BIRD STRIKE COMMITTEE EUROPE

BSCE23/WP26
London, 13 - 17 May 1996

Standardized bird counts on German airfields - Method and first results from Frankfurt Airport

by Heinrich Weitz

German Military Geophysical Office

Mont Royal

D-56841 Traben-Trarbach

Germany

Summary

To get a representative description of the avifauna of Frankfurt airfield, bird countings according to the "point count transect method" were started in January 1994. This method is widely accepted in field ornithology. The first results after one year of fieldwork were very encouraging, therefore the Bird Strike Committee Germany (DAVVL) decided to apply this method to most of the German airports, starting in autumn 1995. For this task, the DAVVL took experienced ornithologists under contract.

On Frankfurt airport, more than 50 counts have been made up to now. After a short presentation of the method, some results will be presented. These will mainly describe the species of birds observed and their numbers and distribution on Frankfurt airfield in the course of the year.

(Keywords: Aerodrome surveys; Europe; Bird populations; Detection visual)

Introduction

In the past there have been a lot of trials to count birds on German airfields. With the beginning of bird strike prevention it soon became apparent, that a succesfull work in this field could not be done without sufficient information concerning the avifauna of each airfield. In his BSCE22/WP57 Mr. A. Dekker stated: "In any bird control programme knowledge of birds has to play an important role. Only then it is possible to anticipate for bird numbers (detection) and behaviour (dispersal) and take preventive actions accordingly."

The counting methods used in former times often failed to fulfill this task. Most often a program was started without answering the question beforehand, how to count and what to count. The data were also not collected systematically, so that it was very difficult or even impossible to make them operational and to use them as a tool for habitat management on airfields.

When the Bird Strike Committee Germany (DAVVL) engaged a manager in January 1994, the advisory work of this board could be intensified. But due to the lack of adequate data concerning the avifauna of German airports, the advisory work concerning special questions of habitat management could be only very limited. After checking and comparing the different methods used in field ornithology, bird countings according to the "point count transect method" were started on Frankfurt/Main airfield in the second half of January 1994. The first results after one year of fieldwork were very encouraging, therefore the DAVVL decided to apply this method to additional 13 German airports, starting in autumn 1995.

Method

To get a representative description of the avifauna of Frankfurt/Main airport, the point transect method is used. There are 42 fixed points on the airfield with 42 corresponding plots. The plots differ slightly in size, because during plot layout in the field it was the intention, that each plot should have a nearly homogeneous structure and maintenance. This is essential for later analysis of the data when comparing the spatial distribution of birds due to the (possible) different attractivity of the plots.
The bird counts are made twice a month, one during the middle of the first half and one during the middle of the second half of the month. The dates are not exactly fixed, because days with bad weather conditions should be avoided for bird counts. During counting the ornithologist reaches every stop by car, where he leaves the car and counts all birds on and over each plot for exactly five minutes.

To record his observations he uses a special formular or a small portable tape recorder.
42 stops with 5 minutes of counting adds up to a time of 3 and a half hour. Adding the time for driving on the airfield, one can easily imagine, that one counting day on Frankfurt/Main airfield takes around five hours.
Counting starts in the early morning shortly after sunrise. It is well known, that a great number of birds are more activ in the morning and evening hours than during the rest of the day. Always starting at stop 1 means, that stop 42 is always reached around noon when the birds are less active and therefore more difficult to detect. For this reason the starting point alters at each counting day. The first count begins at stop 1 and and ends at stop 42, the second begins at stop 42 and ends at stop 1.
Generally, all species of birds are counted, including those without a risk for flight safety. Particularly smaller birds are not so easy to detect and are more often overlooked than bigger ones, but many of the smaller birds have very special demands concerning their habitats. Their occurence or missing in the single plots is a good indication for special qualities of the habitat. Good examples for these specialized species are Stonechat and Wheatear.
Are only 2 counts per months enough to get sufficient information for a representatative description of the avifauna of an airfield ? In order to answer this question you have to keep in mind, that on airfield bird strike prevention in the first instance means that you have to change the habitat conditions by using methods of the habitat management. Therefore you have to know, which species of birds (that are a risk for flight safety) are in which location and in which numbers. In a second step you have to examine why the birds prefer these plots.
What you will probably never get with two counts per months is an exact description of the temporal distribution of the birds in the course of the year. But even two counts a month are extremly time consuming not to forget the time the observer needs for typing the data into a computer data file. (Later analysis of the data is carried out by the DAVVL). Another factor, besides time, that allows not more than two countings a month are the costs, because for all 14 airports the DAVVL employs experienced ornithologists.

