ZERO-TOLERANCE A PANACEA?

Arie Dekker & Luit Buurma
Royal Netherlands Air Force
PO Box 20703
2500 ES The Hague
Netherlands
Tel: + 31 70 339 6348, Fax: + 31 70 339 6347
Email: sneb@stl.af.dnet.mindef.nl

Abstract

A zero-tolerance attitude towards birds on airfields is generally considered to be the best way to prevent bird strikes. Any airport claiming such an approach is making a firm statement that leaves the public with a suggestion of safety and convinces airline operators that maximum effort is put in bird strike prevention. Because of the mobility of birds it is –on the other hand- clear that bird-free airfields do not exist and that a zero-tolerance approach will at best be limited to a zero tolerance effort. All Bird Strike Manuals recognise this and introduce nuances that alleviate the rigid zero-tolerance statement. Introducing these nuances without making them explicit means that we are left with semi zero-tolerance statements. Therefore, bird controllers in the field are left without clear handles as to how soft the fringes are that are furnished to the solid, firm goal of zero-tolerance. In the paper a plea is made not to deny the fact that there will always be birds on airfields and to focus on the development of guidelines for bird controllers which help to achieve a *situation involving a minimum risk on bird flight movements across a runway.*

Key words: bird control strategy, zero tolerance, regulations

1. Introduction

Bird strike prevention has in the course of the last 50 years known different stages. From an “act of God”, that had to be accepted, bird strikes were then seen as a problem that could be dealt with in a reactive way: birds that frequented an airfield were scared away. Habitat management, where birds were discouraged to use an airfield by creating adverse conditions, was the next step. Active scaring away of birds then became a complementary tool, only to be used when habitat management failed. Nowadays bird strike prevention could be considered growing into maturity and the focus seems to shift to organisational aspects. As a consequence there is a world-wide tendency of embedding bird strike prevention in regulation, legislation and subduing it to certification. This means that bird strike specialists, who were used to making “informal bird strike risk assessments throughout their working lives” (*Allan*, 2000) now have to make this assessment more explicit. Vague statements that are open to discussions are no longer accepted. This seems to have led to a discord between an Anglo-American approach that takes a zero-tolerance attitude towards birds on airfields as a starting point, on the one hand and a less outspoken, more moderate Continental European approach on the other hand.

This paper first puts question marks at the zero-tolerance approach. Practical feasibility, position of the bird controllers and adverse effects are discussed. An example is given in which a moderate, well-controlled strategy was successful, where a zero-tolerance approach would not have been possible. Then, in a more general way, the alternative strategy as it is in use in the Royal Netherlands Air Force, is sketched and its regulations dealt with in more detail. The paper ends with the conclusion that different strategies are possible but stresses the need for more knowledge, irrespective the strategy.

2. Zero-tolerance, a strategy

There is full agreement that bird control should be aimed at the prevention of bird strikes. In pursuit of this aim, airfields sometimes advocate a bird-free airfield. Although not always explicitly stated, there seems to be full agreement in Anglo-American literature that the policy in bird control should be a “zero-tolerance” one (CAA 1998, MACKINNON 2001, CLEARY & DOLBEER 1999). Any airport claiming such an approach is making a firm statement that leaves the public with a suggestion of safety and convinces airline operators that maximum effort is put in bird strike prevention. Because of the mobility of birds it is – on the other hand – clear that bird-free airfields do not exist and that a zero-tolerance approach will at best be limited to a zero-tolerance effort. Bird Strike Manuals recognise this and introduce nuances that alleviate the rigid zero-tolerance statement.

