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**BARNACLE GOOSE RUSSIA/GERMANY & NETHERLANDS POPULATION STATUS
REPORT 1980-2018**

*Report prepared by the AEWA European Goose Management Platform Data Centre and
Sovon Vogelonderzoek Nederland*

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Summary

Census data from January (complete wintering range) and July-August (part of North Sea and Baltic breeding populations) were used to assess population status in Barnacle Geese of the Russia / Germany & Netherlands population. For January 2018, this population was estimated to be 1.4 million individuals. On average (2015-2018) 58% was observed in The Netherlands, 25% in Germany, 13% in Denmark, 3% in Sweden and 1% in Belgium. The total flyway population has increased with 9% annually since 1981, but the increase rate has levelled off from 2014 onwards. The observed increase has occurred in all countries and has also coincided with a marked range expansion in the southern Baltic and a decline in relative numbers present in the core wintering area in The Netherlands (which in the 1980s supported more than 90% of the flyway population).

Current data from summer counts point at high numbers in The Netherlands (MU3, 61,999 individuals in 2018) and Finland (MU2, 33,707 in 2019), but only represent part of their respective management units. In the North Sea area, small gaps in coverage occur, mainly in Northern Germany. A very provisional estimate for this MU3 is 65,000 to 70,000 individuals, thus about 5% of the total flyway population. For the Baltic management unit (MU2) such an estimate is not possible yet, as there is no information on numbers present in Sweden during summer. Apart from Finland, counts indicate larger numbers present in Denmark and the Oslofjord region in Norway, but these are small in comparison to those reported in Finland. With an estimate lacking for MU2, it is also not possible yet to derive a reliable estimate for the large population breeding in Arctic Russia (MU1).

Productivity data collected in flocks in winter in the northern part of The Netherlands, referring to MU1 and MU2 birds, show a general decline in the percentage of first-year birds in flocks, from about 15% in the 1970s and early 1980s to around 10% in recent years. Moreover, the difference between "good" and "poor" breeding years has become smaller. Productivity data from the temperate breeding populations have been collected in recent years, but will be presented in the next status report.

Data from Belgium, The Netherlands, Germany, Denmark, Sweden and Estonia show that 50,565 Barnacle Geese were shot under derogation in the EU in 2016, the last year with a complete dataset. Of this number, 88% was killed in The Netherlands and in Denmark. Both countries have seen a marked increase in derogation activities from 2013 onwards.

Recommendations for future monitoring and provision of input for the Integrated Population Models focus on the speed of data delivery for the winter counts, extension of summer counts in Northern Germany, Denmark, Southern Norway and in Sweden (including productivity assessments) and high-resolution derogation data which enable assignment of derogations to the three management units.

1. Introduction

Since 2018, the Russia / Germany & Netherlands population has become part of the framework of the European Goose Management Platform and is now covered in an AEWA International Single Species Management Plan (ISSMP) (Jensen et al., 2018). This is the first report to give an overview of monitoring data for the Russia / Germany & Netherlands population after the implementation of the plan was launched. It deals with Barnacle Geese breeding in the Russian Arctic, in the Baltic and in the North Sea areas and wintering in Belgium, The Netherlands, Germany, Denmark and Sweden. The current breeding range is the result of a spectacular range expansion, starting in the 1970s and continuing until today (e.g. Larsson et al., 1988; Ganter et al., 1999; Feige et al., 2007; van der Jeugd & Kwak, 2017). A first version of an Integrated Population Model (IPM) has been established to inform the envisaged Adaptive Flyway Management Plan (AFMP) (Baveco et al., 2020). Various monitoring data have been collected as input variables for this IPM.

This report gives a summary of all monitoring data currently available (mainly period 1980-2018) and comes with an extensive account on coverage of the data and methods used. The main aim of the report is to present data on abundance and productivity. Furthermore, it updates some of the data on derogations in EU-countries

presented earlier in the ISSMP. Hence, the setup of this report differs somewhat from reports for species which have been part of the ISSMP/ISSAP process and EGMP framework already for a longer time (<http://egmp.aewa.info/>) which usually only cover the most recent season.

For this report, Barnacle Goose monitoring data have been collected until the 2017/18 season (including summer 2018 and partly also 2019 for Norway and Finland). The data provide the most up-to-date knowledge on population status available at present. It does not only cover winter counts made in the entire flyway in winter, but also presents for the first time data collected in some of the temperate breeding populations in summer. These temperate populations meanwhile comprise an important share of the flyway population and differ from the arctic breeding population in e.g. timing of breeding, constraints for chick-rearing and migration strategies (van der Jeugd et al., 2009, van der Jeugd & Kwak, 2017). Being the first population status report, a series of recommendations are given to improve the monitoring routines for Barnacle Geese. These also follow the considerations made when defining the so-called management units (MUs) within the overall flyway, i.e. a MU1 with the breeding population in the Russian Arctic, MU2 for the breeding population in the Baltic (including the breeding population in the Oslofjord region in southern Norway) and MU3 for the breeders in the North Sea region (see document AEWA/EGMIWG/4.15). Preferably, a monitoring system should be organised in a way that MU-specific statistics can be derived from it.

2. Data collection and methods

2.1. Winter counts

International counts of all European goose species have been carried out in the framework of the International Waterbird Count (IWC) coordinated by Wetlands International and international goose counts in January. In addition, international counts for Barnacle Geese have also been conducted in the Wadden Sea area in March, in the framework of the trilateral monitoring and assessment programme (TMAP), covering the Danish, German and Dutch Wadden Sea and adjacent areas behind the seawall (e.g. Kleefstra et al., 2019). However, these counts only cover part of the flyway population in that time of the year, and thus cannot be used to assess total population size. The January census, carried out in wetlands and in farmland areas (specific schemes for geese), currently provides the best available knowledge on the size of the wintering population and has been in place for decades to assess population status and monitor numbers internationally. The counts are mostly carried out during daytime on feeding sites, but precise methods, details about gap-filling and especially coverage may vary between countries, see overview below.

