Numbers and distribution of wild geese in the Netherlands, 1984-89, with special reference to weather conditions

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This paper deals with numbers of geese counted in the Netherlands from autumn 1984 through spring 1989. This period brought maximum numbers for Taiga Bean Goose (33,000), Tundra Bean Goose (204,000), Pink-footed Goose (23,000), White-fronted Goose (423,000), Greylag Goose (81,000), Canada Goose (1500), Barnacle Goose (138,000) and Dark-bellied Brent Goose (99,000). This means that the Netherlands regularly hosts entire or large proportions of populations of several species. Taken all species together, at least 700,000 to 900,000 geese spent part of their annual cycle in the Netherlands during 1984-89. Severe winters did not have a significant effect on population size through starvation or a diminished breeding success in the subsequent breeding seasons. The main effect of such winters was that the cold forced geese wintering east of the Netherlands westward. Depending on the snow situation and the species involved, the northern part of the country was often deserted by geese. The Delta area was then the main refuge. In general, the smaller and shorter-billed geese responded faster than the larger and stouter-billed geese upon the onset of severe weather.

This paper summarizes the results of goose counts in the Netherlands, covering the period from autumn 1984 to spring 1989, as organised by the Dutch Goose Working Group (Ganzenwerkgroep Nederland/België 1987a, 1987b, 1989, 1990, 1991). In previous reports (Rooth *et al.* 1981, Ebbinge *et al.* 1986) numbers during the preceding ten years, phenology and spatial distribution in relation to climatical and environmental conditions in the Netherlands have been described.

In the period under review the first three winters were severe, the last two mild (Fig. 1). This provides us with the opportunity to compare numbers and distribution of geese in relation to weather conditions within a short period of time. In addition, data from the only two other severe winters since 1970, viz 1978-79 and 1981-82, have been included, because both were different with respect to the snow situation.

Weather and snow conditions

Periods of severe cold occurred in January-February 1985, February 1986, and January-February 1987. The cold spell of January 1985 brought much snow. However, in southwest Friesland hardly any snow was present. The winter 1985-86 was almost without any snow, and grass had died-off by exposure to low temperatures and dry winds. In early March, green grass could only be found along the main rivers in the low-lying foreland pastures which had been protected by ice after earlier inundation. During January-February 1987, the northern part of the country received much snow. As in the previous winter grass had extensively died-off. The winters of 1987-88 and 1988-89 were very mild and did not bring any significant frost or snow.

The two severe winters included for comparison, are a) 1981-82, with in December and January heavy snowfall in the north-

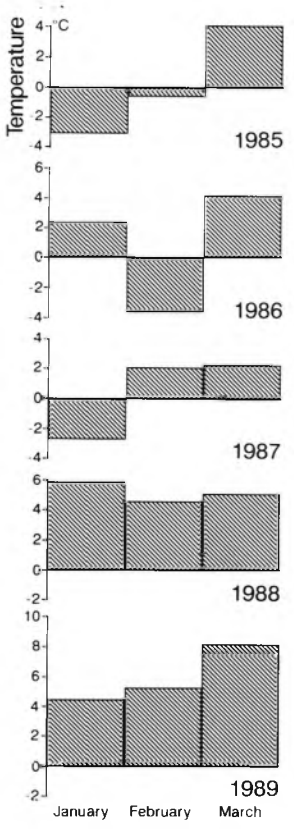

Figure 1. Mean temperature per month in the central Netherlands (weather station De Bilt).

ern and central parts of the country but with the Delta area in the southwestern part free of snow, and b) 1978-79, the only winter during which the entire country was snow covered for several weeks. This situation was aggravated by prolonged glazed frost at the end of January.

Species accounts

Bean Goose Anser fabalis - *LvdB*

Of the two races of Bean Goose wintering in the Netherlands the tundra breeding *A. f. rossicus* is the most abundant with tens of thousands in mild winters and 100,000-200,000 in severe winters. According to Huyskens (1986) these maximum numbers represent up to 40% of the European winter population. The subspecies winters predominantly in the central part of the Netherlands along the main rivers, in the newly created IJsselmeerpolders and in the Delta area. However, in 1984-85, when most geese remained concentrated along the main rivers, numbers in the Delta were small.

