

Analysis of Wildlife Hazards at Airports under the Jakarta AIS Region

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Article Info	ABSTRACT
Article History: Submitted: July 31, 2025 Revised: August 3, 2025 Accepted: August 24, 2026	This study evaluates the effectiveness of Safety Risk Management (SRM) implementation and mitigation procedures for wildlife hazards at Radin Inten II Airport and Supadio Airport, under the Jakarta Aeronautical Information Service (PIA) Region. Using a qualitative approach—through direct observation, document review, and interviews—the study reveals that both airports have applied basic mitigation measures such as 3–4 daily patrols, manual dispersal (e.g., vehicle chases and pyrotechnics), and NOTAM issuance during high wildlife activity. Supadio Airport further applies environmental strategies, including closing three open drainage channels and managing water gates to minimize bird attraction. However, several challenges remain: lack of modern equipment (e.g., bird radar), limited operational funding, and the absence of specialized wildlife control units. Dispersal methods also become less effective over time as wildlife adapts to recurring deterrents. Strengthening SRM requires forming dedicated units, improving technology, and conducting regular evaluations. The novelty of this research lies in its comparative analysis between two airports under the same regional authority, highlighting practical differences in implementation and offering targeted recommendations for improved wildlife hazard control at regional Indonesian airports.
Keywords: <i>Safety Risk Management, Wildlife Hazard, Radin Inten II Airport, Supadio Airport</i>	

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INTRODUCTION

Wildlife hazard is one of the key threats to aviation safety, especially when wild animals interfere with aircraft operations during critical phases such as takeoff and landing. According to the International Civil Aviation Organization [1], wildlife hazards can lead to physical damage to aircraft and pose significant risks to flight safety. In Indonesia, reports of wildlife interference have increased in airports located in semi-rural and peri-urban areas, including Radin Inten II Airport and Supadio Airport, both operating under the Jakarta Aeronautical Information Service (PIA) Region.

Wildlife hazard information is generally communicated through Notice to Airmen (NOTAM), which temporarily informs flight crews of wildlife presence near runways. However, the presence of NOTAMs alone does not necessarily reflect a comprehensive wildlife risk control system. As mandated by ICAO and the Indonesian Ministry of Transportation, the implementation of Safety Management System (SMS)—particularly the Safety Risk Management (SRM) component—is critical for identifying, assessing, and mitigating wildlife-related risks systematically [2,3].

Previous research has primarily focused on reporting wildlife occurrences and general mitigation actions at individual airports (e.g., Hang Nadim, APT Pranoto, and Soekarno-Hatta), often highlighting reactive responses and limited coordination among airport units [4]. However, these studies have not evaluated how effective SRM frameworks are in managing wildlife hazards, nor have they analyzed variations in mitigation implementation across different airports under the same regulatory region. This creates a significant literature gap regarding performance-based assessment of SRM in Indonesia's secondary airports.

Therefore, this study aims to evaluate the effectiveness of Safety Risk Management (SRM) implementation and mitigation procedures for wildlife hazards at Radin Inten II and Supadio Airports. The research employs a qualitative method through observation, document analysis, and interviews with relevant personnel. The contribution of this study lies in its comparative approach within a shared administrative context (PIA Jakarta Region), offering practical insights into how institutional limitations—such as equipment shortages and budget constraints—affect SRM execution. By identifying gaps and proposing targeted recommendations, this study is expected to enhance wildlife hazard control strategies in support of safer airport operations in Indonesia.

METHODS

This study employs a qualitative descriptive approach to evaluate the implementation of Safety Risk Management (SRM) in addressing wildlife hazards at airports under the jurisdiction of the Aeronautical Information Services (AIS) Jakarta Region [5,6]. The research focuses on two airports—Radin Inten II and Supadio—which were specifically selected due to the recurrent issuance of wildlife-related NOTAMs reported to the AIS Jakarta Unit. These airports represent typical secondary airports with limited infrastructure and resource constraints, providing a relevant case for assessing the practical implementation of SRM.

Data were collected through three main techniques: observation, interviews, and document analysis, each aligned with the SRM component of the Safety Management System (SMS), which emphasizes hazard identification, risk assessment, and mitigation planning.

1. Observation

Observations were carried out at the AIS Jakarta Unit by examining wildlife-related NOTAMs submitted by both airports. These NOTAMs served as initial data to understand the frequency, timing, and severity of wildlife occurrences—especially in the runway areas of both locations [7].

2. Interviews

Structured online interviews were conducted with five informants, selected based on their direct involvement in wildlife hazard control activities at the respective airports. The selection criteria included operational responsibility, field experience, and authority in decision-making related to safety. The informants consisted of three Apron Movement Control (AMC) officers from Radin Inten II Airport, and two Airport Quality and Safety Management System staff from Supadio Airport [8]. The interviews explored

daily mitigation practices, perational challenges, perceptions of SRM effectiveness, and proposed improvements. Each interview lasted approximately 30–45 minutes and was conducted via Zoom.

3. Document Analysis

Document analysis was performed on regulatory references, ICAO Annexes and Documents, Ministerial Regulations, and relevant scientific studies[9,10]. These documents provided theoretical grounding and served to validate field findings in the context of SRM implementation.

