

# The birds of Mambo Wetlands Reserve, Port Stephens

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The avian population of the Mambo Wetlands Reserve was surveyed in 2017 and 2018. The majority of the species recorded were common woodland birds. Six uncommon species were recorded and there was an unconfirmed record of the Australian Little Bittern *Ixobrychus dubius*, which is a rare species in the Hunter Region. Records were compared with those from surveys conducted between 1999 and 2016. The number of species recorded declined from 116 to 90 and a comparison of reporting rates suggested that many species had decreased in abundance.

## INTRODUCTION

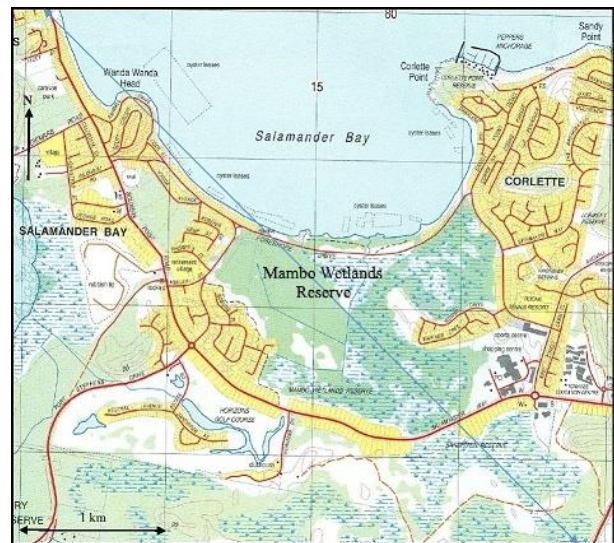
In 2017 a proposed development of land adjoining the Mambo Wetlands Reserve provided impetus for a proposal to have the reserve nominated as a site of international importance under the Ramsar Convention on Wetlands (1999). Previous studies by General Flora and Fauna (2004), Gary Worth Project Consulting (2009) and Wildthing Environmental Consultants (2016), and a report by Port Stephens Council (2006) identified a number of threatened avian, mammal, amphibian and flora species within the reserve and adjacent areas. Four endangered ecological communities were also identified in the reserve.

To support the above nomination, regular surveys of the reserve were conducted over 13 months in 2017 and 2018 to confirm the avian threatened species present (Fraser 2018). The objective of this paper is to document the full suite of avian species present and compare with previous studies.

## METHOD

Mambo Wetlands Reserve is located at Salamander Bay, Port Stephens NSW (32° 44' 00"S, 152° 05' 45"E). Covering 175 hectares of saltwater and freshwater wetlands and coastal forest, the reserve is connected to Salamander Bay by the tidal Mambo Creek. It is bounded by Foreshore Drive to the north, Port Stephens Drive to the west, Salamander Way to the south and Sandy Point Road to the east. Residential properties adjoin the reserve to the southwest, south and east, while the Salamander Bay shopping and council precinct adjoins to the southeast. To the north it meets the shores of Salamander Bay. Seven vegetation

communities are present in the reserve; Coastal Sand Woodland (CSW), Estuarine Mangrove Complex (EMC), Estuarine Saltmarsh Complex (ESC), Freshwater Gahnia Swamp Forest (FGSF), Moist Coastal Apple Forest (MCAF), Mahogany/Paperbark Swamp Forest (MPSF) and Paperbark/Swamp Oak Complex (PSOC) (Port Stephens Council 2006). The location of the reserve is shown in **Figure 1** and the vegetation communities in **Figure 2**.



**Figure 1.** Mambo Wetlands Reserve location map

The reserve is the hub of several wildlife corridors. To the east, it is linked via Kingfisher Reserve to Gan Gan Hill. To the south it adjoins Sandpiper Reserve and thence links to Tomaree National Park to the east and Tilligerry Nature Reserve to the west. To the west the reserve is connected through Boronia Gardens Reserve and Wanda Wetlands Reserve to reserves along Cromarty Bay and the Tilligerry Nature Reserve. The tidal areas of the reserve are part of the Port Stephens -

Great Lakes Marine Park. The reserve is zoned Environmental Protection - Urban Conservation by the Port Stephens Council.

