Population trends for the birds of Salamander Waters Estate and comparisons with the nearby Mambo Wetlands Reserve populations

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Received 5 June 2024, accepted 11 January 2025, published online date 26 May 2025.

During a fifteen-year study (2008-2022) of the avian population of Salamander Waters Estate, Salamander Bay, Port Stephens NSW, the authors recorded a total of 130 species, almost all of which were birds common to the Hunter Region. Woodland species formed the major population component (90 species) followed by waterbirds (30 species) and raptors (10 species). Surveys were conducted over two time periods (Wooding 2008-2016; Stevens 2017-2022). Comparison of the two data sets indicated a population increase among larger, mobile, somewhat aggressive species, and a decline in populations of small woodland species. One hundred of the 130 species recorded at the site were also recorded at the nearby Mambo Wetlands Reserve during surveys conducted over a similar time period.

INTRODUCTION AND OBJECTIVES

Salamander Waters Estate (**Figure 1**) is located off Tarrant Road, Salamander Bay (at 32º43'5"S, 152º04'44"E) and comprises approximately 20 ha of partially-modified coastal woodland which was zoned as Residential in 2000 under the Port Stephens Environmental Plan (https://www.portstephens.nsw.gov.au). Currently, approximately 50% of the site has been developed for residential housing, public playing fields, sports complex facilities, and associated parking. A second 66-lot residential development, which is still at the primary concept level, will require the removal of 12 ha of the site's native woodland (https://www.portstephens.nsw.gov.au).

An earlier paper described the site's development history, and provided a detailed compilation of multi-sourced flora and fauna records associated with the site between 1998 and 2022 (Stevens & Wooding 2023). This paper is confined to an examination of avian records collected by the authors during monthly bird counts undertaken between 2008 and 2022. Standardised population tests were used to evaluate the current population status of the species found on site, and to indicate possible future population trends, with particular emphasis on resident species. Three additional species of interest, due to their presence just prior to the commencement of the study, are also discussed.

A comparison of the Salamander site's avian records with data collected during a comparable study undertaken at the nearby Mambo Wetlands Reserve was also attempted (Fraser 2018). The locations of the two sites are indicated in **Figure 2**.

METHODS

Between 2008 and 2022, early morning 2-3 hr walking surveys were carried out at approximately monthly intervals. The route was designed to allow optimal coverage of the site's varied habitats, in accordance with Birdata protocol for surveys within a 500 m radius (https://www.birdata.birdlife.org.au/). The study was conducted in two periods. Observations for the first period (2008-2016) were recorded by L. Wooding, and the second period records (2017-2022) were compiled by G. Stevens. Birds were identified both visually and by call, and breeding or probable breeding, was assumed when juveniles of a species were regularly seen, and when adult birds were seen on a nest or observed carrying nesting material or feeding chicks and fledglings.

The data were recorded on MS Excel spreadsheets and subjected to population testing using the Reporting Rate Percentage (RR%) and Chi-square methodologies (Fowler & Cohen 2016). RR is the number of records for a species divided by the number of surveys, expressed as a percentage.

The Chi-square Test, using the Yates correction, was used to compare data from the two study periods, 2008-2016 and 2017-2022, and thus identify species showing notable population changes. Chi-square values above 3.84 indicate less than 5% probability that the result is random ($p < 0.05$) and Chi-square values above 6.63 indicate less than 1% probability that the result is random ($p < 0.01$).

The test results were summarized then tabulated by guild. References to distance were derived from measurements obtained using Google Earth (https://www.googlecom.au/earth).

