The development of an effective bird detection and dispersal programme

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THE DEVELOPMENT OF AN EFFECTIVE BIRD DETECTION AND DISPERSAL PROGRAMME

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Summary

Bird detection and dispersal operations require a detailed knowledge of the habits of the bird population at each airport. Bird dispersal can take hours or even days to become effective and requires persistence and dedication on the part of those staff involved in the task and also the trust and understanding of air traffic controllers. For these reasons, there is a need for bird detection and dispersal operations to be concentrated amongst a small group of individuals who work to the demands of the birds. Effective bird detection and dispersal operations can lead to a reduction in bird strikes, a reduction in the number of birds which regularly come to the airfield and a reduction in the time required to disperse those birds. The result of this can be a dramatic reduction in operating costs.

1. INTRODUCTION

Habitat modification, designed to make an airfield less attractive to birds is an essential component of any bird hazard management programme. However, since this method is never totally effective, the cornerstone of any bird control programme remains an effective bird detection and dispersal operation.

Methods of bird dispersal have changed very little over the years, however, developments in our knowledge of bird behaviour and ecology, and in particular, a better awareness of the individual nature of the bird hazard at each airport means that more effective use can be made of these standard techniques.

This paper aims to describe the way in which the principles of bird detection and dispersal should be tailored to the demands of the bird hazard at a particular airport. In so doing it attempts to clarify the essential difference which exists between bird scaring and bird management.

Data presented below relate to the bird hazard management programme at Manchester Airport which was designed to deal primarily with the hazard posed by lapwings and gulls.

2. THE PRINCIPLES OF BIRD DETECTION

Although an airport is intrinsically attractive to some species of birds, others visit it whilst en route to another site and may only use it at certain times of the day. Even those airports on which the number of "resident" birds is comparatively small can face a serious bird hazard where the environment surrounding the airport is diverse and rich and, therefore, full of birds. Since some species of bird fly long distances each day between their roost or nest and their feeding areas (for example, gulls will fly upto 50 miles per day in search of food) a very large area of countryside surrounding an airport can provide the source of a bird hazard.

Although there are some predictable patterns to the behaviour of birds in a particular locality, these change seasonally, and even on a day to day basis. The result is that in theory, flocks of birds may appear over the perimeter fence at any time and from any direction and land on the runway. Despite the flat nature of an airport, its large size makes it impossible to carry out effective detection of birds from a single fixed point, even a well positioned control tower.

3. THE DEVELOPMENT OF A BIRD DETECTION PROGRAMME

The level of bird control cover provided at a particular locality will be dependent upon the extent of the bird hazard and also the economics of the airport. At some airports, bird detection involves little more than an occasional inspection of the runway before aircraft movements, or even a visual inspection from the control tower. Where regular (for example two hourly) bird patrols are carried out, they are often provided by staff (such as the Airport Fire Service) whose primary responsibility lies elsewhere and often, the frequency of patrols is dictated by the other duties of those staff rather than the demands of the birds. The only truely effective method involves the provision of dedicated staff who can spend their entire working day patrolling the airfield, if the extent of the bird hazard demands it.

4. THE PRINCIPLE OF EFFECTIVE BIRD DISPERSAL

Those birds which use the airport en route to other sites can often be dispersed with comparative ease using standard techniques, however, those species which are attracted to the airport itself will tend to be more persistent.

There is a tendency for flocks of birds which are loafing in remote corners of an airfield (and even, sometimes, at sites quite close to the runway) to be allowed to remain if they show the least sign of persistence. This practice, which is at best short sighted and at worst dangerous, arises both because of limitations in the amount of time which can be allocated to bird control by staff whose prime responsibilities lie elsewhere and also because bird dispersal carried with it a degree of hazard to aircraft and Air Traffic Controllers are often unwilling to allow dispersal to take place when aircraft are taking off and landing.

There are a number of reasons why all flocks of birds should be dispersed at the earliest reasonable opportunity:

1. A flock of birds on the ground can act as attractant to others overflying the airport. These come down and join the existing flock thereby increasing the numbers on the airfield.

2. Small flocks of birds are comparatively easy to disperse in a controlled manner, however large flocks can be dangerous since they may split up

into a number of small flocks which fly in several directions.

3. While a flock remains on the ground, it offers no immediate threat to an aircraft (unless, of course, it is on the runway). However, it may be disturbed at any time and fly up in a dangerous and uncontrolled manner. The bird officer can, however, select when and in what way to disperse the flock.

