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Optimization of Bird Hazard Reduction in Coimbatore International Airport

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Abstract: This paper is based on the bird hazard reduction in airports. First half is dealing with various problems faced by the airport like collision on aircraft causing the engine to stall which ultimately leads to aircrash in some cases. The next step provides information on each of the program components: vegetation and water management; insect control; and the supplemental on-airportshooting program.Finally this paper provides an elaborate description of the BHRP which advises and works with CIA on bird hazard management issues.

Keywords: Airport; Bird hazard reduction; Engine stall; Vegetation; BHRF-Bird Hazard Reduction Program.

1. INTRODUCTION

Birds represent a major hazard to aviation. Especially bird ingestions by one or more engines, which can Lead to significant power loss, are safety critical. Ensure the survivability of aircraft components under bird strike. At present, experiments and numerical simulations are used to aid design of bird strike resistant structures. As a proactive measure: to minimize hazard / control bird movement in the airports. A review of the Air Force (AF) bird strike statistics between 1999 and 2000 highlights how real the wildlife strike risk can be. During this period, the AF lost thirty-five crew and forty-two aircraft to bird strike; between 1999 and 2000, they lost seventeen aircraft in combat and twelve aircraft to bird strike (Kelly, 2010; DeFusco, et al 2008).

At that time, there was an almost equal chance the AF could lose a pilot and/or aircraft from bird strike as from combat, and they were losing significant operational capability. Between 2002 and 2011, the Indian Transport Safety Bureau (ITSB) reported wildlife related incidents for civilian air transport in Indian was the most common occurrence, accounting for 23% of all non-serious incidents ii (ITSB, 2012). For general aviation, incidences for non-serious strike for the same period accounted for 9% (ITSB, 2012). All strike and hazard data supports bird strike as a serious aviation safety hazard that warrants high-level commitment and resource allocation for management.

The future of effective bird strike management will incorporate a significant contributions from all facets of the aviation industry (i.e. air traffic control, airlines, pilots, aircraft manufacturers), along with the integration of technology such as bird detection radar and other remote sensing devices to accommodate separation-based management models. However, the current model places the responsibility almost solely on the airport operator to develop and implement bird hazard management programs to mitigate the risk to aircraft operating on airports (ICAO, 2012; IBSC, 2006). Here we present the basic principles of the current management model, identifying and summarising the key management elements that comply with, and in some instances, exceed international best practice.

2. THE INTEGRATED APPROACH

There is no single management tool that will 'solve' the bird strike problem. Quick 'set-and-forget' solutions are often expensive and are almost always ineffective. Generally, bird hazard management programs must be long-term, fully integrated, and aim to identify, monitor, manage and evaluate the wildlife risk. Specifically, these programs should: define responsibilities; implement hazard monitoring protocols that collect data for meaningful analysis; incorporate active and passive measures; involve stakeholders; communicate risks quickly and effectively; assess the risk via formal risk assessments; document strike, monitoring and management data; define strikes; encourage a positive strike reporting culture; facilitate suitable training, and provide appropriate equipment and other resources. Furthermore, national regulators are encouraged to regulate the specific requirements for management programs and audit airport regulatory compliance regularly. This should align with International Civil Aviation Organization (ICAO) guidelines (ICAO Annex 14, ICAO 2012).

a. Defining Roles & Responsibilities.

Identifying the position that has overall responsibility for driving and directing an airports bird management program is

critical to ensure program progress and the adequate allocation of resources (IBSC, 2006). Furthermore, the roles and responsibilities of all personnel charged with the responsibility of bird strike management should be clearly defined and documented (ICAO, 2012)

b. Monitoring& Data Collection

Bird monitoring programs should be standardized, replicable and capture relevant data. Reliable data provides analysis that is more robust and meaningful, allowing a greater appreciation of risks, strike trends, and hazard trends. It also allows the success or failure of management programs to be measured. Personnel carrying out bird surveys must receive training on count procedures, bird identification, and be suitably equipped with binoculars and standardized datasheets. Monitoring should be long-term and frequent enough to identify seasonal trends in bird activity. Understanding seasonal trends in bird activity (i.e. migration and breeding patterns) can help to develop predictive approaches to management. Monitoring off-airport wildlife hazards is equally important.

c. Active Management

Harassment and dispersal is critical for immediate hazard management. Airport personnel charged with this responsibility should apply various devices and techniques in varied ways. Reliance on only one or two devices quickly results in habituation by birds, significantly reducing their effectiveness, and ultimately having minimal, or no, influence on the strike rate. Dispersal tools may include, but not be limited to, distress callers, lights, pyrotechnics, gas canons, lasers, falconry, remote controlled devices, dogs, stockwhips, whistle, vehicles and sirens (IBSC, 2006; IAF, 2004; FAA, 2005). Due to rapid habituation to static devices, we do not recommend their use. Personnel must be trained and competent in dispersal tool use (incl. firearms if required), species identification and airport situational awareness. Furthermore, personnel must be trained on how to identify and prioritize hazardous birds, locations, and times. The lethal control of hazardous birds is a useful and important component of management programs.

