AVISURE

MITIGATING BIRD STRIKE RISK

MackayAirport

FOR WORKDAYS AND HOLIDAYS

Mackay Airport Pty Ltd

Wildlife Hazard Management Plan

July 2014

Foreword

To meet the requirements of Appendix 1 to CASR 1998 subparagraph 139.095(a)(ii) this management plan deals with the particulars of the procedures to deal with dangers to aircraft operations caused by the presence of birds and other wildlife on or near the aerodrome.

Birds and other wildlife in general are a threat to air safety, particularly if they are present on the airport and in the vicinity of runways. The aim of this management plan is to minimise the hazard to aircraft operations created by the presence of birds and other wildlife on or in the vicinity of the airport.

This plan has been developed based on the knowledge of local bird and other wildlife populations and the hazard that various species pose to aircraft. It is designed to allow an airport operations team to concentrate their effort at times and locations when and where aircraft are most at risk from wildlife.

Authorisation

As required by the Australian Civil Aviation Safety Authority, this Wildlife Hazard Management Plan has been prepared in accordance with Civil Aviation Safety Regulations 1998 Part 139 (CASR Part 139) to provide particulars of the procedures to deal with danger to aircraft operations caused by the presence of birds or animals on or near the aerodrome and forms the Wildlife Hazard Management Plan for Mackay Airport.

The organisation responsible for coordinating this plan is Mackay Airport Pty Ltd and is authorised by the Manager Aviation Operations of Mackay Airport Pty Ltd.

Recommended:

Manager Aviation Operations Mackay Airport Pty Ltd

Record of Review

The Mackay Airport Wildlife Hazard Management Plan will be reviewed as required, in accordance with the review schedule detailed on page 3 of this document, to ensure it remains relevant and effective.

Rev	Review Date	Review Type	Authorised	Signature
00	February 2012	Wildlife Hazard Management Plan		
01	September 2012	Updates to: · Risk assessment · Species action plans		
02	September 2013	Updates to: · Euthanasia and egg/nest removal · Risk assessments · Species actions plans		
03	July 2014	Updates to: · Risk assessment · Species management table · Species action plans		

Glossary

Active Bird Management	The use of short-term management techniques such as distress calls, pyrotechnics, trapping and euthanasia to disperse or remove birds.
Airside	The movement area of the airport, adjacent terrain and buildings or portions thereof within the airport security fence line.
Bird Strike	A "**reported bird or animal strike**" is deemed to have occurred whenever: • a pilot reports a strike to the ATSB • aircraft maintenance personnel find evidence of a bird or animal strike on an aircraft • personnel on the ground report seeing an aircraft strike one or more birds or animals • bird or animal remains are found on the airside pavement area, or within the runway strip, unless another reason for the bird or animals' death can be found. A "**suspected bird or animal strike**" is deemed to have occurred whenever a bird or animal strike has been suspected by aircrew or ground personnel but upon inspection: • no bird or animal carcass is found, and • there is no physical evidence on the aircraft of the strike having occurred. A "**confirmed bird or animal strike**" is deemed to have occurred whenever: • aircrew report that they *definitely* saw, heard or smelt a bird strike • bird or animal remains are found on the airside pavement area or within the runway strip, unless another reason for the bird or animals death can be found • aircraft maintenance personnel find evidence of a bird or animal strike on an aircraft. A "**bird or animal near miss**" is deemed to have occurred whenever a pilot takes evasive action to avoid birds or animals. An "**on-aerodrome bird or animal strike**" is deemed to be any strike that occurs within the boundary fence of the aerodrome, or where this is uncertain, where it occurred below 500 ft on departure and 200ft on arrival. A "**bird strike in the vicinity of an aerodrome**" is deemed to have occurred whenever a bird strike occurs outside the area defined as "on aerodrome" but within an area of 15 kilometres radius from the aerodrome reference point (ARP) or up to 1,000 feet above

	the elevation of the aerodrome. A "**bird or animal strike remote from the aerodrome**" is deemed to have occurred whenever a bird strike occurs more than 15 kilometres from an aerodrome or more than 1,000 feet above the elevation of the aerodrome.
Bird Count	Bird counts are conducted by Airport Safety Officers on a regular basis.
Bird Survey	Bird surveys of airside areas are conducted by wildlife biologists or ornithologists.
Consequence	The outcome of an event expressed qualitatively or quantitatively, being a loss, injury, disadvantage or gain. There may be a range of possible outcomes associated with an event.
Critical Area	Areas within or in close proximity to the flight strip, approach and landing paths, and movement areas of an airport.
Foraging	When birds search for and obtain food.
Habituation	The tendency for wildlife to become accustomed to certain stimulus when repeatedly exposed to it.
Hazard	A source of potential harm or a situation with potential to cause loss.
Loafing	When birds rest.
Migration	When birds pass periodically from one region to another.
Passive Bird Management	The modification of habitat to render it less attractive to birds.
Probability	The likelihood of a specific event or outcome, measured by the ratio of specific events or outcomes to the total number of possible events or outcomes.
Raptor	Birds of prey such as eagles and falcons.
Risk	The chance of something happening that will have an impact upon objectives. It is measured in terms of consequences and probability.
Roosting	When birds repeatedly return to a particular place in numbers to loaf or spend the night.
Transit	When birds fly from one place to another.

Abbreviations

AAWHG	Australian Aviation Wildlife Hazard Group
AM	Airport Manager
ASIC	Aviation Security Identification Card
ASO	Airport Safety Officer
ASRI	Airport Survey Risk Index
ATSB	Australian Transport Safety Bureau
CAMBA	China-Australia Migratory Bird Agreement
CASA	Civil Aviation Safety Authority
CASR	Civil Aviation Safety Regulations
EHP	Department of Environment and Heritage Protection
EPBC	Environment Protection & Biodiversity Conservation Act
FOD	Foreign Object Debris
ICAO	International Civil Aviation Organisation
JAMBA	Japan-Australia Migratory Bird Agreement
MAPL	Mackay Airport Pty Ltd
MOS	Manual of Standards
NOTAM	Notice to Airman
ROKAMBA	Republic of Korea-Australia Migratory Bird Agreement
RPT	Regular Public Transport
RWY	Runway
SAP	Species Action Plan
SRI	Survey Risk Index
TWY	Taxiway
WHMP	Wildlife Hazard Management Plan
WMC	Wildlife Management Committee
WMP	Wildlife Management Procedure or Permit
YBMK	Mackay Airport ICAO identifier code

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1. Background and Administration

1.1 Introduction

The consequence of wildlife collisions with aircraft can be very serious. Worldwide there have been 55 recorded fatal strike incidences, resulting in 276 human fatalities and destroying 108 aircraft (Thorpe 2012). Wildlife strikes cost the commercial civil aviation industry an estimated US$1.2 billion per annum and involve more than just the repair of damaged engines and airframes (Allan 2002). Even apparently minor strikes which result in no damage can reduce engine performance, cause concern among aircrew and add to airline operating costs.

The main factors determining the consequences of a strike are the number and size of animals struck and the phase of flight when struck and the part of the aircraft hit. Generally the larger the animal the greater the damage. Large animals have the ability to destroy engines and windshields and cause significant damage to airframe components and leading edge devices. Strikes involving more than one individual (multiple strikes) can be serious, even with relatively small animals, potentially disabling engines and/or resulting in major accidents.

