

REDUCTION OF WILDLIFE HAZARDS TO AIRCRAFT

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Reduction of wildlife hazards to aircraft depends more on the state of mind of the people involved and their hard work than on all the technology we have developed. The state of mind we need involves a great deal of determination to work on the problem each and every time it occurs and to use all of the knowledge, ideas, and technology we have, to control creatures which have more time than we do to learn how to take advantage of their environment and make a living. In doing that, these creatures cause us problems in ways that continually amaze us.

You need to keep one thing in your mind, always, in regard to wildlife problems. That is never to become complacent and assume that there is no problem or that you have solved the problem. I have seen too much of that where you do all the obvious things you have read about in all the published papers, you have attended the lectures, and you think you know how to do it. You get out there, you do all the right things on the airfield and then something happens that neither you nor anybody else had experienced or thought of before. A few examples: At Stephenville, Newfoundland, on the 5th of September, 1980, an Eastern Provincial Airlines B737 hit gulls on take-off, had a JT8D engine take fire and disintegrate for a replacement cost of \$1.2 million. There had been no previous reported strikes there though gulls had been seen with increasing frequency during a period before the strike. Unfortunately no one was thinking much about bird hazards there because they had had no previous problems and nobody was doing anything there to discourage the gulls. Murphy's law worked and that airplane got hit. If the engine fire had not gone out when they fired the second fire bottle, there might have been casualties. They were lucky; they got away with it. On January 19, 1979, a Wien Alaska B737 struck a covey of ptarmigan just after landing at the airport at McGrath, Alaska. Both engines ingested birds; one was heavily damaged. Ptarmigan

with their white winter plumage don't show up very well against a snow background. The airline sued the State, which operated the airport, for \$1/2 million and the State had to pay. State officials called me and asked what they should have been doing about all this? I looked at their records and it turned out that ptarmigan, which move around the country in the wintertime, had been seen a few times around the airport but none had been struck by an aircraft at that airport so no one paid any attention. There was no bird control program at the airport.

At Dunsfold in Surrey, England, at a company-operated airfield there was a well-organized bird management plan in place with staff trained to deal with bird hazards when requested to do so by the air traffic controller. All personnel on the airfield were supposed to report observations of birds on the airfield to the controller. On November 27, 1977, an F8 Jet took off, after advising with control that no bird reports had been received, ran into a flock of plovers, lost a wing on both engines, spun after crashing, burned back on the runway, ran out the end, the main cabin heated up and the cabin doors opened and demolished a station wagon and killed a person. It burned in flames and burned out 1 crew and passengers (9-11-77). The investigation showed that some airport people had seen birds on the airfield prior to the take-off but had assumed that "someone else" would have reported them to the controller. All the fueling and equipment was wasted and 6 lives lost because the good bird control system was not activated.

I mention these historic examples because they make the point better than anything else I can say. You have to be thinking about these things all the time. You have to know the kinds of things that might happen and always realize that birds and mammals do things that can cause problems. That must be in your mind all the

time. You have to have everybody on the airfield helping you. If you don't know that birds or mammals are there you may not take the kind of action that will prevent accidents.

Some of our recent published work has shown the differential vulnerability of turbine engines of different sizes and different locations on the aircraft. That should remind you that, if for example the Canadian Armed Forces change from B707-320 aerial tankers to DC10 tankers as the U.S.A.F. has done recently, underwing engine strikes can be expected to go up from 0.32 per 10,000 engine movements to 0.47 while the tail engine on the DC10 will have a strike rate of only 0.16 per 10,000 engine movements.

We have known for quite a while that some underwing engines have more than four times as many bird ingestions as rear-mounted engines of the same size and that larger, quieter engines have higher strike rates than smaller noisier engines. So what do the designers do? The biggest-selling modern transport aircraft are big, quiet twins with underwing engines, exemplified by the Airbus 300 and the Boeing 767. This means that bird hazard reduction is increasing in importance daily if we want to avoid serious incidents.