Belgium (Flanders)

Data in Belgium have been collected in an extensive network of counting sites in Flanders, covering all relevant areas for wintering geese in the country during winter, including January (Devos & Kuijken, 2012; 2020). Fieldwork is carried out by teams of volunteer observers which cover the entire area in a largely simultaneous survey. Counts for Barnacle Geese have always covered about the entire wintering population present, so presumably reflect national totals.

The Netherlands

Goose counts in The Netherlands are part of the monthly waterbird census scheme, carried out under the umbrella of a governmental ecological surveillance scheme (Netwerk Ecologische Monitoring, NEM). They focus both on wetland areas and a vast farmland range relevant for geese (Hornman et al., 2020). In January, many extra sites are covered for the IWC. Coverage of Barnacle Geese is very high. An earlier comparison of census data with non-systematic records submitted to the online data-portal www.waarneming.nl revealed that only up to 1% of the Barnacle Geese occurred outside the network of counting sites (Sovon, unpublished data). For that reason, additional records from this portal have not been used to complete national totals. Gaps in the network of counting sites are interpolated ('imputed'), making use of standardised routines developed in

collaboration with the national statistics agency (CBS) and based on regional phenology and trend patterns (see Hornman et al., 2020 for details). For this report, estimated totals have been used (so counted + interpolated). Given the high coverage and gap-filling routines, figures for Barnacle Geese in The Netherlands may be regarded as national totals.

Germany

Data for Germany was analysed and provided on behalf of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) and the Federal Agency for Nature Conservation (BfN). German goose counts are based on a network of counting sites in the federal states, covered mainly by volunteer counters (Sudfeldt et al., 2012, Wahl et al., 2017). It is mainly the western and northern part of the country which is relevant for Barnacle Geese in winter, i.e. federal states of Nordrhein-Westfalen, Niedersachsen, Schleswig-Holstein and Mecklenburg-Vorpommern, but smaller numbers are also observed elsewhere. Moreover, there has been a range expansion of (inland) feeding sites, especially along the river systems of Rhine, Ems and Elbe. For the period 1981-2000, the data used in this report have been derived from January totals used for an earlier population review (see Fox et al., 2010) and are assumed to have high coverage as the winter distribution was still mainly limited to the well-covered coastal areas (which are also part of the international Wadden Sea monitoring scheme). From 2000-2016 data were derived from a national overview prepared for the latest national EU Art. 12 report. For this purpose, gaps in coverage have been assessed and interpolated, making general assumptions on coverage in each federal state. Data for January 2017 and 2018 have not been compiled yet, but have been estimated during the IPM process by Baveco *et al.* (2020), by using logistic regression (see Baveco et al., 2020 for details). For consistency, the same numbers are used in this monitoring report. The national goose monitoring scheme in Germany is currently under reconstruction and hence may provide better estimates in the near future.

Denmark

In Denmark the monitoring of Barnacle Goose is undertaken annually under NOVANA (the National Monitoring and Assessment Programme for the Aquatic and Terrestrial Environment), where the numbers presented here have been derived from specific goose counts (both feeding sites and roost counts) carried out by a network of professional and volunteer counters. Results from these is supplemented with non-systematic observations available through www.dofbasen.dk for areas not covered in the goose census scheme, with the aim to derive national totals for Barnacle Goose as well as other goose species. Latest NOVANA results is online for 2017 (Nielsen et al., 2019), but the 2018 data used here is produced using the same protocol, outlined in a technical advice note (Holm et al., 2018). The scheme involves annual counts in January. March counts were annual during 1987-2016, but have since then been undertaken every second (even) year (2018 and 2020). Data only consist of counted numbers.

Sweden

Sweden has a long tradition of monthly goose counts, nowadays covering September, October, November and January. Results are reported annually, shortly after the winter season (e.g. Nilsson, 2013; Haas & Nilsson, 2019, see also <http://www.zoo.ekol.lu.se/waterfowl/GooseInv/goose.htm>). Data presented here have been derived from the data in these annual reports. They cover most of the relevant goose staging and wintering sites, mainly located in the southern part of Sweden. Data collection is mainly carried out by experienced volunteer counters and in many areas focus on feeding sites during daytime. Locally, also numbers from roost counts are included, often as a result of coordinated effort to cover all flight directions to or from the roost (see Nilsson 2013 for details). Records submitted to www.artportalen.se are searched systematically to keep track on newly established staging and wintering areas, leading to some new sites being included in the network of counting sites. Hence, coverage is assumed to be high. Data presented refer to counted numbers (no gap-filling or estimates are made).

2.2. Summer counts

Summer counts of geese are a rather new phenomenon in countries with temperate breeding populations. These counts mainly aim to assess national abundance and distribution, often also productivity. Summer counts cover not only breeding birds and their offspring, but also failed breeders and non-breeders. So, compared to regular breeding bird surveys in spring, they therefore give a more complete account on abundance during the breeding and post-breeding period. In the framework of the ISSMP, abundance of Barnacle Goose in the breeding areas in summer (but also information of their productivity) is of particular interest, as they provide input for estimates of the respective populations within each management unit. Counts are usually carried out around in the 2nd half of July, but in some countries also in late summer, prior to the onset of autumn migration. They are always performed during daytime and cover wetland areas (with usually the biggest gatherings during daytime) as well as relevant farmland areas. Details for each country are described below.

Belgium (Flanders) (North Sea)

In Belgium (Flanders), summer counts are carried out in July and follow the methods developed in The Netherlands (Adriaens *et al.*, 2010), see below. Coverage is very high and assumed to include the entire summer (post-breeding) population.

