

# WILDLIFE – BIRD STRIKES

**Madagascar**  
**AIRLINES** ' PERSPECTIVE



# Heritage



## MADAGASCAR'S Flag Carrier Current fleet: 5 ATR72



# NETWORK



From January 2022 to September 2023, out of a total of 210 ASRs, 28 reported bird strike or encounter.

This threat is among Madagascar Airlines' top 5 safety concerns



Airports	Bird strike ASRs
NOS	8
TNR	6
DIE	4
MJN	3
TMM	2
TLE	2
SMS	1
MOQ	1
FTU	1



# Madagascar Airlines' data only:

Period	Bird strike per 1000 flights
Q3_2023	2,78
Q2_2023	5,82
Q1_2023	7,02
Q4_2022	3,36
Q3_2022	0,86
Q2_2022	1,12
<b>AVERAGE</b>	<b>4,95</b>

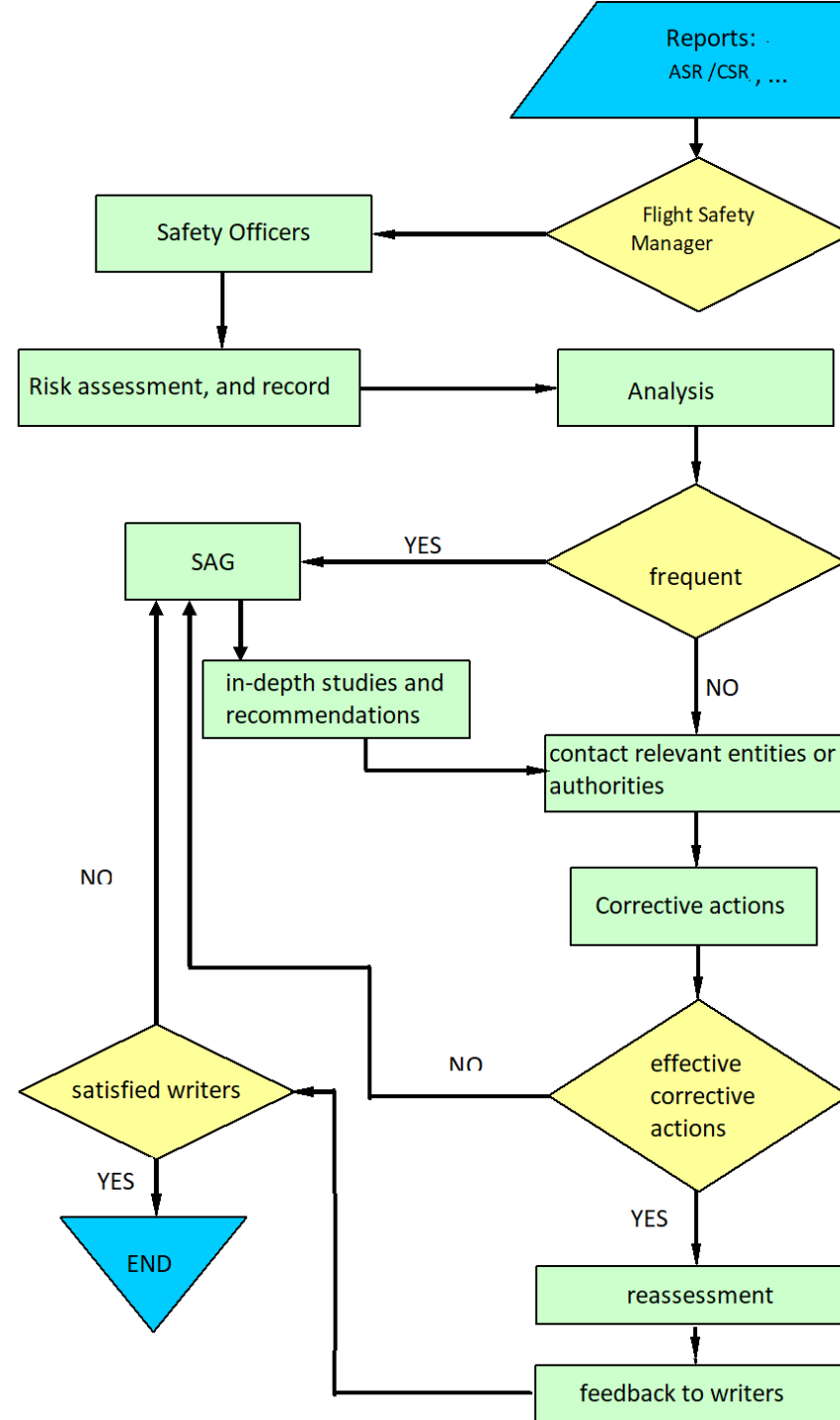


Data from airport management company.  
For all flights during first half-year 2023:

