

MONITORING BIRD ACTIVITY ON BRITISH AIRFIELDS

P.N.Ferns, R.J.Cowie, J.Simons & R.Woodburn

School of Pure and Applied Biology

University of Wales

College of Cardiff

PO Box 915

Cardiff

CF1 3TL

UK

ABSTRACT

The development of a simple form for systematically recording the activity of birds on British airfields is described. A single form is filled in each day and the extracted information stored in a PC database. Monthly summaries can then be extracted either before or after entry into the database. Yearly summaries can be prepared in a similar fashion. It takes approximately 18 person hours to process the data arising from a single airfield in a year. Using this system, it is possible to quantify differences in bird abundance between sites, and to monitor seasonal and annual changes. It is also possible to monitor bird control operations.

(Keywords: Bird Counts, Bird Monitoring)

1. THE DEVELOPMENT OF THE SYSTEM

The accurate monitoring of bird numbers and activity represents an important part of any airfield safeguarding program. It also provides a suitable mechanism for assessing the effectiveness of bird clearance operations. Systematic record keeping also enables long term changes in bird abundance and behaviour to be measured, so that bird control teams can respond quickly to changing circumstances.

At most British commercial passenger airfields, bird activity and bird clearance operations are currently recorded in a hand-written log. A few sites have developed more elaborate systems of their own. These records are periodically inspected by the Civil Aviation Authority (CAA). While this system works satisfactorily, there are differences in the degree of detail recorded at different sites. This makes it difficult to make comparisons between airfields, particularly of the different problems they face, and the ways in which they deal with them. Our brief was to develop a more consistent and detailed recording scheme and to explore its potential for monitoring bird abundance and activity.

We initially employed a form that needed to be filled in manually (Fig. 1). The format was developed following discussion of several drafts with both the CAA and safeguarding staff. In general, the form proved reasonably easy to understand and fill in. Misunderstandings occasionally occurred because people were too busy to read the instructions properly. The greatest confusion arose over the meaning of the terms "peak count" and "number of bird counts". These were intended to refer respectively to the largest count made at any one complete inspection of the airfield during the specified time period, and the total number of complete inspections made.

Each day was divided into four time periods because of the possibility that there might have been greater activity of different species at different times of day. For example, at some sites gulls are attracted to feed on areas of grass during the main part of the day, while at others there are movements of gulls across the airfield associated with the dawn and dusk flights of birds to roosts. Lists giving the exact start and stop times of the dawn and dusk ± 1 hour periods each day were provided for each participating airfield. Since weather conditions clearly exert an influence on bird activity, this was recorded at the same time.

Measures taken to deal with any birds present on the airfield were also recorded. This means that such forms can be used as a means of monitoring clearance activities, and their effectiveness, as well as bird numbers. Comparisons of control operations between different airfields can also be made. As well as the actual maximum numbers of birds present in each time period, their activity (in broad categories) and location on the airfield were also recorded. Even if many checks were made for birds during the course of the day, only the maximum count in any one time period (together with the location and activity of the birds) were entered on the form.

2. FIRST TRIAL

An initial trial was carried out for six months at five British airfields. It revealed, for example, that Lapwing numbers at one airfield in north-west Britain were low during the autumn months, but rose to a significant peak in December, remaining high throughout the following two months (Fig. 2). This is a quite different

AIRPORT BIRD ACTIVITY RECORDING SHEET
(see explanatory notes for help)

AIRFIELD = _____ DATE = _____

TIME PERIOD	Dawn ± 1 hr	Day	Dusk ± 1 hr	Night
Sky Condition	no cloud <input type="checkbox"/> some cloud <input type="checkbox"/> 100% cloud <input type="checkbox"/>	no cloud <input type="checkbox"/> some cloud <input type="checkbox"/> 100% cloud <input type="checkbox"/>	no cloud <input type="checkbox"/> some cloud <input type="checkbox"/> 100% cloud <input type="checkbox"/>	no cloud <input type="checkbox"/> some cloud <input type="checkbox"/> 100% cloud <input type="checkbox"/>
Precipitation	fog <input type="checkbox"/> rain <input type="checkbox"/> snow <input type="checkbox"/>	fog <input type="checkbox"/> rain <input type="checkbox"/> snow <input type="checkbox"/>	fog <input type="checkbox"/> rain <input type="checkbox"/> snow <input type="checkbox"/>	fog <input type="checkbox"/> rain <input type="checkbox"/> snow <input type="checkbox"/>
Wind	strong wind <input type="checkbox"/>	strong wind <input type="checkbox"/>	strong wind <input type="checkbox"/>	strong wind <input type="checkbox"/>
DISPERSAL MEASURES TAKEN	No. additional birds used _____ No. birds used _____ Encourages calls played <input type="checkbox"/> Arm Waving _____ Other (specify) _____	_____	_____	_____
PEAK COUNT, ACTIVITY & LOCATION OF BIRDS	P = pecking over (omit location) R = resting e.g. 20 P, 48 R = 20 birds feeding in water 48			