The study initially involved identifying records from technical reports and previous bird surveys. A total of 29 surveys were conducted between 1999 and 2016; Tom Clarke (1), Graeme Stevens (16), BirdLife Australia Atlas (2), General Flora and Fauna (3), Mambo-Wanda Reserve Committee (1), Tomaree Bird Watchers (5) and Wildthing Environmental Consultants (1).

The routes and methods used for these surveys are unknown. Shorebird records of Salamander Bay included in some surveys were not used. This study was limited to birds recorded within the boundaries of the reserve.

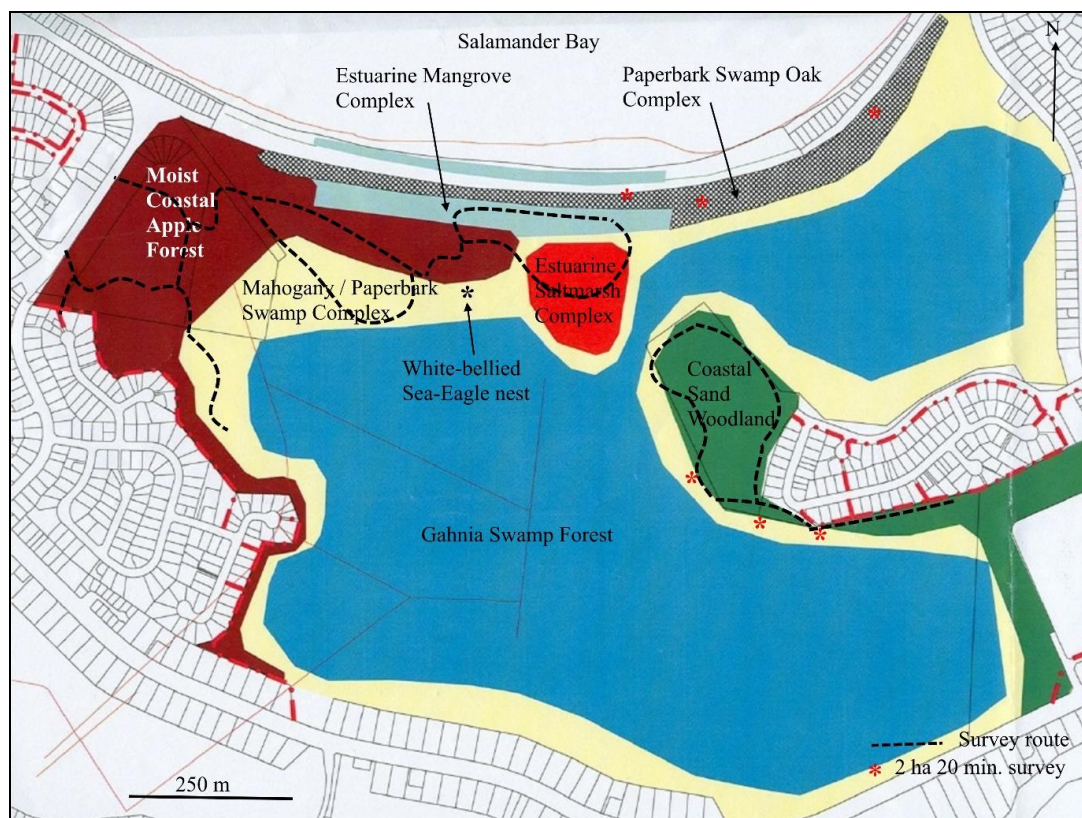
A programme of standardised surveys was conducted to confirm the presence of previously recorded species, particularly threatened species. As previous surveys had neglected the areas of EMC, ESC and CSW, a more uniform survey approach was adopted across all vegetation communities. Two survey routes were adopted. One route accessed the reserve from the east and covered areas of the CSW, FGSF, MPSF and PSOC communities. The other route accessed the reserve from the west sampling the ESC, MCAF and MPSF communities. The EMC community was only surveyed at low tide. Due to difficult access, the FGSF and PSOC communities were surveyed using a 2-ha 20-minute method from fixed points. Other communities were