Numbers of the taiga race *A. f. fabalis* range from about 1000-2000 birds in mild winters up to over 30,000 in cold winters (Fig. 2). Huyskens (1986) estimates the size of the population at a maximum of 100,000 birds, and hence relatively few winter regularly in the Netherlands. Again, as for the tundra race, the central part of the country is the main staging area for *fabalis*. The overall distribution of both subspecies over the Netherlands is little influenced by weather conditions, the IJssel, Rhine, Waal and Meuse rivers remaining the stronghold. However, in 1978-79 the heavy snow and glazed frost forced the geese to move and many took refuge into the Delta area (Fig. 3).

Pink-footed Goose Anser brachyrhynchus – *ATA*

Pink-footed Geese wintering in the Netherlands originate from the Spitsbergen

Table 1. Peak counts of geese in the Netherlands, 1984-89.

	1984-85	1985-86	1986-87	1987-88	1988-89
Taiga Bean Goose	23,000	25,000	33,000	2,400	1,350
	(Feb.)	(Jan.)	(Feb.)	(Jan.)	(Jan.)
Tundra Bean Goose	161,000	115,000	204,000	64,000	45,000
	(Feb.)	(Jan.)	(Feb.)	(Jan.)	(Dec.)
Pink-footed Goose	17,500	18,600	19,600	22,800	16,400
	(Nov.)	(Nov.)	(Nov.)	(Nov.)	(Nov.)
White-fronted Goose	311,000	410,000	423,000	339,000	401,000
	(Jan.)	(Jan.)	(Feb.)	(Jan.)	(Jan)
Greylag Goose	60,000	62,000	49,000	62,000	81,000
	(Oct.)	(Nov.)	(Nov.)	(Oct.)	(Oct.)
Canada Goose	470	185	1,500	75	125
	(Feb.)	(Feb.)	(Feb.)	(Jan.)	(Jan.)
Barnacle Goose	58,000	85,000	90,000	106,000	138,000
	(Jan.)	(Dec.)	(Jan.)	(Jan.)	(Nov.)
Brent Goose	63,000	71,000	62,000	67,000	99,000
	(May)	(Apr.)	(May)	(May)	(May)

