

Changes in numbers and distribution of staging and wintering goose populations in Sweden, 1977/78–1998/99

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Abstract

Regular goose counts have been undertaken in Sweden since 1977/78 as a part of the International Goose Counts organised by Wetlands International. The main counts are undertaken in October and November, covering all sites of importance for Bean Goose *Anser fabalis* and in January when all sites are covered. September counts of Greylag Goose *Anser anser* will be published separately. In October, the major part of the World population of the Taiga Bean Goose *Anser fabalis fabalis* is found in Sweden. The population increased from about 20,000 in 1960 to 80,000 in 1989, after that it has decreased to about 50,000. During the study period Bean Goose numbers decreased markedly in the southernmost part of Sweden, whereas numbers increased at sites further north in southern Sweden. The

species also established new important staging areas. This change in distribution was probably related to differences in hunting pressure between different regions and to changes in agriculture. Staging populations of White-fronted Goose *Anser albifrons* also increased during the period reflecting changes in the much bigger population south of the Baltic. Marked increase in numbers and a spread to new sites were also noted among staging Greylag Geese, Canada Geese *Branta canadensis* and Barnacle Geese *Branta leucopsis* reflecting increased breeding populations in south Sweden.

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Introduction

Regular goose counts have been undertaken in some European countries since the 1950s and 1960s. In Sweden, they started in 1977/78, although some early country-wide surveys are available for the Bean Goose (Jensen et al. 1962, Mathiasson 1963). Because efficient goose monitoring requires international co-operation, the counts in different countries were co-ordinated through Wetlands International, formerly IWRB (Madsen et al. 1999). The results of the Swedish goose counts have been regularly published (Nilsson 1979, 1981, 1984, 1986, 1988a, 1991, 1993 and from 1994 annually in the reports from the Swedish Waterfowl Counts in the Publication "Fågelåret" ; latest in Nilsson 1999). Furthermore, the most recent count results are also available on the Internet under the address: www.darwin.biol.lu.se/waterfowl/goose.htm). The most recent previous analysis of the national goose counts was published by Nilsson (1988b), covering the first decade with regular goose counts in Sweden. Since then, marked changes in the numbers and

distribution patterns of staging and wintering goose populations in Sweden have been recorded and a new more detailed analysis has been long due.

This paper describes the changes in numbers and distribution patterns of autumn staging (October and November) and wintering (January) goose populations in Sweden for the period 1977/78–1998/99. The total counts of staging Greylag Geese undertaken in September are analysed separately (Andersson & Nilsson in prep.), but data on the occurrence of Greylag Geese together with other geese in late autumn and winter are also included here.

Material and methods

The main target of the Swedish goose counts during the autumn was the Taiga Bean Goose, for which the major part of the world population stages in Sweden during autumn, in October. The counts were therefore organised to cover all sites of importance for this species (Figure 1), but later special country-



Figur 1. Important goose areas in south Sweden. Viktiga gåsområden i södra Sverige.

wide surveys of the Greylag Goose were initiated in September (cf. Andersson & Nilsson in prep.). From the beginning monthly counts were organised in September/October to April, but they were discontinued after ten seasons. The October count was kept in the programme as being the optimal month for the Taiga Bean Goose, even if the main count date of Wetlands International for *Anser* geese (with the exception of the September Greylag Goose count) was November.

Covering all sites of importance for the Taiga Bean Goose implies that the coverage is good also for the White-fronted Goose, whereas a number of sites of importance for the Greylag Goose will not be covered. In the same way, the Canada Goose occur on a number of autumn sites not covered by the counts. Of the remaining goose species the Barnacle Goose is adequately covered on the mainland, whereas Öland and Gotland were not covered. Brent Geese which mostly only pass through Sweden without staging are not included here. Pink-footed Geese *Anser brachyrhynchus* occur on the same sites as Bean Geese, but are difficult to count accurately in the flocks of the much more numerous species. The January counts give a good coverage of wintering geese in south Sweden, for the Canada Goose additional information from sites not covered in the regular goose counts have been obtained from the

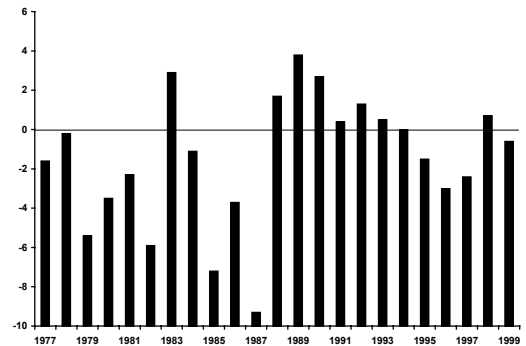
International Midwinter Counts of Waterfowl (IWC; Nilsson 1998).

Counts were undertaken on the dates established by Wetlands International, i. e. the weekend closest to the 15th in the different months or so close to this date as possible if counts were delayed by bad weather. The goose counts were generally undertaken by the same observers or team of observers over an extended period of years, and in many cases the same observers have taken part since the start.

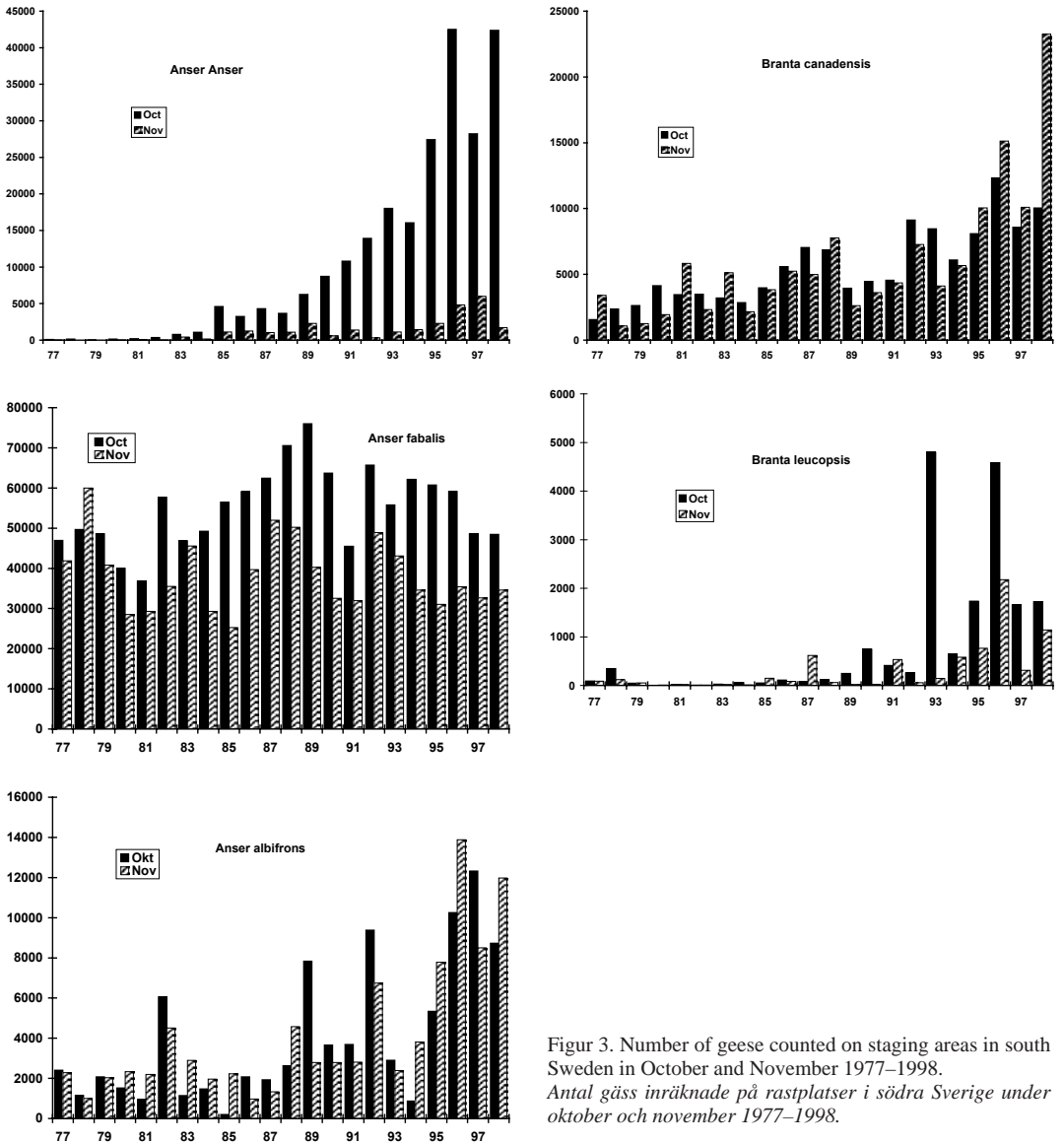
On some sites with large goose numbers, such as Lakes Tåkern, Kvismären and Östen, the counts have been undertaken during the morning flights from the lakes to the feeding areas, with teams of observers covering all flight directions. As an effect of the method sparse species such as Pinkfeet were not adequately covered here. Counts in Scania were made in the feeding areas with a much better coverage of scarce and rare species. This was necessary in Scania, where large numbers of Whitefronts occurred together with the Bean Geese in late autumn, making separation of the two species impossible during the morning or evening flights.