NUMBER OF BIRD COUNTS	INITIALS OF RECORDER
GULLS	_____
Black-headed gull	_____
Common gull	_____
Herring gull	_____
Lesser black-backed gull	_____
Greater black-backed gull	_____
WADERS	_____
Large eg	_____
Golden Plover	_____
Oystercatcher	_____
Other (specify)	_____
CORVIDS	_____
Common Crow / Rook	_____
Jackdaw	_____
PIGEONS	_____
Feral Pigeon / Stock Dove	_____
Woodpigeon	_____
Columba Dove	_____
OTHER LARGE SPECIES	_____
Partridge	_____
Kestrel	_____
Other (specify)	_____
SMALLER SPECIES	_____
Starling	_____
Other (specify)	_____

Please enter here any special conditions at, or in the vicinity of, the aerodrome, during the 24 h period, that may have affected bird activity, e.g. grass cutting and ploughing, etc.

EXPLANATORY NOTES

- The recording sheet is to be filled in at the end of each of the four time periods (Dawn ± 1 hr, Day, Dusk ± 1 hr, Night), summarizing the presence of birds during each period. Therefore, one form should be completed each day.
- Time periods** The time periods of Dawn ± 1 hr and Dusk ± 1 hr for each day of the year at your location are enclosed in your computer file. Please refer to the file for the time periods in any one hour before dawn and one hour after dusk for the day; and for one hour after dusk and one hour before dawn on the following day, as the night.
- Sky condition** Tick the box which best reflects the sky condition for the majority of each time period. Only one of the three boxes should be ticked.
- Precipitation** Tick boxes to show the precipitation which occurred during each time period. More than one of the 3 boxes may be ticked. No boxes ticked indicates no precipitation.
- Wind** Tick box if the wind reaches Beaufort Scale 5 (19-24 mph, 17-21 knots), during the time period.
- Dispersal measures taken** Tick boxes to show what dispersal measures were taken and the number of antiretractors and traps that were used. If no dispersal measures were employed do not tick any boxes.
- Number of bird counts** The number of bird counts refers to the number of separate occasions that the birds on the aerodrome were counted during each time period.
- Initials of recorder** The recorder refers to the person who actually fills in the form. This may not necessarily have been the observer.
- Peak Count, Activity & Location of Birds** Fill the spaces of the remainder of the recording sheet with the peak counts of each species (i.e. the highest number of individuals counted at any one time during the relevant time period), and the activity and location of the majority of those birds, using the system shown overleaf.
- If no individuals of a species were observed during a time period, leave the space blank.
- The peak counts, activity, and location of birds that have not been identified as a particular species but only as a general group e.g. gulls, should be entered in the appropriate group row (indicated in capitals overleaf). If all birds are identified to species, these 'group rows' should be left blank.
- A species that has been identified but is not on the list should be named and entered under the heading of 'Others (specify)' in the relevant group.

Figure 1. Manual version of the bird activity form.

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pattern of occurrence from that recorded in south-east Britain, where numbers were high in the autumn months, but decreased in mid-winter (Milsom et al. 1985, Lack et al. 1986). This is a consequence of the generally westerly movement of Lapwings that quite often occurs at this time of year across the British Isles, though it may be reversed if conditions are cold in the west and mild in the east. Such cold-weather movements of Lapwings are a regular feature of most winters.

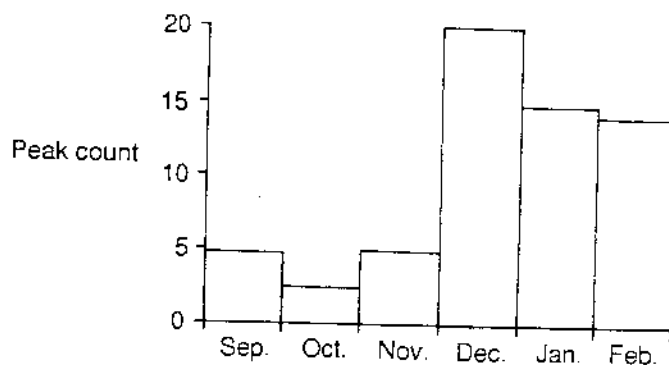


Figure 2. Average monthly peak Lapwing counts at one airfield in the first trial.