Airports	Birds events per 1000 flights
NOS	4,82
TNR	0,91



Process for handling bird strike ASR, involving authorities, aerodrome stakeholders, operators and crew



Origin	Destination	SUMMARY	ACTION TAKEN
TNR	NOS	BIRDSTRIKE ON SHORT FINAL RUNWAY 23 AT NOSY BE. NO DAMAGE DETECTED. NORMAL LANDING. VISUAL INSPECTION BY THE CREW. IMPACT POINT ON RIGHT SIDE OF AIRCRAFT. NO DAMAGE SEEN BY THE CREW. PRESENCE OF BLOOD ON RIGHT ENGINE COWL.	<p><b>MAINTENANCE:</b> Unscheduled action after bird strike performed as per ATR.. No defect found.</p> <p><b>RAVINALA AIRPORTS:</b> Proof of supplementary measures done since; Ravinala Airports <b>recommends crews to notify on-site teams directly for immediate actions.</b></p> <p>Latest answer: following second occurrence on 12/05/2023: increasing vigilance during night inspections, and identify any bird species roaming at night.</p>

Some ASR examples: ASR 1





# ASR 2

Origin	Destination	SUMMARY	ACTION TAKEN
SMS	TNR	EVENT: BIRD STRIKE DURING TAKEOFF AT SMS ACTIONS: CHECK ALL PARAMETERS OK. FILL ATL	MAINTENANCE: Maintenance action and no anomaly.  ADEMA AIRPORTS: <b>This incident was not communicated by radio.</b> However, a procedure has been implemented to combat bird hazard (use of bird scaring sound). <b>Reinforcement of control resources.</b>



Origin	Destination	SUMMARY	ACTION TAKEN
MJN	TNR	EVENT: LIGHT BIRD IMPACT ON NOSE DURING LIFT OFF ACTION: FLIGHT CONTINUED.	<p>MAINTENANCE: Inspection following bird strike performed as per: ATR... No defect found.</p> <p>ADEMA AIRPORTS: The airport ground vehicle was out of radio range when the pilot informed the tower about the bird encounter. <b>(Potential discontinuity of ATC and Airport staff communication regarding bird events; may impact timely notams).</b></p> <p><b>Collaboration project with ornithologists, and acquisition of new bird scaring equipment for MJN airport.</b></p>

## ASR 3



Origin	Destination	SUMMARY	ACTION TAKEN
TNR	MJN	<p>EVENT: BIRD STRIKE DURING LANDING ROLL. TWR ADVISED AND BIRD DEBRIS FOUND</p> <p>ACTIONS: AFTER WALKAROUND AND VISUAL INSPECTION, NO DAMAGE SUSPECTED. FCOM PROCEDURES APPLIED AND AFTER RECEIVING RELEASE MAIL FROM MCC, FLIGHT CONTINUE.</p> <p>BIRD STRIKE: IMPACT ON FOLDABLE DOOR OF MAIN LEFT GEAR AND PHOTOS SENT TO MCC.</p>	<p><b>MAINTENANCE:</b> Performed unscheduled inspection after birdstrike, no abnormal condition found.</p> <p><b>ADEMA AIRPORT:</b> Acquisition of new equipments in progress, to reinforce the measures already in place.</p> <p><b>AUTHORITY: Letter to all Airports: Request for systematic sending of evidence of implementation of preventive actions described in wildlife hazard control program for each aerodrome (every half-year).</b></p>

# ASR 4



Origin	Destination	SUMMARY	ACTION TAKEN
TNR	TLE	<p>BIRD STRIKE UPON LANDING AND FEATHER AND BLOOD FOUND ON THE LEFT SIDE OF THE AIRCRAFT JUST AFTER THE RADOME. NO DAMAGE FOUND ON THE AIRCRAFT;            ACTION: INSPECTION AFTER BIRD STRIKE FOLLOWING MAINTENANCE ADVICES AND FCOM ATR.            NO DAMAGE FOUND.</p>	<p><b>MAINTENANCE: Actions:</b></p> <ul style="list-style-type: none"> <li>-Transmit the documents required for an inspection to the crew on site.</li> <li>-Interpret the results of the inspection and give approval for the flight to continue.</li> <li>-On arrival at base, complete the inspection.</li> <li>-TLB.</li> </ul> <p><b>ADEMA AIRPORTS:</b></p> <p>Apart from the effective implementation of the operating procedure in force relating to the fight against bird risk, effort focused on <b>reinforcement of the material means (bird scaring equipment) and the collaboration with specialists (ornithologists)</b> for the follow-up in order to avoid recurrence.</p>

