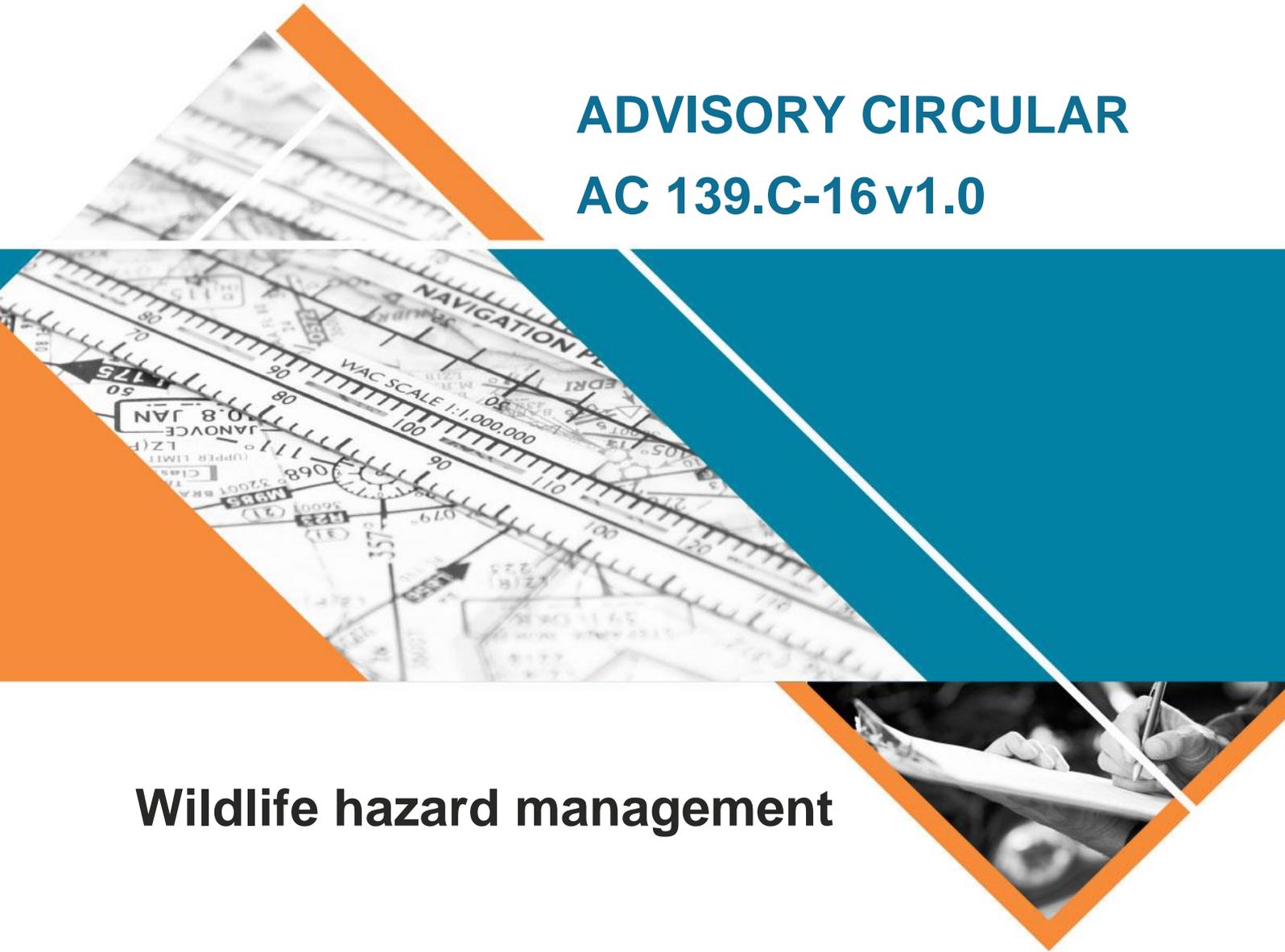




ADVISORY CIRCULAR

AC 139.C-16 v1.0



Wildlife hazard management

Date June 2023
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Advisory Circulars are intended to provide advice and guidance to illustrate a means, but not necessarily the only means, of complying with the Regulations, or to explain certain regulatory requirements by providing informative, interpretative and explanatory material.

Advisory Circulars should always be read in conjunction with the relevant regulations.

Audience

This advisory circular (AC) applies to:

- aerodrome operators
- air traffic control
- stakeholders as outlined in section D.4 of Appendix D.

Purpose

The purpose of this AC is to provide general information and guidance for the management of wildlife hazards at aerodromes.

Aerodrome operators should use the guidance in this circular to inform their decision-making process to meet the requirements of the Part 139 of the Civil Aviation Safety Regulations, Part 139 Manual of Standards (MOS) and PANS-Aerodromes.

Operators should always consider the context of their own current and future operational environment, and the operational needs of pilots, aircraft operators and associated stakeholders, including but not limited to the size and complexity of the aerodrome operation.

It is important to note that this guidance does not create or permit departures from regulatory requirements.

For further information

For further information, contact CASA's Personnel Licensing, Aerospace and Air Navigation Standards (telephone 131 757).

Unless specified otherwise, all subregulations, regulations, divisions, subparts and parts referenced in this AC are references to the *Civil Aviation Safety Regulations 1998 (CASR)*.

Status

This version of the AC is approved by the Manager, Flight Standards Branch.

Note: Changes made in the current version are not annotated. The document should be read in full.

Version	Date	Details
v1.0	June 2023	This new revision includes a thorough review and refinement of the initial AC139-26(0) Wildlife hazard management at aerodromes
(0)	July 2011	This is the first AC on the subject of wildlife hazard management at aerodromes.

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1 Reference material

1.1 Acronyms

The acronyms and abbreviations used in this AC are listed in the table below.

Acronym	Description
AAWHG	Australian Aviation Wildlife Hazard Group
AC	advisory circular
ATSB	Australian Transport Safety Bureau
ATC	Air Traffic Control
CAR	<i>Civil Aviation Regulations 1988</i>
CASA	Civil Aviation Safety Authority
CASR	<i>Civil Aviation Safety Regulations 1998</i>
ERSA	En-Route Supplement Australia
ICAO	International Civil Aviation Organization
MOS	Manual of Standards
NOTAM	Notice to Airmen
RMP	Risk Management Plan
RP	recommended practices
SMS	Safety Management System
TSIR	Transport Safety Investigation Regulations 2003
WHMP	Wildlife Hazard Management Plan

1.2 Definitions

Terms that have specific meaning within this AC are defined in the table below. Where definitions from the civil aviation legislation have been reproduced for ease of reference, these are identified by 'grey shading'. Should there be a discrepancy between a definition given in this AC and the civil aviation legislation, the definition in the legislation prevails.