The Tundra Bean Goose *Anser fabalis rossicus* occurs in south Sweden in small numbers, mainly in Scania in October, some years totalling about 1000 individuals (Persson 1990, 1997). However, the observers do not normally separate them from the more numerous Taiga Bean Goose. For that reason, Bean Goose hereafter denotes a *fabalis* population mixed with small numbers of *rossicus* and a few occasional *middendorfi* and *serrirostris*.

The weather situation is of special importance during the winter. To give an idea of the strength of the winter, mean temperatures for ten weather sta-



Figur 2. Mean temperatures for January for ten weather stations in south Sweden. Medeltemperaturen i januari för tio väderstationer i södra Sverige.



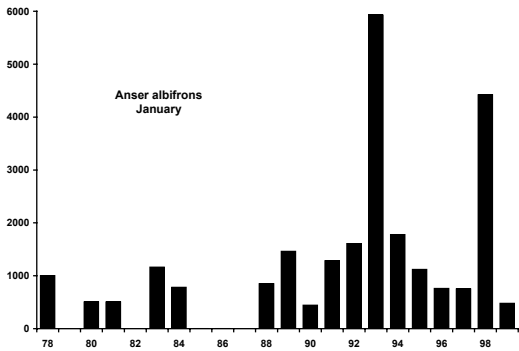
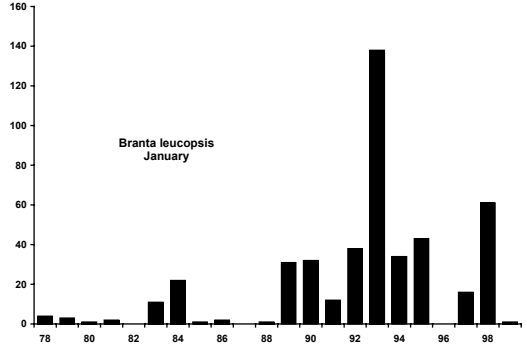
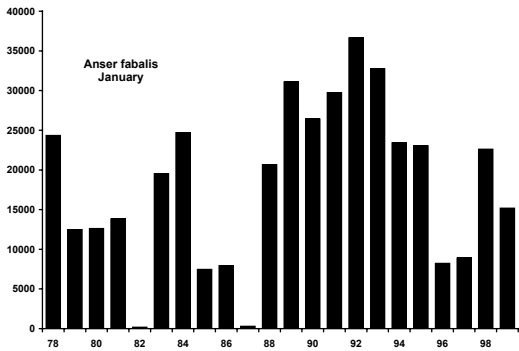
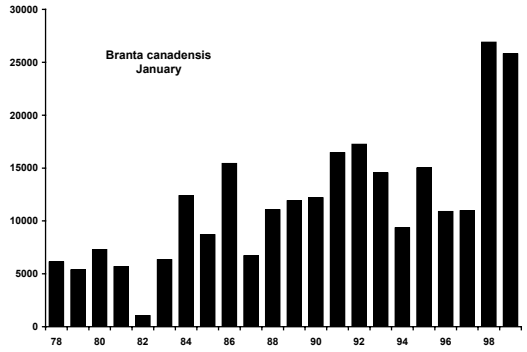
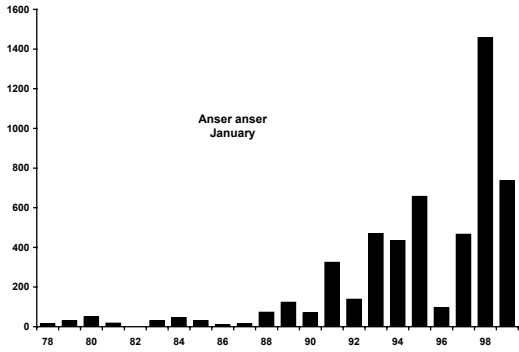
Figur 3. Number of geese counted on staging areas in south Sweden in October and November 1977–1998. Antal gäss inräknade på rastplatser i södra Sverige under oktober och november 1977–1998.

tions in south Sweden for January are presented in Figure 2.

Results

Autumn totals of the different species are found in Figure 3, whereas the midwinter counts are shown in Figure 4. In addition to the species shown in the

graphs, small numbers of Pink-footed Geese, Lesser White-fronted Geese *Anser erythropus*, Snow Geese *Anser caerulescens* and Brent Geese were regularly seen. Red-breasted Geese *Branta ruficollis* were seen singly on a number of occasions. For details on the rare species, see the national reports referred to above. During October, the Bean Goose was the dominating species in south Sweden. In the first years, this was very marked, but in the most recent



Figur 4. Number of geese counted on wintering areas in south Sweden in January 1978–1999.
Antal gäss inräknade på övervintringslokaler i södra Sverige i januari 1978–1999.

years it is probable that the number of Greylag Geese in Sweden in October actually was higher than the number of Bean Geese, but the coverage was less complete for the Greylag Goose. The number of Canada Geese is high, but the population is not adequately covered by the counts. The Bean Goose dominates the November counts, but probably the

population of Canada Goose is of the same size or even larger but inadequately covered.

January counts show a marked variation between different years (Figure 4), to a large degree dependent on the winter situation (Figure 2), the only common species being the Bean and Canada Goose. Generally, the Bean Goose was more common than