Rooks were the commonest large bird species recorded at two of the airfields in the trial, Black-headed Gulls were commonest at another two and Lapwings at the fifth. An examination of the location of the records of this species at one airfield showed a somewhat unexpected cluster in sectors F3 and G3 (Fig. 3). When investigated, this turned out to be a consequence of a temporary pool that had formed on waste ground outside the airfield's perimeter fence. Gulls tended to gather inside the airfield after washing and drinking at the pool. This provides an example of how regular records can lead to the identification of unexpected concentrations of birds that can be quickly dealt with. In this case, clearance inside the fence provided a temporary solution while steps were taken to get the pool drained.

The trial was thus successful, but it took a good deal of time to transfer the data from the forms into a database and to summarise it. It was thus decided to develop a machine readable version of the form.

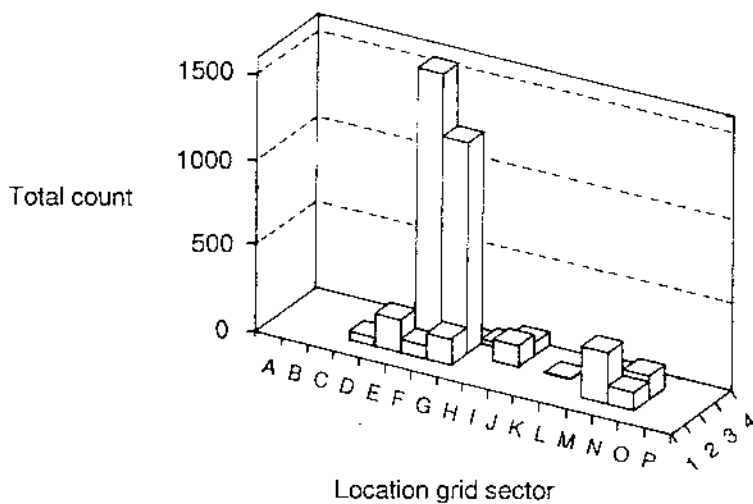


Figure 3. Sum of total peak counts of Black-headed Gulls in different sectors at one airfield in the first trial.

Careful consideration was given to the possibility of using a system based on PCs at each site. With such a system, bird control staff could enter details of records directly into a database. Copies of the records could then be transferred to a suitable national co-ordinating centre. No trial of this scheme was undertaken for two main reasons. Firstly, not all control staff yet have access to a PC. Secondly, only a few of them are familiar with using computers. It may, however, be possible to introduce such a system at some time in the future.

3. THE MACHINE READABLE RECORDING FORM

Given the amount of time that operatives have to devote to bird monitoring, it was considered important to keep the form short and simple. For this reason it was decided to limit its size to a single side of A4. This was the same size as the original hand-filled form, but because the size of the mark capable of being read by the present generation of optical mark readers is quite large, it placed a significant constraint on the amount of information that could be recorded (Fig. 4). There was insufficient room for detailed counts of a significant number of species of birds in the four daily time periods. Instead, a series of abundance codes for a slightly smaller number of species were employed. Likewise, it was not possible to record the location of birds on the airfield in individually numbered sectors. Thus it was not possible, for example, to store information sufficiently detailed to compile Fig. 3.

EXPLANATORY NOTES
 This recording sheet should be filled in at the end of each of the four time periods (08:00-12:00, 12:00-16:00, 16:00-20:00, 20:00-24:00) during each period. Therefore, one form

Birds commonly found on aerodromes - a handy guide

CAA
Bird Survey

RECORDING CODES

DATE	YEAR	MONTH	DAY
	19	20	

TIME PERIOD

PERIOD	08:00-12:00	12:00-16:00	16:00-20:00	20:00-24:00
ABUNDANCE	0	1	2	3
SPECIES				

Figure 4

A simple bird identification guide originally developed by the CAA was printed on the reverse side of the form. This was a useful feature as not all safeguarding staff are experienced at identifying birds. One common error is the failure to distinguish individual species of gulls correctly. Many Black-headed Gulls, for example, are recorded as Common Gulls. The general categories "gull", "crow" and "pigeon" were designed for use by those not sure of specific identity.

4. SECOND TRIAL

The scheme was extended to include 20 airports. The optical mark reader software was set up to deliver the data as a comma delimited ASCII file in which one day's information was recorded on a single line. In most cases, it was convenient to enter the data one month at a time, since the forms were returned in monthly batches. This was to allow the return of the forms to be monitored during the trial. In a full scale operation, a longer time interval would be more appropriate.

Each month's results were stored in a Paradox database. At the same time, the ASCII file was pasted into an Excel spreadsheet set up to calculate and print a summary of the month's results. Data handling time was cut dramatically with this system. It took about an hour to check and correct one month's worth of returns for 20 airfields, and a further hour to scan these forms through the optical mark reader. Transfer and checking of the resultant ASCII file into a PC database took a further hour. Preparation of monthly spreadsheet summaries took a further 2-3 hours.

