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AIRFIELD BIRD CONTROL – SETTING THE STANDARDS

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Summary

The UK Civil Aviation Authority has introduced an Aerodrome Safety Management Initiative which significantly changes the way in which it regulates aerodromes, and requires operators to take prime responsibility for safety management. Bird hazard control is an important part of safety management culture and must be fully described in aerodromes' operations manuals. The CAA's safety audits are now based on assessment of the promulgated organisation and procedures. To ensure that the best and most recent information is available to managers tasked with providing bird hazard control systems, the CAA commissioned a review of 30 years' experience and development of bird scaring methods and recent relevant research in bird behaviour. The study concluded that only man–operated scaring systems remain effective in the long term and meet the exacting requirements of the aerodrome environment. It set standards of performance for the most effective systems and identified the best operational procedures. The results are being used to update and expand the CAA's aerodrome bird control manual which will be published in a new format, with particular emphasis on organisation and management. In less than a year's operation, the new system is creating a more positive approach to bird hazard control.

Keywords: Books; Arm–waving; Shooting; Falconry; Gas cannons; Pyrotechnics; Bioacoustics; Hazard management; Guidance.

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1. CAA AERODROME SAFETY MANAGEMENT INITIATIVE

In 1995, The UK Civil Aviation Authority's Aerodrome Standards Department introduced a new framework for delivering safety: the Aerodrome Safety Management Initiative. In it the role of both the aerodrome operator and regulator were redefined. The emphasis of aerodrome inspections by the CAA has been shifted from a prescriptive system, in which the operator's compliance with CAA regulations and guidance was measured, to an audit–based evaluation which takes greater account of how safety is *managed* at the aerodrome. Therefore, the prime responsibility for safety resides with the aerodrome operator. Bird hazard control is part of an aerodrome's safety culture and operators are responsible for assessing their own hazards and producing effective bird hazard control and management systems. Already, this is causing managers to address the problem in a new way. Previously, on many airports, acquiring the 'recommended' equipment and sending staff on courses had been the sum total of management activity. Now, the bird control programme recorded in the Operations Manual must cover comprehensively and clearly the following: bird control aims and policy; chain of responsibility; staff terms of reference; habitat management programme; active bird control instructions; quality assurance programme; training; and health and safety.

2. BIRD SCARING METHODS REVIEW

2.1 AIMS

The research which laid the foundations of aerodrome bird hazard reduction in the UK was carried out mainly from the early 1960s to the mid 1980s. The CAA has funded research into aerodrome bird control for many years. With the introduction of Aerodrome Safety Management Initiative and the Aerodrome Manual becoming a legal requirement, it was considered timely to review aerodrome bird control methodology to:–

- Identify best practice.
- Encourage the adoption of best practice through education and motivation.
- Be able to assess the performance of aerodrome bird control organisations against a best practice standard.

CAA Research & Analysis Department funded a review of research, development and operational experience over 30 years. The task was divided into a number of work packages covering the following topics (overleaf):–

- DISTRESS CALLS – call fidelity, dialect, multiple recordings, recording and reproduction systems, speaker arrays, fixed and mobile systems.

- VISUAL SCARERS – best methods, use on airfields, combination with other methods.

- BIRD SCARING CARTRIDGES – performance criteria, possibility of colour, sound, etc improvements, operational techniques, shotgun blanks.

- GAS CANNONS – appropriateness for airfield use, other 'banging' devices.

- OTHER METHODS – trained birds of prey, shooting, chemical repellents.

- OPERATING HOURS – in relation to bird activity

- A MODEL 'AERODROME MANUAL'

2.2 THE STUDY

A Contract was awarded in favour of a joint proposal by Airfield Wildlife Management Ltd and MAFF Central Science Laboratory Birdstrike Avoidance Team. The Review used information from:–

- literature searches

- consultation with specialists

- analysis of unpublished research data

- accumulated field experience and expertise

- field trials

The project was carried out between February 1994 and May 1995 and involved 118 man days of work which produced 196 pages of reports. These are being used as the basis of a complete rewrite of the current CAA publication CAP 384 *Bird Control on Aerodromes* to provide a full guide to aerodrome bird control operations and management. Studies which demonstrate the relationship between the level of resource committed to bird control and birdstrike rates have recently been undertaken in the UK (Horton 1996). The new CAA publication will set out unequivocally the Review findings in a way which will enable aerodrome operators to implement best practice, and to avoid the perpetuation of ineffective or inefficient systems.

