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Variation in survival in an increasing population of the Greylag Goose *Anser anser* in Scania, southern Sweden

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Abstract

Based on resightings of neck-banded Greylag Geese, we calculated mean annual survival rates of 76% for juveniles, 74% for subadults and 83% for adults. The survival rate was significantly lower over the winters 1989/90 and 1990/91 than over the winters 1985/86 - 1988/89 and 1991/92 for adults (80 vs 87%). In the winters 1989/90 and 1990/91, hunting on Greylag Geese was intensive in southwestern Spain. Greylags wintering in the Netherlands (mainly the Dutch Delta) had significantly higher survival rates than birds wintering in southwestern Spain in both juveniles (90 vs 72%) and adults (94 vs 85%). Most losses occurred during autumn migration and just after arrival into the winter quarters.

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Introduction

The breeding population of the Greylag Goose *Anser anser* in Sweden, as in a number of other countries, has increased markedly in recent years (Fog et al. 1984, Madsen 1991). This has resulted in the establishment of large summer and autumn concentrations in different places leading to management discussions related to agricultural problems and hunting possibilities. A neck-banding project was therefore initiated in 1984 with the main aim to investigate the detailed migration and movement patterns of Greylag Goose populations in the Nordic countries (Nordic Greylag Goose Working Group 1988).

In order to understand the factors behind the increase in different goose populations and to be able to evaluate the effects of management practises on the future development of goose populations, a thorough knowledge of various aspects of the population dynamic is essential. One of the more important aspects in this respect is the variation in survival between different cohorts of geese and between different years. In this respect, it is also of special importance to study the survival of geese that experience different hunting pressures.

Neck-banding proved to be a very successful method to obtain information about staging, wintering and moulting areas and the movements between these for individual Greylag Geese from known breeding areas, with a very high resighting frequency (no less than 72% of adults seen on one or more occasions abroad). The original study in SW Scania, south Sweden, was therefore extended to include various aspects of the breeding ecology and population dynamics.

The Greylag Geese breeding in southwestern Scania mainly winter in two areas: the tradtional wintering area in Coto de Doñana in southwestern Spain and in the Dutch Delta (Andersson et al. 1990, Andersson, Follestad & Nilsson in prep.). Moreover, a smaller number has started to winter in Villafáfila in north-central Spain in recent years. On migration (mainly in autumn), the geese stage in the Netherlands and to some extent in areas between south Sweden and the Netherlands, whereas very

few have been seen staging between the Netherlands and Spain. In spring, young geese and non-breeders return to south Sweden, making a moult migration mainly to the Netherlands in early summer. In late summer and autumn the majority of these geese return to staging areas in southwestern Sweden before the autumn migration.

The geese wintering in the Netherlands and Spain experience different hunting pressures. Whereas the hunting pressure in the Netherlands may be characterized as moderate or slight, it may in some years be heavy in southern Spain. The winters 1989/90 and 1990/91 were characterized by extremely heavy hunting in southwestern Spain (Persson 1992). The total number of shot and retrieved Greylag Geese in southwestern Spain in 1989/90 and 1990/91 were >30,000 and >20,000, respectively. In 1987/88 and 1988/89 the total hunting bag was >20,000 and 6-10,000, respectively, whereas only a few hundred Greylag Geese were shot in 1991/92. Different goose populations show different distributions in the main wintering areas (Persson in prep.), and during 1987/88 Greylag Geese from Scania did not occur in larger numbers in the heavily hunted areas.

The Greylag Geese from SW Scania are thus suitable for a study on variation in survival related to different choice of wintering areas with different hunting pressures. In this paper we present data on the annual survival rates for different age cohorts of Greylag Geese. We especially try to evaluate the survival of geese related to their different choice of wintering areas with different hunting pressures. For young birds we also estimate the survival between different parts of the annual cycle separately. Some preliminary data from this study were presented by Nilsson & Persson (1991).

Study area

Catches of pairs with young have been made annually since 1985 at four lakes in SW Scania (55 30'N,13 15'E), southernmost Sweden: Yddingen, Fjällfotasjön, Klosterviken and Börringesjön (Fig.1). The study area also includes a fifth breeding lake, Björkesåkrasjön, but no catching operations were made here. The lakes are situated in a rolling landscape mainly used for agricultural purposes. The study area also includes the coastal bay Foteviken in SW Scania. During the first years, Lake Snogeholmsjön, situated 30 km to the east, was also included in the study area. For a more detailed description of the study area, see Nilsson & Persson (1992).