The Netherlands (North Sea)

The longest data series of summer originate from The Netherlands, with counts starting in 2005 (van der Jeugd *et al.*, 2006; Voslamber *et al.*, 2007). Data used in this report refer to national overviews made in 2005 (van der Jeugd *et al.*, 2006), estimates produced in 2009 and 2012 (Schekkerman *et al.*, 2012) and a compilation of results of national surveys in 2013-2018 (Buij & Koffijberg, 2019). The latter mainly refer to counts organised by the national hunting association and the provincial wildlife councils, but in some provinces also include counts carried out by professional staff from Sovon. Coverage is regarded high (>90%), but not exactly known in detail for all 12 provinces in all years. Counts have always been carried out around 15-20 July, which is assumed to be an optimal timing as most geese still gather close to the breeding sites and post-breeding sites, but have not dispersed widely into farmland areas to feed on spilled grain (which especially is a constraint when counting Greylag Geese during the same survey, Voslamber *et al.*, 2007). In some provinces where counts are carried out by professional staff from Sovon, also age-ratio counts are done to estimate productivity (methods similar as in wintering flocks, see below). In winter this is not possible, as local breeding populations and wintering birds merge.

Germany (North Sea)

In Germany, summer counts started in 2011 in the federal state of Nordrhein-Westfalen, following the routines used in The Netherlands. All relevant sites for Barnacle Geese have been covered annually, but the numbers counted are still rather small (Koffijberg & Kowallik, 2018). Both numbers and productivity are assessed. In 2018, summer counts also started in Niedersachsen, a region having a much larger summer population. However, in the first year of the survey, counts in some areas important for Barnacle Geese were missing or incomplete, so the total numbers reported only partly reflect the population present (Nipkow, 2019).

Denmark (Baltic)

In Denmark complete national moult counts are undertaken every 6th year in the NOVANA programme, but with focus on numerically and internationally important moult concentrations of Mute Swans and seaducks (2012 results in Nielsen *et al.*, 2019). In the latest 2018 census some attention was also given to moulting Barnacle Geese, with a dedicated count at the island of Saltholm on 25 July, by far the most important moult site in the country with 16,000 birds. Data from land-based counts and aerial surveys from the remaining parts of the country have not been finally analysed yet, but are not likely to sum up to more than a few hundred birds.

Norway (Baltic)

Since 2007, surveys have been conducted in the Oslofjord area (counties of Oslo and Akershus), covering the breeding population in the inner part of the fjord (Isaksen, 2019). In 2019, additional areas in the western part of the Oslofjord region (county of Vestfold) have been systematically surveyed as well (Tombre et al., 2019), the reason why we include data from 2019 as well. Even with this recent extension, the areas where systematic surveys are conducted still only cover a part of the breeding population in southern Norway. Hence, figures presented in this report are underestimates.

Finland (Baltic)

Another long data series with summer counts originates from Finland. Since 2008, BirdLife Finland has organised a national survey of Barnacle Geese in late summer (end of August / first days of September) to assess the size of the national breeding population. By this time of the year, flocks present have left the breeding sites and are more easily to count, whereas autumn migration (thus immigration from e.g. arctic breeders) has still not started. Coverage of the national population is assumed to be very high (>95%). Smaller numbers of birds in the western part of the country perhaps may have moved to Sweden and thus missed during the count.

Data for Sweden and the Baltic states (notably Estonia) were not available, as counts in (late) summer are not carried out. Both countries do have breeding populations, of which especially the one in Sweden is of considerable size (see Jensen et al., 2018) and represents the biggest gap in information on numbers in the Baltic in summer.

2.3. Productivity

For this report, only productivity data from winter counts have been analysed (data from summer counts will be included in the next report). Productivity assessments in the flyway have been made in The Netherlands (including border regions of Germany) since winter 1975/1976. These counts are mainly carried out in the northern part of The Netherlands and the German Dollart area. It is assumed that the collected data predominantly belong to either the Russian (MU1) or Baltic breeding birds (MU2), as local breeding populations mainly concentrate in the western and southwestern part of The Netherlands (based on observed dispersion of ringed birds, H. van der Jeugd pers. comm.), where productivity counts have not been carried out. Counts originate from October to January, when identification of adult and first-year birds is still possible for trained observers. Wintering flocks are scanned by a small team of dedicated volunteers and both the individual number of adult and first-year birds and size of individual broods is recorded (the latter in a sub-sample of the flocks). Recently, effort to collect age-ratio data has been expanded to northern Germany (notably Elbe region). In this report, only the long-term dataset for The Netherlands has been analysed. Even if preliminary data show little regional variation in the ratio of adult and first-year birds, the dataset from The Netherlands currently provides the best long-term trend in productivity.

2.4. Derogations

Barnacle Goose is listed as an Annex 1 species in the EU Bird Directive and as an Appendix II species (strictly protected species) in the Bern Convention. EU countries may decide on lethal control measures by applying Article 9 of the EU Bird Directive and under consideration of a series of conditions. Numbers shot (or taken out of the population by any other measure) have to be reported to the EU annually. Data presented in this report have been derived from the data collected for the ISSMP in 2018 (Table 7 in Jensen et al., 2018). For more recent years, data have been derived either from the EU Eionet central data repository (https://ec.europa.eu/environment/nature/knowledge/rep_birds/index_en.htm), or collected at national level in The Netherlands (overview by Buij & Koffijberg, 2019) and Denmark (National Environmental Protection Agency). Barnacle Geese killed by derogation only covers offtake in EU countries. The total annual offtake cannot be properly assessed, as information from hunting activities and numbers harvested in Russia

are not available (but see Jensen et al., 2018 for some details). Norway is not an EU member, but has its own hunting and wildlife legislations. Barnacle Goose is a protected species in Norway in accordance with the Bern Convention and shooting is not practiced as a population regulating tool. Both in EU countries and in Norway (Isaksen, 2019), also nests and eggs are managed, but this data is not included in this report, as it does not have a direct impact on the numbers and is also often considered inefficient to control numbers on a larger scale at all (e.g. van der Jeugd et al., 2006).