Historically, over 90% of reported strikes have occurred on or in close proximity to airports (ICAO, 1999). Consequently, the primary focus of management programs is directed here with the responsibility resting on airport owners and operators. It is, however, important that the whole airport community (including airline operators) and surrounding land managers are aware of wildlife strike as an issue and that all stakeholders become involved in the process of reducing the hazard wildlife represent to aircraft operations. It is imperative that the risk presented from wildlife attracting land uses adjacent to the airport is managed effectively.

1.2 Function

The function of this document, the Mackay Airport (YBMK) Wildlife Hazard Management Plan (WHMP), is to define the risk that wildlife pose to air traffic at YBMK and to set objectives, performance indicators and procedures in place for the systematic management of that risk.

1.3 Policy

Mackay Airport Pty Ltd (MAPL) is committed to a zero tolerance for all wildlife that may be in a position, on or near the airport, to potentially cause damage to or risk the safety of the aircraft and passengers.

While the safety of aircraft and passengers at YBMK is paramount, all care is taken to ensure that the euthanising of wildlife is a last resort and this option is only used after all other deterrent and dispersal actions have been taken.

1.4 Objectives

The objectives of the YBMK WHMP are to:

- Identify and address broad wildlife management issues at YBMK including the risk posed by wildlife to aircraft operating at YBMK, public safety from aggressive animals (e.g. swooping birds), hygiene issues related to handling wildlife remains and damage to infrastructure by wildlife.
- Ensure compliance with all relevant airport operational and environmental legislation.
- Ensure compliance with the Civil Aviation Safety Authority (CASA) Manual of Standards (MOS) Part 139 and associated Advisory Circular (AC) 139-26(0) (section 7.4).
- Ensure that adequate systems are in place to define roles, responsibilities and procedures for managing wildlife risks at YBMK.
- Define the methods by which wildlife hazards are managed at YBMK.
- Develop performance goals and targets for management of wildlife issues.
- Periodically review the management of wildlife risks at YBMK.

1.5 Legislation

Australia has international obligations as a contracting state to the International Civil Aviation Organisation (ICAO). The Civil Aviation Safety Authority (CASA) enacts and enforces the Civil Aviation Safety Regulations (1998).

The following legislation was reviewed in order to ensure the WHMP satisfies legislative requirements:

- ICAO Annex 14.
- ICAO Airport Services Manual, Part 3.
- Civil Aviation Safety Regulations 1998, Part 139.B.2 – Aerodrome Manual
- CASA Manual of Standards Part 139 – Aerodromes.
  - Section 10.1.4 – Aerodrome Safety Management System.
  - Section 10.2.7 – Birds or Animals on, or in the Vicinity of the Movement Area.
  - Section 10.14 – Bird and Animal Hazard Management.
  - Section 13.17 – Runway and Runway Strip Conditions.
- CASA Advisory Circular 139-26(0) – Wildlife hazard management at Aerodromes.

- Air Navigation Act Section 19A and B.
- Transport Safety Act 2003 (requiring mandatory reporting of bird and other wildlife strikes).
- Airports Act 1996.
- State Planning Policy 1/02 (pertaining to developments in the vicinity of airports).
- Nature Conservation Act 1992 (QLD).
- Environmental Protection and Biodiversity Act 1999.

1.6 Roles and Responsibilities

The person responsible for the overall implementation of the WHMP at YBMK is the Manager Aviation Operations. Roles and responsibilities of all stakeholders and YBMK personnel are detailed in Appendix A.

1.7 Review

The WHMP is subject to continuous review and improvement to ensure its currency and relevancy in accordance with the hazards identified at YBMK. The CASA MOS Part 139 requires review of the WHMP on a regular basis. Reviews are carried out annually, with the assistance of a suitably qualified and experienced aviation ecologist. More frequent reviews may be triggered in response to regulatory changes, operational changes, or significant wildlife strike risk at YBMK. A major review will occur every five years and annual reviews will achieve the following:

- Ensure compliance with all current legislation.
- Update the risk assessment.
- Ensure all procedures, roles, responsibilities and associations are current and relevant.
- Ensure all management actions undertaken by YBMK are listed in the WHMP.

1.8 Communication

Managing the risk of wildlife strike at YBMK requires a cooperative effort between several key stakeholders. The YBMK Wildlife Hazard Management Committee (WHMC) aids in the development and implementation of the WHMP. Committee meetings are held biannually.

1.9 Strike Reporting

Strikes are recorded by the Airport Safety Officers (ASOs) on the relevant wildlife strike form when a strike is reported by a pilot or airport maintenance personnel, or when a carcass is discovered on or within the runway area. Reports are forwarded to the Australian Transport Safety Bureau (ATSB) for inclusion in the national database. Strikes are reported to the ATSB regardless of strike confirmation or location.

Carcasses from wildlife strike or carcasses found on airport that may be the result of a strike are stored in a freezer for identification by an ornithological consultant. Stomach contents may be examined for indicators of food attractants on airport. Where only remnants of struck wildlife are available, samples are collected for DNA analysis or feather identification.

1.10 Permits

Several permits/licences are required for the management of wildlife hazards at YBMK:

- Damage Mitigation Permit (to allow euthanasia and egg/nest removal).
- Firearms licences.
- Airside Drivers Authority.
- Aviation Security Identification Card (ASIC).
- Aircraft Radio Operators Certificate of Proficiency.

2. Species Risk Assessment

2.1 Overall Species Risk

This information combines the strike risk assessment (Section 2.2) with the survey risk assessment (Section 2.3) to provide a combined, overall assessment of risk for individual species at YBMK. Priorities in management should focus on these species. High and moderate risk species have Specific Action Plans included in Section 5. Refer to Appendix B for details on the risk assessment approach.

Table 1. Mackay Airport overall species risk (high and moderate risk species only), 2013/14.

Risk	Species	Risk	Species
High	Australian White Ibis	Moderate	Rainbow Lorikeet
High	Plumed Whistling-Duck	Moderate	Eastern Osprey
Moderate	Black Kite	Moderate	Cattle Egret
Moderate	Straw-necked Ibis	Moderate	White-faced Heron
Moderate	Torresian Crow	Moderate	Masked Lapwing
Moderate	Feral Pigeon	Moderate	Unidentified flying-fox
Moderate	Whistling Kite	Moderate	Bush Stone-curlew
Moderate	Royal Spoonbill	Moderate	Wandering Whistling-Duck
Moderate	Pacific Black Duck	Moderate	Greater Sand Plover

Key Revisions:

- Eastern Osprey, White-faced Heron, Bush Stone-curlew and Wandering Whistling-duck increased from low to moderate risk.
- Magpie Geese were not observed on-airport during surveys resulting in a risk decrease from high to low. However they remain active in habitats adjacent YBMK such as Manzelmans.
- Torresian Crow, Unidentified flying-fox and Wood Duck decreased from high to moderate risk.
- White-bellied Sea-eagle, Caspian Tern, Little Black Cormorant, Australian Pelican, Australian Magpie and Fairy Martin decreased from moderate to low risk.

2.2 Strike Risk Assessment

Strike reports provided by YBMK were used to determine the species strike risk categories, Table 2.

Table 2. Mackay Airport strike risk matrix 2009/10-2013/14 (Allan 2006).

