

**MINIMUM BEST PRACTICE STANDARDS FOR AERODROME BIRD CONTROL****John R. Allan**

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**Abstract**

Despite almost 40 years of research effort and operational experience, there remains very limited consensus concerning the best methods for managing the birdstrike hazard at aerodromes. This is, in part, because the levels of risk, habitat type and bird species present at different aerodromes varies and the precise techniques that are successful at one site may not work at another. It is also partly due to differences in the levels of resources available at different airports and to differences in the attitude of airport managers and national regulators to the hazard posed by birdstrikes. Following the implementation of the new ICAO standards on airport bird control, IBSC agreed at the 26<sup>th</sup> meeting in Warsaw that a set of recommended minimum best practices should be developed to try and address these problems.

This paper seeks to identify those areas where universally applicable practices can be identified, and suggests a minimum standard of equipment, manpower, airfield habitat management and control of hazards around the airport that any medium to large regional or international airport should have in place if it is to effectively manage the birdstrike risk to aircraft.

The author, and the IBSC Steering Committee, invite debate and critical comment on these standards with a view to having them endorsed by the IBSC membership

**Key words:** IBSC, bird control, aerodrome, best practice, standards.

**1. Introduction**

Several excellent handbooks exist that describe in detail the techniques that can be used to manage the birdstrike risk on aerodromes (e.g. CAA 1998, Cleary & Dolbeer 1999, Transport Canada 2001). There has, however, been little attempt to determine the levels of investment in time, manpower, equipment, training and monitoring that are needed to effectively manage the birdstrike hazard. This contrasts with other aerodrome safety provisions, such as levels of fire control equipment and manpower, that are precisely defined by regulation. This situation has arisen, in part, because the levels of risk, habitat type and bird species present at different aerodromes vary and the precise techniques that are successful at one site may not work at another. It is also partly due to differences in the levels of resources available at different airports and to differences in the attitude of airport managers and national regulators to the risk posed by birdstrikes.

Following the implementation of the new ICAO standards on airport bird control, a need was recognised to update the accompanying guidance material in Annex 14. This process is currently ongoing and will, when combined with the various national handbooks described above, provide the technical detail needed to construct a bird control programme. It does not, however, describe the levels of effort that are needed if the programme is to operate effectively at an airport with a normal birdstrike hazard. It was therefore agreed at the 26<sup>th</sup> meeting of IBSC in Warsaw that a set of recommended minimum best practices should be developed by the committee. These best practices should identify the levels of effort needed to achieve the minimum acceptable level of bird control.

This paper therefore seeks to identify those areas where universally applicable practices can be identified, and suggests a minimum level of equipment, manpower, airfield habitat management and control of hazards around the airport that any medium to large regional or international airport with a normal birdstrike hazard should have in place if it is to effectively manage the birdstrike risk to aircraft.

It is envisaged that these best practice standards will inform airport managers, national regulators, the insurance industry, lawyers etc. about what they should expect to see invested in bird control at an average airport. It should be emphasised that these are minimum standards for normal birdstrike hazards. Airports with unusually high birdstrike risk for whatever reason would be expected to invest more in birdstrike prevention in order to control that risk.

No attempt has been made to provide a detailed scientific underpinning for the best practices proposed. Those wishing to explore the underlying science in more depth are referred to previous volumes of the proceedings of IBSC, Birdstrike Committee Europe, Birdstrike Committee N. America and the scientific literature. The aim of this document is to distill the views of the individuals responsible for producing that science into a set of basic recommendations that the aviation industry as a whole can use.

This is a discussion document, and it is anticipated that the contents will be subject to modification before a final draft acceptable to the IBSC membership is produced. The author, and the IBSC Steering Committee, invite debate and critical comment on these proposed standards, with a view to having them endorsed by the IBSC membership in due course.