Methods

Between 1984 and 1991 a total of 235 adult and 697 young Greylag Geese were neck-banded in the study area. Moreover, 23 adults and 67 goslings were neck-banded at Lake Snogeholmssjön.Regular checks for the occurrence of neck-banded geese were undertaken from the arrival in February/March to the departure in November, the entire area being searched about once a week. More frequent observations were made during arrival and hatching periods in spring.

The survival estimates presented here are mainly based on observations made in the study area. Almost all surviving adults returned to the marking area. Actually,in 98.1% of all cases, when an adult was known to be alive during a breeding season (N = 324 seasons* individuals), the bird was seen in the marking area. Likewise, for geese marked as young, most estimates of survival are based on observations from SW Scania. For geese marked during 1988-1991, 97.5% of the survival estimates of 389 individuals were based on observations in Scania (88.5% for 130 young marked 1985-1987 when field work was less intensive). In most cases, series of observations were obtained, so few last observations (and survival

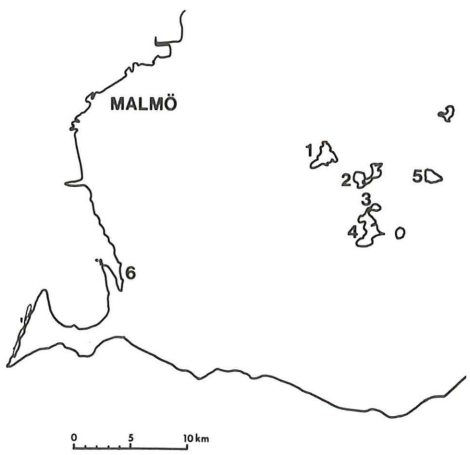

Fig.1. The study area in SW Scania.

Undersökningsområdet i SV Skåne. 1. Yddingen, 2. Fjällfotasjön, 3. Klosterviken, 4. Börringesjön, 5. Björkesåkrasjön, 6. Foteviken.

estimates) rely on single observations of a marked goose. For geese marked as adults we do not have one single case of a "missing" year, i.e. a neck-banded individual not seen during one year but well later (with the exception of a few known cases of neck-band losses, see below). For birds marked as young, the frequency of missing years was about 2% (N = 844 seasons*indivudals). Young geese marked in 1985 and 1986 were excluded from these calculations as the number of visits to the study area were fewer in those years and there thus were larger risks that an indvidual staying for a short period was overlooked. This does not apply to adults with their high site tenacity. Missing years for a small number of young geese is mainly related to dispersal of a few individuals out of the study area after their first moult (Nilsson & Persson unpubl.).

Outside SW Scania, sightings of neck-banded Greylag Geese were obtained from a network of observers. The chances of resighting vary markedly between different countries, being high in the Netherlands, where important staging areas and the wintering area in the Delta were regularly checked, and lower in Spain due to much fewer bird watchers and more difficult areas. However, intensive field work was undertaken in Spain by one of the authors (H. Persson), especially in 1989/90 and 1990/91.

The data base used for this analysis includes 33,200 resightings from the study area in SW Scania and 6,500 resightings from other areas.

As most of the geese were marked during June, we calculate survival rates per 1 July for the different years. Annual survival rates were expressed as the number of geese resighted after 1 July in year t+1 as per cent of the number resighted after 1 July in year t. When comparing the first winter survival of young wintering in Spain and the Netherlands (Table 4), we have used 1 April instead of 1 july to avoid any effects of the first moult migration on the survival estimates.

In the analysis we separate three age groups: juveniles (over the first winter), subadults (over the second and third winter for birds marked as young) and adults (known breeders). Older geese marked as young have only been included in the adult sample if they were known to have bred in the study area.

In connection to this it should be remembered that estimates of survival rates based on neck-band resightings are biased due to neck-band losses (cf. Ebbinge et al. 1991, Samuel et al. 1990). In our study, we recorded some losses in the beginning, especially among breeding males, but conditions improved when we changed to a new material in the neck collars in 1986. During the catching operations, a number of previously marked geese were regularly caught. For geese marked after 1986, three of 41 adult males had lost the neck-band compared to one of 44 adult females and one of 22 marked as young. Taking the exposure time into consideration (on average 2.6 years), this corresponds to an annual loss rate of about 1.8%. The replacement of lost and broken neck bands during the round-ups reduced the effects of neck band losses on the calculations of survival rates especially for adults, and we have accordingly not used any correction factors. Moreover, practically all neck-bands were retained over the first winter. Thus neck-band losses could potentially have some slight effect on survival estimates for subadults but even here we considered the effect too small to try to calculate correction factors.