CIVIL AVIATION AUTHORITY 1998 (United Kingdom). CAP 680 Aerodrome bird control:

> *the aim is to achieve and maintain a bird-free airfield: no birds; no bird strikes. Airfields which are completely and permanently bird-free do not exist. However, a situation in which birds are prevented from using an airfield for feeding, resting and commuting across, can be established and maintained by an active, efficient bird control organisation. Incoming birds are dispersed before hazardous flocks build up or gain access to the movement areas. When birds no longer habitually visit an airfield, bird movements (arrivals, transits and departures) are greatly reduced. All professional bird control organisations should, except in unusual conditions, be able to maintain their airfield and, often, their immediate environs in a bird-free state in this sense.*

MACKINNON 2001 (Canada). Sharing the skies:

> *Any wildlife on airport property is a potential threat to flight safety. Because of this, Wildlife Control Programs should be directed at habitat modification and the scaring or removing of **all** birds and mammals from airports.* But on another page*: It is the Wildlife Control Officer’s duty to ensure that the airfield is cleared of wildlife and to implement control techniques for any species of wildlife that has been identified as a problem in the management plan.*

CLEARY & DOLBEER 1999 (United States of America) Wildlife Hazard Management at Airports:

> *The goal of an airport Wildlife Hazard Management Plan is to minimise wildlife populations on and around the airport that pose a threat to aviation safety or to structures, equipment and human health.*

ANONYMOUS 2000 (Netherlands) Amsterdam Airport Schiphol Fauna managementplan 2000 to 2005 inclusive:

> *the airport's principle is to keep the landing area (as) free (as possible) of birds*

The original, attractive, clear and straightforward statement of the zero-tolerance strategy ignores the reality of coexistence of birds and man. In practice it therefore appears to be much more complicated than the one-liner suggests.

3. Zero-tolerance and bird control units

Stating a zero-tolerance strategy and at the same time introducing nuances, without making these sufficiently explicit, means that we are left with semi zero-tolerance statements. As a consequence bird controllers in the field are left without clear handles as to how soft the fringes are that are furnished to the solid firm goal of zero-tolerance. Law-abiding bird controllers, working by the book, might therefore well end up with a straightforward approach to remove all birds that come in view. This approach is corroborated by the tendency to find someone to blame when the inevitable bird strike does occur, often accompanied by legal pressure. The more talented bird controllers, who also include their local experience and knowledge, probably are better at determining the "sense" in which he is supposed to keep the airfield free of birds. Since this "sense" is always open to debate he is the one that is taking the risk of being litigated, not having implemented a bird free airfield as advocated by the zero-tolerance doctrine. In effect this means that there is a bonus for law-abiding bird controllers, working by the book, not showing own initiative and not incorporating knowledge and experience in the way they operate.

4. Zero-tolerance and the bird strike risk

Following ALLAN (2000), there are a number of factors that each contribute to the risk of a hazardous bird strike. His flow chart, showing the risk chain for a bird strike event, starts of with "Presence of birds on or near the airfield". There is no doubt that it all starts with the mere presence of birds. Aiming bird strike prevention at just this one factor ignores the fact that the key factor in the eventual risk of a hazardous bird strike is the probability that these birds will be flying in the flight path of an aircraft. To a very high degree this risk is species specific. Some species spend almost all of their time flying (Swifts), while other species do so to a much lesser extend (Buzzard). Also some species are flying in a way that does not seem to take into account any external factors at all: prey fixation of Kestrels are a good example, but also the low, fast and very determined way a flock of homing-pigeons demonstrates this point. Both species are scoring very high in local bird strike statistics.

Apart from these species-specific aspects that relate to the way birds fly there are external factors that determine the probability that a certain bird, at a certain place, will fly and therefore will pose a real threat. Examples of these factors are:

- time, of the day or in the season;
- presence and accessibility of food and water
- presence of cover and/or nesting opportunities;
- disturbance;
- weather.

Once flying, there are yet unknown factors which determine whether or not a bird will be able to detect an aircraft, recognise it as a threat and is able to avoid it. Furthermore, the probability that –under set conditions- a bird strike becomes hazardous is determined by another set of properties of the bird involved:

- **size**: collisions with larger, heavier birds generally have a greater chance of resulting in damage to the aircraft (DEKKER, VAN GASTEREN & SHAMOUN BARANES, this conference).
- **density**: in addition to bird weight, the chance of a collision resulting in damage is also determined by the density of the bird. Some bird species have most of their mass concentrated in only a small part of the body. They act like small bullets, bird strikes with these species result more often in damage to the aircraft than is expected on the basis of their mere weight. Swifts are a good example of this phenomenon (DEKKER, VAN GASTEREN & SHAMOUN BARANES, this conference).
- **flocking behaviour**: from bird strike statistics it is known that when more birds are involved a bird strike is more likely to result in damage to the aircraft. This could be because hitting a flock of birds means that there is an increased risk of hitting a vulnerable part of the aircraft. Another explanation could be that the released energy of repetitive impacts, millisecond separated in time, and close to each other on the aircraft's surface, is more than the structure can deal with.

