INTERNATIONAL BIRD STRIKE COMMITTEE **IBSC25/WP-A1**
Amsterdam, 17-21 April 2000

FIFTY YEARS OF AIRFIELD GRASS MANAGEMENT IN THE UK

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Abstract

In 1949, the Royal Air Force was advised to permit airfield grass to grow taller by biologists tasked with devising means of controlling the increasing birdstrike hazard. The recommendation was not adopted but was repeated until a limited trial was commenced on RAF stations in 1967. A marked reduction in bird usage of long grass areas was obvious, and the RAF adopted long grass with a specially designed maintenance regime in 1974. The civil sector was at first slow to follow but, by the 1990s, a long grass policy had become a major element in bird hazard control policy on most airports. Many years' experience has accrued of the mechanisms by which longer grass deters birds, how it should be maintained, and problems that can arise to reduce its effectiveness. The RAF has adhered to a fixed maintenance regime that, if applied fully, virtually guarantees a bird deterrent sward. However, some civil airports, from ignorance of the requirements or in attempting to cut maintenance costs, have suffered a number of problems, including increased bird infestation and high rectification costs. Successful long grass is almost always linked with the aerodrome's bird control organization being closely involved in planning and monitoring the maintenance program. Experience now enables bird hazards to be predicted from inspection of the grass alone and, in some cases, problems with the grass to be diagnosed from analysis of birdstrikes. A fixed formula for grass height is not appropriate in all situations. The management regime that successfully deters medium-sized birds from feeding on soil invertebrates on western European aerodromes is not necessarily ideal in, for example, Africa where the birds are much larger and hunt prey that lives in the grass, rather than in the soil.

Key Words: Control methods, Chemicals, Herbicides, Food sources, Habitat modification, Long-grass

1. Introduction

The majority of UK airfields, both military and civil, now operate a "Long Grass Policy" (LGP) based on establishing relatively weed-free grassland over the non-paved areas of the airfield, and maintaining this grass at a minimum length of 150mm. This policy has undoubtedly made an important contribution to reducing birdstrikes with the most hazardous bird species found on UK airfields, and failure to implement this policy properly can make the bird hazard difficult, and at times impossible, to control adequately. There have been attempts to adopt this approach at other airports and military airfields throughout the world, with mixed results. Additionally, certain agencies have recommended its adoption at airports in countries where ecological conditions, and the airfield avifauna, are radically different from the areas where this technique has been developed. Even in the UK the LGP is not a panacea, and is probably inappropriate, or needs modification, for different ecosystems. In some circumstances it is probably completely inappropriate.

2. The Early History of Development of the Long Grass Policy

UK aerodromes were originally large cleared, graded, open areas covered with grass that was mown short to allow unimpeded taxiing, take-off and landing. As the need for paved runways and taxiways increased, the airfield grassland continued to be maintained in the same way, to allow aircraft to use it when required, or in emergency for larger/heavier aircraft, and because mowing was the simplest and most convenient maintenance regime available. Unfortunately, the environment this created proved highly attractive to a number of species of birds. Equally unfortunately, the species particularly attracted to airfields proved to be medium to large birds that occurred in large flocks and these birds gave cause for concern by the number of bird/aircraft collisions - birdstrikes - that were occurring. Birdstrikes caused relatively few serious incidents or accidents to the slow-moving, piston-engined early aircraft. However, the rapid development of much faster, less stable aircraft, particularly during the second world war, led to increasing numbers of strikes and a worrying increase in the amount of damage sustained by military aircraft. As the war drew to a close, the first generation of jet aircraft had taken to the skies, and in the following years piston-engined military combat aircraft were progressively replaced by their turbine-engined successors. Early experience with these aircraft showed that the birdstrike issue had now become a serious hazard to the safe operation of military combat aircraft, as for the first time the aircraft's engines became highly vulnerable to damage. With open air intakes, and turbine blades with very high rotational speeds, jet engines proved vulnerable to damage, obstruction, failure or complete destruction when they ingested birds. Many of these early jets were singleengined, or even when twin-engined were difficult to control if one engine lost power. During take-off and landing, when the aircraft were close to the ground, and precise control of engine power was needed, the consequences of a birdstrike could be very serious.

The RAF realised that action was necessary to prevent the damage, destruction and loss of life caused by birdstrikes and began to research techniques for deterring birds from visiting their airfields, and removing them when they were present. The earliest attempts to remove birds were based on “scaring” hazardous concentrations of away from the airfield, but this was seen as a difficult, labour-intensive task that often failed to prevent hazardous birdstrikes. The need was recognised for a passive system (or combination of systems) that made the airfield less attractive to birds and was less prone to failure. Early efforts to use predator models, ultrasound, chemical repellents and pesticides to destroy the birds’ food supply all failed.