surveyed using a 500 m-area search method (BirdLife Australia 2018). Species present in each community were recorded separately. The eastern and western routes were surveyed on alternate occasions. Surveys took 3.0-3.5 hours. The routes were a combination of existing tracks and regular circuits through the less accessible areas. A total of 41 surveys were conducted approximate weekly between February 2017 and February 2018. The survey routes and survey points are shown on **Figure 2**.

Most of the 1999-2016 surveys recorded species' presence only and this was continued for the 2017-2018 surveys. Reporting rates (RR) were calculated for both data sets by dividing the number of surveys and expressing the result as a percentage. To identify if recorded differences for species between the two datasets were significant, the chi square test was applied using the Yates correction.

## RESULTS

The 29 surveys conducted from 1999 to 2016 recorded 116 species. In 2017-2018, 41 surveys were conducted and 90 species were recorded. The majority of the species recorded are common throughout the Hunter Region (Stuart 2017) and are dominantly woodland birds (see **Table 1**). The species recorded and their reporting rates (RR) are presented in the **Appendix**.



**Figure 2.** Vegetation communities and survey routes, Mambo Wetlands Reserve

**Table 1.** Summary of species categories, Mambo Wetlands Reserve.

	1999-2016 Surveys	2017-2018 Surveys
Woodland Birds	92	73
Waterbirds	15	13
Raptors	9	4
Total Species	116	90

There was an unconfirmed record of the Australian Little Bittern *Ixobrychus dubius*, a rare species in the Hunter Region (Stuart 2017). Six uncommon species (Stuart 2017) were also recorded; Fork-tailed Swift *Apus pacificus*, Lewin's Rail *Lewinia pectoralis*, Powerful Owl *Ninox strenua*, Glossy Black-Cockatoo *Calyptorhynchus lathami*, White-browed Woodswallow *Artamus superciliosus* and Restless Flycatcher *Myiagra inquieta*. The presence of Fork-tailed Swift has no significance with respect to the importance of the reserve. The Lewin's Rail and the possible Australian Little Bittern were identified by call.

The species most commonly recorded varied between the two survey periods. Those with RR>60% (in most instances) comprise two groups occupying different strata in the habitat. The canopy was dominated by Rainbow Lorikeet *Trichoglossus moluccanus*, Yellow-faced Honeyeater *Caligavis chrysops*, Laughing Kookaburra *Dacelo novaeguineae*, Australian Magpie *Gymnorhina tibicen*, Grey Butcherbird *Cracticus torquatus*, Little Wattlebird *Anthochaera chrysoptera*, Noisy Miner *Manorina melanocephala* and Eastern Rosella *Platycercus eximius*. Smaller, less obvious species were mainly recorded in the shrub layer and ground layer; Brown Thornbill *Acanthiza pusilla*, Grey Fantail *Rhipidura albiscapa*, White-cheeked Honeyeater *Phylidonyris niger*, Variegated Fairy-wren *Malurus lamberti*, Eastern Yellow Robin *Eopsaltria australis*, Golden Whistler *Pachycephala pectoralis*, White-browed Scrubwren *Sericornis frontalis*.

Almost half (48%) of the species recorded in both survey periods were recorded infrequently and had RR<15%. The majority of these species are common in the Hunter Region (Stuart 2017). Fewer species (90) were recorded in the recent surveys than in previous data sets (116). The majority of this decrease was in woodland species (**Table 1**).