		Probability of Strikes				
		V. Low	Low	Mod.	High	V. High
Probability of Damage	V. Low	Horsfields's Bushlark Welcome Swallow	Australasian Pipit Fairy Martin* Rainbow Lorikeet*			
	Low	Black-shouldered Kite Feral Pigeon*	Eastern Grass Owl	Nankeen Kestrel Cattle Egret*	Masked Lapwing* Unidentified Bird*	
	Mod.	Whistling Kite		Black Kite Unidentified Flying-fox Bush Stone-curlew		
	High	Wandering Whistling Duck		Plumed Whistling Duck*		
	V. High					

Low Risk: no further action beyond current management is required
Medium Risk: review current management practices & options for additional action required
High Risk: immediate action required to reduce the current risk
* indicates elevation of strike risk rank due to multiple strike

2.3 Survey Risk Assessment

Using data derived from airside surveys completed by Avisure, the Airport Survey Risk Index (ASRI) for YBMK was calculated. The value of a survey-based risk assessment is proportional to the number of surveys completed and the length of time over which they are conducted. The survey risk assessment also calculates a Species Risk Index (SRI) to rank the risk of each species, Figure 1.

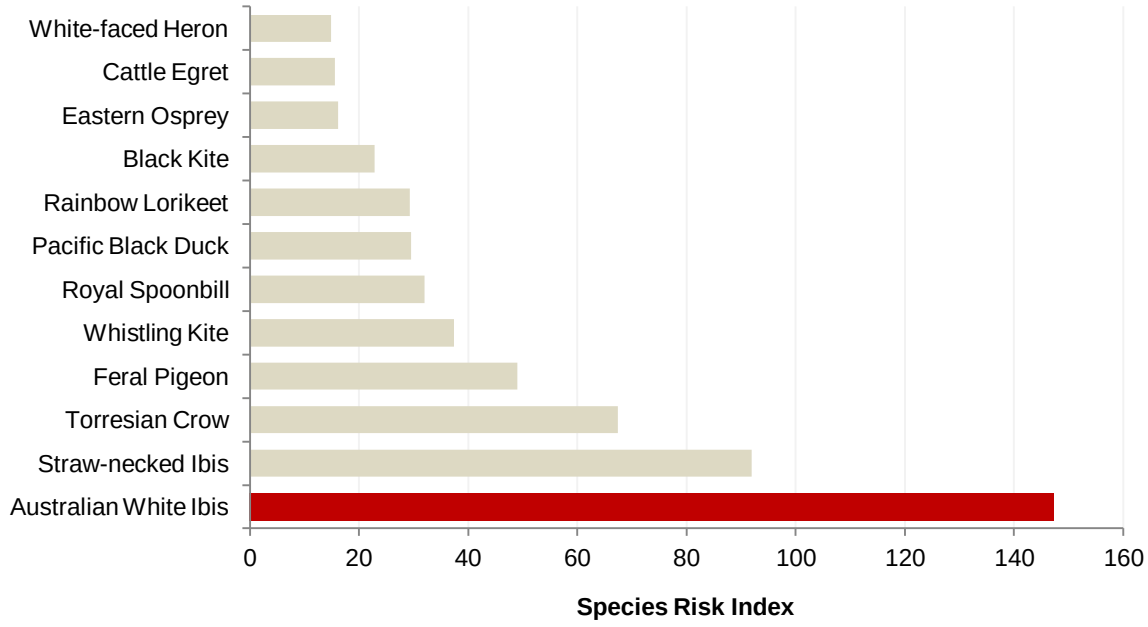

Figure 1. Survey risk assessment species risk indices, Mackay Airport 2013/14.

3. Risk Characterisation

3.1 On-airport Hazards

This section presents strike data from the YBMK strike database and an analysis of professional survey data collected during quarterly surveys between July 2013 and June 2014.

3.1.1 Strike trends

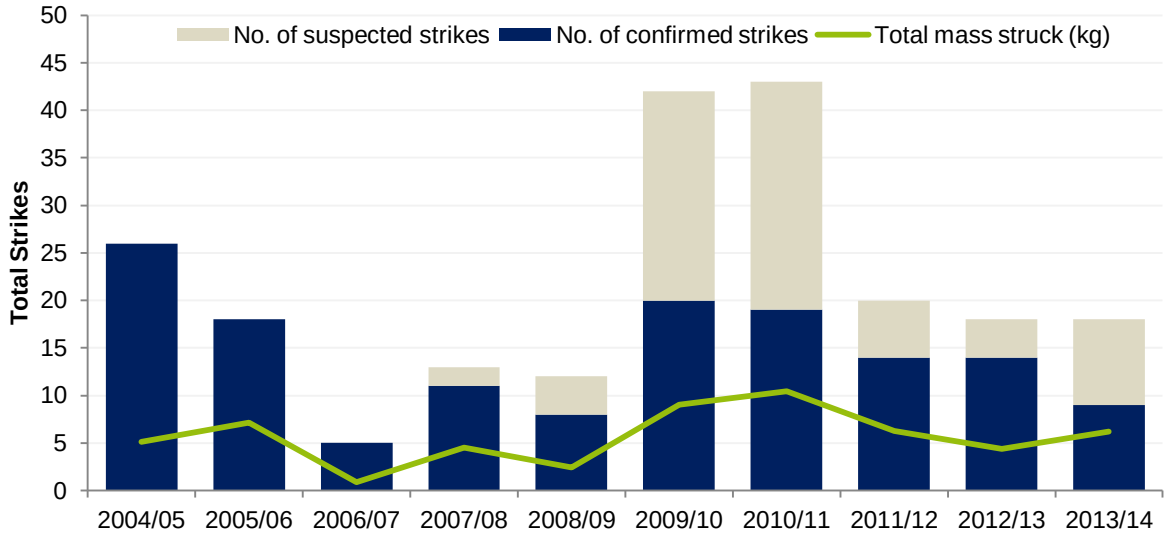

Figure 2. On-airport confirmed and suspected bird strikes and total mass struck (on-airport) per financial year, Mackay Airport, 2004/05-2013/14.

Table 3. Confirmed on-airport species struck, Mackay Airport, 2013/14.

Species Struck	Total Strikes	Species Struck	Total Strikes
Australasian Pipit	2	Rainbow Lorikeet	1
Black Kite	2	Unidentified snake	1
Bush Stone-curlew	2	Unidentified bird	3
Cattle Egret	1	Unidentified small bird	1
Plumed Whistling-duck	1	Wandering Whistling-duck	1

Key Points:

- Strikes involving large birds such as Bush Stone-curlew and whistling-ducks resulted in an increasing mass struck trend despite a decreasing strike trend.

3.1.2 Strikes causing damage/delay

Table 4. Strikes causing damage/delay, Mackay Airport, 2013/14.

Date	Time	Operator	Species	Comment
29/09/2013	12:30	Virgin Australia	Australasian Pipit	Possible impact point under right cockpit window.