In the UK, in the absence of effective bird hazard control systems, around two-thirds of the recorded birdstrikes involved only three bird species - the lapwing ***Vanellus vanellus***, the common gull ***Larus canus*** and the black-headed gull ***Larus ridibundus***. The majority of birdstrikes occurred during the autumn and winter months, and most bird/aircraft encounters involved flocks of birds. Single birds of these species proved capable of damaging jet engines, and the risk, and occurrence, of strikes with flocks meant that damage could be severe and multiple engines could be affected. In the search for a passive solution to the hazard these species presented, ornithologists noted that they fed on soil invertebrates, primarily earthworms, which they detected by sight. Flocks were seen to feed or rest only in areas where there was bare earth or mud, or very short or sparse vegetation. In fields of grass or growing crops, flocks could be present when the growth of vegetation was still short, but when it reached a certain height, the field was abandoned as a feeding or resting area. There were a number of possible explanations for this, but the primary ones were that the longer vegetation interfered with sight-hunting of earthworms and other soil invertebrates, and with these birds’ line of sight, making predator detection and social contact difficult, reducing insecurity.

The first suggestion that airfield grass should be grown longer appears to have been made by R.S.R Fitter in 1949 (Adams, 1949), but the first serious attempts to conduct airfield trials began in the 1960s. During the late 1960s large-scale trials were conducted on a number of RAF airfields around the UK, where the grass in strips 100m either side of the runways was allowed to grow to between 150 and 200mm. Observations of bird numbers on the “long grass” areas compared with the short-mown grass of the remainder of the airfield showed that bird numbers in the “long grass” areas were reduced by about two-thirds (Brough & Bridgman, 1980). The effect on lapwing and small gull numbers was particularly dramatic. The trial was adjudged a success, and was formally adopted in the 1970s as a policy at most UK RAF airfields. Rather than the restricted strips, the new “Long Grass Policy” was to be applied over as much of the airfield grassland as was operationally practicable. Civil airports and aerodromes began to follow suit some years later.

3. Maintenance Methods

Maintaining permanent grassland at a constant 150-200mm had no parallels in agriculture, and a basic management regime was developed (Mead & Carter, 1973) to prevent weakening of the sward and any build-up of dead grass leaves, or accumulation of clippings (“thatch”) from the regular “topping cuts” required to prevent the grass from growing too long. This system was designed to be reproducible by agricultural contractors anywhere in the UK, and as such was, understandably, somewhat rigid and stereotyped. With minor modifications, it remains widely in use to this day. It is summarised in diagrammatic form below (Fig. 1).

