

**Microhabitat Utilisation by Bird Species at Royal Australian Air Force Edinburgh (RAAF EDN)  
South Australia**

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## **Abstract**

Bird management is a significant issue for the Royal Australian Air Force Base Edinburgh (RAAF EDN). Previous consultant reports have focused on the identification of bird species and basic non-lethal bird management strategies. Their recommendations have been based on short-term observations and have not addressed such issues as variations in weather, seasonal changes, microhabitat structure or modification of these situations as a result of the current redevelopment program on the Base which may increase risk to aviation safety.

The research program was conducted at the Base between 14 April and 4 September 2009 and focused on the microhabitat structure and how bird species interacted within the structure. Four survey sites were identified Site 1 Golf Course, Site 2 Southern Detention Area, Site 3 Airside and Site 4 Accommodation. Data collected identified which sites attracted particular birds and the behaviours they displayed. Analysis of this data provided an understanding of how to develop specific management strategies to reduce their presence. Air Traffic Control (ATC) also provided data collected as part of an on-going program implemented on Base.

Twenty species of bird were identified with Site 1 Golf Course attracting the highest and most diverse range of bird species, and Site 4 Accommodation recording the lowest. Activities undertaken by the birds ranged from flying overhead without interacting with the site to flying into the microhabitat to feed, stand or perch, walk, swim, chase or fight. It was also observed that different bird species utilised different positions within the microhabitats.

Analysis identified a range of issues which impacted both directly and indirectly upon the Base. For instance, even though Site 1 was the most utilised site it was noted that a reduction in bird population was achieved when the microhabitat was modified during a storm and the birds utilising that particular structure relocated elsewhere. It was also concluded that the data recorded in Site 3 Airside supported the data collected by ATC. Site 4 had the best vegetation structure for bird access and interaction but was the least utilised until towards the end of the observation period.

One of the more critical sites identified through this research was the Airfield where the presence of birds could lead to a catastrophic bird strike. The presence of bird species in this area together with the continuing development of Site 2 impacts on the core business of this Base, resulting in delays, near misses and bird strikes ATC (2009).

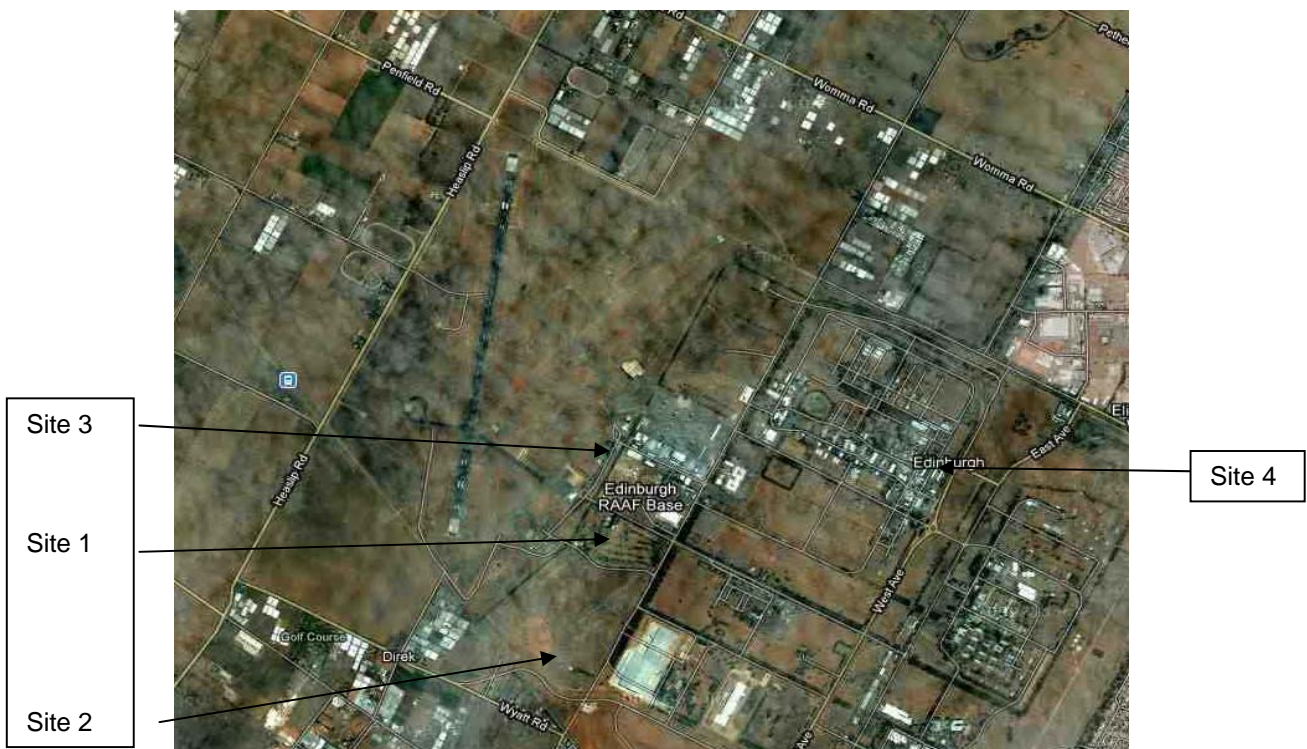
The research concluded that a rigorous program on monitoring and recording bird presence and activities, as well as habitat modification and bird harassment strategies would reduce the likelihood of bird strike. Seasonal food sources, which attract bird species to these critical areas, need to be managed and an audit of the airfield biodiversity would assist in the development of this bird strike reduction program.

