

# FLIGHT SAFETY IMPROVED BY HANDLING OF WILDLIFE HAZARD

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## Abstract

Indonesia is one of the countries that has many islands so that people need transportation, especially aircraft as a support for increasing mobility. There is a wildlife hazard and birdstrike is one of the factors that can endanger flight safety. This type of research is descriptive qualitative with the aim of this study to determine the efforts made in handling and preventing wildlife hazards, knowing the solutions in efforts to handle wildlife hazards, and knowing how effective the solution is in handling wildlife hazards at Kualanamu International Airport Medan. The problem that the author puts forward in this research is the handling of wildlife hazards, the prevention of wildlife hazards, and the effectiveness of handling wildlife hazards at Kualanamu International Airport Medan. The research method that the author uses is by means of data collection techniques through the process of observation, documentation, interviews, and literature studies. The data analysis technique used in this research is data reduction, namely focusing on important things, presenting data in the form of a brief description containing charts and flowcharts, and drawing conclusions. The result of this research is to carry out handling and expulsion of wildlife hazard and birdstrike in the airside area to be more careful in carrying out monitoring, calculation, and expulsion in order to minimize the occurrence of unwanted incidents.

**Keywords:** Wildlife Hazard Handling, Birdstrike, Aviation Safety

## INTRODUCTION

Indonesia is a country consisting of many islands, so its population requires transportation facilities, especially aircraft to facilitate increased mobility. In the context of the rapid development of air transportation in this era of globalization, Indonesian citizens have a desire to move places quickly, efficiently and safely without having to pay high costs. Airline companies also prioritize safety first policies, where safety during each flight is a top priority in its implementation [1] [2] [3] [4]. Wildlife hazard and birdstrike are among the factors that can jeopardize flight safety [5] [6] [7] [8] [9]. The presence of wildlife hazard and birdstrike during flight operations [10] can lead to the potential for wildlife and birds to enter the aircraft engine or even cause delays in flight schedules [11]. So the existence of wildlife hazard and birdstrike needs to be handled properly in accordance with the applicable Standard Operational Procedure (SOP). Kualanamu Medan International Airport is located in a swampy area and a fairly dense forest, making wildlife hazards and birdstrikes easily enter the airside area in search of food, passing or building new

habitats [12] [13]. In a period of three months, eight birdstrike attacks were recorded from January to March in 2023. There are regulation to requires the formation of work teams to carry out controlling and equipment training for handling birdstrike and wildlife hazards at airports and surrounding areas [14]. The wildlife handling unit is tasked with identifying potential birdstrikes and wildlife hazards, implementing habitat management for birds and wild animals, recording bird and wild animal surveillance and coordinating with related units.

Based on this background, a problem formulation is taken as follows :

1. How are efforts to handle wildlife hazards at Kualanamu International Airport Medan?
2. What solutions can be done in efforts to prevent wildlife hazards at Kualanamu International Airport Medan?
3. How effective is the solution to handling wildlife hazards at Kualanamu International Airport Medan?

The purpose of this study produces the following benefits:

1. Theoretical benefits

To add insight and means to research related to other variables that also have an impact on flight safety at airports.

## 2. Practical Benefits

To find out the efforts made in the prevention and handling of wildlife hazard to flight safety at Kualanamu International Airport Medan and the results of this study can be used to improve the effectiveness of handling wildlife hazard at Kualanamu International Airport Medan and be a solution to the problem.

## METHODS

### Research Design

In a study, researchers must determine the method that will be used in the study. The research method can be interpreted as a scientific way to obtain valid data with the aim of discovering, developing, and proving certain knowledge so that in turn it can be used to understand, solve, and anticipate problems [15]. This research is used to find out efforts to improve the handling of wildlife hazards and find out how effective the handling of wildlife hazards at Kualanamu International Airport Medan is [16]. Therefore, this research uses descriptive qualitative research which is carried out through the process of observation, documentation, interviews, and literature study [17].