Results

The bird counting program on Frankfurt/Main airfield started in the second half of January 1994 and will be continued until December 1996. In this paper only some initial results from the years 1994 and 1995 are presented.
In these two years 47 counts have been made and 57 bird species (Tab. 1) have been detected so far. The number counted per species shows, that from all 31442 recorded birds only few species appear in bigger numbers. These are Buzzards and

Kestrels, Swifts, Skylarks, Crows, Starlings, Greenfinches and Linnets. The numbers of all the other species are often very small and from some species only one individual could be found in the two years. Nevertheless one should not concentrate bird strike prevention activities only on those bird species that occur in great numbers. At present, the numbers of Grey Herons for example are still very small on Frankfurt/Main airfield, only 30 birds have been counted, but because of its heavy weight and its habit to fly at very low levels if not migrating, it is a substantial danger for air traffic. Besides this, the population of the Grey Heron is continuosly growing in most parts of Europe thus we can expect that in future there will be more Herons on Frankfurt airfield. As the word prevention implies, we now have to discover the reasons for the occurence of Herons on Frankfurt/Main airfield and we have to change the conditions this bird prefers now.

Another important fact besides number, weight and typical habits is the duration of time the different bird species are present on Frankfurt airfield in the course of the year. For all observed species it is shown in Tab. 1 at how many times of all 47 counts they were observed. The minimum is only once, the maximum 47 times, which means, that this bird species was present throughout the two years. Species that were recorded at every counting are Buzzard, Kestrel, Skylark and Crow. The Starling was missed at only 3 counting days and the Magpie at 12 counting days. If we neglect those species that are rare visitors on the airfield, the data in Tab. 1 give a first impression on the duration of the stay for the different species, mainly depending on their migratory or sedentary behaviour.

Another remark to Tab. 1 from the ornithological point of view: Some bird species like Lapwings and Gulls, that are often a problem on other airfields, could not be detected on Frankfurt/Main airfield or only in very small numbers. This is mostly explained by the fact, that Frankfurt/Main airport is located in the inland and that both species do not occur as breeding birds in the vicinity of the airport. An additinal reason for this is dry sandy soil in most parts of the airfield. Earthworms, a prefered food for Gulls and Lapwings, are less common in such soils.

Birds of Prey

In 1994 and 1995 eight different species of birds of prey were observed on Franfurt/Main airfield, some of them in only very small numbers like Peregrine (Falco peregrinus) or Hen Harrier (Circus cyaneus). Buzzards (Buteo buteo) and Kestrels (Falco tinnunculus) are the most common birds of prey in Frankfurt. In the past these birds caused a considerable number of birdstrikes with one very heavy accident that happend on 20. March 1993, when two Buzzards hit a starting Boeing 747 cargo plane on runway 18 west.

Using the standardized method of the point transect census 215 Buzzards were counted in 1994 and 155 in the following year. The corresponding numbers for Kestrels are 429 and 269. This shows that the numbers of both bird species were much smaller in 1995 than in the year before. I assume, that this is due to the fact that the abundance of voles, the main prey of both birds, was lower in 1995 than in 1994.

There are no big differences in the number of Buzzards present on Frankfurt/Main airfield in the course of the year. The numbers are on a relativly low level with the exception of the early spring months when slightly higher numbers are reached. This small increase is possibly an observational effect caused by the Rough-legged Buzzard (Buteo lagopus), a bird of prey that migrates across Western Europe in Februar and March and is not easily to distinguish from the similar looking Buzzard, a resident bird in most parts of Europe.

Comparing the temporal distribution of Kestrels in 1994 and 1995 (Fig. 1), the curves for the first and the last quarter of both years are almost similar. In 1994 there was a steady increase in the number of Kestrels up to the second half of July, afterwards their numbers began to decrease. In 1995, the number of Kestrels did not grow steadily, but there were also two peaks in the summer months, one in the second half of July and the other in the second half of August. What could be the reason for this summer peaks ?