3.1.3 Risk and time of day

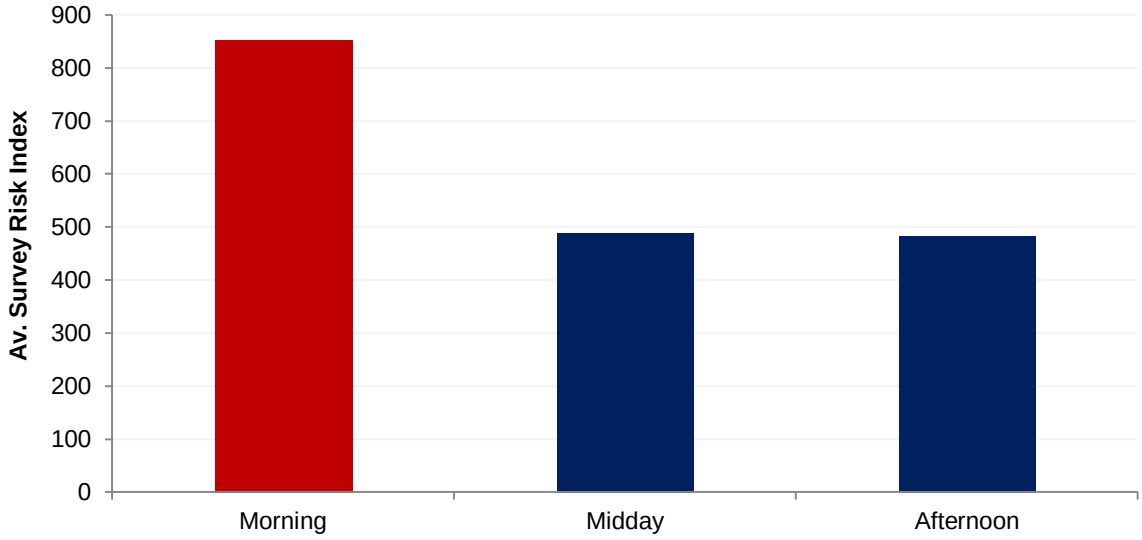

Figure 3. Average survey risk index for time of day, Mackay Airport, 2013/14.

Key Points:

- The morning risk peak is attributed to high bird activity and high transiting rates in critical airspace.

3.1.4 Behaviour and habitat usage

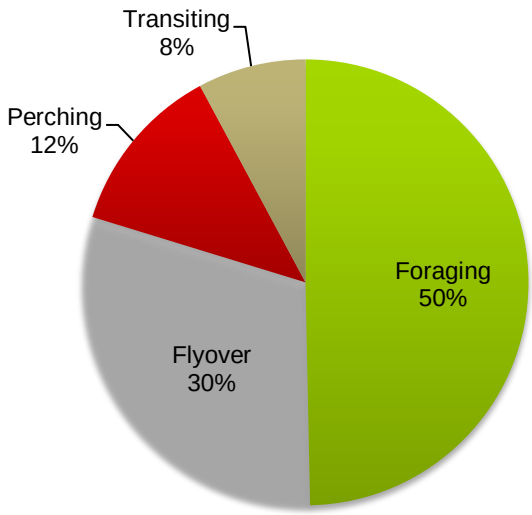

Figure 4. Proportion of wildlife behaviour observed during surveys, Mackay Airport, 2013/14.

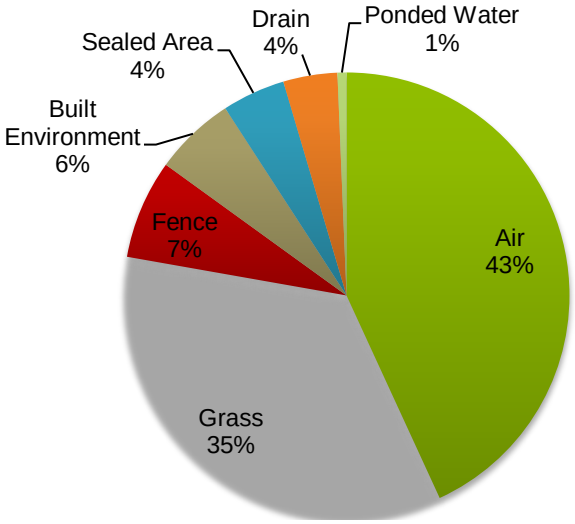

Figure 5. Proportion of habitat usage by wildlife observed during surveys, Mackay Airport, 2013/14.

Key Points:

- High and moderate risk species accounted for 78% of observed flyover behaviour, including Australian White Ibis, Torresian Crow, Straw-necked Ibis, Royal Spoonbill, Pacific Black Duck and Feral Pigeon.
- Seventy percent of birds observed were directly using YBMK habitat (i.e. perching or foraging on-airport).
- High and moderate risk species observed foraging on-airport include Black Kite, Cattle Egret, Pacific Black Duck, Straw-necked Ibis, White-faced Heron and Whistling Kite.

3.2 Off-airport Hazards

Several land uses surrounding the airport can support large numbers of wildlife, and can therefore, influence the risk of wildlife strike at YBMK (Figure 6).

3.2.1 Sports Fields

A number of sports fields are situated immediately north-west of YBMK, and predominantly maintained as short grass (>30mm). These sports fields attract large numbers of Masked Lapwing, Magpie Lark and Feral Pigeon.

3.2.2 Drains

The drainage system surrounding the airport occasionally supports several species of waterbird including White-faced Heron, Intermediate Egret and Australian White Ibis. Drainage culverts may also provide nesting habitat for Welcome Swallows and Fairy Martins.

3.2.3 Retention Pond

The Shellgrit Creek Retention Pond is located approximately 400 metres east of Runway 14/32. The island in the retention pond is a significant roosting and foraging site for several species of birds. Its location in relation to other off airport hazards presents a risk as transiting birds may come into conflict with aircraft as they cross airside areas and flight paths.

3.2.4 Shellgrit Creek

Two wader roosts have been previously identified in close proximity to the mouth of Shellgrit creek. These roosts can harbour large numbers of migratory waders during the summer months. In times of severe weather, birds have been observed sheltering in airside areas and other adjacent off airport areas.

3.2.5 Manzelmann's

Manzelmann's privately owned property incorporates a number of bird attracting features including grasslands, freshwater ponds and large numbers of domestic animals. Significant numbers of Magpie Geese Plumed Whistling-ducks and other waterbirds forage and roost at this site. Birds transiting to and from the property can intersect critical areas of the airport and flight paths, posing a significant risk to aircraft operations.

4. Management Plan

The management of risks at YBMK is broken down into three key elements:

1. Monitoring risks
2. Detecting and reporting hazards
3. Arrangements for removing wildlife hazards.

Each element is detailed below.

4.1 Monitoring Risks

YBMK monitors on-airport risks through structured and repeated wildlife patrols and surveys across all airside areas. This monitoring assists with the location of eggs and nests, as well as remains which may be a result of a strike. Patrols are particularly important at first light, and mid-afternoon, prior to peak periods of wildlife activity.

All monitoring efforts are recorded, with wildlife count data entered into a wildlife count database.

Table 5. Wildlife risk and hazard monitoring requirements, Mackay Airport.

Task	Frequency	Who	Reference
Runway and flight strip inspection	Daily	ASO	SOP: Wildlife Patrols and Inspections
Bird count	Daily	ASO	SOP: Bird Counts

YBMK also monitors landside areas to locate eggs and nests. This assists YBMK to identify areas which could cause public safety concerns, hygiene issues or damage to infrastructure.

By actively inspecting all potential breeding sites and removing nests or eggs from the airport vicinity YBMK can continue to create an environment that is unattractive to birds. By undertaking these practices alongside other passive management techniques, including the modification of habitats around the airport, we can indirectly remove or reduce the number of birds attracted to the airport.

4.2 Detecting and Reporting Hazards

It is important to report all hazards posed by wildlife to aircraft in order to effectively identify and manage such risks. It is essential that all possible sources of information are investigated and details accurately recorded. Strike hazards are recorded in the YBMK Bird Strike Chart Database and forwarded to the ATSB and other relevant stakeholders within 72 hours of the incident regardless of strike confirmation or location.

Table 6. Requirements for detecting and reporting wildlife hazards, Mackay Airport.