Term	Definition
Aerodrome	A means an area of land or water (including any buildings, installations and equipment), the use of which as an aerodrome is authorised under the regulations, being such an area intended for use wholly or partly for the arrival, departure or movement of aircraft.
Aerodrome operator	means: <ol style="list-style-type: none"> a. for a certified aerodrome—the person who holds the aerodrome certificate for the aerodrome; or otherwise—the person who is responsible for the operation and maintenance of the aerodrome

Term	Definition
Aerodrome vicinity	<p>for the purposes of wildlife hazards, may be considered as being:</p> <ol style="list-style-type: none"> for sources of attractants and wildlife movements which present a hazard — within a radius of 3 km from all the runways of an aerodrome; and <p>for significant sources of attractants or hazardous wildlife movements across the aerodrome site — within a radius of 8 km from the aerodrome reference point.</p>
Air Traffic Control	means Air Traffic Services in its capacity as a provider of air traffic control services.
Certified Aerodrome	means an aerodrome in respect of which an aerodrome certificate is in force.
confirmed wildlife strike	<p>A wildlife strike is confirmed in the following cases:</p> <ol style="list-style-type: none"> When physical evidence of a wildlife strike is found on the runway or runway strip used by the aircraft involved (unless another reason for the death of the wildlife can be found). When physical evidence of the strike is found on the aircraft involved following an inspection; and <p>In any other instance where it can be reasonably proved from evidence that wildlife was struck as a direct result of a moving aircraft. For example, when aircrew report they saw, heard, or smelt a wildlife strike.</p>
hazard	A condition or an object with the potential to cause or contribute to an aircraft incident or accident.
likelihood	Used as a general description of probability or frequency. Note: Can be expressed qualitatively or quantitatively.
NOTAM	means a notice issued by the NOTAM Office containing information or instructions concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to persons concerned with flight operations.
risk	<p>The predicted probability and severity of the consequences or outcomes of a hazard.</p> <p>Notes:</p> <ol style="list-style-type: none"> A risk is often specified in terms of an event or circumstance and the consequence that may flow from it. Risk is measured in terms of a combination of the consequences of an event and its likelihood. Risk may have a positive or negative impact.
risk treatment	describes the measures taken to reduce the likelihood of a wildlife strike occurring and/or the resultant consequence.
safety	The state in which risks associated with aviation activities, related to, or in direct support of the operation of aircraft, are reduced and controlled to an acceptable level.
substantial damage	means damage or structural failure incurred by an aircraft by a wildlife strike that adversely affects the structural strength, performance, or flight characteristics of the aircraft and that would normally require major repair or replacement of the affected component.
suspected wildlife strike	<p>An event where a wildlife strike has been suspected by aircrew or ground personnel but upon inspection:</p> <ul style="list-style-type: none"> no carcass from the wildlife is found; and

Term	Definition
	<ul style="list-style-type: none"> there is no physical evidence on the aircraft of the strike having occurred
UNICOM	(universal communications) means a non-air traffic control communication facility operated to provide an advisory service to enhance the value of information normally available at a non-controlled aerodrome.
wildlife	includes all birds, bats, and terrestrial animals and includes insects as a practical definition.
Wildlife Hazard Management Plan	a method for aerodrome operators to adopt reasonable wildlife risk control measures, address features that may attract wildlife, control the presence of wildlife on, and in the vicinity of, the aerodrome. A WHMP should be developed based on the wildlife hazard risk assessment, according to the size and complexity of the aerodrome.
wildlife incident	An event where it is likely that a strike could have resulted from a wildlife hazard. A near miss event involving both wildlife and aircraft should be considered a form of wildlife incident.
wildlife strike	when wildlife and a moving aircraft collide.

1.3 References

Legislation

Legislation is available on the Federal Register of Legislation website <https://www.legislation.gov.au/>

Document	Title
EPBC No. 91, 1999	Environment Protection and Biodiversity Conservation Act 1999
Part 139 of CASR 1998	Aerodromes
Part 139 (Aerodromes) Manual of Standards (MOS)	Aerodromes

International Civil Aviation Organization documents

International Civil Aviation Organization (ICAO) documents are available for purchase from <http://store1.icao.int/>

Many ICAO documents are also available for reading, but not purchase or downloading, from the ICAO eLibrary (<https://elibrary.icao.int/home>).

Document	Title
ICAO Doc 9137	Airport Services Manual: Part 3 - Wildlife Hazard Management Fifth Edition, 2020
ICAO Doc 9981	PANS-Aerodromes: Third Edition, 2020

Advisory material

CASA's advisory material is available at <https://www.casa.gov.au/resources-and-education/publications-and-resources/guidance-material>

Document	Title
AC 139-16	Safety management systems for aerodromes
AC 139.C-27	Risk management plans for aerodromes
AC 139.C-01	Aerodrome Manual

Other references

Document	Title
Australian Aviation Wildlife Hazard Group (AAWHG) Recommended Practices	Available from: https://aawhg.org/resources/recommended-practices/
National Airports Safeguarding Framework Guideline C	Available from: https://www.infrastructure.gov.au/sites/default/files/documents/3.1.4_Guideline_C.pdf https://www.infrastructure.gov.au/sites/default/files/documents/Guideline_C_Attachment_1.pdf

2 Background

2.1 General

- 2.1.1 Australian aerodromes face a challenging range of operational environments and weather conditions when managing wildlife hazards. The diverse wildlife population in Australia requires aerodrome operators to develop and adopt wildlife hazard management strategies that address location specific issues when minimising the impact of wildlife hazards.
- 2.1.2 Wildlife hazard management should align with Australia's commitment to environmental stewardship and conservation. The protection of both people and the welfare of wildlife is essential. To ensure effective wildlife hazard management, Australian airports should collaborate with relevant authorities, wildlife experts, and local communities.
- 2.1.3 The presence of wildlife at and in the vicinity of aerodromes is a hazard to the safety of aircraft operations. Where wildlife hazards are not appropriately managed consequences may include aircraft damage, flight delays and litigation.
- 2.1.4 Incidents, where aircraft encounter wildlife strikes can endanger passengers and crew, cause damage to aircraft resulting in costly repairs and operational disruptions, potential reputational impact, and potentially insurance related implications for aerodrome and aircraft operators. In rare cases, wildlife strikes may result in the catastrophic termination of a flight.
- 2.1.5 An aerodrome operator's Wildlife Hazard Management Plan (WHMP), for aerodromes that meet the trigger requirements (refer section 3 of this AC), or wildlife hazard management program for other certified aerodromes (refer section 2.2 of this AC) should be developed to focus on reducing the likelihood of wildlife being attracted within and in the vicinity of the aerodrome, with the aim of reducing potential impacts of wildlife when aircraft are arriving or departing.
- 2.1.6 A well-developed WHMP or program is required for aerodrome operators to effectively manage the risks posed by wildlife hazards in a cost-effective manner. The plan should consider available resources, local experience, knowledge, and effective risk management by the aerodrome operator.
- 2.1.7 National and state-level guidelines and regulations (such as the Environment Protection and Biodiversity Conservation Act 1999) should be considered when establishing wildlife hazard management procedures at aerodromes.

2.2 Wildlife hazard management

- 2.2.1 Wildlife hazard management involves influencing wildlife behaviour on or in the vicinity of an aerodrome, in order to achieve a specific goal with regards to altering behaviour, population, or geographic distribution of birds or wildlife. At aerodromes, the goal of wildlife management is to sufficiently alter the behaviour of animals so that they are less likely to occupy critical safety zones where aircraft operate.
- 2.2.2 The key to managing wildlife at aerodromes is to understand the basic requirements of the relevant species and how their behaviour can become a hazard to aviation safety.

This understanding provides an opportunity to anticipate how animals could behave, and accordingly initiate actions to prevent wildlife activity within and in the vicinity of an aerodrome.