Results

Survival between fledging and departure

During 1984-1990, 216 families could be followed from fledging of the young until departure from SW Scania, and the number of young was established (Table 1). During this period, 6% of the fledged young were lost.

Table 1. Losses of young Greylag Geese in families with marked parents from fledging (10 July) until departure from SW Scania in autumn (or last observation where the number of young in the family could be determined).

Förluster av unga grågäss i familjer med märkta föräldrar från det ungarna blev flygga (10 juli) till bortflyttningen från SV Skåne på hösten (eller sista tillfälle när antalet ungar i familjen kunde fastställas).

	Number of families *Antal familjer*	Total number of young *Totalt antal ungar* Fledged *Flygga*	at last obs. *vid sista obs.*	Losses of young % *Ungförluster %*
1984	2	15	15	0
1985	17	65	64	1.5
1986	17	82	78	4.9
1987	33	120	109	9.2
1988	40	139	129	7.2
1989	54	205	195	4.9
1990	53	182	166	8.8
Total	216	808	756	6.4

Table 2. Annual survival (%) of neck-banded Greylag Geese from SW Scania during years with normal (85/86-88/89) and heavy (89/90, 90/91) hunting pressure in the main wintering area in southwestern Spain. The number of marked birds known to be alive by 1 July in year t+1 is shown as per cent of the number known to be alive by 1 July in year t (shown in brackets) or for young birds in their first winter as per cent of the number known to have fledged. Note: data for first-winter birds in 85/86 not included due to lower chance of observations compared to first-year birds in later years (see text).

Årlig överlevnad (%) för halsringmärkta grågäss från SV Skåne under år med normalt (85/86-88/89) respektive högt (89/90, 90/91) jakttryck i det viktigaste övervintringsområdet i sydvästra Spanien. Antalet märkta grågäss som setts efter 1 juli år t+1 anges som procent av det antal som setts efter 1 juli år t (visat inom parentes) eller för unga gäss under första vintern i procent av det antal som blev flygga. Unga gäss vintern 85/86 har uteslutits eftersom chanserna för observation av dessa var lägre än under senare år (jfr. texten).

	Marked as young and controlled in their		Adults
	First winter	Second and third winter	
	Märkta som unga och kontrollerade under		*Vuxna*
	Första vintern	*Andra och tredje vintern*	
1985/86-88/89			87 (242)
1986/87-88/89	79 (215)	77 (173)	
1989/90-90/91	72 (255)	73 (280)	80 (293)
Total *Summa*	76 (470)	74 (453)	83 (535)
Chi^2	2.68, n.s.	0.91, n.s.	4.66, P<0.05

First year survival

The overall survival of young from fledging to 1 July the next year was 76% (Table 2), with a significant variation between years, from 65 to 92% (Fig. 2). Based on observations made in SW Scania, the first winter survival was 67%, being significantly different from the estimate presented above (Ch^2= 6.08, P< 0.02). With 1 July as datum line, a small number of young that do not return to Sweden after their first moult migration and dies before they return next spring will be lost in the calculations based only on data from SW Scania. On the other hand, these individuals were mainly recorded in autumn staging areas south of Sweden. With 1 April as datum line, the survival estimate based on observations in Scania is 72%, which is not significantly different from the estimate based on the entire data set (Ch^2=1.26, n.s.).

First year survival of birds from different lakes varied within years. In 1987, the survival of fledglings from Lake Yddingen was significantly lower than for those from the other lakes. In 1988, on the other hand, fledglings from Lake Yddingen had a very high survival (Table 3).

Survival also varied between wintering areas. Table 4 shows first winter survival of all young geese with known wintering quarters, i.e. marked parents or brood mates were actually seen in winter, either in Coto de Doñana or in the Netherlands (Dutch Delta or for two families Flevoland). This procedure was necessary in order to assign the winter area of young that were lost early. The overall first winter survival for young birds from fledging to 1 April next year (se above) was 90% for Dutch wintering birds compared to 72% for those wintering

Table 3. First-year survival (%) of fledged young from different lakes. Number of fledged young is given in brackets. G-test used for cases when Chi^2 was not applicable (*).

Överlevnad (%) av flygga ungar från olika sjöar under första året efter märkningen. Antalet flygga ungar anges inom parentes. G-test utnyttjat när Chi^2 ej kan tillämpas (*).