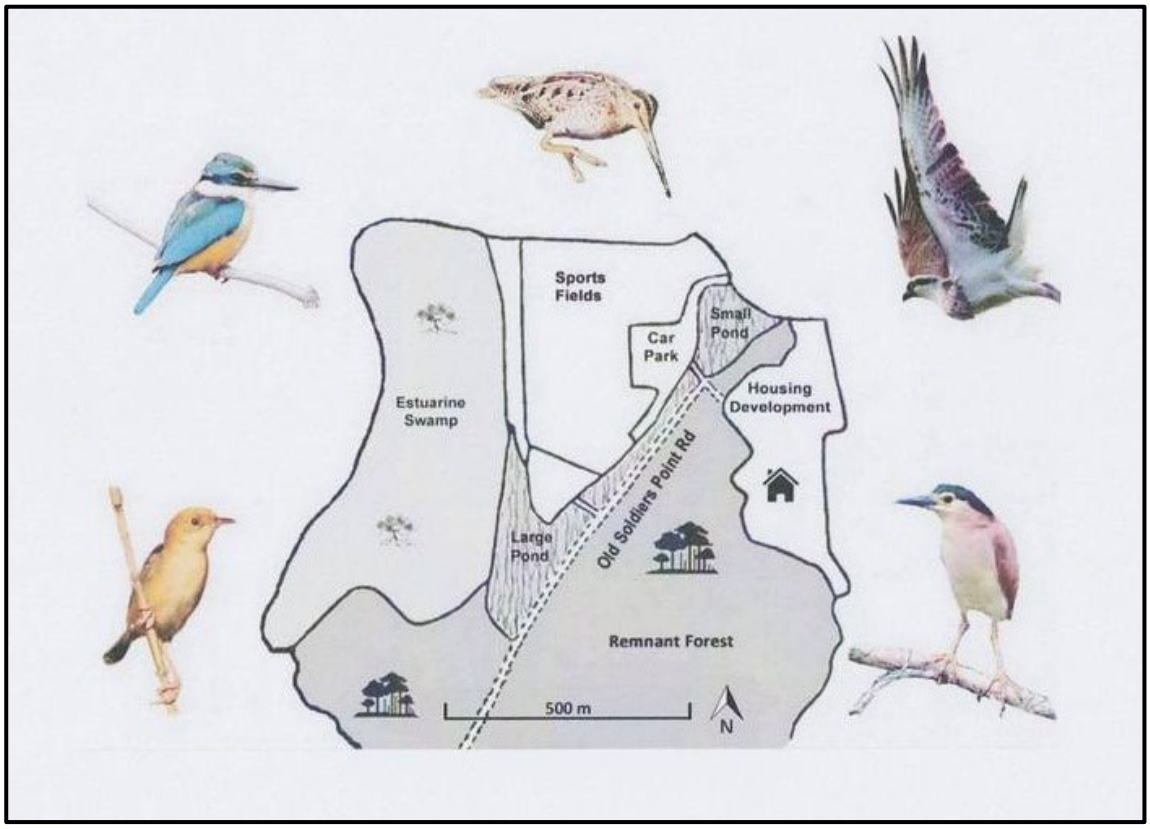

Figure 1. Salamander Waters Estate study site.