Of the species recorded in 1999-2016 surveys, 31 were not recorded in 2017-2018, and 26 of these have not been recorded for 10 years or more. Among those not recorded in 2017-2018 were four of the uncommon species, Fork-tailed Swift, Powerful Owl, Glossy Black-Cockatoo and Restless Flycatcher. Seven new species were recorded in the reserve in 2017-2018 (see **Appendix**). Comparison of the two datasets, shows that the RRs of some larger, more mobile species have increased, many of the smaller woodland species have decreased while some have remained relatively unchanged. Four species that illustrate this are White-bellied Sea-Eagle *Haliaeetus leucogaster*, Lewin's Honeyeater *Meliphaga lewinii*, White-throated Treecreeper *Cormobates leucophaea* and Varied Sittella *Daphoenositta chrysoptera*. All four species are residents in the Hunter Region (Stuart 2016). The White-bellied Sea-Eagle had a RR of 17.2% for 1999-2016 which increased to 39% in the 2017-2018 surveys while Lewin's Honeyeater increased from 10.3% in 1999-2016 to 46.3% in 2017-2018. In contrast, the White-throated Treecreeper had a RR of 44.8% in 1999-2016, but was not recorded during the 2017-2018 surveys. The RR for the Varied Sittella was almost unchanged with RRs of 17.2% in 1999-2016 and 14.6% in 2017-2018.

To test significance of the difference in numbers recorded between the two datasets, the chi square test was applied. Species that exhibited a statistically significant difference are shown in **Table 2**.

The only confirmed breeding record from both survey periods was for the White-bellied Sea-Eagle. An occupied nest was located in January 2018 on the edge of the MPSF (32° 43' 52.14"S, 152° 05' 34.62"E) where it overlooked Salamander Bay. The location is shown in **Figure 2**. It is not known how long this nest has been at this site.

Seven of the species recorded in the reserve are classified as vulnerable in NSW (*Biodiversity Conservation Act 2016*); Eastern Osprey *Pandion haliaetus*, White-bellied Sea-Eagle, Powerful Owl, Glossy Black-Cockatoo, Little Lorikeet *Glossopsitta pusilla*, Varied Sittella and Dusky Woodswallow.

**Table 2.** Species exhibiting significant differences in reporting rate (RR) between the 1999-2016 and the 2017-2018 surveys. Chi square values are 3.841 for  $p < 0.05$  and 6.635 for  $p < 0.01$ .

Species	1999-2016 Surveys		2017-2018 Surveys		Chi square values	P	Significance
	RR	Records	RR	Records			
Peaceful Dove	17.2%	5	0.0%	0	4.86	$p < 0.05$	Significant
Bar-shouldered Dove	17.2%	5	53.7%	22	4.93	$p < 0.05$	Significant
Whistling Kite	24.1%	7	0.0%	0	7.63	$p < 0.01$	Very significant
Galah	51.7%	15	12.2%	5	7.96	$p < 0.01$	Very significant
Little Corella	24.1%	7	61.0%	25	4.27	$p < 0.05$	Significant
Musk Lorikeet	17.2%	5	0.0%	0	4.86	$p < 0.05$	Significant
White-throated Treecreeper	44.8%	13	0.0%	0	16.04	$p < 0.01$	Very significant
Scarlet Honeyeater	31.0%	9	2.4%	1	7.82	$p < 0.01$	Very significant
Lewin's Honeyeater	10.3%	3	46.3%	19	5.90	$p < 0.05$	Significant
Mangrove Gerygone	0.0%	0	43.9%	18	11.08	$p < 0.01$	Very significant
Rufous Whistler	37.9%	11	7.3%	3	6.50	$p < 0.05$	Significant
Grey Shrike-thrush	58.6%	17	19.5%	8	6.22	$p < 0.05$	Significant
Pied Currawong	27.6%	8	2.4%	1	6.51	$p < 0.05$	Significant

## DISCUSSION

Interpretation of the difference in RRs between the two data sets is complicated by the difference in survey methods, the observers conducting the surveys and the extent to which different ecological communities were sampled. It is not possible to separate the impact of these differences from the underlying changes in the status of each species. Consequently, the statistical evaluation merely reflects differences in the frequency species were recorded and does not necessarily imply a statistically significant change in the status of a species.

### Factors contributing to statistically significant changes of Reporting Rate (Table 2)

The increased numbers of Mangrove Gerygone *Gerygone mouki* and Bar-shouldered Dove *Geopelia humeralis* recorded reflect increased survey effort in ecological communities that were not previously surveyed. The Mangrove Gerygone was only recorded in the EMC and ESC communities and the Bar-Shouldered Dove was mostly frequently recorded in the CSW community.

The decreased occurrence of Peaceful Dove recorded is attributed to habitat changes following the fire in the reserve in 2003. Open areas produced by burning of ground cover and shrub layer would have provided habitat suitable for ground foraging, granivorous species such as the

Peaceful Dove. Subsequent regrowth would have resulted in loss of habitat and permanent relocation of the species. Other species with similar habitat requirements that exhibit the same pattern of change are Brown Quail *Coturnix ypsilophora*, Double-barred Finch *Taeniopygia bichenovii* and Australasian Pipit *Anthus novaeseelandiae*. The Brown Quail was last reported in 2004 and the other two species were last reported in 2006 (see **Appendix**). The Black-shouldered Kite *Elanus axillaris*, an open grassland foraging species, was similarly last reported in 2006.

The absence of Musk Lorikeet records in 2017-2018 is attributed to their nomadic behaviour and the absence of suitable species flowering during the survey period. They have since been recorded in the reserve in response to flowering of Blackbutt *Eucalyptus pilularis*.

Reasons for the increase in records of Little Corella and Lewin's Honeyeater are not clear. The Little Corella is reported as 'stable or possibly increasing' in the Hunter Region from BirdLife Australia Atlas records, while the Lewin's Honeyeater is reported as 'probably stable' (Stuart 2017). Newman (2009) reported Lewin's Honeyeater at Green Wattle Creek had benefitted from increased understorey growth, however there has been no apparent change in reserve habitat since recovery from the 2003 fire that would account for the increase. In contrast to the regional trends, the Atlas of NSW and ACT Birds (Cooper *et al.* 2014, Cooper *et al.* 2016) records the Little Corella RR trend as declining and the trend for



Lewin's Honeyeater on the North Coast as increasing since 2003.

Other species with decreased occurrence are Whistling Kite *Haliastur sphenurus*, Galah *Eolophus roseicapillus*, White-throated Treecreeper, Scarlet Honeyeater *Myzomela sanguinolenta*, Rufous Whistler *Pachycephala rufiventris*, Grey Shrike-thrush *Colluricincla harmonica* and Pied Currawong *Strepera graculina*. The absence of White-throated Treecreeper in 2017-2018 is considered to be a short-term anomaly as the species was recorded by Wildthing Environmental Consultants in 2016. All these species are reported as 'probably stable' in the Hunter Region from BirdLife Australia Atlas records (Stuart 2017). However, the Atlas of NSW and ACT Birds (Cooper *et al.* 2014, Cooper *et al.* 2016) records declining RR trends for Whistling Kite, Galah, Scarlet Honeyeater and Rufous Whistler. The Atlas reports the trend for the White-throated Treecreeper as being unclear and the trends for Grey Shrike-thrush and Pied Currawong as showing an increase. The Birds Australia report on Woodlands and Birds (2005), revealed a national decline for many woodland species. This report highlighted loss and fragmentation of habitat as a major contributing factor to the decline. In the Port Stephens region, continuing housing development in the Salamander Bay/Corlette area has resulted in the destruction of local habitat. The declining occurrence of these woodland species within the reserve most likely reflects the broader-scale trend for these species.

### Species recorded infrequently or recorded in one survey only

A large number of species (48%) were recorded infrequently (RR<15%) in both survey periods. This is a normal outcome for this type of survey. However, of particular note are the 33 species recorded in the 1999-2016 surveys that were not recorded in the 2017-2018 surveys. Of these, 21 have not been recorded in 10 years or more. These were mainly woodland species plus some waterbirds that are common in the Hunter Region (Stuart 2017). The cryptic Buff-banded Rail *Gallirallus philippensis* which has not been recorded since 2005, has been recorded in the reserve more recently (L. Wooding pers. comm.), but was not recorded during the 2017-2018 surveys. Confirmation of the occurrence of the Australian Little Bittern, which was an unconfirmed record during the recent surveys, should be a focus of future surveys.