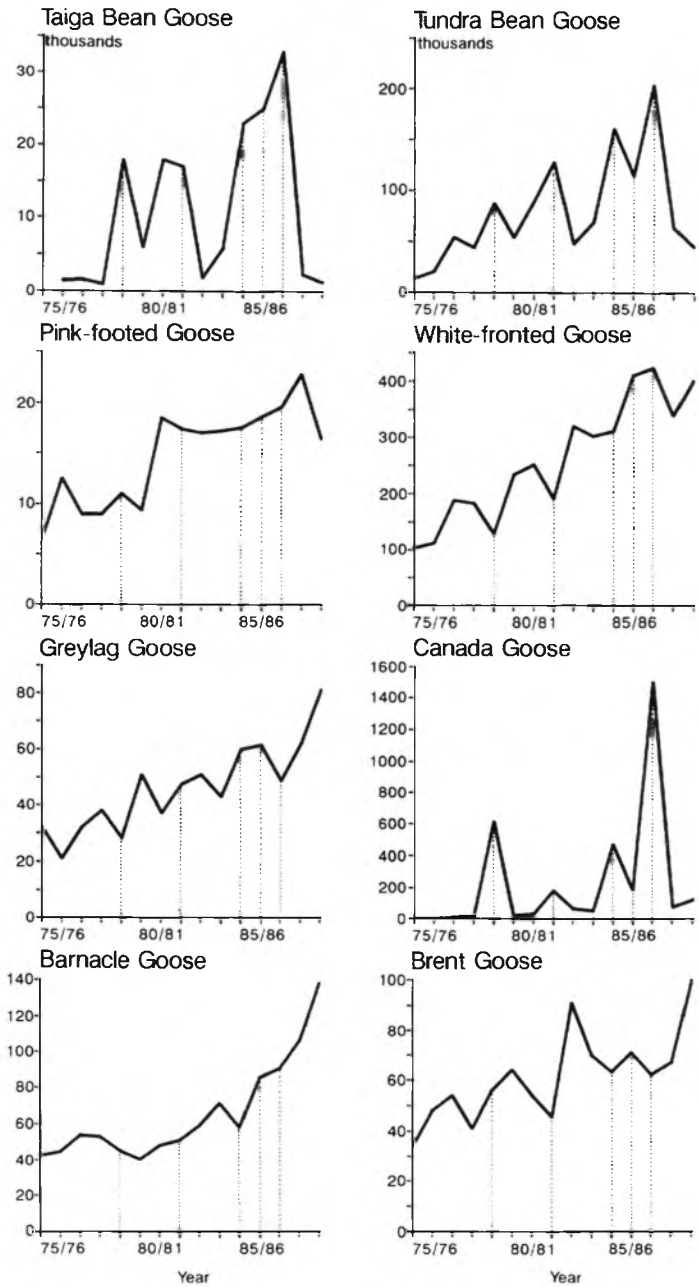

Figure 2. Annual peak numbers of geese in the Netherlands; dotted lines: severe winters.

breeding population, which numbers 25,000-27,000 birds (Madsen 1987). In the 1980s, peak numbers in the Netherlands increased from about 10,000 in the 1970s to 17,000-23,000 (Fig. 2). Nowadays, the first Pinkfeet arrive at the end of September, much earlier than in the 1970s. Peak numbers are reached in November, as before.

Within the Netherlands this species has a very restricted distribution with sizeable numbers in southwest Friesland only. Recently, however, a few hundred Pinkfeet established a new wintering area in

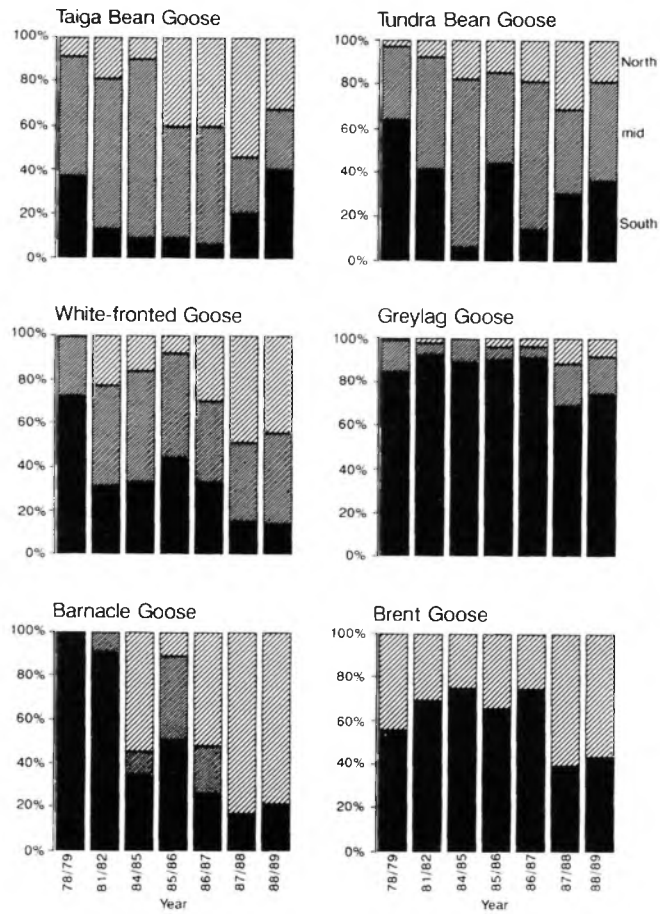

Figure 3. Distribution of geese across the Netherlands in January (black, shaded and light: southern, central and northern part of the Netherlands, respectively).

Delfland, west of Rotterdam.

In November and December, most birds move directly from Friesland to Flanders, Belgium, where numbers have recently increased to 10,000-15,000 birds (Fig. 4). In mild winters the geese return to Denmark as early as December. During cold spells, birds return from there to Friesland. During prolonged frost the birds flee further to the southwest, especially to Flanders where in cold winters usually an additional few thousands are counted (Meire *et al.* 1988).

White-fronted Goose Anser albifrons - *JPh*

From the Baltic-North Sea population a major proportion winters in the Netherlands where the species has increased since the 1970s in numbers from about 100,000-200,000 to 400,000 birds (Fig. 2).