Task	Frequency	Who	Reference
Runway and flight strip inspection	Daily	ASO	SOP: Wildlife Patrols and Inspections
Wildlife strike reporting	As required	ASO	SOP: Wildlife Strike Reporting
Bird patrol	Daily	ASO	SOP: Wildlife Patrols and Inspections

4.3 Managing Hazards

Strategies for managing wildlife strikes at an airport typically focus on managing populations on and surrounding the airport. Management actions are classified as either:

1. Active management – directly removing or reducing the numbers of animals in risky areas; or

2. Passive management – modifying habitats or other aspects of the airport environment to indirectly remove or reduce the number of animals attracted to risky areas.

Hazard removal actions and their outcomes are important sources of information. It is important that all dispersal, euthanasia and removal actions and their outcomes are recorded. This provides a historical record for comparison and analysis and may provide evidence of adequate wildlife hazard management in the event of litigation.

4.4 Active management

Active management plays an important role in managing the risks associated with the presence of wildlife. YBMK currently employs dispersal and depredation techniques using a variety of different tools and methods.

Frequency of active management is related to the detection of hazards and the opportunity to safely and effectively carry out the activity.

Basic Dispersal, Euthanasia and Removal Guidelines:

1. Dispersal is most intense at the end of the breeding season to discourage young wildlife from foraging at the airport.

2. Young are especially targeted in dispersal, to provide recognition that the airport is an unattractive and threatening environment.

3. Do not allow settling wildlife to feed or breed on the airport in order to discourage regular visitation or habituation.

4. Dispersal efforts are concentrated during peak wildlife activity periods such as early morning and mid to late afternoon.

5. Dispersal efforts are increased before each block of RPT movements across the day.

6. Dispersal actions are prioritised in relation to the location of the hazard, and the proximity to critical areas.

7. Actions such as egg/nest removal are undertaken to limit the breeding success and hence populations of birds nesting on-airport, to deter birds from establishing breeding territories on-airport and to limit the number of young birds present on-airport who are more likely to react inappropriately in the presence of aircraft.

Dispersal, Euthanasia and Removal Actions:

There are a number of options available for undertaking dispersal which are employed by ASOs at YBMK in various situations. This approach limits habituation of wildlife to any one dispersal option and ensures results with a variety of species. These include:

1. Vehicle, siren, lights, loud speakers and horns can be used to alarm and herd animals in a variety of airside environments.

2. Arm waves and stock whips are inexpensive and sometimes effective means of dispersal. These are useful with flocks of birds, or to lift birds from water before combining with other herding techniques.

3. Pyrotechnics is a very useful tool in dispersal. To reduce habituation use as few shots as possible to achieve the required effect and ensure the cartridge activates as close to the target as possible.

4. Lethal control is a last option management technique that is used to reinforce other non-lethal methods of dispersal and remove high risk animals in situations of imminent safety hazard. This method is always a controlled and targeted approach to strategically remove hazards. YBMK has a Damage Mitigation permit (DMP) issued by the Department of Environment and Heritage Protection (EHP). All ASOs equipped with a firearm hold current QLD Firearms licences and appropriate training. High risk species listed as 'least concern' under the *Nature Conservation Act 1992* that may need to be targeted for control are listed in Appendix D.

5. Physical removal of eggs and nests of species of least concern under the *Nature Conservation Act 1992* (refer to Appendix D) prior to hatching reduces breeding potential and can interrupt territorial behaviour. It is anticipated that removal of eggs/nests of these species on-airport will not have any detrimental effects on local or regional populations. The preferred practice is to minimise impact to such species by regularly undertaking inspections and monitoring to check for nests prior to any eggs/young. This will discourage the building of nests on the airport.

Table 7. Active wildlife hazard management requirements, Mackay Airport.

Task	Frequency	Who	Reference
Wildlife dispersal	As required	ASO	SOP: Wildlife Dispersal
Wildlife euthanasia	As required	ASO	SOP: Wildlife Euthanasia (incl. Egg/Nest Removal)
Egg and nest removal	As required	ASO/ AMS[1]	SOP: Wildlife Euthanasia (incl. Egg/Nest Removal)

[1] AMS = Asset Management Staff

Handling animal remains	As required	ASO	SOP: Identification/Handling of Wildlife Remains
Use of firearms	As required	ASO	SOP: Firearms Policy

4.5 Passive management

Grass Management

Long grass strategies have been trialled at YBMK in order to reduce populations of grassland species such as ibis, magpies, lapwings, whistling ducks and Magpie Geese. While effective in the winter months, high summer rainfall inhibits access by mowing equipment in some areas. YBMK encourages grass heights of up to 300mm where possible on the airport in dry months. During December, YBMK mows the grass to 200mm to help mitigate the problem of inaccessibility during summer. Mowing is completed by Maintenance Staff (MS).

Drainage

Drain design that encourages rapid water drainage have been factored into new drainage works at YBMK. This will discourage birds, particularly ducks, from foraging and sheltering in airside areas during high rainfall events.

Table 8. Passive wildlife hazard management requirements, Mackay Airport.

Task	Frequency	Who	Reference
Grass management	As required	MS	SOP: Grass Management

5. Species Management

This section details the actions required to manage those species that have been assessed as moderate to high risk at YBMK.

Species action plans (high risk):

- SAP01 Australian White Ibis
- SAP02 Plumed Whistling-duck

Species management table (moderate risk):

- Black Kite
- Straw-necked Ibis
- Torresian Crow
- Feral Pigeon
- Whistling Kite
- Royal Spoonbill
- Pacific Black Duck
- Rainbow Lorikeet
- Eastern Osprey
- Cattle Egret
- White-faced Heron
- Masked Lapwing
- Flying-foxes
- Bush Stone-curlew
- Wandering Whistling-duck
- Greater Sand Plover

SAP01 Australian White Ibis

Overall Risk:	High
Strike History (2009/10-2013/14):	0
Damaging Strikes (2009/10-2013/14):	0
Mass (g):	1950
IUCN conservation status	Least Concern

Species Information

Australian White Ibis (*Threskiornis molucca*) has a featherless black head with a distinctive large curved black bill. Its body plumage is predominantly white with a black tail and black legs. Distributed over much of Australia, the Australian White Ibis is a large native waterbird. Originally inhabiting natural habitats such as terrestrial wetlands, grasslands, saline and marine environments, Australian White Ibis are now highly adapted to urban environments such as landfills, cultivated areas, urban parks and gardens, airports, and sewage farms. Their diet consists of insects, fish, crustaceans and molluscs, but also almost any putrescible waste.

Australian White Ibis are usually found in small groups or flocks. They can also soar on thermals to high altitudes. On airports, ibis are particularly attracted to disturbed grassland invertebrates immediately following grass mowing.

Australian White Ibis nest and roost in large colonies, often gathering in large flocks to forage. Breeding occurs between June to December in southern Australia, but in urban areas, it can extend into early March.

Reason for Listing

Australian White Ibis are a large flocking species which have a high strike tendency and the ability to cause significant damage to aircraft when struck.

Presence at Mackay Airport

Australian White Ibis are predominantly observed transiting the southern end of the airfield as they move between foraging locations situated within the Shellgrit Creek. This species rarely forages airside however, they can sometimes mix with flocks of Straw-necked Ibis.

Management Actions

Continue the long grass strategy, ensuring grass heights are maintained at approximately 300mm in all areas except the flight strips where suggested mowing height is 200mm.

When Australian White Ibis are observed the following actions are taken:

- Dispersal using standard dispersal techniques.

- Monitor flight path prior to RPT movements and notify pilots of hazards.
- Judicious euthanasia of individuals that pose an immediate hazard to aircraft or are persistently utilising the airside area.
- For persistent long-term risks, a NOTAM will be issued.

