WP/22

THE SNOW BUNTING HAZARD TO AIRCRAFT AT ANDØYA AIRPORT IN NORTHERN NORWAY.

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Introduction

The Snow Bunting Plectrophenax nivalis is a Holarctic passerine. It is a circumpolar tundra species, which is divided into four subspecies, i. e. P.n. nivalis, vlasowae, insulae and townsendi (Howard & Moore 1980).

Each spring large flocks of Snow Buntings gather on the northernmost point of the island of Andøya (69^0 19'N, 16^0 07'E; Fig. 1), where the airport is situated close to the sea.

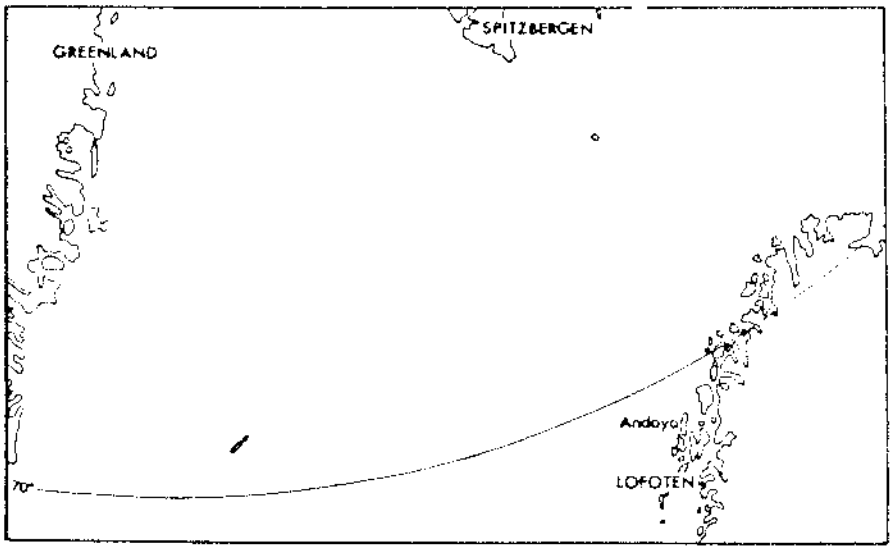

Fig. 1. The location of Andøya close to 70^0 N latitude.

The main and parallel runways run SE-NW. On the west side the aircraft movement area is bordered by marshland and some deciduous shrub vegetation. In the east, the shore vegetation reaches the main runway. The concentration of

Snow Buntings in the northern parts of Andøya has been known for centuries. But since the airport was established in the beginning of the 1950's, the birds seem to concentrate within the airfield (J. Markussen unpubl.). Drainage of marshland, introduction of new grass species on the shoulders along the runways and taxiways, and the decrease of farming in the district might have influenced this phenomenon.

The first Snow Buntings arrive at Andøya Airport at the beginning of April, when snow still covers the ground (Winsnes 1974). More birds arrive continuously and the peak with tens of thousands of birds reported from the airfield occurs in the latter part of April. At the beginning of May the number of Snow Buntings decreases rapidly and almost no birds are observed after 15 May (J. Markussen unpubl.). Apparently these Snow Buntings are not local breeding birds, but staging birds in transit at Andøya Airport for some weeks during spring migration.

The Snow Buntings that congregate at the airport are a considerable hazard to aircraft as they often fly over the runways in their search for new feeding grounds. Every spring several birdstrikes involving Snow Buntings have been reported (Winsnes 1974). Some of these caused damage to aircraft, resulting in high repair and operational costs (J. Markussen unpubl.).

These findings raise the following questions:

1. Where do the Snow Buntings at Andøya Airport originate and where are they going?
2. Why do they congregate at the airport and how long does each individual stay there?
3. What can be done to reduce the risk of collisions between Snow Buntings and aircraft?

Migration pattern of the Andøya Snow Buntings

The Snow Buntings that occur in northern Norway most likely belong to the subspecies P. n. nivalis, which breeds in Scandinavia, Spitzbergen, Greenland and North America (Vaurie 1959). The migration pattern of this subspecies is briefly shown in Fig. 2 (after Salomonsen 1967, Alerstam 1982).

