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CURRENT WORK ON THE PROBLEM OF COLLISIONS BETWEEN BIRDS AND AIRCRAFT IN SWEDEN

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A project group with representatives from the Air Force, the Board of Civil Aviation and the Department of Animal Ecology, University of Lund, has the mandate to carry out investigations about the problem of collisions between birds and aircraft in Sweden. This work started in 1971, and some recent results and current plans will be briefly described in this report.

The primary goal of the group is to develop a system to forecast important concentrations of migrating birds in space and time. This project involves extensive studies on the process of bird migration over wide geographical areas. Radar and field observations have been conducted in several springs and autumns in order to gather information, essential for a reliable forecast system, about the behaviour of different bird species:

a) Geographical distribution. For many bird species or categories of species the geographical migration patterns have been mapped in detail. Special studies have been devoted to the migration of eider, crane and wood-pigeon, and the migratory patterns of many passerines, both diurnal and nocturnal migrants, have also been analysed.

b) Flight altitudes. Until recently studies on the birds' flight altitudes have been carried out on a small scale only. Some results have been obtained for migrating eider and crane flocks. However, last year Mr. Bertil Larsson, a meteorologist, was adjoined to the group. He is engaged in the study of flight altitudes under different environmental conditions and will inform the BSCE-meeting of his work in a separate report.

c) The influence of weather on bird migration. Short-term variation in migratory intensity is closely related to changing weather conditions. Detailed and reliable forecasts of the risks for bird collisions have to be based on extensive statistical analyses of the association between migratory activity of different

bird species and weather. Such analyses are presently conducted for the relation between weather and (i) the intensity of low-altitude visible migration (diurnal), (ii) the intensity of high-altitude radar migration (diurnal and nocturnal) and (iii) the number of night-migrants trapped at a bird station in the early morning after the preceeding night's migration. Multivariate statistical analyses (multiple regression, discriminant and factor analysis) are used.

The results obtained from the studies described above will be combined into a forecast system. Although such a system has not yet been introduced in Sweden, information about the occurrence of bird concentrations based on preliminary studies has from time to time been communicated to aviation authorities.

A brief presentation "Survey of concentrations of migrating birds during the autumn (1 July - 15 November) in South Sweden" (in Swedish) was published in the first part of 1975. This presentation contains three principal sections: (i) Maps illustrating the occurrence of certain abundant bird species in different geographical regions. (ii) Graphs showing the seasonal and diel distribution of intensive migratory activity, (iii) Warnings for high bird hazards over different areas and during different times of the season and the day. These warning have already been heeded by the Air Force in planning the periods and areas of intensive flight training.

Recent progress in our knowledge about the bird-collision problems in Sweden and the imminent introduction of a "bird forecast system" have called for a general presentation of these topics to all different categories of personel involved in aviation. For that purpose, a book "Birds and Aviation" (in Swedish) was published in autumn 1975, and is presently used as a tool at a number of different courses. This book contains six chapters.

1) The bird fauna of Sweden - a general presentation. The distribution and densities of different birds in different seasons and in different habitats are presented and related to factors influencing their abundance. Furthermore, a brief overview is given,for example, of population dynamics, inter- and intra-specific competition, predation, hunting and the significance of available food for population sizes.

2) The bird fauna of the airfield. The commonest bird species to be observed at Swedish airfields in different seasons are presented, and notes about their habits and choice of food are included. This chapter is illustrated with photographs of a large proportion of the birds involved and may thus serve as a guide to identification of the species.

3) Bird migration. Migratory habits of North European birds are described on the basis of results from ringing, field observations and radar studies. Relations between breeding, resting and wintering areas are surveyed and migration seasons for different species are discussed. The process of the migration flight is also touched upon, including the speed, altitude and geographical pattern. The association between migration and certain weather variables, particularly winds, as well as the orientational and navigational capabilities of migrating birds are also mentioned.

4) Collisions between birds and aircraft. Statistics about collisions in Sweden from 1967 to 1974 are presented for both civil and military air traffic. Serious accidents from international records as well as six total losses of military aircraft in Sweden due to bird collisions are discussed in some detail.

5) Actions to prevent collisions. The role of vegetation, topography, garbage dumps and different hunting techniques for bird numbers at airfields is discussed, and recommendations are issued. The efficiency of different types of scaring devices, methods of decimating bird populations and techniques of survey of the airfield is evaluated. The basic features of the future forecast system are also described.

6) Table of the Swedish bird fauna. Condensed information about geographical distribution during different seasons, choice of habitat, migration periods, population size and body weight is presented for all Swedish bird species.

The books mentioned above are at the present used in the education of air traffic leaders and other categories of people working at the airports. Furthermore, steps are currently being

taken to include the bird/aircraft-problem in the basic education of all categories of pilots, and the book "Birds and Aviation" is planned to be used as a course book.

The specific bird problems at the airports are investigated by competent biologists, resulting in working plans which, for each airport, describes what can be done to reduce the abundance of birds. Primary attention is directed towards preventive measures, such as making the environment less attractive to birds; it is especially important to minimize the production and availability of food for those bird species that are known to create the greatest problem for the aviation.

At the 10th BSCE meeting there appeared a short report on some experiment with laser beams as a scaring device. The work with this equipment will continue in the future. This summer experiments will be initiated with a machine-gun dummy (originally constructed for military purposes), to test its effect as a bird scaring device. The equipment is composed of a number of mobile "loud-speakers" (pneumatic noise generation). From a remote control unit the loud-speakers can be made to emit a noise identical with that from a machine-gun. The control unit can be placed in a traffic tower or in a car. Compared with conventional gas-canons, this equipment seems to have many advantages: the loud-speakers are easy to move and the exact time and length of their operation can be remotely controlled. These factors may considerably reduce the rate at which the birds become accustomed to the scaring device.