### Populations and Samples

In this study, the population was 5 safety and risk management unit personnel and 11 apron movement control (AMC) unit personnel at Kualanamu International Airport Medan [18] [19]. The sample is part of the number and characteristics possessed by the population, the sample taken from the population must be truly representative or represent the population under study. The sample is part or representative of the population to be studied. The sample of this study were 5 safety risk and management unit personnel and 11 apron movement control (AMC) personnel.

### Data Collection Technique

#### Observation

Observation is the systematic observation and recording of the elements that appear in a symptom on the object of research. Observation is a complex process, a process composed of various biological and psychological processes [20]. Observation or field studies that have been carried out while carrying out On The Job Training (OJT) at Kualanamu International Airport Medan obtained indices that need to be observed as follows:

1. The absence of food sources for wild animals in the area around the airport,

2. Lack of effective security equipment that can prevent and repel wild animals from entering the airside area,

3. Implementation of deterrence of wild animals passing through the airside area by recording perspecies on a daily basis, monitoring and evaluating the handling that has been done, and actions in manual eviction of wild animals.

### Interview

Interviews are conducted verbally face-to-face or without face-to-face to get more information about the problem or information under study. An interview is a conversation between an informant who is considered to have and will provide important information about something, and a researcher, who hopes to get information. In this study using open interview techniques with 5 safety and risk management unit personnel and 11 apron movement control (AMC) unit personnel.

### Documentation

Documentation is a data collection technique in the form of a collection of records, transcripts, books, journals, papers, videos, photos, minutes, and so on that are approved for use in an observation or research and can be used as a theoretical basis or main guideline for conducting a research. One of the secondary data sources needed in a study is documentation. With this method, researchers collect data from existing documents, so as to obtain records related to the research such as, airport overview, conditions related to wildlife handling, records, and so on.

### Literature Study

Literature study is a data collection technique by conducting a study of books, literature, notes, and reports that have something to do with the problem being solved.

### Data Analysis Techniques

Data collection techniques from qualitative methods are triangulated, data analysis is inductive, and emphasizes meaning rather than generalization. Data analysis techniques have the principle of processing data and analyzing the collected data into systematic, organized, structured, and meaningful data. Activities in data analysis, namely :

#### 1. Data Reduction

The amount of data obtained from the field is quite a lot, for that it needs to be recorded carefully and in detail. The longer researchers stay in the field, the more complex and complicated the amount of data will be. For this reason, it is necessary to immediately analyze data through data reduction. Reducing data means

summarizing, researching the essentials, focusing on the things that matter, looking for themes and patterns.

## 2. Data Display

In qualitative research, the presentation of data can be done in the form of brief descriptions, charts, relationships between categories, flowcharts, and the like. The most often used to present data in qualitative research is with narrative text. In this case the researcher will present data in text form, to clarify the results of the study, it can be helped by including tables or figures.

## 3. Conclusion

Conclusions in qualitative research may be able to answer the problem formulation formulated from the beginning, but may not be, because as it has been stated that problems and problem formulations in qualitative research are still temporary and will develop after the research is in the field. The conclusion in qualitative research is a new finding that has never been found before can be in the form of a description or description of an object that was previously still dimly lit or dark so that after being examined it becomes clear, it can be a causal or interactive relationship. Hypothesis or theory.