- 2.2.3 After conducting a thorough assessment of wildlife hazards specific to the aerodrome's location and operating environment, aerodrome operators should establish standardised procedures within their wildlife hazard management processes, in conjunction with the local environmental controls.
- 2.2.4 Certified aerodrome operators are required to include, or have referenced in their aerodrome manual, procedures to deal with hazards caused by the presence of wildlife to aircraft operations. For further information, refer to Section 11.08 of the Part 139 MOS.
- 2.2.5 The wildlife hazard management procedures should include:
 - a. monitoring wildlife hazards at the aerodrome
 - b. assessing any wildlife hazard
 - c. mitigating any wildlife hazard
 - d. reporting wildlife hazards to aircraft may be through one or more of the following, as applicable: the AIP, NOTAM, ATC, or UNICOM
 - e. for proposed or actual sources of wildlife attraction outside the aerodrome boundary — liaising with the relevant planning authorities or proponents to facilitate wildlife hazard mitigation
- 2.2.6 In Australia, the Australian Aviation Wildlife Hazard Group (AAWHG) is our national wildlife strike committee. It was established to support the aviation industry in efficiently and successfully implementing wildlife hazard management practices that best suit their operating environment, including aerodromes. The AAWHG has developed Recommended Practices (RP) documents that allow aviation industry to:
 - a. Utilise the most suitable elements that are available from worldwide practice.
 - b. Capture the unique experiences and knowledge available from the industry.
 - c. Tailor practices to meet the conditions that are unique to Australia and local environments.

2.3 Wildlife hazard management program

- 2.3.1 The implementation of appropriate hazard mitigation measures is a key method of reducing the risk of wildlife strikes.
- 2.3.2 An aviation wildlife management program is a comprehensive set of procedures designed to mitigate the risks and hazards associated with wildlife at airports and in the vicinity of aircraft operations. The program aims to minimise the potential for bird strikes and other wildlife-related incidents that can endanger aircraft and passengers. The wildlife hazard management program involves multiple steps that needs to be implemented for effective management of wildlife hazards.
- 2.3.3 The specific details of an aviation wildlife management program may vary depending on the location, size of the airport, and the wildlife species present in the area. The

program should be tailored to, and be commensurate with, the size and level of complexity of the aerodrome, the number of aircraft movements and their type.

- 2.3.4 The program should take into consideration the wildlife hazards identified and the risk assessment of those hazards.
- 2.3.5 The portability and commonality of wildlife hazard management plans between airports can vary depending on several factors. While certain elements of a wildlife hazard management program can be transferable, there are also site-specific considerations that may require customisation. Local wildlife species, wildlife behaviour and patterns, airport infrastructure and environment, and non-aviation regulatory requirements are considerations for unique and site-specific wildlife hazard management programs.
- 2.3.6 However, certain aspects of wildlife hazard management programs can be transferable between airports. Wildlife hazard management strategies such as habitat modification, use of deterrents, and reporting systems can be implemented across different airports. Additionally, training and education, data analysis, research outcomes, risk management processes and mitigation practices may be common across a range of aerodromes.
- 2.3.7 If the wildlife hazard management program identifies sufficient evidence of increased risk, the ensuing hazards and risks should be considered through the applicable safety management system (SMS), or a risk management plan (RMP) and appropriate controls established and implemented to reduce the risk to aviation safety.
- 2.3.8 Stakeholder engagement is a crucial aspect of an aviation wildlife management program. Involving and collaborating with various stakeholders helps ensure a comprehensive and effective approach to wildlife management. Engaging with stakeholders ensures that diverse perspectives are considered, fosters cooperation, and promotes a shared commitment to wildlife safety in aviation. See section D.4 of Appendix D for further details on stakeholder engagement.

3 Wildlife Hazard Management Plan (WHMP)

3.1 General

- 3.1.1 Beyond the requirements for wildlife hazard management procedures in Section 11.08 of the Part 139 MOS, certain aerodromes are required to prepare and implement a WHMP. CASA recommends a WHMP appropriate to the size and complexity of the aerodrome, irrespective of the passenger or movement rates, where wildlife hazards at the aerodrome impact the safe operation of aircraft at the aerodrome.
- 3.1.2 Aerodrome operators should prepare and establish a robust WHMP that is appropriate for the aerodrome environment.
- 3.1.3 During a financial year, aerodromes having 50,000 or more air transport passenger movements (or) 100,000 or more aircraft movements, must have a WHMP in place. The aerodrome operators of these aerodromes are required to establish and implement the plan and include or refer to the plan in the aerodrome manual. If it is the first time these triggers are met aerodrome operators have six months to prepare and implement the WHMP. For further information, refer to Section 17.03 of the Part 139 MOS.
- 3.1.4 The plan is required to be prepared in consultation with suitably qualified or experienced persons (refer Section 17.04 of the Part 139 MOS), including:
- a. an ornithologist, zoologist, biologist, ecologist
 - or
 - b. a person with demonstrated expertise in the management of wildlife hazards to aviation.
- 3.1.5 The WHMP should illustrate the complete background of the prevailing hazards in the aerodrome environment and should endeavour to minimise the risks to safe aircraft operations, to acceptable levels.
- 3.1.6 The plan must, as a minimum, include (refer to Section 17.04 of the Part 139 MOS):
- a. procedures for wildlife hazard monitoring and detection
 - b. procedures for data collecting, reporting, and recording wildlife data
 - c. a wildlife safety risk assessment method and procedure, including annual reviews
 - d. procedures for implementing wildlife hazard mitigation measures, including expelling and deterring wildlife from aerodrome environment
 - e. procedures, means and provisions for the training of staff
 - f. specific liaison arrangements for local planning authorities within a radius of at least 13 km from aerodrome reference point
 - g. an aerodrome operator's strategy for wildlife hazard reduction
 - h. records of qualification and experience of key personnel identified in the plan.
- 3.1.7 Additionally, the processes for habitat and land management may also be included in the WHMP, along with appropriate resource requirements.
- 3.1.8 Where a WHMP is established, the aerodrome operator must constantly review the plan to suit the evolving aerodrome environment. For further information, refer to Section 17.04 of the Part 139 MOS.

- 3.1.9 The need for reviewing WHMP may include the following circumstances:
- a. if an aircraft experiences multiple wildlife strikes
 - b. if an aircraft experiences substantial damage following any wildlife strike
 - c. if an aircraft experiences an engine ingestion of wildlife
 - d. if the ongoing presence of wildlife is observed on the aerodrome in size or in numbers reasonably capable of causing an event mentioned in paragraph (a), (b) or (c)
 - e. at least every 12 months, but if during a period of 12 months the plan was reviewed under paragraph (a), (b), (c) or (d), at least every 12 months after that review.
- 3.1.10 As part of effective implementation of a WHMP, individuals and positions responsible for monitoring and mitigating wildlife hazards must be identified. This information must be included or referenced in the aerodrome manual. For further information, refer to Section 11.08 of the Part 139 MOS.

