

## AEWA EUROPEAN GOOSE MANAGEMENT PLATFORM



### 6<sup>th</sup> MEETING OF THE AEWA EUROPEAN GOOSE MANAGEMENT INTERNATIONAL WORKING GROUP



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## ALLOCATION OF BREEDING NUMBERS TO WINTERING COUNTRIES

### Background

The AEWA European Goose Management International Working Group (AEWA EGM IWG) has decided in June 2019 to define the wintering Favourable Reference Population values (FRPs) of the NW European / SW Europe population of Greylag Goose *Anser anser* by distributing the breeding FRPs according to the winter distribution of national breeding population.

It has been proposed that the breeding numbers will be allocated using the neckband resighting data from Bacon et al. (2019) and using a multiplier factor to convert breeding pairs into individuals during the midwinter period.

### Multiplier factor

A multiplier factor of 3.63 has been used by Johnson et al. (2021) in the Multi-criteria Decision Analysis (MCDA) to convert breeding pairs into mid-winter population estimate based on the conversion factor of 3.85 developed by Schekkerman (2012) between breeding pairs and July total population sizes and taking into account of mortality between July and January.

### Mid-winter distribution of national breeding populations

Mid-winter distribution of breeding birds were filtered out from the dataset used by Bacon et al. (2019) for two periods: 2008-2012 and all years. Data were available for Denmark and Germany for all years only, for the Netherlands, Norway and Sweden for both periods.

Data from Denmark represents the situation in the 1990s.

Data from Germany in this dataset represents the situation in the NW part of the country where the population is more resident than in the NE part of the country. The NE segment of the German Greylag Geese is more migratory than the NW segment and winters more in France and Spain (Bairlein et al., 2014).

The dataset contains no data for the birds breeding in Finland, Belgium and France.

Figures 1 and 2 show the change in the period 2008-2012 compared to all years (i.e. a longer period of time including also the 2008-2012 period). It is clearly visible that the proportion of Norwegian and Swedish birds wintering in Spain has decreased substantially. In the meantime, the proportion of Norwegian birds wintering in the Netherlands and Swedish birds wintering in Sweden has increased substantially. Therefore, the 2008-2012 distribution was used to whenever data was available from this period.

Based on the changes in the winter distribution of birds from Norway and Sweden, it can be assumed that the winter distribution of birds from Denmark has also changed, but there is no data to substantiate this.