Responsibilities

Implementation: ASO and Manager Aviation Operations

Accountability: Manager Aviation Operations

SAP02 Plumed Whistling-Duck

Overall Risk:	High
Strike History (2009/10-2013/14):	4 (3 multiple)
Damaging Strikes (2009/10-2013/14):	1
Mass (g):	1000
IUCN conservation status	Least Concern

Species Information

The larger of the two whistling duck species found in Australia, the Plumed Whistling-Duck (*Dendrocygna eytoni*) name is derived from their flamboyant elongated feathers that extend from the flanks over the wings and above the bodyline. A tall, long legged species with an elongated neck, their legs and bill are light pink in colour. Plumage across the back is black, with the chest a pale cinnamon colour that is lightly barred black.

Also known as grass whistling ducks due to their preference to forage in open grassland, they are not commonly associated with open water bodies. The size and nature of the water system is unimportant, birds will gather in flocks that can number in the hundreds in regions with lush or seeding grass growth. A highly mobile and migratory species that is able to transit large distances in search of suitable habitat. Birds tends to transit and forage more commonly at night, often arriving in an area from their daytime roost just prior to dusk before spreading out in groups to feed.

Reason for Listing

Very high numbers observed airside at night, and the occurrence of a multiple strike in April 2011 (3 birds) and again in July 2011 (6 birds).

Presence at Mackay Airport

Flocks of up to 40 birds observed roosting and foraging airside in long grass and drains, most frequently in the northern and western areas of the airport. A large transient population inhabits the farmland (Manzelmann's) to the south of the airport that is the major source of this species airside.

Management Actions

Continue the long grass strategy, ensuring grass heights are maintained at approximately 300mm in all areas except the flight strips where suggested mowing height is 200mm.

When Plumed Whistling-ducks are observed the following actions are taken:

- Dispersal using standard dispersal techniques.
- Monitor flight path prior to RPT movements and notify pilots of hazards.

- Judicious euthanasia of individuals that pose an immediate hazard to aircraft or are persistently utilising the airside area.
- For persistent long-term risks, a NOTAM will be issued.
- Liaise with Mr Manzelmann regarding options for monitoring and implementing management actions to decrease utilisation and attractiveness of the property.

Responsibilities

Implementation: Maintenance Staff and ASO on Duty

Accountability: Maintenance Staff and Airside Safety Supervisor

Species Management Table

Species	Risk Category	Management Actions Required
Black Kite	Moderate	• Use integrated dispersal techniques including long-range pyrotechnics to disperse as per Section 4.3.1 of this WHMP. • Limit attraction to airport by: – Removing carcasses from on and around YBMK. – Ensuring waste receptacles are covered.
Straw-necked Ibis	Moderate	• Use active dispersal techniques as per Section 4.3.1 of this WHMP. • Disperse ibis as early as possible in the day or when they arrive to discourage regular use. • Cull persistent individuals or the flock scout where necessary as per Section 4.3.1 of this WHMP. • Maintain an effective grass height strategy as per Section 4.3.2 of this WHMP.
Torresian Crow	Moderate	• Use active dispersal techniques as per Section 4.3.1 of this WHMP. • Limit attraction to airport by: – Removing carcasses from on and around YBMK. – Ensuring waste receptacles are covered.
Feral Pigeon	Moderate	• Use active dispersal techniques as per Section 4.3.1 of this WHMP. • Limit perching and nesting habitat on-airport including built environment (e.g. hangars), installing netting and anti-perching spikes where appropriate. • Maintain an effective grass height strategy as per Section 4.3.2 of this WHMP.
Whistling Kite	Moderate	• Use integrated dispersal techniques including long-range pyrotechnics to disperse as per Section 4.3.1 of this WHMP.

		• Limit attraction to airport through limiting prey species (i.e. juvenile magpies and vertebrate pests such as rodents.
Royal Spoonbill	Moderate	• Use active dispersal techniques as per Section 4.3.1 of this WHMP.
Pacific Black Duck	Moderate	• Use active dispersal techniques as per Section 4.3.1 of this WHMP. • Disperse loafing flocks during daylight hours to deter habitat use at night. • Cull persistent individuals where necessary in accordance with Section 4.3.1 of this WHMP. • Limit attraction to airport by removing/reducing sources of ponded water, for example: – Net drains/creeks to prevent access. – Infill ground depressions that are prone to ponding.
Rainbow Lorikeet	Moderate	• Limit attraction to airport through landscape management; avoid using attractive plant species on-airport such as Melaleuca and Eucalypt.
Eastern Osprey	Moderate	• Use integrated dispersal techniques including long-range pyrotechnics to disperse as per Section 4.3.1 of this WHMP. • Limit attraction to airport by removing carcasses/fishing waste from on and around YBMK. • Limit perching o signs, built environment).
Cattle Egret	Moderate	• Use active dispe of this WHMP. • Maintain an effective grass height strategy as per Section 4.3.2 of this WHMP.
White-faced Heron	Moderate	• Use active dispersal techniques as per Section 4.3.1 of this WHMP. • Maintain an effective grass height strategy as per Section 4.3.2 of this WHMP.
Masked Lapwing	Moderate	• Use active dispersal techniques as per Section 4.3.1 of this WHMP. • Increase dispersal intensity in later winter/early spring when territorial behaviour commences to

AVISURE
MITIGATING BIRD STRIKE RISK

		discourage breeding. • Maintain an effective grass height strategy as per Section 4.3.2 of this WHMP.
Flying-foxes	Moderate	• Monitor critical airspace during fly-out times and notify relevant stakeholders when hazard is present. • Limit attraction to airport through landscape management; avoid using attractive plant species on-airport such as Melaleuca and Banksia.
Bush Stone-curlew	Moderate	• Use active dispersal techniques as per Section 4.3.1 of this WHMP. • Maintain an effective grass heights strategy as per Section 4.3.2 of this WHMP.
Wandering Whistling-duck	Moderate	• Use active dispersal techniques as per Section 4.3.1 of this WHMP. • Disperse loafing flocks during daylight hours to deter habitat use at night. • Maintain an effective grass heights strategy as per Section 4.3.2 of this WHMP.
Greater Sand Plover	Moderate	• Use active dispersal techniques as per Section 4.3.1 of this WHMP. • Disperse loafing flocks during daylight hours to deter habitat use at night. • Maintain an effective grass heights strategy as per Section 4.3.2 of this WHMP.

References

Allan, J. O., (2006) *A Heuristic Risk Assessment Technique for Birdstrike Management at Airports*. Risk Analysis, Vol. 26, No. 3, pp. 723-729, June 2006

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Civil Aviation Safety Authority (2013) Manual of Standards Part 139 – Aerodromes. Version 1.11

Civil Aviation Safety Regulations (1998) Part 139.

International Civil Aviation Organisation (1999) *The need to strengthen the provisions of ICAO annex 14, Volume 1, relating to bird control on and in the vicinity of Airports*. Proceedings of Bird Strike '99, Vancouver, Canada.

Thorpe, J. (2012) *Update on Fatalities and Destroyed Civil Aircraft due to Bird Strikes*. 30th Meeting of the International Bird Strike Conference, Stavanger, Norway.

Appendices

Appendix A: Roles and Responsibilities

Appendix B: Risk Assessment

Appendix C: Committee

Appendix D: Targeted Species for Euthanasia and Egg/Nest Removal

Appendix A: Roles and Responsibilities

In order to facilitate effective management of wildlife risks, roles and responsibilities for the implementation of the YBMK WHMP are outlined in this section.