## 1 Introduction

Birds are part of the environment at RAAF Base Edinburgh in South Australia located to the north of the city of Adelaide. The original vegetation indigenous to the area no longer exists and although many of the established trees and understorey are Australian species, they are not indigenous to the area (ERM, 2007). The vegetation structure is well established consisting mature gums with high canopies and an understorey exhibiting a range of herbs and introduced weeds. Very few low to mid-range shrubs are located on the Base and much of the structure of the site is open areas with planted stands of Eucalypts and Aleppo Pines.

Previous RAAF Bird Management Plan Reports identified birds species observed in a number of locations on the Base but did not identify the type of microhabitat the species were observed in or how the species utilised the areas. As a consequence, it was determined there would be benefit in undertaking a more indepth study investigating which bird species accessed identified microhabitats and what attracted these species to those areas.

The research was conducted in 2009 over a five-month period between April and September, observing and recording the activities of birds in four identified survey sites. Three sites were located within the Base and the fourth was located adjacent to the southern boundary of the Base.



Source: [www.google.com](http://www.google.com) (Google Earth, 2009) (No scale available)

The survey sites identified were:

Survey Site 1 – Golf Course located in the south eastern corner of the Base

Survey Site 2 – Southern Detention Area located adjacent to the Base and the southern end of Runway 36

Survey Site 3 – Airside the area adjacent to Taxiway Bravo between the Tanker Refueling Compound and Air Traffic Control Tower

Survey Site 4 – Accommodation area to the north of the Officers' Accommodation and west of the two-storey accommodation block

Each site was identified as an area where the presence of bird species impacted on either the environment or operational activities undertaken at RAAF EDN. The overall structure of each site was similar with mature trees, groundcover with a lack of low-medium shrubbery. Exceptions to this were in the Southern Detention Area where no trees and very little groundcover existed at the beginning of the observation period and the Airside Area where trees were only located to the east of Taxiway Bravo.

Analysis of the data collected determined that, as 30% of the bird species observed on the Base were located on the airfield, their presence could increase the risk of bird strikes, near misses during take-offs and landings, aborts and delays which would continue to rise unless this situation was acknowledged, evaluated and managed.

Another factor which possibly increases the presence of bird species, particularly Silver Gulls is the waste transfer station located about 1 km the north of the Base. This facility accepts waste products and attracts a large number of birds. Opposite the waste transfer station is the Northern Detention Area which contains mature trees and a long-term water source. These establishments together with the Kaurua wetlands located approximately 5 kms south of the Base, the Southern Detention Area adjacent to the Base and the proposed program of expanding the Southern Detention have not taken into consideration 13km bird circle (IBSC, 2006) may all increase the attractiveness of the area.

## 2 Survey Sites

### Site 1 RAAF EDN Golf Course

The well maintained RAAF EDN 18-hole Golf Course located on the southern side of Fifth Avenue consists of greens, fairways with a variety of mature trees. The area of interest was the 9<sup>th</sup>/18<sup>th</sup> hole. The Golf Course has since been closed and the area will no longer be irrigated through the dry summer months.



Survey Site 1 Golf Course (Google Earth, 2009) (No scale available)



Species identified at this site include:

Site 1 Tree Species:

| Common Name | Species Name                 |
|-------------|------------------------------|
| Sugar Gums  | <i>Eucalyptus cladocalyx</i> |
| Aleppo Pine | <i>Pinus halepensis</i>      |
| Bottlebrush | <i>Callistemon</i> spp.      |
| Grey Box    | <i>Eucalyptus microcarpa</i> |

Site 1 Ground Vegetation Species:

| Common Name            | Species Name                            |
|------------------------|---|
| Cape Weed              | <i>Arctotheca calendula</i> (L.) Levyns |
| Various Winter Grasses | Unknown                                 |
| Onion Weed             | <i>Asphodelus fistulosus</i>            |
| Nut Grass              | <i>Cyperus rotundas</i>                 |
| “Carpet” weed          | Unknown                                 |
| Soursobs               | <i>Oxalis pes-caprae</i>                |
| Ruby Saltbush          | <i>Enchylaena tomentosa</i>             |

**Site 2 Southern Detention Area**

The City of Salisbury recently established the Southern Detention Basin which is located within the RAAF Base. The Southern Detention Basin is licensed to the City of Salisbury to operate the flood mitigation function and storm water harvesting. This involves linear wetlands that polish storm water prior to injection into an Aquifer storage recovery system. .

There are no trees in this site. Most of the vegetation was not identified because of the inability to access the site. However the vegetation comprising winter grasses and unidentified groundcover which grew during the observation period appeared to be similar to the species seen growing along the roadside.