In mild winters several tens of thousands may stay in the eastern FRG. During severe weather often all move westward

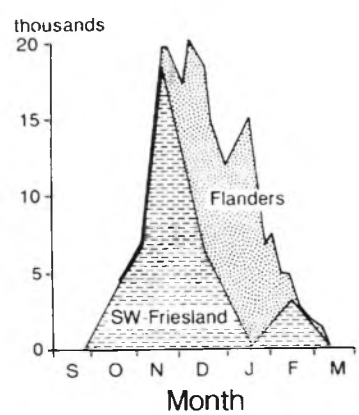

Figure 4. Numbers of Pink-footed Geese in southwest Friesland and Flanders in 1985-86.

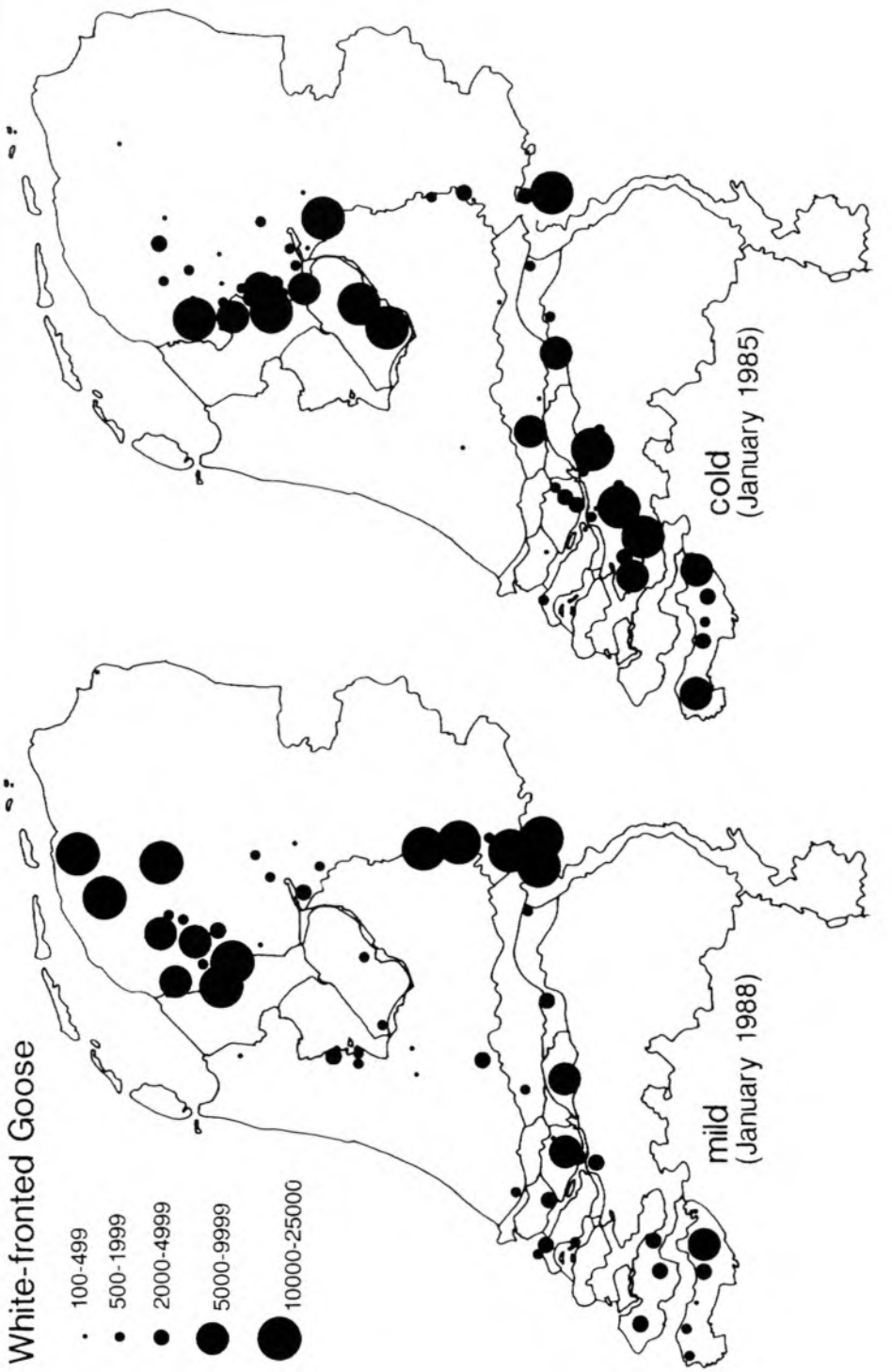

Figure 5. Distribution of White-fronted Geese in January of a mild (1987-88) and a severe winter (1984-85).