Marking year *Märkår*	Yddingen	Fjällfotasjön	Klosterviken	Börringesjön	Chi^2	P
1985	50 (16)	64 (28)	80 (10)		2.42	n.s.
1986	90 (20)	100 (2)	100 (2)		0.76*	n.s.
1987	61 (36)	81 (21)	87 (30)	91 (11)	7.97*	0.05
1988	96 (24)	65 (20)	77 (31)	72 (18)	8.23*	0.04
1989	69 (26)	100 (2)	80 (41)	77 (48)	2.16*	n.s.
1990	75 (56)	59 (27)	72 (29)	62 (26)	2.96	n.s.
Total Summa	74 (178)	68 (100)	80 (143)	74 (103)	4.33	n.s.

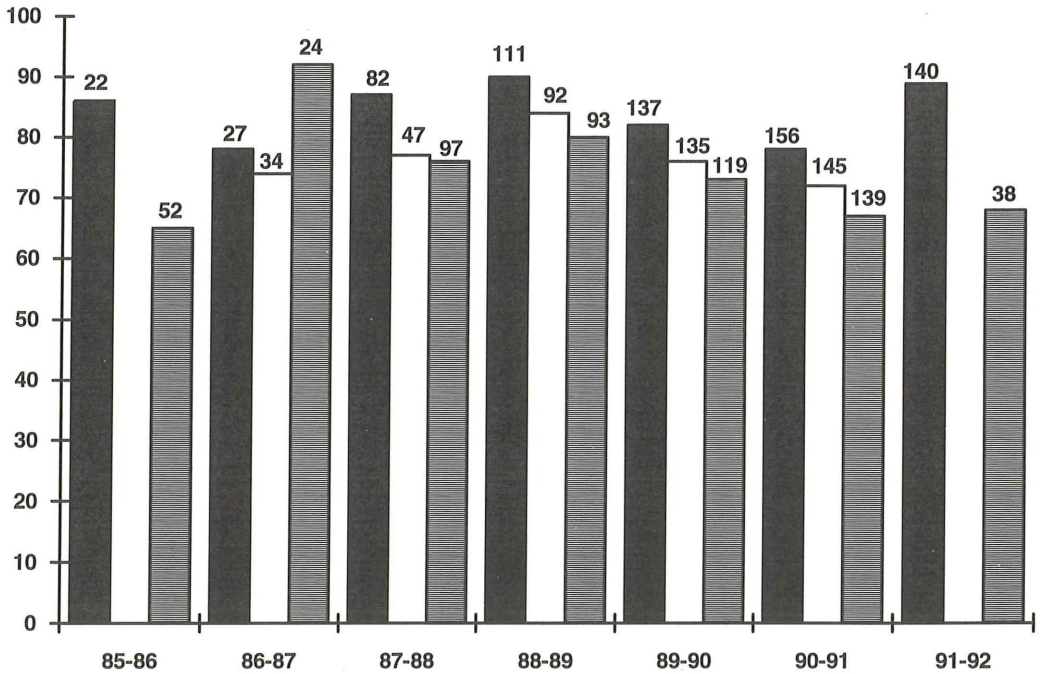

Fig. 2. Annual survival rates (per 1 July) for Greylag Geese from SW Scania. Adults (filled bars), subadults (unfilled bars) and juveniles (hatched bars) are shown separately. For 1991/92, only adults and young are included as too short a period has passed for all subadult birds to have a chance to be reported. The annual variation was significant for adults (Chi^2=11.59, P=0.03) and juveniles (Chi^2=10.44, P<0.05) but not for subadults (Chi^2=4.14, n.s.).

Årliga överlevnadsvärden (per 1 juli) för grågäss från SV Skåne. Adulta (fyllda staplar), subadulta (ofyllda staplar) och unga (streckade staplar) visas separat. För 1991/92 redovisas endast adulta och unga eftersom för kort tid passerat för att alla subadulta gäss skall ha haft en chans att rapporteras. Den årliga variationen var signifikant för vuxna (Chi^2=11.59, P=0.03) och unga (Chi^2=10.44, P<0.05) men inte för subadulta (Chi^2=4.14, n.s.).

in Coto de Doñana, the difference being highly significant (Chi^2=9.65, df=1, P<0.002). During the two winters (1989/90 and 1990/91) with intensive field work in Spain, the difference between the areas was particularly marked in 1990/91 (Fig. 3).