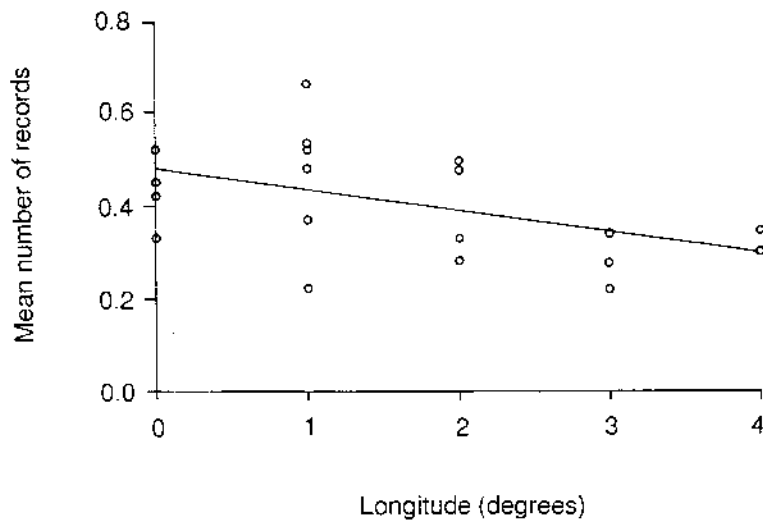


Figure 5. Average daily number of positive bird records plotted against the longitude of each airfield in the second trial.

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A year's worth of data from 20 airfields occupies about 2 Mb of hard disc storage space, though this can be greatly reduced by compression because of the large number of blank spaces that such databases usually contain. It would take about one person-day per week to operate such a system for 20 airfields, with the result that the total cost would be about £3,000 per year (£150 per airfield).

One way of demonstrating how information such as this can be used is to examine the numbers of records of each of the 21 categories of birds listed in Fig. 4 occurring daily at each airfield throughout the trial. There were no significant correlations between these values and the altitude, latitude or number of aircraft movements at each of the airfields, but there was with longitude (Fig. 5) ($r = -0.47$, $p < 0.05$). Thus airfields in the west of Britain generally seem to have fewer birds than those in the east. This is probably due to the greater numbers of several species of birds that occur in eastern England, particularly the south-east (Lack 1986, Gibbons, Reid and Chapman 1993).

As well as examining bird abundances, it is possible to look at the way in which different control methods are used. Combining all airfields in the trial, distress calls were by far the most common dispersal method employed (Fig. 6). Shell crackers were used about half as often during daylight hours, but less often at other times. Some operators used arm-waving (the third most common bird dispersal technique overall) regularly, but others scarcely used it at all. It is probably a good idea to employ a variety of techniques, as this lessens the rate at which birds become habituated to any particular method. Falconry was one category not provided with an individual tick-box on the form, as it was only used at one of the airfields in the trial.

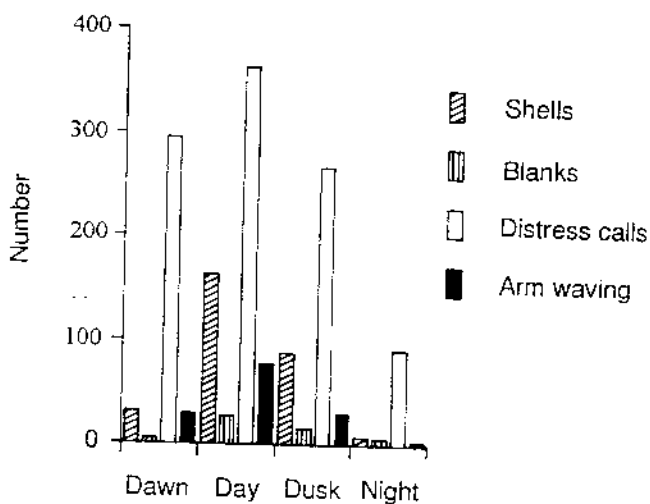


Figure 6. Total number of different dispersal measures undertaken at all airfields during the second trial.

One of the potentially most useful features of this type of recording system is the ability to examine changes in bird abundance from season to season, and from year to year. Such changes could be caused by changes in the national population of the species concerned, or by more local changes on or near the airfield. In either case, further investigation can be carried out, and measures undertaken if necessary, to ensure that high standards of flight safety are maintained.

5. CONCLUSION

It is possible that individual airfields will assume greater responsibility for their own safeguarding procedures in future, and if this is the case, a national bird monitoring scheme may not be appropriate. Our work clearly shows, however, that such a scheme is feasible, and could be implemented at relatively low cost.

6. ACKNOWLEDGEMENTS

We would like to thank those responsible for bird control operations at all the airfields that participated in our trials, for their willing co-operation. We are also grateful to the CAA for funding the studies and presenting us with such an interesting challenge.

7. REFERENCES

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