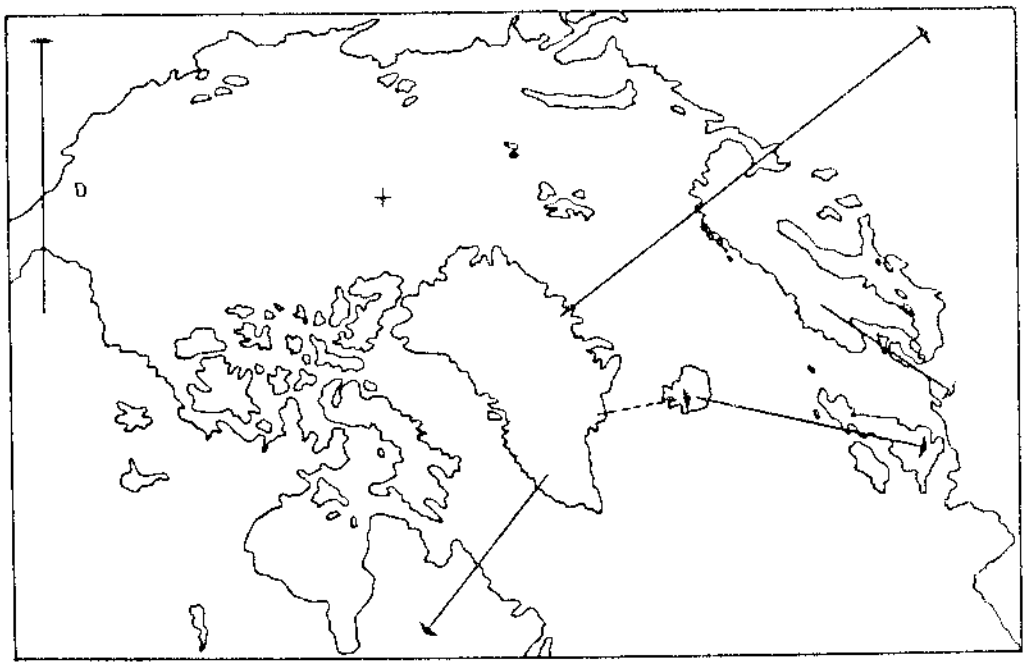

Fig. 2. Autumn migration routes of some P. n. nivalis populations.

Due to differences in migratory pattern, the east Greenland Snow Buntings can be split up into two separate populations. Ringing recoveries show that birds from northeastern Greenland pass northern Scandinavia and the White Sea district on their way to the Russian steppes, where they winter together with birds from the Spitzbergen population (Alerstam 1982). Salomonsen (1967) suggested that Snow Buntings from southeastern Greenland migrate to North America together with western Greenland birds. According to Alerstam (1982), however, the southeastern population is

presumed to pass Iceland during migration and to winter in western Europe, but until now no clear evidence in this matter exists.

In order to determine if the same population passes Andøya during spring migration as during the autumn, 742 Snow Buntings were caught and 99 shot at Andøya Airport in the springs of 1982-84. Biometrical data (wing- and tail-length) from these birds were compared with data from skins from northeastern Greenland held at the Zoological Museum in Copenhagen, and this revealed that the birds at Andøya belonged to the northeastern Greenland population (Bentz in prep.). In addition all birds caught were ringed and dyed with picric acid, which makes the white feathers yellow and the birds easy to recognize in the field. One dyed bird was observed later the same season at Germania Land on northeastern Greenland, which supports the conclusion mentioned above.

Length of staging period, feeding behaviour and food choice of the Andøya Snow Buntings

Snow Buntings at Andøya Airport in spring congregated where food was available. In the beginning of the investigation periods the birds were attracted in particular to the aircraft movement areas where the snow had been cleared. Flocks of a few individuals up to several hundred birds, were observed daily foraging on the grass shoulders along the runways and taxiways. They were seen feeding mainly on crane-fly larvae (Tipulidae), and to some extent on grass seeds. Analysis of stomach contents of 18 birds supports this observation. While the snow was melting, single buntings or small flocks occurred all over the airfield, but the main flocks were on the grass strips alongside the aircraft movement areas. The numbers of birds in the melting zone, on dry, bare ground and on snow-covered ground, were

recorded. Foraging birds favoured the melting zone, i.e. the edge of the snow-cover, where icy water partially covered the ground (Fig. 3.). In the water-saturated soil crane-fly larvae moved to the surface and became easy prey for the Snow Buntings. In addition, the melting of the snow continously exposed new grass seeds to the birds. This preference for the melting edge of snow drifts was observed earlier by Hobson at Vadsø in northern Norway (Nethersole-Thompson 1966).