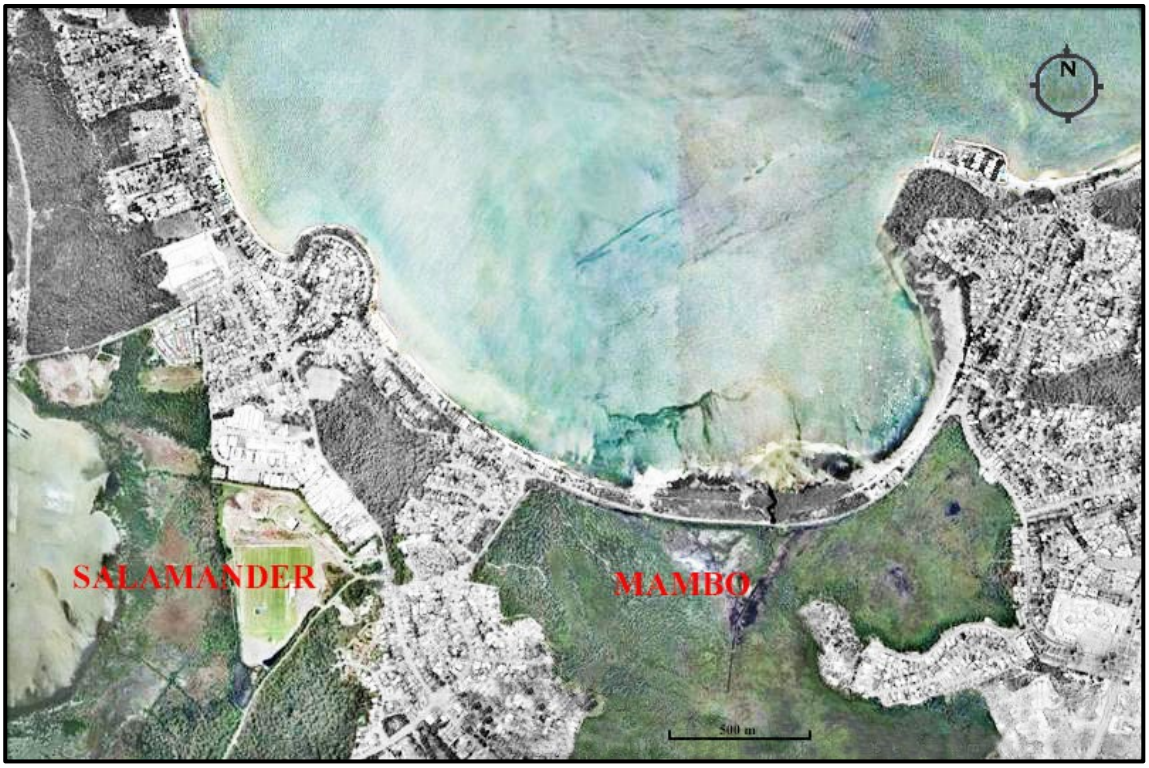

Figure 2. Salamander and Mambo study site locations (Adapted from Google Earth).

RESULTS

One hundred and thirty avian species were recorded during the 171 surveys conducted throughout the study (2008-2022). A list of all species and the associated reporting rates are presented in the **Appendix**.

The taxonomic species list was redistributed into four RR groups: >60%; <60% but >30%; <30%; and species only recorded in one data set. The results for each group are summarised in **Table 1**, in order to illustrate the relationship between guild and reporting rate. Woodland birds (90 species, 69%) predominated in all four categories, followed by waterbirds (30 species, 23%) and raptors (10 species, 8%). Seventy-four species recorded comparable RRs across both study periods (<20% variation) which would seem to indicate population stability; 27 species had increased RRs, and 29 species reported a RR decline.

The Chi-square Test identified thirteen species exhibiting highly significant population change (χ^2 > 6.63) and a further five species exhibiting significant population change (χ^2 > 3.84). The eighteen species, and the calculated Chi-square (χ^2) values, are presented in **Table 2**.

Four species recorded during the course of the study were found to be listed as Vulnerable in NSW (*Biodiversity Conservation Act 2016*); Osprey *Pandion haliaetus,* White-bellied Sea-Eagle *Haliaeetus leucogaster,* Glossy Black-Cockatoo *Calyptorhynchus lathami*, and Varied Sittella *Daphoenositta chrysoptera*. A further two species are listed as Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*; Latham's Snipe *Gallinago hardwickii* and White-throated Needletail *Hirundapus caudacutus*.

A comparison between the Salamander Waters and the Mambo Wetlands studies (Fraser 2018) found that 100 of the 130 species recorded at Salamander, including five of the above six vulnerable species, were also recorded at Mambo (77 woodland birds; 16 waterbirds; 7 raptors). Those species that also were recorded at Mambo are indicated as such in the **Appendix**.

DISCUSSION

With the possible exception of the six vulnerable species, the species recorded over the course of the study were common both locally and across the Hunter Region (Williams 2021). The variety of species found was perhaps remarkable given the study site's relatively small area (~20 ha) and that it is bordered by an industrial zone, a housing development, and a well-used sporting facility, with all the associated noise and disturbance generated by human activity (Stevens & Wooding 2023).

The two ponds and connecting channel, which provide an easily accessible, permanent water supply to a variety of habitats within the study area, are perhaps the site's most important feature, particularly during drought events (Stevens & Wooding 2023).

Fraser (2018) used the same Chi-square test for his Mambo Wetlands study. Only two species showing substantial changes in RR were common to both studies: Little Corella *Cacatua sanguinea*; Lewins Honeyeater *Meliphaga lewinii*. The sites differ in size (Salamander ~20 ha; Mambo ~175 ha) and the timing of the studies did not match exactly (Salamander 15 years, 2008-2022; Mambo 20 years, 1999-2018) but there was an 11-year overlap (2008-2018). Given habitat similarities and the minimal site separation distance (~0.7 km), avian interchange between sites was considered a possibility, hence data comparison might contribute to a better overall understanding of the local avian community.

Indications of local population change suggested by the results of the two data sets should be interpreted with caution. Variations in reporting rates may be due to differences in survey methodology, and changing climatic conditions affecting water levels and blossom development. Survey discontinuity in the second half of the survey period due to COVID-19 travel restrictions and other unforeseen circumstances, may also have had a bearing on the results. While ornithological population studies tend to be imprecise, long-term statistical evidence can indicate broad trends among avian groups. The following expanded assessment of some representative species from the Salamander study's test results may suggest generalized on-site trends.

