway and Sweden, although these represented only 8.2% of 7,075 Greylags marked in the Nordic countries (Fig. 3). This relatively low re-sighting frequency for birds marked in Norway (5.5% of all neck-banded geese reported at least once in France over the years) and Sweden (5.5% reported, excluding the special case of geese marked in Södermanland, discussed below) is clearly related to the country being visited mainly during migration, with the geese staging only for short periods. The re-sighting frequency is much higher from countries where the geese stage or winter for longer

periods: Germany 21%, the Netherlands 76% and Spain 47% for birds marked in Norway, and Germany 14%, the Netherlands 49% and Spain 29% for birds marked in Sweden. Only a small number of individuals neck-banded in Germany, the Netherlands and the Czech Republic have been recorded in France, however 0.7% of 4,895 geese marked in these countries, except for Czech-marked birds re-sighted in the Camargue (see below), so the proportion of Nordic-ringed birds re-sighted in France is significantly higher than those from other countries ($\chi^2_1 = 192$, $P < 0.001$ on omitting geese marked in Södermanland).

The Greylag Geese seen in western France originate mainly from southern Sweden and Norway, whereas those introduced to Öster-Malma in Södermanland, south-central Sweden were found to winter mainly in a restricted area around Lac du Der. A total of 405 Greylag Geese were neck-banded at

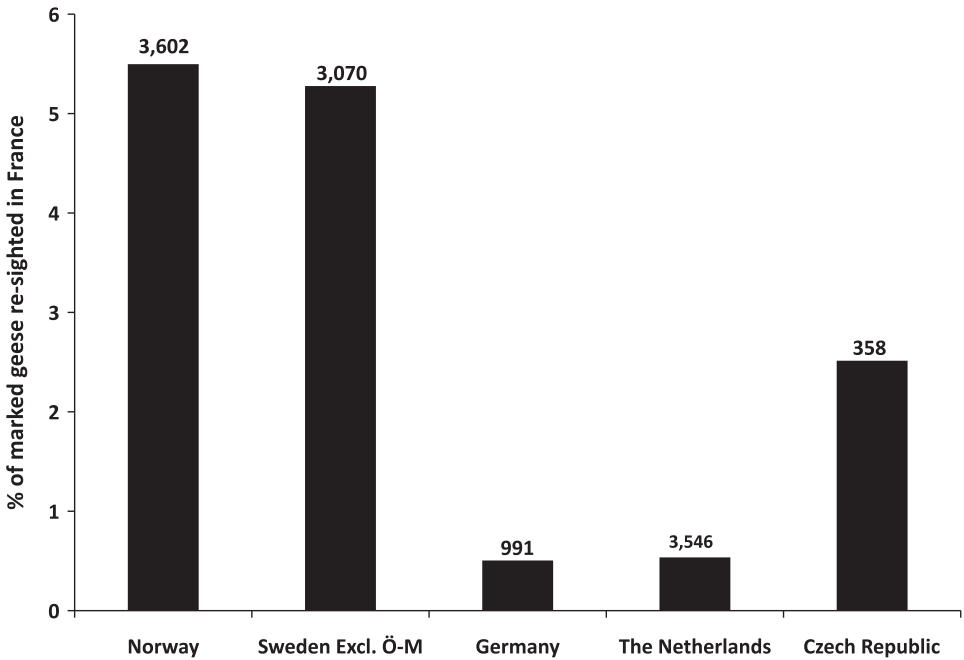


Figure 3. Percentage of all neck-banded Greylag Geese marked in different countries that were recorded at least once in France, based on records in www.geese.org. The total number neck-banded per country is given for each case.

Öster-Malma during 1984–1995, of which at least 221 (55%) have since been recorded wintering in France, mainly at Lac du Der but also to a lesser extent at Lac de la Forêt d’Orient (*c.* 50 km away) and in northeast France (Andersson *et al.* 2001). There is no new information relating to these birds since the Andersson *et al.* (2001) study, as neck-banding did not continue in this area, and there are no recent sightings in the database of the earlier marked geese.