Due to the sensitivity of this activity, it should only be used remove high or moderate risk species, and only if all other methods of dispersal have been exhausted without the desired effect. In some circumstances, lethal control is useful to reinforce other dispersal techniques. All lethal control activity must adhere to relevant legislation, animal welfare guidelines and codes of practice. Personnel must be trained and competent in firearm use, species identification and airport situational awareness.

Other active management approaches include the trapping and relocation of problematic wildlife, in coordination with local environment authorities, and the removal of eggs and nest from airside areas to discourage site usage and to disrupt local breeding success.

d. Passive Management

Passive management aims to manipulate local resources and attractants to reduce their appeal. The results of passive management measures are usually more permanent compared to active management. Passive management usually targets grasslands, landscaping, waterways, drainage, buildings and fencing. Trials at various airports around the world support the concept that carefully managed long grass (200-300mm) is a viable method of deterring ground foraging birds (Ecosure 2008; Thomson 2005). Long grass, or other ground vegetation, lowers predator detection (Devereux et al 2006; Whittingham et al 2004; Butler & Gillings 2004; Whittingham & Evans, 2004) creating unsafe environments for birds to forage.

However, in some circumstances, long grass may create additional wildlife hazards. Additionally, grass type, soil type and climatic influences may impede grass growth, therefore site-specific trials are recommended. On-airfield soil depressions accumulate water following rain creating a bird attraction. Depression should be identified and filled. Poorly designed, or poorly managed, drains can attract birds, including drain infrastructure such as culverts and pipes. New drain design should consider the potential bird attraction, and existing drains can be modified to reduce the attraction (e.g. the replacement of unlined, heavily-vegetated drains with concrete-lined drains). Retention ponds or other large permanent water sources should be modified, eliminated or exclusionary devices, such as netting, installed. Airport infrastructure can provide perching, nesting and roosting opportunity for birds. Areas of attraction should be identified and modified to restrict access or deter use. Adequate perimeter fencing can effectively prohibit access by terrestrial animals. We recommend a subterranean extension of fencing up to 30cm to prevent burrowing animal access. Perimeter fencing should completely enclose the airside area and be inspected regularly for potential breaches.

Transport Canada (2001) recommends the removal of airport trees to reduce perching, roosting and sheltering opportunity. Trees can also provide significant foraging opportunity to nectivorous and frugivorous animals, including birds and bats. All existing airport landscaping, including landside areas, should be assessed for bird and other animal usage, and all new landscaping works must consider the potential bird attraction when selecting species, design and layout.

e. Involving Stakeholders

Despite the current airport-centric management approach, stakeholder contribution is necessary. The formation of bird management committees by airports provide a suitable forum for airlines, air traffic control, government representatives,

regulators, environmental representatives, and off-airport land operators to work with the airport to identify hazards and share the risk, contribute resources, and cooperatively develop risk mitigation measures. Multi-stakeholder approaches to management ultimately yield outcomes that are more meaningful, promote cooperation within the industry, and improve bird strike risk management.

f. Communicating Risks

Cooperation from all aviation stakeholders is required to expedite the dissemination of risk and hazard information that may compromise aircraft safety. Formal communication channels such as Notice to Airman (NOTAM), Internal Notice to Airman (INTAM), Bird Watch Condition Reporting (BWCR) and Aeronautical Information Packages (AIP) are available. Additionally, modifying Automated Terminal Information Services (ATIS) recordings to include bird information for acute hazardous conditions has proven effective (Avisure, 2009), and direct radio communications between ground crew, air traffic control and pilots can promptly convey immediate hazards. All hazard communications must be clear, specific and concise, and where possible include recommended actions to avoid conflicts with birds.

g. Assess the Risk

Categorizing species by risk helps to identify problematic species and provide clear management direction for the most appropriate allocation of resources to best manage the risk. Risk assessment should be quantifiable and may utilize data derived from strike records (Allan, 2006) or survey data (Shaw, 2004: Paton, 2010). Reliable data is required, and annual risk assessments are recommended (IBSC, 2006).

h. Documentation

A Bird Hazard Management Plan (BHMP) will help an airport manage it hazards, contribute to reducing the strike rate, and may be useful in situations where liability and duty of care issues are formally scrutinized. BHMPs should focus on identifying risks and establishing procedures and protocols for the management of these risks. As a minimum, BHMPs should include; a review of bird strike data, risk assessments and legislative requirements; documentation of protocols, policies and procedures for reducing bird strike incidences; clearly defined objectives, targets, roles and responsibilities; a summary of hazardous wildlife and how they contribute to the strike risk.

I. Defining Strikes

Strike definitions should be inclusive of all possible strike events such as confirmed, unconfirmed and serious incidents (IBSC, 2006), and be inclusive of location parameters to determine occurrence on-airport, off-airport and remote from airport. The strike definition should avoid subjectivity by providing tangible and measurable strike guidelines. The national aviation regulator must endorse and regulate strike definitions.

j. Reporting Strikes

Maintaining comprehensive records of all strike events is a cornerstone to bird strike management. Dekker & Buurma (2005) highlight reliable bird strike reporting as important for scientific, educational and quality assurance purposes, and reinforces the need for detailed reporting that aligns with national definitions and captures as much information as possible on each strike event. Furthermore, detailed strike records that capture critical information such as species, time, height and damage usually requires the input of other aviation stakeholders such as pilots, ground crew and engineers. Therefore, cooperation and expedient communication amongst stakeholders is essential. It is estimated that only 20% of strikes are reported in countries where mandatory reporting is absent (Transport Canada, 2001). Such limited insight and awareness of what is struck, and at what frequency, creates significant challenges for management. Mandatory strike reporting is recommended.

k. Training

The requirement for training underpins all facets of bird hazard management at airports. As a minimum, airport personnel responsible for bird hazard management should be trained in; bird identification, regulatory and legislative requirements relevant to wildlife management, active management techniques and guidelines, approaches to passive management, monitoring and data collection, handling animal remains and other biological material, and strike reporting. Non-airport personnel, such as contractors and consultants, contracted by airports to carry our bird hazard management activities should be trained in airside awareness and familiarisation, airport layout, airport operations, airport safety (incl. navigational aids and other airport markers), basic flight operations, aircraft design and communications, (FAA, 2012; Patrick et al, 2012)

3. REGULATING AIRPORT BIRD MANAGEMENT PROGRAMS - THE INDIAN EXAMPLE

The Indian Civil Aviation Safety Authority (CASA) specifies the requirements for bird management programs at certified Indian airports (Table 1). In July 2011, CASA released Advisory Circular (AC) 139-26(0), created to provide advice, illustrate regulatory compliance, and to present general bird hazard management guidance. They regularly facilitate audits, documenting all non-compliances and providing recommendations for compliance. The Indian bird strike national committee (Indian Aviation Wildlife Hazard Group), significantly contributing bird strike management in Indian.

Section	Requirements
S10.14.1.1	Carry out regular bird counts to monitor risks Ensure bird counters are suitably traine
S10.14.1.2	Management plan must be developed and implemented
S10.14.1.3	Management plan prepared by suitably qualified person (i.e. biologist)
S10.14.1.4	1.The management plan must address: 2.hazard assessment, including monitoring action and analysis 3.liaison and working relationships with land use planning authorities 4. on-airport bird and animal attractors which provide food, water or shelter 5. an ongoing strategy for bird and animal hazard reduction, including provision of appropriate fencing. 6. suitable harassment methods
S10.14.1.6	Include an appropriate warning notice in the En Route Supplement Australia (ERSA).
S10.14.1.6	Include an appropriate warning notice in the En Route Supplement Australia (ERSA).
S10.14.1.7	Use Notices to Airman communicate acute, or short term or seasonal hazards.

4. EFFECTS ON AIRCRAFTS (SOME OF IMAGES)

The effect of bird strike

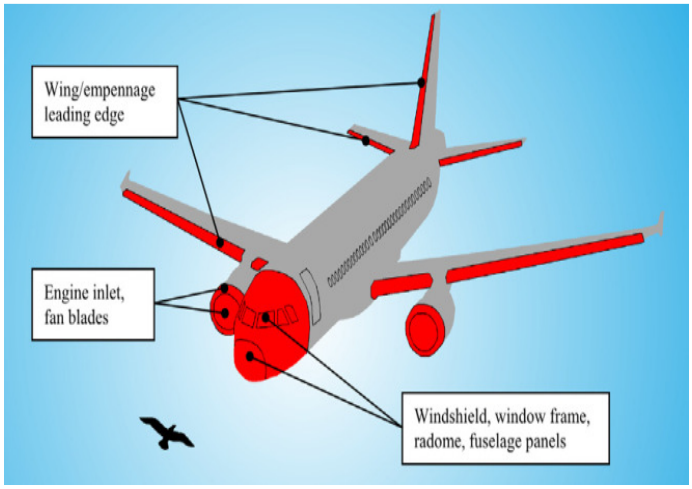
This engine on an A320 ingested a great blue heron on departure from a western USA airport in 2002. The pilot observed the bird just prior to impact. The aircraft made an emergency landing with the engine out. The engine and nose cowl were replaced. The runway was closed for 38 minutes while fire trucks washed the debris from the runway (photo courtesy S. Gordon).

Piston engines are not as susceptible to bird-strike damage as turbine engines. However, other parts of piston-powered aircraft can be severely damaged. This Rockwell Commander, flying at 1,500 feet AGL and 130 knots, struck a large bird. This was the second damaging bird strike this aircraft had suffered in less than 10 years (photo courtesy B. McKinnon, Transport Canada).

Fig 3.4 Prone area for bird hit

Populations of most bird species weighing over 4 pounds have increased dramatically in the USA since 1980. These large birds can cause substantial damage when struck by aircraft (photo courtesy USAF).

5. PREVENTIVE METHOD FROM BIRD HIT



The direct hit part of airplane is to be covered with some air ballons in order to prevent the accidents during flight. Birdstrikes continue to be a problem despite various individual efforts to reduce their occurrence. Increasing bird populations and an expanding world aviation fleet ensure that birdstrikes will remain a safety issue.

Worldwide, birdstrikes are estimated to cost the civilian aviation fleet $US3 billion annually. The majority of these costs are associated with disruptions to commercial operations. In addition to the traditional bird control techniques, such as live and cracker shotgun rounds, airport authorities (particularly those involved in military aviation) are now investigating new ways of deterring birds from airports. Among other techniques, the US developed Avian Hazard Advisory System (AHAS) is proving to be a successful method of reducing birdstrikes. Higher birdstrike reporting rates would enable a more thorough understanding of the problem, and would allow for the development of more effective bird control and management techniques. It is important that all strikes are reported to the ATSB to enable more thorough data analysis and information to be released back into the aviation industry. This can now be done through a reporting form on the ATSB website (www.atsb.gov.au). The available data suggests that there has been a significant increase in the rate of both total birdstrikes and damage birdstrikes recorded between 2003 and 2013.

6. RESULTS AND DISCUSSIONS

The evidence suggests that this is a result of an increasing number of strikes occurring, although a proportion of the increase could be a result of an improving reporting culture. Both FAA statistics and ICAO reports suggest that the majority of birdstrikes occur on or near the airport environment. This corresponds to several critical phases of flight – approach, landing, take off and climb, and the statistics show that birdstrikes are most common at these stages of flight.

Indian military statistics indicate that whilst the majority of strikes to military aircraft also occur on or near the airport, over one quarter of strikes occur during low level operations. Birdstrike rates appear to vary according to the time of day. The available data suggests that strikes are most common in coimbatore during dawn, early morning and dusk. This may be due to a combination of bird and aircraft activity at these times. Birdstrikes also vary by month and location. These variations are likely to reflect bird movements within Australia throughout the year. The most struck bird species in coimbatore between 2003 and 2013 include the peacock, piegeon, gull and magpie. A composite hazard ranking allows airport authorities to assess which species pose the greatest threat to aircraft if struck, and to prioritise control methods accordingly. The results of the current study suggest that the top most hazardous species in coimbatore between 2003 and 2013 was the peacock, duck, bat and galah. Bird strikes are capable of exerting very large forces on an aircraft.

7. CONCLUSIONS

According to the ATSB data, the most commonly damaged sections of an aircraft following a bird strike include (not expectedly) the wings or main rotor, the engine(s) and the windshield. This study aimed to provide an outline of the coimbatore bird strike statistics, and to remind all those involved in the industry of the potential hazard posed by birds. It also highlights the importance of reporting bird strikes giving as much detail as possible to the ATSB.

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