

## XVI. OBSERVATIONS ON THE SVALBARD POPULATION OF *ANSER BRACHYRHYNCHUS* IN DENMARK:

- (a) Numbers distribution and breeding success in 1980/81 and  
(b) Population trends 1931–1980

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### Introduction

The present report presents a preliminary account of a census of the Svalbard population of *Anser brachyrhynchus* in Denmark during 1980/81, and a summary of the evidence on population development during the period from 1941/32 to 1980/81.

The census is a part of an intensive study programme of the staging and wintering goose populations in Denmark, undertaken by the Goose Study Group of the Danish Ornithological Society. The Goose Study Group, which cooperates with the Game Biology Station (Kale), the Zoological Museum of the University of Copenhagen and the National Agency for Protection of Nature, Monuments and Sites of the Ministry of Environment, started national goose counts in October 1980. The aim of the study is to provide data on the status of Danish goose haunts, their habitats and goose usage as well as to provide accurate, monthly estimates of the total numbers of geese in the country. The study is an extension of an earlier account of the Danish goose haunts (*Fog*, 1971) and is a continuation of previous and on going recording at the most important Danish bird localities (*Joensen*, 1974, *Ferdinand*, 1971 and 1980, *Meltofte* in press, *Dybbro* in prep.), carried out by the Danish Ornithological Society and the Game Biology Station. The goose study is based on mid-monthly counts, supplemented with as many counts as possible, where the observers map the location of the goose flocks and the agricultural usage of the habitats. At the moment 82 sites are covered.

In addition to goose counts it is planned to make a continuous assessment of the breeding success of *A. brachyrhynchus*, *Branta bernicla bernicla*, *Branta bernicla hrota* and *Anser fabalis* staging and wintering in Denmark. A full account of the activities of the Goose Study Group is given in an annual report (in prep.), of which a summary is given by *Madsen* and *Lund* (in press).

### Numbers, distribution and breeding success in 1980/81

The Svalbard *A. brachyrhynchus* stay on the west coast of Denmark during autumn and spring on their way between the Arctic breeding grounds and their wintering quarters in the west of Germany, the Netherlands and Belgium. The first flocks usually arrive by the end of September (*Lind*, 1956, *Madsen*, 1980), and the major part of the population stays in Western Jutland till the end of October whereupon the geese leave the country (*Meltofte*, 1973, *Madsen*, 1980). They arrive in the Netherlands by early

November (*Timmermann*, 1977). In mild winters a smaller part of the population may winter in Denmark (*Madsen*, 1980), but the majority of the birds do not reappear until mid March. From mid April to mid May the population is concentrated on the Danish haunts whereupon the migration to the breeding grounds proceeds (*Lind*, 1956, *Fog*, 1977a).

In Table 1. the results of the 1980/81 counts are compared to average numbers in the preceding four winters, when counts were carried out by the Game Biology Station (*Fog*, 1977b, 1978, 1979, 1980). Temperatures were high in mid February 1981, and this gave rise to extraordinarily high numbers of wintering geese. Apart from this, no major difference was found in numbers compared to earlier years.

Figure 1 shows the distribution of *A. brachyrhynchus* during autumn (October to December) and spring (January to May), respectively. The distribution is given in goose-days per haunt (calculated as the multiple of the average number of geese on two successive counts by the number of days between the counts), as this is regarded a better expression of usage than maximum numbers.

In autumn *A. brachyrhynchus* restricted to sites where shooting is controlled, whereas in spring when shooting is banned the geese are more dispersed. Thus, in autumn 91% of the total goose-days were spent at two localities, whereas the same percentage was spent on seven sites in spring. A total of 2 217 000 goose-days were spent in Denmark in 1980/81, the most important sites being Filsø (648 000 goose-days), Vest Stadil Fjord (499 000 goose-days) and Ballum Enge (330 000 goose-days). The dike-building on the Rodenas (Hojer Wadden Sea coast) seems to have affected goose usage drastically. Only 7400 goose-days were spent in the Danish part of the area (against 127 000 goose-days in 1979) before the dike-building (*Gram*, 1981).

The significance of the Danish haunts can be expressed as goose-days in Denmark in relation to the total number of goose-days spent on the wintering grounds (from 1 October to 15 May). Thus Denmark holds 36% of the goose-days (using 27 000 geese as an average population size for the season; see below).

Table XVI/1.