4. The ease with which a flock of birds can be dispersed from an airfield varies between species (lapwings are particularly persistent). If a flock is allowed to remain on an airfield for any length of time, the birds become more resistant to dispersal action. In the short term they learn that with a little persistence they will be allowed to settle again. In the longer terms, if the birds are allowed to return day after day, they start to include the airport as part of their daily routine. Birds are most easily dispersed if attacked while they are still in the air before they have settled on the airfield.

Lapwings are responsible for a high proportion of bird strikes reported in western Europe. The lapwing problem is, in the main associated with the autumn and winter months when the birds revert to their flocking habit which persists until the following spring. When flocks arrive back in late summer the numbers are small, however, at this time of year, at most civil airports, air traffic is at its maximum. Due to the disruptive effects of bird dispersal operations, there is a temptation to allow these small flocks to remain undisturbed. By late autumn, when air traffic numbers have declined, the resident bird flock has increased to a hazardous level. However, since a significant proportion of these individuals have used the airfield as part of their daily routine for weeks or even months, they are almost impossible to disperse. Bird dispersal can only be successful if it is started as soon as the birds move into the area and maintained throughout the period that they are there.

The effectiveness of this theory may be assessed from bird dispersal operations mounted against lapwings at Manchester Airport over the past three years. The numbers which attempt to use the airfield on a regular basis have been dramatically reduced (Fig. 1) and those which do return can be easily driven off. The result has been a marked decline

in the number of strikes involving lapwings from approximately 12 per year to only 2 in 1986 and 0 in 1987.

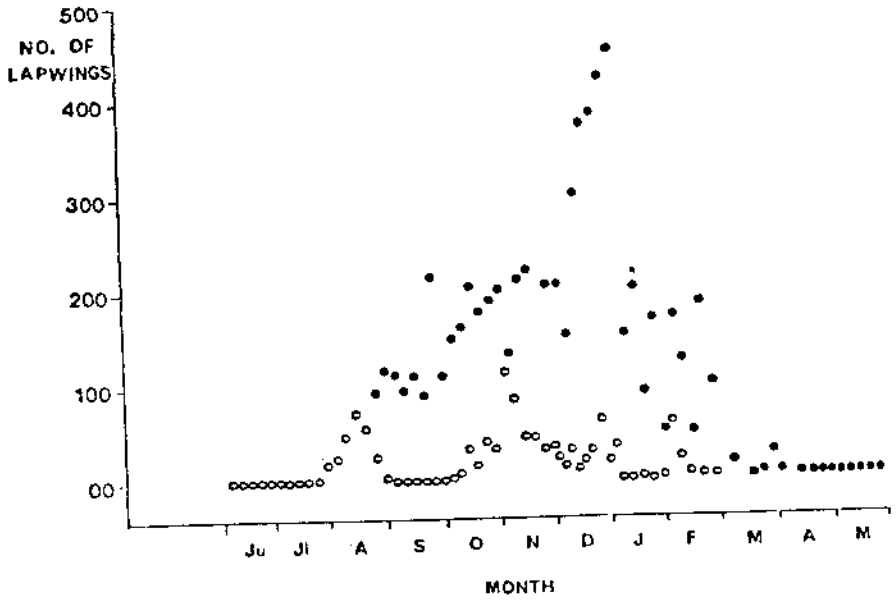

Fig. 1: The number of lapwings which regularly use Manchester Airport as a loafing site before (o) and after (o) the introduction of comprehensive detection and dispersal operations.

Bird dispersal operations may take only a matter of minutes, however, frequently they can require an hour to be effective. A persistent flock may require continuous dawn to dusk scaring for a number of days in order to break its allegiance to the airport, however this can be avoided if dispersal is started as soon as the birds arrive in the area.

Observations on the movements of different types of birds will indicate the direction in which they will most easily be driven off. This requires the maintenance of detailed records and also an intimate knowledge of the local bird populations.

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5. ALLOCATION OF RESOURCES

Theoretically, birds may arrive and settle on an airfield at any time through the day or night, however, in practice there are general patterns in the behaviour of birds which, if identified, can be used to predict the times of day, or of year when the hazard is greatest. The way in which these patterns manifest themselves is dependent upon the reasons why the birds come into the vicinity of the airport and also the opportunities for feeding, loafing, breeding or roosting at other sites in the surrounding countryside. For example, the extent of the hazard at a coastal airport is likely to be determined to a large extent by the state of the tide.

An analysis of bird strike statistics can give an indication of the times of day and times of year when the hazard is greatest, however these data should be viewed in conjunction with field observations in order to develop a complete picture.

Gulls pose the single most serious avian threat to aircraft safety at Manchester Airport and account for 40% of all bird-strikes. An analysis of gull related strikes revealed that:

1. Three quarters occurred on the runway itself, 80% below 50' and 90% below 100'.

2. Strikes occurred from late summer until spring and reached a peak in November when 1 could be expected every ten days.