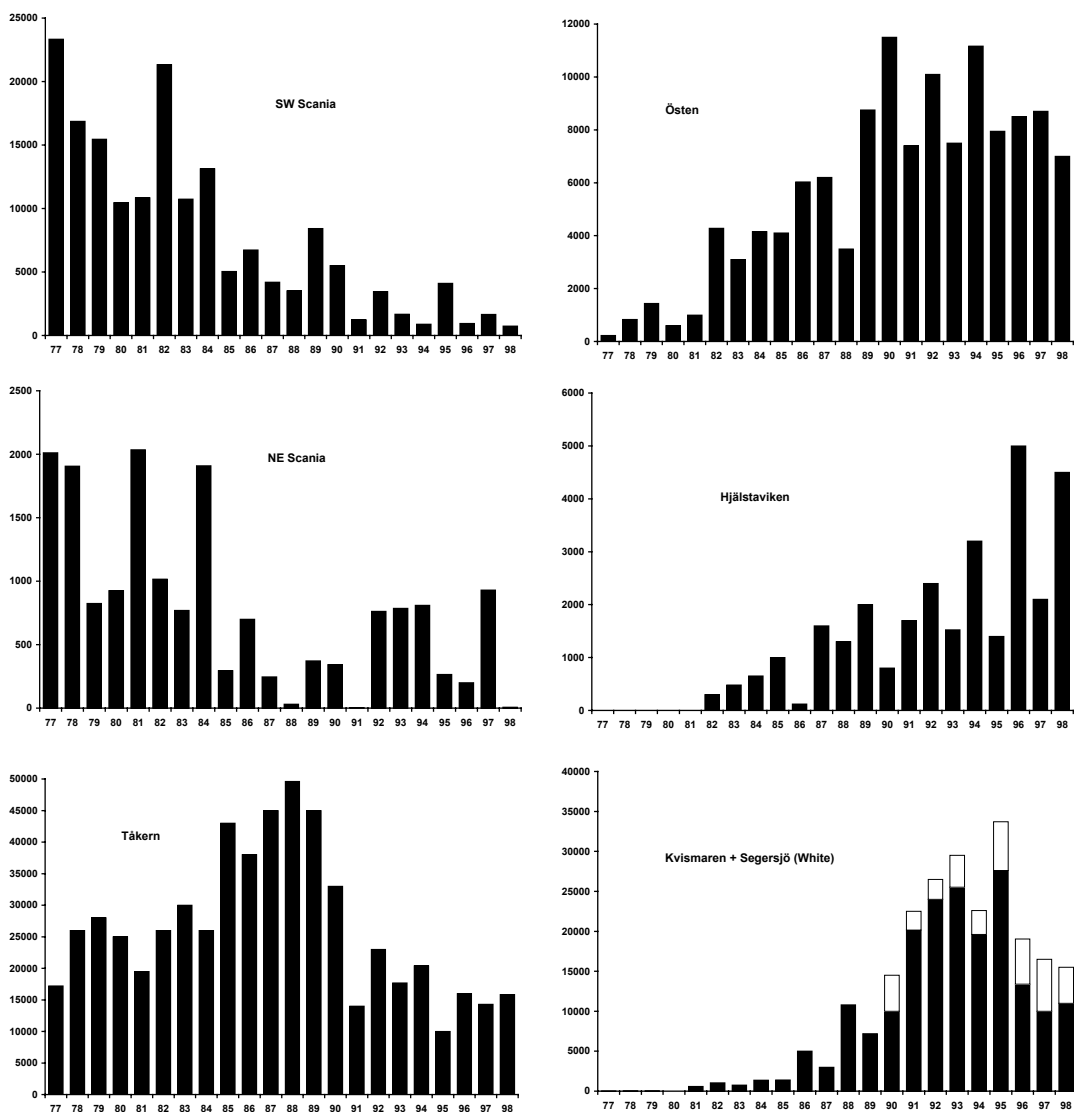
the Canada Goose, but very high counts were noted for the latter species in the last two winters.

Bean Goose

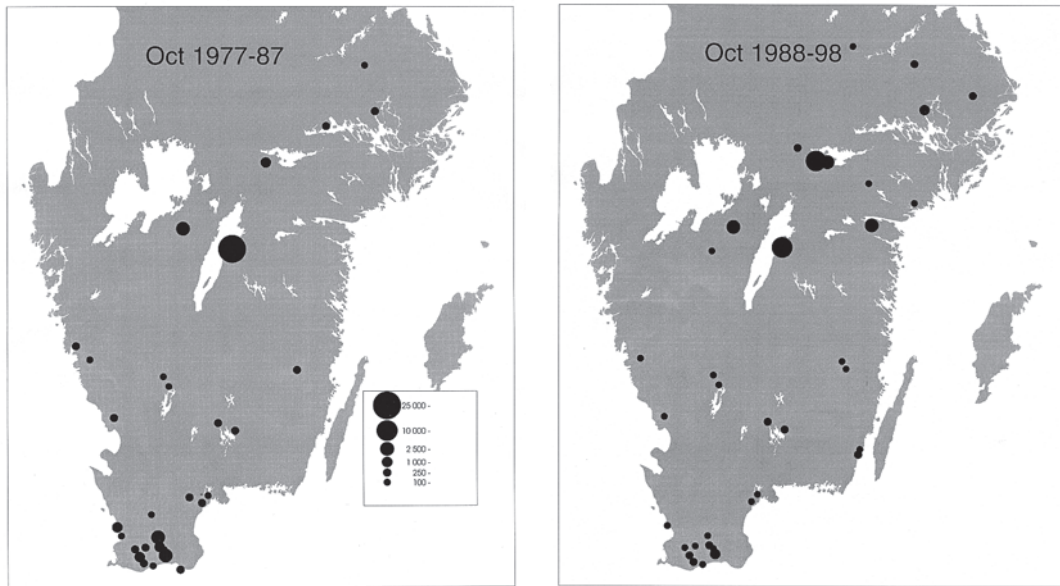
When the counts started in 1977, the October population of Bean Geese was between 40,000 and 50,000 (Figure 3). After the cold winter of 1979, it decreased and in 1981 only 37,000 Bean Geese were counted.

A steady increase to a peak of 70,000–80,000 in October 1989 followed. During 1990–1996, October totals varied around a level of about 60,000 individuals with the exception of a very low count in 1991. In October 1997 and 1998, however, counts were down to 50,000 individuals in spite of good coverage. In most years between 30,000 and 40,000 were counted in November (Figure 3).

January totals show much variation in relation to



Figur 5. Number of Bean Geese *Anser fabalis* on important staging areas in Sweden in October 1977–1998. Antalet sädgäss *Anser fabalis* på viktigare rastlokaler i Sverige i oktober 1977–1998.



Figur 6. The distribution of Bean Goose *Anser fabalis* in south Sweden in October. Mean values for different sites during two periods.

Sädgåsens Anser fabalis utbredning i södra Sverige i oktober. Medelvärden för olika lokaler under två perioder.

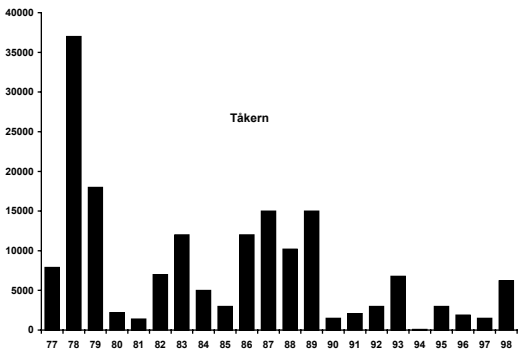
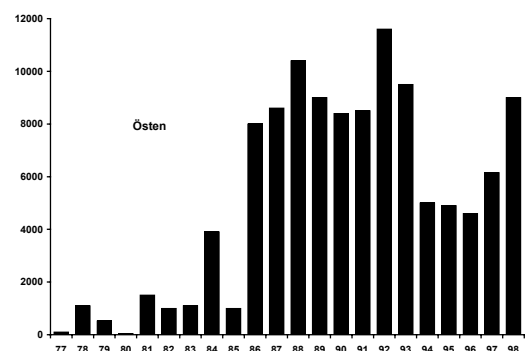
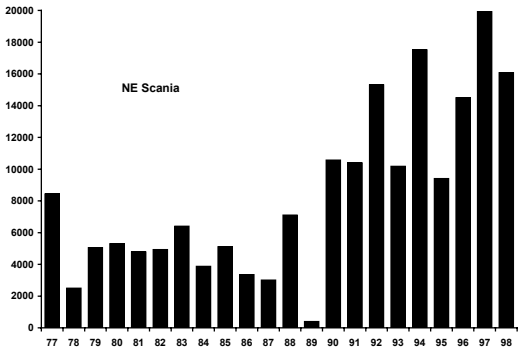
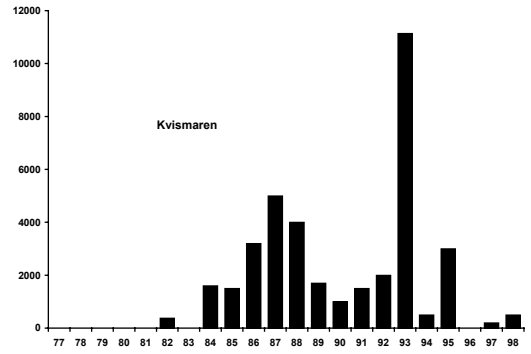
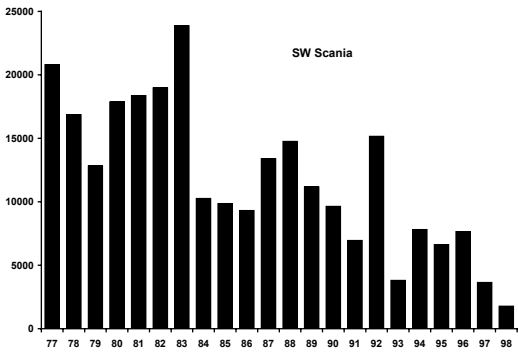
the strength of the winter, especially to the occurrence of snow cover in south Sweden, but without any clear time-trend (Figure 4). Normally, more than 20,000 Bean Geese were counted during mild winters, the maximum count being about 35,000 in 1992. In the coldest winters, 1982 and 1987, almost all Bean Geese had left Sweden in January.