2.3 RESULTS

2.3.1 BIOLOGICAL BACKGROUND TO BIRD SCARING. Although the CAA required primarily that the principle types of bird scarer should be evaluated and compared, the opportunity was taken to consider the concept of bird scaring and dispersal in a broader context of bird biology and recent ethological studies. In their daily lives, wild birds face the dangers of being attacked, killed and eaten by predators. They must, therefore, be constantly alert to danger and take appropriate action to avoid being caught, or they will not survive. On the other hand, they must be sufficiently discerning to take avoiding action only when necessary, or the time and energy devoted to it would itself threaten their survival at times when much of the day must be devoted to foraging. For example, birds recognise the real threat of hunting falcons and hawks by fleeing, and ignore or mob other raptors like buzzards and kestrels, neither of which are specialist bird predators.

2.3.2 TYPES OF BIRD SCARER. Bird scaring relies on deluding birds that a relatively harmless signal presented by man indicates the presence of real danger. There are several classes of bird scarer which may be avoided by birds:–

- Devices which rely on novelty (neophobic devices): birds avoid them because of their natural caution about unfamiliar objects which may or may not pose a threat. Many commercial scarers rely on this effect, *e.g.* by displaying bright colours and/or having conspicuous movement. Birds may flee from novel objects or approach to investigate them. The response may depend on a comparison between the new phenomenon and expectation based on past experience. A large discrepancy causes the fleeing reaction, whereas a small degree of novelty provokes an approach to investigate. With repeated exposure, a bird acquires more information about a new object and it becomes less unfamiliar. Thus, an initial fleeing reaction will progressively give way to approach and, finally, the object will be ignored as it becomes part of the familiar environment. The deterrent effect for *all* birds of a given species is weakened when *some* have lost their fear and have alighted (Inglis & Shepherd 1990). Further, if the scarer has been deployed to protect a crop, there is a danger that habituation may be followed by a learned association between the intended scaring device and food (Inglis and Isaacson, unpublished data quoted in Feare *et al* 1990).

- Devices which 'startle' by their sudden action: above a threshold level of stimulation (*e.g.* loudness approaching the pain level), and in addition to the behavioural response of fleeing, a physiological effect (elevated heart rate, etc) is triggered. Startled responses are similar to reflexes, and their function may be to protect the sense organ from damage. Habituation can occur, albeit relatively slowly. The majority of startling devices are acoustic. In practice – for example, with a gas cannon – the level of stimulus is insufficient to cause a true physiological response

and obviously decreases with distance, and the target birds react to a repeated or sustained stimulus in the same way as to a 'novel' scarer (I R Inglis *pers. comm.*).

- Devices which mimic some element of the appearance or action of a predator: these include scarecrows, model hawks, and airborne devices such as radio controlled model aircraft, balloons and kites (*inter*specific devices). Predators and scarers which mimic predators tend to have a sustained aversive effect because a bird which does not respond promptly and appropriately to avoid predation is unlikely to survive to pass on such behaviour into the next generation. The most realistic means of presenting a predator threat is the use of trained falcons or hawks. The effectiveness of predator mimics is directly related to their realism, both in appearance and behaviour.

- Devices intended to convey the proximity of an unspecified threat by presenting some aspect of the target species either dead, in distress, or displaying a warning signal (*intra*specific devices). Examples are distress calls, or a dead crow suspended from a pole. As with predator–based scarers, birds react strongly to signals from other birds which indicate danger, distress, or death, and habituation does not readily occur. However, the response may include a strong element of investigation, rather than immediate departure.

2.3.3 HABITUATION. This behavioural response prevents scarers, especially those which rely simply on neophobia, from retaining their initial startling effect in the long term. Without it, removing birds from aerodromes would be relatively cheap and simple. Habituation is learning not to respond to a repeated stimulus, especially where the response does not produce a benefit. It is the simplest kind of learning but is a common behavioural trait of animals from worms to man (Krebs 1980). In theory, declining responses could be due to a sensory adaptation causing the stimulus to be perceived less strongly, or muscular fatigue weakening the response. However, habituation does not involve either of these mechanisms because muscles remain usable for other activities and it is clear that the animal is still able to perceive the stimulus. The change must be due to processes taking place in the central nervous system (Slater 1980). Habituation shows a number of common features described by Thompson & Spencer 1966 and quoted by Slater 1980 in a paper describing habituation to sound stimuli, but which is generally applicable: responsiveness decreases with the number of exposures; the response recovers with time; with repeated exposure to a stimulus habituation becomes progressively more rapid; if stimulation is continued after responding has ceased, recovery is reduced or absent; animals which have habituated to a particular stimulus also show less response to similar stimuli; and a different stimulus may produce dishabituation. These effects have obvious implications for the ongoing regime of bird scaring on an aerodrome.