Greylag Geese wintering in the Camargue seem to have a more easterly origin than the birds in other parts of France (Fig. 4). Nine neck-banded Greylags ringed in the Czech Republic seen wintering in France were all

found in the Camargue, whilst five of the seven birds neck-banded in the Camargue subsequently re-sighted outside France were all reported from eastern Germany. One Greylag Goose observed in the Camargue was marked during the moult at Lake Hornborgasjön in south Sweden; this bird could be of German origin. There is also some exchange between the Atlantic flyway and the Camargue area, though this concerns only a limited proportion of birds: of eight Greylag Geese recorded in the Camargue during winter 2012/13, one had been ringed in the Netherlands, one in Sweden and one in Germany, whereas the five others were from the Czech Republic.

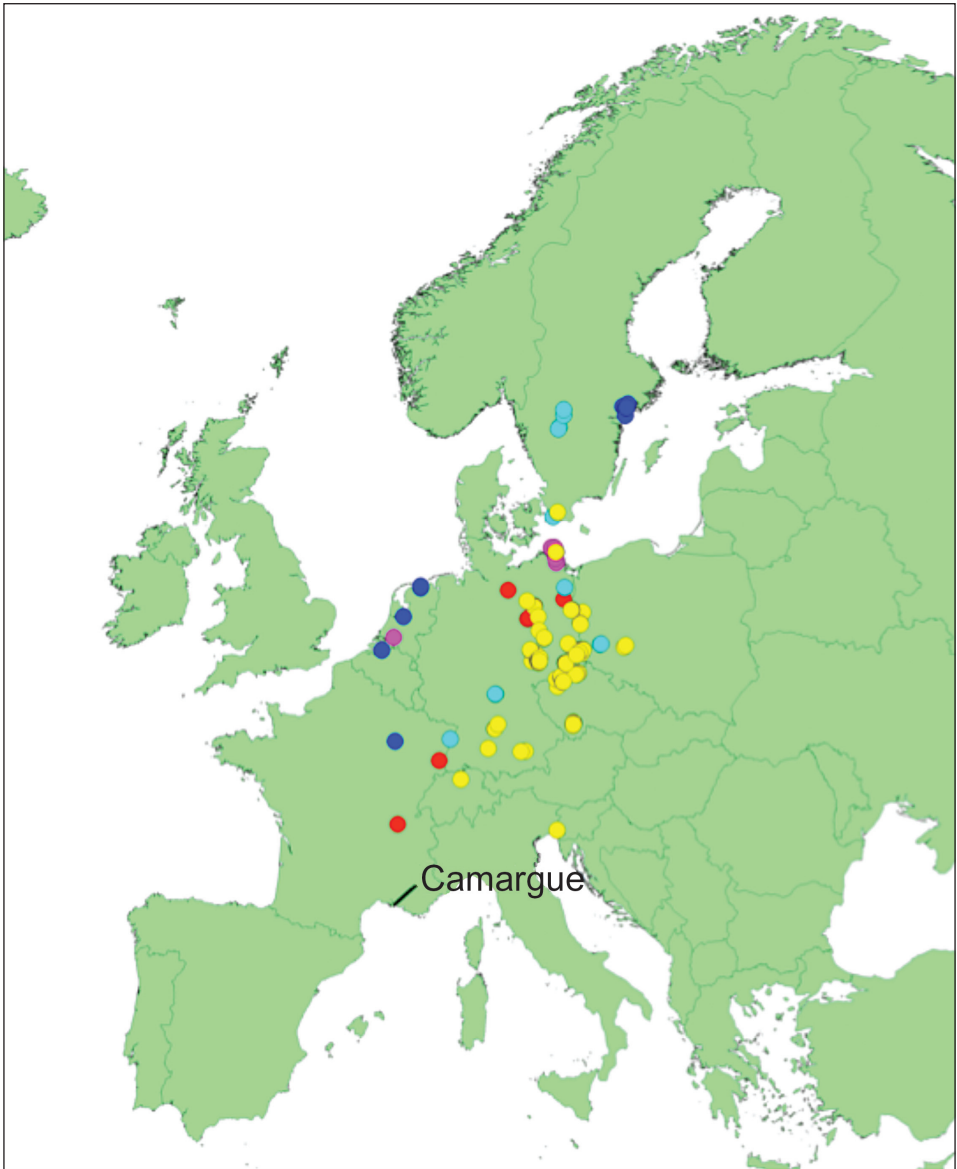


Figure 4. Marking places and all re-sighting locations for Greylag Geese observed wintering in the Camargue. Symbols show marking sites and all observation sites for these birds. Marking areas (with the number of individuals marked in each area that were subsequently re-sighted given in parentheses): Red = Camargue (5), Dark Blue = Södermanland, Sweden (1), Light Blue = Lake Hornborgasjön, Sweden (1), Violet = Germany (1), Yellow = Czech Republic (9).