#### **Important Note**

**These guidelines are provided in good faith and every effort has been made to ensure that the contents are accurate. IBSC, the author and the IBSC membership accept no responsibility for any loss or damage howsoever caused arising from the use or implementation of these guidelines.**

## **2. Proposed Minimum Best Practice Standards**

### **2.1 Active Bird Control On The Airport**

#### **Background**

Effective bird control requires that even small numbers of hazardous birds are dispersed as soon as possible from the airfield. This avoids them becoming an attraction to other birds as their presence indicates that there is food available on the airfield and/or that it is a safe place for the birds to rest. To achieve this, birds need to be detected rapidly once they arrive and then dispersed quickly. Efficient bird detection cannot be achieved from the ATC tower or the Airfield Operations centre. Relying on Air Traffic to call out staff to disperse birds will result in small numbers of birds being missed. It will also result in a delayed response when birds are detected, because it will take time for the bird controller to reach the bird's location. Efficient detection requires the use of a mobile patrol, operated by trained and equipped staff who are able to disperse birds immediately they are detected. If these staff are diverted to other duties, such as marshalling aircraft, the bird control will be reduced in efficiency. Bird control at night is more problematic because it is often difficult to detect where birds that are dispersed from the airfield are moving to. Further research, using modern bird detection technology, is needed in this area.

#### **Recommendation**

**There should be a continuous presence on the airfield of at least one properly trained and equipped bird control officer, with no other duties except bird detection and dispersal, throughout daylight hours. At night, active runways and taxiways should be checked for the presence of birds at least every 20 minutes, and more frequently if the bird species local to the airport are active by night (e.g. waterfowl).**

## 2.2 Organisation

### Background

Different aerodromes adopt a variety of organisational structures for their bird control programmes. These vary from having bird control as a secondary duty of the Air Traffic Control or Fire Sections, through staffing bird control from the Airfield Operations Section to employing specialist wildlife managers or bird control units. Bird control staffed from larger units has the advantage that there are more staff to call upon and greater flexibility to cope with sudden increases in bird numbers. However, staff employed primarily in other roles may regard bird control as a secondary or low status duty which, if they only carry it out on rare occasions, it not really their responsibility. Conversely, small specialist units are normally staffed by people who have a real interest in birds and bird control, and who clearly recognise that the responsibility for birds on the airfield lies with them. This 'ownership' of the bird problem can be a powerful motivation to improve standards of bird control. Such units may, however, find it difficult to cope with staff illness or sudden increases in bird numbers which require additional staff to be deployed.

**There is no 'best practice' in terms of organising airport bird control. Providing that the system in place delivers the minimum best practice described elsewhere in this document then it meets the basic requirements.**

## 2.3 Equipment

### Background

The type and level of sophistication of the equipment needed to deter birds from airfields depends on the bird species involved and the quantity of manpower that can be deployed. If a single staff member is required to disperse birds from a large airport then equipment such as pistol launched pyrotechnics or distress call broadcasting devices will be essential. If more staff can be deployed or is the airport is small, then more basic equipment may suffice.

Bird deterrent devices can be broadly divided into visual, acoustic and lethal, and subdivided into portable and static systems. The levels of sophistication, and hence cost, available are highly variable and include the simple scarecrow, (a static visual device), complex radio controlled sound generators (static acoustic), pyrotechnic pistols and vehicle mounted distress call apparatus (mobile acoustic), hand held lasers (mobile visual), traps (static lethal) and a shotgun (mobile lethal). The choice of which systems, or combination of systems, to deploy will depend on cost and logistical constraints and, perhaps most importantly, on the bird species that need to be dispersed. For example, attempting to use a distress call system on species which do not produce such calls is doomed to failure.