Survey Site 2 Southern Retention Area (Google Earth, 2009) (No scale available)

Species identified at this site include:

Site 2 Ground Vegetation Species

| Common Name            | Species Name                               |
|------------------------|--|
| Cape Weed              | <i>Arctotheca calendula</i> (L.)<br>Levyns |
| Various Winter Grasses | Unknown                                    |
| Onion Weed             | <i>Asphodelus fistulosus</i>               |
| Water Reeds            | <i>Typha</i> spp.                          |

**Site 3 – Airside Area**

The Airside Site is located on the eastern side of Taxiway Bravo. The site comprises established trees (*Eucalyptus* spp), grasses, unidentified groundcover, leaf litter and sealed surfaces. There is no understorey and the grass is maintained in accordance with the Manual of Standards 139 - Aerodromes (CASA 2008).



Survey Site 3 Airside (Google Earth, 2009) (No scale available)

Species identified at this site include:

Site 3 Tree Species:

| Common Name            | Species Name                 |
|------------------------|------------------------------|
| Sugar Gum              | <i>Eucalyptus cladocalyx</i> |
| Grey Box Gum Myrtaceae | <i>Eucalyptus microcarpa</i> |

Site 3 Ground Vegetation Species

| Common Name            | Species Name                            |
|------------------------|---|
| Cape Weed              | <i>Arctotheca calendula</i> (L.) Levyns |
| Various Winter Grasses | Unknown                                 |
| Onion Weed             | <i>Asphodelus fistulosus</i>            |
| Nut Grass              | <i>Cyperus rotundas</i>                 |
| Kikuyu                 | <i>Pennisetum clandestinum</i>          |
| “Carpet” weed          | Unknown                                 |
| Soursobs               | <i>Oxalis pes-caprae</i>                |
| Ruby Saltbush          | <i>Enchylaena tomentosa</i>             |

**Site 4 – Accommodation**

Site 4 Accommodation is located in the Domestic Area. This, and the surrounding area, is considered the most accessed roosting point used by the Corellas when residing at Edinburgh. The location contains a number of mature (*Eucalyptus spp*) trees but no understorey. At the commencement of observations the ground was dirt with minimal leaf litter however rainfall during the observation period encouraged the growth of groundcover.



Accommodation Area Survey Site (Google Earth, 2009) (No scale available)

Species identified at this site include:

Site 4 Tree Species

| Common Name   | Species Name                    |
|---------------|---------------------------------|
| Carob         | <i>Ceratonia siliqua</i>        |
| Cypress Pine  | <i>Callitris spp.</i>           |
| Silky Oak     | <i>Grevillea robusta</i>        |
| Sugar Gum     | <i>Eucalyptus cladocalyx</i>    |
| Grey Box Gum  | <i>Eucalyptus microcarpa</i>    |
| River Red Gum | <i>Eucalyptus camaldulensis</i> |
| Pepper        | <i>Schinus aeria var molle</i>  |

|              |                           |
|--------------|---------------------------|
| Stringy Bark | <i>Eucalyptus obliqua</i> |
| Aleppo Pine  | <i>Pinus halepensis</i>   |

#### Site 4 Ground Vegetation Species

| Common Name            | Species Name                               |
|------------------------|--|
| Cape Weed              | <i>Arctotheca calendula</i> (L.)<br>Levyns |
| Various Winter Grasses | Unknown                                    |
| Onion Weed             | <i>Asphodelus fistulosus</i>               |
| Nut Grass              | <i>Cyperus rotundas</i>                    |
| Kikuyu                 | <i>Pennisetum clandestinum</i>             |
| Soursobs               | <i>Oxalis pes-caprae</i>                   |
| Ruby Saltbush          | <i>Enchylaena tomentosa</i>                |

#### Air Traffic Control (ATC) Observations

Air Traffic Control Bird Activity Reports are included in this research as they have been part of an established reporting system for the past three years. They are used to substantiate priorities when implementing the RAAF Bird Management Action Plan.

No trees are planted on the airfield and ground vegetation structure is the same as Site 3. Length of cover is maintained in accordance with the Manual of Standards 139 - Aerodromes (CASA 2008).

#### ATC Vegetation Species

| Common Name            | Species Name                            |
|------------------------|---|
| Cape Weed              | <i>Arctotheca calendula</i> (L.) Levyns |
| Various Winter Grasses | Unknown                                 |
| Onion Weed             | <i>Asphodelus fistulosus</i>            |
| Nut Grass              | <i>Cyperus rotundas</i>                 |
| Kikuyu                 | <i>Pennisetum clandestinum</i>          |
| Soursobs               | <i>Oxalis pes-caprae</i>                |
| Ruby Saltbush          | <i>Enchylaena tomentosa</i>             |

### 3 Methodology

To establish the level of risk the presence of these birds have on operational capability the research program included recording birds that flew straight over without interacting with the site as well as those that flew into and interacted with the survey site. These observations were then recorded on a formatted environmental survey form and collated.

Observations commenced on Tuesday 14 April 2009 and were conducted twice weekly until Friday 4 September 2009. Each survey site was visited twice during the week and observed the activities of the bird species present in that site. Each observation period lasted 15 minutes and was recorded on the survey form.

The information captured in the recording format included:

- location
- vegetation
- weather
- species
- time observed
- number of birds
- what activity



- where in the survey site they were located, and
- any relevant comments.