The Kestrel is a common and widespread breeding bird on the airport and in its sorrounding. Most young Kestrels leave their nest around the end of June/beginning of July. After that the fledgelings will still be fed by their parents for at least one month until they are fully grown. When the young birds are independent they are forced by the adult birds to leave their place of birth. The higher number of Kestrels in the summer months is therefore mainly caused by young birds. Because they do not have any experience with the flight traffic they therefore cause a very high bird strike risk. The smaller number of Kestrels in the summer months of 1995 compared with the year before may depend on the above mentioned smaller abundance of prey. Breeding studies show, that the clutch size of Kestrels and their breeding success is strongly correlated with the availability of prey.

Where do we find Buzzards and Kestrels on Frankfurt/Main airfield, are there places (plots) which are more prefered than others ? The (generalized) maps of the airfield, showing the spatial distribution of Buzzards and Kestrels in 1994 and 1995 (the number of birds on the ground and in the air for each plot are summarized), indeed indicate that there are differences.

Both species reach their highest number in the area between runway north and runway south and also in the area south of the latter one. In 1994 there was also a concentration of Kestrels in the western and eastern corner of the airfield. In these

areas the grass is always cut relativly short for better visibility of the light marks and other flight control instruments. Therefore the prey, chiefly small mammals, especially voles, is easier to detect and to catch.
Astonishing are the relativly low numbers of Buzzards and Kestrels in the region of runway 18 west, located in the south of the airport. This area is completly surrounded by wood and should normally be an optimal habitat for these bird species. There are some possible explanations why this oportunity is not used appropriate:
1) The abundance of small mammals is lower than in the other parts of the airport due to a higher humidity of the soil
2) in some parts of this region the vegetation is relativly high with small pine trees interspersed (habitat of the Stonechat), therefore the prey is only hardly to detect
3) the thermal updraft conditiones in this part of the airport are not sufficient for the soaring flights of Buzzards
4) the area of runway 18 west belongs to the home ranges of Buzzards and Kestrels that are breeders in the adjacent forest, during breeding time the home ranges are defended against intruders.
These possible explanations also indicate, that there are always a lot of factors that influence the temporal and spatial distribution of birds in a given area. For bird strike prevention activities on airfields we have to find out what are the main factors. Due to the complex structur of ecosystems, this is no easy task.

After closing the fieldwork in December 1996 we will have to analyse the collected data in detail. We will also have to take a closer look at those plots that have been especially prefered by bird strike relevant species. This can also include additional examinations concerning the food resources for birds, their density and availability. Another task is to find out, whether there have been any relations between the bird strikes that happend and the results of the bird counts in these 3 years. All these results have to flow in a detailed plan for the management of Frankfurt/Main airfield.
Because of the dynamics in ecological systems, including the avifauna, it is intended to repeat the bird counts some years later.

Tab.1

Bird species (in systematical order) observed on Frankfurt/Main airfield in 1994 and 1995

		Frequency of detection with respect to 47 counts	Total number of individuals
Ardea cinerea	Grey Heron	18	30
Milvus migrans	Black Kite	12	33
Milvus milvus	Red Kite	2	2
Circus cyaneus	Hen Harrier	2	3
Accipiter gentilis	Goshawk	1	1
Accipiter nisus	Sparrowhawk	3	3
Buteo buteo	Buzzard	47	370
Falco tinnunculus	Kestrel	47	698
Falco peregrinus	Peregrine	2	2
Charadrius dubius	Little Ringed Plover	9	26
Vanellus vanellus	Lapwing	17	180
Numenius arquata	Curlew	1	1
Tringa ochropus	Green Sandpiper	1	1
Tringa glareola	Wood Sandpiper	1	2
Columba livia domestica	Dove	5	80
Columba oenas	Stock Dove	7	20
Columba palumbus	Woodpigeon	34	237
Streptopelia turtur	Turtle Dove	6	39
Cuculus canorus	Cuckoo	1	1
Apus apus	Swift	10	795
Jynx torquilla	Wryneck	3	3
Dryocopus martius	Black Woodpecker	1	1
Dendrocopos major	Great Spotted Woodpecker	1	1
Lullula arborea	Woodlark	3	3
Alauda arvensis	Skylark	47	5530
Hirundo rustica	Swallow	9	108
Anthus campestris	Tawny Pipit	1	1
Anthus trivialis	Tree Pipit	2	4
Anthus pratensis	Meadow Pipit	8	138