Table 1. Guild distribution of species by Reporting Rates (RR%) at Salamander Waters Estate

Guild	Total	Stable	Increase	Decline
RR >60% (32 species)				
Woodland birds	20	10	5	5
Waterbirds	11	8	3	
Raptors	1		1	
RR >30% to <60% (23 species)				
Woodland birds	18	10	3	5
Waterbirds	5		2	3
Raptors				
RR <30% (49 species)				
Woodland birds	37	35	2	
Waterbirds	8	8		
Raptors	4	3		1
Only seen on one data set (26 species)				
Woodland birds	15		8	7
Waterbirds	6		1	5
Raptors	5		2	3
Species totals	**130**	**74**	**27**	**29**

Table 2. Chi-square (χ^2) values and population trends for 18 species exhibiting significant (χ^2 >3.84) or highly significant (χ^2 >6.63) change in Reporting Rate (RR%) between the 2008-2016 and 2017-2022 surveys.

Species showing significant change	2008-2016 Surveys		2017-2022 Surveys		χ^2 Values >3.84	Comments
	RR%	Records	RR%	Records		
Woodland birds (3)						
Spotted Dove	81.3	87	53.1	34	4.11	Decline
Lewin's Honeyeater	29.0	31	51.6	33	4.87	Increase
Torresian Crow	39.8	42	64.1	41	4.58	Increase
Waterbirds (2)						
Eurasian Coot	42.1	45	70.3	45	5.55	Increase
Great Egret	59.8	64	34.4	22	4.66	Increase

Species showing highly significant change	2008-2016 Surveys		2018-2022 Surveys		χ^2 Values >6.63	Comments
	RR%	Records	RR%	Records		
Woodland birds (7)						
Crested Pigeon	42.1	45	84.4	54	11.67	Increase
Little Corella	15.9	17	62.5	40	24.72	Increase
Superb Fairy-wren	96.3	103	37.5	24	17.84	Decline
Brown Honeyeater	21.5	23	60.9	39	16.11	Increase
Spotted Pardalote	47.7	51	20.3	13	7.29	Decline
Pied Butcherbird	9.3	10	62.5	40	36.90	Increase
Australian Raven	68.2	73	23.4	15	14.75	Decline
Waterbirds (5)						
Grey Teal	17.5	19	59.4	38	19.58	Increase
Nankeen Night-Heron	42.1	45	12.5	8	10.35	Decline
White-faced Heron	23.4	25	50.0	32	7.74	Increase
Little Pied Cormorant	54.2	58	90.6	58	7.30	Increase
Australasian Darter	45.8	49	82.8	53	8.59	Increase
Raptors (1)						
Osprey	10.3	11	76.6	49	48.27	Increase

Frequently seen species (RR>60%)

Almost all the woodland birds in this group are considered to be resident species, probably breeding, and the waterbirds are considered to be regular visitors from the Port Stephens Estuary. Evidence of population decline in one woodland species in this group was of particular interest. Superb Fairy-wren *Malurus cyaneus* recorded a decline in RR of 58.8% and a highly significant χ^2 value (17.84). This species, found regularly along the edges of the now abandoned old Soldiers Point Road in the first half of the study, became something of a rarity during the second survey period, which took place after the completion of the first housing development. Off-leash dogs, e-scooters and general human disturbance may have been contributing factors; however, a 24.3% RR decline also occurred at the much quieter Mambo site (Fraser 2018). These results may support the suggestion of a potential long-term decline in this species across the Hunter Region (Williams 2021).

The Australian Raven *Corvus coronoides*, an example of a large woodland species, recorded a 44.8% decline in RR and had a highly significant χ^2 value (14.75). Steadily decreasing numbers for this species may be related to the 24.3% RR increase in Torresian Crows *Corvus orru* which had a significant χ^2 value (4.58). Torresian Crows were frequently observed chasing ravens (LW pers. obs.). The Mambo study, which did not record any Torresian Crows, showed a 12.3% RR for Australian Ravens (Fraser 2018).

Reporting rate increases in this group were generally associated with large, mobile species, such as the Little Corella *Cacatua sanguinea* (46.6% RR increase and highly significant χ^2 of 24.72). The only raptor species of interest was a resident pair of Osprey, that established a nest on a mobile phone tower overlooking the playing fields in 2015 and successfully raised a fledgling every year for the remainder of the study period. Ospreys are listed as vulnerable in NSW.