During the observation period 58.7% of the observations were completed in the morning, particularly at the Southern Detention Area. To ensure consistency, observers recorded the Little Corella (*Cacatua sanguinea*) and Long-billed Corella (*Cacatua tenuirostris*) as 'Corellas', and the Purple-crowned Lorikeet (*Glossopsitta porphyrocephala* Trichoglossus), Rainbow Lorikeet (*Haematodus Race eyei*) and Eastern Rosella (*Platycercus eximius* Race eximius) as 'Parrot and Lorikeets'. The category 'Duck' refers to the Australian Wood Duck (*Chenonetta jubata*) and Pacific Black Duck (*Anas superciliosa*). Over 1100 birds were recorded during this time.

To support the program equipment including a digital camera, binoculars, voice recorder and lap top were utilised. Data collected was collated and analysed to provide the following results.

#### 4 Results

During the research program the following species were identified.

| Common Name              | Scientific Name                                  |
|--------------------------|--|
| Australian Magpie        | <i>Gymnorhina tibicen</i> Race <i>telonocua</i>  |
| Australian White Ibis    | <i>Threskiornis molucca</i>                      |
| Australian Wood Duck     | <i>Chenonetta jubata</i>                         |
| Black Swan               | <i>Cygnus atratus</i>                            |
| Eastern Rosella          | <i>Platycercus eximius</i> Race <i>eximius</i>   |
| Galah                    | <i>Cacatua roseicapilla</i>                      |
| Little Corella           | <i>Cacatua sanguinea</i>                         |
| Little Raven             | <i>Corvus mellori</i>                            |
| Long-billed Corella      | <i>Cacatua tenuirostris</i>                      |
| Masked Lapwing (Plover)  | <i>Vanellus miles</i>                            |
| Magpie Lark              | <i>Grallina cyanoleuca</i>                       |
| Noisy Miner              | <i>Manorina melanocephala</i>                    |
| Pacific Black Duck       | <i>Anas superciliosa</i>                         |
| Purple-crowned Lorikeet  | <i>Glossopsitta porphyrocephala</i>              |
| Rainbow Lorikeet         | <i>Trichoglossus haematodus</i> Race <i>eyei</i> |
| Rock Dove (Feral Pigeon) | <i>Columba livia</i> Intro.                      |
| Silver Gull              | <i>Larus novaehollandiae</i>                     |
| Starling                 | <i>Sturnus vulgaris</i>                          |
| Welcome Swallow          | <i>Hirundo neoxena</i>                           |
| White-faced Heron        | <i>Egretta novaehollandiae</i>                   |

However, for the purpose of this conference paper, only bird species identified as either an 'Extreme' or a 'Very High' risk to aircraft and aircrew have been included. These species were determined to be in these categories using the matrix referred to in the *Bird Risk Assessment Model for Airports and Aerodromes* (Paton, 2009). This matrix is based on probability, consequence, body-mass, flocking and flying behaviours.

As a result, seven species were identified as being a bird strike risk at the Base.

They are:

| <b>Bird Species</b>        | <b>Risk Rating</b> |
|----------------------------|--------------------|
| Australian Magpie          | Very High          |
| Australian White Ibis      | Extreme            |
| Australian Wood Duck       | Very High          |
| Galah                      | Extreme            |
| Little/Long-billed Corella | Very High          |
| Rock Dove (Feral Pigeon)   | Very High          |
| Silver Gull                | Very High          |

### **Survey Site 1 Golf Course**

Survey Site 1 recorded the most diverse range of bird species interacting within the survey site. Although many of the Rosella/Lorikeet species utilised the flowering trees for feeding and roosting activities, it was the Corellas and Galahs that flew in to utilise the Aleppo pines and mature gums along the roadway to clean and sharpen their beaks. This activity led to increased leaf and branch litter within this site.

The Australian Magpies were observed in groups of 2 or 3 and these groups appeared to be consistently present throughout the program on the ground walking, feeding and socialising. The Australian White Ibis were observed feeding on an unknown food source however their presence in this site was not consistent or long-term. Air Traffic Control (ATC) reports indicated that during this survey the Ibis were present in larger numbers on the airfield close to Runway 18/36 (see ATC results).

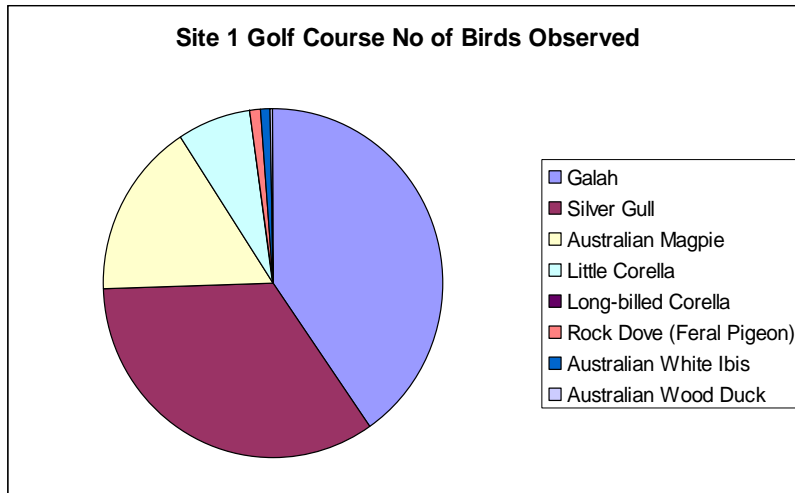
During the survey period one of the flowering trees was uprooted during very wet and windy conditions. This occurrence had an immediate impact on the vegetation structure resulting in a change in the number, activity and behaviour of Rosellas and Lorikeets interacting with the site.

### **Site 1 Birds Observed**

| <b>Common Name</b>       | <b>No of Birds Observed</b> | <b>Total %</b> |
|--------------------------|-----------------------------|----------------|
| Galah                    | 407                         | 40.3           |
| Silver Gull              | 345                         | 34.2           |
| Australian Magpie        | 165                         | 16.3           |
| Little Corella           | 71                          | 7.0            |
| Rock Dove (Feral Pigeon) | 11                          | 1.1            |
| Australian White Ibis    | 9                           | 0.9            |
| Australian Wood Duck     | 2                           | 0.2            |

Simpson & Day (2004)

### Site 1 % Birds Observed



The largest group of birds to utilise this site were Galahs, either flying straight over or interacting with the microhabitat foraging for seeds and roots.

### Site 1 Major Activities/Location observed within Site

| Common Name                        | No of Birds | First Activity | Second Activity | Location        |
|------------------------------------|-------------|----------------|-----------------|-----------------|
| Galah                              | 407         | Flying - 323   | Feeding - 181   | Overhead/Ground |
| Silver Gull                        | 345         | Flying - 242   | -               | Overhead        |
| Australian Magpie                  | 165         | Flying - 53    | Feeding - 37    | Overhead/Ground |
| Little Corella Long-billed Corella | 71          | Flying - 69    | Perching - 2    | Overhead/Trees  |
| Rock Dove (Feral Pigeon)           | 11          | Feeding - 11   | -               | Ground          |
| Australian White Ibis              | 9           | Feeding- 8     | -               | Ground          |
| Australian Wood Duck               | 2           | Flying - 2     | -               | Overhead        |

Of those species observed at this survey site 68.2% flew straight over, and 23.7% interacted with the microhabitat.

Survey Site 1 was well watered and maintained, and analysis of the data collected indicated that this site would not contribute to an increase in risk of bird strike if left as is. However variations such as the development of land to the east involving the removal of trees and turning of soil may increase the attractiveness of alternative microhabitats including the airfield thus encouraging the flocks of Corellas and Galahs westwards towards the runways and other high risk areas of the airfield.

### Survey Site 2 Southern Detention Area

The Southern Detention Area was developed as part of the South Australia's Storm Water-proofing of Adelaide and is adjacent to the south of Runway 18.

The International Bird Strike Committee 13km birdstrike exclusion zone recommended guideline was not considered when this development was planned, however negotiations are continuing with the local Council to ensure the risk of bird strike is minimised. Strategies implemented so far include netting, pumping water to the aquifer and ensuring water only remains in the open system for 48 hours.

Data collected indicated this was not necessarily the most utilised survey site but it was the most interesting. When the rain increased the body of water the birds did not re-enter the area until the water had receded enough to expose land. Then birds such as Plovers, Magpie Larks and Ducks would reappear to forage for food made easier to access by the softened ground. This survey site recorded the largest presence of Masked Lapwing, as well as small groups of Australian Wood Duck which utilised this site for swimming, feeding and breeding.

This site was used by the higher risk species as a flight path. This in itself did not necessarily indicate an increase in risk to aircraft, however depending on the flying activities and behaviours of the relevant species they could impact on aircraft activity during take-off or landing causing aborted flights and variations in direction or pilot instructions.

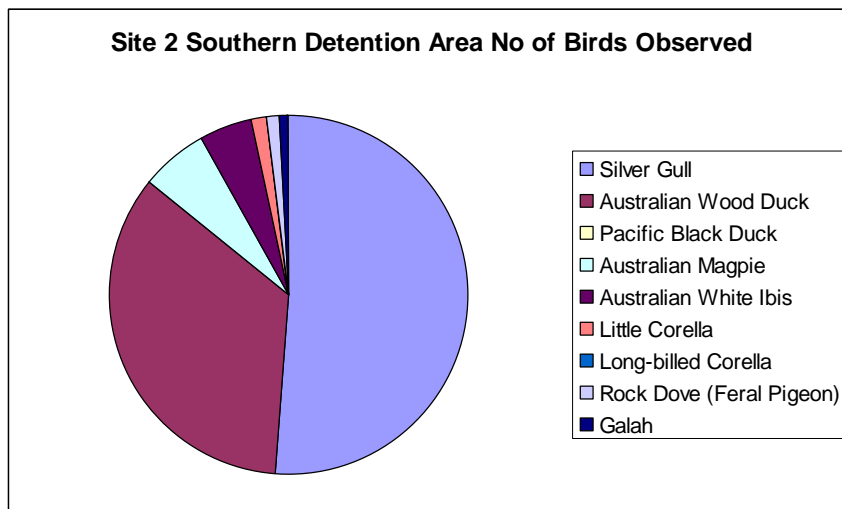
Other factors impacting on the area include the current development as well as the local Council's proposed expansion of the Southern Detention program.

