AIRPORT DESIGN AND MANAGEMENT TO REDUCE BIRD HAZARDS

by V. E. F. Solman *

Abstract

Airport location and design must be planned to minimize the hazards from birds. Areas habitually used by birds should be avoided. Soil should be sandy and well-drained, or a drainage system should be designed to run off surface water quickly.

A sturdy, fire-resistant ground cover which is not attractive to birds, should be selected.

Vegetation which provides food, shelter, or roosting areas for birds or habitat for small mammals should be removed. Earthworms and snails should be eliminated if possible or at least kept off paved runway areas. Any use of airport land for crop production requires very careful control to avoid creating bird hazards through kinds of crops planted, their parasites or culture methods. Grazing of domestic mammals may also cause a hazard.

Airport buildings, structures, and landscaping should be designed to minimize attractiveness to birds. Buildings outside airport boundaries may also create bird hazards.

Modern jet airports tend to attract some birds because they provide large areas of almost uniform habitat with minimum human presence. For that reason, emergency action to remove sudden arrivals of birds may still be necessary and must be prompt and well organized.

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* Staff Specialist,
Canadian Wildlife Service,
Environment Canada,
Ottawa, Ontario, Canada.
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Bird problems at airports and methods of correcting them have been outlined by Munro and Harris, 1963 and Solman, 1966 and 1968. It is possible now to prepare specifications for airport location and design to minimize bird problems from the beginning.

The initial consideration is the location of the airport. Birds use some areas habitually for stopover on migration and for other purposes. Those areas should be avoided in airport construction whenever possible because traditional avian use of areas is extremely difficult to change.

If an area is not habitually used by concentrations of birds, the airport design and arrangement of facilities should try to avoid creating bird attractions. Because modern jet airports involve large areas of almost uniform habitat with minimum human presence they cannot avoid attracting some birds, but proper design can reduce that attraction.

Water is an important attraction to birds and a source of aquatic food for them. Lake and sea shores, tide flats, and lowlands on river flood plains should be avoided.

Another important consideration is soil. Sandy, well-drained soil, which dries quickly after precipitation and will support only certain types of vegetation, is preferred. It is unlikely to harbour earthworms

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and certain other invertebrates which can be important attractions to birds. If a sandy, well-drained site is not available then great care should be taken in designing and building the drainage system, so that surface water can be moved off as quickly as possible without ponding, and so that growth of aquatic plants will be kept at an absolute minimum. No borrow pits or other water-holding areas should be permitted on the airport.

Having selected a site on soil either naturally well-drained or provided with adequate drainage, a ground cover is needed to stabilize the soil, prevent erosion and provide a pleasant appearance. Airport ground cover plans must be sufficiently robust to stand up to wheeled traffic on the airport and sufficiently flame-resistant to avoid being a fire hazard under exposure to jet engine exhaust.

There is a common tendency to use grass or some easily managed crop to provide an attractive and stable ground cover. However, grass must be maintained continuously to provide a ground cover height of minimum bird attraction; it is food for some bird species and provides habitat for many kinds of invertebrates that birds like to eat. We are studying the possible use of several other plants, of which one of the most promising is Hieracium Pilosella, as replacements for grass on some types of soil. Those plants would require practically no maintenance, such as mowing or

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fertilizing, would form a good ground cover, would attract few invertebrates, and would have no flowers or seeds attractive to birds or to the invertebrates on which birds feed.

If airport areas must be used for production of agricultural crops, as is the case in some countries, great care must be taken to ensure that the crops, their parasites and the culture methods used, do not singly or together attract birds. Cultivating the soil before planting or during growth of the crop may expose invertebrates not usually available to birds and thus create a serious hazard.

The cutting of airport vegetation and its removal from the airport for use as animal feed may reduce the cost of maintaining the vegetation at the height which attracts the fewest birds. The harvesting operations may repel some birds.

The grazing of domestic mammals to maintain short vegetative cover on an airport may create a bird hazard. Birds may be attracted by the invertebrates disturbed by the grazing mammals or feeding on the mammal droppings.

Trees, shrubs, brush, and tall vegetation of all kinds must be eliminated from airports because they can provide food, nesting, and escape cover and roosts for birds. Large birds such as partridge, pheasants, or

ducks are a direct hazard to aircraft. Roosting areas from which groups of birds may move into the path of aircraft are especially dangerous. The most serious bird accident to an aircraft in the United States, in which more than 60 people were killed, was caused by a group of starlings emerging from a roosting area in front of the aircraft as it took off.

All modern airports have large paved areas upon which aircraft move about. Those areas may contribute to the bird hazard if earthworms or snails inhabit the airport soil and move onto the paved areas in wet weather. Earthworms and snails are easily visible food which attracts several species of birds. Until more effective methods of earthworm and snail control are devised, mechanical means must be used either to exclude them from the paved areas or to quickly remove them when they arrive there. Worms and snails are bird attractions even when partly hidden in vegetation beside the runways. Efforts should be made to select soil and vegetative cover which does not encourage the presence of worms or snails.

Some bird attractions are not as obvious as earthworms or snails. Some of our most serious bird accidents have been caused by large, predatory birds which fly about over airports searching for small mammals as food. Those birds, when not in flight, may perch upon projections from which they can observe large areas. At some Canadian airports snowy owls perching on the runway marker lights have caused a real hazard. Potential perches should be as few as possible or rendered unusable to birds by

being equipped with sharp spikes on the top. Some perches may be equipped with a trapping mechanism to catch and hold the birds unharmed until they can be removed from the airport to areas where they do not constitute a hazard to aircraft. At Vancouver International Airport more than 500 raptors, mostly owls, were removed by that means in three years. The birds were released unharmed sufficiently far from the airport that very few would return.

Airport development involves a number of buildings and structures as well as the layout and engineering of the field itself. Buildings themselves can contribute to, or minimize, bird attractiveness. Roofs which overhang walls provide protection for nest construction by cliff swallows and species with similar nesting requirements. Buildings which have ornamental architecture may provide crannies and openings which can be used for bird nesting. Ornamental foundation plantings may provide berries and seeds which attract birds. Design and landscaping of buildings and structures should eliminate all those attractions. Flat gravel roofs, unless the drainage is carefully designed, may provide pools of water after rains which attract waders and gulls. Near some airports flat, gravel-covered roofs of industrial buildings which hold a few inches of water provide roosting areas for large numbers of gulls. They are not readily visible from the ground, but they may take off and fly into the paths of aircraft approaching airport runways. In some cases it has been necessary to ask building operators outside the airport boundary to improve the drainage

on their roofs to minimize gull roosting near the flightways leading to airports.

When all steps have been taken to design both the airport and its buildings and other structures to minimize the bird problem, there still remain the situations in which birds arrive suddenly on an airport, sometimes in large numbers, for no reason other than that the airport provides a convenient landing site. That sort of situation can occur at any time but is more likely during spring and autumn migration. The airport staff must be constantly on the alert for such an emergency. To deal with it may require firearms, scaring and killing ammunition, lights, sound-reproducing equipment, traps and of course patrol vehicles. Airport personnel should regard the arrival of birds in the same way they do an unexpected snow storm. When snow comes, every effort is made to remove it quickly to keep the runways and other flight facilities serviceable. When birds come unexpectedly they must be dealt with as a similar emergency and all necessary steps taken to remove them from the airport as quickly as possible to restore the safe operating conditions which existed before. The need for quick action is easy to define - many more aircraft have been disabled by birds than by snow on airports. We must work to bring the bird hazard down to the same level as the snow hazard by dealing with it as an emergency when it occurs.

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