Analysis of traditional ring recoveries (*i.e.* of metal rings reported to the French ringing centre) for Greylag Geese shot in France (Fig. 5) shows a similar picture to that of the neck-band sightings (Fig. 6). Seventy-seven geese ringed in Denmark have been shot in France and reported over the study period. These records show the same distribution pattern as the other

Nordic geese, but too few Greylag Geese have been neck-banded in Denmark in recent years for an analysis of their distribution in France. The most marked difference was amongst geese marked in Germany; there were 25 recoveries of metal rings in the French ringing centre's database, compared to only one collar observation in www.geese.org. These differences might be

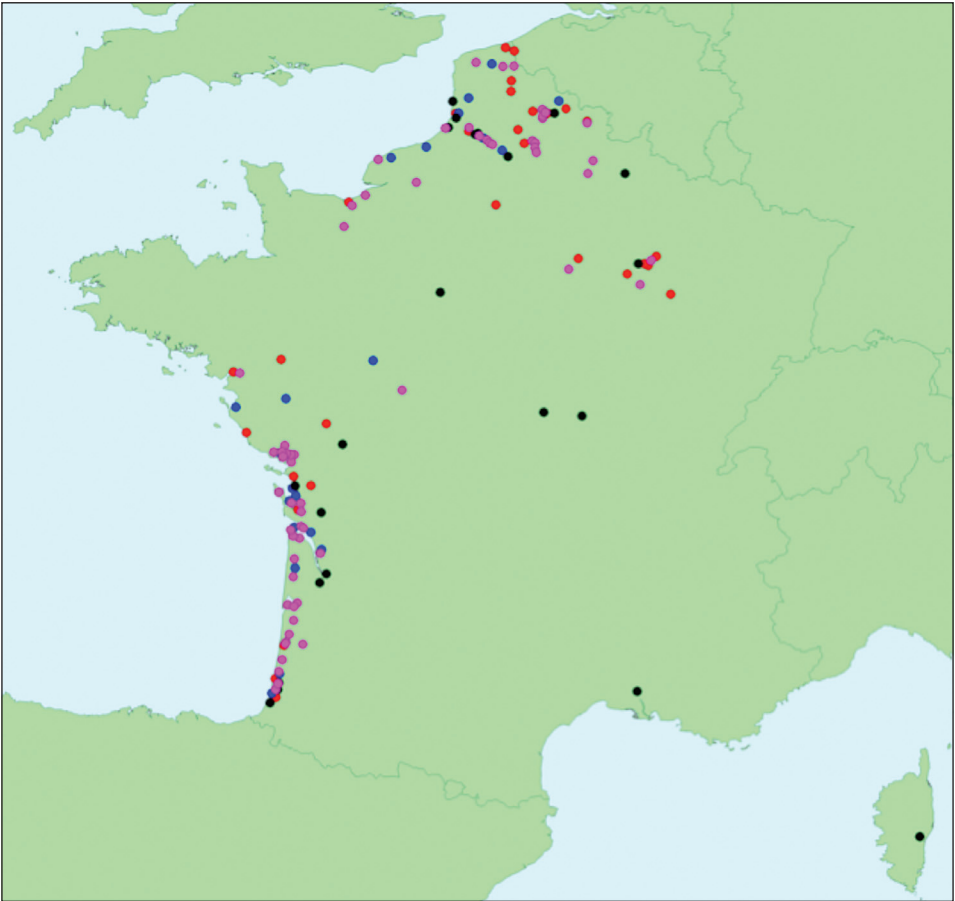


Figure 5. Distribution of recoveries (number of records in brackets) of shot Greylag Geese *Anser anser* reported from France. Origin: Red = Sweden (103), Dark Blue = Denmark (77), Violet = Norway (44), Black = outside Nordic countries, notably Germany (25), Poland (5), Czech Republic (1) and Finland (1).