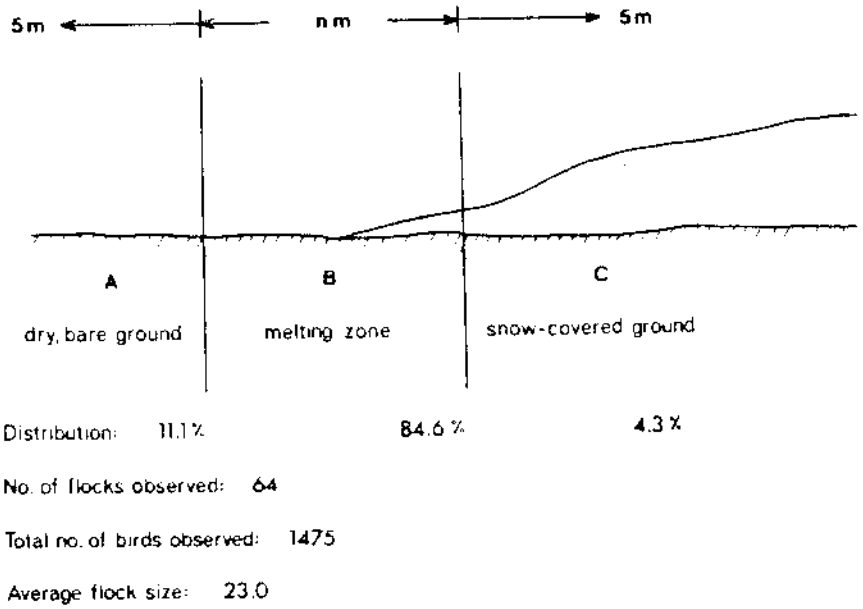

Fig. 3. Percentage distribution of foraging Snow Buntings along the melting zone in April 1984 at Andøya Airport. The width of the melting zone (n) varies from 1 to 10 metres.

In order to find out if there was a changeover of Snow Buntings throughout the staging period, the daily proportion of males was observed. In all three springs the proportion decreased throughout the period. A sample of data for a short period in April 1982 is shown in Fig. 4. The first half of the period shows a significantly higher proportion of males than the last one (chi-square test; $p < 0.001$). This

significance is supported when the calculation of temporal sex ratio change is based on birds caught.

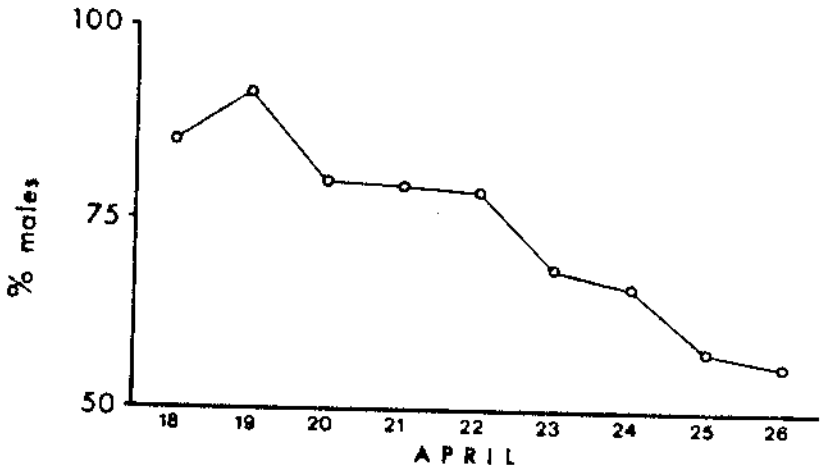

Fig. 4. Daily proportion of males (%) among the Snow Buntings at Andøya Airport, 18-26 April 1982.

These results indicate that the males arrive earlier than the females. Whether the absolute number of males is constant or decreases throughout the period when the females arrive, can not be determined from these calculations, but Meltofte (1983) has shown that males arrive earlier than females at breeding grounds in northeastern Greenland.

Sightings of dyed Snow Buntings were recorded each day. The cumulative number of dyed birds and the daily number of sightings of dyed birds in the period 19-25 April 1982 are shown in Fig. 5. According to this figure many dyed birds must have left Andøya the night between 21 and 22 April.