3.2 Wildlife hazard monitoring

- 3.2.1 For effective wildlife hazard management processes, wildlife activities, including bird activities, should be continuously monitored within and in the vicinity of the aerodrome.
- 3.2.2 Aerodrome operators should implement strategies for continuous monitoring, and they should be documented in the WHMP or program.
- 3.2.3 Wildlife monitoring should be conducted regularly, and the frequency should correlate to the severity of the wildlife hazard. In practical terms, the greater the wildlife hazard, the more frequently monitoring should be conducted. The timing of wildlife monitoring should be such that it provides a complete coverage of wildlife activity, day, night, dusk or dawn, as appropriate to the aerodrome.
- 3.2.4 For aerodromes, where wildlife hazard management is established, the aerodrome operator must monitor and record the following as part of the aerodrome serviceability inspection (refer to Section 17.01 of the Part 139 MOS):
- a. the presence and behaviour of wildlife on the aerodrome
 - b. wildlife activity that is visible:
 - i. in the vicinity of the aerodrome
 - ii. from the aerodrome.
- 3.2.5 Where hazard levels and associated risks due to wildlife activities are found considerable, a dedicated wildlife inspection (including recording wildlife counts) may be implemented.
- 3.2.6 Furthermore, the aerodrome operator, in consultation with the local planning authorities, must attempt to monitor sites within 13 km of the aerodrome that do or could attract wildlife. For further information, refer to Section 17.01 of the Part 139 MOS.
- 3.2.7 Aerodrome operators must attempt to monitor any reported wildlife aircraft strike events at, or in the vicinity of, the aerodrome (refer to Section 17.01 of the Part 139 MOS).
- 3.2.8 The results from wildlife monitoring must be recorded and maintained to track changes in wildlife activity patterns and identify trends. The recorded data may also be used to

develop strategies to mitigate wildlife hazards and improve the safety of aircraft operations.

- 3.2.9 Wildlife monitoring techniques within, and in the vicinity of, the aerodrome may vary depending on the aerodrome environment, and some practices are listed in the following sections. Similarly, different strategies may be applied for monitoring wildlife activities before and post wildlife strike incidents.
- 3.2.10 Some suggested practices for monitoring wildlife on the aerodrome include:
- a. The aerodrome environment should be divided into separate monitoring zones. It is reasonable to expect that the aerodrome operator will select these zones based on:
 - i. geographical size
 - ii. specific environmental factors within the zone such as terrain, soil type, flora, land use etc
 - iii. the operational use of the zone by aircraft such as take-off, approach etc.
 - b. A trained person should monitor and record wildlife populations and behaviour within each zone.
 - c. Any wildlife that transits across the zone, either by ground or by air, should be included.
 - d. Identifying aerodrome infrastructure that provides a habitat for the wildlife to survive within the aerodrome.
- 3.2.11 Monitoring practices in the vicinity of an aerodrome:
- a. The aerodrome operator should establish a process to monitor and record the presence of wildlife activity that is visible within the vicinity of the aerodrome, or visible from the aerodrome.
 - b. Aerodrome operators, in consultation with the local planning authorities should conduct an inventory of sites that attract wildlife within a defined radius around the aerodrome, paying particular attention to sites close to the airside and the approach and departure paths.
 - c. The radius for monitoring sites that attract wildlife should be 13 km around the aerodrome reference point. For further information, refer to Section 17.01 of the Part 139 MOS. However, the radius may be extended or reduced, based on a wildlife evaluation of the aerodrome vicinity.
 - d. Monitoring in the vicinity of the aerodrome may include but is not limited to:
 - i. areas used for waste, recycling, offal, or sewage
 - ii. wetlands, marshes, areas of water discharge and open waterways; areas containing significant food sources for high-risk species
 - iii. national parks, wildlife reserves and other significant wildlife corridors.
 - e. The identification of these areas can be achieved by:
 - i. the observation of wildlife transiting across the aerodrome between separate sources of attraction
 - ii. the physical observation of land uses in the aerodrome environment
 - iii. any wildlife hazard reports received from pilots, authorities and/or the public.

- f. Offsite aerodrome attraction sources (such as animal sale centres, picnic areas, aeration facilities, waste disposal and landfill areas etc.).
 - g. Climatic or seasonal considerations, such as the presence of wildlife at certain times of the year.
- 3.2.12 The outcomes from the wildlife monitoring process must be recorded (refer to Section 17.01 of the Part 139 MOS). These records should be maintained to provide a detailed history of wildlife populations and behaviour over time.

3.3 Data collection, reporting and recording data on wildlife activities

- 3.3.1 Knowledge of the wildlife living in the aerodrome and its vicinity, their movements and to which areas they are attracted, is essential. Accurate and reliable data is vital for an effective wildlife hazard management program at an aerodrome.
- 3.3.2 Aerodrome operators should develop standardised processes to report and record any observed wildlife activities as well as wildlife strike incidents. The data should include both within and in the vicinity of the aerodrome.
- 3.3.3 The process of reporting should be applicable for all stakeholders in the aerodrome environment. Personnel other than those nominated for wildlife monitoring, should also be encouraged and educated on how to report wildlife activities (including wildlife strikes, bird remains, etc) to the aerodrome operator. (Wildlife strike incident reporting is discussed in the subsequent sections).
- 3.3.4 After the scheduled wildlife monitoring inspections (where implemented) or the serviceability inspections at aerodrome by nominated personnel are conducted, the information should be logged thoroughly in a specified format. As a minimum, the log may include the following information:
- a. the name of the person logging the data
 - b. date and time of the observation
 - c. numbers, species, and location of the wildlife observations
 - d. proactive and reactive actions taken to decrease the number of present wildlife and the results thereof
 - e. weather and lighting conditions.
- 3.3.5 Reporting ongoing wildlife hazards:
- a. Where the existence of a wildlife hazard is assessed as an ongoing hazard to safe aircraft operations, the aerodrome operator must advise the AIS provider in writing to include an appropriate warning in the AIP-ERSA. For further information, refer to Chapter 17.05 of the Part 139 MOS.
 - b. Further, if a wildlife hazard is assessed as being:
 - i. at a higher risk than usual
 - ii. of a short-term or seasonal nature
 - iii. the aerodrome operator should ensure that a timely NOTAM warning of the hazard is given to pilots using the aerodrome.

- c. Where a wildlife hazard is identified as a serious and an imminent threat to aviation safety, the aerodrome operator must ensure the pilots using the aerodrome are directly advised through CTAF and UNICOM frequencies.
- 3.3.6 Reviewing and analysing wildlife strikes, and wildlife observations will help identify hazards at the aerodrome and its vicinity and indicate the effectiveness of current wildlife strike prevention methods.

3.4 Wildlife risk assessment

- 3.4.1 The overarching outcome sought through risk assessment and mitigation is the protection of aviation operators, their aircraft and the persons on-board; this is where the safety risk in wildlife hazard management is realised.
- 3.4.2 Accordingly, irrespective of any assessments or mitigations put in-place, the onus for effective and consistent communication to the operators of aircraft including pilots is crucial. In doing so, at a minimum, this allows the aircraft operators and pilots to make informed risk-based decisions just as they do for many other dynamic hazards in aviation such as the weather.
- 3.4.3 The communication of the hazard information, as discussed in the previous section, may be in the form of longer term (strategic) communication and include AIP-ERSA updates. NOTAMS, briefings and the like are in the short to immediate term (tactical) communication, including the Automatic Terminal Information Service (ATIS), at controlled aerodromes, or directed transmission of information to aircraft in the air or on the ground.
- 3.4.4 Section 17.02 of the Part 139 MOS mandates implementation of risk assessment processes for hazards associated with wildlife prevailing at and in the vicinity of an aerodrome.
- 3.4.5 The risk assessment process should, as a minimum, include following wildlife data in the analysis:
- a. wildlife observations
 - b. reported aircraft strike events
 - c. reported aircraft near miss events
 - d. where multiple species exist and threats can be ordered accordingly, the assessment should include this information.
- 3.4.6 The AAWHG has established a recommended practices (RP) document to help implement wildlife risk assessment and analysis procedures at aerodromes (Refer to AAWHG RP 1.3(0)).
- 3.4.7 The AAWHG-RP document encourages participants to implement wildlife risk assessment as per the ISO Standard 31000 - "Risk Management -Principles and Guidelines".
- 3.4.8 The RP document has highlighted the following steps to be followed during the risk assessment process:
- a. establish the context
 - b. identify risks