When the counts began in October 1977, the majority of the Bean Geese were concentrated in two areas, southwest Scania and Lake Tåkern (Figure 5, 6). Smaller numbers were also found in some other staging areas in south Sweden (Figure 6). Over the years a marked change in the October distribution was noted. Numbers in SW Scania decreased markedly; before 1985 all counts were above 10,000 individuals, then numbers were appreciably lower and during most years in the 1990s only small numbers were found here. The decrease was not the same for all sites and in some years larger flocks were still seen in October at one site in SW Scania, Lake Krageholmssjön. An early arrival in autumn and a markedly lower frequency of neck-banded individuals than at other Scanian sites (Nilsson & Persson 1991a) indicates another origin of the geese at Lake Krageholmssjön.

Simultaneously with the decrease in October numbers in SW Scania, a steady increase was noted at

Lake Tåkern to a peak close to 50,000 in October 1988, numbers at Lake Tåkern then decreased and during 1991–1998 October totals here varied between 10,000 and 23,000.

When numbers decreased in SW Scania, new staging areas were established also in other parts of south Sweden (Figure 5, 6). In 1977, small numbers were counted at Lake Östen in the autumn, this lake hitherto known as an important spring staging area (Nilsson & Persson 1984). A marked increase was found here during the 1980s, then levelling out with October counts between 7,000 and 12,000. A few years later, Lake Kvismaren, another spring staging area, came in use as an autumn staging area. This site soon grew in importance, becoming more important for Bean Geese than Lake Tåkern during the 1990s, peaking with close to 26,000 individuals in October 1993. From 1990, a second important staging area was established close to Lake Kvismaren at Segersjö. In the last few years the number of Bean Geese that use Lake Kvismaren has decreased. Another spring staging area, Hjälstaviken, also became an autumn staging area for Bean Geese at the same time as the other sites mentioned above, but did not reach higher peak counts than 5,000. Recently, another new staging area was established at Bråviken (Figure 6).

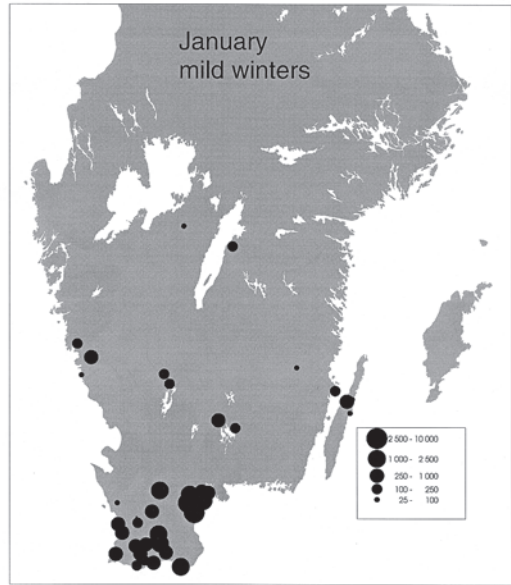


Figur 7. Number of Bean Geese *Anser fabalis* on important staging areas in Sweden in November 1977–1998. Antalet sädgäss *Anser fabalis* på viktigare rastlokaler i Sverige i november 1977–1998.

As already stated, November counts were more varied than the October counts, due to the influence of frost, the parts of south Sweden north of Scania in some years having too much snow for the geese to find good staging conditions. Counts at Lakes Tåkern and Kvismaren have accordingly been very variable among years (Figure 7). When the counts started, a very high count was noted for Tåkern, but normally November counts were much lower than October counts, the same applies to Lake Kvismaren. Lake Östen, on the other hand, normally had

more or less the same number of staging geese in November as in October.

The re-distribution noted for the Bean Goose in October was also apparent in the results from the November counts, but not so marked as the frost in some years forced the geese to leave southern Sweden north of Scania. When the counts started, SW Scania dominated the November counts as well as the October counts. November numbers remained high longer, but from 1984 onwards, November counts in SW Scania were lower than before, the decrease

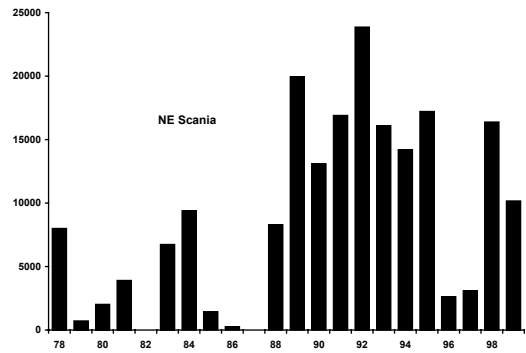
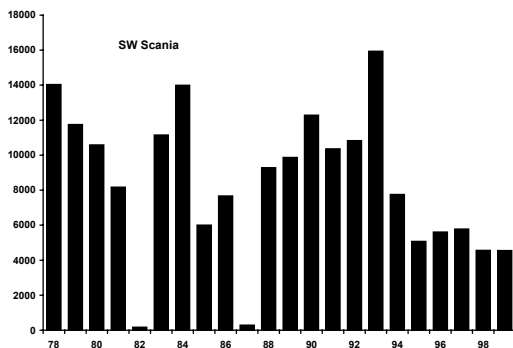


Figur 8. The distribution of Bean Goose *Anser fabalis* in south Sweden in mild and cold winters. Mean values for different sites. *Sädgåsens Anser fabalis utbredning i södra Sverige under milda och kalla vintrar. Medelvärden för olika lokaler.*

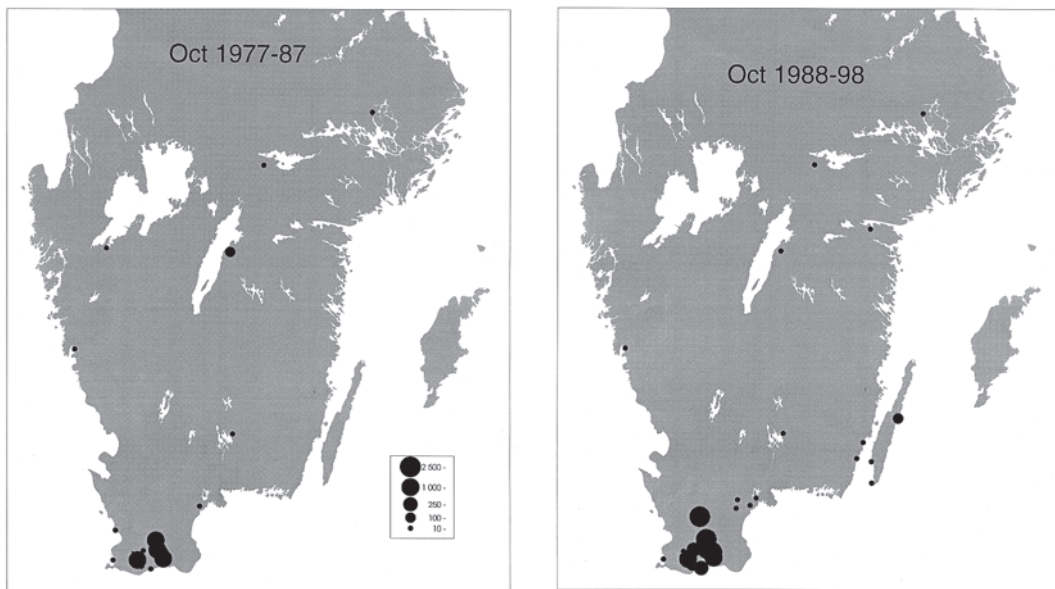
being accentuated in the most recent years. During the same period NE Scania, an area hardly used in October, gained in importance with recent peak counts in November of up to 20,000 Bean Geese.