Mid-range sighting frequency (RR<60% but >30%)

Woodland birds are the predominant guild present in this group and included a mix of residents, seasonal migrants and occasional visitors. There were also five waterbird species. Among the eight species having a RR decline, the results for three woodland species were concerning (**Table 2**). Spotted Pardalotes *Pardalotus punctatus*, thought to be resident, recorded a 27.4% RR decline, and a highly significant χ^2 value (7.29). Nest burrows were found in roadside embankments in the same area inhabited by Superb Fairy-wrens (discussed above). The small pardalote population (estimated at 5-10 birds) may have been subjected to similar stress factors. The nest site may also be vulnerable to disturbance by service vehicles. While this species may be at risk at the Salamander site, the long-term trend across the Hunter Region suggests a small, but stable population more consistent with the 2.7% RR increase recorded in the Mambo data (Fraser 2018; Williams 2021).

The 26.5% RR decline in White-throated Gerygones *Gerygone olivacea* was also contrary to an 11% RR increase recorded at the Mambo site. (Fraser 2018). Long-term Hunter Region data suggests a recent population decline in this regular summer migrant (Williams 2021). It is uncertain whether the result for this species was a response to on-site change or a reflection of the regional trend. Similarly, the reason for the 15.5% RR decline in White-browed Scrubwrens *Sericornis frontalis* is not apparent. A similar unexplained change was noted at the Mambo site since 2018 (N. Fraser pers. comm.). Among the waterbirds, significant change (25.4% RR decline) was noticed in sightings of Great Egrets *Ardea alba*, thought to be irregular, solitary visitors from the Port Stephens estuary, and Nankeen Night-Herons *Nycticorax caledonicus* (29.6% RR decline) a nomadic and irruptive species. A camouflage combination of thick leafy pond-cover and cryptic plumage may have meant that roosting Night-Herons were sometimes undetected.

Species seen infrequently (RR<30%)

Trends for this group, containing the largest number of species (49), including three species listed as vulnerable in NSW and one international migrant, cannot be interpreted with certainty due to the infrequency of records. However, Fan-tailed Cuckoos *Cacomantis flabelliformis* and Azure Kingfishers *Ceyx azureus*, were not recorded during the last four years of the study, and Australasian Pipits *Anthus novaeseelandiae*, were no longer observed foraging on the site's playing fields after 2010. All three species are no longer thought to occur on site.

The small decline in Latham's Snipe (9% RR) is mentioned due to international interest in this species, but it should be noted that usually only small numbers (1-4 birds) of this summer migrant

visited the site in drought years when low pondwater levels exposed a muddy verge with a vegetated periphery.

White-bellied Sea-Eagles *Haliastur leucogaster* (vulnerable in NSW) also registered a small decline (7.1% RR) but this species was usually observed in flight, therefore, on-site population relevance is unlikely. Bi-annual, boat-based surveys indicate a regular and increasing presence of this species in the Port Stephens Estuary (Stuart 2024).

There were one-off sightings of Glossy Black-Cockatoos *Calyptorhynchus lathami* at both the Salamander site and the Mambo site (Fraser 2018). This species, thought to be in decline across the Hunter Region, and listed as vulnerable in NSW, was probably an anomaly for both sites (Williams 2021).

Varied Sittella *Daphoenositta chrysoptera*, another vulnerable NSW species, recorded a slight increase (3.5% RR) in the second half of the Salamander study. In the second half of the Mambo study the species declined (2.6% RR) Fraser 2018). We suggest that the continued on-site presence of small woodland-dependent flocks of Sittellas would be adversely affected by habitat disturbance.

Additional species of interest

Three species, found just prior to the commencement of the study, or only seen in one early survey, are mentioned as further examples of small avian species that are no longer recorded at the study site, and may no longer occur in the local area. Up until late 2007, Black-fronted Dotterels *Elseyornis melanops* were regularly observed around the edges of the small pond, and were known to breed (LW pers. obs.). A single bird recorded during one 2012 survey is regarded as an anomaly. Records for Red-rumped Parrots *Psephotus haematonotus* ceased in 2008; before then they were often observed feeding on the playing fields (LW pers. obs.). Similarly, site records for Rainbow Bee-eaters *Merops ornatus* ceased in 2007 (LW pers. obs.). The absence of this species is thought to be directly related to the removal of their sand-dune nesting location, to make way for the site's Stage 1 housing development (Stevens & Wooding 2023). There was a single record for this species in the Mambo study (Fraser 2018).