Efforts from bird controllers to scare away all birds, regardless the species and circumstances, do not take into account all the above mentioned environmental and species-specific factors. It could well be that the scaring actions induce such flight activity of the birds that the risk of a strike is increased. The aim of "no birds on the airfield" may then be reached, the ultimate goal, "no birds flying in the flight path of aircraft", is not.

In conclusion it is safe to say that, apart from the mere presence of birds, there is a multitude of both internal and external factors that determine the risk that a (hazardous) bird strike will occur. Well-trained, experienced bird controllers integrate in an intuitive way these factors in their informal risk assessment and set their priorities accordingly. A bird strike prevention policy that is primarily based on the first condition, the mere presence of birds, does not do justice to this reality. It oversimplifies reality, degrades bird controllers to scarecrows and may even increase the risk.

5. Feasibility of a zero-tolerance approach

A great effort to forcefully remove birds from an airfield results in a situation where there is a potential capacity to hold a certain number of birds. Due to the extreme mobility of birds there will always be birds trying to exploit this capacity. Older, more experienced birds will know when this is possible. This means that these experienced birds will only frequent an airfield when it is closed. Younger, inexperienced birds will also try to exploit the available capacity of an "empty" airfield during operations, while bird controllers have finished their inspection. So pushing it to hard most probably will result in a situation involving more bird flight movements of inexperienced birds.

Apart from the practical impossibility there is the public attitude to take into account. Especially so when lethal methods are included. REITER ET AL. (1999) state that, although there seems to be public support for management that protects public safety (bird strikes), the public tends to rate all lethal methods as inhumane. In other words, the public prefers non-lethal methods to be used. The Kennedy Airport – Jamaica Bay Wildlife Refuge case, where in 6,369 person-hours of shooting in 1991-1997 a total of 52,285 gulls were shot for flight safety reasons (DOLBEER 1998) nicely demonstrates this. BROWN ET AL. (2001) argue that population control of the laughing gull colonies just outside JFK international Airport is not an option "until all on-airport management alternatives have been properly implemented and demonstrated to be ineffective at reducing bird strikes, including habitat alterations and increasing the capability of the bird control unit to eliminate bird flocks on-airport using non-lethal bird dispersal techniques". Clearly, the public asks for bird control policies that are in line with the increased appreciation for nature and animal welfare. In Europe this is reflected in fierce legislation based upon EC directives. In the Netherlands flight safety is recognised in this legislation as a valid ground for dispensation but dispensation is only granted when it is satisfactory proven that all alternatives have been tried and have failed.

6. Where zero-tolerance (in all senses) is impossible, an example

The grasslands on sandy, well-drained soils in the “higher” parts of the Netherlands recently are infected with chafers (mainly Garden chafer, also named Rookworms, *Phyllopertha horticola*, but also the Summer chafer, *Amphimallon solstitiale*). According to PARKER (1997) this is also the case in the United Kingdom when he describes the situation on Mildenhall Airbase. Whether or not an area will be infected seems determined by soil conditions, irrespective of the management of the grass. Intensely managed golf courses and sports fields experience severe damage while also some extensively managed RNLAF airbases have now been infected. The larvae of these beetles live underground and in a certain stage forage on the rootsystem of grasses. This results in a loose vegetation under which in autumn vast numbers of larvae are accessible, on which mainly corvids are feeding. Although unacceptable on sports grounds, this hardly causes a real flight safety hazard. A different situation arises during a one to three week period in May, when the adult beetles are flying out to multiply. The millions of flying beetles attract birds that must consider them to be the manna from heaven.