## RESULTS AND DISCUSSION

### a) Research Results

### b) Regional Conditions of Kualanamu International Airport Medan

**Table 1 Problem Conditions**

No	Conditions in the Field	Expected Conditions	References
1	There is no optimal tool to carry out the expulsion and handling of wild animals and <i>birdstrikes</i> in the airside area.	Planning optimization tools to carry out the expulsion and handling of wild animals and birds.	1. ICAO Doc 9137 AN/898 Part 3 About <i>Wildlife Hazard Management Plan</i>
2	Some units that patrol with <i>platform cars</i> in the airside area are not fully equipped so that when patrolling is still not optimal.	Plan the procurement of equipment equipment on <i>platform cars</i> used for patrolling the airside area.	2. SKEP/42/III/2010 3. UU Number 1 Tahun 2009 4. KP 326 of 2019 5. Standard Operations and Procedures for the Prevention and Expulsion of Birds &; Wild Animals ( <i>Wildlife</i> ) Team in the <i>Movement Area of</i> Kualanamu International Airport Medan.
3	There is still a habitat for wild animals in the airside area	Planning for sterilization of the airside area to reduce the habitat of birds and wild animals that enter the airside area.	
4	There is no special team to improve the handling of <i>wildlife hazard</i> and <i>birdstrike</i> .	Planning to create a special <i>wildlife hazard</i> and <i>birdstrike</i> team at Kualanamu International Airport Medan.	

In the implementation of observations that have been obtained by the author for approximately three months at Kualanamu International Airport Medan, the control of the entry of wild animals into the airport area has not been handled optimally by personnel. There is no maximum effort to prevent wild animals from entering

the airside area because the equipment used is still manual, and the sirens on the car are not used in an effort to prevent wild animals and birds from passing in the airside area.

When monitoring the airside surveillance area, there are still many conditions that can still invite wild animal and bird habitats to enter the airside area. Like a broken parameter, many plants are already tall that can invite wild animals to forage. There are puddles and open waterways that can invite birds to find food and drink as well as high grass so that the potential for wild animals and birds is greater to enter the airside area.

### Findings of Wildlife Hazard and Birds in the Airport Area

In accordance with data and observations that have been carried out for three months, from January to March 2023, there are seven mapping zones for surveillance in the airport zone. Below is a lay out based on the results of observations of the distribution of bird and wild animal activity in several zones :

**Table 2 Surveillance Zone in Kualanamu International Airport Medan**

Zone 1	RESA and End of Runway 23
Zone 2	RESA and End of Runway 05
Zone 3	North Side Shoulder Runway
Zone 4	Shoulder Taxiway H-G; G-E; E-D; D-C
Zone 5	Shoulder Taxiway A1; A2; A3; A4; Terminal Apron; Shoulder Taxiway B near Victor Apron; Shoulder Taxiway B near Pertamina Satellite
Zone 6	Area around Shoulder Taxiway Alpha, Bravo, and Service Road Cargo to Service Road Victor
Zone 7	Area around Tower, Pertamina, and Work Shop

According to observations for approximately three months, the zone with the most birdstrike incidents is zone 1, namely RESA and runway 23 with 4 birdstrike incidents, then there are two birdstrike incidents in the runway 23 touchdown area. The second most birdstrike incidents are in zone 2, namely RESA and runway 05 with one incident.

### Birdstrike and Wildlife Hazard Incident at Kualanamu International Airport Medan

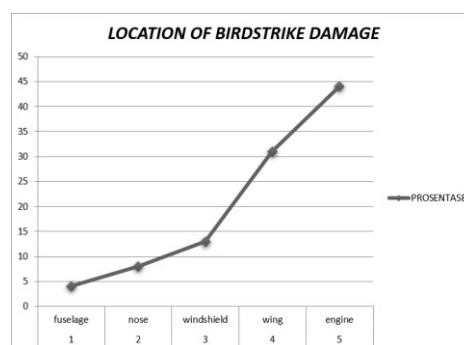
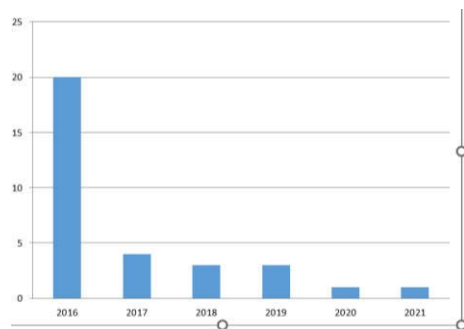