CONCLUSIONS

The majority of the 130 avian species recorded during the 15 years of this study were found to be locally and/or regionally common, with woodland species predominating (90 species). Over the duration of the study, local population increase was observed in 27 species, mainly larger, more-mobile types, while evidence of decline was noted in 29 species, mostly small woodland birds. Records for five woodland species and one waterbird species ceased during the course of the study, and the populations of at least five more woodland species are thought to be at risk. While some waterbirds were known to breed on site, most are assumed to be occasional visitors from the nearby Port Stephens Estuary where populations are thought to be stable (Stuart 2020).The population of the site's only resident raptor, the Osprey, was considered stable.

While populations of larger, more-mobile species would appear to be relatively secure, the study clearly indicates the tenuous on-site situation for small woodland birds, should the indiscriminate clearing of flowering trees and shrubs and mature, hollow-bearing trees occur in order to facilitate future residential development.

ACKNOWLEDGEMENT

The authors wish to thank the Editors, Alan Stuart and Neil Fraser, for their advice, guidance and patience during the preparation of this paper.

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APPENDIX

Species reporting rates from surveys over two time periods at Salamander Waters Estate, 2008-2022, and an indication if the species was recorded at Mambo Wetlands during surveys 1999-2018. Species are listed in order of the number of records at Salamander Waters over 2008-2016.

Common Names	Scientific Names	2008-2016 107 Surveys		2017-2022 64 Surveys		Mambo Wetlands Record
		Records	RR%	Records	RR%	
Dusky Moorhen	*Gallinula tenebrosa*	105	98.1	64	100.0	✓
Magpie-lark	*Grallina cyanoleuca*	105	98.1	64	100.0	✓
Australian Magpie	*Gymnorhina tibicen*	105	98.1	62	96.9	✓
Laughing Kookaburra	*Dacelo novaeguineae*	103	96.3	48	75.0	✓
Superb Fairy-wren	*Malurus cyaneus*	103	96.3	24	37.5	✓
Australian Wood Duck	*Chenonetta jubata*	101	94.4	63	98.4	✓
Australian White Ibis	*Threskiornis moluccus*	101	94.4	63	98.4	✓
Rainbow Lorikeet	*Trichoglossus moluccanus*	101	94.4	62	96.9	✓
Willie Wagtail	*Rhipidura leucophrys*	99	92.5	63	98.4	✓
Pacific Black Duck	*Anas superciliosa*	99	92.5	62	96.9	✓
Yellow-faced Honeyeater	*Caligavis chrysops*	99	92.5	59	92.2	✓
Little Wattlebird	*Anthochaera chrysoptera*	99	92.5	56	87.5	✓
Purple Swamphen	*Porphyrio porphyrio*	92	86.0	46	71.9	✓
Welcome Swallow	*Hirundo neoxena*	89	83.2	49	76.6	✓
Spotted Dove	*Spilopelia chinensis*	87	81.3	34	53.1	✓
Grey Fantail	*Rhipidura albiscapa*	80	74.8	52	81.3	✓
Royal Spoonbill	*Platalea regia*	80	74.8	43	67.2	✓
Brown Thornbill	*Acanthiza pusilla*	80	74.8	39	60.9	✓
Eastern Rosella	*Platycercus eximius*	78	72.9	46	71.9	✓
Chestnut Teal	*Anas castanea*	77	72.0	48	75.0	✓
Little Black Cormorant	*Phalacrocorax sulcirostris*	77	72.0	45	70.3	
Masked Lapwing	*Vanellus miles*	73	68.2	29	45.3	✓
Australian Raven	*Corvus coronoides*	73	68.2	15	23.4	✓
Eastern Great Egret	*Ardea alba modesta*	64	59.8	22	34.4	✓
Little Pied Cormorant	*Microcarbo melanoleucos*	58	54.2	58	90.6	✓
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	58	54.2	28	43.8	✓
White-breasted Woodswallow	*Artamus leucoryn*	57	53.3	37	57.8	✓
Galah	*Eolophus roseicapilla*	52	48.6	32	50.0	✓
Noisy Miner	*Manorina melanocephala*	51	47.7	20	31.3	✓
Spotted Pardalote	*Pardalotus punctatus*	51	47.7	13	20.3	✓
Red-browed Finch	*Neochmia temporalis*	50	46.7	26	40.6	✓
Australasian Darter	*Anhinga novaehollandiae*	49	45.8	53	82.8	
Sacred Kingfisher	*Todiramphus sanctus*	47	43.9	33	51.6	✓
Crested Pigeon	*Ocyphaps lophotes*	45	42.1	54	84.4	✓
Eurasian Coot	*Fulica atra*	45	42.1	45	70.3	
Nankeen Night-Heron	*Nycticorax caledonicus*	45	42.1	8	12.5	
Silvereye	*Zosterops lateralis*	44	41.1	25	39.1	✓
Olive-backed Oriole	*Oriolus sagittatus*	43	40.2	22	34.4	✓
Common Myna	*Acridotheres tristis*	43	40.2	2	3.1	✓
Torresian Crow	*Corvus orru*	42	39.3	41	64.1	
White-throated Gerygone	*Gerygone olivacea*	40	37.4	7	10.9	✓
Variegated Fairy-wren	*Malurus lamberti*	39	36.4	24	37.5	✓