(Rutschke & Wessel 1987). In the Netherlands, however, total numbers are hardly affected by the weather situation (Fig. 2). The net effect is mainly an increase in numbers in Belgium. Thus, during 1985-87, 32,000-55,000 birds were counted there compared with 16,000-20,000 geese during the two subsequent mild winters. In severe winters, many geese move from the northern to the southern part of the Netherlands (Figs 3 and 5). This shift is most pronounced in years with extensive snow in the north as was the case in 1978-79. In 1985-86 and 1986-87 with little snow, the fresh green grass in river forelands, which were earlier protected by ice cover, attracted large concentrations of Whitefronts at the end of the winter.

Greylag Goose Anser anser - *JPr*

During the past 15 years the Greylag Goose in the Netherlands showed an annual growth in peak numbers of 7.5%, and maximum numbers increased from approximately 30,000 to 80,000. These numbers represent about 60% of the northwest continental European population (Madsen 1987). Largest numbers are present in October-early November (Fig. 6). In autumn, most geese are concentrated in the northern and central parts of the country, with the most important haunts in the Dollard, Lauwersmeer and in Flevoland. The majority of the geese of the northwest European population migrates to France and Spain (Rooth 1971), resulting in small numbers in the northern and central parts of the Netherlands during winter (average 4200 in 1984-88). In contrast, in the southwestern parts, Greylag Geese reach maximum numbers in winter (average 12,000 birds). The most prominent haunts in winter are the Verdronken Land van Saeftinge, the Grevelingen/Haringvliet area and the Biesbosch.

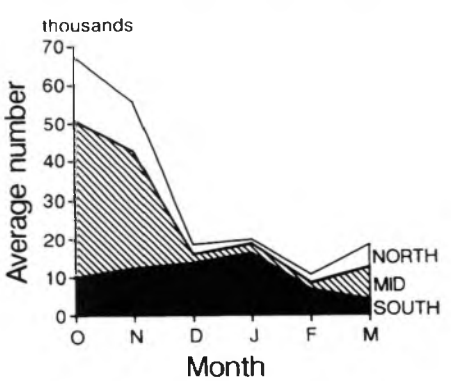

Figure 6. Average numbers of Greylag Geese across the Netherlands during winter, 1984-89.

Numbers of Greylags in the Netherlands appear to be little influenced by weather conditions. Thus, numbers during cold periods did not deviate substantially from the numbers in mild winters. This may be due to the fact that in winter influxes of geese from the east are negligible and that only a minor fraction then migrates further south to escape the winter conditions. However, when conditions deteriorate the northern part of the Netherlands is abandoned by the Greylags (Fig. 3).

Canada Goose Branta canadensis - *LvdB*

Up to the 1980s, only small groups of feral birds with numbers amounting to 15 birds at most were seen, except for a few wild stragglers. During the severe winter of 1978-79 there was a influx of more than 600 Canada Geese (Dirksen 1980). Most probably, these birds belonged to the Scandinavian breeding population, which normally winters in the Baltic. This hypothesis is supported by the presence of a few Swedish ringed birds (Dirksen 1980). During severe winters in later years up to a few hundreds visited our country, with a peak of 1500 birds in February 1987 (Fig. 2). During these visits the geese are mainly found on pastures along the main rivers, in particular the IJssel river, which is the first open water the birds meet coming from the northeast.