In the Southwest part of the Netherlands both Gilze-Rijen airbase and Woensdrecht airbase (which are situated about 35 Km apart from each other) suffer from a severe Chafer plague. On Gilze-Rijen, a former jet base where helicopters are stationed, the infection is concentrated on the Western part which has a soil structure that is favourable for chafers. This means that up to 500 Jackdaw and 250 Rook are present there when in May/June the temperature rises and the beetles start flying. The Jackdaw and Rook just walk in the vegetation and have their easy meal. On Woensdrecht, where training aircraft are based, the situation is different. The airbase is located at just a few kilometres from the Delta and all of the airbase is situated on very sandy soil. Since the introduction of the poor grass management there are no gulls on the airbase. But when conditions in May/June are right, up to 2000 black-headed gulls can be present, they not only walk but also hover at 1 meter above the vegetation and have their feast meal of flying beetles.

In previous years the strategy on both airbases was to just enable incoming and outgoing aircraft in a bird free window in time created by intensive scaring activities. This was never realised with full certainty and bird controllers felt very unsatisfied with the situation. On Gilze-Rijen, after an action to scare them away, the quietly feeding Corvids spread all over the airbase and tried to fly again in the direction of the infected area. On Woensdrecht it proved just possible to facilitate starts and landings. For the touch-and-go exercises that are inherent to a training squadron it was impossible to guarantee pilots a bird free window of sufficient time. There just were too many birds. As with a stone that is thrown in a pond and over which the water closes immediately, after a scaring action there immediately were other gulls “flowing in”.

By deliberately choosing for a non bird-free airfield, the bird controllers of Gilze-Rijen and Woensdrecht, in good joined consultation, were in 2002 still able to facilitate safe operations. On Woensdrecht AB two bird controllers, for a very limited time were able to “push” the gulls to one part of the airbase while the aircraft left from the other side. When reaching the part of the airfield where gulls were present on either side of the runway, the aircraft were at altitudes at which gulls were not present. After departure the bird controllers no longer put energy in unsuccessfully trying to scare gulls away. Instead they gave full opportunity to the gulls to feed away the beetles up to the expected time of return from the aircraft. In the mean time, where touch-and-go’s were making part of the operations, these were effectuated on Gilze-Rijen AB where Jackdaw and Rook were left in peace on one confined part of the airbase. The bird controller there, together with Air Traffic Control (ATC), co-ordinated the situation. Everything was done to prevent unexpected disturbance of the birds. Since the birds were quietly present in only one confined area next to the end of the runway, it proved perfectly well possible to perform the touch-and-go exercises on the extreme other end of the runway. The aircraft were sufficiently high when they approached the area where the Corvids were feeding.

Of course this is an undesirable situation, but despite this the bird controllers felt that by very carefully acting and much attention to clear communication to all people involved, they did not take an irresponsible risk while still enabling operations to be executed.

7. An alternative approach: differentiating bird control effort

Other than the actual number of birds on an airfield, as in the zero-tolerance approach, the criteria for a *situation involving minimum risk on bird flight movements across a runway* are susceptible to personal interpretations. This puts a considerable responsibility on the shoulders of bird controllers. On the other hand, since a bird-free airfield is not the ultimate criterion, there is no longer the risk of litigation. Still, bird controllers have to be able to explain why they act as they do. This means that bird controllers must be well educated, have ample local experience and have authority to convince OPS, ATC etc. Furthermore, it is essential that they know that the management is backing them instead of finding ways to blame them if an unavoidable bird strike eventually does occur. This does not mean that bird controllers should have unconditional support. In the RNLAF an effort is made to incorporate the alternative approach into regulations. The core of these regulations consists of an assessment of the bird situation in relation to the distance to the runway. Parallel to the system that is used to indicate the weather situation of an airfield, this leads to the " bird status" of an airfield. The bird status is determining the effort of bird controllers (frequency of runway inspections) and the operational use of a runway. Making these regulations operational involved the creation of a schematic outline containing the decision factors that lead to a bird status (Annex A). Despite the fact that it proved –up to now- to be impossible to make these decision factors explicit, bird controllers experienced the scheme as a support in their decision making. Dedicated, responsible and well-educated bird controllers even recognised the logic behind the scheme as the way they intuitively worked already for years. The scheme now is the framework of conditions under which bird controllers work.