Relatively few of the bird control devices available to airports have been subjected to a proper scientific evaluation of their effectiveness. It is not possible, therefore, to recommend particular devices as being suitable for airport bird control. Experience over many years has, however, shown that a number of basic principles apply:

### Portable equipment

Portable equipment, that requires a staff member on the airfield to operate it, is generally regarded as providing the best airport bird control, providing that the staff involved are properly trained and motivated. Devices such as pyrotechnic pistols, or vehicle mounted distress call generators produce an impression of a direct threat which can be continually varied by the operator in a manner not available to static systems. In all cases staff should have access to a shotgun to remove birds that cannot be dispersed by non-lethal means, providing that the bird protection and firearms legislation in the country concerned permits this. Staff should be properly trained in the use of this weapon and carry the necessary permits to own or operate a firearm. Supporting the non-lethal threat of pyrotechnic and other devices with an element of lethal control will help to ensure that birds do not habituate to the bird control programme.

### Static devices

In general, static bird scaring devices, such as gas cannons or other sound generators, gradually lose their effectiveness over time. Although some of the more sophisticated devices, which generate a variety of sounds in random or pre-programmed order, may delay this habituation, they are generally

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more suitable for providing short term bird deterrence from limited areas (e.g. ground being reinstated after building works).

### **Recommendation**

**Bird control staff should be equipped with bird deterrent devices appropriate to the bird species encountered, the numbers of birds present and to the area that they need to control. Staff should have access to a shotgun. All staff should receive proper training in the use of bird control devices. Static bird scaring devices are not an adequate substitute for a mobile human patrol.**

## **2.4 Logging Activities**

### **Background**

There is an increasing tendency towards airlines and/or their insurers embarking on legal action to recover the costs of birdstrike damage from the airports at which they occur. It is important that airports record the bird control actions that they take in order to be able to show that they had an adequate bird control programme in place at the time of an incident and that the programme was functioning properly. Data gathered as part of a bird control programme is also important in assessing the effectiveness of the actions taken.

### **Recommendation**

**Airport bird controllers should record the following at least every 30 minutes:**

- areas of the airport patrolled,
- numbers and species of birds seen,
- action taken to disperse the birds,
- results of the action.

More general information such as the name of the bird controller on duty, time on and off duty, weather conditions etc should be recorded at the start of a duty period.

## **2.5 Airfield Habitat Management**

### **Background**

Controlling the attractions offered by an airport to birds is fundamental to good bird control. Indeed, it is probably more important than bird dispersal in terms of controlling the overall risk. If an airport offers resources to birds in terms of food, water, shelter or breeding sites, then the birds will continue to try and return whatever dispersal tactics are used to dissuade them. The bird control programme is thus doomed to failure unless the airport is made as unattractive to birds as possible. Habitat management to deter birds involves two processes, identifying the attractive features and implementing habitat management to either remove the attraction or to deny birds access to it.

### **Identifying attractions**

The reasons why birds frequent an airfield are not always obvious. They may be attracted to food such as invertebrates, seeds or plants in the grassland; water from ponds, ditches, or puddles on the tarmac; nesting sites in trees, bushes or buildings; or simply the security offered by large open spaces where they can easily see approaching predators. In some cases it may be obvious what resources the birds are attracted to but in others it may not. If there is any uncertainty, obtaining the assistance of a professional wildlife biologist or ornithologist is advisable in order to identify what it is that is attracting the birds. Obviously the attraction will vary from one bird species to another. Once the attraction has been identified a management plan can be developed either to remove it entirely, reduce it in quantity or to deny the birds access to it.

### **Habitat Management**

Because airfields around the world are all different and because the bird species that frequent them vary from region to region, it is not possible to define precisely what types of habitat management constitute best practice. However, all airports should be able to show that they have assessed the bird attractions on their property and developed and implemented a habitat management plan to reduce these attractions as far as is practicable.