Barnacle Goose Branta leucopsis - *ML*

After an initial growth from several thousands Barnacles wintering in the Netherlands in the early 1950s to over 50,000 in the 1970s, numbers stabilised in the early 1980s after a series of poor breeding seasons. Then the population grew again quite spectacularly, exceeding 100,000 birds in 1987-88 and reaching 138,000 birds in 1988-89. In recent years the newly established population at Gotland, Sweden (Larssen *et al.* 1988) begins to contribute to the numbers counted in the Netherlands. The response to severe weather conditions varied markedly in the various winters (Figs 3 and 7). In 1978-79 with much snow, the Delta area harboured vir-

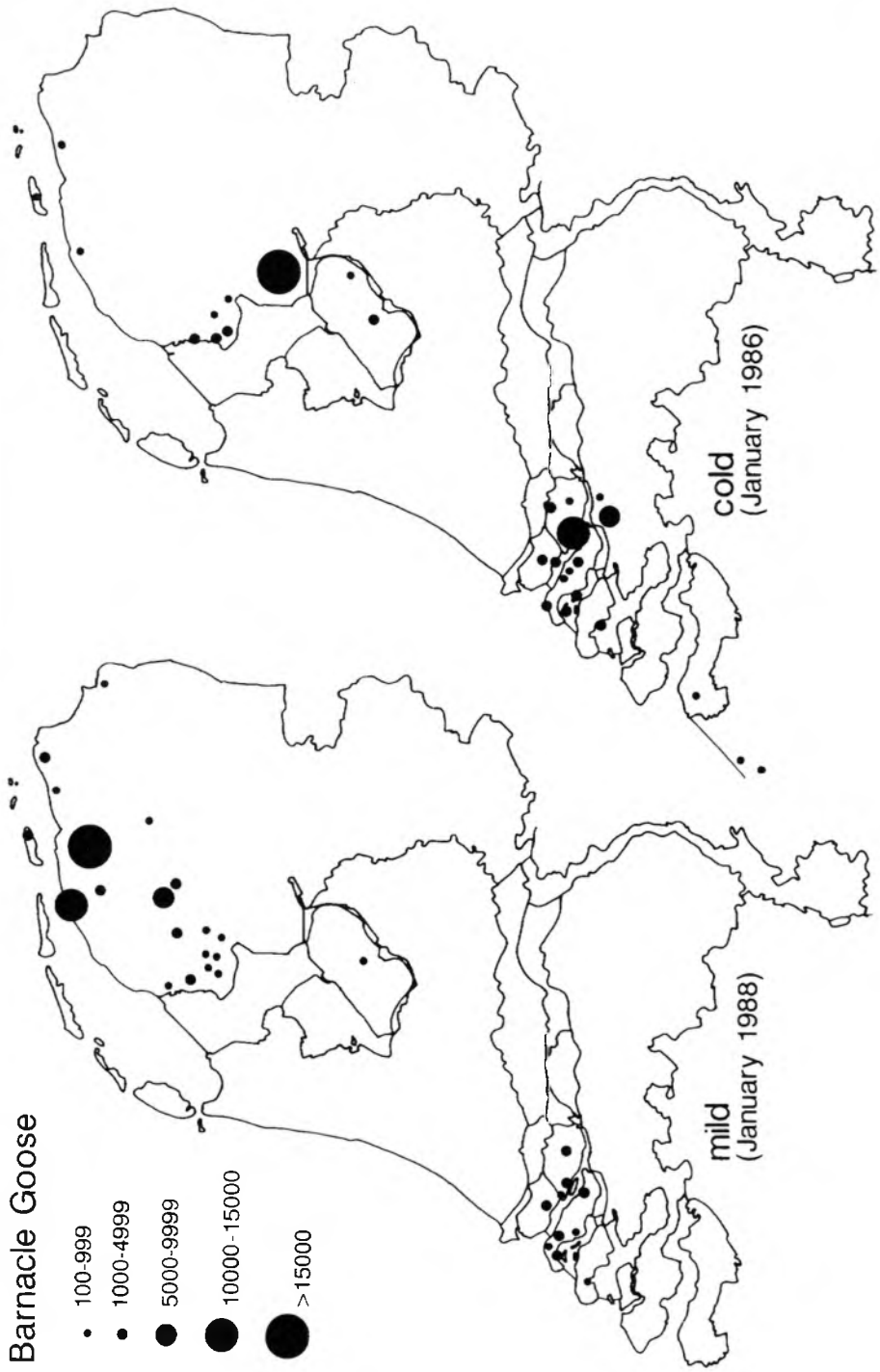

Figure 7. Distribution of Barnacle Geese in January of a mild (1987-88) and a severe winter (1985-86).