	1976/77 - 1979/80 <sup>a</sup>	1980/81
September	1 350	—
October	18 025	17 625
November	1 065	2 606
December	240	344
January	508	224
February	5 725	12 131
March	9 363	12 929
April	15 900	19 339
May	—	1 552
June	—	0

<sup>a</sup>: Average of four seasons, based on *Fog* (1977b, 1978, 1979, 1980)

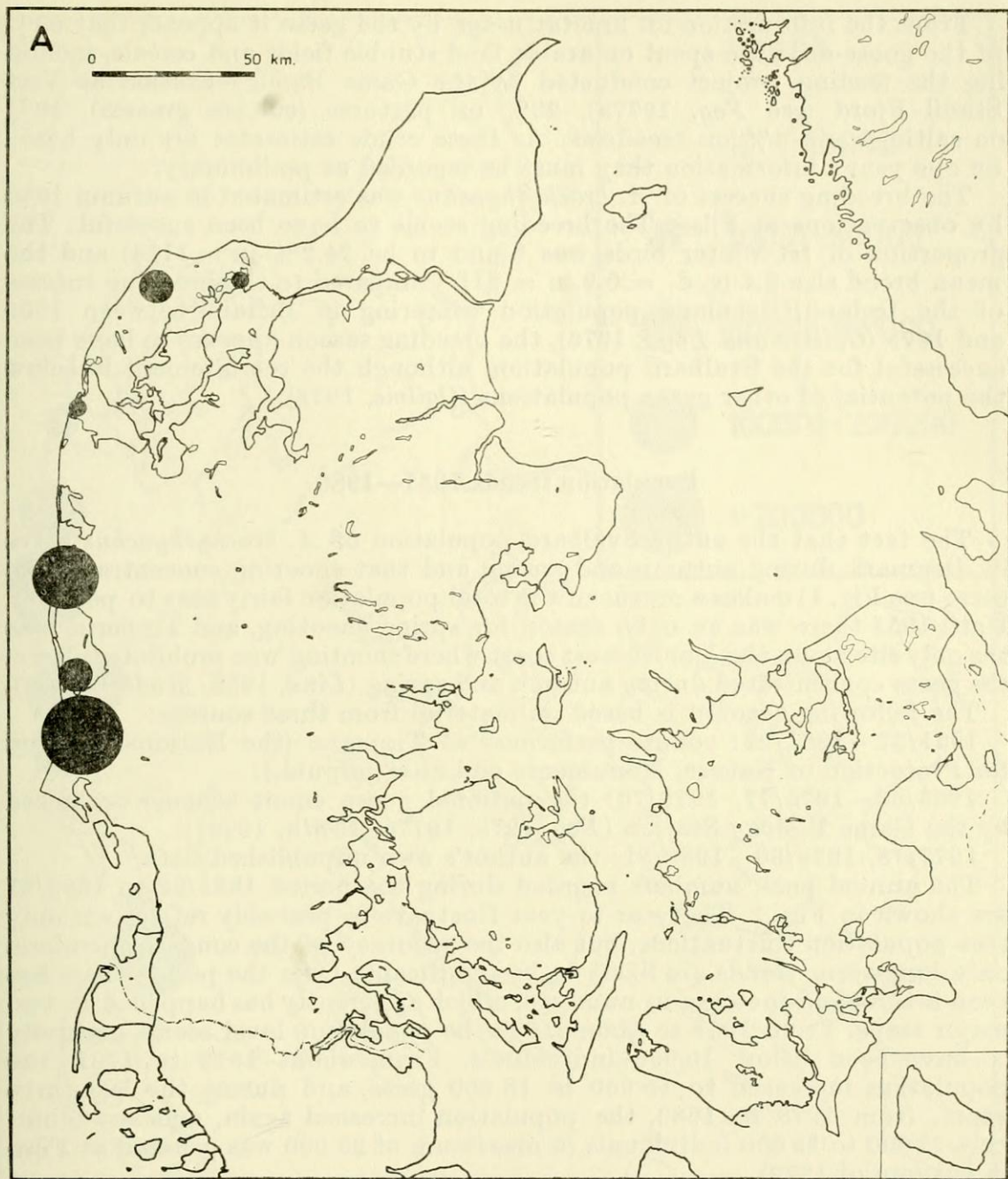


Figure XVI/1 A: Distribution of *Anser brachyrhynchus* in autumn (October-December) 1980. For key to size of circles, see Fig. 1. B.

From the information on habitat usage by the geese it appears that 63% of the goose-days are spent on arable land stubble fields and cereals, including the feeding project conducted by the Game Biology Station at Vest Stadil Fjord (see *Fog*, 1977a), 23% on pastures (culture grasses), 10% on saltings and 4% on meadows. As these crude estimates are only based on one year's information they must be regarded as preliminary.