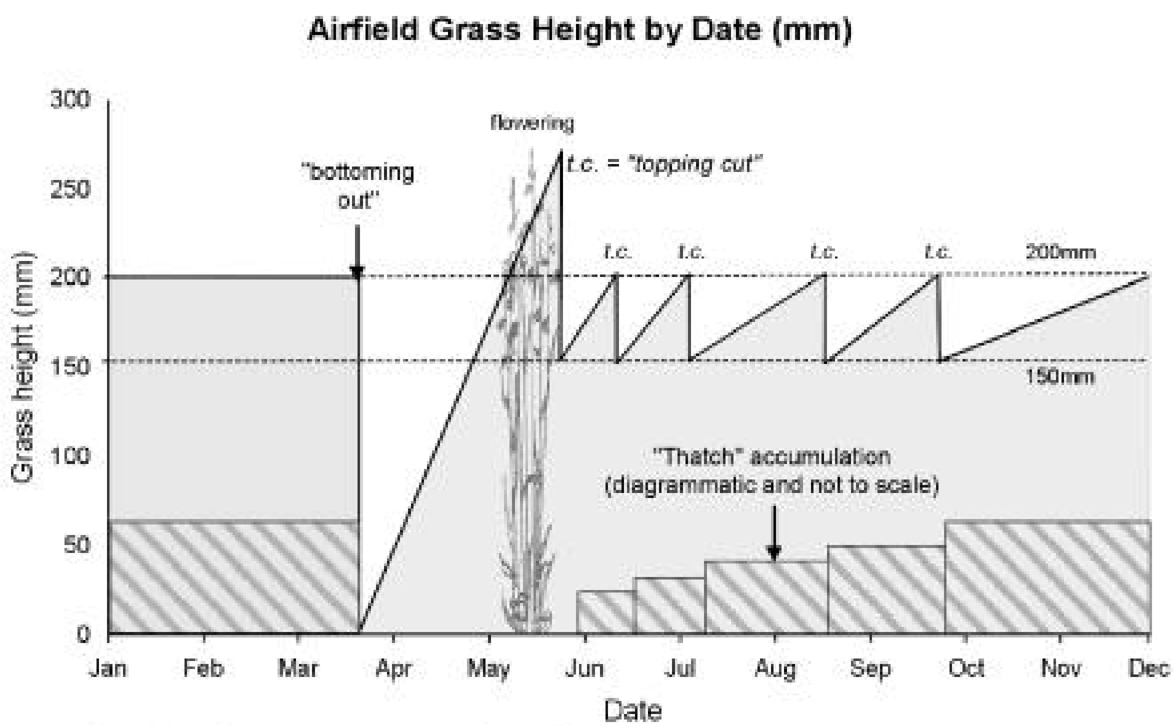

Fig.. "Basic" Long Grass Policy Maintenance Programme

The airfield grassland is kept within the 150-200mm height range for the majority of the year. A single annual "bottoming out" cut to ground level, where the cut grass was removed from the airfield, was recommended and study of seasonal variations in airfield bird numbers showed that late March to early April was the best period to carry out this operation. Following bottoming out, the grass is allowed to recover, flower and then is "top cut" at the required height throughout the growing season. The lignified flowering stems, top cut at 150mm, remain intermingled with the grass leaves, and provide support for the sward throughout the summer, autumn and winter months, reducing the tendency of the grass to be flattened by wind, rain or snow. Any soil nutrient depletion is made good at the beginning of the growing season, and weed control may be indicated. Although this system was designed to be "idiot proof," it has, inevitably, often failed in this and elementary mistakes like bottoming out too early, or setting the topping cut height too low have caused serious problems. However, followed closely, this system, or variants, of it consistently produce the best results at most UK airfields.

Fig. 1. "Basic" Long Grass Maintenance Programme

Other maintenance regimes are also in use. The commonest includes agricultural cropping of the grass for silage during the summer months. Although commercially attractive, this often causes acute bird problems in the UK, as it coincides with the appearance of many young birds in the countryside and the presence of tall crops in the agricultural areas. The airfield therefore becomes the most attractive feeding site in the area. From midsummer onward, silage cropping may coincide with the return of lapwings and small gulls from their breeding grounds. In dry summers, or if the airfield is over-cropped or cropped too late, the airfield grass often fails to achieve the 150mm minimum height we require. Another tempting option has been to omit the expensive bottoming out cut, or delay it for several years. At most airfields the annual cut of the basic system can be reduced to a biennial or triennial cycle, but longer delays usually cause problems. Accumulations of dead grass leaves felted into the live sward can make the grass flammable, and when crushed by vehicle tyres, the wheel ruts persist for months. Invertebrate populations can increase, and cyclic population explosions of the short-tailed vole (***Microtus agrestis***) can occur, attracting predators. These population cycles are disrupted by bottoming out, and populations never become high when it is carried out over one to three year cycles. This may not be applicable to other grassland microtines and similar species, if they have extensive underground burrow systems (which ***M. agrestis*** lacks). The European field vole, ***M. arvalis***, is absent from the UK mainland.

4. Weaknesses, Failures and Compromises

The main weakness in implementing and enforcing this policy is lack of expertise and flexibility at airfield/airport level in managing it, and lack of understanding about how critical such factors as grass height and extent of coverage are. Following the adoption of the LGP by the RAF in the 1970s, extensive short mown areas, amounting to thousands of square metres, seriously compromised its effectiveness. These included margins around the edges of all sealed surfaces, fences or buildings, and extensive short-mown areas around lights and navigational aids. During the late 1980s and 1990s, most of these areas were eliminated from RAF airfields under the guidance of aerodrome bird control specialists, but such problems persist at a number of civil airports. Contractors often fail to deliver the results demanded, and the introduction of commercial silage cropping often causes a conflict of interest where the end result is a compromised LGP. Another common failure is an inability to recognise problems in their early stages or, even when they are recognised, to react in time. This has resulted in serious damage to the grassland by insects, infestation with weed species that attract hazardous birds, and failure or weakening of the grassland by nutrient depletion.

Another serious problem involves the disruption of soil profiles by airfield works. Soil excavated during airfield works is too often redistributed on the airfield without thought to preserve the soil profile, and subsoil is spread and compacted on the surface. It is extremely difficult to reinstate this disturbed ground with grassland, and it is colonised by annual weeds and nitrogen-fixing species. These in turn attract pigeons, which are absent from “clean” weed-free grassland.

If an LGP is to be successfully maintained, it requires close supervision and a swift reaction to events that could compromise its effectiveness. Flawed decisions or errors by planners, contractors or grass cutting machinery operators can all have serious consequences, but the only people likely to notice the consequences - the increase in bird numbers and persistence - are the staff tasked with bird hazard control. For this reason it is important that they should have a role in planning and day-to-day supervision of airfield habitat management work.

