

Autumn radar study of the coastal migration in Western Holland.

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Introduction.

Prevention of birdstrikes "en route" is only possible by avoiding those parts of the airspace in which the density of birds exceeds a certain level.

En route birdstrikes form 60% of damage-strikes in the RNLAf. Although the risk of fatalities is believed to be less than in collisions which occur on and near airfields, the economic loss due to "en route"-birdstrikes is, if we exclude the total crashes, much bigger.

For estimating the chance of collisions and for formulating flight restrictions we need knowledge about flight envelopes of both aircraft and birds.

The envelope of bird activity is very difficult to describe taking into account the many discrepancies between studies on bird movement patterns and also the differences in reported relations to weather variables.

The main reason for the discrepancies are the different methods and tools used in birdmigration studies. The biggest sources of bias come from total sample size, mesh width and especially the differences in detectability of all potential heightlevels at which the birds are able to fly under varying conditions. The last aspect was the motive for a rather detailed radarstudy carried out during autumn 1976 along the North Sea-coast of Holland. The collected data are still under analysis and only some first (preliminary) impressions can be given. But the problem and the chosen setup of the study may be of interest to you.

The problem.

For better understanding of the variation of ideas and approaches to the problem first some historical remarks.

The earliest bird migration studies were visual ones. Difficulties to organise an extended fieldobserversnetwork and to overcome variation in observationquality hinders the getting of a good overall picture. But slowly it was discovered that higher flying birds did not always fit into the described visible migration patterns. Thanks to ringing data the visual impression more and more began to lose its place of importance. The old models could not solve the newly raised questions satisfactorily.

The use of search radars for birdmigration research resulted in a big step forward. The fortunated ornithologists, who got the chance to use radar, made lots of radarfilms.

They sometimes produced long descriptions and built ~~new models~~ ^{BSCE 12} sometimes strongly contrasting with the ones of researchers not using radar. But, in spite of much new data, the whole picture did not become clear. Nowadays, after a period of nearly 20 years radarwork we still have to conclude that many already published results should be partly reanalysed. ^{28 October 1977}

It becomes clear more and more that in many studies the registration methods was not studied or described critically enough and, as a result, we do not know what part of the migration was detected, and thus what bias is included in the results. As far as height levels of bird flights are concerned one have to conclude that in general long range surveillance radars will miss the lowest flightlevel. On the other hand most visual studies did not look high enough. Depending on the situation (important variables being flatness of the country, capabilities, programming of the radars and also fieldobservers) sometimes a certain overlap between visual and radar approach could be reached but even if both registration methods were more than complementary, they never were comparable quantatively.

Turning back to the birdstrike problem: in several countries ad-hoc radar warnings are in use for "en route" birdstrike prevention. On average this means that the measurements mainly sample the high birdmigration. In many cases this high level migration also will be very strong and because of the aircraft-flight-envelope very dangerous. But it is not sure that on other days, on which the radar gives no or weak movements, no strong low level migration are occurring. This could be the reason for birdstrikes in very low level fighter training outside the detected peakmigration days.

In very flat countries the radar will be able to pick up more of the lowest migration than in hilly areas. The relations between actual birdstrikes (if the aircraft were not highly restricted to less dangerous areas and height levels) and measured migration by radar then will be present. This was shown rather convincingly in Holland and Denmark. But if weather conditions influence heightlevel choice of migrating birds strongly, then the comparison of weather factors and the total number of migrants (that is the birds of all heights added up thanks to the use of search radars) will become difficult, even impossible.

For both "ad hoc" birdmigration warnings and (especially) the establishment of forecast systems more quantitative data are needed.

This does not mean that the ways of monitoring have to be altered, but the outcome has to be reinterpreted.

Two questions were stated in the Dutch study:

- 1) What are the differences in altitude choice under varying conditions, especially in relation to winds?
- 2) What is the influence of the coastline (and the difficulties to cross the North Sea) on the spacial and directional aspects of migration. Especially the forming of concentrations is important.

The set-up of the study and some preliminary results will be shown with help of slides.