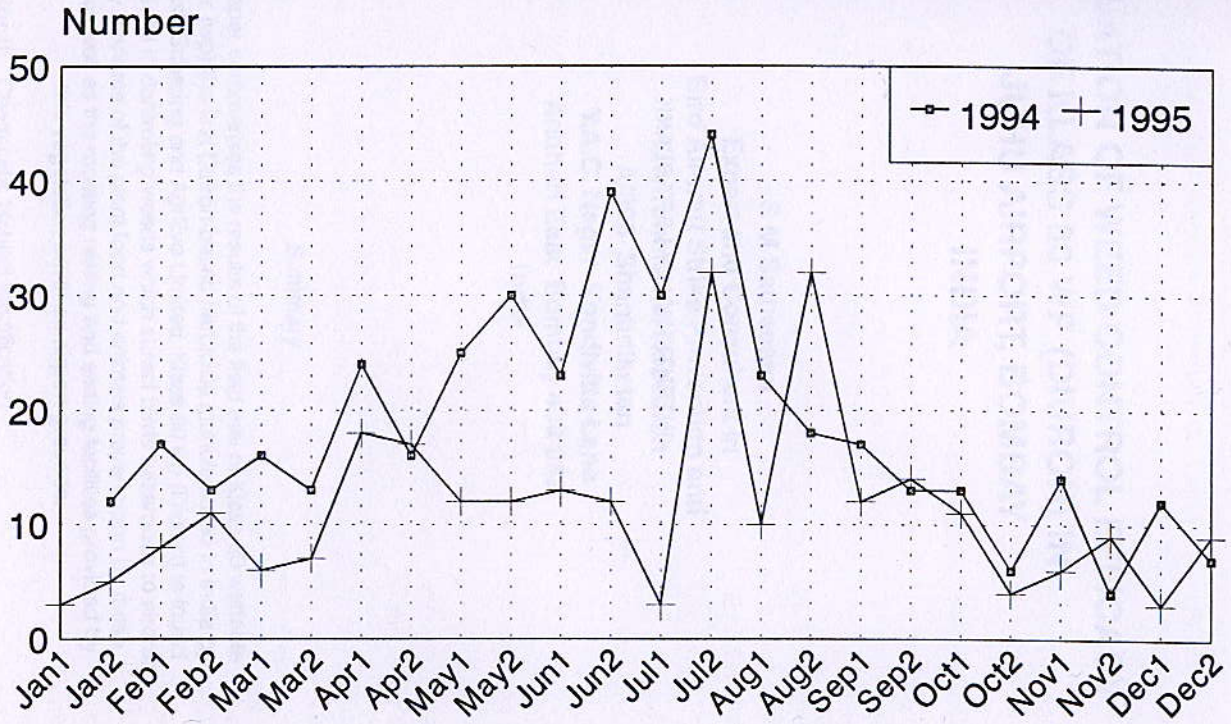
Tab.1 (continued)

Bird species (in systematical order) observed on Frankfurt/Main airfield in 1994 and 1995

		Frequency of detection with respect to 47 counts	Total number of individuals
Motacilla flava	Yellow Wagtail	1	1
Motacilla alba	Pied Wagtail	30	393
Prunella modularis	Dunnock	1	1
Phoenicurus ochruros	Black Redstart	3	8
Saxicola rubetra	Whinchat	3	18
Saxicola torquata	Stonechat	10	23
Oenanthe oenanthe	Wheatear	20	194
Turdus merula	Blackbird	6	7
Turdus philomelos	Song Thrush	2	7
Turdus viscivorus	Mistle Thrush	18	84
Sylvia borin	Garden Warbler	1	1
Sylvia atricapilla	Blackcap	1	1
Parus major	Great Tit	5	17
Oriolus oriolus	Golden Oriole	1	1
Lanius collurio	Red-backed Shrike	5	10
Garrulus glandarius	Jay	3	6
Pica pica	Magpie	35	156
Corvus frugilegus	Rook	1	4
Corvus corone corone	Carrion Crow	47	1872
Corvus corone cornix	Carrion Crow	4	4
Sturnus vulgaris	Starling	44	18746
Passer domesticus	House Sparrow	2	42
Fringilla coelebs	Chaffinch	9	151
Carduelis chloris	Greenfinch	14	587
Carduelis carduelis	Goldfinch		5
Carduelis cannabina	Linnet	26	634
Emberiza citrinella	Yellowhammer	13	111
Emberiza schoeniclus	Reed Bunting	4	45

Standardized bird counts on Frankfurt/Main Airport

Number of Kestrels per count in 1994 and 1995



(1994: n = 429, 1995: n = 269)

Figure 1: