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2010

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Available at: https://works.bepress.com/paul_eschenfelder/14/

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Collisions between aircraft and wildlife, principally birds, commonly referred to as "birdstrikes", are a relatively new and increasingly hazardous threat to both civil and military aviation worldwide. Although birdstrikes have occurred since man began flying only in the last 20 years or so has the problem become acute. There are several reasons for this.

Efforts over the last generation to clean up the environment have lead to a more benign habitat which has allowed bird populations, especially large flocking birds, to grow geometrically. Controls on the use of pesticides, hazardous runoff from fields and streams and improved air quality have all contributed. At the same time aviation in North America has continued to grow and expand. Conflict between birds and aviation was inevitable. Birdstrikes in the U.S. are not declining or even leveling off (chart 1).

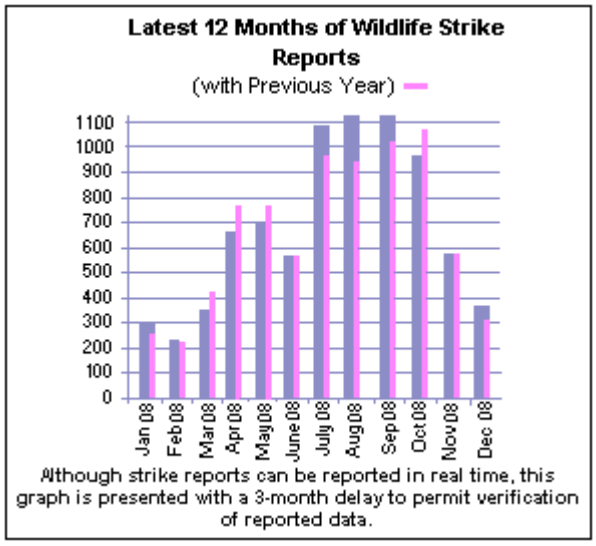

Chart 1

When birds or mammals collide with aircraft serious damage can occur to the aircraft's wings or control surfaces, possibly rendering the aircraft uncontrollable. Likewise ingestion of birds into a jet or turboprop engine is a serious event. Bird remains can block the airflow through the engine, causing it to overheat, or dislodge compressor blades which can completely destroy the engine.

Figure 1
An American Airlines MD-80 engine showing fire damage after ingesting a double crested cormorant on departure from Chicago's O'Hare Airport.

Previously federal regulators and aircraft and engine manufacturers agreed upon design and construction standards which afforded a certain level of safety should collisions occur. Unfortunately these standards have not kept pace with the exponential expansion of large birds. For instance, engines flying today for mid-size, twin-engine airliners, such as the A-320 or B-737, must only be capable of safely shutting down after ingesting one four pound bird. The engine does not have to survive. Currently, in the United States, there are over 30 species of large flocking birds which weigh in excess of 4 pounds; some are as large as 15-20 pounds. The fact that these large birds are social and travel in flocks played itself out most dramatically in January, 2009, when a USAirways A-320, during its climb out from New York's LaGuardia Airport, struck a flock of Canada geese. Both engines failed and the aircraft was crash landed in the Hudson River in downtown New York City. Interestingly, only three months before this accident, a similar accident occurred at Rome's Ciampino Airport in Italy. A Ryanair B737-800 struck a large flock of starlings during its approach, lost thrust on both engines and crash landed on the runway at Ciampino Airport.

Unfortunately this is not an uncommon affair. The U.S. FAA's birdstrike database reveals that every year since 1990 multiple turbofan or turboprop aircraft have experienced dual engine damage due to bird ingestions. This FAA database reveals over 7,000 reported birdstrikes per year in the U.S., but the FAA estimates that only 20% of the birdstrikes are reported to it. Therefore the true number of collisions between birds and aircraft is closer to 35,000 per year, or over 95 collisions per day, on average, in the U.S. The cost of all this damage is quite astounding. A study by United Airlines and the U.K.'s Central Science Laboratory put the dollar cost of birdstrikes to airlines, worldwide, at US$1-1.5 billion annually due to direct repair cost and loss of service. In a sixteen month period between the fall of 2007 and January, 2009, there were four catastrophic aircraft accidents caused by birdstrikes in the U.S., leaving 15 people dead.

Most birdstrikes happen either on the airport or in its immediate vicinity. Because of this the International Civil Aviation Organization (ICAO) amended its Standards and Recommended Practices (SARPs) to mandate wildlife control programs on airports as a standard. As most nations worldwide attempt to comply with ICAO standards a new emphasis was placed on this discipline.

Airport wildlife control is generally an attempt to keep birds on and around the airport separated from the aircraft operating on the airport. This strategy includes many different techniques: some passive, such as habitat modification; others active, such as bird harassment. Obviously different species of birds require different modification measures.