explained by changes in the migration habits and wintering areas of German (and other) Greylag Geese over the years, as most neck-banding has taken place in recent years, whereas the recoveries of ringed-only birds cover a longer time span. The older neck-band observations from Germany are not yet available on www.geese.org.

Seasonal and geographical distribution of neck-banded Greylag in France

Sightings of neck-banded Greylag Geese from the Nordic countries are concentrated in the western part of France, although there are a few observations, mainly of birds from south Sweden, in the north-eastern part of the country, in addition to the birds

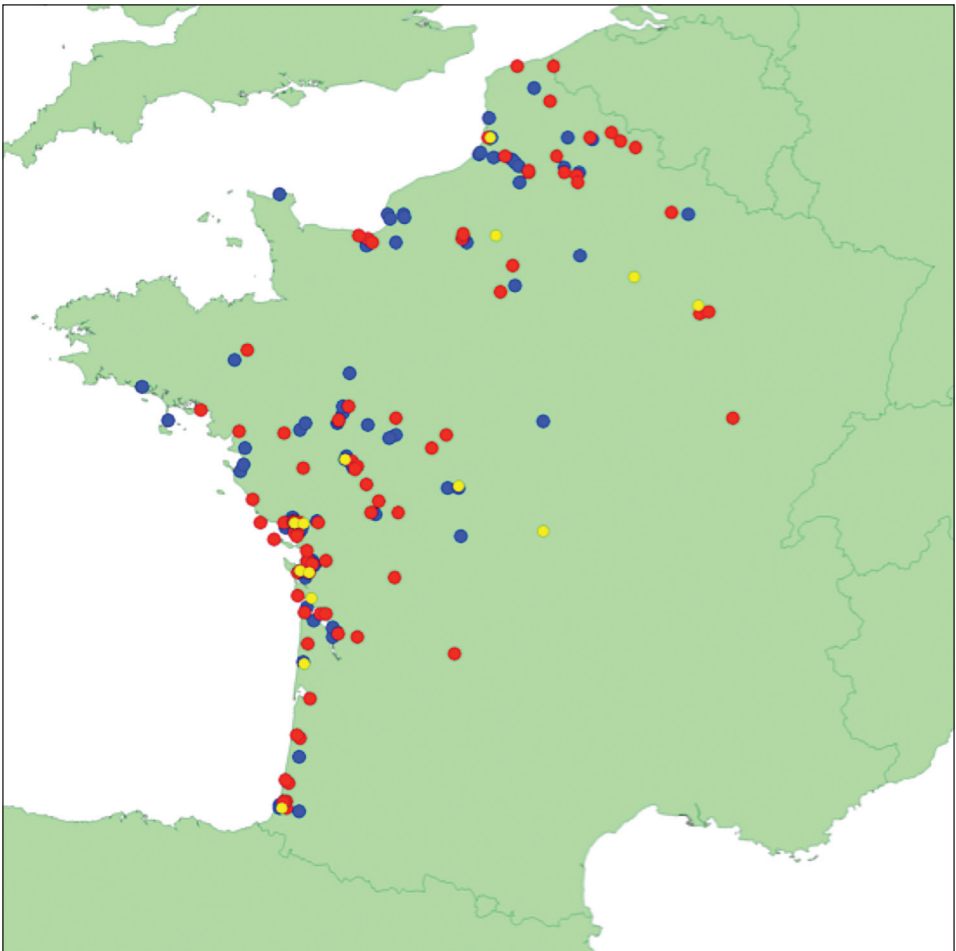


Figure 6. Distribution of observations of neck-banded Greylag Geese *Anser anser* in France from Sweden (excl. Södermanland) (Red, $n = 154$), Norway (Blue, $n = 198$) and the Netherlands (Yellow, $n = 19$).

from Södermanland at Lac du Der (Fig. 6). The same applies to birds from the Netherlands seen in France. In southwest France, observations are clearly concentrated along Atlantic coasts. Recoveries of ringed birds show a similar distribution pattern in France (Fig. 5).

