

## SPRING MIGRATION OF CRANES OVER SOUTHERN SCANDINAVIA

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Although bird migration since long has been a topic of intensive research, there is still a wealth of fundamental facts to be unravelled. This becomes particularly evident when ornithologists are asked by aviation authorities to supply information that may be useful for preventing collisions between birds and aircraft. The existing data on numbers of birds, geographical and diel patterns of migration, flight altitudes, migratory activity in relation to weather and so on, are quite insufficient. Thus, ornithologists must start collecting such data, giving priority to bird species, that represent the greatest hazards to airplanes, and which could be successfully studied by available methods, i.e. in most cases by field and radar observations.

In Sweden, after cooperation between the Air Force, the Board of Civil Aviation, the Department of Animal Ecology, University of Lund, and Falsterbo Bird Station had been established, a joint project to study bird migration in southern Sweden was started in 1971. An effort has been made to map different main types of bird migration, such as winter movements of waterfowl, diurnal migration of passerines, notably finches, and nocturnal migration of passerines, particularly thrushes. The focus, however, has so far been centered on the migration of three species, i.e. the Eider *Somateria mollissima*, the Wood Pigeon *Columba palumbus* and the Crane *Grus grus*. As an ornithologist participating in the project it is my hope that the information gathered will provide answers to some of the questions raised by air traffic authorities and that it will contribute to the development of efficient bird warning systems.

To give an example of recent bird migration studies in Sweden I will briefly review some results concerning the spring migration of the Crane over southern Scandinavia. In this instance, radar monitoring and field observations provided complementary data yielding an exceptionally full picture of the migratory process. Details not only of this study but of all investigations conducted by the joint research project will be found in the publications in the reference list (included as an appendix).

1) Geographical pattern. The Cranes rest in large numbers at several sites on the southern coast of the Baltic, especially on the island of Rügen. They depart over the Baltic towards almost due north and cross central Skåne. Many of the birds later gather to rest at Lake Hornborgasjön, 400 km north of Rügen. About 75 % of the Scandinavian Cranes depart from Rügen or from the coast immediately west of this island; a small part arrive via Denmark (10 %) and a still smaller fraction from Poland (1 %).

- 2) Diel pattern. Departures towards north from Rügen take place between 0530 and 1400 hrs. A smaller peak of departures often takes place from 0600-0830 hrs, while most birds depart between 1030 and 1300 hrs. The Cranes generally reach the central part of Skåne after about two hours' flight and Hornborgasjön after a travelling time of less than eight hours.
- 3) Numbers of Cranes. By way of counting radar echoes from Crane flocks and multiplying with the mean flock size, based on field records, it was concluded that at least 25 000 birds pass through southern Scandinavia in spring.
- 4) Weather conditions during migration. This problem has not yet been analysed in detail, but intensive Crane migration consistently coincides with following winds.
- 5) Cruising technique. Crane flocks behave in a markedly different way over sea and land, respectively. Over the Baltic Sea radar echoes of Crane flocks move with a constant rate of progress indicating continuous active flight. Over land the same echoes frequently halt for a brief period, move for a short distance to make another halt, and so on. Such behaviour clearly reflects the technique of flight used by birds soaring in thermal air. Soaring of Crane flocks lasts on the average 6.3 minutes, and the mean distance travelled between soaring interludes is 13.3 km.
- 6) Speed. The true air speed for travelling over the sea is  $67 \text{ km h}^{-1}$  (the mean ground speed is higher due to the tailwinds, viz.  $77 \text{ km h}^{-1}$ ). Over land, the height gain obtained from soaring in thermals has to be paid for in slower cruising speed; true air speed is only  $44 \text{ km h}^{-1}$  (mean ground speed  $50 \text{ km h}^{-1}$ ). True air speed during the flights between thermals is about  $70 \text{ km h}^{-1}$ .
- 7) Flight altitudes. Flight altitudes of Crane flocks, as measured by radar over southernmost Skåne, varies between 200 and 700 m. Very few flocks have been recorded above the cloud base, and flight altitudes seem to be positively correlated to the altitude of the cloud ceiling.
- 8) Wind drift. The Cranes compensate completely for wind drift over land, but only incomplete compensation takes place over the sea. Hence, arrivals to the south coast of Skåne occur more to the west under easterly winds and vice versa. The angle between the Cranes' heading and track directions over the sea is composed of 68 % compensation and 32 % drift.

APPENDIXList of references - Swedish bird migration project

Department of Animal Ecology, University of Lund  
 Falsterbo Bird Station  
 Swedish Air Force  
 Swedish Board of Civil Aviation

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