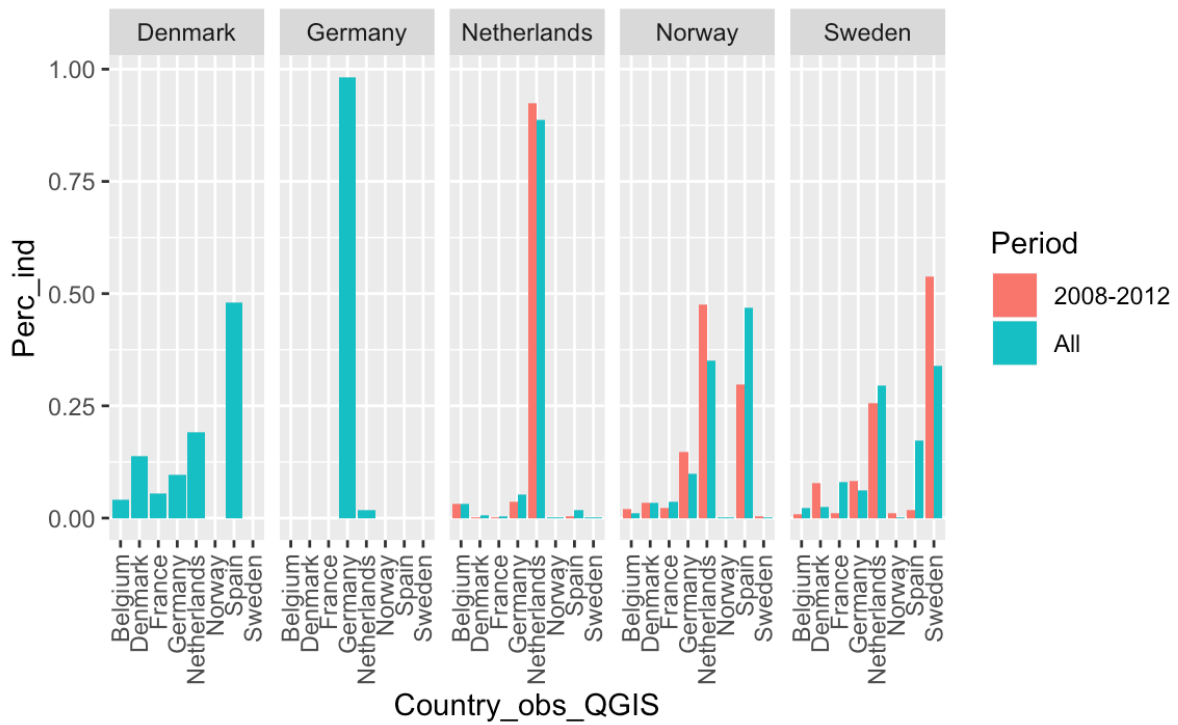


Figure 1. Winter distribution of Greylag Geese ringed in different countries.

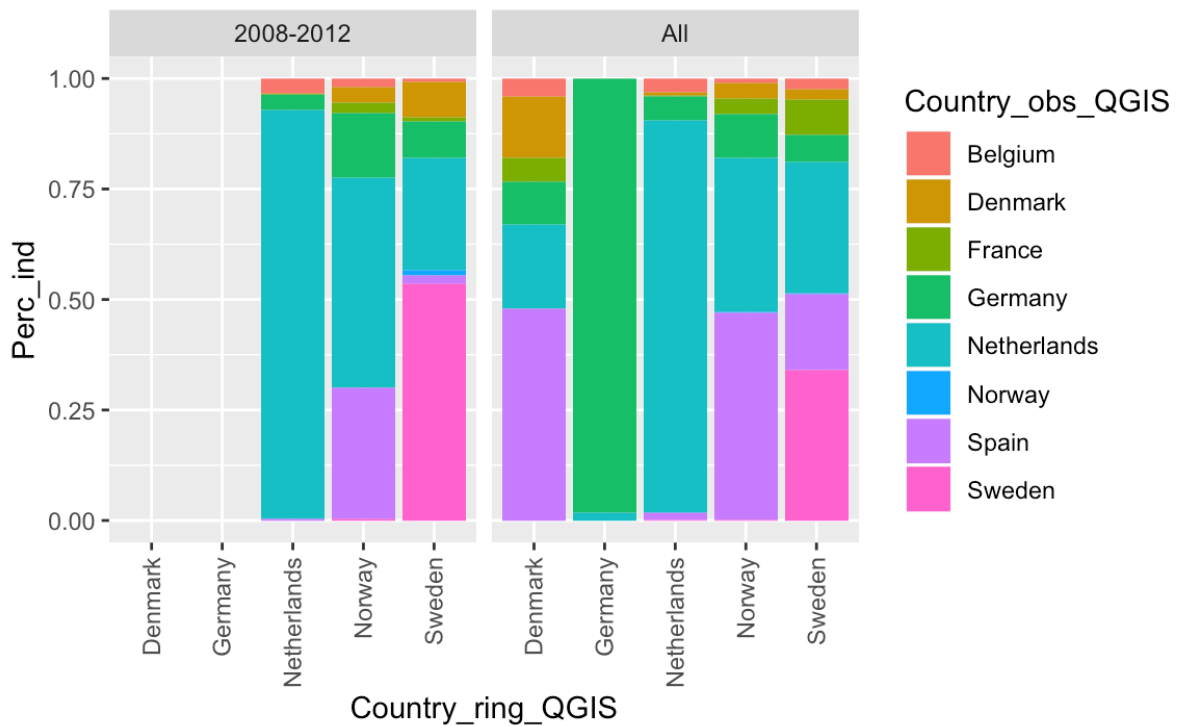


Figure 2. Winter distribution of Greylag Geese ringed in different countries.

## Distribution of breeding numbers to wintering areas

To test the allocations based on the winter re-sightings of neck-banded birds, breeding numbers for the 2008-2012 period were taken from BirdLife International (BirdLife International, 2015), which is based on the 1st report of Member States to the European Commission under Article 12 of the EU Birds Directive, complemented with data from BirdLife International partner organisations from outside of the EU.

At this stage the 2008-2012 winter distribution percentages were used for the Netherlands, Norway and Sweden, all years for Germany and Denmark from Bacon et al. (2019). Proportion of Finnish birds wintering in the NW Europe / SW Europe flyway were estimated from the January figures of Appendix 2 in Andersson et al. (2001). However, this also represents a situation for the late 1980 and early 1990s. The winter distribution for the marginal breeding populations of Belgium and France were only guessed, but this will have negligible influence on the results due to the small size of these populations. See Table 1 for details.