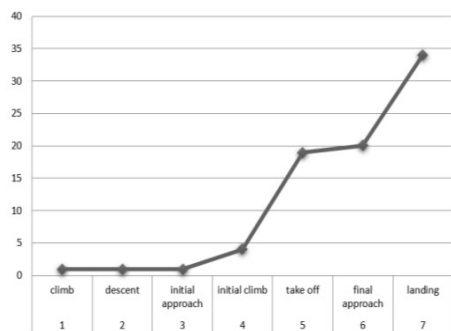
Figure 1 Location of Birdstrike Damage

The diagram above is the percentage of the location of damage to the aircraft caused by birdstrike. In fuselage damage as much as 4%, nose damage as much as 8%, damage to the windshield 13%, then damage to the wing as much as 31%, and the highest damage location to the engine by 44%.



**Figure 2 Birdstrike Incidents in 2016-2019**

The data in the diagram above shows that in 2016 there were 20 birdstrike incidents, then in 2017 there were 4 birdstrike incidents, in 2018 and 2019 there were 3 birdstrike incidents, then in 2020 and 2021 there was 1 birdstrike incident. It can be seen that 2016 was the year when the most birdstrikes occurred at Kualanamu International Airport Medan. In 2016 there were the most birdstrike incidents because the wildlife management system has not been implemented properly and also inspections have not been optimal so that birds are still not familiar with aircraft.



**Figure 3 Birdstrike of Flight Phase 2016-2019**

The diagram above shows that the occurrence of birdstrike in the highest flight phase at the time of landing with a percentage of 34% and the lowest percentage of 1% at the time of climb and descent.

### Factors Causing Wildlife Hazard Enter to the Airside Area

There are many factors that cause wildlife hazards at Kualanamu Medan International Airport. In the airside area, especially those that have an attraction for wild animals to make nests or look for food sources in the

area. Factors causing wild animals to enter the airside area include :

1. The geographical location of Kualanamu International Airport Medan, which is located in an area far from settlements. In addition, Kualanamu Medan International Airport is close to plantation areas, lush forests, and swamps, making it easy for some wild animals such as snakes and birds to enter the airport area to create new habitats and find food.
2. The perimeter fence is poorly maintained and many grasses grow tall. In zone seven the area around the tower, Pertamina, and work shop perimeter is damaged and wide open so that it can make it easier for wild animals such as cats to enter the airside area.
3. There are open waterways in the airside area that can be utilized by flocks of birds to find drinking and feeding. Puddles and waters around the apron can attract animals such as snakes and birds. Coinciding with the time of the research, there were several changes in the weather to heavy rain.

### Handling of Wildlife Hazard in the Airside Area

1. **Airside Area Patrol**  
Patrolling the airside area is one form of prevention and deterrence in handling wildlife hazards and birdstrikes at Kualanamu International Airport Medan. This patrol activity is carried out in the morning at and in the afternoon at. This patrol is useful for ensuring readiness and security such as being free from Foreign Object Debris (FOD) and also something that is considered to endanger flight safety such as wild animals breaking in or flocks of birds that colonize looking for food and drink in the airside area.
2. **Counting and Recording of Wild Animals and Birds**  
The counting and recording of bird species is carried out for the purpose of carrying out daily bird monitoring reports and to help detect comparative data on the number and location of bird species found. Inspectors write down the location of the inspection or surveillance, identification of bird and wildlife species, follow-up when wildlife or birds are found, a caption to add notes on the day's monitoring process, the name of the person on duty, the unit conducting the inspection, and the officer's signature.
3. **Wild Bird and Animal Removal**  
Wild animal eviction is carried out to secure the airside area from wild animals and birds that want to pass by. The form of expulsion is by chasing and blocking using a patrol car and

using the siren on the patrol car after carrying out the expulsion and ensuring it is safe for flight operations. For monitoring and expulsion times in accordance with NOTAM, namely, in the morning at 09.00 WIB and in the afternoon at 16.30 WIB.