Position	Responsibilities
MAPL Manager Aviation Operations	Endorse the final version of the WHMP. Ensure resources for implementing the WHMP are provided. Oversee implementation and review of the WHMP. Liaise with other stakeholders and committee members (aircraft operators, local government and Air Traffic Control).
MAPL Aviation Regulatory Compliance Supervisor	Ensure that YBMK Operations staff are trained and competent in the functions required for wildlife hazard management. Ensure ASO's adhere to responsibilities listed in the WHMP. Update annual risks in WHMP as per wildlife hazard management annual report.
NQA Manager, Environment	Lodge Return of Operations and amendments to Damage Mitigation Permit to EHP. Review management actions and practices and provide technical advice where actions or practices need to be altered. Liaise with EHP if further mitigation actions are necessary.
MAPL Airport Safety Officers	Count, inspect assess, remove, record and report wildlife or potential attractions as described in the relevant sections of the WHMP. Use, store and maintain firearms and ammunition as required by MAPL.

Appendix B: Risk Assessment

The Risk Assessment Process

Management of bird and other wildlife hazards at airports requires an understanding of wildlife populations, their behaviour, and the risk management process. The process outlined in Australian & New Zealand Standard 31000:2009 Risk Management has been followed for this assessment.

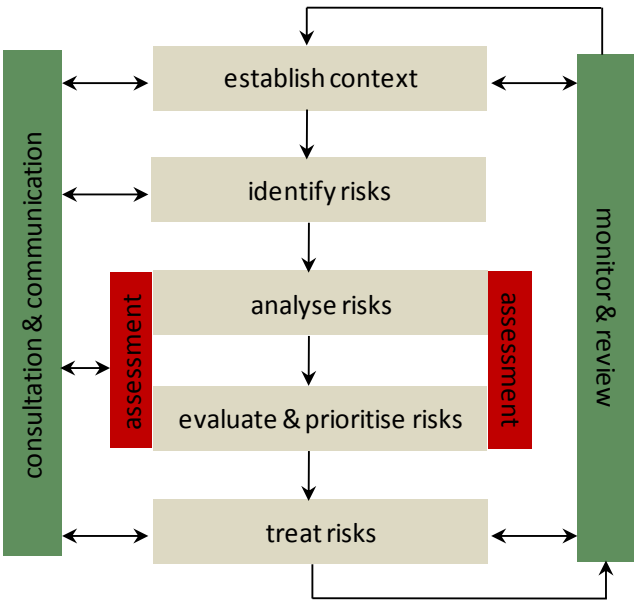

Figure B1. The risk management process (Source: AS/NZS 31000:2009 Risk Management)

Previous efforts to rank species according to risk level have involved one of the following:

1. Using national databases to indicate risk level across a country (Dolbeer et al., 2000). This lacks the resolution required to determine risk at a particular airport, although may be useful as a guide.

2. Subjective assessment based on knowledge of species present, interpretation of the strike history and professional judgement. This is the primary methodology used by advisors to airports worldwide.

3. A more formalised, yet still subjective assessment of risk based on scoring a species for categories such as population size, bird mass, flock size, time of day, location on airport, time spent in air, etc (Carter, 2001; Morgenroth, 2003). This assessment is open to the vagaries of professional interpretation and cannot be easily used to compare one airport with another, or objectively compare one year to the next.

4. A determination of probability of strike based on bird strike history at the airport over the previous five years to determine a yearly average for each species and using percentage of strikes causing damage for each species in a national bird strike database to determine consequence levels (Allan 2006). This

methodology does not consider the effect of differences in numbers of aircraft movements both between airports and across the same airport for different time periods.

Two methods, which offer a means of objectively comparing the risk between years at an individual airport, are the strike risk assessment (Allan 2006) and the survey risk assessment (Shaw 2004).

Strike Risk Assessment (Allan, 2006)

This method uses historical strike data to assign a risk to specific bird species. It assumes that bird species composition, movement patterns and distribution remain constant from year to year. Bird species are categorised in terms of their probability of being struck (using a five year strike history from the airport), and the likelihood of damage should they be struck (derived from the United Kingdom's bird strike database using body mass). This allows it to be placed into a risk matrix as outlined below.

		Probability of Strikes (5yr average)				
Probability of damage		Very Low	Low	Moderate	High	Very High
	Very Low					
	Low		Species A			
	Moderate					
	High	Species B			Species C	
	Very high					

Figure B2. Strike risk assessment matrix (Allan 2006).

Risks that fall into the green section are classified as "low" and require no further action beyond current management; brown is "moderate" and requires a review of current management practices and options for additional action, and; red is "high" and requires immediate action to reduce the current risk. If a strike involves a multiple strike, the likelihood of damage increases. Therefore, species involving multiple strikes are increased up one risk category.

Risk assessment procedures based on historical strike data are limited, as they cannot easily accommodate real time changes in bird species composition or distribution. It cannot categorise species that have not been struck in the previous five year period, yet may remain a significant risk. It is also dependent on effective bird strike reporting which is consistent over time.

Survey Risk Assessment (Shaw, 2004)

Avisure has developed a model for determining risk categories using professional bird survey data. The survey data is used to derive probability factors (population size, position on airport, time spent in air and the species ability to avoid) and consequence factors (bird mass and flock size) for all species recorded. The combination of these probability and consequence factors gave a numerical risk index, the Survey Risk

Index (SRI). This provides a real-time method of risk assessment as it is able to react to observed changes in airside bird assemblages and movement patterns.

The following tables outline the risk rating for wildlife species according to calculated SRI, and the risk ranking of an airport.

Table B1. Survey Risk Index and Airport Species Risk Index for determining risk categories based on survey data.

SRI ranges used to rate risk for each species		ASRI ranges used to rate risk of an airport	
SRI	Risk rating	ASRI	Risk rating
>1000	Very high	>10000	Very high
100 to 999.9	High	1000 to 9999.9	High
10 to 99.9	Moderate	100 to 999.9	Moderate
1 to 9.9	Low	10 to 99.9	Low
< 1	Very low	< 10	Very low

The process intends to provide a transparent, logical and systematic approach to the identification and treatment of wildlife related risks at the airport. The risk assessment identifies high risk species, which allows suitable management practices to be targeted in areas where the maximum reduction in risk may be achieved.

References

Allan, J. O., (2006) *A Heuristic Risk Assessment Technique for Birdstrike Management at Airports.* Risk Analysis, Vol. 26, No. 3, pp. 723-729, June 2006

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Dolbeer, RA, Wright, SE and Cleary. EC 2000, 'Ranking the hazard level of wildlife species to aviation', *Wildlife Society Bulletin* 28:372–378

Morgenroth, C. (2003) *Development of an index for calculating the flight safety relevance of bird species for an assessment of the bird strike hazard at airports*. Bird and Aviation 23.

Shaw, P.P. (2004) *A model for determining risk categories for birds at airports using bird survey data*. Bird Strike 2004. Baltimore, USA.

Standards Australia/Standards New Zealand 2009, Risk management – principles and Guidelines. Sydney, New South Wales, Australia

Appendix C: Committee

Wildlife Hazard Management Committee (WHMC)

Activities both on and off-airport affect the safety of airport operations, aircraft and passengers using Mackay Airport. A cooperative effort is required to adequately manage the risk to aircraft operations posed by wildlife at Mackay Airport. The aim of this committee is to provide a forum for discussion with relevant stakeholders and local authorities of regulatory requirements and management practices to assist in the implementation of wildlife risk management.