- c. analyse risks
 - d. evaluate risks
 - i. risks and hazards to the aerodrome operator
 - ii. risks and hazards encountered by pilots and aircraft operators
 - e. treat risks.
- 3.4.9 Similarly, the RP document suggests several risk analysis techniques to understand identified hazards and associated risks better. The document has suggested advanced risk analysis techniques such as:
- a. risk ranking analysis
 - b. damaging strike analysis
 - c. network theory/cause and effect ('bow-tie') analysis
 - d. event/outcome analysis.
- 3.4.10 The risk analysis process should assist organisations to determine the priority of treatment and the most effective strategies available to mitigate/control.
- 3.4.11 Where an aerodrome operator has implemented a SMS or an RMP, the wildlife hazard identification and risk management must be conducted in accordance with the SMS or RMP. For further information, refer to Section 17.02 of the Part 139 MOS.
- 3.4.12 In such cases, the risk analysis process should consider the probability and the severity of a hazard causing harm to aircraft operations, and whether any existing controls implemented by the aerodrome operators to manage the risk, are suitable, present, operating, and are effective.
- 3.4.13 Where it is identified that risk controls are not effective, the aerodrome operator should ensure the risk is re-evaluated, and ensure effective controls are implemented as soon as reasonably practical.
- 3.4.14 The aerodrome operator's wildlife hazard identification and risk assessment should be updated and repeated at regular intervals, at least annually or after a significant event, commensurate with assessed risks.

3.5 Wildlife hazard mitigation

- 3.5.1 Based on the wildlife activity prevailing within, and in the vicinity of, an aerodrome, appropriate mitigation measures need to be implemented to control the risks associated with the hazard.
- 3.5.2 Aerodrome operators must implement hazard control measures, identified through the wildlife hazard identification and risk assessment process, for the hazards identified within the boundary of the aerodrome. For further information, refer to Section 17.06 of the Part 139 MOS.
- 3.5.3 For hazards identified in the vicinity of the aerodrome, the aerodrome operator should endeavour to engage with the local planning authorities to highlight the problem sources and implement mitigation measures.
- 3.5.4 Some wildlife hazard mitigation measures include:

- a. modifying the habitat and the environment, both within and in the vicinity of an aerodrome
 - b. implementing land use practices, to discourage wildlife being attracted toward aerodromes
 - c. patrols and observations
 - d. use of repellents and deterrents.
- 3.5.5 Generally, any mitigation measures should be included in the WHMP or program. Each mitigation measure should contain essential information, including the targeted species and risk activity, a description of the mitigation technique, technical details, the implementation period, personnel responsible for implementation, and the results and effectiveness of the measure.
- 3.5.6 To evaluate the effectiveness of each measure, appropriate performance indicators should be established. These indicators should be specific and measurable characteristics that can assess the effectiveness of the mitigation measure.

3.5.7 Habitat management

- 3.5.7.1 Generally, habitat management may be implemented in two categories:
- a. On-aerodrome management.
 - b. Off-aerodrome management.
- 3.5.7.2 Aerodrome operators should develop an inventory of sites, both within and in the vicinity of the aerodrome, which attract wildlife.
- 3.5.7.3 For on-aerodrome management, consideration should be given to factors like:
- a. design (airport buildings and structures)
 - b. fencing
 - c. grass
 - d. forest, vegetation, and agriculture
 - e. waste management
 - f. availability of water.

Note: Refer to Appendix A for on-aerodrome facilities management practices to prevent wildlife attraction.

- 3.5.7.4 Off-aerodrome management may often require the support of local authorities and hazard mitigation measures should be initiated in association with such agencies.
- 3.5.7.5 The factors contributing to off-aerodrome wildlife activities depends on how the land use planning is implemented in those regions. The concept of compatible land use planning emphasises the relationship between airports and their neighbouring communities. It involves careful study and coordinated planning to ensure that land use around airports does not negatively impact aircraft safety.
- 3.5.7.6 Aerodrome operators should engage with local planning authorities and relevant stakeholders, to plan and implement compatible land use around aerodromes. Effective communication between aerodrome operators and local authorities is encouraged to raise awareness of safety concerns. Incompatible land use should be prevented or addressed through risk assessment processes.

- 3.5.7.7 Where necessary, local planning authorities may also be involved in the wildlife hazard management program. The strategies for compatible land use surrounding the aerodrome may be included in the WHMP or program.
- 3.5.7.8 Regular monitoring of sites with hazardous wildlife and periodic comprehensive land use surveys are recommended. Modern technology, such as satellite detection, can aid in registering and monitoring different land use types.
- 3.5.7.9 Engaging with neighbourhood groups may also prove beneficial in wildlife hazard management. For instance, collaboration with local farmers is important to encourage agricultural practices that are less attractive to hazardous species.
- 3.5.7.10 A list of types of land use that should be prevented, eliminated or mitigated is available in Appendix B of this AC.

3.5.8 Patrols, observations, expelling and deterring techniques

- 3.5.8.1 Ongoing wildlife dispersal techniques should be implemented to reduce presence of wildlife, beyond the preventive measures discussed above. These dispersal techniques are generally reactive in nature.
- 3.5.8.2 The choice of appropriate dispersal actions and the frequency depends on several factors such as wildlife density, prevailing environment, nature of aircraft operations, etc.
- 3.5.8.3 Dispersal techniques should be consistently reviewed for effectiveness as wildlife quickly adapt to some mitigation responses implemented and they become alert to any deterrents/repellents. For instance, they adopt a 'wait and watch' behaviour in response to routine wildlife control measures such as a bird scarer or an observation jeep.
- 3.5.8.4 Similarly, wildlife controllers at aerodromes should identify appropriate dispersal techniques for the species prevailing in the aerodrome. The type of species may vary according to seasons and therefore the same dispersal technique may not always be beneficial to control wildlife activities.
- 3.5.8.5 Wildlife control personnel should be appropriately trained and sufficiently equipped to perform their duties. Aerodrome operators should ensure resources to deploy the right dispersal technique. Further, any control activities should only be deployed when necessary and not always, since overuse may result in such controls becoming less effective for wildlife dispersal.
- 3.5.8.6 Once the responses of different wildlife species at an aerodrome are understood, they can be associated with control actions to reduce their risk. Strategies developed for dispersing prevailing wildlife and controlling the risks associated should be documented in the WHMP or program.

Note: Refer to Appendix C for suggested practices when implementing wildlife dispersal techniques.

3.6 Training wildlife hazard management personnel

- 3.6.1 Aerodrome operators should provide sufficient training to their wildlife hazard management teams. This training must be delivered by qualified specialists who have demonstrated expertise in this domain, using established competency-based training and assessment principles.