In 30 families, the number of young could be determined soon after the arrival to the winter quarters in Spain (Coto de Doñana). Seventeen per cent of the young seen in Sweden (N=109) were lost before the first resighting of the family in Spain. For 8 families wintering in the Dutch Delta, 7% of 42 young were lost.The difference between Dutch and Spanish wintering families was not significant (Chi^2=2.58, P=0.11).

Survival of older birds

After the first year, the overall survival of birds marked as young was 74% over the following two winters (Table 2). For those marked as adults, the overall survival was 83%. Survival estimates based on observations made in SW Scania were 77% for subadults over their second and third winters and 80% for those marked as adults. These estimates were not significantly different from the estimates based on the entire data set (Chi^2= 1.34 and 2.79 for subadults and adults, respectively). The slightly lower estimate for the restricted data set is related to a few adults seen in Scania in spring who left in early summer, thereafter being seen in Denmark and/or the Netherlands after 1 July.

Table 4. First winter survival (to 1 April) of marked young wintering in, or migrating to Coto de Doñana and the Dutch Delta, respectively. Only young with one or both parents marked are included. Individuals not seen in the winter quarters are allocated to winter area according to observations of their parents. Total number of young per winter area and season shown in brackets.

Överlevnad till 1 april för märkta ungar som övervintrat eller flyttat till Coto de Doñana eller det holländska deltat. Endast ungar med minst en märkt förälder medräknas, ungar som ej setts i vinterkvarteret hänförs till vinterområde efter föräldrarna. Antalet ungar per vinterområde och år anges inom parentes.

	Winter area *Vinterområde*	
	Coto de Doñana	Dutch Delta
1985-86	69 (16)	-
1986-87	90 (10)	-
1987-88	76 (54)	91 (11)
1988-89	69 (39)	92 (26)
1989-90	70 (47)	84 (19)
1990-91	69 (26)	90 (21)
Total *Summa* 1987/88-90/91	72(166)	90 (77)

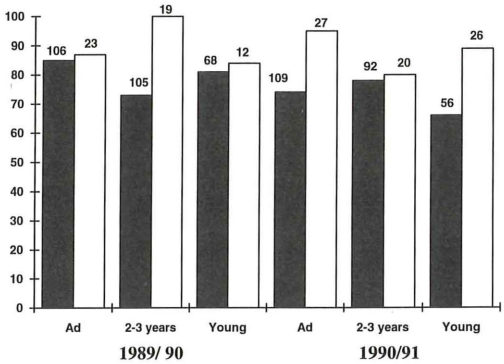

Fig. 3. Survival of Greylag Geese from SW Scania wintering in SW Spain (filled bars) and the Netherlands (unfilled bars) in 1989/90 and 1990/91.

Överlevnad för grågäss från SV Skåne, som övervintrat i SV Spanien (fyllda staplar) resp. Nederländerna (ofyllda staplar) 1989/90 och 1990/91.

The annual survival rates for birds marked as adults showed a significant variation between years (Fig. 2). Particularly high survival rates were found in 1987/88, 1988/89 and 1991/92, whereas the survival was only 78% between 1990 and 1991. The subadults did not show any significant variation over the years. As noted above, 1991/92 was a year when few Greylag Geese were shot in southwestern Spain. In 1987/88, the hunting pressure was very high, but the geese from Scania mainly stayed in areas where hunting was less heavy (H. Persson unpubl.).

Separate survival values were calculated for those wintering in the Dutch Delta and Coto de Donana (Table 5), using geese that had been known to spend the winter there during previous seasons. Overall survival rates for adult geese wintering in the Netherlands were significantly higher than for those wintering in Coto de Doñana. Marked differences in survival rates were found for geese using the different winter areas in 1989/90 and 1990/91, whereas the data from the Netherlands were too few in the other years to calculate annual survival rates (Fig. 3).

Table 5. Annual survival (%) of neck-banded Greylag Geese wintering in the Netherlands (mainly the Dutch Delta) and Coto de Doñana. Accumulated number of individuals per winter shown in brackets.

Årlig överlevnad (%) av halsringmärkta grågäss övervintrande i Nederländerna (huvudsakligen deltaområdet) och Coto de Doñana. Antal individer anges inom parentes.

	The Netherlands	Coto de Doñana	Chi^2	P
Adults	94 (88)	85 (414)	5.21	<0.05
Subadults	88 (65)	80 (348)	2.18	n.s.