2.3.4 BIRD SCARING IN THE AERODROME ENVIRONMENT. Runways are commonly several kilometres long and airfields cover areas of several hundred hectares. By comparison, agricultural fields, for which most scaring devices have been developed, are much smaller: tens of hectares at the most. Even so, several scarers are often required in a single field. To project a scaring effect over an entire airfield requires many 'free-standing' bird scarers (*i.e.* those which are left *in situ* to scare birds without the on-going intervention of man) or, alternatively, mobile systems. The prospect of covering an airfield with large numbers of scarers, perhaps of several different types, is unrealistic, especially when the generalised nature of habituation is taken into account. Aerodromes attract a variety of bird species to feed, rest and breed, with diurnal and seasonal variations. However, the need to exclude birds is year round and, on many aerodromes, throughout a 24 hour day. Any technique for aerodrome bird control must, therefore, remain effective more or less permanently, unless a constantly changing bird control regime can be contemplated. We must use scarers in a way which ensures that birds do not become habituated, yet we cannot use them infrequently. The only practical approach to protecting such a large area in the long term is to take the scaring stimulus to the target birds. Habituation can be avoided with man-operated devices because the operator uses the device only when required and can reinforce it with other measures, if necessary. In effect, the man is the primary agent in dispersing birds, and the scarer merely a tool.

2.3.5 SCARERS FOR AERODROME USE. The following conclusions were drawn from the study:-

- NEOPHOBIC AND STARTLING SCARERS, AND MODEL PREDATORS. Birds habituate - usually sooner rather than later - to *all* devices which carry no real threat. Their area of influence and duration of effect are insufficient to have any value on aerodromes. To meet the requirement, the stimulus to cause birds to depart must be taken to them as and when required: a man detects and disperses birds; the devices he uses are only 'tools of the trade'.

- DISTRESS CALLS are an efficient and cost effective means of dispersing birds from aerodromes. Operator technique is the most important factor in the successful application of distress calls. New solid state reproduction systems are potentially better than compact cassette-based equipment, but standards vary. Comparative field trials have enabled a set of criteria to be issued as guidance for manufacturers and purchasers.

- BIRD SCARING CARTRIDGES have a number of useful characteristics: the response is of immediate departure away from the detonation; some directional control is possible over birds in flight; and the scaring effect can be projected into areas beyond the bird controller's reach. To achieve these effects and be safe to use, a cartridge *must* meet certain performance standards and, again following field trials, these have now been simply defined.

- SHOTGUN BLANKS have been found in trials to have no practical value for dispersing birds from aerodromes.

- OTHER MAN-BASED TECHNIQUES. Arm scares, lures, etc are very effective but fear of ridicule inhibits their use. One of the most important factors in attracting birds to aerodromes is the absence of man: bird controllers should spend significant periods on foot on the airfield.

- TRAINED BIRDS OF PREY. Falcons operated to a high standard can disperse birds from an aerodrome very effectively but, as with standard techniques, there is virtually no residual effect, and the use of all methods must be sustained. There is no operational advantage over good full-time bird control without falcons, but the additional cost - largely of manpower - is around 50%.

- SHOOTING is an important part of a bird control system: it can reduce populations of local residents (crows, game birds, and birds in hangars); deter other birds, both as a scaring technique in its own right and by reinforcing the effect of non-lethal scarers; and remove the hazard in situations where non-lethal methods are ineffective (sick or injured birds, persistent individuals which 'decoy' flocks back to the airfield, etc).

3. LESSONS FOR AERODROMES

Aerodrome managers and staff sometimes do not have the knowledge and skills necessary to evaluate unfamiliar scarers and are thus susceptible to advertising claims which may be exaggerated and misleading. The following facts about bird scarers should be kept in mind:-

- Free-standing devices are all susceptible to habituation within a timescale which makes them inappropriate for use on aerodromes.

- Free-standing devices which operate intermittently and not under direct control can, if they are effective at all, cause birdstrikes.

- So much effort has been devoted to devising bird scarers and developing tactics for using them on aerodromes over many years that it is very unlikely that any 'new' device is anything other than an existing system presented differently, or that it will be more effective than the tried and tested standard systems.

- Any scarer claimed to operate by disorientating or blocking sensory inputs by sound, light or radiation will, if effective, probably also be harmful to people and may be illegal.

- The effect of habituation is not merely to render a scarer ineffective, birds may even be attracted in areas where similar scarers are used by farmers.

- Deployment of scarers which are ineffective from the start or rapidly lose their effect may give aerodrome managers and bird controllers a false sense of security.

4. VALUE OF THE REVIEW

The Review produced no new devices or radical changes in method. Rather, it has enabled the existing recommended systems to be endorsed more positively and standards set for equipment and performance. Equally important, a wide range of fringe methods, which were previously suspect but considered *might* have some value under some conditions, may now be rejected as ineffective or inappropriate for aerodrome use. Taken in the context of the CAA's Aerodrome Safety Management Initiative, it has emphasised the requirements for an effective bird control system. Effective techniques are available. However, training staff and buying equipment does not guarantee success. An aerodrome's bird control programme must be written into the Operations Manual in such a way that all staff involved understand it and their own responsibilities in achieving its aims.

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