- 3.6.2 It is the responsibility of the aerodrome operators to ensure that wildlife management teams possess necessary skills, knowledge, and attitudes required to perform their tasks to the prescribed standard.
- 3.6.3 Section 17.07 of the Part 139 MOS mandates training requirements for personnel engaged in wildlife hazard monitoring and reporting and, wildlife hazard mitigation processes:
- a. wildlife hazard monitoring and reporting personnel must be trained competently to:
 - i. conduct wildlife observations and identify high-risk species.
 - ii. assess wildlife populations and describe their behaviour.
 - iii. record information.
 - iv. collect any remains of a wildlife strike on the aerodrome
 - v. attempt to facilitate the identification of:
 - A. any wildlife involved in a strike event
 - B. any resulting damage to an aircraft.
 - vi. report the outcomes of observation, monitoring and strike collection activities.
 - b. personnel engaged in wildlife hazard mitigation must be trained competently to:
 - i. engage in active wildlife management without causing a hazard to aviation safety
 - ii. assess the effectiveness of any mitigation measures that are taken.
- 3.6.4 The WHMP or program should include procedures for the initial and recurrent training of personnel involved in wildlife control. The minimum initial and recurrent training requirements for wildlife control personnel, and a typical training syllabus, are included in Appendix D of this AC.
- 3.6.5 Wildlife control personnel should be fully aware of the details pertaining to aerodrome operations, the aerodrome environment and should have received appropriate training, including:
- a. airside driver training, aerodrome familiarization, air traffic control communications (radiotelephony (RTF)), signs and markings, navigational aids, aerodrome operations and safety, and other matters that the aerodrome operator deems appropriate
 - b. aircraft familiarization, including aircraft identification and effect of wildlife strikes on aircraft systems.
- 3.6.6 Aerodrome operators must maintain the training records for a period of at least three years. For further information, refer to Section 17.07 of the Part 139 MOS.

4 Reporting wildlife strike incidents

Wildlife strikes may take place within aerodromes or in the surrounding vicinity leading to minor or major aircraft damage, or occasionally with no impact to aircraft structure. However serious the consequences are, an aerodrome operator should endeavour to investigate the occurrence to identify the potential causes.

The investigation process should connect with existing mitigation measures implemented at the aerodrome. Should a gap be identified, or an enhancement process recommended through the investigation process, the same should be included in the WHMP or program for future compliance.

Where an SMS or a RMP is established, the aerodrome operator should investigate such occurrences as per the existing system in place.

Aerodrome operators must report to the Australian Transport Safety Bureau (ATSB) following a wildlife strike event in accordance with the Transport Safety Investigation Regulations 2021 (TSIR).

Under the TSIR, the operators of a certified aerodrome are required to report to the ATSB within 72 hours of a wildlife strike occurring at an aerodrome. For all aircraft operations, the TSIR defines a wildlife strike as being 'a collision with an animal, including a bird'.

As the process for identifying the wildlife species can take time, an initial report with the known information should be submitted to the ATSB within 72 hours. If a subsequent investigation uncovers additional details of the strike (such as the species involved), the ATSB should then be contacted with the new information. The original report can then be updated accordingly.

Reports to the ATSB should include the following information as known by the person making the report:

- a. The name and contact details of the reporter.
- b. The date and time (local) of the strike.
- c. Aircraft part(s) damaged (if any).
- d. The location of the strike (i.e., at aerodrome, greater than 5 kilometres away, etc).

Additionally, reports to the ATSB may also include the following details as known by the person making the report:

- a. For bird strikes, the:
 - i. runway number or taxiway designator used by the aircraft operation
 - ii. number of birds sighted
 - iii. number of birds struck
 - iv. species involved (or bird type if the actual species is not known)
 - v. size (large, medium, small etc.) of the actual bird(s) involved (not what is the normal size for the particular species)
 - vi. details of any engine ingestion (including the number of engines experiencing ingestion).
- b. For animal strikes:
 - i. specific location (runway, taxiway, etc.)
 - ii. the size (large, medium, small etc.) of the animals(s) involved (not what is the normal size for the particular species)

- iii. the species involved (or type of animal if species is not known).

Should the aerodrome operator be unable to identify the wildlife species involved in the strike, forensic identification methods such as DNA sampling of the remains may assist. More information is available from the ATSB report titled "[Forensic Identification of Aviation Bird Strikes in Australia](#)".

Under the TSIR, aircraft operators are also required to report a wildlife strike involving their aircraft to the ATSB.

5 Integration with aerodrome safety management system or risk management plan

Where available, the WHMP or program should be integrated into the aerodrome operator's SMS or RMP.

Any investigations into a wildlife strike, wildlife incident etc. should follow the relevant investigation procedures in the SMS or RMP.

The WHMP or program should also be subject to the review and audit functions of the SMS or RMP.

Appendix A

On-site aerodrome habitat management

A.1 On-site aerodrome habitat management

This appendix discusses various strategies for managing habitats and reducing wildlife hazards on the aerodrome itself:

A.1.1 Design of buildings and structures

- a. Hangars can be screened to prevent access, and netting can be installed to exclude birds from nesting in the rafters.
- b. Adding slopes greater than 45 degrees to building edges can deter birds from nesting.
- c. Netting and anti-perching devices like spikes can be used to eliminate perching sites on existing structures.
- d. Unused structures should be removed to prevent nesting and roosting.
- e. Nest removal may be possible in buildings with existing bird nests, but consultation with local and national environmental requirements is necessary.

A.1.2 Fencing

- a. A complete perimeter fence is an effective method to prevent wildlife (except birds) from entering the aerodrome.
- b. Electric fences can be used, and cattle gates can be installed at entry and exit points to prevent hooved mammals from crossing.
- c. Fencing should be buried underground, when possible, to discourage animals from digging under it.

A.1.3 Grass

- a. Grass height should be determined based on the target high-risk species.
- b. Site-specific studies are recommended to determine the optimal grass height.
- c. Vehicle access to grass areas should be restricted to minimize damage and alteration to grass heights.
- d. Undesirable or mildly toxic vegetation can deter wildlife feeding.
- e. Alternatives to grass, such as wood mulch or artificial turf, can be used to reduce attractants for hazardous wildlife.

A.1.4 Forest, vegetation, and agriculture

- a. Brush, shrubs, and forests should be eliminated from airport areas, especially near manoeuvring areas.
- b. Tree species that attract wildlife should be removed or thinned, and large trees should be located far from runways.
- c. Undergrowth should be removed, and trees should be inspected for nesting or roosting birds.
- d. Agricultural activities at airports should be avoided, but, if necessary, crop selection and modified practices may be required to decrease risks to aviation.

A.1.5 Waste management

- a. Wildlife-proof storage of food waste should be implemented, wildlife feeding should be prohibited, and good sanitation and litter control programs should be promoted.
- b. Waste disposal sites should be located off the aerodrome property. If on-site disposal is necessary, measures such as fencing, netting, or overhead wires should be used to prevent access.

A.1.6 Water

- a. Water bodies should be removed if possible, or drained and filled.
- b. Drainage ditches can be replaced with buried culverts or cleared of vegetation.
- c. Where water bodies remain, vegetation should be cleared, slopes should be steep, and physical barriers like fencing, exclusion wiring, or netting can be used to prevent wildlife access.
- d. Dredging can increase water depth and decrease surface area.
- e. Storm water management ponds should have a maximum retention period to reduce attractiveness.