Timing of mortality

The actual date of death was only known in a few cases when the birds were shot. With the intensive checks for marked geese in all areas the last date of observation will give some indication on when most mortality occured (Fig. 4). The vast majority of last observations was made in October and November for all age groups, indicating the importance of losses during the autumn migration for the overall losses among the Greylag Geese. Losses during spring migration were minimal except for subadults wintering in Spain (Table 6).

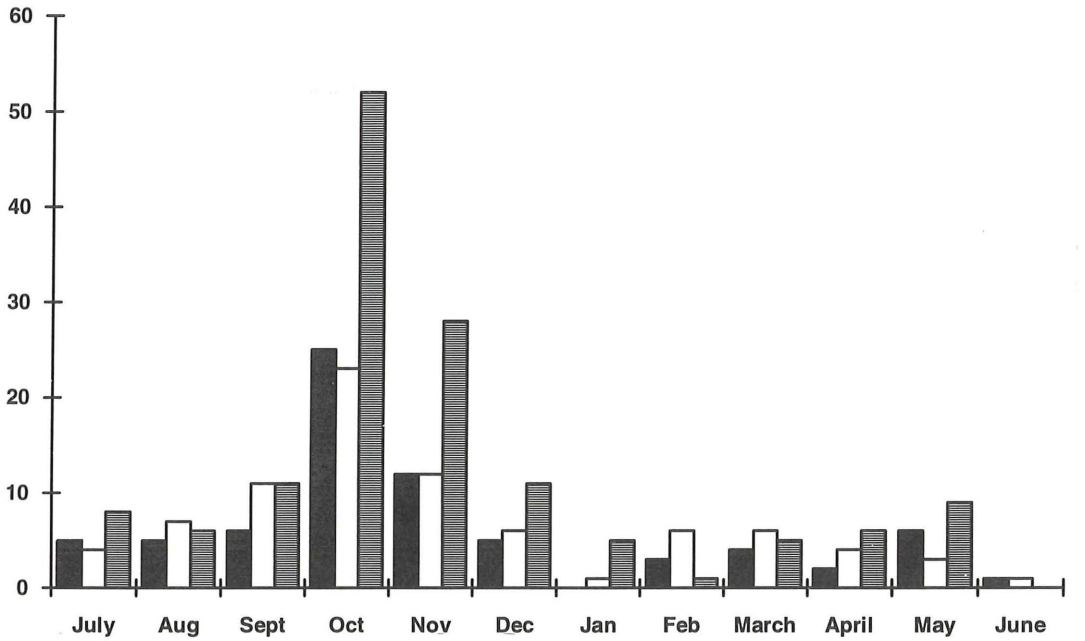

Fig. 4. Monthly distribution of last observations of Greylag Geese from SW Scania. Number of individuals: juveniles (hatched bars) 142, subadults (unfilled bars) 84 and adults (filled bars) 69. Last marking years included are for juveniles 1990, adults 1989 and subadults 1988 (marked as young).

Månadsfördelning av sista observationer av grågäss från SV Skåne. Totalt antal redovisade individer: unga (streckade staplar) 142, subadulta (ofyllda staplar) 84 samt adulta (fyllda staplar) 69. Sista medtagna märkår är för unga 1990, adulta 1989 och subadulta 1988 (märkta som ungar).

Discussion

Data on the survival rate of Greylag Geese originating from this flyway, as well as from central Europe, have been presented by Paludan (1973) on the basis of traditional ringing data. For adults, the annual mortality rate was 32% compared to 41% for young birds. These rates are higher than the data obtained in our study: 17% for adults and 24% for juveniles. As the estimates have been obtained by completely different methods they are not directly comparable. It is, however, clear that the mortality rate for the Greylag Goose has decreased since Paludan's study. In this respect it should be remembered that our values are slightly too high due to an estimated 2% loss of neck-bands per year.

During recent years a number of statistical methods for the calculation of survival rates and other demographic parameters based on resightings of marked birds have been presented (Clobert & Lebreton 1991; for a review see also Ebbinge et al. 1991). Most studies on geese using neck collars or coloured legbands for survival estimates rely on observations from voluntary observers in different staging and wintering areas and thus have to compensate for differences in resighting possibilities.

Table 6. Survival (%) during spring migration of Greylag Geese seen in Coto de Doñana and the Dutch Delta in January - February 1990 and 1991. Number of individuals shown in brackets.