**Site 2 Observed Bird Species**

| <b>Common Name</b>       | <b>No of Birds Observed</b> | <b>Total %</b> |
|--------------------------|-----------------------------|----------------|
| Silver Gull              | 434                         | 51.2           |
| Australian Wood Duck     | 293                         | 34.6           |
| Australian Magpie        | 51                          | 6.1            |
| Australian White Ibis    | 40                          | 4.7            |
| Little Corella           | 13                          | 1.5            |
| Rock Dove (Feral Pigeon) | 9                           | 1.1            |
| Galah                    | 7                           | 0.8            |

Simpson & Day (2004)

**Site 2 % Birds Observed**



The majority of birds entering the survey site were the Silver Gull contributing 76.7% of activity. They interacted indirectly with the site utilising it as a flight path only.

**Site 2 Major Activities/Location observed within Site**

| <b>Common Name</b>       | <b>No of Birds</b> | <b>First Activity</b> | <b>Second Activity</b> | <b>Location</b> |
|--------------------------|--------------------|-----------------------|------------------------|-----------------|
| Silver Gull              | 434                | Flying – 333          | Feeding – 99           | Overhead/Ground |
| Australian Wood Duck     | 293                | Swimming – 112        | Feeding – 90           | Ground/Water    |
| Australian Magpie        | 51                 | Flying – 37           | Feeding – 4            | Ground          |
| Australian White Ibis    | 40                 | Flying - 40           | -                      | Overhead        |
| Little Corella           | 13                 | Flying – 13           | -                      | Overhead        |
| Rock Dove (Feral Pigeon) | 9                  | Standing – 4          | Walking – 3            | Ground          |
| Galah                    | 7                  | Flying – 7            |                        | Overhead        |

Three main activities occurred within this site’s microhabitat, flying 50.8%, feeding 22.8% and swimming 13.2%.

It was considered that this survey site did not in itself pose any problems in relation to bird species interacting with the microhabitat, however there is an issue with the number of birds flying from the south-west to areas in the north. As the area continues to develop into an industrial estate, the turning of soil and microhabitat modification of the area may result in an increase in flocks of birds feeding and roosting closer to the Base.

**Survey Site 3 Airside**

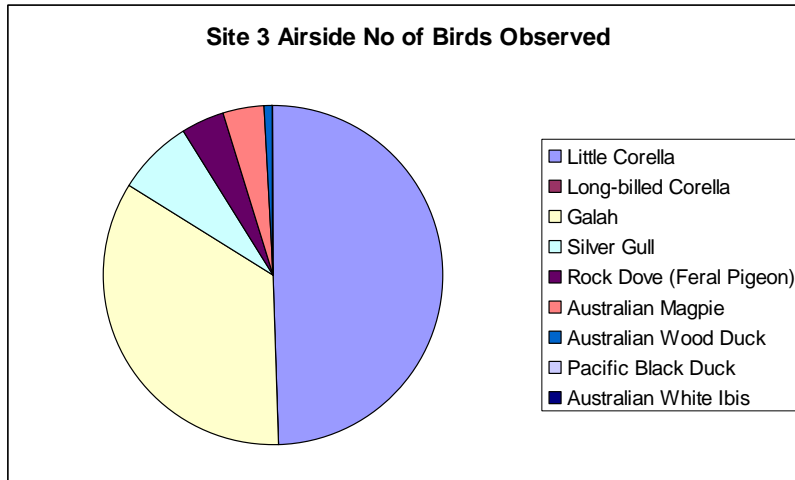
This survey site is adjacent to Taxiway Bravo. The microhabitat structure attracted a large number of ‘high risk’ species including the Little Corellas which accessed this site to walk, stand or feed. This species together with the Galahs fed on onion weed and kikuyu through the later part of the survey period. They gathered in flocks numbering more than 90, most flying north after feeding but on other occasions many were observed flying west across Taxiway Bravo and Runway 18/36. Silver Gulls flocks did not interact with this site only flying in groups of 5-10 over the site north-east towards the waste transfer station and fast food outlets located approximately 2 kms away from the Base.

**Site 3 Bird Species Observed**

| <b>Common Name</b>       | <b>No of Birds Observed</b> | <b>Total %</b> |
|--------------------------|-----------------------------|----------------|
| Little Corella           | 617                         | 49.6           |
| Galah                    | 426                         | 34.2           |
| Silver Gull              | 91                          | 7.3            |
| Rock Dove (Feral Pigeon) | 53                          | 4.3            |
| Australian Magpie        | 49                          | 3.9            |
| Australian Wood Duck     | 9                           | 0.7            |
| Australian White Ibis    | 0                           | 0              |

Simpson & Day (2004)

### Site 3 % Bird Species Observed



The main bird species observed at this site was the Little Corella contributing 49.6% of the total flock with the Galah contributing 34.2% identifying this as the most utilised site for these species.

### Site 3 Major Activities/Location observed within Site

| Common Name              | No of Birds | First Activity | Second Activity | Location        |
|--------------------------|-------------|----------------|-----------------|-----------------|
| Little Corella           | 617         | Flying – 397   | Feeding – 306   | Overhead/Ground |
| Galah                    | 426         | Flying - 276   | Feeding – 145   | Overhead/Ground |
| Silver Gull              | 91          | Flying – 91    | -               | Overhead        |
| Rock Dove (Feral Pigeon) | 53          | Flying – 53    | -               | Overhead        |
| Australian Magpie        | 49          | Feeding – 21   | Flying – 19     | Ground/Trees    |
| Australian Wood Duck     | 9           | Swimming – 5   | Flying – 4      | Water/Overhead  |
| Australian White Ibis    | 0           |                |                 |                 |

There were two main activities conducted in this area, 69.7% flying and 37.9% feeding. No Australian White Ibis were present, however this 'extreme risk' species were observed further west along the runway (see ATC results).