In January, almost all Bean Geese in Sweden were found in Scania, especially during cold winters, whereas small numbers were seen further north in southern Sweden during mild winters (Figure 8). During 1978–1993 no clear trend was noted in the January counts of Bean Geese in SW Scania, but numbers varied in relation to the strength of the

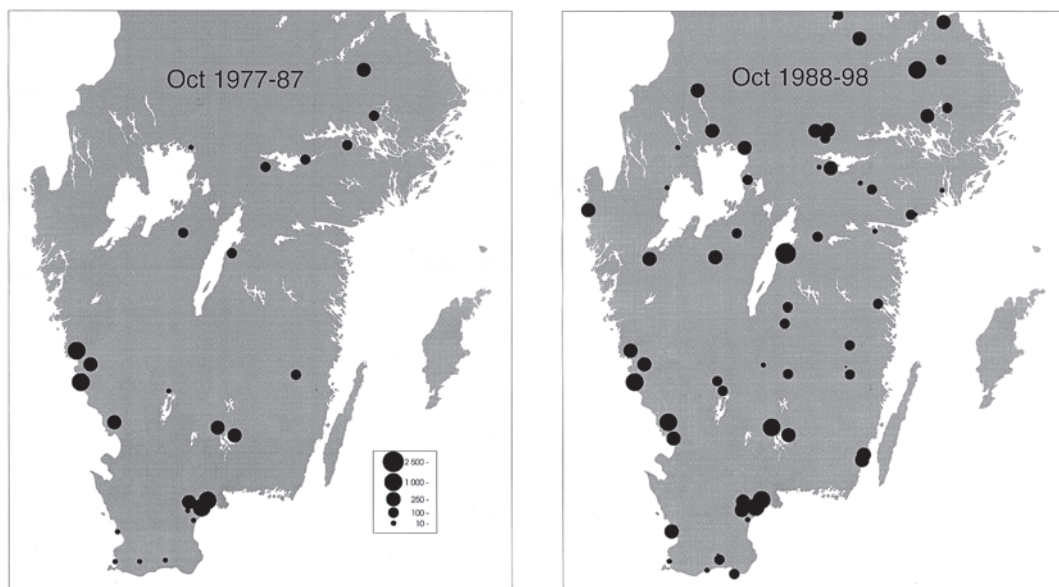
winter (Figure 9). Counts were markedly lower in the period 1994–1999 than before. As in the November counts, NE Scania had a higher proportion of the Bean Geese during the latter half of the census period, whereas the situation was the opposite during the first half. The only exceptions were the cold winters 1996 and 1997 with low totals in NE Scania, whereas only small differences were found in the Bean Goose counts in SW Scania over the period 1995–1999.



Figur 9. Number of Bean Geese *Anser fabalis* in NE and SW Scania in January 1978–1999. *Antalet sädgäss *Anser fabalis* i nordöstra respektive syvästra Skåne i januari 1978–1999.*



Figur 10. The distribution of White-fronted Goose *Anser albifrons* in south Sweden in October. Maximum counts for different sites in two periods.
Bläsgåsens Anser albifrons utbredning i södra Sverige i oktober och november. Högsta antal för olika lokaler under två perioder.



Figur 11. The distribution of Canada Goose *Branta canadensis* in south Sweden in October. Maximum counts for different sites in two periods.
Kanadagåsens Branta canadensis utbredning i södra Sverige i oktober. Högsta antal för olika lokaler under två perioder

White-fronted Goose

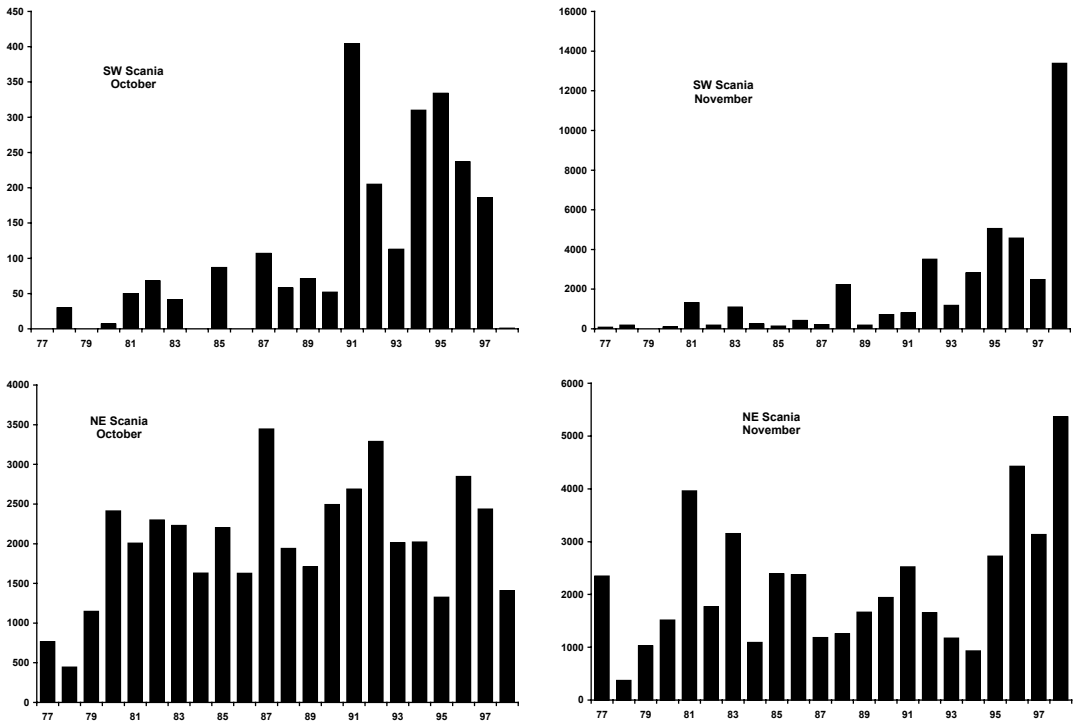
The White-fronted Goose has been a regular staging bird in Scania during the entire period of the Goose counts, the distribution being markedly concentrated to the central lake area of SW Scania with only smaller flocks in other parts of the country (Figure 10). Peak numbers in different years were found either in October or in November, depending on the exact timing of the migration. Many large flocks stayed in Scania for a brief period, increasing the variation of the results. When the counts began, peak counts in the autumn were regularly around 2000 individuals, numbers then started to increase during the latter part of the period with a peak count around 14,000 in November 1996 (Figure 3). January totals were markedly lower and the species was absent during the coldest winters (Figure 4).

Greylag Goose

The Greylag Goose is not adequately covered by the counts in October and November as the species

occurs on a number of sites not used by Bean Geese, the target species for the counts in these two months (Figure 3). October is moreover the main migration month for the species and the timing of the migration in relation to the count date will be of great importance for the interpretation of the results. Anyhow, the marked increase found in the September counts (Andersson & Nilsson in prep.) is also reflected in the October counts. The October totals varies between about 25% and over 50% of the numbers counted during the full-cover September counts.

By November, the majority of the Greylag Geese have left Sweden, but in some years up to 5000 individuals were counted on the sites visited (Figure 3). In January, the number of Greylag Geese counted in Sweden is small, and before 1988 only single individuals were found in the flocks of other more numerous species, often together with the Canada Geese. As a response to the mild winters from 1988 onwards the number of Greylag Geese increased mainly at the coast of SW Scania in January, but later flocks were also found in other parts of south Swe-



Figur 12. Number of Canada Geese *Branta canadensis* in NE and SW Scania in October and November 1977–1998. Antal kanadagäss *Branta canadensis* i nordöstra respektive sydvästra Skåne i oktober och november 1977–1998.

den, with the highest total (1998) of more than 1400 (Figure 4).