The location of the reserve and the changing nature of its surrounds is probably a factor influencing the above observations. The reserve is closely surrounded by residential and commercial development, much of which has been built in the past 10-20 years. The reserve is impacted by noise from motor vehicles, residential and commercial sources and recreational activities within the reserve. This activity may have progressively made the reserve a less desirable habitat for some species. Many of the infrequently recorded woodland birds possibly use the reserve temporarily as they move between adjacent habitats in response to changing foraging opportunities. The absence of records for 10 years or more for some species may be a reflection of the broader-scale decreases in the diversity of woodland birds highlighted in the State of Australia's Birds study (Birds Australia 2005).

### Resident threatened species

The reserve is an important habitat for two resident threatened species, White-bellied Sea-Eagle and Varied Sittella. The proximity of the reserve to the shoreline of Port Stephens and the presence of tall, mature trees in a secluded location makes the reserve an ideal nest site for White-bellied Sea-Eagle. The increased numbers of records in 2017-2018 is due to the presence of an active nest.

Varied Sittella is in decline in the Hunter Region (Newman 2010). The similar RRs (17.2% and 14.6%) for the two survey periods suggest that the local population may be stable. The RR is considerably higher than the overall Hunter Region RR of 3.7% from the BirdLife Australia Atlas (Stuart 2017). Newman (2015) has shown the importance of connectivity between remnant woodlands in providing habitat to support local strongholds for sittellas in the Paterson area of the Hunter Region. Newman suggested that the species was being locally nomadic. Varied Sittella clans require large territories, 13-20 ha with mature, rough-barked trees with hollows and dead branches to provide sufficient foraging and nesting opportunities (Noske 1998). The reserve provides these resources and is considered to be an important habitat and probable stronghold for the species, particularly in the near coastal areas of the Hunter Region.

### CONCLUSION

Despite the urban location, surrounding development and associated habitat loss, the

reserve provides suitable habitat for a number of resident, larger, more mobile species that dominate the canopy and smaller species that occupy the shrub and ground layers. These are dominantly woodland species. Around half the species recorded appear to use the reserve temporarily. The reduction in number of species present between the two survey periods is an indication of declining bird diversity in the reserve. The RRs of species that have declined and the previously reported species that are no longer recorded in the reserve may be a reflection of a broader-scale decline of woodland birds. The results of the surveys support efforts to obtain further recognition and protection for the reserve and other undeveloped areas of local habitat.

