

## HOW MANY BIRDS ARE THERE IN SWEDEN?

Staffan Ulfstrand

Department of Animal Ecology, Helgonav 5, S-223 62 Lund, Sweden.

From theoretical as well as practical aspects data about the size of bird populations over large areas are most desirable and useful though rarely available. Thus, for instance, quantitative ornithology patently has a role to play in our joint efforts to minimize the hazards of bird collisions to aircraft.

It is evidently impossible to count accurately all the birds in Sweden. Different types of sampling programmes are currently being developed and tested (Svensson 1974) with the aim of estimating the absolute numbers of breeding birds in this country and, above all, the annual fluctuations of bird populations. However, many species will not be encompassed in this programme which, moreover, so far has yielded only preliminary published results. Notwithstanding the amount of census work, bird numbers cannot possibly be more than crudely estimated, since their populations change from day to day, from season to season and from year to year, owing to the balance between rates of birth and death and of immigration and emigration.

Actually, for many purposes, we do not require estimates better than to the right order of magnitude, and it is my contention that we can estimate the size of most Swedish bird populations considerably better than that; for many species the following figures, although so-called "guesstimates", are presumably correct within a factor of 2.

Let us first look at the Swedish breeding bird fauna which consists of about 240 species. Two different approaches may be used. First, the preliminary census data published by Svensson (1974) may be used. They are especially applicable to the abundant small birds in terrestrial habitats. Most bird communities censused were found to consist of 250 to 750 breeding pairs  $\text{km}^{-2}$ , although the range of density values reached from below 50 to above 1500 pairs  $\text{km}^{-2}$ . However, the areas censused are not representative for the whole country, since rich habitats have been preferred by the ornithologists, while there are disproportionately few data from moors, dry pine forests, and agricultural land. Therefore we have to reduce the density figure indicated by Svensson's data. Let us put

Sweden's area to  $450\,000\text{ km}^{-2}$ ;  $200\text{ pairs km}^{-2}$  would seem a fair estimate corresponding to a total Swedish bird population of 90 mill. pairs.

Second, we may try to estimate the total population size for each species using density figures and results of country-wide inventories when available and filling in with estimates for the rest. I have tried this exercise, and the detailed result is presented in a book by Thomas Alerstam, Johnny Karlsson and myself (1975). According to this approach the total Swedish breeding avifauna was found to consist of approximately 110 mill. pairs.

Thus, let us assume that about 100 mill. bird pairs breed in Sweden.

A great majority of Sweden's birds are migratory and depart from this country after having completed their reproduction. There are no density figures for the winter bird fauna, so we can use only the second approach described above, viz., estimating the size of each population and adding over all species. This has been tried and produced an estimate of 28 mill. birds being present in Sweden at midwinter. Since large and heavy birds more often are stationary than small birds (Ulfstrand 1974), the total weight of the bird fauna is less reduced in winter than are numbers of individuals.

If we wish to estimate the number of birds taking part in the autumn migration in southern Sweden, we have of course to add the year's production of young to the number of breeding birds. We have assumed that there are 100 mill. breeding pairs, i. e. 200 mill. individual birds. A reasonable estimate may be 3 young per pair surviving at the time for the autumn migration. Many species of course have much larger clutches than so, but the early postbreeding mortality is often severe. Accepting the estimate, we arrive at a figure of 500 mill. birds departing from Sweden each autumn.

A very important item in our attempted avian budget is the number of birds that derive from other geographic areas, especially Finland and the western part of the USSR, and pass through southern Sweden during their autumn migration. We know that a tremendous number of birds do cross the Baltic, mainly over the Åland archipelago and further south, and the fame of Ottenby bird station on the island of Öland is based almost entirely on migrating birds from east of the Baltic. In the absence of data, we have as always to attempt to make a fair estimate, although one that is much more uncertain than the rest in this paper, and assume that the trans-Baltic migration may add another 50 percent

the autumn's total rarely exceeds 1 mill. birds (Ulfstrand et al. 1974), and at Ottenby the figure is much lower still (Edelstam 1972).

Since the migrating birds tend to fly at a fairly low altitude, especially during the day, the density of birds in the air may sometimes be considerable. As pointed out, however, intense migration is concentrated to periods of relatively short duration. Since the migratory activity is correlated with predictable meteorological conditions, different for different species or species groups, it seems to be both meaningful and possible to develop a forecasting system for fluctuations in space and time of bird migration intensity.

#### References

- Alerstam, T., Lindgren, A., Nilsson, S.G. & Ulfstrand, S. 1973. Nocturnal passerine migration and cold front passages in autumn - a combined radar and field study. - *Ornis Scand.* 4: 103-111.
- Alerstam, T. & Ulfstrand, S. 1972. Radar and field observations of diurnal bird migration in S. Sweden in autumn 1971. - *Ornis Scand.* 3: 99-139.
- Alerstam, T., Karlsson, J. & Ulfstrand, S. 1975. Fåglar och flyg. Luftfartsverket, Stockholm.
- Edelstam, C. 1972. The visible migration of birds at Ottenby, Sweden. - *Vår Fågelv. Suppl.* 7: 1-360.
- Rudebeck, G. 1950. Studies on bird migration. - *Vår Fågelv. Suppl.* 1: 1-148.
- Svensson, S. 1974. Svenska häckfågeltaxeringen - den fortlöpande övervakningen av fågelfaunan fortsätter. - *Vår Fågelv.* 33: 92-99.
- Ulfstrand, S. 1974. Den skånska fågelfaunans artsammansättning under vinter och sommar - några ekologiska jämförelser. - *Anser* 13: 225-240.
- Ulfstrand, S., Roos, G., Alerstam, T. & Österdahl, L. 1974. Visible bird migration at Falsterbo. Sweden. - *Vår Fågelv. Suppl.* 8: I-XLIV + 1-245.