3. Over 70% of strikes were reported within 2 hours of sunrise.

4. Strikes occurred more frequently on days when it was raining.

5. All gull strikes reported during the approach or climb phase occurred in the same airspace (over the western perimeter of the airport).

6. A half of all gull related strikes occurred less than six minutes after the previous aircraft had used the runway.

Field observations revealed that the gull hazard is associated with a large winter night roost on an area of open water 4 miles away from the airport. The birds leave the roost at dawn and fly out into the surrounding countryside in search of food. A marked gull flightline crosses the western approach to the airfield, normally at 200-300'. The gull movement is generally from north west to south east at dawn and is reversed at dusk. The seasonal change in the size of the roost corresponds to the change in the number of strikes recorded each month. The diurnal variation in strikes corresponds to the numbers crossing the airfield at different times of the day. An analysis of weather records showed that more gulls crossed the airfield on days when conditions were wet (when it was raining or had recently rained). However, despite these apparent trends in the data, there was remarkable day to day variability in numbers with remains to be explained.

From these data, therefore, it is possible to detect a general pattern of times and conditions in which the strike hazard is greatest and during which bird detection and dispersal operations should be maximised. In addition, it has become apparent that dispersal operations in the morning should, in general, aim to drive birds towards the south east and in the afternoon towards the north west. A Bird Control Officer (whose sole responsibility is to detect and disperse birds) is present at the airport from dawn to dusk throughout the year (very few strike occur at night) however plans have now been drawn up to double the cover during the period around dawn when the hazard posed by gulls is greatest.

Thus we have been able to make the more effective use of our resources with comparatively little detailed knowledge of the bird hazard. Data are still being collected and in the future it is hoped to develop a multivariate model of factors which influence numbers of birds crossing the airfield each day. This will permit more accurate predications both for reasons of manpower management and also for warning pilots.

The finding that gull strikes result from large numbers of birds crossing the airfield during a short period of time, that they occur in conditions of poor visibility, at a time when air traffic activity is high and also that strikes occur very shortly after the previous movement along the runway, suggests that bird detection and dispersal will not be the long term solution to this problem. Accordingly, efforts are being made to reduce the number of gulls in the vicinity of the airport either by dispersal of the night

roost or through changes to farming practice in the surrounding countryside.

6. THE RELATIONSHIP WITH ATC

The freedom of movement and action which is a necessary prerequisite to successful bird dispersal operations requires the understanding and trust of ATC staff. It is important therefore, that a dialogue be maintained between the two groups and also that an individual controller knows the ability of, and limitations of the person who is actually carrying out bird control on the manoeuvring area.

7. THE COST OF COMPREHENSIVE DETECTION AND DISPERSAL OPERATIONS

The employment of dedicated bird control staff is obviously an additional drain upon an airports' financial resources, although it can never be measured against the potential savings to the aviation industry generally. However, bird control staff can take on additional duties, providing they work primarily to the demands of the birds and particuarly if those duties involve them working out on the airfield itself. There is evidence from a number of airfields, however that improved bird detection and dispersal operations can lead to a dramatic reduction in the use of bird scaring cartridges since the birds become less persistent in their attempts to return to the airport. The financial savings in shell cracker use at Manchester Airport have been sufficient to pay the salary of one full time bird control officer (Table 1). (Intensive bird detection and dispersal operations started in the middle of 1985).

Table 1: The annual cost of bird scaring cartridges used at Manchester Airport.

Year	1982	1983	1984	1985	1986	1987
Cost	£13,108	£12,831	£ 9,193	£3,747	£2,670	£1,638

8. THE EFFECTIVENESS OF COMPREHENSIVE DETECTION AND DISPERSAL

Data are available from Manchester Airport for the period before and after the estabishment of a Bird Control Unit and the instigation of full time bird detection and dispersal operations. These indicate that improved bird control on the airfield has resulted in (see Table 2).

1. A decline in the bird strike rate.

2. A reduction in the proportion of strikes involving birds which are comparatively straight forward to control.

3. A reduction in the number of birds which regularly use the airfield. (Data from Fig. 1 for October - January).

4. A reduction in the effort required to disperse those birds which do come to the airfield (as measured by the number of bird scaring cartridges used).

Table 2: Measures of the effectiveness of part-time and full-time bird detection and dispersal operations.

	Part-time	Full-time
1. No. strikes per 1000 movements	4.1	2.5
2. % strikes involving easily controlled birds	76	28
3. Average number of resident lapwings	214	31
4. Bird scaring cartridges/ year	10921	2420