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## APPENDIX

Species reporting rates all surveys, Mambo Wetlands Reserve, 1999-2018

Species	1999-2016 Surveys		2017-2018 Surveys		Last Record
	RR	Records	RR	Records	
Rainbow Lorikeet	93.1%	27	92.7%	38	Feb-18
Yellow-faced Honeyeater	86.2%	25	92.7%	38	Feb-18
Brown Thornbill	79.3%	23	95.1%	39	Feb-18
Laughing Kookaburra	72.4%	21	85.4%	35	Feb-18
Australian Magpie	72.4%	21	73.2%	30	Feb-18
Grey Fantail	69.0%	20	61.0%	25	Feb-18
White-cheeked Honeyeater	65.5%	19	34.1%	14	Feb-18
Grey Shrike-thrush	58.6%	17	19.5%	8	Feb-18
Grey Butcherbird	58.6%	17	92.7%	38	Feb-18
Variegated Fairy-wren	55.2%	16	65.9%	27	Feb-18
Little Wattlebird	55.2%	16	90.2%	37	Feb-18
Noisy Miner	55.2%	16	80.5%	33	Feb-18
Silvereye	55.2%	16	51.2%	21	Feb-18
Australian White Ibis	51.7%	15	46.3%	19	Feb-18
Galah	51.7%	15	12.2%	5	Feb-18
Eastern Yellow Robin	51.7%	15	63.4%	26	Feb-18
Eastern Spinebill	48.3%	14	26.8%	11	Feb-18
Golden Whistler	48.3%	14	82.9%	34	Feb-18
Eastern Rosella	44.8%	13	63.4%	26	Feb-18
White-throated Treecreeper	44.8%	13			Dec-16
Black-faced Cuckoo-shrike	44.8%	13	41.5%	17	Feb-18
Superb Fairy-wren	41.4%	12	17.1%	7	Jan-18
Australian Raven	41.4%	12	53.7%	22	Feb-18
Sacred Kingfisher	37.9%	11	36.6%	15	Feb-18
Rufous Whistler	37.9%	11	7.3%	3	Feb-18
Little Pied Cormorant	34.5%	10	7.3%	3	Feb-18
Olive-backed Oriole	34.5%	10	58.5%	24	Feb-18
Spotted Dove	31.0%	9	36.6%	15	Feb-18
Scarlet Honeyeater	31.0%	9	2.4%	1	May-17
Dusky Woodswallow	31.0%	9	14.6%	6	Dec-17
White-faced Heron	27.6%	8	19.5%	8	Feb-18
Pied Cormorant	27.6%	8	2.4%	1	Mar-17
Noisy Friarbird	27.6%	8	22.0%	9	Jun-17
Red Wattlebird	27.6%	8	19.5%	8	Nov-17
White-browed Scrubwren	27.6%	8	61.0%	25	Feb-18
Pied Currawong	27.6%	8	2.4%	1	Nov-17
Welcome Swallow	27.6%	8	51.2%	21	Feb-18
Crested Pigeon	24.1%	7	53.7%	22	Feb-18
Whistling Kite	24.1%	7			Oct-16
Dollarbird	24.1%	7	24.4%	10	Feb-18
Little Corella	24.1%	7	61.0%	25	Feb-18
Scaly-breasted Lorikeet	24.1%	7	7.3%	3	Jun-17
Spotted Pardalote	24.1%	7	26.8%	11	Feb-18
Channel-billed Cuckoo	20.7%	6	14.6%	6	Jan-18
Masked Lapwing	20.7%	6	9.8%	4	Jan-18
Brown Honeyeater	20.7%	6	26.8%	11	Feb-18