# ASR 5



Origin	Destination	SUMMARY	ACTION TAKEN
DIE	TNR	A VERY STRONG BIRD CONCENTRATION AROUND THE AIRPORT OF FMNA AT THE TIME OF DEPARTURE (TAXI). WE ASKED THE TOWER TO BROADCAST A NOTAM DUE TO THIS STRONG BIRD CONCENTRATION. SOME BIRDS HAVE BEEN SEEN CROSSING THE RUNWAY AT THE TIME OF TAKE OFF. WE ASKED THE TOWER TO DIFFUSE A NOTAM TO MAKE AIRCRAFT OPERATOR TO BE	<p>FLIGHT SAFETY UNIT: Retroactive ASR, CAPT was asked to file an ASR following reception of ASR-020-2022.</p> <p>AUTHORITY: ACM letter asking for action from DIE airport manager (ADEMA).</p> <p><b>ADEMA AIRPORTS: Current weeding of flight strips attracts more birds, which find food there after the rainy season.</b></p> <p>Actions:</p> <ul style="list-style-type: none"> <li>- Notam on the presence of birds,</li> <li>- Weeding of flight strips,</li> <li>- Dispersal using scarer with sounds of predatory birds.</li> <li>- <b>Enhancing the skills of airport agents.</b></li> </ul>

## ASR 6



Origin	Destination	SUMMARY	ACTION TAKEN
TMM	TNR	<p>EVENT: BIRD STRIKE ON RH2 WINDSHIELD AT FLARE RWY29</p> <p>ACTION: ATL AND REPORT TO ATC. TALK TO MAINTENANCE.</p>	<p><b>MAINTENANCE:</b> inspection done, see evidence on TLB copy: No defect found;</p> <p><b>RAVINALA AIRPORTS:</b> New occurrence despite previous letter response (5 points of the risk mitigation measures put in place, and 1 planned action: Continuing daily and systematic actions to address wildlife hazards);</p> <p>Latest mail reponse:</p> <p>Actions undertaken:</p> <ol style="list-style-type: none"> <li>Careful monitoring of the management of the green zone.</li> <li>Contracting for a weeding campaign.</li> <li>Insect and rat control.</li> <li><b>Assessment of wildlife hazard at TNR airport which best summarizes the actions and their effectiveness.</b></li> </ol>

# ASR 7



Origin	Destination	SUMMARY	ACTION TAKEN
NOS	TNR	<p>BIRD STRIKE JUST AFTER LIFT OFF 50FT AGL RWY05 LEFT HAND FUSELAGE. ACTION: CONTROL ALL PARAMETERS, NO ANOMALIES AND CONTINUE FLIGHT. AFTER RUNWAY CHECK A BIRD REMAINS FOUND BY FLYCO TO BE REPORTED TO MECHANICS UPON ARRIVAL</p>	<p>MNT: TLB: inspection after birdstrike performed iaw ATR;  FLIGHT SAFETY UNIT: Third birdstrike ASR after ASR-071 and 075;  RAVINALA AIRPORTS: Email response: Implemented measures will be logged and shared shortly;  Latest mail response: Actions undertaken:</p> <ol style="list-style-type: none"> <li>1. Careful monitoring of the management of the green zone.</li> <li>2. Contracting for a weeding campaign</li> <li>3. Disinfestation operation</li> <li>4. <b>Acquisition of a long-range LED spotlight on the track vehicle for night inspections in order to detect potential animals (nocturnal birds), identify their species and plan appropriate corrective actions.</b></li> <li>5. <b>Assessment of wildlife hazard at NOS Airport which best summarizes the actions and their effectiveness.</b></li> </ol>

# ASR 8



Origin	Destination	SUMMARY	ACTION TAKEN
TNR	MOQ	<p>EVENT: BIRD STRIKE ON LANDING.</p> <p>ACTION: WE CHECKED AIRCRAFT AND SAW 3 IMPACTS. NIL DAMAGE, ONE BIRD DEAD FOUND ON RUNWAY.</p>	<p><b>FLIGHT SAFETY UNIT:</b> Crew interview done: Walk around completed by flight crew and confirm that there is no need for maintenance action.</p> <p><b>MAINTENANCE:</b> No defect found (TLB copy).</p> <p><b>ADEMA AIRPORTS:</b></p> <ul style="list-style-type: none"> <li>-Setting up scarers with different bird calls following study by an ornithologist.</li> <li>Update forecast for next year;</li> <li>-Enforcing runway inspections;</li> <li>-Managing bird attraction areas.</li> <li><b>-Letter to the authority about pigeon farmers surrounding MOQ airport.</b></li> </ul> <p><b>FLIGHT OPS:</b> Flight crew General assembly to remind of procedures for TLB and some items in SOP.</p>