3. Population status and trends in numbers

3.1. Wintering numbers

Based on the current compilation of census data, the flyway population size of Barnacle Goose in the Russia/Germany & Netherlands population was in the range of 1.3 to 1.4 million in the 2016/17 and 2017/2018 seasons (Table 1, Figure 1). Given the fact that we partly deal with estimates and may have to account for some missing count data, we propose to use 1.4 million individuals as the most recent population estimate for January 2018. This estimate is larger than the latest estimates presented in the ISSMP (1.2 million in 2014/15) but also points at a reduced population increase since 2014 (Figure 1). The absolute number of individuals in the Russia / Germany & Netherlands population has increased by on average 9% per year since 1981 (Figure 2).

In January 2015-2018, 58% of the Barnacle Geese in the Russia / Germany & Netherlands population winters in The Netherlands, 25% in Germany, 13% in Denmark, 3% in Sweden and 1% in Belgium. This reflects the situation during midwinter (January), but may change markedly later in winter or spring, which are characterised by strong increases in e.g. northern Germany (Wadden Sea region) and Denmark (both Wadden Sea and Baltic regions). Together, the five countries listed in Table 1 are likely to cover the entire wintering range of the flyway population, with only very small numbers present in other countries like Poland (see also Table 1 in Jensen et al., 2018). The rate of exchange with wintering populations on the British Isles is negligible in the context of assessing flyway population size, as exchange is very little (Black et al., 2014).

Both the share of single countries in wintering numbers within the flyway and the absolute numbers in each country (see below) have shown profound changes in the past decades. In the 1980s, usually more than 90% of the flyway population gathered in The Netherlands, but this has gradually gone down to 58% at present. In the same period, the share of wintering birds in Germany has increased to 25% in the 1990s, and has remained at that level since then, thus keeping pace with the overall population increase. Wintering in Denmark and Sweden was of little importance in earlier days, but has become obvious after 2010. Whilst wintering numbers in Sweden still represent only a relatively small proportion of the flyway population (<5%), Denmark meanwhile has taken a share of around 13% in January 2014-2018. It is likely that part of this development is driven by the tendency for mild winters in the past decades, allowing birds to winter in the southern part of the Baltic, as long as winter conditions permit (Nilsson, 2013). A similar trend has been observed in many other waterbird species (e.g. Lehtikoinen et al., 2013; Pavón-Jordán et al., 2018).

Table 1. January counts for Barnacle Geese in the wintering range of the Russia / Germany & Netherlands population in 2017 and 2018. Note that numbers for Germany are based on an estimate (see chapter 2 for details).

Country	2017	2018
Belgium	9,406	13,715
The Netherlands	791,337	729,667
Germany	338,624	332,443
Denmark	164,688	176,785
Sweden	22,934	50,158
Total flyway (winter)	1,326,989	1,302,768

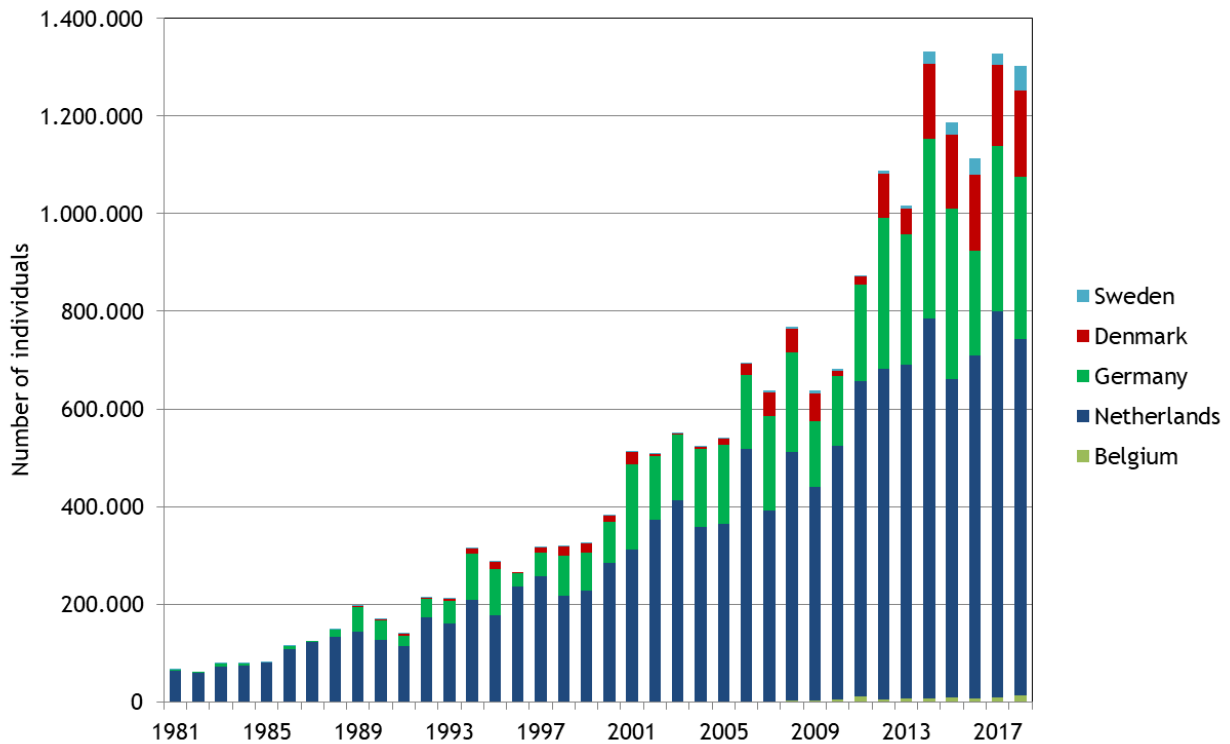


Figure 1. Numbers of Barnacle Geese in the wintering range of the Russia / Germany & Netherlands population in January 1981-2018, specified according to the individual countries. Note numbers for Germany in 2017 and 2018 represent estimates (see chapter 2 for details).