The breeding success of *A. brachyrhynchus* was estimated in autumn 1980 by observations at Filsø. The breeding seems to have been successful: The proportion of 1st winter birds was found to be 24.2% ( $n = 1114$ ) and the mean brood size 2.4 (s. d. = 0.9,  $n = 81$ ). Compared to the breeding success of the Iceland/Greenland population wintering in Britain between 1969 and 1975 (*Ogilvie and Boyd*, 1976), the breeding season appears to have been successful for the Svalbard population, although the recruitment is below the potential of other goose populations (*Ogilvie*, 1978).

### Population trends 1931—1980

The fact that the entire Svalbard population of *A. brachyrhynchus* stays in Denmark during autumn and spring and that shooting concentrates the geese (see Fig. 1) makes a census of the total population fairly easy to perform. Until 1955 there was an open season for spring shooting, and Tipperne was the only site along the Danish west coast where shooting was prohibited. Here, the geese concentrated during autumn and spring (*Lind*, 1956, *Madsen* 1980).

The following account is based on material from three sources:

1931/32—1961/62: counts performed at Tipperne (the National Agency for Protection of Nature, Monuments and Sites unpubl.);

1965/66—1976/77, 1978/79: the national goose count scheme organised by the Game Biology Station (*Fog*, 1975, 1977a, 1977b, 1979);

1977/78, 1979/80—1980/81: the author's own unpublished data.

The annual peak numbers counted during the period 1931/32 to 1980/81 are shown in Fig. 2. The year-to-year fluctuations probably reflect not only true population fluctuations, but also the accuracy of the counts. Therefore, only long-term trends are likely to be significant. Over the period there has been a threefold increase in numbers, which apparently has happened in two major steps. From 1931 to about 1959 the population level seems generally to have been below 10 000 individuals. From about 1959 to 1961, the population increased to 15 000 to 18 000 geese, and during the last three years, from 1978 to 1980, the population increased again, and now numbers 27 000 to 29 000 individuals (a maximum of 28 500 was counted at Filsø in autumn of 1979).

Studies of reproduction were not carried out earlier, so that the exact nature of the increases is unknown. However, a probable explanation for the increase in the late 1950s is the closure of spring shooting from 1955. The number of geese shot during spring is unknown, but probably the shooting has had both a direct and an indirect effect on the population. Directly as a mortality factor, known to limit the growth of several goose populations, e. g. *Bb. bernicla* (*Prokosch*, 1981) and Svalbard *Branta leucopsis* (*Owen and Norde aug*, 1977). Indirectly, it is possible that spring feeding has a limiting factor, as shooting prevented the geese from utilizing many potential sites.