### Regulations

The following sources are used as guidelines by the author, including :

1. Airport proficiency assessment according to the Standard Operational Procedure (SOP) wildlife hazard management plan affects the occurrence of birdstrike out of 10,000 (ten thousand) aircraft movements, there have been wildlife animal hazard events out of 10,000 (ten thousand) aircraft movements [21].
2. Concerning the National Aviation Safety Program [22].
3. Concerning about technical and operational standards of civil aviation safety regulations [23].
4. According to the Standard Operation and Procedure of the Bird & Wildlife Prevention and Expulsion Team, the expulsion method used is by using tools such as laser beams, using manual tools such as flags, wood, vehicles and sound so that the birds can get out of the movement area [24].

### Discussion

From the results of research that has been carried out from observations, interviews, literature studies show that several times there have been incidents of birdstrikes and wildlife hazards that enter the airside area due to poorly maintained perimeter fences, open waterways and long growing grass that can attract wild animals and birds to find food and drink and make new residences. According to information from the source, the airport layout factor also affects because the location of Kualanamu Medan International Airport is in the area around swamps, plantations, and dense forests, so it is also one of the triggers for the arrival of flocks of birds and wild animals to enter the airside area. This needs to be done to solve these problems in order to improve the assessment of airport proficiency according to the Standard Operational Procedure (SOP) Wildlife Hazard Management Plan (WHMP) affecting birdstrike events from 10,000 (ten thousand) aircraft movements, there have been wildlife hazard incidents from 10,000 (ten thousand) aircraft movements, and there have been incidents due to Foreign Object Debris (FOD) as many as 10,000 (ten thousand) aircraft events.

### Problem Solving

#### A. Solving Short-Term Problems

1. It is recommended for the relevant parties as the unit that carries out the handling and expulsion of wildlife hazards and birdstrikes in the airside area to be more careful in carrying out monitoring, calculation, and expulsion in order to minimize the occurrence of unwanted incidents in order to maintain safety during flight operations.
2. Provide specialized training for personnel to handle wildlife hazard and birdstrike.
3. It is recommended to mow the grass in the area near the runway, as well as the grass and tall plants inside the perimeter fence near the airside of the airport. It is also recommended to exterminate insects by spraying environmentally friendly insecticides on a regular and continuous basis to minimize the presence of insects as one of the food sources for birds and other wild animals that are insect eaters.
  - B. Long-Term Troubleshooting
    1. The establishment of a special unit that focuses on wildlife hazard management procedures and bird attacks to improve the handling of wildlife hazard and birdstrike.
    2. Plant mangroves to create new habitats for birds to find food and water and create new dwellings.

### CONCLUSION

Based on the previous discussion, it has been explained about the condition of the airport, the activities of birds and wild animals and the risk of wildlife hazard and birdstrike, and explained about what efforts have been made at Kualanamu Medan International Airport, so that the following conclusions can be drawn:

1. The handling of wildlife hazard at Kualanamu International Airport Medan is carried out only by manual eviction and blocking, while the handling of birdstrike is carried out by cutting grass with a mower tractor, blocking with a patrol car, and counting and recording of bird flocks in the airside area.
2. Solutions that can be done in preventing wildlife hazards are closing or repairing broken perimeters because it is one of the triggers for wild animals to easily enter the airside area, and closing open drainage. And also plant mangroves to reduce bird habitat at Kualanamu International Airport Medan.
3. Solutions in handling wildlife hazards at Kualanamu Medan International Airport so far are still less effective because the fixed bird deterrent system is still under repair and the expulsion of wild animals and birds still uses manual methods, namely patrols in the morning and evening so that the risk of birdstrikes and wildlife hazards

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