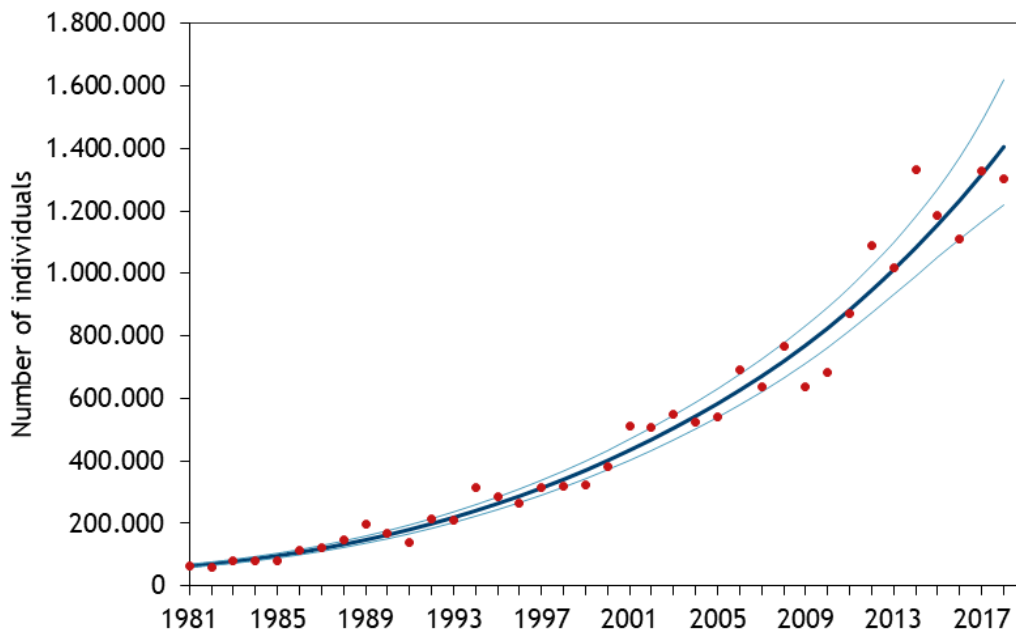


Figure 2. Trend in wintering numbers of Barnacle Geese in the Russia/Germany & Netherlands population (same data as Figure 1). Red dots represent annual totals in January; the bold line the calculated trend (calculated with TrendSpotter, see Hornman et al., 2020) along with lower and upper 95% cl for the trend (thin lines). Annual growth rate since 1981 is on average 9% per year.

3.2. Summer numbers

Information derived from summer counts is still incomplete, but both for the Baltic Management Unit (MU2) and the North Sea management unit (MU3), there is data available for at least part of the countries and including some key regions.

Table 2 gives an overview of available figures of summer counts of temperate-breeding Barnacle Geese of the Russia / Germany & Netherlands population. In the Baltic, numbers counted in 2018-2019 amounted up to 51,426 individuals. However, this does not include the large Swedish breeding population (4,900 breeding pairs in 2008-2012 but locally decreased, see Jensen et al., 2018) and smaller populations in Estonia (70-120 breeding pairs in 1999-2017). Besides, there is also a small but expanding breeding population in the Russian Baltic and areas around Lake Ladoga and Onega, which should be regarded as part of the Baltic population. Here, numbers are currently still small (up to 76 breeding pairs in 2015, Kouzov et al., 2019) and they may even be partly included in the Finnish late-summer census. Coverage in the Oslofjord region in Norway is currently incomplete as well. Hence, it is not possible yet to assess a total population estimate for the Baltic breeding population, as gaps are too large (notably by missing data from Sweden).

In the North Sea area, likely the largest share of the breeding population is found in The Netherlands (Jensen et al., 2018). Here, 61,999 birds were counted in 2018 (Table 2). Populations occurring in Belgium (Flanders) and border regions in the western part of Germany (Nordrhein-Westfalen) are relatively small in comparison to the Dutch breeding population. The main gaps in coverage in this part of the range are represented by the federal states of Niedersachsen and Schleswig-Holstein in Germany, where several thousands of Barnacle Geese may be present in July-August, according to information from local bird counters and unpublished data from the Wadden Sea census scheme. The sum of available summer counts in the North Sea region is 63,375 individuals in July 2018. Given the presumed large share of The Netherlands and much smaller numbers elsewhere in the North Sea region, a very provisional figure for the size of the North Sea population may be between 65,000 and 70,000 individuals, thus about 5% of the estimated 1.4 million individuals in the flyway (see Table 1).

Table 2. Overview of recent summer counts (individuals) in the temperate breeding regions for Barnacle Geese in the Russia / Germany & Netherlands population. For Germany, data are available for the federal state of Nordrhein-Westfalen (NW) and Niedersachsen (NI) only.