### **Recommendation**

**An airport should undertake a review of the features on its property that attract birds. The precise nature of the resource that the birds are attracted to should be identified and a management plan developed to eliminate or reduce the quantity of that resource or to deny birds access to it as far as is practicable.**

**Professional support from a wildlife biologist or ornithologist should be sought.**

**Documentary evidence of this process and its implementation should be kept.**

## **2.6 Birdstrike Reporting**

### **Background**

All bird management programmes need to be monitored to see if they are working effectively and whether they need to be modified extended or improved. The only effective way to do this is by collating data on the birdstrikes at the airport concerned. Other measures, counting the birds on the airfield for instance, provide useful additional information, but are not a direct measure of the birdstrike risk at the airport. All birdstrikes should be reported, whether or not they cause damage to the aircraft and whatever bird species was involved. Unless the airport is confident that it knows what birds are being struck on its property it cannot hope to direct its management efforts in the correct direction. It is important that airport managers do not penalise staff for reporting birdstrikes. Even though strikes to large jet airliners from small species such as swallows or sparrow sized birds are unlikely to cause damage to an aircraft, staff should be required to report them. Similarly, **the total number of birdstrikes at an airport should never be used as a measure of birdstrike risk or of the performance of the bird controllers.** The main birdstrike risk arises from strikes with large species, especially those that form flocks. A risk assessment process that combines strike frequency with likely severity needs to be employed to properly assess the birdstrike risk (see below). Such a process cannot work effectively unless all strike are reported, however.

### **Definition of a birdstrike**

There are a wide variety of definitions of precisely what constitutes a birdstrike. In terms of gathering information to better understand the birdstrike risk it is preferable to include as many events as possible in an inclusive definition. Again, it is important that airports are not penalised for defining incidents as birdstrikes that are not included by other airports in the same country thus increasing their total birdstrike numbers. An inclusive definition of birdstrikes should be adopted by regulators.

### **The following should be regarded as birdstrikes**

**Any reported collision between a bird and an aircraft (whether or not remains of a bird can be found or evidence of a collision is present on the aircraft).**

**Any bird found dead on an airfield where there is no other obvious cause of death (e.g. struck by a car, flew into a window etc.).**

This simple definition ensures that the maximum quantity of information is gathered to support the risk assessment process and to assess the effectiveness of the bird management programme.

### **Analysis of birdstrike data**

If an inclusive definition of a birdstrike is used, then the analysis of birdstrike data becomes particularly important. For example, separating strikes that occur on the airport (under 250 feet on approach and 500 feet on climb out using the ICAO definition) from those that occur further out in the approaches helps to define those strikes that are likely to be influenced by the airport bird management programme. Similarly, separating strikes with species that are over 100g in weight (i.e. those more likely to cause damage), and giving greater emphasis to strikes with flocks all help to identify trends in the real birdstrike risk at the airport. This process can be carried out separately, or combined with a risk assessment process as described below.

### **Bird remains identification**

Birdstrike statistics cannot be properly interpreted unless the species struck is known. The risk assessment process depends on a knowledge of the size of bird struck to assess the likely severity of impacts, and the airport's bird management programme may be targeting the wrong bird species if no record of what birds are being struck is kept. Bird remains recovered following strikes are often fragmentary but even the smallest feather fragments can be identified and blood smears can be separated to species by the use of DNA analysis. Although these services are only available in a small number of specialist centres, most airports could obtain the services of a local ornithologist or university department where specialists could ensure that any remains are properly identified.

### **Data required in a birdstrike report**

The more information that is recorded about a birdstrike incident the better. As a minimum, the data required on the ICAO birdstrike reporting form should be collected as fully as possible. If some data items are not available (e.g. altitude of strike) then as much information as possible should be collected and due account taken of the missing data during subsequent analyses.

### **Submission to ICAO**

Although this is not a matter directly for individual airports, countries should be encouraged to collate birdstrike data at the national level and to submit this to ICAO. This assists in assessing the true levels of birdstrike risk and costs to the aviation industry of birdstrikes around the world.

