

# A record (2002-2009) of the birds of the Tank Paddock site within the Green Corridor, Lower Hunter Valley NSW

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The Tank Paddock covers 147 hectares and lies immediately to the north of the village of Minmi. It is a key part of the Green Corridor connecting Stockton Bight and Hexham Swamp to the east, with Lenaghans Swamp to the north, Pambalong Swamp to the west and a forested corridor extending southwest towards Mount Sugarloaf and the Watagans. Although somewhat degraded, the Tank Paddock contains significant habitat, including dry and wet forested areas linked to the surrounding wetlands. Over eight years of surveys a total of 153 species was recorded in the Tank Paddock. Of these, four species were listed as threatened in NSW, five species were rare or uncommon in the Hunter Region and at least eight other species were recorded as breeding. The number and diversity of bird species highlight the importance of the Tank Paddock as a significant avian-rich habitat within the Green Corridor of the Lower Hunter Valley.

## INTRODUCTION

In June 2001 Newcastle City Council initiated the “Stockton Bight to the Watagans and Lake Macquarie Conservation Framework” which led to the establishment of a Green Corridor extending from Stockton Bight to the Watagans. A key part of the Green Corridor, the Tank Paddock connects Hexham Swamp to the east, with Lenaghans Swamp to the north, Pambalong Swamp to the west and a forested corridor extending southwest towards Mount Sugarloaf and the Watagans. In 2001 the Tank Paddock was the subject of a proposed housing development.

Due to the potential importance of the Tank Paddock to the proposed Green Corridor, members of Hunter Bird Observers Club were asked to conduct avian surveys of this area by the Coordinator, Green Corridor Coalition in 2002. At the time the land, Lot 1 DP 1007615, was owned by Coal and Allied Industries Limited (Coal and Allied). Some of the property had been degraded by cattle and vehicular tracks made by four-wheel drives, cars and motor bikes. However, the Tank Paddock was shown to contain significant habitat with ecotones between dry and wet forested areas and between the forest and fringing wetlands (Umwelt 2003).

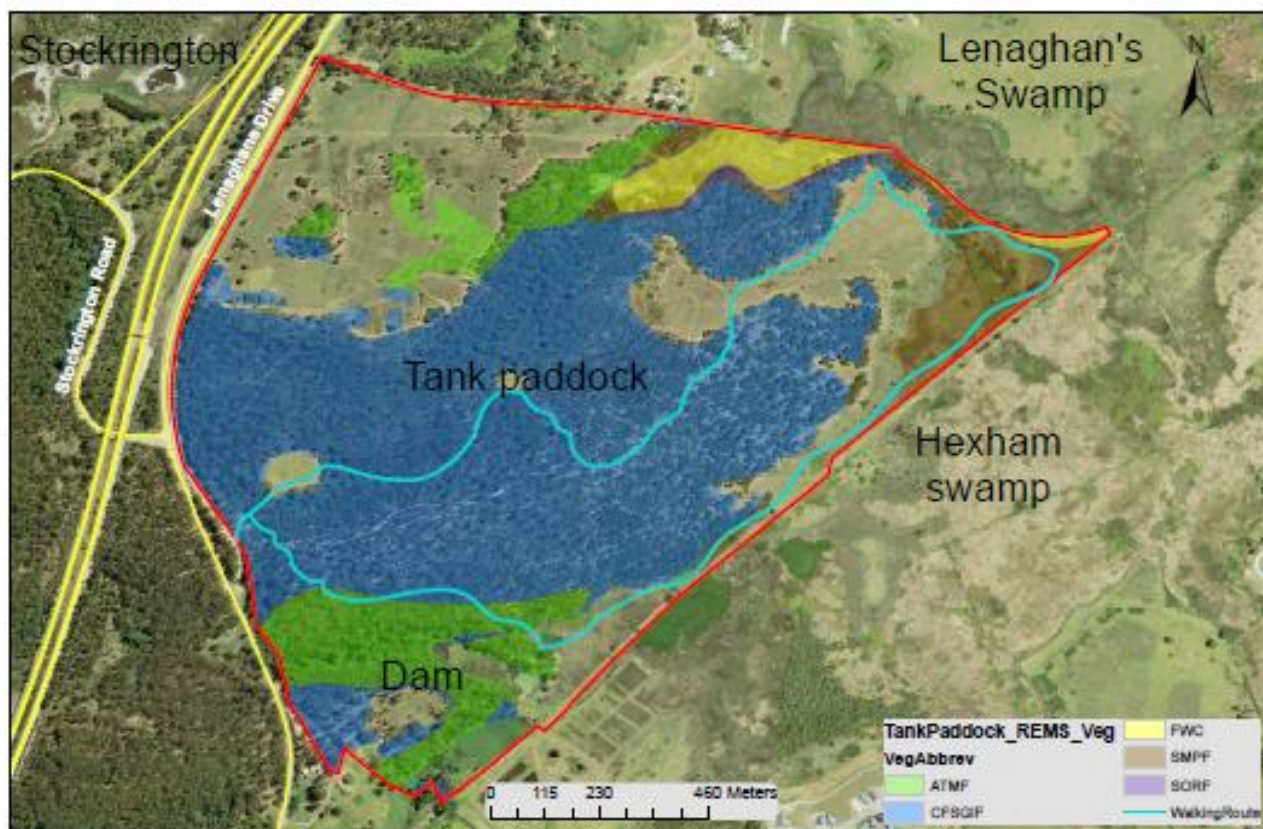
The pertinent characteristics of the site are as follows:

