INTERNATIONAL BIRD STRIKE COMMITTEE IBSC 24/WP 8
Stara Lesna, Slovakia, 14 - 18 September 1998

# BIRD STRIKES VERSUS BIRD COUNTS ON AIRPORTS - IS THERE ANY CORRELATION?

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**Summary**

On the basis of bird count programs on German airports we discuss the relation between counted birds res. species and the bird strikes and bird strike rates. Only for the number of birds counted and the bird strike rate We found a weak correlation. The behaviour of birds and measures to pre vent bird strike influence the correlation.

Keywords: aerodrome, bird strike statistic, bird census

## 1. Introduction

On many international airports there are bird counting programs (DEKKER, 1994; FERNS et al., 1994). Bird counts give information about:

- bird species appearing on airfields,
- abundance res. number of individuals,
- temporal distribution,
- spatial distribution.

The results of bird counts on airfields are an important and necessary tool for bird strike prevention by giving information about birds which have to be scared and specified adapted habitat management (HAHN 1994).

On the basis of the results of standardised bird counts on 15 German airports (fig. 1) and the number and species recorded in bird strikes on these airports we try to answer the following questions:

- Does the number of different bird species involved in bird strikes reflect the diversity of bird species on the airports?
- Is the total number of birds counted on the airports correlated with the bird strike rate at these airports?
- Are the bird species observed in high numbers also causing more bird strikes than those counted in smaller numbers?

## 2. Method

### *2.1 Bird counting*

A description of the standardised bird count method on German airports, first used at Frankfurt airport, was given at the BSCE meeting in London in May 1996 (WEITZ 1996). Mostly in the years 1994 to 1997 bird counts according to the "point count transect method" were carried out at 15 German airports, shown in Figure 1. The counts were made twice a month by local ornithologist, at least for one year, on some airports for 2 or 3 years. On each airport there were fixed points or stops with corresponding plots, covering the whole airfield. On counting days all birds on and over each plot were counted for exactly five minutes. Counting always started early in the morning shortly after sunrise. The dates were not exactly fixed previously because days with bad weather conditions should be avoided. Generally, all species of birds had to be counted. In Frankfurt, for example, there were 42 stops and the bird counting program lasted for 3 years. By counting twice a month this adds up to a total counting time of 252 hours (without the time necessary for the ornithologist to proceed from one stop to the next one).

### *2.2 Database for Statistics*

The Bird Strike Committee Germany (DAVVL) compiles the bird strike statistic Germany. In spite of all airlines have to report occurred bird strikes we know that there are shortcomings in the recording system. An uncertain portion of bird strikes will not be reported, depending on the willingness to report bird strikes respectively the probability of the detection - bird strikes with small birds will not so often be perceived. In many cases the bird species causing the strike will not be determined. In 45% of the reported strikes we have information about the bird species involved.

In Germany the Lufthansa compiles the most reliable and extensive bird strike reporting system. We used this database because the Lufthansa is the leading airline in Germany, we get feathers or bird remains of bird strikes to determine the causing bird species and we have exact information about aircraft movements from the Lufthansa at the interesting airports. In some cases there is a deficiency of statistic data for calculating the bird strike rate, so this airports could not take into consideration. We compared only data with the same time of reference.

## 3. Results

### *3.1. Bird species diversity oil airports and species involved in bird strikes*

In table 1 we compare the number of different bird species observed in bird count program on *8* German airports with the number of bird species reported in bird strikes. This table shows the number of bird species that were reported in bird strikes but not observed during bird counts. Adding this numbers to the number of birds that were observed we get an "exact" number of bird species present on each airport. If we now compare this "exact" number with the number of species not observed it comes clear, that especially on airports with low species numbers up to *30 %* of all bird species were not detected by the bird counters. In only one case all in bird strikes reported bird species were also recorded by bird counts.
The most bird species (90) are observed on an airport in the northern part of Germany, the least (14 species) on an airport in the southern part. Are these differences only caused by the fact that some airports are more monotonous while others have a wider biological richness offering more different habitats for a larger number of bird species? Comparing the percentage of bird species reported in bird strikes with the total number of species ("exact" number) we can say: On airports with small species numbers up to 50 % of them are involved in bird strikes whereas on airports with a greater number of bird species the percentage is much smaller.

Finally we have to realise that the different number of bird species on the various airports is not only depending on habitat parameters but also reflects the quality of the ornithologists carrying out bird counts.