Few Nordic Greylag Geese, with the exception of the birds from Södermanland (see below) were found in France before November and after March, although a small number were sighted there in October and April (Fig. 7a,b). Those from the main marking areas in Norway and Sweden showed a typical bimodal occurrence in France, with most sightings made during autumn migration (November–December) and spring migration (February–early March), indicating that these birds mostly cross the country on their way to and from more southern wintering grounds on the Iberian Peninsula (Fig. 7a,b). There were some differences between the arrival patterns of Greylag Geese from Norway and south Sweden in France during autumn; geese from south Sweden were seen mainly in November (Fig. 7a), whereas those from Norway were sighted mostly in December, although a few had arrived in November (Fig. 7b). The spring peak for birds from both countries was in February.

A large proportion of the Greylag Geese seen in France (65% of 138 from south Sweden and 77% of 181 from Norway) were also seen at wintering sites in Spain in the same winter (Figs. 7a,b, Fig. 8). For most months the numbers seen in France but not seen in Spain was relatively small, with the exception of December birds from Norway, probably due to France being a staging area

during migration. Of 38 Greylags from southwest Sweden re-sighted in both France and Spain within the same season (Fig. 8), 10 were seen in France during autumn migration in early November, and 28 seen in France during spring migration in February and early March. No birds were identified in France in both autumn and spring. One individual seen in Spain in late December was recorded back in France during mid-January and was seen there until mid-February.

For the Greylag Geese from Södermanland, the Lac du Der (and neighbouring areas) is a major wintering area. There the birds mainly arrive in October and leave in March, with numbers in November–February being rather stable (Fig. 9).

Discussion

When the neck-banding studies of Greylag Geese in Europe commenced, France was mainly a country through which large numbers of Greylag Geese migrated in autumn and spring, with most individuals just passing or staging for short periods within the country (Andersson *et al.* 2001; Nilsson *et al.* 1999). Assessment of re-sightings data, presented here, indicate that the majority of the Greylag Geese passing through France come from the Nordic countries. Some additional birds originate from the Netherlands, but most Greylags breeding in the Netherlands are generally sedentary or show only limited local movements (Voslamber *et al.* 2010). Nordic-breeding geese also stage in the Netherlands, before continuing on the second or third leg of their journey to wintering sites in Spain.