Appendix B

Land use habitat management around aerodromes

B.1 Land use habitat management around aerodromes

The following is a non-exhaustive list of the types of land uses which have proven to attract hazardous wildlife and which should, in particular, be prevented, eliminated or mitigated on and in the vicinity of aerodromes:

- a. Fish processing.
- b. Agriculture.
- c. Cattle feed lots.
- d. Garbage dumps and landfill sites.
- e. Factory roofs and parking lots, or other infrastructure.
- f. Theatres and food outlets.
- g. Wildlife refuges.
- h. Artificial and natural lakes.
- i. Golf or polo courses, etc.
- j. Animal farms.
- k. Slaughterhouses.

Appendix C

Wildlife dispersal techniques

C.1 Wildlife dispersal techniques

C.1.1 Deterring and expelling wildlife

- a. Wildlife deterring and expelling techniques should be appropriate to the wildlife situation on the aerodrome and its vicinity and should be based on risk assessment procedures established as part of the WHMP or program.
- b. Multiple expelling techniques may be deployed; however, their effectiveness should be reviewed constantly and where necessary, a different strategy should be employed to achieve desired results.

C.1.2 Some wildlife dispersal techniques

- a. Audio Repellents, such as stock-whips, distress and alarm call simulators, specific signals, natural and synthetic cries and pyrotechnics, such as medium- and long-range bird fright cartridges and shell crackers.
- b. Optical and visual deterrents, such as laser devices, flags and streamers, lights, predator models, gull models, hawk kites, balloons.
- c. Other techniques such as firearms, chemical repellents, lethal chemicals, trained predators (dogs and falcons), gas cannons, traps, and relocation methods.

The advancements in electronics, remote sensing, and computers have led to the development of systems capable of automatically dispensing repellents (such as noisemakers or chemical sprays) in specific areas when targeted wildlife enters. However, it is important to note that automated repellents cannot replace trained personnel on the ground who can appropriately respond to incursions by different wildlife species. They should only be considered when traditional methods of control and dispersal have been proven otherwise ineffective.

C.1.3 Audio repellents

- a. Pyrotechnics:
 - i. This includes non-lethal cartridges fired from shotguns, specialised pistols, and stationary cannons, that are commonly used at aerodromes to disperse wildlife. These devices can control the direction of wildlife movement to some extent, but they should be employed alongside trained personnel on the ground for optimal effectiveness.
 - ii. Pyrotechnics combined with other harassment techniques can be useful in driving birds away, and their distribution by wildlife management personnel targeting specific species helps associate the pyrotechnics with a perceived threat.
 - iii. Firing at a greater angle can extend the impact of cartridges beyond the aerodrome perimeter, particularly on approaching flocks, while detonations near flocks can disperse regrouping wildlife.
 - iv. Coordination with ATC is necessary when using pyrotechnics, and proactive fire prevention measures should be taken in dry conditions. Propane cannons (exploders) that produce shotgun sound blasts should be used sparingly and strategically to avoid habituation and scaring birds into flight paths.
- b. Distress calls, emitted manually and species-specific, can attract flocking species and stimulate group investigation. It is important to consider the potential attraction of predatory mammals to distress calls.

- c. Electronic noise-generating systems, such as long-range acoustic devices, offer the ability to emit targeted sounds over long distances, but caution is needed to control wildlife reactions and avoid drawing birds in from a wider environment.

C.1.4 Optical and visual repellents

- a. Presence of Humans and Vehicles:
 - i. Is an effective tool for controlling hazardous wildlife at aerodromes. Consistently harassing wildlife within the aerodrome environment creates a learned behaviour where wildlife becomes aware of approaching wildlife controllers and leaves before any control method is implemented.
- b. Visual Objects:
 - i. Visual repellents, such as scarecrows, hawk effigies, reflective tape, and flags, have short-term effectiveness but are not suitable as long-term solutions. Displaying dead birds in a "death pose" can scare birds away, but it may also attract scavenging species.
- c. Lasers:
 - i. Certain bird species perceive laser beams as a threat and will fly away, making lasers effective during specific times of the day. Caution should be exercised to protect pilots and drivers from the hazards of lasers.
- d. Trained Predators:
 - i. Trained predators like dogs and falcons can introduce a predator presence and prompt hazardous wildlife to disperse.

C.1.5 Other techniques

- a. Firearms:
 - i. This includes the use of lethal cartridges fired from shotguns in cases where it is not otherwise possible to remove the hazard, or in cases where the animal is otherwise harmed and needs to be despatched in a humane manner.
- b. Non-Lethal Projectiles:
 - i. Non-lethal projectiles can also be used to elicit a flee response, but proper training and awareness of any restrictions are necessary for their safe handling.
- c. Chemical Repellents:
 - i. Non-lethal chemical repellents function by influencing the animal's senses, creating aversion to smell or taste. These repellents can be applied through spraying on roosting sites, food sources, or other areas where hazardous wildlife congregates. However, it should be noted that some chemical repellents, such as predator urine, may inadvertently attract other hazardous wildlife.
 - ii. Aerodrome operators must consider the potential impacts of using these repellents. Additionally, it is crucial to use chemical repellents that are registered and approved by the appropriate national, regional, and local authorities.
- d. Trap and relocate:
 - i. Hazardous wildlife can be captured and relocated away from the aerodrome. The aerodrome operator must adhere to local laws and regulations concerning the trapping and release of such wildlife. If live bait is employed, regular monitoring and feeding are required. When using bait or decoys, precautions should be taken to avoid attracting additional wildlife to the aerodrome.

Appendix D

Wildlife control training

D.1 Initial training

D.1.1 The minimum requirements for the initial training of wildlife control personnel should cover the following areas:

- a. Comprehensive understanding of the aviation wildlife hazard, its nature, and extent, including local hazard identification.
- b. Familiarity with national and local regulations, standards, and guidance pertaining to the management of wildlife hazards at airports, emphasizing the adoption of best-practice models.
- c. Adequate knowledge about local wildlife ecology and biology, ensuring a broad appreciation of the subject.
- d. Recognition of the significance of precise wildlife identification and observations, encompassing the use of field guides.
- e. Understanding of local and national laws and regulations concerning protected species, as well as species of special concern, and the corresponding policies of the airport operators in relation to them.
- f. Awareness of high-risk species identified during the wildlife risk assessment.
- g. Proficiency in procedures for collecting, identifying, and reporting wildlife strike remains.
- h. Proficiency in employing established and effective techniques for wildlife removal, dispersal, detection, and control, focusing on active and tactical measures.
- i. Competence in documenting wildlife activities, control measures, and reporting procedures, constituting the airport's wildlife management program.
- j. Familiarity with the usage of firearms, drones, and any other equipment employed at the airport, including the appropriate utilization of personal protective equipment.

D.2 Recurrent training

D.2.1 To ensure the ongoing proficiency of wildlife management personnel, regular training sessions should be conducted, incorporating various essential topics covered during the initial wildlife control training. These recurrent training sessions should encompass:

- a. Updates on changes occurring in the local environment.
- b. Reviewing recent wildlife events that have taken place at the aerodrome.
- c. Familiarizing personnel with any modifications made to active and passive measures employed for wildlife management.
- d. Addressing any additional subjects that the aerodrome operator considers relevant and necessary.