tually the entire population, apart from 3500 birds in Belgium and 1000 in France (Schricke 1983). In 1981-82, the population again took refuge in the northern part of the Delta area i.e. on the first snow-free feeding grounds they encountered. In the cold winter of 1984-85, no major shift to the southwest of the country took place at all. This time the geese found suitable feeding grounds in southwest Friesland. In 1985-86, the geese again left the northern part of the country but now most of them travelled only some tens of kilometers to the IJsselmeerpolders with a only 15,000 reaching the Delta area (Fig. 7). Finally, in the severe winter of 1986-87 no mass departure to the southwest of the country occurred, the birds remaining in southwest Friesland and in the IJsselmeerpolders.

Brent Goose Branta bernicla - *BE and AvH*

During the period under review the world population of the Dark-bellied Brent Goose numbered between 150,000 in 1984-85 and 240,000 in 1988-89 (A. St Joseph). In three seasons there were very few first-winter birds, but in the two other seasons breeding success was high (Table 2).

Table 2. Proportion of first-year birds in wild geese flocks in the Netherlands (%).

	1984-85	1985-86	1986-87	1987-88	1988-89
Taiga Bean Goose	24	33	17	19	30
Tundra Bean Goose	17	31	13	19	31
Pink-footed Goose	20	11	11	29	20
White-fronted Goose	20	40	12	24	46
Barnacle Goose	7	35	4	6	31
Brent Goose	1.5	35	0.5	2	40

Usually about 10% of the world population winter in the Dutch Wadden Sea, but severe cold spells may cause a marked decline in numbers in this subspecies' northernmost part of its wintering range. But even during such conditions more than 1000 birds may remain here. In January 1985, total numbers in the Dutch Wadden Sea declined after the mid-winter count to about 1300 birds, of which 200 died from starvation.

Numbers in the Delta area, to the contrary, are relatively stable throughout the season, even during severe winters. Still, sight-records of ringed birds in more southern areas show that some hard weather movements occur in such winters.

In March, numbers in the Wadden Sea build up rapidly as a result of immigrating birds that have spent the winter in France and Britain. March 1987 was exceptionally cold, and very little food was available to the geese. Several colour-ringed birds that were observed in the Wadden Sea that month, were seen back later that month in East-Anglia.

The severe winters of 1985-86 and 1986-87 brought influxes of several tens of the pale-bellied subspecies *Branta bernicla hrota*. Most birds were observed in the Delta area and in the western Wadden Sea, with a maximum of about 100 birds. In the severe winters 1978-79 and 1981-82, 100 and 190 birds, respectively, were present.

Discussion

During 1984-89, the Greylag Goose, the White-fronted Goose and the Barnacle Goose increased considerably in numbers while the increase of the Pink-footed Goose and the Brent Goose was less pronounced. Severe winters resulted in record numbers of Taiga and Tundra Bean Goose, and the Canada Goose. This means that at least 700,000 geese (in 1986-87 up to 880,000 birds) spent part of their annual cycle in the Netherlands. Each year the country harboured almost the entire Russian breeding population of the Barnacle Goose, most of the Baltic-North Sea wintering population of the White-fronted Goose, the majority of the Spitsbergen Pinkfeet and 60% of the northwest continental European population of the Greylag Goose. During cold winters the Netherlands functioned as a refuge area for important parts of the populations of taiga and tundra Bean Goose. New were the invasions of up to 190 Pale-bellied Brent Geese and 1500 Canada Geese during cold spells. In spring, the Netherlands hosted about one third of the population of the Dark-bellied Brent Goose.

The increases in population size is assumed to be caused mainly by restrictions on hunting that came into force during the last decades (Ebbinge 1985). In the

present study period, population growth has been boosted by excellent breeding seasons in 1985 and 1988 for all species investigated.

Two effects of weather on numbers and distribution can be discerned. Firstly, large scale movements caused by snow in countries northeast of the Netherlands lead to influxes of Bean Geese, Whitefronts and Canada Geese. In addition, cold weather in the Netherlands causes emigration of Brent Geese to Great Britain and France. Under very extreme conditions when food becomes inaccessible, other species emigrate as well, such as, for example, Barnacle Geese to Belgium and France in 1978-79.