### **Recommendations**

A birdstrike should be defined as:

**Any reported collision between a bird and an aircraft (whether or not remains of a bird can be found or evidence of a collision is present on the aircraft).**

**and**

**Any bird found dead on an airfield where there is no other obvious cause of death (e.g. struck by a car, flew into a window etc.).**

**The total number of birdstrikes should never be used as a measure of risk or of the performance of the bird control measures at an airport.**

**Airports should ensure that the identification of the species involved in birdstrikes is as complete as possible, utilising local or international experts as necessary.**

**Airports should record all birdstrikes and include, as a minimum, the data required for the standard ICAO reporting form**

**Individual countries should collate birdstrike data and submit this to ICAO annually.**

## **2.7 Risk Assessment**

Formal risk assessment is now routinely used in almost all aspects of health and safety work. Birdstrike prevention has tended to lag behind in this field because the involvement of birds (creatures whose behaviour can vary hourly, daily and seasonally, and whose populations can fluctuate over longer periods) as a key component of the system being assessed makes it difficult to accurately predict risk levels. Techniques are now available that make use of data on birdstrike frequency at the airport combined with probability of aircraft damage following a strike with a particular species. These allow risk assessment matrices to be constructed and updated annually in order to evaluate how the risk level is changing in response to the bird management measures in place.

### **Recommendation**

**Airports should conduct a formal risk assessment of their birdstrike situation at least annually and use the results to help target their bird management measures and to monitor their effectiveness.**

## 2.8 Bird management off the airfield

Providing that best practice in terms of habitat management and active bird control are put in place on an airfield the birdstrike risk arising from the airfield itself can be largely controlled in all but the most extreme circumstances. Managing the birdstrike risk that originates from off the airfield is a more complex and difficult challenge. The same basic principles apply when developing a management plan whether it is on or off the airfield. They are to identify the attractions, then to manage the habitat to reduce the attraction, or deny the birds access to it. Dispersal tactics can then be deployed to remove any birds that remain. The difficulty is that, if the land concerned is not owned by the airport, none of this may actually be possible!

### Identifying attractions

Part of the new ICAO standards concerning airport bird control states that:

*The appropriate authority shall take action to eliminate or to prevent the establishment of garbage disposal dumps or any such other source attracting bird activity on, or in the vicinity of, an aerodrome unless an appropriate aeronautical study indicates that they are unlikely to create conditions conducive to a bird hazard problem.*

Whilst the reference to garbage dumps is clear, 'any such other source attracting bird activity' requires a significant degree of interpretation. As with the bird attractions on the aerodrome, airport managers may need to seek assistance from bird control specialists when identifying the major bird attractions near their airport. They will certainly require some assistance in assessing whether the birds using such a site pose a significant risk to flight safety, as this needs an understanding of bird ecology and behaviour that is unlikely to be available from within the airport's own staff.

### Management

Once sites that support birds that are, or might, cause a flight safety problem are identified management options can be developed. These can range from minor habitat modification, changing cropping or other agricultural practices, major drainage operations or large scale removal of bird populations. Again the choice of technique will depend on the particular situation encountered and expert advice should be sought if necessary. Larger scale off-airport bird management may also involve liaison with local conservation interests, especially if the sites that need to be managed are nature reserves. In some cases it may be impossible to resolve the conflicting interests of flight safety and conservation, but in trying to do so the airport will be in a better position to show due diligence in the event of an accident or legal claim in the future

### Recommendations

**Airports should conduct an inventory of bird attracting sites within the ICAO defined 13km bird circle. A basic risk assessment should be carried out to determine whether birds attracted to these sites contribute significantly to the birdstrike risk at the airport. If this is the case, options for bird management at the site(s) concerned should be developed and a more detailed risk assessment performed to determine if it is possible and/or cost effective to implement bird management processes at the site(s) concerned. This process should be repeated annually to identify new sites or changes in the risk levels produced by existing sites.**

**Where national laws permit, airports should seek to have an input into planning decisions and land use practices within the 13km bird circle for any development that may attract significant numbers of hazardous birds. Such developments should be subjected to a similar risk assessment process as described above and changes sought, or the proposal opposed, if a significant increase in birdstrike risk is likely to result.**

## References

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