5. The Uk Long Grass Policy - Present and Future

Most UK military and civil airfields have now adopted, or claim to have adopted, the policy outlined above, which is enforced by the RAF on most of its airfields, and recommended (and described in detail) by the Civil Aviation

Authority in CAP 680 - Aerodrome Bird Control. The quality and extent of its implementation vary, but where it has been properly established and maintained, there have been noticeable effects on birdstrike records, most dramatically in the virtual elimination of lapwing birdstrikes from a number of civil airports, and nearly all UK RAF airfields.

However, problems remain. Human failings, some of which are outlined above, continue to cause problems, but is the system itself perfect? The present policy requires grass heights of between 150 and 200mm, which were the heights trialled in the 1960s. However, if one of the mechanisms by which it works is meant to be interference with line of sight, then 150mm is too short for our target species - they can see over it. Species such as rooks ***Corvus frugilegus***, that stand with an eye level well above 150mm grass, and do not need to sight-hunt soil invertebrates (they probe or dig), are not deterred at all by present grass heights, but some airfields have reported success with taller grass. Worse, if the grass is inadvertently cut to around 100mm, it can fail utterly to deter the target species, and a return to the historical flocks of thousands of birds on the airfield can occur. In my opinion, 150mm is too short to be as effective as it could be, and leaves an insufficient safety margin. A minimum height of 200mm seems more appropriate. The upper limit should be determined by both airfield operational requirements and the ability of the grass to stay upright, but 250mm seems a reasonable starting point. There is no reason to believe that the first grass heights trialled some thirty years ago were, or remain, perfect - we should not be afraid to experiment further.

Although there have been limited trials with utilising other plant species as ground cover, and some airfields have extensive areas of heather ***Calluna vulgaris*** or gorse ***Ulex europaeus*** and ***U. minor***, maintained within the height range described above, such species are more difficult to maintain and more prone to catching fire, and a thick covering of a mixture of fine-leaved native perennial grasses is preferred. Its cultivation and maintenance is relatively simple, and, properly maintained, it presents negligible fire risk. None of our hazardous airfield bird species feed on long grass, so the grass itself is no attraction to feeding birds. Many other plant species have the potential to attract pigeons, themselves extremely hazardous, and other plant species may die back in the winter, leaving bare patches in the grass cover. Many species of wild flowers can be tolerated, but some species, particularly members of the leguminosae, are highly unwelcome. In the UK, airfield grassland containing large numbers of broad-leaved species usually attracts feeding flocks of woodpigeon ***Columba palumbu***s and/or stock dove ***C. oenas***, which are dangerous to aircraft, and persistent while the food source remains. With efficient selective herbicides, we have reliable, cost-effective ways of removing these food sources from the grassland, making the airfield unattractive to pigeons.

6. Conclusions

The LGP currently recommended, and widely adopted, in the UK, was based on analysis of the bird species involved in UK birdstrikes, research into their biology and ecology, and a hypothesis that a minor habitat change could significantly interfere with, or negate, the conditions that attracted them to airfields. The hypothesis was researched, trialled and then introduced, initially by the Royal Air Force, in an evolutionary, measured manner. There were many misgivings about its operational acceptability and effectiveness, and uncertainty as to the best maintenance methods. These problems were largely resolved before the trials were judged to be successful, and the LGP as we presently recognise it was finally introduced to UK airfields, with the military leading the way, followed by civil airports and aerodromes. Although a comparable system may well be applicable in areas with similar avifauna and ecologies, great care should be taken before trying to impose or introduce it where conditions are very different. Any habitat management system should be based on knowledge of local conditions, and trials should be done in controlled manner and carefully scrutinised over several seasons before final adoption or rejection. For example, at Entebbe airport in Uganda, very long grass attracts (and conceals) large numbers of herons and raptors that hunt large insects and small vertebrates, and flocks of weavers that feed on the seeding grasses. Maintaining the grass height at around 200mm would probably reduce the food supply to many of these species, remove the vegetation cover that they prefer, and make the birds easier to detect. Superficially, this may appear to be the same system used in the UK, but the manner in which the system would operate is entirely different, as it would be targeted at local species with very different ecological requirements. Additionally, without field trials is unclear whether the new habitat thus created would be exploited by species that at present avoid the airport.

The Long Grass Policy System described above can work outstandingly well in the UK, where it makes a major contribution to flight safety, but even in the UK there remains room for further research and development. Any habitat management system designed to deter birds from airfields and their environs should be based on an understanding of the ecology of local bird populations, and subjected to thorough scientific trials before widespread adoption.

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