**APPENDIX continued**

Species reporting rates all surveys, Mambo Wetlands Reserve, 1999-2018

Species	1999-2016 Surveys		2017-2018 Surveys		Last Record
	RR	Records	RR	Records	
White-throated Gerygone	20.7%	6	31.7%	13	Feb-18
Eastern Whipbird	20.7%	6	14.6%	6	Feb-18
Pacific Black Duck	17.2%	5	4.9%	2	Apr-17
Peaceful Dove	17.2%	5			Dec-06
Bar-shouldered Dove	17.2%	5	53.7%	22	Feb-18
Pheasant Coucal	17.2%	5	29.3%	12	Feb-18
Eastern Koel	17.2%	5	41.5%	17	Feb-18
Fan-tailed Cuckoo	17.2%	5	26.8%	11	Nov-17
White-bellied Sea-Eagle	17.2%	5	39.0%	16	Feb-18
Musk Lorikeet	17.2%	5			Apr-09
Yellow Thornbill	17.2%	5	4.9%	2	Jan-18
Varied Sittella	17.2%	5	14.6%	6	Feb-18
Magpie-lark	17.2%	5	29.3%	12	Feb-18
Red-browed Finch	17.2%	5	7.3%	3	Oct-17
Purple Swamphen	13.8%	4	19.5%	8	Nov-17
Sulphur-crested Cockatoo	13.8%	4	2.4%	1	Feb-18
Pied Butcherbird	13.8%	4	2.4%	1	Apr-17
Willie Wagtail	13.8%	4	19.5%	8	Feb-18
Chestnut Teal	10.3%	3			Nov-17
Great Egret	10.3%	3	7.3%	3	Feb-18
Blue-faced Honeyeater	10.3%	3	9.8%	4	Feb-18
Brown-headed Honeyeater	10.3%	3	2.4%	1	Sep-17
White-naped Honeyeater	10.3%	3			Sep-07
Lewin's Honeyeater	10.3%	3	46.3%	19	Feb-18
Striated Thornbill	10.3%	3			Apr-09
White-breasted Woodswallow	10.3%	3	7.3%	3	Dec-17
Leaden Flycatcher	10.3%	3			Oct-08
Tree Martin	10.3%	3	4.9%	2	Apr-17
Shining Bronze-Cuckoo	6.9%	2	2.4%	1	Apr-17
Tawny Frogmouth	6.9%	2	2.4%	1	Sep-17
Dusky Moorhen	6.9%	2			Jan-06
Swamp Harrier	6.9%	2	2.4%	1	Feb-18
Grey Goshawk	6.9%	2			Jul-08
Powerful Owl	6.9%	2			Jul-16
Yellow-tailed Black-Cockatoo	6.9%	2	19.5%	8	Feb-18
Little Lorikeet	6.9%	2			Oct-16
Southern Emu-wren	6.9%	2	29.3%	12	Feb-18
Brown Gerygone	6.9%	2	2.4%	1	May-17
Australasian Figbird	6.9%	2	12.2%	5	Oct-17
Grey Teal	3.4%	1			Jan-06
Australian Wood Duck	3.4%	1	7.3%	3	Sep-17
Brown Quail	3.4%	1			Jun-05
Brown Cuckoo-Dove	3.4%	1			Dec-14
Horsfield's Bronze-Cuckoo	3.4%	1	4.9%	2	Aug-17
White-throated Needletail	3.4%	1	9.8%	4	Feb-18
Fork-tailed Swift	3.4%	1			Jan-06
Buff-banded Rail	3.4%	1			Jun-05



**APPENDIX continued**

Species reporting rates all surveys, Mambo Wetlands Reserve, 1999-2018

Species	1999-2016 Surveys		2017-2018 Surveys		Last Record
	RR	Records	RR	Records	
Nankeen Night-Heron	3.4%	1			Jan-06
Royal Spoonbill	3.4%	1	9.8%	4	Feb-18
Black-shouldered Kite	3.4%	1			Jan-06
Pacific Baza	3.4%	1			Jan-06
Brown Goshawk	3.4%	1	2.4%	1	Mar-17
Southern Boobook	3.4%	1			Dec-16
Rainbow Bee-eater	3.4%	1			Jan-06
Glossy Black-Cockatoo	3.4%	1			Jan-06
Long-billed Corella	3.4%	1			Dec-16
Striated Pardalote	3.4%	1			Sep-06
Yellow-rumped Thornbill	3.4%	1			Jan-06
White-winged Triller	3.4%	1			Jan-06
Spangled Drongo	3.4%	1	9.8%	4	Feb-18
Rufous Fantail	3.4%	1	4.9%	2	Dec-17
Restless Flycatcher	3.4%	1			Jan-06
Black-faced Monarch	3.4%	1			Jan-06
Rose Robin	3.4%	1	2.4%	1	Jan-18
Mistletoebird	3.4%	1	9.8%	4	Jan-18
Double-barred Finch	3.4%	1			Jan-06
Australasian Pipit	3.4%	1			Jan-06
Australian Reed-warbler	3.4%	1			Jan-06
Common Starling	3.4%	1			Dec-16
Common Myna	3.4%	1	2.4%	1	Mar-17
Lewin's Rail			7.3%	3	Nov-17
Australian Little Bittern			4.9%	2	Oct-17
Little Egret			2.4%	1	Dec-17
Eastern Osprey			9.8%	4	Feb-18
Striped Honeyeater			4.9%	2	Aug-17
Mangrove Gerygone			43.9%	18	Feb-18
White-browed Woodswallow			2.4%	1	Oct-17