Survey Site 3 continued to attract the Little Corellas and Galahs during the survey period encouraged by the easy access to seeds and bulbs until their food source was exhausted. Their flocking and flying nature increased the risk of bird strike, delaying takeoffs, landings and aborted flying activities.

### Survey Site 4 Accommodation Area

This survey site experienced very little interaction with any of the high risk groups. Most interaction involved small groups of Australian Magpies, Noisy Miners, Lorikeets and Rosellas. The survey period did not include the months of November to April when historically Little Corellas establish their summer flock at the Base. An interesting observation was a small group (3) of Australian Wood Ducks flying and perching in the lower branches of one particular gum tree.



The bird species accessing this site would not be considered a 'high risk' as this site is located approximately 500m from the airfield. However the direction of their flight over this site either north-east in the morning or south-west in the afternoon must be considered as increasing the risk of a near-miss or birdstrike event. Of particular concern are the Silver Gulls that fly in groups during aircraft activities.

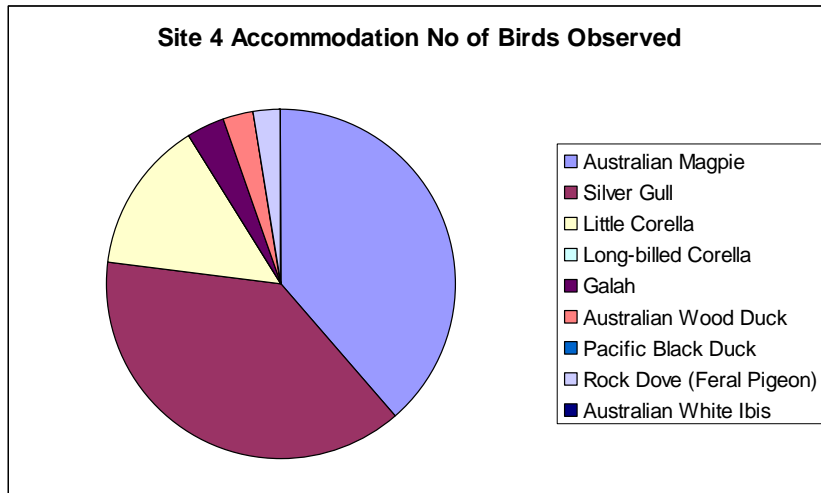
The survey site's microhabitat does not provide a suitable seed or bulb-based food source to encourage interaction by the Little Corella or Galah flocks. However the tree species included mature gums with large bare canopy areas do provide good roosting and viewing points for the scout Corellas.

**Site 4 Bird Species Observed**

| Common Name              | No of Birds Observed | Total % |
|--------------------------|----------------------|---------|
| Australian Magpie        | <b>138</b>           | 38.5    |
| Silver Gull              | <b>137</b>           | 38.3    |
| Little Corella           | <b>51</b>            | 14.2    |
| Galah                    | <b>13</b>            | 3.6     |
| Australian Wood Duck     | <b>10</b>            | 2.8     |
| Rock Dove (Feral Pigeon) | <b>9</b>             | 2.6     |
| Australian White Ibis    | <b>0</b>             | 0       |

Simpson & Day (2004)

**Site 4 % Bird Species Observed**



Site 4 Major Activities/Location observed within Site

| Common Name              | No of Birds | First Activity | Second Activity | Location               |
|--------------------------|-------------|----------------|-----------------|------------------------|
| Australian Magpie        | 139         | Flying – 84    | Feeding – 11    | Overhead/Ground /Trees |
| Silver Gull              | 137         | Flying - 127   | Standing – 10   | Overhead/Ground        |
| Little Corella           | 51          | Flying – 52    | -               | Overhead               |
| Galah                    | 13          | Flying - 13    |                 | Overhead               |
| Australian Wood Duck     | 10          | Flying – 9     | Feeding – 2     | Overhead/Ground /Tree  |
| Rock Dove (Feral Pigeon) | 9           | Flying – 9     | -               | Overhead               |
| Australian White Ibis    | 0           |                |                 |                        |

This survey site was the least utilised with the Silver Gulls, Little Corellas and Galahs constituting 56% of the observed birds exploiting the site exclusively as a flight path towards the north and on return to the south. Australian Magpies were the largest group of birds observed, however only 3.7% of them utilised the site as a feeding ground. Towards the end of the survey period a pair of Lorikeets was observed inspecting tree hollows for the purpose of breeding.