Although the scheme is operational it also puts the finger on the spot as to how little we know. Decision factors are named but not -yet- made explicit. We do not know what "extreme numbers of birds" are. Ten Skylarks may easily be neglected, while ten Grey Herons may form a problem, depending of their position in relation to the runway. In all, almost every named decision factor is in need of more attributes that are explicit for bird species, location, weather, season etc. The extremes are clear: large numbers of big, flocking birds are not to be tolerated close to the runway. On the other hand, small passerines at considerable distance on the runway should not be considered a priority. For all the less extreme cases there are no explicit and easy rules of thumb available.

8. Conclusion

Earlier we concluded that a zero tolerance bird strike prevention policy, that is primarily based on the presence of birds does not do justice to the complex and still poorly understood multitude of both bird specific (behavioural) and environmental factors that determine the risk that a hazardous bird strike will occur. This resulted in the statement that such a policy is unrealistic, degrades bird controllers to scarecrows, may even increase the risk and may well meet resistance from society. As to the alternative approach we have to conclude that, although it does include the key factors in the decision making of bird controllers, it does not so in an explicit way. For the specific situation on and around an airfield, knowledge has to be generated in order to understand the risk that a bird species imposes, including the variation due to season, weather, bird behaviour etc. Combined with historical data on bird presence and actual information this understanding should be used by modern modelling techniques to create self-learning models. Once we are able to make such models we also are able to define the soft fringes that are furnished to the solid goals of zero tolerance. We then provide bird controllers with an operational tool with which he can create *a situation involving minimum risk on bird flight movements across a runway*.

10. References

ALAN, J.R. (2000). A protocol for bird strike risk assessment at airports. Proc. I of the 25th Meeting of the International Bird Strike Committee, Amsterdam 17-21 April 2000, Working Paper OS-3 pp. 29-46.

ANONYMOUS (2000). Amsterdam Airport Schiphol Fauna management plan 2000 to 2005 inclusive.

BROWN, K.M., R.M. ERWIN, M.E. RICHMOND, P.A. BUCKLEY, J.T. TANACREDI & D. AVRIN, (2001) Managing Birds and Controlling aircraft in the Kennedy Airport – Jamaica Bay Wildlife Refuge Complex: The need for hard data and soft opinions. Environmental Management Vol. 28, Nr. 2, pp. 207-224.

CIVIL AVIATION AUTHORITY (1998). CAP680 Bird Control On Aerodromes. CAA London.

CLEARY E.C. & R.A. DOLBEER (1999). Wildlife Hazard Management at Airports. US Federal Aviation Administration/USDepartment of Agriculture

DEKKER, VAN GASTEREN & SHAMOUN-BARANES (2003). EURBASE, progress report and first impressions on bird species. Proc. I of the 26th Meeting of the International Bird Strike Committee, Warsaw 5-9 May 2003, Working Paper ID-2, pp 225-237.

DOLBEER, R.A. (1998). Evaluation of shooting and falconry to reduce bird strikes with aircraft at John F. Kennedy International Airport. Proc. of the 24th Meeting of the International Bird Strike Committee, Stara Lesna 14-18 September 1998, Working Paper 13 pp. 145-158.

MACKINNON B. editor (2001)Sharing the Skies. Report issued by Transport Canada.

PARKER WG CDR R. (1997). In Sanctuary nr. 26, 1997 p. 63-64. MOD Conservation Office for the Press Secretary and Chief of Information, Ministry of Defence, UK.

REITER, D.K., M.W. BRUNSON AND R.H. SCHMIDT (1999).Public attitudes toward wildlife damage management and policy. Wildlife Society Bulletin 1999: 27(3)746-758.

Annex A: Decision scheme helping bird controllers from the RNLAF to establish the bird status for an airfield.