Secondly, movements which are also mainly determined by accessibility of food, occur within the Netherlands. In cold winters the snow-covered northern parts of the country are often abandoned. The Delta area with generally less snow is then often the main refuge. In addition, the availability of fresh green grass, and perhaps open water, influences distribution. This is illustrated by the presence of large numbers of Whitefronts in river forelands.

The response to severe weather was not the same for all species. The larger and stouter-billed Bean, Greylag and Canada Geese which probe for food, showed a stronger tendency to stay during cold periods than the smaller and shorter-billed Barnacle and Pink-footed Geese, which quickly responded by leaving their snow-covered wintering areas to snow-free pastures in the south. The White-fronted Goose occupied an intermediate position. Compared with the bigger geese, the smaller species are in a less favourable position with respect to both thermoregulation (Lefebre & Raveling 1967) and feeding capabilities.

The counts do not indicate that cold winters significantly reduce population size through starvation or poor reproductive success in the subsequent breeding seasons. A very successful breeding season like 1985 even followed a cold winter. Apparently geese can cope very well with adverse weather conditions.

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References

Ebbinge, B.S. 1985. Factors determining the population size of arctic-breeding geese, wintering in western Europe. *Ardea* 73:121-128.

Ebbinge, B., van den Bergh, L., van Haperen, A., Lok, M., Philippona, J., Rooth, J. & Timmerman Azn, A. 1986. Numbers and distribution of wild geese in The Netherlands, 1979-1984. *Wildfowl* 37:28-34.

Dirksen, S. 1980. Canadese Ganzen (*Branta canadensis*): een invasie in Nederland in 1978-79. *Watervogels* 5:99-107.

Ganzenwerkgroep Nederland/België 1987a. Ganzentellingen in Nederland en Vlaanderen in 1984-85. *Limosa* 60:31-39.

Ganzenwerkgroep Nederland/België 1987b. Ganzentellingen in Nederland en Vlaanderen in 1985-86. *Limosa* 60:137-146.

Ganzenwerkgroep Nederland/België 1989. Ganzentellingen in Nederland en België in 1986-87. *Limosa* 62:81-90.

Ganzenwerkgroep Nederland/België 1990. Ganzentellingen in Nederland en België in 1987-88. *Limosa* 63:71-79.

Ganzenwerkgroep Nederland/België 1991. Ganzentellingen in Nederland en België in 1988-89. *Limosa* 64:7-15.

Huyskens, P.R.G. 1986. Het Europese Rietganzenprobleem *Anser fabalis*. *Oriolus* 52:105-256.

Larssen, K., Forslund, P., Gustafsson, L. & Ebbinge, B.S. 1988. From the high Arctic to the Baltic: the successful establishment of a Barnacle Goose *Branta leucopsis* population on Gotland, Sweden. *Ornis Scand.* 19:182-189.

Lefebre, E.A. & Raveling, D.G. 1967. Distribution of Canada Geese in winter as related to heat loss at varying environmental temperatures. *J. Wildl. Mgmt.* 31:538-546.

Madsen, J. 1987. Status and management of goose populations in Europe, with special reference to populations resting and breeding in Denmark. *Danish Rev. Game Biol.* 12:1-76.

Meire, P., Kuijken, E., & Devos, K. 1988. Numbers and distribution of White-fronted and Pink-footed Geese in Flanders (Belgium), 1981-87 in a North West European context. *Wildfowl* 39:71-81.

Rooth, J. 1971. The occurrence of the Greylag Goose *Anser anser* in the western part of its distribution area. *Ardea* 59:17-27.

Rooth, J., Ebbinge, B., van Haperen, A., Lok, M., Timmerman Azn, A., Philippona, J. & van den Bergh, L. 1981. Numbers and distribution of wild geese in The Netherlands, 1974-1979. *Wildfowl* 32:146-155.

Rutschke, E. & Wessel, C. 1987. Ergebnisse der Wasservogelzählungen Januar 1987/November 1986/Maerz 1987. *Zentrale für die Wasservogelforschung der DDR* 19:5-20.

Schricke, V. 1983. Reflexion sur le statut actuel de la Bernache nonnette (*Branta leucopsis*) en France. *L'Oiseau et R.F.O.* 53:121-132.

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