**Table 1.** Proportions of breeding populations wintering in other countries estimated from re-sightings of neck banded Greylag Geese in other countries (LB indicates data from Leo Bacon)

Breeding countries	Wintering countries	NO	SE	FI	DK	DE	NL	BE	FR	ES	Other	Sum	Source
NO				0.3%		3.3%	14.7%	47.5%	2.0%	2.3%	29.8%		100% LB 2008-2012
SE		1.0%	53.7%		7.8%	8.2%	25.5%	0.3%	1.0%	1.9%	1.0%		100% LB 2008-2012
FI			3.9%			3.9%	3.9%			19.4%	69.0%		100% January in Appendix 2 in Andersson et al.
DK					13.7%	9.6%	19.2%	4.1%	5.5%	48.0%			100% LB all_years
DE						98.2%	1.8%						100% LB all_years
NL					0.2%	3.5%	92.5%	3.2%	0.1%				100% LB 2008-2012
BE							5.0%	95.0%					100% guessed
FR									100.0%				100% guessed
ES										0%	n.a.		0% n.a.
Other													0% n.a.

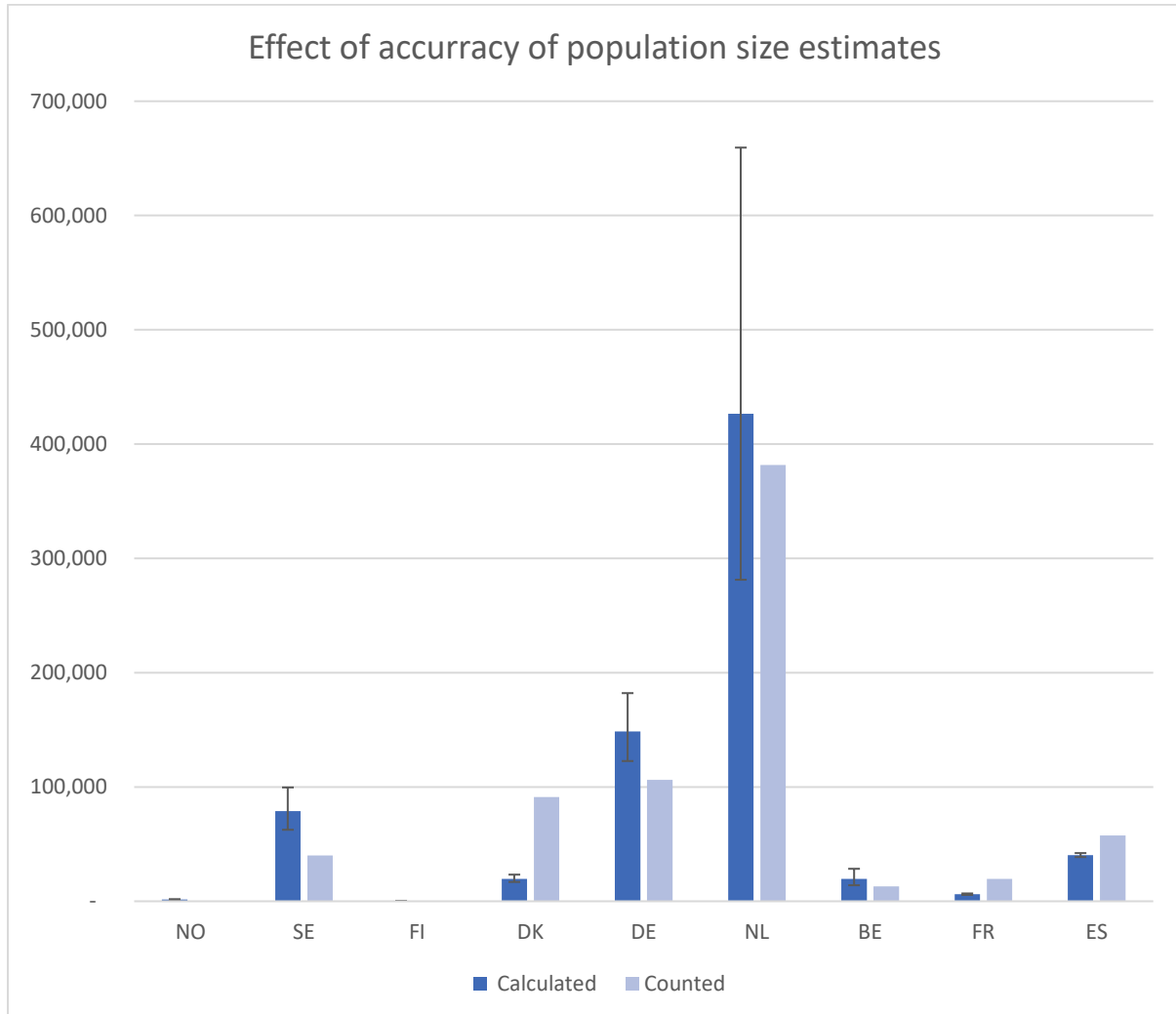
Allocating the breeding numbers to wintering numbers per country results in the figures presented in Table 2. The estimated numbers show a relatively good match with the count totals: the estimated total wintering population is only 6% higher than the reported count total was in 2012. This suggests that the conversion factor 3.63 is a relatively good approximation of the relationship between breeding and mid-winter numbers.