D.3 Wildlife control training syllabus

The training syllabus for wildlife management personnel may include, but not limit to the following:

Table 1: Competency considerations for wildlife hazard management and control personnel

Overview	Familiarisation	Specification
Theoretical training	Practical training	Specific wildlife training
<ul style="list-style-type: none"> • Aerodrome overview • Aerodrome certification • Aerodrome procedures • International regulations • National regulations • Environmental regulations • Aerodrome safety management system • Promulgation of information • Health and safety overview • Accident and incident reporting/investigation 	<ul style="list-style-type: none"> • All aerodrome operational procedures and standards • Landside overview • Airside safety • Airside security • Apron driving • Radiotelephony • Runway incursion training • Protection of NAVAIDs • Low/reduced visibility program • On-the-job training • Recurrent refresher training • Familiarization program 	<ul style="list-style-type: none"> • All aerodrome operational procedures and standards • Landside overview • Airside safety • Airside security • Apron driving • Radiotelephony • Runway incursion training • Protection of NAVAIDs • Low/reduced visibility program • On-the-job training • Recurrent refresher training • Familiarization program

Note: The syllabus may include further concepts commensurate to the local aerodrome and surrounding environments. The syllabus should be updated based on the outcomes of period wildlife hazard identification and risk assessment process.

D.4 Stakeholders participation

- D.4.1 Effective wildlife hazard management requires communication, cooperation, and coordination with all relevant stakeholders.
- D.4.2 Aerodrome operators should identify which stakeholders on and off the aerodrome should be involved and consulted in developing the WHMP or program.
- D.4.3 The WHMP or program should identify and establish the extent of participation of such stakeholders.

D.4.4 Stakeholders within the aerodrome

D.4.4.1 Airside personnel

- Airside personnel may come across the wildlife activities and wildlife strike incidents at an aerodrome. The aerodrome operator must ensure that all relevant third parties and aerodrome personnel report wildlife incidents, wildlife remains, and any other potential hazards to the aerodrome operator.
- All aerodrome personnel who are not directly involved in wildlife control measures should be informed about hazardous wildlife attractants and the significance of avoiding foreign object debris (FOD) as well as reporting or picking up FOD that could attract wildlife. The aerodrome operator should include this information in their briefings and during airside induction.

D.4.4.2 Air traffic control

- a. ATC must adhere to established procedures and report all wildlife incidents that occur at the aerodrome, as well as maintain constant communication with the aerodrome's wildlife hazard management team. In response to potential wildlife strike hazards, ATC may act or provide advice such as delaying take-off, utilising alternative runways for take-off and landing, or adjusting routes and altitudes.

D.4.4.3 Pilots

- a. Pilots must report any wildlife strikes by following the aerodrome operator's established procedures. Additionally, they must report any wildlife activity or remains detected near or on the movement areas to ATC, enabling other stakeholders to be informed and the wildlife hazard management team to evaluate the situation and take necessary action.
- b. Pilots that observe hazardous wildlife before take-off or landing, may choose to delay the departure or execute a missed approach.
- c. Participation of pilots in local aerodrome wildlife committees is highly recommended, as their distinctive vantage point allows them to provide valuable information about wildlife movements and activity during approach, landing, and take-off operations.

D.4.4.4 Aircraft operators

- a. The aircraft operator must report all wildlife strikes to the aerodrome operator. They must also report any wildlife hazards observed by the aircraft operator, whether in the air or on the ground. If a high frequency of strikes occurs at a specific aerodrome, the aircraft operator may collaborate with the aerodrome operator to investigate the matter.
- b. The aircraft operator must provide training to pilots and ground personnel on wildlife hazards related to flight operations and the reporting requirements.
- c. As part of the risk assessment or airfield audit of an aerodrome, the aircraft operator may request the assessment from the WHMP or program and provide feedback to the aerodrome operator.

D.4.4.5 Other stakeholders

- a. Other stakeholders may include aircraft manufacturers seeking to enhance the resistance of materials, airframes, and engines to withstand bird impact. Additionally, aviation authorities may be involved in developing protective legislation, exchanging information and knowledge, disseminating best practices, and maintaining a database on wildlife strikes, among other tasks.

D.4.5 External stakeholders

D.4.5.1 Landowners

- a. Aerodrome operators do not have the authority to directly manage habitats that are outside of the aerodrome. It is recommended for operators to develop a good relationship with landowners within the vicinity. Landowners should be made aware by the aerodrome operators of any potential wildlife attractants of the land use activities and construction.

D.4.5.2 Local authorities

- a. Local authorities and public entities responsible for territorial planning should collaborate to establish restrictive legal requirements or raise awareness about land uses and human activities within a 13 km radius of aerodromes. This collaboration can lead to the development of environmental legislation or regulations that control or eliminate wildlife attraction areas near aircraft flight paths. State authorities should also provide information to landowners near aerodromes about applicable laws and regulations that may impact building design, land use, and agricultural practices.
- b. Local and regional authorities assess and form decisions on the types of land uses or activities to be developed near aerodromes, using tools such as easement regulations, safeguarding areas, and wildlife hazard risk assessments. These authorities have responsibility for managing facilities or activities known to attract wildlife and can work towards minimising wildlife presence and attraction in such areas.

D.4.5.3 Environmental authorities

- a. Environmental authorities develop legislation that requires environmental impact assessments for projects near aerodromes, ensuring that wildlife hazards are adequately evaluated and monitored. Environmental impact statements should avoid promoting projects that attract wildlife near aerodromes. Effective coordination and collaboration between environmental authorities, aerodrome operators, and CASA involve sharing information on wildlife species, population trends, habitats, concentration areas, and management procedures for addressing human-wildlife conflicts.

D.4.5.4 Security and police force

- a. The responsibilities and capabilities of security and police forces may differ depending on the State. Typically, they are responsible for detecting and potentially preventing certain human activities that pose wildlife hazards near aerodromes, particularly if those activities are illegal.

D.4.5.5 Local community groups and aerodrome neighbour organisations

- a. Effective coordination between the aerodrome operator and local community groups is necessary to ensure aerodrome safety. By providing them with adequate information about the risks associated with wildlife presence, collaborative efforts can be enhanced.
- b. Effective collaboration with local community groups may lead to various beneficial outcomes:
 - i. Farmers can choose crops that are less attractive to wildlife, adjust growing and harvesting techniques to minimise wildlife attraction.
 - ii. Hunters can coordinate hunting activities with the aerodrome operator to prevent wildlife from being directed towards the aerodrome. They can also assist in reducing the population of hazardous wildlife.
 - iii. Agreements can be made with farmers to collaborate on vegetation management, animal care, and property maintenance.
 - iv. Fishing groups can adjust their fish handling practices avoiding attracting birds.

D.4.5.6 Industry

- a. The aviation sector invests considerable resources into researching advancements in technologies and materials for aircraft structures and engines to enhance their resilience against hazardous wildlife incidents.
- b. The wildlife control industry consistently explores and adjusts new technologies to develop innovative measures and equipment for managing wildlife.

D.4.5.7 Wildlife SMEs

- a. SMEs in wildlife and government agencies, actively share their knowledge and collaborate on wildlife management strategies. They contribute to raising awareness among stakeholders and publishing information about the risks that wildlife poses to aviation.
- b. Scientists and universities play a crucial role by conducting research on wildlife hazard management, wildlife attractants, and emerging technologies that enhance our understanding of wildlife behaviour. Their findings benefit other stakeholders and ultimately contribute to improving aviation safety.