APPENDIX cont.

Common Names	Scientific Names	2008-2016 107 Surveys		2017-2022 64 Surveys		Mambo Wetlands Record
		Records	RR%	Records	RR%	
Oriental Dollarbird	*Eurystomus orientalis*	36	33.6	21	32.8	✓
White-cheeked Honeyeater	*Phylidonyris niger*	34	31.8	18	28.1	✓
Noisy Friarbird	*Philemon corniculatus*	34	31.8	12	18.8	✓
White-browed Scrubwren	*Sericornis frontalis*	35	32.7	11	17.2	✓
Lewin's Honeyeater	*Meliphaga lewinii*	31	29.0	33	51.6	✓
Scaly-breasted Lorikeet	*Trichoglossus chlorolepidotus*	31	29.0	7	10.9	✓
White-throated Treecreeper	*Cormobates leucophaea*	28	26.2	4	6.3	✓
Whistling Kite	*Haliastur sphenurus*	27	25.2	2	3.1	✓
White-faced Heron	*Egretta novaehollandiae*	25	23.4	32	50.0	✓
Great Pied Cormorant	*Phalacrocorax varius*	25	23.4			✓
Golden Whistler	*Pachycephala pectoralis*	24	22.4	21	32.8	✓
Red Wattlebird	*Anthochaera carunculata*	24	22.4	16	25.0	✓
Fan-tailed Cuckoo	*Cacomantis flabelliformis*	24	22.4	2	3.1	✓
Brown Honeyeater	*Lichmera indistincta*	23	21.5	39	60.9	✓
Australasian Grebe	*Tachybaptus novaehollandiae*	23	21.5	18	28.1	
Australian Pelican	*Pelecanus conspicillatus*	23	21.5	12	18.8	
Black Swan	*Cygnus atratus*	23	21.5	9	14.1	
Common Starling	*Sturnus vulgaris*	23	21.5			✓
Great Cormorant	*Phalacrocorax carbo*	22	20.6	12	18.8	
Azure Kingfisher	*Ceyx azureus*	22	20.6	2	3.1	
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	21	19.6	8	12.5	✓
Eastern Spinebill	*Acanthorhynchus tenuirostris*	20	18.7	15	23.4	✓
Hardhead	*Aythya australis*	20	18.7	14	21.9	
Grey Butcherbird	*Cracticus torquatus*	20	18.7	8	12.5	✓
Grey Teal	*Anas gracilis*	19	17.8	38	59.4	✓
Bar-shouldered Dove	*Geopelia humeralis*	18	16.8	12	18.8	✓
Australian Reed-Warbler	*Acrocephalus australis*	18	16.8	8	12.5	✓
Little Corella	*Cacatua sanguinea*	17	15.9	40	62.5	✓
Australasian Pipit	*Anthus novaeseelandiae*	17	15.9			✓
Brown Gerygone	*Gerygone mouki*	16	15.0	2	3.1	✓
Grey Shrike-thrush	*Colluricincla harmonica*	15	14.0	8	12.5	✓
Leaden Flycatcher	*Myiagra rubecula*	13	12.1	8	12.5	✓
Latham's Snipe	*Gallinago hardwickii*	13	12.1	2	3.1	
Straw-necked Ibis	*Threskiornis spinicollis*	12	11.2	15	23.4	
Eastern Yellow Robin	*Eopsaltria australis*	12	11.2	7	10.9	✓
Eastern Koel	*Eudynamys orientalis*	12	11.2	6	9.4	✓
Horsfield's Bronze-Cuckoo	*Chalcites basalis*	12	11.2	1	1.6	✓
Osprey	*Pandion haliaetus*	11	10.3	49	76.6	✓
Rufous Whistler	*Pachycephala rufiventris*	11	10.3	22	34.4	✓
Pied Butcherbird	*Cracticus nigrogularis*	10	9.3	40	62.5	✓
Yellow Thornbill	*Acanthiza nana*	9	8.4	11	17.2	✓
Pheasant Coucal	*Centropus bengalensis*	9	8.4	1	1.6	✓

APPENDIX cont.