**Table 2.** Estimated wintering numbers per country based on the geometric mean of the breeding population estimates.

Breeding countries	Breeding pairs	NO	SE	FI	DK	DE	NL	BE	FR	ES	Other	Total wintering
NO	16,971	-	185	-	2,033	9,056	29,261	1,232	1,417	18,358	-	
SE	40,398	1,466	78,748	-	11,438	12,025	37,394	440	1,466	2,786	1,466	
FI	3,550	-	503	-	-	503	503	-	-	2,500	8,891	
DK	11,000	-	-	-	5,470	3,833	7,667	1,637	2,196	19,166	-	
DE	31,016	-	-	-	-	110,562	2,027	-	-	-	-	
NL	104,226	-	-	-	757	13,242	349,964	12,107	378	-	-	
BE	1,225	-	-	-	-	-	222	4,224	-	-	-	
FR	182	-	-	-	-	-	-	-	660	-	-	
ES	-	-	-	-	-	-	-	-	-	-	-	
Other	-	-	-	-	-	-	-	-	-	-	-	
National wintering populations (ind)		1,466	79,436	-	19,698	149,220	427,038	19,640	6,118	42,810	10,357	745,426
2012 wintering numbers reported to the Data Centre		-	40,033	-	91,185	106,083	381,774	12,941	19,612	57,532	-	709,160

Figure 3 shows the comparison of calculated wintering numbers with the count totals for January 2012. Calculated values were higher than the actuals for Sweden, Germany, Belgium and the Netherlands. However, for the Netherlands the January 2012 count total was within the (very broad) confidence interval. For the other countries, the actuals were lower than the lower bound of the estimated wintering numbers indicated some bias in the allocations.

On the other hand, the actual values were higher than the estimated wintering numbers for Denmark, France and Spain. In case of Denmark, this is most likely caused by the old re-sighting data (representing the situation in the 1990s, see in Bacon et al., 2019), but also points towards potential underestimation of breeding numbers in the source countries or bias in re-sightings. The wintering numbers of Greylag Goose of Danish origin is 39,930 individuals. Assuming that the allocation of the numbers from Norway, Sweden and the Netherlands is correct, the wintering total would be still less than 54,158 individuals, which is only about 60% of the January 2012 total.



**Figure 3.** Comparison of wintering numbers calculated for Range States in the NW Europe / SW Europe flyway using the geometric mean of the minimum and maximum breeding population estimates from BirdLife International (2015), i.e. data from the period of 2008-2012, with national mid-winter count totals reported to the EGM Data Centre for January 2012. The lower bound of the error bar represents the values calculated using the minimum breeding population estimates and the upper bound represents the values calculated from the maximum breeding estimates.

## Conclusions

The test of the methodology has revealed that the conversion factor developed by Johnson et al. (2021) for the MCDA works rather well at the population level. However, there are problems with using the re-sighting data to allocate breeding numbers to non-breeding numbers particularly in case of Sweden (large overestimation), Denmark (large underestimation – due to outdated distribution data) and Germany (overestimation – due to biased sample from NW Germany, containing mainly resident birds). However, this dataset represents the best available data at present. Revision of the wintering FRPs will be necessary when adequate banding and tagging become available

## References

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