Site Location: The Tank Paddock is roughly rectangular in shape, covers 147 hectares and lies immediately north of the village of Minmi (32°53'0"S 151°43'0"E). Its location is shown in **Figure 1**. It is bounded to the west by the M1 Motorway, Lenaghans Drive to the southwest, the abandoned Richmond Vale Railway line to the southeast and Lenaghans Swamp to the north.

Vegetation communities: The nomenclature and classification of vegetation communities followed that of the Lower Hunter and Central Coast Regional Environmental Management Strategy (House 2003; see **Figure 1**).

The dominant vegetation is Coastal Foothills Spotted Gum - Ironbark Forest (CFSGIF, light blue, **Figure 1**) which covers approximately 65% of the Tank Paddock. It is present along the central north-south ridge and adjacent slopes to the west and east. The dominant forest species are Spotted Gum *Corymbia maculata*, Grey Ironbark *Eucalyptus siderophloia*, Grey Gum *Eucalyptus paniculata* and White Mahogany *Eucalyptus acmenoides*. An understorey of juvenile eucalyptus, melaleuca, leptospermum and wattle is present above a mixture of grasses and herbaceous plants.

Approximately 25% of the Tank Paddock, to the northwest and northeast is Cleared Land (CL) with a mixture of native and introduced grasses and weeds.



**Figure 1.** Image of Tank Paddock showing boundary, vegetation communities and adjacent landmarks

Two areas of Alluvial Tall Moist Forest (ATMF, light green, **Figure 1**) comprise approximately 5% of the area. They are located along the lower slopes of the central ridge in the northwest and on the lower slopes of the ridge in the south. The dominant species are Spotted Gum, Sydney Blue Gum *Eucalyptus saligna*, and White Mahogany. The understorey is comprised of she-oak, juvenile eucalyptus, myrtle, rosewood, clerodendrum, turpentine and wattle above a mixture of grasses, sedges, ferns, mat-rush, flax and vines.

In the northeast corner of the Tank Paddock, Swamp Mahogany - Paperbark Forest (SMPF, brown, **Figure 1**) covers approximately 4% of the site. The dominant species are Swamp Mahogany *Eucalyptus robusta*, Broad-leaved Paperbark *Melaleuca quinquenervia*, Flax-leaved Melaleuca *Melaleuca linariifolia*, Prickly-leaved Melaleuca *Melaleuca styphelioides* and Swamp Melaleuca *Melaleuca ericifolia*. The understorey is a mixture of juvenile melaleuca, sedges, ferns, rushes and weeds. Along the northern boundary and surrounding the Tank Paddock in Lenaghans and Hexham Swamps, the vegetation is a Freshwater Wetland Complex (FWC, yellow, **Figure 1**). There is a small area of Swamp Oak Rushland Forest (SORF, purple, **Figure 1**) along the southern edge of the Freshwater Wetland Complex. The dominant vegetation is

Swamp Oak *Casuarina glauca* with an understorey of lantana and rushes. There are also some remnant Forest Red Gums *Eucalyptus tereticornis* with weedy understorey, possibly remnant Hunter Lowlands Redgum Forest (HLRF), along the northern boundary of the site.

**Site significance:** The Tank Paddock is the narrowest part of the 60-kilometre-long Green Corridor connecting Stockton Bight to the Watagans. As well as providing much of the last forested area on the edge of Hexham Swamp, the Tank Paddock has regional value due to its variety of vegetation communities which have been largely lost to urban expansion. The diversity of vegetation communities within the Tank Paddock is a potential driving force for the avian species richness found as a result of these surveys.

This paper aims to describe and record the diversity of avian species using the Tank Paddock, and hence demonstrate the importance of this area to the Green Corridor.

## METHODOLOGY

The Tank Paddock was surveyed regularly between 2002 and 2009. Surveys were generally conducted on a

monthly basis between July 2002 and August 2005 with a break until August 2006. From that time, surveys were conducted on a three-monthly basis until June 2009. Between two and eight observers participated in the surveys, however more commonly there were two or three observers. Species were identified and recorded during surveys of the Tank Paddock which were designed to traverse all of the vegetation communities present. Raptors observed soaring over the fringing wetlands in Hexham Swamp were included.