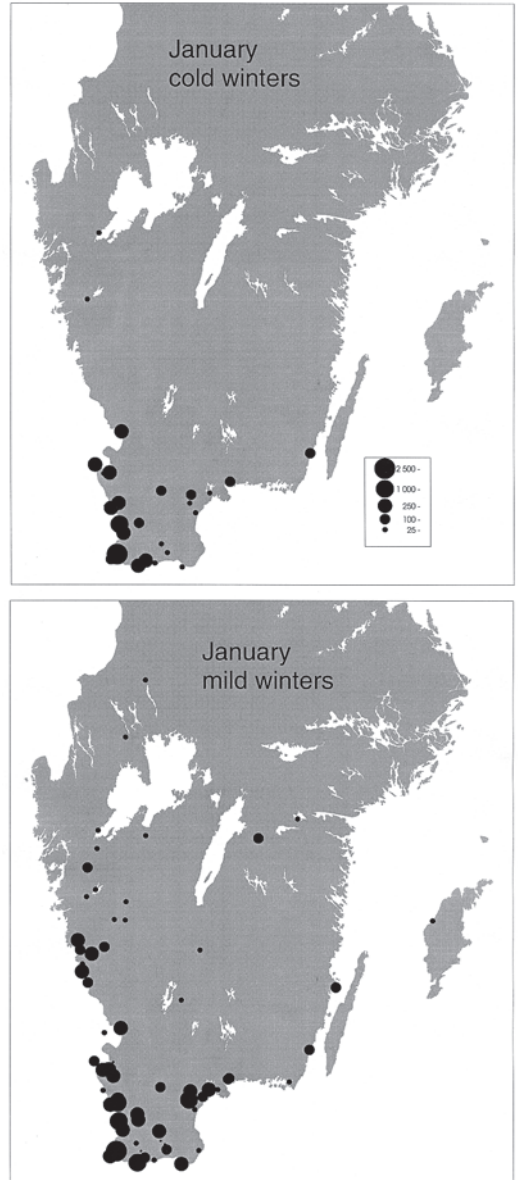
Canada Goose

The Canada Goose is a common staging and wintering bird in south Sweden. In autumn, the Canada Geese are well dispersed and flocks are found on a large number of sites both in October and November (Figure 11). During the first half of the period considered here, there was a concentration of larger flocks both in NE Scania and on the west coast in the province of Halland. Additional flocks were spread over south Sweden. In October only small numbers were found in SW Scania, but flocks started to appear there in November.

The counts clearly show a marked increase in the Canada Goose population during the survey period (Figure 3) and during the latter part of the period Canada Geese were well spread over the entire area surveyed (Figure 11). Both in October and November flocks were found over the entire area, but there was a change in the distribution to the southwest between October and November.

Two larger areas were completely covered during all counts, SW and NE Scania (Figure 12). In NE Scania, Canada Geese occurred regularly in large flocks when the surveys started in the 1970s and total counts in many years resulted in between 1500 and 2500 in both October and November with some higher peaks. No trend in the numbers was found. In SW Scania the situation was different. In October, few Canada Geese were counted at the surveys before 1991, then smaller flocks started to appear already in October at some sites. Similarly, with the exception of 2000 counted in November 1988, November counts in SW Scania were also low before 1992, numbers then becoming higher with a notable peak of 13,000 Canada Geese in November 1998. Formerly, Canada Geese arrived in SW Scania during December or January (Nilsson 1988b).

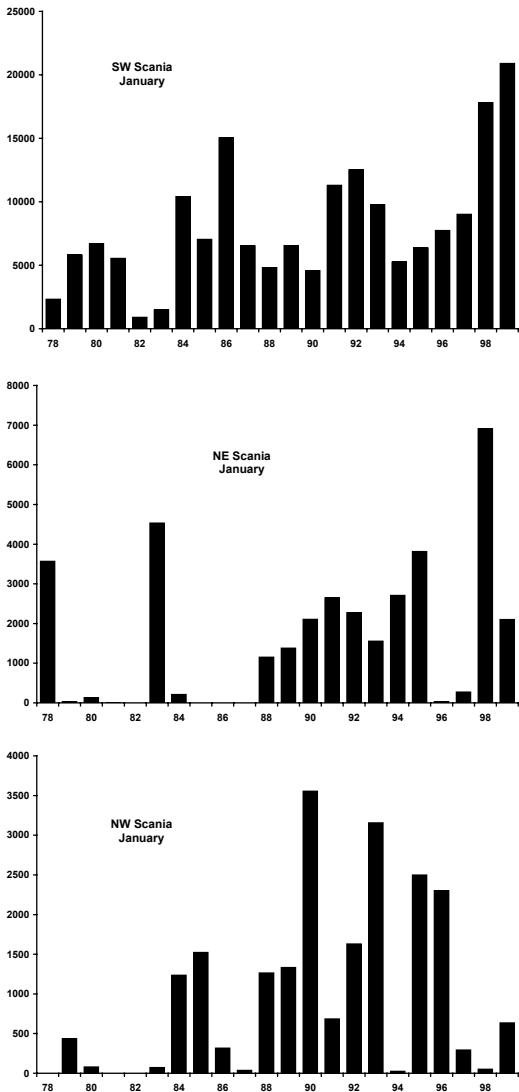
In January, the Canada Geese in southern Sweden have been markedly concentrated to the West coast, the Öresund and NE Scania (Figure 13), but as for the autumn (Figure 11), there has been a marked spread of the species to new sites as the population increased. During both cold and mild winters, the Canada Geese were markedly concentrated to the coast. During the cold winters only few Canada Geese were found north of Scania during the first years, but some small flocks were found in Southeast Sweden and in Halland during the cold winters of 1996 and 1997.



Figur 13. The distribution of Canada Goose *Branta canadensis* in south Sweden during mild and cold winters. Maximum counts in January for different sites.

Kanadagåsens Branta canadensis utbredning i södra Sverige under milda och kalla vintrar. Högsta antal i januari för olika lokaler.

The January counts for the period 1978 to 1992 show a slow increase in the number of Canada Geese from about 6000 to 16,000 individuals with some years with higher counts (Figure 4). After that lower



Figur 14. Number of Canada Geese *Branta canadensis* in different parts of Scania in January 1978–1999. *Antal kanadagäss Branta canadensis i olika delar av Skåne i januari 1978–1999.*

numbers (the species probably more spread) was recorded for some years, then suddenly increasing to more than 25,000 in January 1998 and 1999. The majority of the Canada Geese seen in January were counted in Scania, where the coast in northwest was also thoroughly covered in addition to the traditional goose areas in the SW and NE (Figure 14). The

counts for SW Scania are characterised by marked variation with some high counts, notably over 20,000 in January 1999, but with an increasing trend. Counts in the NW have also shown a marked variation, but low counts were obtained during the last few winters. The situation in NE Scania was also variable. The Canada Geese were more or less absent here during the cold winters, but low counts were also obtained in some other more normal winters.

Barnacle Goose

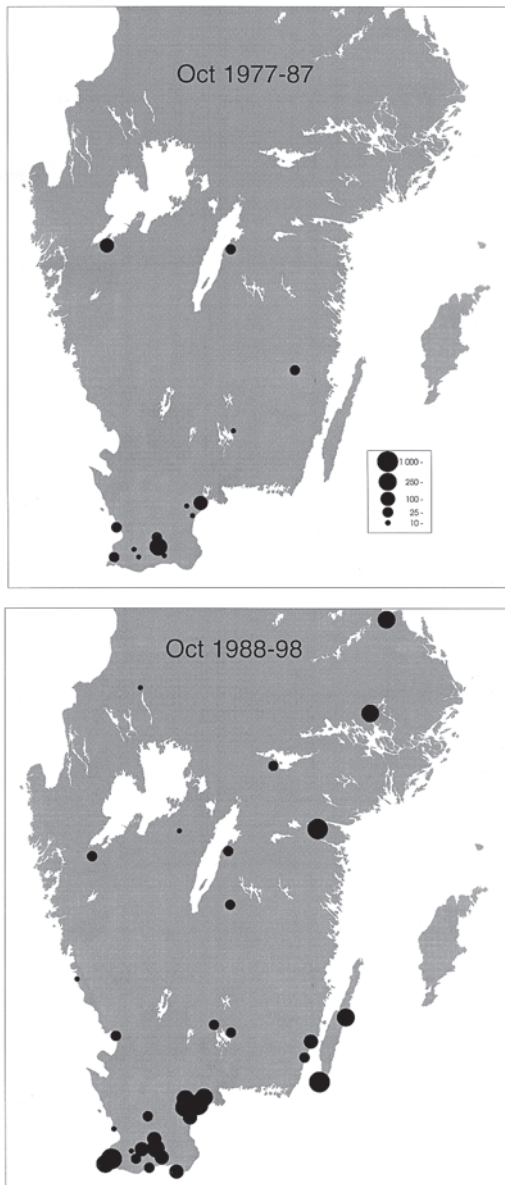
Until 1987/88, the Barnacle Goose was a rare visitor to the goose sites in south Sweden (note Öland and Gotland were not covered in October and November), single birds were also seen during the midwinter count (Figure 3, 4). In the latter period larger flocks appeared regularly at some sites and two years produced counts of between 4000 and 5000 individuals. In many areas the Barnacle Geese seem to be on passage, staging for a few days, so some large flocks may pass unnoticed. Winter totals are low, but the species has been regular in small numbers on the goose sites in especially Scania even in January (Figure 4).