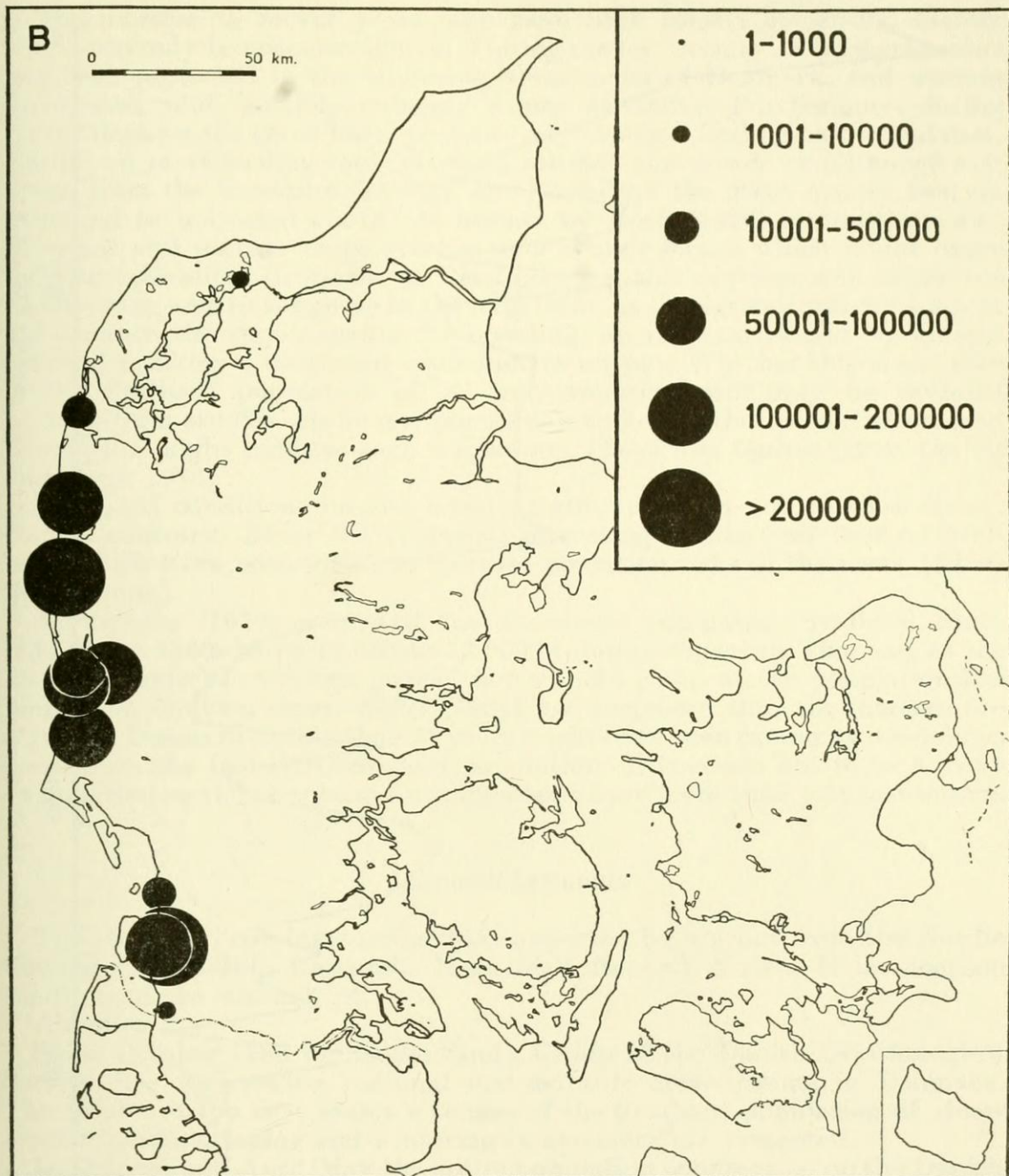


Figure XVI/1 B: Distribution of *Anser brachyrhynchus* in spring (January to May) 1981.  
 Number of goose-days per haunt indicated by size of circle

