

An Analysis of Bird Strike Mitigation Strategies at Clark International Airport

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Abstract: - The goal of this study is to assess the Bird Strike Mitigation Strategies implemented at Clark International Airport. This research will include the collection and collation of data only concerning Clark International Airport. This study used both quantitative and qualitative design, particularly a descriptive survey. Respondents are employees from companies utilizing the Clark International Airport for their day-to-day operations. Demographic profiles of respondents were presented. Results showed that Lasers, Habitat Management, Directional Acoustic System, High-Frequency System, and Bird & Drone directions systems are the most effective strategies in mitigating the risk of bird strikes at Clark International Airport.

Key Words — *Bird Strike, Clark International Airport, Bird Strike Mitigation.*

I. INTRODUCTION

Since the start of the aviation industry, one of the most important priorities of all airline companies and the aviation sector is safety and rendering the best services. That being said, professionals and experts especially aeronautical engineers, have consistently and thoroughly been innovative in developing new solutions that will produce the desired outcome. One of the biggest issues faced by airline companies is the presence of birds at aerodromes and in the airspace. Birds and aircraft must share the sky and environment but the two does not always get along. Unforeseen situations occur when birds are around during aircraft take-off and/or landing maneuvers. The more birds grow comfortable, develop a domain and move around the same region as aircrafts, the greater the probability of bird strike occurrences.

That is why it is essential to formulate and apply strategies to prevent the presence of birds at airports and on crucial airspaces.

Seven (7) years after the initial bird strike in 1905, the first death occurred in 1912. (LeMieux, 2009). After the first fatal collision between bird and aircraft was recorded, over 500 people around the world have died from plane crashes caused by birds (Bird Strike Control Program, 2009). Dolbeer et al. (2005), calculated that between 1988 and 2004 there were approximately 200 fatalities and 140 civil aircraft damages worldwide as a result of bird strikes. In 2009, EASA published estimations about the number of fatalities and hull losses caused by bird strikes.

The actual figures are much higher though, because military and general aviation are missing from EASA's report. The cost of bird strikes is over one billion Euros every year, and the value of any human life lost is priceless (EASA, 2012). Philippines has also recorded a reasonable incidence of bird strikes. From 14 in 2008 to 54 in 2009, the Philippines has experienced an increase in bird strike incidents. Apart from posing a serious threat to air transport and passengers, it increases airline operational costs. These bird strikes create flight delays and cancellations since the aircrafts must undergo severe safety tests before being released back into operation. For instance, a

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bird strike at Ninoy Aquino International Airport Terminal 1 in September 2013 resulted in the cancellation of a flight to Guam, leaving many passengers stranded and enraged.

Birds pose a serious threat to everyone's safety, not just in aviation but also in a variety of other industries. Bird issues can have a variety of negative effects on people and businesses and even result in deadly mishaps, particularly in the aviation industry. Thus, this study will be taking into consideration worldwide bird species and populations, since the species and population of birds varies in different places. However, this study will comprise the collecting, consolidation of data, and reports on presence of birds and bird strike in the region of Clark International Airport exclusively.

II. OBJECTIVES OF THE STUDY

The study seeks to answer the following:

The profile of respondents in terms of:

- Age and sex
- Name of the company/Institution
- Work Position/designation

Determine the effective preventive measures in mitigating the risk of bird strike incident in terms of:

- General methods
- Habitat management
- Bird Behavior
- Plane schedules

- The time and frequency of bird strike occurrence at Clark International Airport.
- The types of birds involved in bird strikes.
- The financial losses in the event of a bird strike.

III. METHODOLOGY

3.1 Research Design

This study will use the quantitative and qualitative design, particularly a descriptive survey and method including a methodological survey will be used to determine the frequency and effect of bird strikes in terms of operations and finances. The researchers will also apply the methodological study concerned with the testing and evaluation of research instruments and methods.

3.2 Research Instrument

The study will use a self-made survey research instrument composed of five (5) parts. The first part will ask about the demographic profile of the respondents. The second part will be composed of questions related to preventive measures in place in mitigating the risk of bird strikes. The third, fourth and fifth part will be questions regarding the frequency of bird strike, type/s of birds commonly involved in bird strikes, and the financial impacts of such incidents.

3.3 Locale of the Study

This research will be conducted in Clark International Airport located in Region III, Central Luzon, Philippines. There are a several airline and cargo companies utilizing the Clark International Airport. The researchers will focus on two (2) companies as research locales namely the following:

- OMNI Aviation Corporation
- LIPAD Corporation

3.4 Respondents

The respondents of the study are the Office-In-Charge in preventive management in wildlife department of Omni Aviation and LIPAD Corp. The total number of respondents include 4 respondents at Omni Aviation and 1 safety officer at LIPAD Corporation who oversees the Clark International Airport.

3.5 Sampling Procedure

The researchers will conduct the study at the Clark International Airport. The respondents will serve to be the sample population of the study in which they will be selected using purposive sampling. The said sampling technique will be used by the researchers for they have set the following respondent's criteria:

- A company that has an aircraft
- A record of bird strike incidents
- utilizes the Clark International Airport for operations.

3.6 Research Instrument Used

The study used a designed questionnaire that was composed of five (5) parts. The first part asked about the demographic profile of the respondents. The second part is composed of questions related to the strategies in mitigating the risk of bird strikes. While the third, fourth, and fifth part are questions concerning the impacts of a bird strike incident.

3.6.1 Scoring Guidelines

A rubric was used to determine the respondent's perception of the effects and impacts of bird strikes on their companies.

A Likert Scaling was used in the survey. It is a psychometric scale which commonly used in the questionnaire.

IV. RESULTS AND DISCUSSION

Through the survey conducted, the researchers have gathered the results as follows;

4.1 Demographic Profiles

Respondents' demographic profiles were collected. The majority of the respondents are aged 20-35 years old (40%), 36-50 years old (20%), and 50 years old and above (40%). Respondent's different work designation were also identified such as Manager, Airside and Groundside Safety Officer, and Security and Safety Officer.

4.2 Determining the Effective Risk Mitigating Strategies

General methods such as netting, bird housing, catching, and use of retractable scarecrows has proved to be ineffective and not advisable. Not only these increases the risk of incidents and/or accidents by adding more Foreign Object Debris (FOD) in the vicinity of the runway and/or ramp, but these also upscales the possibility of human-related accident and/or incidents given the fact that there will be personnel assigned to man and conduct the said methods in the area/s of concern.

The International Civil Aviation Organization (ICAO) reported 65,139 bird strikes for 2011-14, and the Federal Aviation Authority counted 177,269 wildlife strike reports on civil aircraft between 1990 and 2015, growing 38% in 7 years from 2009 to 2015. Birds accounted for 97%.

Clark International Airport has recorded an increasing number of bird strike occurrences from year 2013 - 2018.

2013 - 30 occurrences	2016 - 62 occurrences
2014 - 15 occurrences	2017 - 94 occurrences
2015 - 56 occurrences	2018 - 99 occurrences

With these data alone, we can infer that bird strikes account for a large percentage of aircraft related accidents/incidents on record. Bird & Drone detection Systems, Lasers, Habitat Management, and Acoustic Methods has proved to be very effective in eliminating if not reducing, the presence of birds in

critical areas as these types of methods relatively target the feel, stress, and threat the birds may experience rendering them restless and uncomfortable in the environment resulting in their migration.

4.3 Frequency of Incidents And/Or Accidents, Effects, And Risk Mitigation Methods

Survey results show that the time and frequency of a bird strike incident at Clark International Airport is on average one (1) to two (2) times a month for OMNI Aviation and LIPAD Corporation. For the past years, it has been determined that bird strikes often happen around the months January to February and July to November where migration of Green Egrets and Oriental Pratincole birds are common. Most of the incidents happen at either at one critical phase of the flight namely during takeoffs, landings, and some occurrences enroute.