Table 1: Number of bird species observed in bird count program in comparison with the number of bird species reported in bird strikes

| *Airport TLC* | *1* | *2* | *3* | *4* | *5* | *6* | *7* |
|---|---|---|---|---|---|---|---|
| *STR* | 14 | 6 | 20 | 30 % | 4 | 10 | 50 % |
| *HAJ* | 30 | 4 | 34 | 11,8 % | 13 | 17 | 50 % |
| *MUC* | 39 | 6 | 45 | 13,3 % | 11 | 17 | 38 % |
| *DUS* | 49 | 3 | 52 | 5,8 % | 14 | 17 | 25 % |
| *CGN* | 58 | 5 | 63 | 7,9 % | 7 | 12 | 19 % |
| *FRA* | 68 | 0 | 68 | 0 % | 19 | 19 | 28 % |
| *BRE* | 89 | 1 | 90 | 1,1 % | 8 | 9 | 10 % |
| *HAM* | 90 | 1 | 91 | 1,1 % | 15 | 16 | 17,6 % |

1 - Number of bird species observed
2 - Number of bird species not observed but involved in bird strikes
3 – "Exact" number of bird species
4 – Number of bird species not observed by the ornithologists in % of the "exact" number
5 – Number of bird species observed and involved in bird strikes
6 – Total number of bird species involved in bird strikes
7 – Number of bird species involved in bird strikes in % of the "exact" number

*3.2. The correlation between the total number of birds counted on airports and the corresponding bird strike rate*

In a second step we asked is there a correlation between the total number of birds counted at an airport and the bird strike rate (number of bird strikes per 10.000 aircraft movement). On the database of 12 airports we calculated the correlation coefficient (Spearman correlation coefficient) and found there is an only weak correlation (rs= 0,338) shown in figure 2. There is a striking outlier on a little airport with a very high number of bird strikes.

*3.3. The relation between number of birds counted and the number of bird strikes caused by this bird species*

On the basis of seven airports we compared the number of counted individuals of a bird species with the number of bird strikes caused by this bird species. We found for none of these airports any correlation between these parameters. In figure 3 we show this on the example of Hanover.

**4. Discussion**

The probability of a bird strike with a certain bird species depends on almost three factors. Besides the duration of time the bird species appears on an airfield in the course of the year (migrating - non migrating birds, breeding birds - seldom visitors), their number (single birds - huge flocks) and their behaviour are to be mentioned. Especially the behaviour of the birds plays a important role. In the years 1994 - 1996 on Frankfurt airfield for example, only 462 swallows *(Hirundo rustica, Delichon urbica, Riparia riparia)* could be counted while 59 bird strikes with swallows were reported. The skylark *(Alauda arvensis)* could be observed in much bigger numbers, 6645 birds were counted but there was only one bird strike with these species reported. Swifts *(Apus apus),* of which 943 birds were counted caused 10 bird strikes reported. Swifts and swallows spent most of their time in the air by hunting for flying insects. Skylarks feed on the around. Their territories, where these birds perform their singing flights, are very limited and they also avoid to sing above man made structures like runways and taxiways. Therefore the probability of a bird strike with a swallow or a swift is much bigger than the probability to collide with a skylark.

Small birds like passerines represents the major part of the avifauna, not only on airports. These birds are problematically for bird strike statistics because of their less impact by strikes and their worse detectability . Therefore the part of undetermined bird species in statistics is mostly caused by small birds. Small birds are also often unknown for inexperienced people and will be wrong determined.

The weak correlation found between numbers of birds counted and the number of bird strikes caused by this bird species may depend on a fault in reporting. Often there is only one impact recorded but really a lot of individuals have collided.

By knowing the shortcomings in bird count programs and bird strike statistic mentioned above, both are essential tools for bird strike prevention and by the combination of the results of bird count programs and strike statistics it is possible to assess the quality of the bird recording program res. the ornithologist. Nevertheless just by these both methods you get the basis to focus your efforts in scaring birds, which causes fatal damage.

But there is a general problem for this study: Only on condition that there are not any bird strike prevention measures we can hypothesise a strong correlation between counted bird numbers and the number of bird strikes because every bird scaring will influence the correlation negative. But we may rate the weak correlation found in this study as an indicator for existing bird strike prevention measures respectively their effectiveness on the concerning airports.