Both in October and November, the absolute majority of Barnacle Goose flocks were found in Scania, both in the SW and NE (Figure 15). In October a number of flocks were found dispersed over southern Sweden north of Scania, whereas few flocks were seen there in November.

Discussion

Changes in Numbers

The goose populations considered here have all shown an increasing trend in north-west Europe or are at least considered to be stable (Fox & Madsen 1999). For three of the common species: Greylag Goose (Andersson & Nilsson in prep., Nilsson et al. 1999b), Barnacle Goose (Ganter et al. 1999, Larsson & van der Jeugd 1998) and Canada Goose (Andersson et al. 1999), increases in staging numbers reflect increases in the breeding populations. The absolute majority of the Greylag Geese and the Canada Geese counted in south Sweden come from the Swedish breeding populations (unpublished neck-banding data). Staging Barnacle Geese in south Sweden may originate both from the population from arctic Russia or from the Baltic population, but the proportions emanating from the different populations are not known.



Figur 15. The distribution of Barnacle Goose *Branta leucopsis* in south Sweden in October. Maximum counts for different sites in two periods.

Vitkindade gåsens Branta leucopsis utbredning i södra Sverige i oktober. Högsta antal för olika lokaler under två perioder

Swedish data (Jensen et al. 1962, Mathiasson 1963, Nilsson & Persson 1984) indicate an increase in the staging population of Bean Geese in Sweden from 20,000 in 1960 to 30,000–40,000 in the early

seventies, 50–60,000 in 1977–1980, and reaching a peak of close to 80,000 in 1989, followed by a decrease in later years.

Due to a failure to separate between the Taiga Bean Goose and the Tundra Bean Goose in most counts in Germany and northern Poland it is difficult to establish the status of the Taiga Bean Goose population of north-west Europe and to establish its recent population trends. Between October and November large numbers of Taiga Bean Geese move south from south Sweden to northern Germany and/or Poland (Nilsson & Pirkola 1991). Recent counts in the region south of the Baltic in late autumn indicate that about 30,000 Taiga Bean Geese have been present there before the arrival from Sweden (Leo van den Bergh unpubl. in Nilsson et al. 1999a). Thus the total population of the Taiga Bean Goose was estimated to be between 90,000 and 110,000, possibly somewhat lower in the most recent years.

Mathiasson (1963) summarised the scanty information on Bean Goose numbers available before 1960 and considered that there had been a general decrease in Bean Goose numbers in Sweden and the rest of western Europe since the early years of the century. With the lack of detailed data separating the Taiga and Tundra Bean Geese in the areas south of the Baltic there can be some doubt whether the increasing trend in south Sweden from the 1950s reflects a genuine increase in the Taiga Bean Goose population overall or in Sweden or whether the pattern seen in Sweden reflects a change in migration patterns as has been established within Sweden for the Taiga Bean Goose in the present study (see further discussion below).

It seems that the Western Palearctic population of White-fronted Goose has been more or less stable in recent decades, but showing very marked changes in migration pattern and winter distribution (Mooij et al. 1999). The increase in the Swedish staging population of White-fronted Goose in recent years is a reflection of the general increase in the staging population of White-fronted Goose in north-west Europe due to redistribution (Mooij et al 1999).

Changes in distribution

There have been marked changes in the autumn distribution of geese in southern Sweden during recent decades, whereas the winter distribution has changed only slightly. In cold and normal winters, wintering geese, with the exception of some smaller flocks of Canada Geese, are restricted to the southernmost part and the west coast due to climatic

reasons. Recent series of very mild winters have, however, made it possible for some smaller flocks to stay during winter further north in southern Sweden, although many goose flocks seen in the region in January are actually early migrants returning from winter quarters further south.

In the Greylag, Barnacle and Canada Goose, the changes in distribution are related to the increasing populations in the country and reflect a dispersal to new sites, whereas a marked redistribution has taken place among the staging Bean Geese in south Sweden. When Jensen et al. (1962) and Mathiasson (1963) made the first censuses of the Bean Goose in south Sweden, almost all were found in Scania with small numbers seen in Halland (cf also Lennerstedt 1962) and at Lake Tåkern. When the regular goose counts in Sweden started, large flocks were staging both in SW Scania and at Lake Tåkern. The establishment of Lake Tåkern as a staging area for Bean Geese seem to have taken place in the latter half of the 1960s, with a peak count of 6,000 being reported from 1971 (Björkman 1972, cf. also Ebenman 1976).

This change in the distribution of staging Bean Geese has continued through the study period, during which a number of new autumn staging areas, although most of these were formerly used in spring, were established in southern Sweden north of Scania. Recently, Lake Kvismaren was established as a very important autumn site for Bean Geese holding in some recent years larger flocks than Lake Tåkern.

The change in distribution within Sweden may have been caused by a number of different factors. As the geese obtain their food from agricultural land changes in agricultural methods can be of great importance for the goose populations. Changed agricultural practices have in many cases been put forward as explanations for the expansion of the European goose populations in addition to changes in hunting pressure (Nilsson & Persson 1984, 1991b). Mechanical harvesting methods for potatoes and sugar beet leaving much spill, have created important feeding opportunities in addition to stubble fields until the fields are ploughed up. After ploughing, grassland and autumn-sown crops have been the remaining feeding opportunities for the geese in agricultural areas. There has been a marked reduction in the area of grassland in south Sweden in recent decades (Gerell 1988), whereas the area with autumn-sown cereals has increased markedly during the same period (Statistiska Centralbyrån). Winter wheat is an important food for the geese after ploughing of harvested fields (Nilsson & Persson 1991b).

The proportional increase of land used for growing winter wheat has not been even in different parts of Sweden. Between 1966 and 1978, there was a moderate increase in the area grown with winter wheat in Scania (from 17 to 22%), whereas the increase was very marked in the provinces of Skaraborg (Lake Östen; from 7 to 18%) and Östergötland (Lake Tåkern; from 16 to 30%). In the provinces of Örebro (Lake Kvismaren) and Uppsala (Hjälstaviken), changes came later, between 1988 and 1998 (from 5 to 18% and 11 to 26%, respectively). Autumn-sown cereals were important as food for the Bean Geese both at Lake Östen and Lake Tåkern in autumn as well as in Scania (Nilsson & Persson 1984).

There is an open season in Scania for Bean Geese hunting, whereas hunting is only allowed for crop protection in other parts of south Sweden. This may be an important factor for the Bean Goose as hunting causes major disturbance for the geese in addition to the mortality risk. Neckbanding of Bean Geese (Nilsson & Pirkola 1991) has shown that the same individuals that use the northern staging areas in south Sweden in mid-autumn move to areas in Scania during late autumn and winter. As geese are long-lived, they may learn which staging areas are disturbed by hunting and remain further north as long as possible. Changed agricultural practices, as discussed above, might have made this change possible.

On another scale similar changes for Swedish Greylag Geese have also taken place outside Sweden. They have in increasing numbers wintered in the Netherlands whereas the number migrating to the traditional winter quarters in SW Spain has decreased (Nilsson et al 1999b). In this case, geese from the neck-banded population in SW Scania is involved, and marked differences in survival and productivity have been observed among those using different wintering and staging areas (Nilsson & Persson 1993, 1996).

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Sammanfattning

Förändringar i antal och utbredning hos rastande och övervintrande gåsbestånd i Sverige 1977/78–1998/99

Regelbundna gåsinventeringar har organiserats i Europa sedan 1950-talet och 1960-talet. I Sverige startade dessa inventeringar 1977/78, även om en del tidigare inventeringar av sädgäss *Anser fabalis* genomförts (Jensen m.fl. 1962, Mathiasson 1963). Gåsinventeringarna i Europa kräver samordning mellan olika länder, vilket numera sker genom Wetland Internationals försorg (Madsen et al. 1999). Resultaten från de svenska inventeringarna har tidigare publicerats i en serie rapporter (Nilsson 1979, 1981, 1984, 1986, 1988a, 1991, 1993 och sedan 1994 årligen i *Fågelåret*), men någon sammanfattande analys har inte publicerats sedan Nilsson (1988b). I denna uppsats analyseras resultaten från de svenska gåsinventeringarna under perioden 1977/78–1998/99. Resultaten från septemberinventeringarna av grågäss kommer dock att presenteras i ett annat sammanhang (Andersson och Nilsson in prep.).