The airport wildlife control effort begins with the airport operator conducting a study to ascertain the number and type of birds and other wildlife on and near his airport. While there is no worldwide standard as to who should conduct this study, it is generally recognized that the party conducting the study should have training and background in aviation wildlife mitigation. In some cases it is quite easy to detect the problem by simple observation; in other cases a more thorough study over time may be necessary. Because airports vary in their environmental settings, i.e., located near large bodies of water, in areas of farming or on major migratory flyways, the scope and degree of their wildlife problem will vary.

Passive Management

Any plan to control birds and other wildlife around airports should consider that birds come to the airport for only three reasons: eating, drinking and loafing (which includes nesting). Therefore not only should bird and wildlife populations be observed, but also the attractants which tend to bring them to the airport must be noted. Both the wildlife and the attractant should be managed. The intent is simply to make the airport and its environs a less desirable place than its surrounding territory. With less food and shelter on the airport the birds will simply move off the airport to more desirable habitat.

Passive habitat modification can take place throughout the airport environment. Airport buildings can be designed and constructed, or modified, to take away nesting and perching sites.

Within 2 weeks of completion, starlings and pigeons had started roosting in this canopy constructed over the passenger drop-off area at a major USA airport (photo by S. Gordon).

The AOA (airport operations area) is the prime focus of passive management. The turf on the field should be managed to an intermediate height: 6-12 inches. This longer grass discourages many species of bird as it impedes movement, limits predator detection,

reduces interflock communication and obscures food sources. Longer grass also reduces the amount of mowing the airport operator must do, saving personnel and equipment time.

Landscaping on the airport should be restricted to only those types of plants or trees which provide neither shelter nor food. Ornamental trees such as firs should be eschewed as they are perfect shelter in inclement weather. Likewise plants such as hollies, which produce berries, should not be used. Trees which are observed serving as roost or perching sites should be removed or have their interior branches thinned extensively.

Agriculture within the AOA should not be authorized as virtually every farming crop, whether grain or otherwise, provides some attractant to wildlife. By the same token, manmade food sources should be eliminated. Dumpster lids must remain closed, garbage bags must not be allowed in the open and personnel must be cautioned regarding wildlife hazards. At one large coastal airport the prime bird attraction was the taxi queue where the cab drivers were killing time by feeding the birds.

Waste dumps and land fills must not be located on or near airports. Land fills can be huge bird attractants virtually around the clock. Some nations have established regulations requiring certain distances between land fills and airport runways to ensure safe separation between birds and aircraft operating from those runways.

Water is always a magnet for wildlife, both birds and mammals. After eating animals migrate to water sources to drink. Drainage ditches, retention ponds, landscaping water features, or simple ground depressions which retain rain water can all be attractants to wildlife. Airport retention ponds should be constructed to drain with 24 hours. Retention ponds and other bodies of water can be mitigated by erecting wire grids over the water area. The grids complicate entry into and exit from the water by birds, making it less attractive. Smaller water features can be covered with ‘bird balls’, floating plastic balls which completely cover the surface.

Active Management

Active wildlife control techniques are applied to those species of wildlife which prove to be more stubborn or resistant to habitat modification. Active controls can take many forms.

Chemicals can be spread throughout feeding areas to create a taste aversion or gastric distress to the feeding animals, which will avoid the area in the future. Likewise repellant sprays can used on roosting areas to disturb the roost and harass its occupants.

Startle devices which generate loud sounds, such as propane cannons which fire at random intervals, and shell crackers or bangers, launched from pistols or shotguns, work effectively when directed toward stubborn wildlife. Pyrotechnics, including the shell crackers, are simple but effective and relatively cheap to use.

Other auditory devices, such as distress calls, must be used in integration with other dispersal means or birds rapidly habituate to the technique. Likewise effigies, such as scarecrows, owl effigies, 'scare eyes', are generally ineffective due to habituation.

Lethal control of wildlife is also a part of an integrated active control plan, particularly for mammals. Large mammals, such as deer, on an airport are an obviously threat to aircraft due to their size. Small mammals, such as rodents, are also a problem as their presence will attract raptors which feed on the rodents. Burrowing mammals can create inadvertent hazards by burrowing next to taxiway or runway surfaces, allowing erosion to undermine those surfaces. Lethal control can consist of traps, poisons or shooting.

Summary

Airport wildlife control is an important part, but only part, of a safety system to address the aviation wildlife hazard. As with any aviation hazard, such as wind shear, volcanic ash or others, airport wildlife control must be part of a comprehensive, integrated aviation wildlife mitigation plan which includes technology, training and regulation.

(*Pictures and graph courtesy of the Federal Aviation Agency).*

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