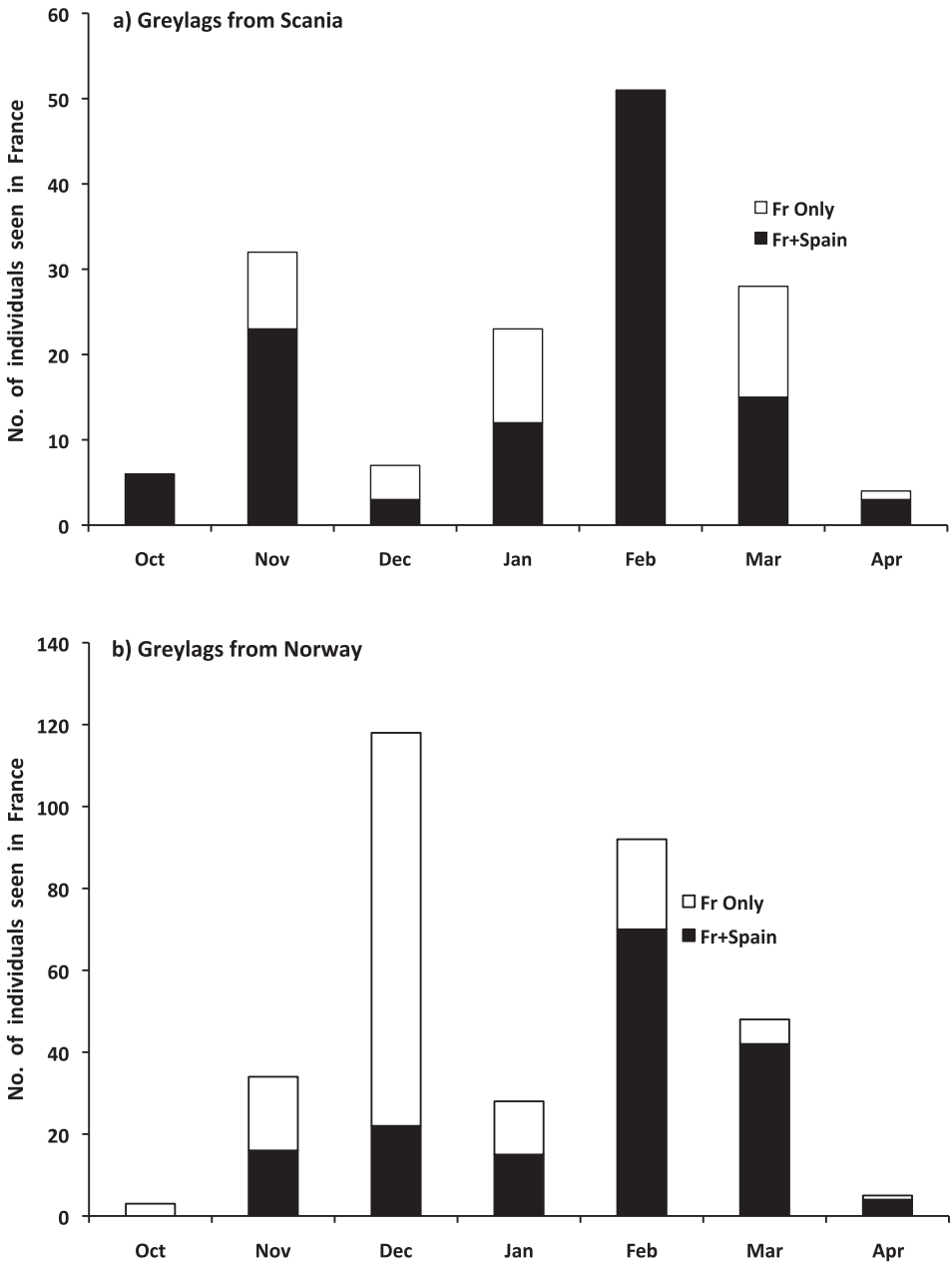


Figure 7. Numbers of neck-banded Greylag Geese ringed in (a) Scania, south Sweden, and (b) Norway, which were re-sighted in France each month. Fr-only = birds seen only in France, Fr+Spain = birds seen in France that were also seen in Spain in the same season.