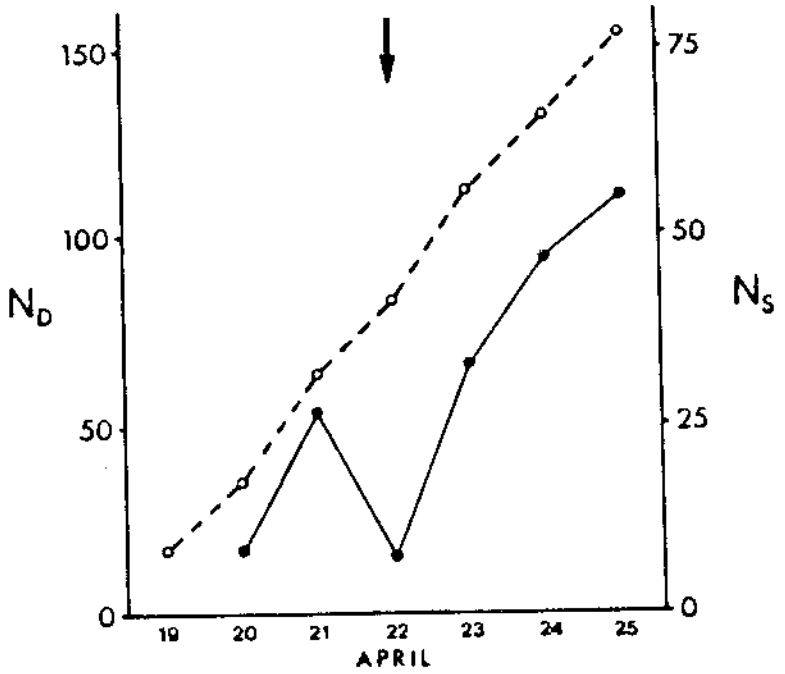

Fig. 5. Cumulative number (N_D) of Snow Buntings dyed at Andøya Airport, 19-25 April 1982 (o- - -o) and daily number of sightings (N_S) of dyed birds (•——•). Black arrow indicates when departure of a major part of dyed birds is supposed to have taken place.

This assumption is supported by data on the daily variation in mean body weight of males during the same period (Fig. 6). Significant differences in means are found between 21 and 22 April (t-test; $p < 0.01$) and 23 and 24 April ($p < 0.05$). The decrease in mean body weight between 21 and 22 April coincides with the decrease of sightings of dyed birds, supporting the conclusion that there was a partial departure of Snow Buntings. Furthermore, many flocks were seen at dusk rising to a height of 2-300 metres before disappearing out of sight in a northwesterly direction.

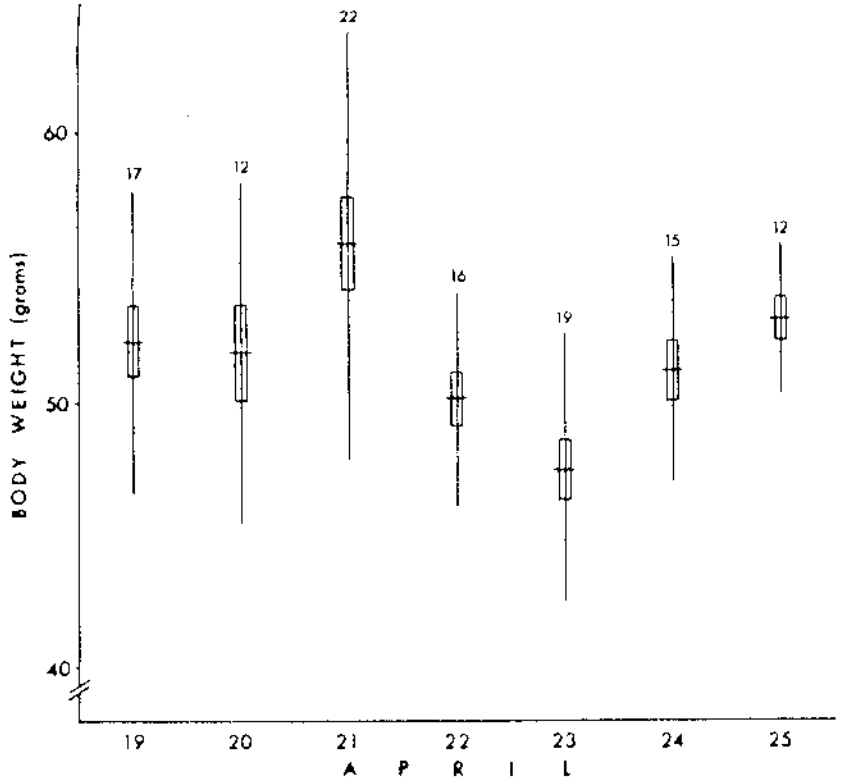

Fig. 6. Daily variation in mean body weight of male Snow Buntings at Andøya Airport, 19-25 April 1982. Means, ± SD and SE are given. Numerals denote sample size.

According to the time elapsed from the last day when Snow Buntings were dyed to the last sightings of dyed birds, the minimum staging time for Snow Buntings at Andøya during spring migration has been calculated to be 10 days. From weight increase of retrapped Snow Buntings, on average the birds put on 2.0 grams in weight during this staging period.

Suggestions for reducing the Snow Bunting hazard to aircraft at Andøya Airport

As Snow Buntings at Andøya Airport in spring are on migration and remain for a relatively short period, with much replacement of individuals, the killing of birds would have little, if any effect on flight safety. Various dispersal methods have been tried, but without success.

Snow removed from the runways and taxiways and heaped into banks along their shoulders is the last snow to disappear from the airfield. Consequently, as this snow melts, the birds gather in greater numbers on the shoulders. Possible solutions to the Snow Bunting hazard at Andøya Airport might lie in avoiding the deposition of snow along the shoulders, in a total removal of the snow from aircraft movement areas, or in hastening the melting of the snow along the shoulders by chemical or other means.

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