Överlevnad (%) under vårflyttningen för grågäss sedda i Coto de Doñana och det holländska deltaområdet i januari-februari 1990 och 1991. Antal individer anges inom parentes.

	Dutch Delta	Coto de Doñana
Adults	95 (19)	96 (49)
Subadults	100 (21)	86 (74)
Juveniles	100 (16)	100 (34)

In our study, on the other hand, we based the estimates almost entirely on intensive observations in the breeding areas. As the resighting effort was thorough and the resighting probability very high in the study area there was no need to compensate for differences in resighting possibilities. The site tenacity is high for the adults (including those marked as young when recruited to the breeding population when older) with more than 98% of those known to be alive actually seen in the study area Nilsson & Persson unpubl.), so an adult goose that has not been seen in Scania and has not lost its neck-band can with confidence be considered as dead. The differences in resighting possibilities in the Netherlands and Spain have no influence on the survival estimates presented here as the absolute majority of the estimates are based on observations in SW Scania. Moreover, the few young geese that do not return to Scania after the moult in the Netherlands spend late summer and autumn in the Netherlands or in Denmark and Germany, where the chances of resighting are high. The only influence of the lower resighting chances in Spain and in the Dutch Delta compared to other areas will be on the number of geese that can be identified as wintering in the two areas. To fully elucidate the possible effects of the resighting chances on the survival estimates we also presented survival rates based only on observations obtained in SW Scania, which showed very small differences compared to the estimates based on the entire dataset.

For young birds, a proportion of 6% was lost between fledging and last observation in SW Scania before the start of autumn migration. The causes of these losses are unknown as there was only a negligible amount of shooting of Greylag Geese under license here for crop protection. For young geese the main mortality occurred between the last sighting in Scania and the arrival in the winter quarters. Most last observations for elder geese were also obtained during this time of the year.

The decrease in mortality rate for Greylag Geese is probably related to changes in the hunting pressure as most known deaths were caused by hunting. The importance of hunting is also seen in the annual pattern of survival in our study population. For all age groups the survival was significantly higher during the seasons of 1986/87-1988/89 compared to 1989/90 and 1990/91. In the latter two seasons, the hunting pressure in the Guadalquivir Marismas in southwestern Spain, the main wintering area within this flyway, was extremely high. The geese were especially vulnerable as they were forced to feed on the much hunted rice fields outside the protected Doñana National Park due to a high water level that made feeding impossible in most areas in the park (Persson 1992). The importance of hunting can also be seen in the differences in survival between geese wintering in Coto de Doñana and the Dutch Delta. The geese are hunted in the Netherlands, but not to the same extent as in southwestern Spain. The mortality of Spanish wintering geese is probably to a large part related to hunting with heavy losses at arrival in southwestern Spain but also during migration through France and northern Spain. Autumn migration is, however, a risky procedure even for protected species such as the Barnacle Goose (Owen & Black 1989, 1991). The importance of hunting for the populations of geese has been discussed by Ebbinge (1985, 1991) who found that recent increases in three arctic breeding goose populations were related to changes in hunting policies with decreased hunting pressure (one case) and total protection (two cases). In this context, it is maybe more than a coincidence that the rapid increase of the studied population occurred after the closure of hunting within the Doñana National Park in 1983/84 (Calderón et al. 1991).

In light of the differences in survival between different wintering areas it is interesting to note the changes in winter distribution of the Greylag Goose that have occurred in recent years. Numbers wintering in the Dutch Delta have increased (Castelijns et al. 1991) and a new important wintering area at Villafáfila in northern Spain has been established (Rodriguez & Palacios 1991). In both these areas, hunting pressure is much lower than in southwestern Spain. These changes probably have two causes. The increase in the Dutch Delta probably reflects the general population increase whereas the increase at Villafáfila, at least partly, is due to a redistribution within Spain. Neck-banded birds that earlier wintered in southwestern Spain now stop at Villafáfila for wintering or prolonged autumn staging. Many of the geese seen in Villafáfila in autumn move on to Coto de Doñana in December or January and even as late as in February (Persson in prep.).

The rapid increase in the number of wintering Greylags in the Dutch Delta may have arisen without a redistribution between wintering areas. This is shown by the segment of the Scanian Greylags wintering there. Besides a higher survival rate, they return earlier to the breeding areas than birds wintering in Spain, and pairs arriving early were found to be more productive than those arriving late (Nilsson & Persson in prep.). However, it shall be

kept in mind that these results were obtained during a succession of mild winters, this strategy perhaps being less favourable during more severe winters.