	Number	Year of latest census (date)	Remark
MU2: Baltic			
Finland	33,707	2019 (late Aug/early Sep)	
Denmark	15,942	2018 (25 July)	Only moulting birds on the island of Saltholm, likely involve Swedish breeding birds as well
Norway (Oslofjord)	1,777	2019 (Mid-July/early Aug)	Main areas covered but still incomplete
MU3: North Sea			
Belgium (Flanders)	535	2018 (Mid-July)	
The Netherlands	61,999	2018 (Mid-July)	
Germany-NW	603	2018 (Mid-July)	
Germany-NI	238	2018 (Mid-July)	Main concentrations not included, so incomplete

Longer data series of summer counts are only available for Finland (MU2), The Netherlands and Nordrhein-Westfalen in Germany (MU3). They all show high annual increase rates (7-12%) for the entire data series, but these recently tend to slow down in Finland and especially in The Netherlands (Figure 3). These are just

examples of trends in summer numbers in single countries and do not necessarily reflect changes in numbers in other countries. For instance in Sweden, the formerly large breeding gatherings on the island of Gotland are known to have collapsed due to heavy predation of White-tailed Eagles, whereas elsewhere along the Baltic and Bothnian coasts numbers have expanded (K. Larsson, L. Nilsson, pers. comm).

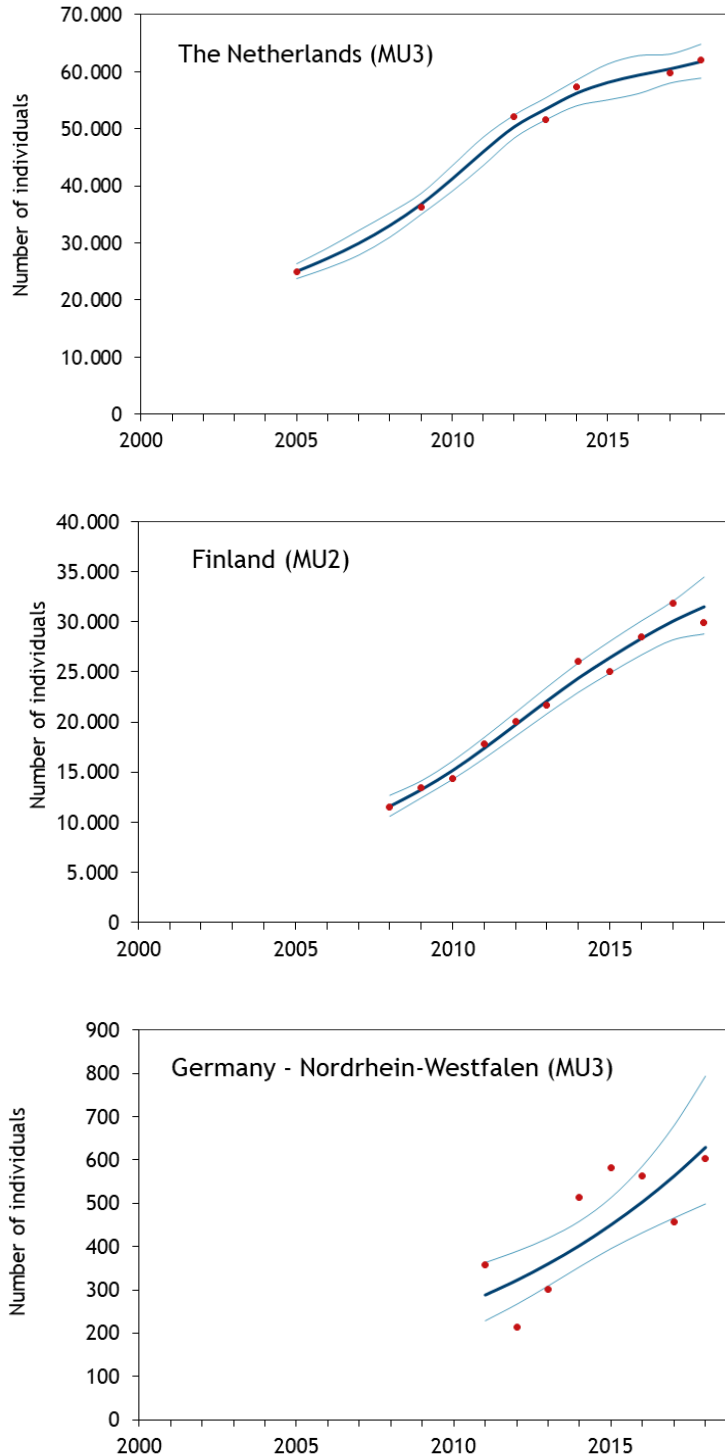


Figure 3. Examples of trends in summer populations of Barnacle Geese in Finland (MU2), The Netherlands and Nordrhein-Westfalen in Germany (MU3), see figure 2 for explanation. Note different scale on y-axis.

4. Productivity

Productivity, expressed as the percentage of first-year birds in wintering flocks in The Netherlands from October to January (thus referring to either Russian or Baltic, MU1 and MU2 respectively), have declined from about 15% in the 1970s and early 1980s to around 10% in recent years (Figure 4). Peak productivity-years (juvenile percentage >30%) were observed about once every three years between 1974 - 1993 but have not occurred since then. Nowadays the amplitude between "good" and "poor" breeding seasons is much smaller, and this is one of the main drivers for the average lower percentage of first-year birds observed in flocks in winter in the past two decades. A similar pattern has also been observed in other arctic-breeding geese, like Tundra Bean Goose, Greater White-fronted Goose and Dark-bellied Brent Goose (Hornman et al., 2020; K. Koffijberg, unpublished data).