**Air Traffic Control (ATC) Sightings**

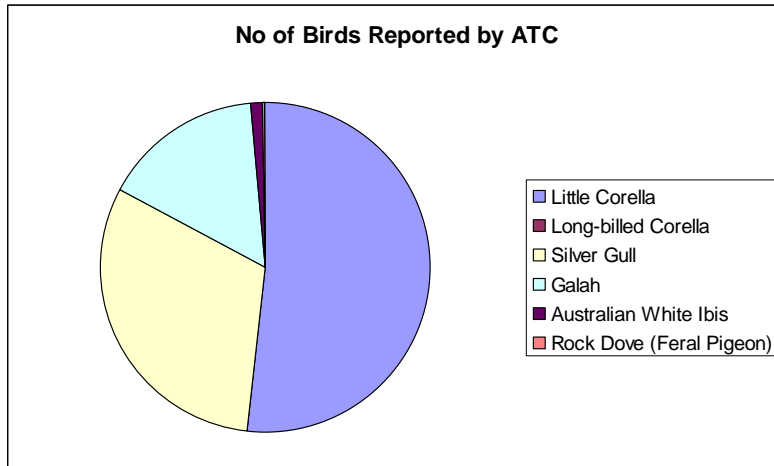
Over the last three years ATC sightings have provided the most consistent data observing an increased bird strike risk and the challenges associated with this risk. The airfield is open grassland with onion weed, grasses and invertebrates such as the introduced white snail. These food sources support the on-going presence of the Little Corella, Galah and Australian White Ibis.

ATC - Bird Species Observed between 14 April and 4 September 2009

| Common Name              | No of Birds | Total % |
|--------------------------|-------------|---------|
| Little Corella           | 1445        | 51.6    |
| Silver Gull              | 870         | 31.1    |
| Galah                    | 445         | 15.9    |
| Australian White Ibis    | 30          | 1.1     |
| Rock Dove (Feral Pigeon) | 10          | 0.3     |

Simpson & Day (2004)

## ATC % Birds Observed



Activities recorded by ATC during the research period indicated the majority of species particularly the Corellas, Galahs and Silver Gulls flew across the airfield flight path prior to landing and feeding along the Taxiway Bravo. However in January and early February 2010 the Australia White Ibis colonised on the airfield after heavy rains. They were recorded as feeding on invertebrates along Runway 36 from its northern end for approximately one-third of its length. Analysis of the stomach contents of an Ibis conducted by the University of Adelaide (2009) identified introduced white land snails as its main food source.

The reports regularly provided by ATC on birds observed within the airfield including the location using a grided map is the most reliable long-term data. ATC will continue to monitor and provide information on bird species sighted on the airfield as this will be a very valuable method of monitoring this area.

The Defence Aviation Hazard Reporting and Tracking System known as DAHRTS indicates nine (9) bird strikes have been reported so far this year (2010) suggesting an increase in the number of birds interacting with the airfield microhabitat. This validates the sightings reported by ATC.

### Conclusion

This research established that the identified survey sites attracted different species because each species was drawn to a specific microhabitat structure. It was also established that the environment and bird species that interacted with the Base survey sites differed to the Adelaide (approximately 30km south west) and Parafield Airfields (approximately 10km south east), due to the different microhabitat structures.

Analysis of the data provided an overview of the structure of the microhabitats within the survey sites. It also provided an insight into which species entered and engaged with the sites and what attracted them to those sites. For example the small white snails found adjacent to the runway attracted the Australian White Ibis and the onion weed and kikuyu encouraged the Little Corellas and Galahs to interact with Survey Site 3.

This research project was not long enough to observe seasonal changes particularly in following the resident Corella flock and the additional Corella flocks that arrive from the north over the summer period. A consistent bird-monitoring program needs to be developed and implemented and should focus on the interaction of the bird species with the airfield contributing to the risk of bird strike. The program would involve monitoring the type of species, direction of flight, behaviour and interaction within the airfield microhabitat. Further survey work is required to assess the risk of birdstrike due to

the flood mitigation basins in the north and south of the site. Currently there is significant redevelopment occurring. This includes landscaping which will provide additional microhabitat at RAAF Edinburgh. These factors should be considered when developing an integrated bird management plan for the site.

As the research established microhabitat structure did determine the type of bird species attracted to a site, a program of microhabitat modification should be developed and implemented commencing with the removal of the Aleppo pines located close to the airfield and the planting of less attractive species. The removal of dead branches from the mature gums which act as vantage points for the Little Corellas and Galahs should also be considered. These mitigation actions should deter problem species and potentially move the flocks on to other areas away from the flight line. Another mitigation measure will be to remove bird-attracting plants and replace them with less attractive species. A program of seasonal weed and pest eradication should also be developed and implemented to manage the food sources identified during the research project to reduce the presence of 'high risk' species such as Little Corellas, Galahs and Australian White Ibis. By removing these food sources these species will find these sites less attractive. However the above programs alone will not provide the solution.

The RAAF EDN Management Plan and Action Plan reflects the Defence ethos that non-lethal methods such as:

- Harassing - sirens, lights, bird frite
- Flying trained Peregrine Falcons

targeting Little Corellas, Galahs and Australian White Ibis will be instigated before escalating to alternative methods.

The RAAF EDN Bird Management Forum enables:

- Local government
- Private organisations
- Defence

to discuss and communicate issues, develop and support strategies focused on reducing the bird strike risk.

Further research in the airfield's biodiversity and annual audits of the system will assist in:

- Better understanding what attracts these species
- Identifying gaps in managing the situation
- Determining what interventions are successful
- Planning future actions
- Implementing rectification strategies

resulting in a consistent approach to mitigating the risk.

Bird management at RAAF EDN must be a team effort with all stakeholders working cooperatively together to ensure that operational capability is maintained to the highest standard with man, machine and nature working in harmony.

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