**References**

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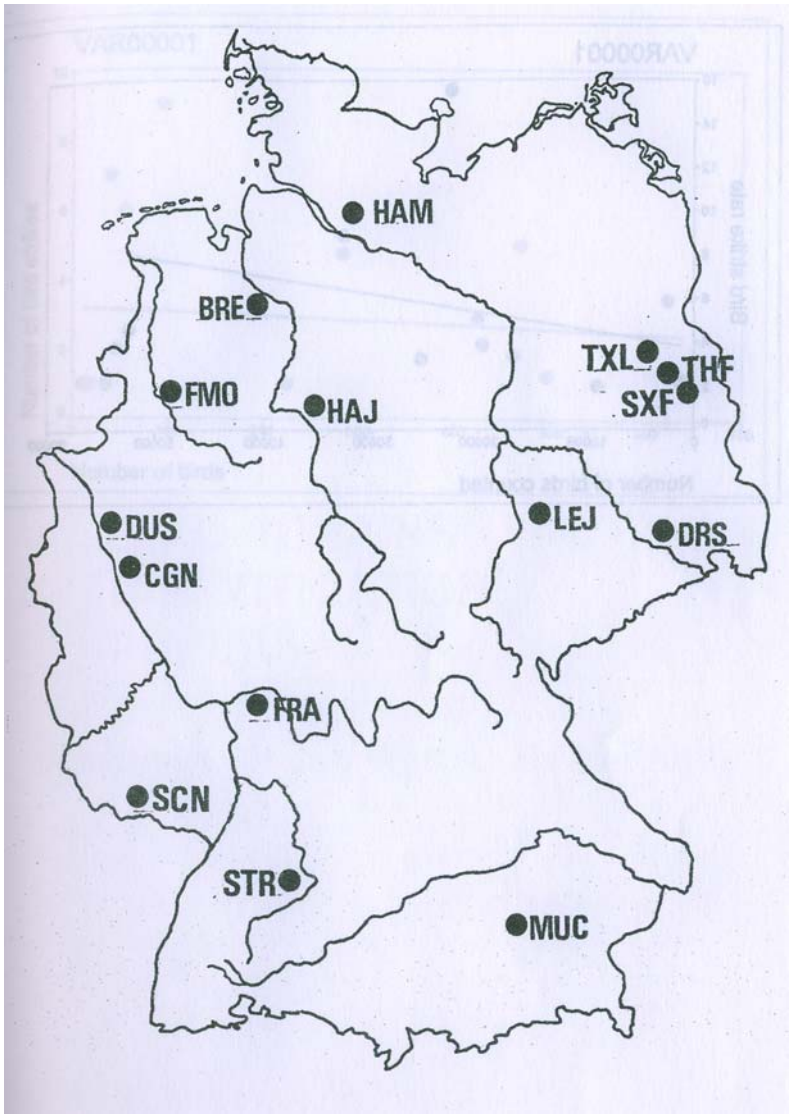
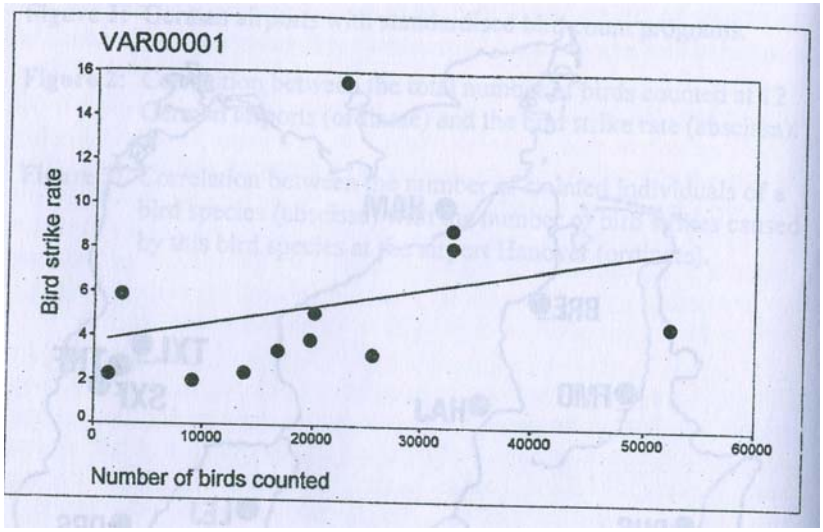
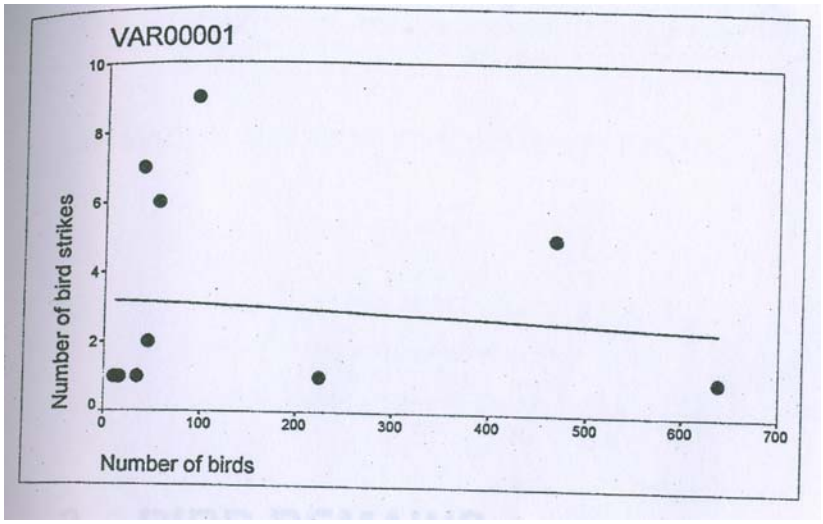
Figure 1: German airports with standardized bird count programs.
Figure 2: Correlation between the total number of birds counted at 12 German airports (ordinate) and the bird strike rate (abscissa).
Figure 3: Correlation between the number of counted invididuals of a bird species (abscissa) with the number of bird strikes caused by this bird species at the airport Hanover (ordinate).

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Number of bird strikes
0
2
4
6
8
10
0
100
200
300
400
500
600
700
Number of birds