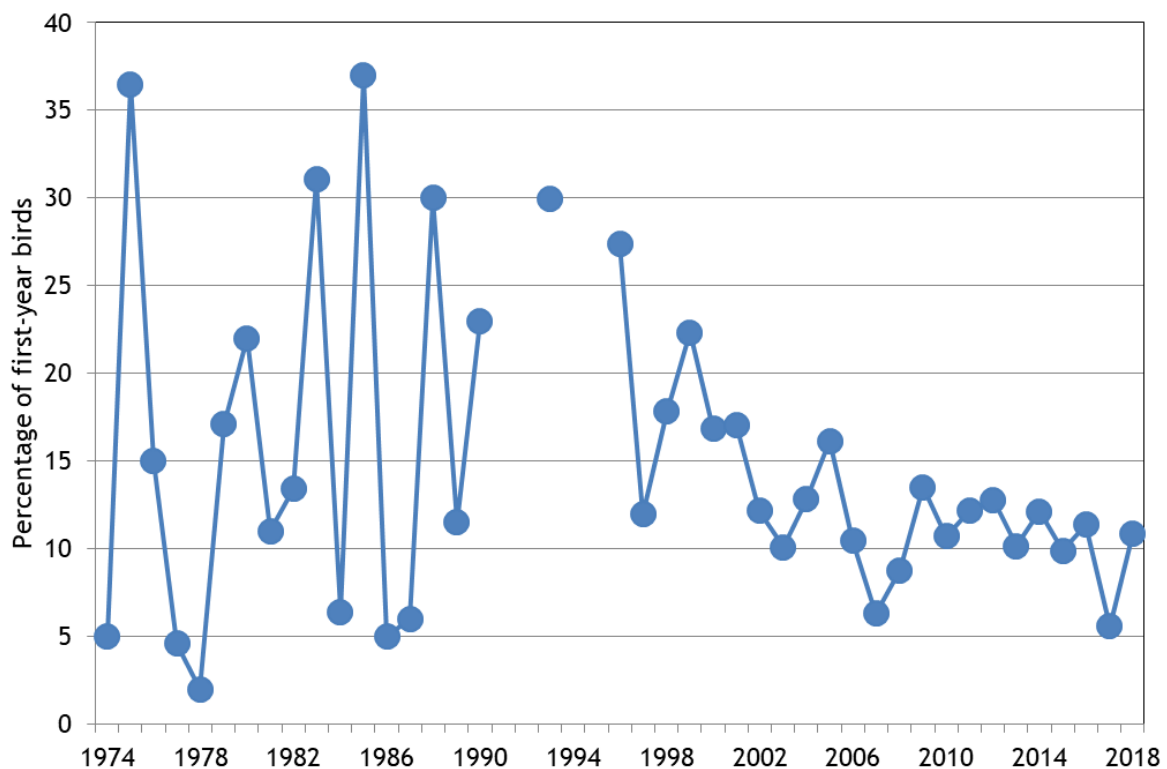


Figure 4. Percentage of first-year birds in Barnacle Geese wintering in The Netherlands (Russian and Baltic breeding birds). Year denotes breeding year (i.e. 1974 was assessed in the field in winter 1974/75).

5. Derogations

We solely report on derogations in EU countries here (and only birds killed), as numbers harvested in Russia are unknown (see Jensen et al., 2018 for details). Derogations on Barnacle Geese have been reported from Belgium, The Netherlands, Germany, Denmark, Sweden and Estonia. They target both temperate breeding populations and the arctic breeding population in Russia (staging and wintering), but it is not known in detail yet which part can be assigned (if at all) to one of the three management units (see also Baveco et al., 2020 for assumptions made for the IPM).

In 2016, the last year with complete information from all countries, 50,565 Barnacle Geese were shot under derogation in the EU, of which 88% in The Netherlands and in Denmark. In 2018, more than 58,000 Barnacle Geese were killed, but as information from Germany is lacking, this number will be too low. Both The Netherlands and Denmark have seen a marked increase in derogations since 2013 (The Netherlands) and 2016

(Denmark) respectively. In Estonia, derogations have taken place in substantial numbers already since 2005 (in autumn) but only in two years (2015 and 2018) exceeded 3000 individuals. In all other countries, annual numbers are not higher than 2000 individuals.