I have talked about transport aircraft. Executive aircraft such as learjets, falcons and challengers have the good feature of rear-mounted engines but also have all the problems related to small engines which can be damaged by relatively smaller birds. These aircraft have the added problem of flying, some of the time, from smaller airports with less awareness of bird problems and less staff to deal with those problems.

High performance military aircraft share with small transports the small engine problem compounded by the very high performance extracted from those engines in military service.

Many of our housekeeping practices on airfields can work to the birds' advantage if we are not very careful. When we use urea for runway ice control we inadvertently fertilize the soil at the runway edges. On prairie airports the grass is noticeably greener along the runway edges. The ground squirrels concentrate there as do the hawks that feed on them. The increased likelihood of bird strikes can only be controlled by the control of ground squirrel numbers in those runway-edge areas or by the control of ice with something that is not a fertilizer.

We cut down trees and shrubs on airports to remove cover used by birds. As the cover grows back it may be used by birds other than those we originally got rid of and so the problem changes but there is still a bird problem.

Birds change their distributions, numbers, and even habits over time. When the municipal garbage dumps at North Bay and Trenton were situated near the airport years ago, gulls were known to feed on dumps but gull numbers near the airport were small and did not pose much of an immediate problem. Over the last ten years the populations of Ring-billed gulls in Ontario have increased by about 10% per year. Some of the biggest gull colonies known are now in Ontario. Without very expensive gull control programs at both airfields, on a continuing basis, the strike rates at both Trenton and North Bay would be unacceptably high.

Sometimes things off the airports, other than garbage dumps can cause airport bird problems. Franklin's gulls live over much of the prairies eating insects in crop fields. At an airfield like Regina, which has grain fields on three sides, when the harvest starts the noise of swathers and combines in the fields causes thousands of gulls to leave the fields and move to where there is less disturbance onto the Regina Airport. After a couple of years of experiencing the

had just collided with a flock of cowbirds which rose from a dump near the runway. He called the control tower and said, "We have hit some birds; we are not going to make it." and then crashed.

That crash, which destroyed the aircraft and killed its seven occupants, started a legal process which passed through the local court, the state high court, the U.S. Supreme court; and involved county officials, the FAA, the insurance company which carried the liability insurance on the airport, and almost everybody in sight. As Doc said, "Everyone was sued: the county was sued, the county commissioners were sued as a body and as individuals, the airport manager was sued. " The settlement, after 9½ years it took, involved payment of between 400 and 500 thousand dollars for each death, as well as payment for the destroyed aircraft and for repairs to damage to buildings and other installations. The payments were shared by the FAA and by the insurance company. In the Dunsfold crash the company which owned the airfield and the aircraft paid for the losses in an out-of-court settlement.

I mention the matter of liability because it is always there in the background as a further incentive to do a good job of controlling wildlife hazards to aircraft. If you fly yourself you already have a more personal reason for excellence. "The life you save may be your own." I can't think of a better incentive for good work.

We have said a lot about bird strikes on and near airports. While they are important we must not lose sight of those that occur away from airports. Another area of increasing concern involves mammal strikes and other actions of mammals which also cause danger for aircraft.

Birds aloft, away from airports, are a threat to all aircraft.

sudden arrival of large numbers of gulls in late August, the Airport authorities now get ready in advance each summer by laying in supplies of shell crackers and other scarers and by arranging for extra manpower and vehicles for much increased anti-bird patrols for the week or so that the problem exists.

Sometimes a nearby industrial area can cause problems, not just through waste food on the ground in drive-in theatres and in super-market garbage, but also through architecture. Industrial areas on flight ways have height restrictions and adjacent buildings are often flat-roofed with parapets around the roof edges. These become problems when drains plug up in wet weather and water pools on the roofs. A few hundred gulls bathing and loafing on a water-filled flat roof can panic and fly up in front of approaching aircraft just as they would off a wet area of ground near the end of a runway. Unfortunately, while they are seen by approaching pilots, all too often they can't be seen from the ground or the control tower because they are behind the roof-edge parapet. We had that problem at Toronto International airport years ago. It was solved through the cooperation of the building operators when airport staff visited them, pointed out the problem and their possible liability in case of an accident. The whole matter of liability is becoming a real issue in some countries involving long drawn-out court battles, one of which lasted for nine years after the crash of an executive jet at Atlanta, Georgia, in 1973, involving seven deaths. Let me report briefly on a paper given by the airport manager, "Doc" Manget, at a conference on airport wildlife control at Detroit in August, 1983.