Material

Sädgåsen utgör huvudmålet för höstinventeringarna och inventeringarna i oktober och november har syftat till att täcka alla sädgåslokaler men samtliga arter inventeras. Täckningen är därför god även för bläsgås *Anser albifrons* och spetsbergsgås *Anser brachyrhynchus*, medan mindre god täckning erhålls för kanadagåsen *Branta canadensis*. Den vitkindade gåsen *Branta leucopsis* är förhållandevis bra täckt vad gäller fastlandet men inte på Öland och Gotland. Midvinterinventeringarna ger god täckning av gässen i södra Sverige. För kanadagåsen speciellt, har en hel del kompletterande information kunnat erhållas från de samtidigt organiserade sjöfågelräkningarna i januari.

På vissa större lokaler såsom Tåkern, Kvismaren och Östen inventeras gässen på morgonsträcket till födosöksområdena. Detta innebär att sparsamt förekommande arter blir underrepresenterade här.

Resultat

Antalet inräknade individ av de viktigaste arterna under höstinventeringarna framgår av Figur 3, medan vinterinventeringarna sammanfattas i Figur 4. Utöver dessa arter har mindre antal av snögås *Anser caerulescens*, fjällgås *Anser erythropus*, prutgås *Branta bernicla* samt vid några tillfällen rödhalsad

gås *Branta ruficollis* setts vid inventeringarna. För dessa arter hänvisas till de ovan redovisade nationella rapporterna.

Sädgås

När inventeringarna startade omfattade oktoberbeståndet mellan 40.000 och 50.000 individer, men efter den kalla vintern 1979 minskade antalet till endast 37.000 (Figur 3). Därefter skedde en markant ökning till en topp med 70.000–80.000 i oktober 1989, varefter antalet minskade igen till ca 60.000. De båda senaste åren sågs dock ca 50.000 sädgäss i landet. November och januariinventeringarna visade en markant variation mellan olika år (Figur 4). Under milda vintrar har mellan 20.000 och 35.000 sädgäss räknats in, medan nästan alla sädgäss hade lämnat Sverige i januari de extremt kalla vintrarna 1982 och 1987.

Sedan inventeringarna startade har en markant förändring av sädgässens höstutbredning i landet konstaterats (Figur 5–7). De första åren var majoriteten av sädgässen koncentrerade till Tåkern och SV Skåne, medan endast små antal sågs på andra lokaler. Under 1970 och 1980-talet ökade antalet gäss vid Tåkern för att som mest uppgå till ca 50.000 samtidigt som gässen minskade mycket markant i SV Skåne. Under samma period etablerades ett antal nya lokaler som höstlokaler: främst Kvismaren, Östen och Hjälstaviken. Under 1990-talet minskade antalet rastande sädgäss vid Tåkern samtidigt som Kvismaren ökade mycket markant och uppvisade 26.000 sädgäss i oktober 1993. Novemberinventeringarna visar också förskjutningar i utbredningen, men dessa har inte varit lika markanta eftersom gässen vid denna tid är starkt påverkade av frostperioder i södra Sverige norr om Skåne. En förskjutning mot en dominans för nordöstra Skåne över sydvästra Skåne har dock kunnat konstateras.

I januari är så gott som alla sädgäss i Sverige koncentrerade till Skåne, men antalet varierar i relation till vinterns hårdhet (Figur 8,9). En förskjutning i utbredningen mot en dominans för nordöstra Skåne har kunnat konstateras.

Bläsgås

Bläsgåsen har under perioden varit markant koncentrerad till Skåne och då särskilt den sydvästra delen av landskapet (Figur 10). Högst antal har setts i oktober eller november, något beroende på flyttningens förlopp (Figur 3). Antalet bläsgäss vid januariinventeringarna har varierat markant beroende på vinterns hårdhet (Figur 4).

Kanadagås

Kanadagåsen rastar allmänt i södra Sverige under höstarna och visar då en spridd utbredning (Figur 11). Detta medför att beståndet inte kunnat täckas in ordentligt vid räkningarna i oktober och november (Figur 3) annat än för Skåne (Figur 12). I januari har kanadagässen varit mer koncentrerade till västkusten, Öresund och nordöstra Skåne (Figur 13), vilket gör att arten säkrare kunnat täckas in vid inventeringarna. Både under kalla och milda vintrar är kanadagässen markant koncentrerade till kusterna, även om detta är mest utpräglat under kalla vintrar. Antalet har visat en markant ökning i januari.

Vitkindad gås

När inventeringarna började var arten en sparsam gäst på de sydsvenska rastplatserna (Öland och Gotland ej inventerade). Under den senare perioden har arten varit väsentligt vanligare (Figur 3, 4) och upp till 5000 har räknats in. Både i oktober och november har merparten av de vitkindade gässen observerats i Skåne, men särskilt i oktober har åtskilliga flockar observerats norr om Skåne (Figur 15).

Diskussion

De här diskuterade gåsbestånden har alla visat en ökning i NV Europa, eller i varje fall en stabil nivå (Fox & Madsen 1999). Sädgåsen i Sverige ökade från ca 20.000 individ 1960 till ca 30–40.000 under tidigt 1970-tal och 50–60.000 1977–1980 (Mathiasson 1963, Nilsson & Persson 1984) för att nå en topp på ca 80.000 1989, varefter antalet minskade. Sädgässen i Sverige utgörs i stort sett enbart av taigasädgäss (*Anser fabalis fabalis*), vilka under hösten enbart finns i vårt land eller söder om Östersjön i Polen och Tyskland, där ca 30.000 räknats de senaste höstarna (Nilsson et al. 1999). Totalbeståndet torde sålunda uppgå till 90.000–110.000. Tyvärr har man inte skilt på taigasädgäss och tundrasädgäss vid inventeringarna i Europa, varför det är omöjligt att

avgöra om den observerade ökningen i Sverige motsvarar en genuin ökning av beståndet eller enbart är att hänföra till en förändring av utbredningen av samma typ som konstaterats inom landet.

Bläsgåsens ökning i Sverige återspeglar en ökning i det mycket stora bestånd som flyttar mot Västeuropa söder om Östersjön (Mooij et al. 1999). Samtidigt som beståndet ökat här har östligare bestånd visat markanta nedgångar, varför man troligen har att göra med en markant förändring i vinterutredningen och inte en beståndsökning. När det gäller grågåsen, kanadagåsen och den vitkindade gässen motsvarar ökningen av de rastande bestånden en ökning i häckbeståndet i landet.

Gässens förändrade utbredning och expansion kan bero på många olika orsaker. Viktiga faktorer i sammanhanget torde vara förändringar i jordbruket samt minskat jakttryck (Nilsson & Persson 1984). Mekaniska skördemetoder torde vara viktiga eftersom de lämnar mycket spill. En annan viktig faktor torde vara en ökad användning av vintervete, som ger gässen goda furageringsmöjligheter under senhösten och vintern.

När det gäller sädgåsens ändrade utbredning kan jakten i kombination med förändringar i jordbruket vara en förklaring till den ändrade utbredningen. Medan gåsjakten sedan länge varit etablerad i Skåne har endast skydds jakt varit tillåten längre upp i landet. Förutom mortalitetsrisken är jakten en allvarlig störningsfaktor och en långlivad art som sädgåsen kan lära sig att undvika områden med mycket jakt när väl de ändrade jordbruksförhållandena medfört att födotillgången gör det möjligt för gässen att stanna längre norrut innan frosten tvingar dem söderut. På motsvarande sätt kan man kanske förklara grågåsens förändrade utbredning i Europa (Nilsson et al. 1999), men färre grågäss på vintern i Spanien samtidigt som antalet övervintrare ökar i Nederländerna, där förhållandena vad gäller överlevnad och framtida ungpoduktion är mer gynnsamma (Nilsson & Persson 1993, 1996).