Membership of this committee comprises of representatives of those stakeholder groups with an operational interest in the management of wildlife hazards and those organisations who can assist with hazard management. Representatives from the following groups or organisations are included in the meetings:

- MAPL Staff
- North Queensland Airports Environment Staff
- Airservices Australia
- Civil Aviation Safety Authority
- Airlines (Qantas, Virgin, Jetstar, Tiger etc)
- Ground Handling Services
- Department of Environment and Heritage Protection
- Reef Catchments
- Mackay Regional Council (Planning and Waste management divisions)
- Avisure.

Meeting twice per year, the committee assists with:

- The ongoing exchange of information between stakeholders to improve wildlife management
- Ensuring all stakeholders are aware of their responsibilities
- Encouraging all stakeholders to adopt a proactive approach and consider wildlife management issues
- Improving communication of issues between key stakeholders
- Reducing the economic/financial impact on aircraft operators and improve operational safety.

Appendix D: Targeted Species for Euthanasia and Egg/Nest Removal

Euthanasia

Table D1. Species listed for Euthanasia

Common Name	Scientific Name	NC(W)R listing
Collared Sparrowhawk	*Accipiter cirrocephalus*	Least Concern
Brown Goshawk	*Accipiter fasciatus*	Least Concern
Pacific Black Duck	*Anas superciliosa*	Least Concern
Magpie Goose	*Anseranas semipalmata*	Least Concern
Cattle Egret	*Ardea ibis*	Least Concern
Intermediate Egret	*Ardea intermedia*	Least Concern
White-necked Heron	*Ardea pacifica*	Least Concern
Bush Stone-curlew	*Burhinus grallarius*	Least Concern
Silver Gull	*Chroicocephalus novaehollandiae*	Least Concern
Torresian Crow	*Corvus orru*	Least Concern
Australian Magpie	*Cracticus tibicen*	Least Concern
Wandering Whistling-duck	*Dendrocygna arcuata*	Least Concern
Plumed Whistling-duck	*Dendrocygna eytoni*	Least Concern
White-faced Heron	*Egretta novaehollandiae*	Least Concern
Nankeen Kestrel	*Falco cenchroides*	Least Concern
Magpie Lark	*Grallina cyanoleuca*	Least Concern
Whistling Kite	*Haliastur sphenurus*	Least Concern
Black Kite	*Milvus migrans*	Least Concern
Australian White Ibis	*Threskiornis molucca*	Least Concern
Straw-necked Ibis	*Threskiornis spinicollis*	Least Concern
Masked Lapwing	*Vanellus miles*	Least Concern

As per the MAPL SOP, euthanasia is utilised as a last resort to manage the threat of wildlife on the airport. Euthanasia also includes the removal of eggs and nests where required, refer tables D2 and D3.

Egg Removal

Table D2. Egg removal management

Common Name	Scientific Name	NC(W)R listing	Location observed	Justification for removal, where necessary *
Pied Butcherbird	*Cracticus quoyi*	Least Concern	Landside – in signage frames, around terminal and Eastern GA.	To discourage presence of species and breeding on airport.
Australian Magpie	*Gymnorhina tibicen*	Least Concern	Landside – in signage frames, around terminal, car parks and Eastern GA.	To discourage presence of species and breeding on airport. Reduce public safety concerns from swooping birds.
Torresian Crow	*Corvus orru*	Least Concern	Landside – in signage frames, around terminal and Eastern GA.	To discourage presence of species and breeding on airport.
Masked Lapwing	*Vanellus miles*	Least Concern	Airside/Landside – in grassed areas adjacent to operational areas, i.e. runways/car parks.	To discourage presence of species and breeding on airport. Reduce public safety concerns from swooping birds.
Bush Stone-curlew	*Burhinus grallarius*	Least Concern	Airside – General and Western GA apron and taxiways.	To discourage presence of species and breeding on airport and to reduce risk of possible damage to aircraft. Previously observed in critical areas on aprons.
Fairy Martin	*Petrochelidon ariel*	Least Concern	Airside – in culverts and drains in critical areas adjacent to runways.	To discourage presence of species on airport and reduce risk of possible damage to aircraft. Recently observed nesting in critical areas adjacent to runways. Management is required despite current listing as a low risk species.

*The aims of this WHMP is to minimise the hazard to aircraft operations created by the presence of wildlife on or in the vicinity of the airport, and to address other wildlife management issues such as public safety from swooping birds, hygiene issues and damage to infrastructure. Depending on the species, it is difficult to identify nests on airport before eggs are laid.

Note: Some eggs may be inadvertently destroyed when mowing in long grass.

Nest Removal

Table D3. Nest removal management

Common Name	Scientific Name	NC(W)R listing	Location observed	Justification for removal, where necessary *
Pied Butcherbird	*Cracticus quoyi*	*Least Concern*	*Landside – nesting in signage frames, around terminal and Eastern GA.*	*To discourage presence of species and breeding on airport and to reduce risk of possible damage to infrastructure.*
Australian Magpie	*Gymnorhina tibicen*	Least Concern	Landside – nesting in signage frames, around terminal, car parks and Eastern GA.	To discourage presence of species and breeding on airport and to reduce risk of possible damage to infrastructure. Reduce public safety concerns of swooping birds.
Torresian Crow	*Corvus orru*	Least Concern	Landside – nesting in signage frames, around terminal and Eastern GA.	To discourage presence of species and breeding on airport and to reduce risk of possible damage to infrastructure.
Masked Lapwing	*Vanellus miles*	Least Concern	Airside – nesting in grassed areas adjacent to operational areas, i.e. runways.	To discourage presence of species and breeding on airport and to reduce risk of possible damage to infrastructure. Reduce public safety concerns of swooping birds.
Bush Stone Curlew	*Burhinus grallarius*	Least Concern	Airside – General and Western GA apron and taxiways.	To discourage presence of species and breeding on airport and to reduce risk of possible damage to infrastructure/aircraft. Previously observed in critical areas on aprons.
Fairy Martin	*Petrochelidon ariel*	Least Concern	Airside – nesting in culverts and drains in critical areas adjacent to runways.	To discourage presence of species on airport and reduce risk of possible damage to aircraft. Recently observed nesting in critical areas adjacent to runways. Management is required despite current listing as a low risk species.

*The aims of this WHMP is to minimise the hazard to aircraft operations created by the presence of wildlife on or in the vicinity of the airport, and to address other wildlife management issues such as public safety from swooping birds, hygiene issues and damage to infrastructure.

By actively inspecting all potential breeding sites and removing nests from the airport vicinity, we can continue to create an environment that is unattractive to birds. By undertaking these practices alongside other passive management techniques, including the modification of habitats around the airport, we can indirectly remove or reduce the number of birds attracted to the airport.

Although it will never be possible to keep the airfield entirely free of birds, by minimising the number of birds living and frequenting on the airport surrounds we can reduce the risk of strikes occurring.

Figure D1. Mackay Airport habitat.

Revision History

Rev. No.	Rev. Date	Details	Prepared by	Reviewed by	Approved by
00	28/07/2014	WHMP – Update	Mandy Todd Wildlife Biologist	Chris Perry Wildlife Biologist	Kylie Patrick Principal Wildlife Consultant

Distribution List

Copy No.	Date	Format	Issued to	Name
1	28/07/2014	E-copy	Mackay Airport Pty Ltd	Phil Clark: Manager Aviation Operations
2	28/07/2014	E-copy	Avisure	Administration

info@avisure.com.au / www.avisure.com.au

GB159_14 Mackay Airport.RE. Wildlife Hazard Management Plan Update July 2014.

Report compiled by Avisure Pty Ltd