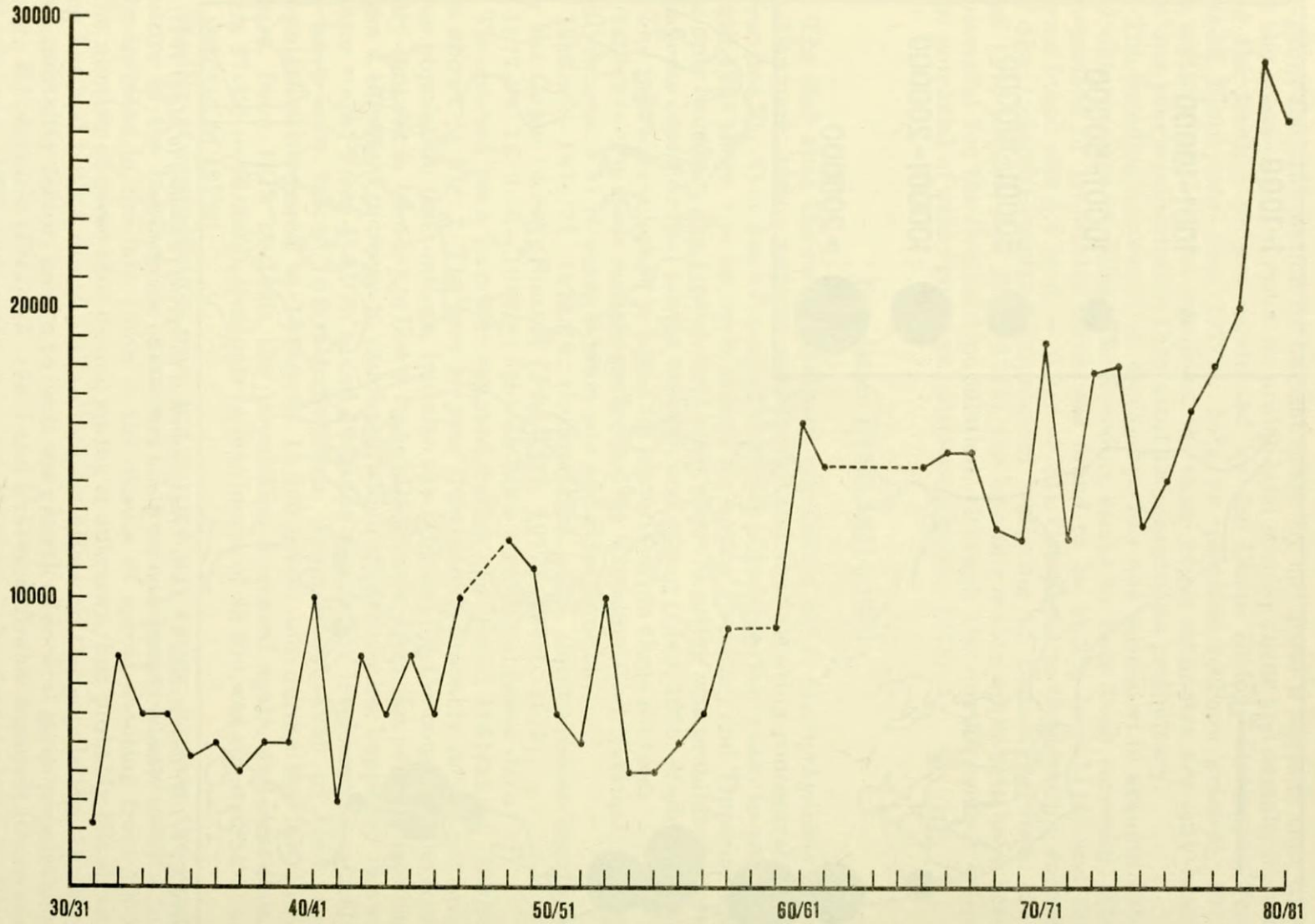


Figure XVI/2: Annual peal counts of *Anser brachyrhynchus* in Denmark, 1931/32 to 1980/81. Stippled lines indicate years with complete counts

The increase in recent years may have been caused by several factors which can only be speculated upon. During the last decade *A. brachyrhynchus* has been protected in the wintering areas south of Denmark, and winters have been mild, possibly reducing winter mortality. Furthermore, during recent decades the geese have progressively changed feeding habits and diet. Earlier on most feeding took place on saltings and meadows (although evidence from the literature is poor), and nowadays the geese mainly feed on farmland as indicated above. As argued by Reed (1976) a change in diet to cereal and pasture crops gives a safer winter forage which might cause reduced mortality. However, as Reed goes on, this development might not be advantageous to the geese in the long term, as the agricultural diets might not balance the requirements for breeding, an increase caused by greater survival masking a decreased reproductive output. Whether this is the case in the Svalbard population of *A. brachyrhynchus* will only be revealed by long-term studies. However, population trends of the Iceland/Greenland population might indicate such a situation (Boyd and Ogilvie, 1969, Ogilvie and Boyd, 1976).

Improved conditions on the breeding grounds seem not to be a factor. On the contrary, Ekker (1981) reports increasing human activities on Svalbard which have been found to increase predation risks of the nests (Ekker pers. comm.).

Norderhaug (1970) estimated the maximum population Svalbard could hold in the 1960s to be 12 000 to 13 000 *A. brachyrhynchus*. This has, as the Danish counts have shown proved not to hold good, as the population has more than doubled since. Ekker (1981) has suggested that the increase observed in Denmark during the last years might have been caused by windblown geese from the Iceland/Greenland population. This seems not to be a likely explanation as the population has increased over more than just one season.

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#### Abstract

Since October 1980 the Goose Study Group of the Danish Ornithological Society has undertaken national mid-monthly goose counts in Denmark. The results of the first season's census of the Svalbard population of *Anser brachyrhynchus* staging and wintering in Denmark are presented.

In October and April/May the entire population congregates on the Danish haunts. In autumn, 91% of the goose-days were restricted to two sites due to shooting, while in spring when shooting is banned, the same percentage was spent on seven sites. The dike-building on the Rodenas/Højer Wadden Sea coast has diminished goose usage at the area drastically. A total of 2 217 000 goose-days was spent in Denmark during the 1980/81 season, constituting 36% of the goose-days spent by the population on the wintering grounds. In 1980 breeding was successful: the proportion of first winter birds was 24.2% and the mean brood size 2.4.

Since 1931 the Svalbard population has tripled in numbers. Probably due

to closure of spring shooting in Denmark in 1955, the population increased from about 10 000 to 15 000 individuals in the late 1950s, and since 1977 another increase has brought the population to its present level of nearly 30 000. The latter increase has possibly been caused by protection of the species in the wintering areas south of Denmark as well as mild winters in the 1970s which may have caused reduced winter mortality.

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