Common Names	Scientific Names	2008-2016 107 Surveys		2017-2022 64 Surveys		Mambo Wetlands Record
		Records	RR%	Records	RR%	
Blue-faced Honeyeater	*Entomyzon cyanotis*	8	7.5	18	28.1	✓
Australasian Figbird	*Sphecotheres vieilloti*	8	7.5	17	26.6	✓
Spangled Drongo	*Dicrurus bracteatus*	8	7.5	5	7.8	✓
Channel-billed Cuckoo	*Scythrops novaehollandiae*	8	7.5	3	4.7	✓
Eastern Whipbird	*Psophodes olivaceus*	7	6.5	5	7.8	✓
Tree Martin	*Petrochelidon nigricans*	7	6.5	5	7.8	✓
Scarlet Honeyeater	*Myzomela sanguinolenta*	6	5.6	17	26.6	✓
Sulphur-crested Cockatoo	*Cacatua galerita*	6	5.6	16	25.0	✓
Yellow-tailed Black-Cockatoo	*Zanda funerea*	6	5.6	7	10.9	✓
Musk Lorikeet	*Glossopsitta concinna*	6	5.6	1	1.6	✓
Pied Currawong	*Strepera graculina*	5	4.7	3	4.7	✓
Black-shouldered Kite	*Elanus axillaris*	5	4.7	1	1.6	✓
White-throated Needletail	*Hirundapus caudacutus*	4	3.7	7	10.9	✓
Fuscous Honeyeater	*Ptilotula fusca*	4	3.7			
Varied Sittella	*Daphoenositta chrysoptera*	3	2.8	4	6.3	✓
Brown Goshawk	*Accipiter fasciatus*	3	2.8	1	1.6	✓
Swamp Harrier	*Circus approximans*	3	2.8			✓
Brown-headed Honeyeater	*Melithreptus brevirostris*	2	1.9	5	7.8	✓
Shining Bronze-Cuckoo	*Chalcites lucidus*	2	1.9	1	1.6	✓
Buff-banded Rail	*Hypotaenidia philippensis*	2	1.9	1	1.6	✓
Little Egret	*Egretta garzetta*	2	1.9	1	1.6	✓
Brush Cuckoo	*Cacomantis variolosus*	2	1.9	1	1.6	
Pallid Cuckoo	*Heteroscenes pallidus*	2	1.9			
Plumed Egret	*Egretta plumifera*	2	1.9			
Cattle Egret	*Bubulcus ibis*	2	1.9			
Long-billed Corella	*Cacatua tenuirostris*	1	0.9			✓
Common Cicadabird	*Edolisoma tenuirostre*	1	0.9	1	1.6	
Tawny Grassbird	*Cincloramphus timoriensis*	1	0.9	1	1.6	
White-headed Pigeon	*Columba leucomela*	1	0.9			
Peaceful Dove	*Geopelia placida*	1	0.9			✓
Striated Heron	*Butorides striata*	1	0.9			
Black-fronted Dotterel	*Elseyornis melanops*	1	0.9			
Grey Goshawk	*Accipiter novaehollandiae*	1	0.9			✓
Red-rumped Parrot	*Psephotus haematonotus*	1	0.9			
Southern Emu-wren	*Stipiturus malachurus*	1	0.9			✓
Musk Duck	*Biziura lobata*			4	6.3	
Striated Thornbill	*Acanthiza lineata*			2	3.1	✓
Australian Hobby	*Falco longipennis*			1	1.6	
Peregrine Falcon	*Falco peregrinus*			1	1.6	
Glossy Black-Cockatoo	*Calyptorhynchus lathami*			1	1.6	✓
Spiny-cheeked Honeyeater	*Acanthagenys rufogularis*			1	1.6	
Striped Honeyeater	*Plectorhyncha lanceolata*			1	1.6	✓
Yellow-tufted Honeyeater	*Lichenostomus melanops*			1	1.6	
Rufous Fantail	*Rhipidura rufifrons*			1	1.6	✓
Little Grassbird	*Poodytes gramineus*			1	1.6	
Species Total: 130						