The LIPAD Corporation has estimated about 80,000,000.00 million pesos of damage incurred when a recent major bird strike event occurred. These losses have been very critical not only in the financial economy of the company of concern, but also to other business utilizing the airport. A major bird strike incident during landing phase can halt every aircraft in line for take-off and landing during the time of the incident. The authority must conduct proper investigation, risk mitigation, and runway vicinity and FOD inspection is one of the basic requirements for the airport to be cleared for operations again. By the time the airport gets clearance to continue its services, several flights and airport services would have already been cancelled, and the aircraft which took a hit would automatically be grounded for at least a few days or maybe even weeks for an in-depth repair and inspection.

With all of these factors affecting operations, bird deterrents have been placed and implemented to minimize and mitigate the risks and possibilities of such events. OMNI Aviation and LIPAD Corporation has been implementing acoustic methods such as using sirens and high-intensity audios, and habitat management such as grass cutting and implementing a wildlife hazard management plan such as nest hunting and removal. Some existing bird strike mitigation methods has already been in place aside from the aforementioned such as wildlife reporting and the use of pyrotechnics or fireworks for bird dispersals. All of these methods combined along with some other suggestions such as the use of the lasers to disperse birds from a distance have all been proven effective and some only to a certain extent.

V. CONCLUSION

In conclusion, there is no one answer or set process that works well in every circumstance. Wildlife deterrence is both an art and a science. The effective use of repellent depends on motivated, skilled, and equipped employees who are aware of the animals on the airport. The use of lasers, habitat management, acoustic methods, and bird & drone detection systems have all been proven effective in dispersing birds in the vicinity of the airport. As a result, bird strike incidents especially in critical phases of flight has also decreased.

“Our Autonomic robotic laser provides a safe continuous bird repelling after a one-time configuration. Once set, it automatically turns itself on and off, running the program in only the areas you instruct it to. When our laser technology is applied with repetition, birds will consider the area as unsafe, causing them to avoid the place. Unlike conventional methods to repel birds, habituation does not occur. Our automated laser systems claim a territory 24 hours a day, 7 days a week, reducing bird pressure between 70 and 99%.” – Bird Control Group (Aerolaser)

The respondents advise against using retractable scarecrows, birdhouses, and netting, as it was found ineffective in reducing the presence of birds in the airport vicinity. Birdhouses only encourages birds to settle near critical location because of a readily available habitat. Netting increases the risk of incidents/accidents since a person must go out and catch the birds while airport operations are on-going. Lastly, scarecrows only add as a foreign object debris which may cause a more detrimental incident/accident in case it falls out of place.

Keeping the grasses short for it not to suit as a bird shelter, has gathered the highest results. Also, seed bearing plants, ponds, bushes, and trees that act as a food source and an attractive nesting site for birds was also recommended by the respondents for removal. All in all, for habitat management, rendering the area unsuitable for birds and other wildlife to stay is the best way to reduce and possibly eliminate their presence.

According to the data, the respondents most strongly agreed that deploying sonic cannons, recorded predator cries, and other noise emitters are effective in disturbing birds when considering bird behavior as a factor in minimizing bird strikes.

The best method for managing flight schedules is to use radar equipment to track the movement and density of bird flocks in order to predict their behavior and better manage control techniques. Radar equipment can also be used to direct aircrafts

to different runways or approaches that spotters using binoculars do not deem to be bird-hazardous.

To summarize, the strategies implemented by OMNI Aviation and LIPAD Corporation being ineffective in bird strike mitigation as a null hypothesis, is rejected. The study showed that the methods in place are mostly effective at managing the presence and risks of wildlife presence in the vicinity of the airport. While some methods were found ineffective, these techniques are already old and too traditional so to speak. Birds have also been proven to adjust to deterrents after some time and the use of scarecrows and netting show that implementing such practice solely without any additional systems in place is pointless.

The times have changed and is constantly rapidly changing. New and improved methods and/or techniques to deter wildlife in critical areas has to be introduced because animals especially birds can also adjust. What is not normal during the old times may be common today. Thus, continued research and development is the most surefire strategy to minimize the risks and hazards brought by animals in critical areas such as airports.

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