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Sammanfattning

Variation i överlevnad hos en växande grågåspopulation i Skåne, södra Sverige.

Grågåsbeståndet i Sverige liksom i ett flertal andra europeiska länder har ökat markant under senare år, varvid bl.a. ett betydande antal nya koncentrationsområden etablerats. Detta ledde till att NKV startade ett halsringmärkningsprojekt i de olika nordiska länderna. I denna uppsats analyseras det insamlade materialet för de skånska gässen med avseende på variation i överlevnad för olika åldersgrupper mellan olika år samt relaterat till olika val av vinterkvarter.

Metoder

Under 1984-1991 fångades och halsringmärktes 235 gamla och 697 unga grågäss vid Yddingen, Fjällfotasjön, Klosterviken och Börringesjön i SV Skåne, varjämte 23 gamla och 67 unga gäss märktes vid Snogeholmsjön. Undersökningsområdet i Skåne kontrollerades intensivt under hela säsongen. Dessutom erhölls ett stort antal kontroller från ornitologer i olika delar av Europa. Eget fältarbete bedrevs under flera säsonger i det viktigaste övervintringsområdet i Spanien. Totalt baseras föreliggande analys på en databas omfattande 33 200 avläsningar från det skånska undersökningsområdet och 6500 avläsningar från andra områden.

Vuxna grågäss visar en mycket hög grad av ortstrohet, varför man kan utgå ifrån att en vuxen grågås som ej observerats under en tid ej längre finns i livet. Även hos unga grågäss är troheten mot födelseområdet stark. Den årliga överlevnaden hos grågässen har beräknats som antalet individer sedda efter den 1 juli år t+1 i procent av det antal som sågs efter 1 juli år t. När höstsäsongen år t+1 avslutats har som regel endast få gäss setts, vilka inte tidigare observerats i SV Skåne. Under de senaste åren har överlevnadsberäkningen justerats för 2,5% av de unga gässen på basis av utlandsobservationer.

Resultat och diskussion

I 216 familjer kunde överlevnaden hos ungarna följas från det de blev flygga tills de lämnade Skåne på hösten. Förlusterna uppgick i genomsnitt till 6% (Tabell 1). I medeltal var överlevnaden för unga gäss från det de blev flygga till den 1 juli året därpå 76%, men en betydande variation noterades mellan olika år (Fig. 2, Tabell 2). 1989/90 och 1990/91 kännetecknades av ett extremt högt jakttryck i det för grågässen viktiga vinterområdet Coto de Doñana med en låg överlevnad för de märkta grågässen som resultat.

Överlevnaden för unga grågäss varierade också mellan de olika häckningssjöarna (Tabell 3) samt i relation till gässens val av vinterkvarter (Tabell 4). För unga gäss som övervintrade i det holländska deltaområdet var den årliga överlevnaden 90% mot 72% för dem som övervintrade i Coto de Doñana (Fig. 3). I ett antal familjer med märkta vuxna kunde antalet ungar fastställas både omedelbart före bortflyttningen från Sverige samt vid ankomsten till vinterområdet. För grågäss som flyttade till Spanien förlorades 17% av 109 ungar mot endast 7% av 42 för grågäss som flyttade till det holländska deltat.

Gäss märkta som ungar visade samma överlevnad över sin andra och tredje vinter som över den första (Tabell 2). Variationen mellan olika år var måttlig. Gäss märkta som adulta visade en betydande variation i överlevnaden mellan olika år (Fig. 2). I genomsnitt var överlevnaden 87% för åren med lågt eller normalt jakttryck i Spanien jämfört med 80% för 1989/90 och 1990/91 med högt jakttryck i Spanien. Liksom för unga grågäss konstaterades en signifikant skillnad i överlevnad mellan adulta grågäss som övervintrade i Nederländerna och i Spanien.

För flertalet individer gjordes de sista observationerna i oktober eller november (Fig. 4). Detta indikerar att merparten av förlusterna inträffade i samband med höstflyttningen, vilken i tiden sammanfaller med jaktsäsongen. Förlusterna under vårsträcket var däremot minimala (Tabell 6).

Tidigare data över grågässens överlevnad (Paludan 1973) grundas på traditionell ringmärkning och är därför kanske inte direkt jämförbara med våra värden. Paludan beräknade mortaliteten för vuxna grågäss till 32% och för unga gäss till 41%. Motsvarande värden från vår undersökning var 17% resp. 24%.