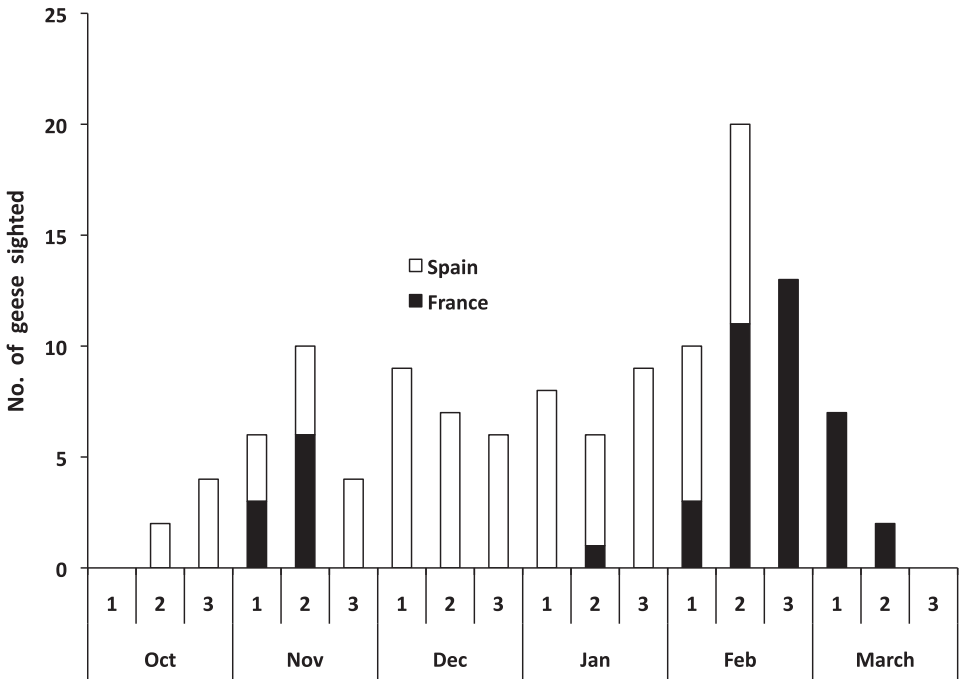


Figure 8. Number of observations per ten-day period (1 = the first ten days in a month, 2 = the next ten days, *etc.*) of 38 neck-banded Greylag Geese marked in southwest Sweden seen in Spain and France during the same season.

The West European Greylag Goose population has increased markedly over recent decades (Madsen 1987; Nilsson *et al.* 1999; Fox *et al.* 2010). In the late 1960s, Rooth (1971) estimated numbers wintering in southern Spain at *c.* 25,000 out of a total population of 30,000 birds. The flyway population subsequently increased to *c.* 93,000–112,000 birds by the early 1980s (Madsen 1987), was > 200,000 in 1991 (Nilsson *et al.* 1999) and reached *c.* 610,000 by 2009 (Fox *et al.* 2010). During the early years, the wintering population of Greylag Geese in the main wintering area in the Guadalquivir delta of southern Spain also increased, but this has since stabilised and

numbers in the main area have decreased in recent years (Rendon *et al.* 2008). On the other hand, other areas in northern Spain were established as wintering areas for increasing numbers of Greylag Geese, due to the restoration of a number of wetlands, the first being Villafafila which soon became an important wintering area especially for Norwegian birds (Andersson *et al.* 2001). Moreover there was a change in the migration pattern of the Greylag Geese in Western Europe, resulting in a diminishing proportion of Greylag Geese from the Nordic countries migrating to Spain (Andersson *et al.* 2001; Nilsson 2006). New wintering traditions have been established