"Doc" Manget began his paper by referring to three sets of famous last words. Madame de Pompadour, after receiving the last rites from a priest who began to leave her room said, "Wait for me, I will go with you," and died. Stonewall Jackson, mortally wounded, lay on the bank of a river, said, "Let us cross over the river and rest in the shade of the trees." He then died. Doc Manget said the saddest last words in his view, were those of the pilot of the Learjet 24 who

Because of their high-speed, low altitude missions are particularly serious for military training and operational flying; much more so than transport aircraft which spend less time in low level flight, and fly more slowly thereby greatly reducing the seriousness of the damage. Cruising above 30,000 ft. is relatively safe because few birds get that high. The greatest in-flight hazard occurs during long distance bird migration when birds may fly at altitudes of up to 15,000 ft. (occasionally higher) to secure the favourable wind speeds and directions needed to accomplish long flights on limited fuel supplies (mostly stored fat). Birds show up well on most radars and their migrations can be forecast in relation to weather forecasts so since the late 1960's it has been possible to schedule flying training at military bases like Cold Lake, Alberta to avoid the heavy migration traffic particularly of large birds.

It is only in the last few years that we have begun to collect information on mammal problems. The number of mammals hit is smaller than the number of bird strikes but the hazard must be considered and dealt with. Deer strikes are perhaps most common and can cause a great deal of damage especially on smaller aircraft. At least one 104 has been written off and the pilot killed by a rabbit strike.

Just as important as strikes is the flooding caused by beavers which can knock out lighting and communication wiring and provide habitat for water-loving birds where it is not wanted. Wolves and Coyotes break runway lights at some northern airports and enjoy chewing on runway light wiring. At one northern airfield one quarter of the maintenance staff is employed for the continuous replacement of damaged lights and wiring. Not only is this an item of expense and a problem for a limited staff but a lighting and/or communication failure at a critical phase of landing could cause a serious hazard.

Mammals may chew external plastic and rubber fittings on parked aircraft as well as entering the aircraft to damage interior fittings. The light-hearted story in "Flight Command #3" * of 1985 should remind us of the serious consequences of mammal damage to aircraft and ground components which could lead to their failure. At Sea Tac International Airport near the Northwest corner of the U.S., liquor supplies are piped from the main terminal bar to those in the satellites through plastic tubes. When the bar records in the satellites did not match withdrawals from stock in the main terminal, the tubes, which run in tunnels with electric power and communication cables, were examined. Chewing rats had caused leaks in the tubing and some damage to insulation on electrical cables. In at least one instance in an airport outside North America rats or other rodents had damaged power cables for radar installations thereby shutting down the system .

I mention a few mammal problems to encourage you to be on the alert for mammals and mammal damage - just as you are for birds and their actions. As we work harder we will find more ways that mammals are causing trouble just like birds. Relatively recently the first bird nest, made of wire from power sweeper brushes was found in an aircraft. That means bird nests can now cause short circuits and fires as well as mechanically plug duct and joints. We don't know just what new problems birds and mammals will cause in the future. A senior member of the original associate committee on bird hazards to Aircraft - which pioneered many bird damage control ideas during its life from 1962 to 1976, said, "Birds are almost always nearby everywhere." He was right about birds and the same thing probably applies to mammals. We must be very alert to keep up with them, let alone get ahead of them. Constant vigilance is needed to maintain our present level of safety. We must try very hard to improve it. Remember-the life you save may be your own-Keep at it.

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