# ASR 9

EVENTS	DESCRIPTIONS	COMMENTS
FLIGHT OPERATIONS	External influence Birdstrike (7)	TNR (3) ; TLE (1) ; SMS (1) ; M.J.N (1) ; FTU (1) ; DIF (1)
AIRPORT MANAGEMENT	<ul style="list-style-type: none"> <li>• Bird/Animal control</li> <li>• FOD</li> </ul>	-FOD : Bird TNR
BIRDSTRIKE	Linked to AIRPORT MANAGEMENT & FLIGHT OPERATIONS	<ul style="list-style-type: none"> <li>- Aerodrome managers are systematically informed of these events.</li> <li>- ATC must also be notified immediately by radio contact</li> <li>- Contact with the MCC enables assessment of impact on airworthiness; the TLB must also be filled in.</li> </ul>





# RISK ASSESSMENT

## **DANGER: WILDLIFE - BIRDS**

### **UNDESIRABLE EVENT: Aircraft impact by bird**

#### **Purpose of the risk analysis:**

***Carrying out flights with managed bird hazard.***

#### **Source :**

#### **ASRs**

### **A. SAFETY EVENTS IDENTIFIED, LEADING TO THE UNDESIRABLE EVENT**

1. Regulatory oversight
2. Airport wildlife risk management:
  1. Control (notification of wildlife presence)
  2. Habitat management (geographic & climatic effects, surrounding waste)
  3. Trend
3. Increased wildlife presence (migrations, environmental changes)
4. Damage proportional to animal size, and aircraft power setting
5. No certification against large flock of birds
6. Flight Ops:
  1. Planning
  2. Policy on bird encounter on short final approach – engine power use
  3. Proximity to ground - Flight path departure vertical profile – exposure time in risk area
7. Maintenance protocol



## B. EXISTING DEFENCES

### ❖ Upstream (barriers)

1. Implemented airport wildlife risk management plan:
  1. Control (patrol, recording, notification, scaring equipment)
  2. Habitat management (grass height, insect and rat control, water, ground, bushes, parked, buildings)
  3. Staff training
  4. Changes, plan update
2. Current single aircraft type, ATR, relatively slow speed during impact
3. Flight planning: TEM applied: birdtam awareness – briefing – mental preparation
4. Engine certification against bird ingestion

### ❖ Downstream (Mitigation)

1. Pilot's appropriate response to bird strike: Abnormal procedure
2. Mandatory report
3. Airline SMS: Record and assess wildlife risk for each airport
4. Maintenance: Mandatory ATLB fill, clear and understandable protocol after bird encounter

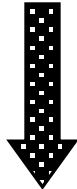



## C. POSSIBLE END STATES

- In-flight damage (structural - depressurization, sensor - erroneous instrument)
- Loss of control in flight (flight control damage)
- Engine damage (aborted take-off, or emergency landing)
- Runway Safety (damage on landing gear - excursion)
- (Operational delay, ...financial cost)



## RISK INDEX

Probability 		Severity (consequence) 				
		Catastrophic A	Dangerous B	Major C	Minor D	Negligible E
Frequent		5A	5B	5C	5D	5E
Occasionnal		4A	4B	4C	4D	4E
Low		3A	3B	3C	3D	3E
Improbable		2A	2B	2C	2D	2E
Extremely improbable		1A	1B	1C	1D	1E

Result of assesment : **4D**



## DEFENCES TO BE PUT IN PLACE

### ❖ Upstream (barriers)

ACTIONS
Obtain proof of enhancement of airports' wildlife risk management
Airport improvement of night patrol and nocturnal birds' identification
ADEMA Airports collaboration with ornithologists
Acquisition of bird scaring material for MJN airport
Improvement of control resources for SMS & TLE airport
Continuous improvement of knowledgeable DIE airport staff
Continuity of ATC and Airport staff communication regarding bird events; Timely notams
Plan ahead on habitat management, considering geography and climate (end of rainy season)
Evidence of implementation of preventive actions described in wildlife hazard control program for each aerodrome manager, to be sent to Authority (every half-year)
Authority action regarding pigeon farmers surrounding MOQ airport
Recommend flight crews to notify on-site teams directly for immediate actions (FSFI0623)

### ❖ Downstream (Mitigation)

ACTIONS
Promote the implementation of our protocol after bird encounter



# POSITIONING THE RISK ON THE MATRIX AFTER MITIGATION HAVE BEEN IMPLEMENTED

Probability ↓		Severity ↓				
		Catastrophic A	Dangerous B	Major C	Minor D	Negligible E
Frequent	5	5A	5B	5C	5D	5E
Occasionnal	4	4A	4B	4C	4D	4E
Low	3	3A	3B	3C	3D	3E
Improbable	2	2A	2B	2C	2D	2E
Extremely improbable	1	1A	1B	1C	1D	1E

Expected result : **3E**





**THANK YOU FOR YOUR ATTENTION**