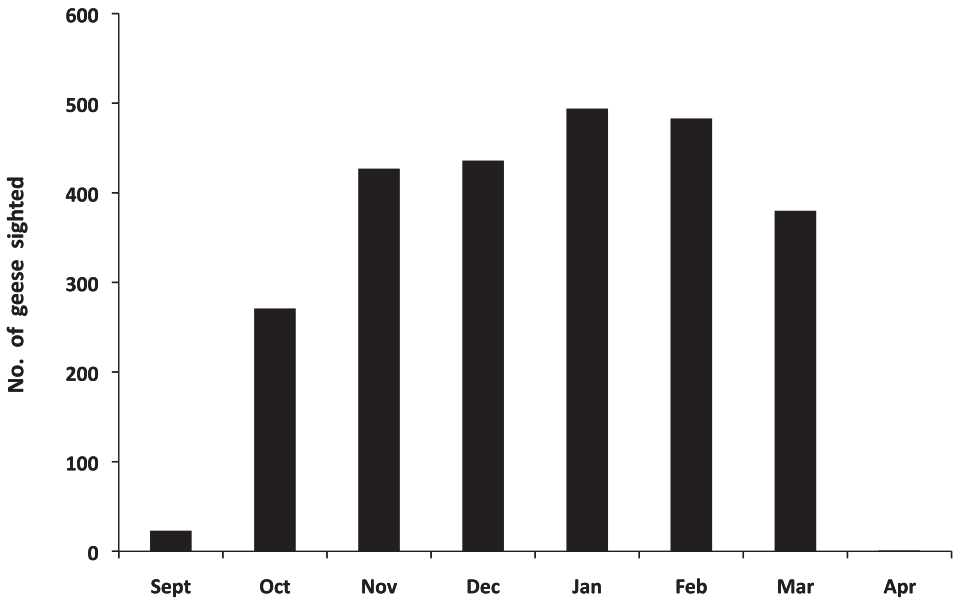


Figure 9. Number of neck-banded Greylag Geese marked in Södermanland, Sweden seen at Lac du Der, France each month. One observation per ring is included per month and year.

further north in the flyway, including up to *c.* 50,000 Greylag Geese (about 20% of the autumn peak) remaining in Sweden for the winter in 2009 (Nilsson 2013). This change in the winter distribution of Greylags and other waterbirds implying a short-stopping further north is most probably an effect of climate change with much milder winters in Europe in recent years (Nilsson 2013) but changes in agriculture are also of importance (Nilsson & Kampe-Persson 2013).

France remains mainly a passage area for Greylag Geese, despite January counts having increased from just 1,000–2,000 birds in the early 1980s to a peak of > 25,000 in 2011, with still < 5% of the flyway population present in mid-winter. The French mid-winter total continues to be low

in comparison with the most recent estimates of numbers wintering in Spain of 140,000 Greylags (A. Green, pers. comm.). It is difficult to calculate how many Greylag Geese reach France from the available count data in France and Spain, as an unknown number of geese are shot during the hunting season in both countries, and these should be added to estimates derived from mid-winter counts. It remains clear, however, that the proportion of the flyway population reaching France has become smaller with time, even though the absolute number of individuals has increased, as more and more Greylags are wintering further north.

There have also been marked changes in the timing of Greylag Goose migration along the west European flyway over the

same period, as the wintering habits have changed. Observations of neck-banded geese seen in France are too few for an analysis at the individual level, but data on neck-banded geese from areas where they are studied more intensively (*e.g.* at the breeding/marking areas in southwest Sweden, Norway and some Dutch staging areas) made it possible to study changes in migration phenology. For instance, Nilsson (2006) found that in recent years Greylag Geese from southwest Sweden have arrived earlier in spring, and migrated south later, compared with the early years of his long-term study. In Norway, Greylag Geese now arrive about three weeks earlier than during the 1970s (Pistorius *et al.* 2006) but, unlike the Swedish birds, they also leave Norway about three weeks earlier (A. Follestad, unpubl. data). The earlier arrival of the Greylag Geese to the Nordic breeding areas can be attributed to warmer winters and earlier springs, whereas changes in the timing of autumn migration are more likely a result of changes in agriculture, albeit that these changes may also be related to weather conditions. In Norway the harvest is earlier compared to former years, whereas in Sweden, in addition to the winters being milder, the geese have also changed their feeding habits and used leftovers from the sugar beet harvest (which provides a high carbohydrate diet) during the entire late autumn from the 1990s onwards (Nilsson & Kampe Persson 2013). The changes in migration timing is apparent for the entire flyway as 20% of the Greylags known to winter in Spain arrived in the Swedish breeding areas before the end of February in 1986–1990, this proportion increasing to

40% for the period 2001–2005 (L. Nilsson unpubl. data). In the latter period, *c.* 5% of the Greylag Geese from southwest Scania wintering in Spain were recorded back in Sweden during January. During the same five-year period, an additional 12% were recorded back in the first days of February. Thus, up to one-fifth of the Greylag Geese migrating from Sweden to wintering areas in Spain probably pass through France on spring migration before the end of January. During the early years of the study, Nilsson & Persson (1996) found that Greylags wintering in the Netherlands had significantly higher breeding success than those migrating via France to winter in Spain. This difference may be due to a shorter migration for the birds wintering in the Netherlands (and their earlier return to breeding areas), but may also be related to disturbances at staging and wintering areas in France and Spain, where hunting pressure is higher than in the Netherlands.

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Photograph: Greylag Geese in flight, by Jan Rabben.