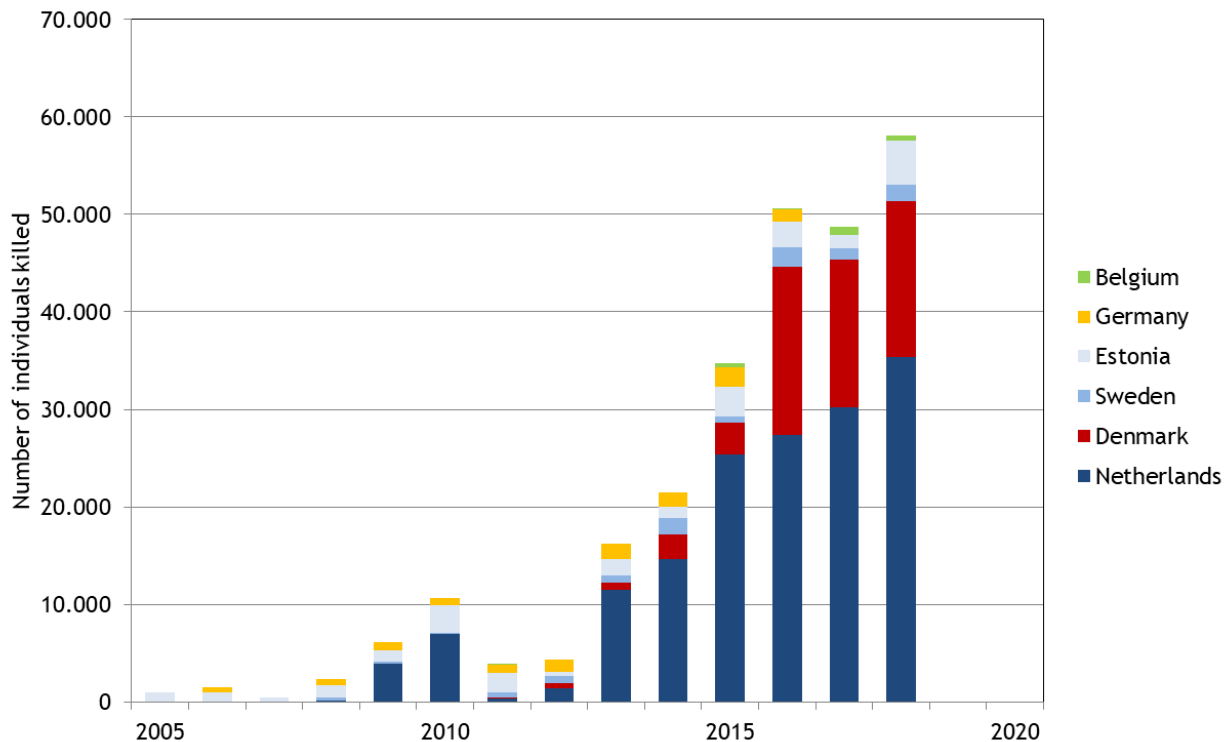


Figure 5. Trends in the number of Barnacle Geese killed under derogations in EU countries 2005-2018. Note data for Germany were not available for 2017-2018 (data mainly taken from Eionet central data repository, https://ec.europa.eu/environment/nature/knowledge/rep_birds/index_en.htm).

6. Recommendations

This report gives a first overview of population statistics of the Russia / Germany and Netherlands population of Barnacle Goose collected until 2018 and 2019. It has been established by contributions from many national coordinators and their supporting (mostly volunteer) counters and staff. For future monitoring a number of recommendations can be made:

Size of the Russia / Germany and Netherlands population

Regarding total flyway population size, we can provide fairly accurate estimates at present, working on the assumption that missing (and now interpolated) data will become available in near future. The major achievement for assessment of wintering numbers would be to speed up the process of data collection in the individual countries, in order to be able to provide more up-to-date data (preferably not older than one year). Moreover, it would be preferable to have site-based data as well, so distribution maps can be included in future status reports. This is also a valuable addition to show changes in winter distribution. Given the tendency for milder winters and the rapid changes in winter distribution, it will also be necessary to keep track on potential range expansions in winter, especially in the southern part of the Baltic. The same applies for Baltic countries regarding their existing network of counting sites.

Assigning numbers to management units

With the data currently available, it is not possible to estimate numbers in the three defined management units. Such an assessment is essential if populations are to be modelled on the level of management units (which is foreseen in the AFMP), and thus input data are needed to feed the models. In the North Sea region, where

smallest knowledge gaps occur, an improvement would be an extension of summer counts in July in northern Germany (Schleswig-Holstein) and/or improved coverage in regions that are already covered with counts (Niedersachsen). Likely this can be linked to the existing Wadden Sea monitoring programme (TMAP) for which counts are already carried out in some key areas.

Larger knowledge gaps occur in the Baltic, notably in Sweden (but also regarding the count frequency in Denmark, only once every 6 years). Especially Sweden poses a challenge, as birds occur dispersed in the archipelagos along the Baltic and Bothnian coasts. For this reason, the summer count in Finland is carried out in late summer (end of August, early September), when flocks have left most of the less accessible coastal breeding sites and concentrate e.g. on farmland. This strategy could also be a consideration in Sweden, especially when carried out simultaneously with Finland (to minimise the rate of exchange). In this context it may also be an option to explore to what extent the September count in Sweden, which is carried out annually, could be used as a proxy for the Swedish population, even if some exchange with neighbouring countries may have occurred (which may be explored by looking into ringing data). In the Oslofjord region in Norway, it is aimed to increase the coverage of counts and data collection in July-August. Here, there are also possibilities to analyse the online-data available submitted by voluntary observers. As this population is somewhat apart from those in Sweden and Finland, a different timing of the count (July/August) should not pose a major problem.

When knowing the size of the North Sea and Baltic breeding populations, also the size of the large Russian breeding population could be assessed, preferably in conjunction with counts made in that region by Russian observers (to be able to compare independent estimates).

Productivity

Productivity data have been collected on a long-term basis in The Netherlands in wintering flocks. They provide information on breeding success in the Baltic and Russian breeding populations, as the sample effort aims to exclude the local breeding populations in The Netherlands as much as possible by focussing on wintering sites of the migratory northern populations. More recently (in 2019 and 2020) effort has been done to increase collection of age-ratio counts in northern Germany and Denmark, since these countries nowadays include a large share of the wintering population and may have different flock compositions regarding successful and unsuccessful breeders. Data from these countries enable us to check whether the long-term data collected in The Netherlands are representative.

In order to assess the productivity in the respective management units, it seems feasible in both the North Sea region and Baltic region to record the number of first-year birds during summer counts in July-August. By this time of the year, identification needs less specialised knowledge (identification needs more skilled observers when carried out later in autumn). This is already done in parts of the Netherlands, Germany, Norway and (locally) in Finland, partly with increased effort in recent years.

Derogations

Regarding derogation data, the EU is currently revising its system of annual reporting, and this should be the preferred gateway to collect information on numbers killed under derogation. It assumes that all countries have some sort of data validation in place, and are able to provide complete information according to the annual reporting scheme. However, numbers reported to the EU usually only include total numbers shot (or eggs taken), sometimes differentiated in time and/or assigned to local breeders and migratory birds. In order to include offtake by derogations properly in the IPM, it is essential to make this distinction, so offtake can be estimated for the different management units as much as possible. When segregation between local breeding birds and migratory birds is not made, alternatively monthly numbers of birds killed can assist in making estimates of the offtake assigned to management unit. Numbers killed outside the EU likely remain difficult to assess, especially in Russia where spring hunting occurs.

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