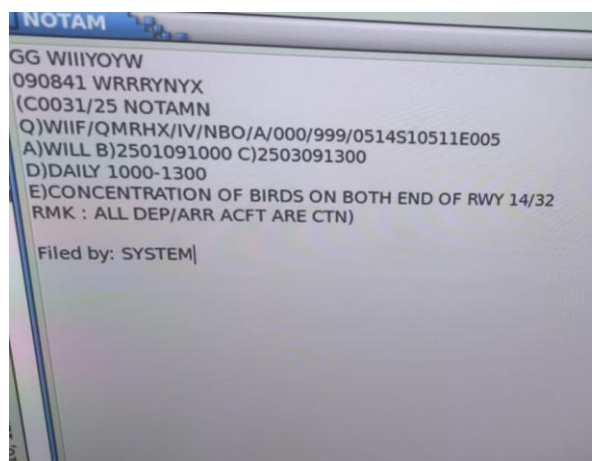
To ensure the validity and reliability of the data, the triangulation method was applied by comparing information obtained through observations at AIS Jakarta, interview responses from operational personnel, official documents and regulations. This multi source triangulation enhanced the robustness and credibility of the findings[11].

Table 1. Research Stages

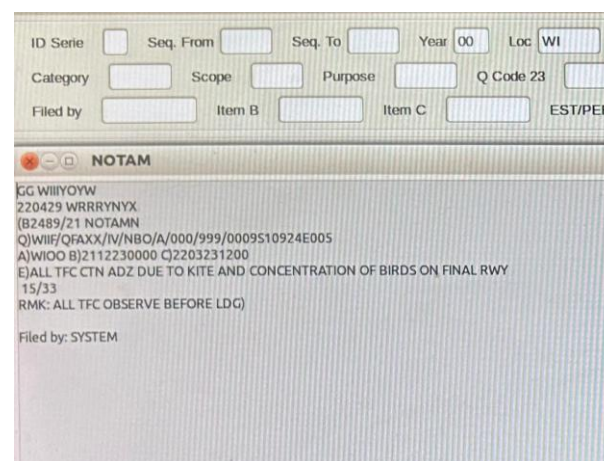
Stage	Activity	Timeframe
Preparation	Problem identification, literature review, and proposal	July – August 2024
Data Collection	Observation, interviews, document review	January – July 2025
Data Processing & Analysis	Data reduction, categorization, and interpretation	May – July 2025
Finalization	Drawing conclusions, writing the final report	July 2024 – July 2025

RESULT AND DISCUSSION

Observations at the Jakarta Aeronautical Information Services (AIS) Unit revealed multiple NOTAMs related to wildlife hazards at both Radin Inten II and Supadio Airports. At Radin Inten II Airport, NOTAM C0031/25 reported significant bird activity near the end of Runway 14/32 between 10:00–13:00 UTC (17:00–20:00 WIB). Similarly, at Supadio Airport, NOTAM B2489/21 indicated bird concentrations at Runway 15/33 between 00:00–12:00 UTC (07:00–19:00 WIB). These NOTAMs serve as early warnings to pilots and reflect wildlife activity patterns with potential impact on operational safety during takeoff and landing.



(a)



(b)

Figure 1 (a) NOTAM C0031/25 (b) NOTAM B2489/21

The primary mitigation strategy at Radin Inten II involves routine ground patrols and manual wildlife dispersal, typically using vehicles and human intervention. Patrols are conducted every hour from morning to evening, especially before and after aircraft movements. However, due to limited equipment, dispersal remains reliant on manual methods without acoustic devices or visual deterrents. Manual methods show immediate but short-term success. Personnel report that birds often return shortly after dispersal, leading to repetitive cycles and increased workload. Furthermore, wildlife habituation reduces long-term efficacy.

Supadio Airport implements environmental mitigation, including the closure of open drainage and operation of water gates to prevent pooling that attracts birds. Wildlife dispersal is conducted using vehicles with loudspeakers or sirens, coordinated across four operational units (Safety, Security, Airside, and PKP-PK). The environmental approach has yielded more sustainable results, with personnel reporting reduced wildlife presence in recently controlled zones. However, challenges remain due to budget constraints, insufficient modern deterrents (e.g., bird radar, laser systems), and reliance on audible patterns that lose effectiveness over time.

The implementation of the Safety Risk Management (SRM) component of the Safety Management System (SMS) at both airports has shown practical efforts in hazard identification, risk analysis, and mitigation[12]. However, limitations remain in equipment availability and funding. The manual nature of operations and lack of a dedicated wildlife control unit present ongoing challenges. Nevertheless, the use of NOTAMs to communicate wildlife hazards reflects a proactive approach to risk awareness and operational safety.

CONCLUSIONS

The implementation of Safety Risk Management (SRM) at Radin Inten II and Supadio Airports reflects an initial but essential commitment to identifying, assessing, and mitigating wildlife hazards—particularly bird presence near active runway areas. Radin Inten II emphasizes routine patrols and manual dispersal, while Supadio applies environmental control measures such as drainage closure and water gate operation to reduce attractants. These actions align with SRM principles but remain basic and reactive, lacking the structural support of dedicated wildlife hazard control units or integrated monitoring systems.

Current mitigation efforts depend heavily on multi-unit coordination (involving AMC, Safety, AVSEC, and Fire Rescue units) and are implemented through routine inspections, vehicle-based wildlife dispersal, and the issuance of NOTAMs as hazard alerts. While these procedures are operationally functional, they exhibit limitations in sustainability and long-term effectiveness, especially due to wildlife habituation and limited technological support. To enhance SRM implementation, this study recommends establishing dedicated wildlife control units equipped with modern tools (e.g., drones). Strengthening institutional structure and integrating risk-based monitoring systems will ensure that mitigation efforts are more proactive, measurable, and adaptive to evolving wildlife patterns around airport environments.

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