The surveys started from Lenaghans Drive at the most western and highest point in the Tank Paddock, then followed a ridge along the centre of the paddock in a northeast direction through CFSGIF. The ridge overlooks farms behind Lenaghans Swamp to the north and Hexham Swamp to the east. Descending towards the northern boundary of the paddock, observers looked over SORF, HLRF and FWC towards Lenaghans Swamp. The survey route headed east through CL, SMPF and SORF (pale blue, **Figure 1**).

The survey route then turned southwest along the eastern boundary of the Tank Paddock traversing through a mixture of SMPF, CL and FWC until reaching a large dam in the south of the paddock. The route traversed around the dam and then turned southwest through a section of ATMF. It then ascended to the ridge through more CFSGIF to return to the starting point. The surveys started around first morning light, traversed

approximately 3.5 km and lasted between three and four hours. Earlier surveys in 2002 were not as extensive, covering less of the ATMF, and less of the eastern end of the Tank Paddock.

Identification of birds was made visually or by call. Evidence of breeding was recorded. Species were classified as either resident in the Hunter Region or migratory (Stuart 2014).

To analyse the results it was decided to address the presence or absence of species on a seasonal basis as it was considered there were insufficient surveys to analyse the records on a monthly basis. In some months there were only two or three surveys conducted (**Table 1**). There was also a concern that the variable monthly survey effort would bias the results. A more uniform survey effort was obtained by accumulating the survey data on a seasonal basis: summer - December to February; autumn - March to May; winter - June to August; spring - September to November.

The overall reporting rate was calculated as the number of surveys during which a species was observed as a percentage of all surveys and is shown in **Appendix 1**. Species reporting rates were calculated in a similar manner for each of the four seasons and seasonal reporting rates should be considered in the context of the number of surveys conducted in each season.

**Table 1.** Monthly surveys conducted at the Tank Paddock between July 2002 and June 2009.

Month	2002	2003	2004	2005	2006	2007	2008	2009	Monthly Totals
January		1	1	1					3
February		1	1	1		1	1	1	6
March		1		1					2
April		1	1	1					3
May		1	1	1		1	1		5
June		1	1	1				1	4
July	1	1	1	1					4
August	1	2	1	1	1	1			7
September	1	1	1				1		4
October	1		1						2
November	1	2	2		1	1	1		8
December	1	1							2
<b>Total</b>	<b>6</b>	<b>13</b>	<b>11</b>	<b>8</b>	<b>2</b>	<b>4</b>	<b>4</b>	<b>2</b>	<b>50</b>

## RESULTS

Over the eight years of the survey period a total of 153 species was recorded in the Tank Paddock (see **Appendix 1** for details). The majority of these species are generally common throughout the Hunter Region and are resident throughout the year. The classification used here for resident and migratory species is adopted from Stuart (2014). The classification resident includes birds classified by Stuart as birds of passage (Straw-necked Ibis *Threskiornis spinicollis*, Yellow-billed Spoonbill

*Platalea flavipes* and Musk Lorikeet *Glossopsitta concinna*).

The reporting rate data highlights a significant number of migratory species that use the Tank Paddock at various times of the year. The survey records also document the presence of four threatened species using the Tank Paddock, five species that are rare or uncommon in the Hunter Region and at least eight other species that have bred there (**Table 2**).

**Table 2.** Number of seasonal surveys and number of species recorded in the Tank Paddock.

	All Years	Summer	Autumn	Winter	Spring
Number of surveys	50	12	10	14	14
Total species recorded	153	121	124	100	134
Resident species	130	104	111	96	113
Migratory species	23	17	13	4	21
Threatened species	4	3	2	2	3
Breeding records	8	6	0	0	2

## Migratory species

A total of 23 of the species recorded in the Tank Paddock are migratory or partially migratory, either within Australia or to overseas destinations.

The most common summer migrants were Sacred Kingfisher *Todiramphus sanctus*, Dollarbird *Eurystomus orientalis*, Rufous Whistler *Pachycephala rufiventris* and Australian Reed-Warbler *Acrocephalus australis*. Sacred Kingfisher was present throughout the Tank Paddock in summer (83%) and spring (79%), occasionally in autumn (10%) and not in winter. Dollarbird was recorded in summer (75%) and spring (64%). Rufous Whistler was in forested areas of the Tank Paddock during spring (93%), summer (92%) and autumn (50%). Australian Reed-Warbler was seen in and near FWC in spring (86%), summer (67%) and autumn (40%).

Six species of migratory cuckoos have been recorded throughout the Tank Paddock; Eastern Koel *Eudynamis orientalis*, Channel-billed Cuckoo *Scythrops novaehollandiae*, Horsfield's Bronze-Cuckoo *Chalcites basalis*, Shining Bronze-Cuckoo *Chalcites lucidus*, Pallid Cuckoo *Heteroscenes pallidus* and Brush Cuckoo *Cacomantis variolosus*. Eastern Koel, Channel-billed Cuckoo and Brush Cuckoo were recorded in spring and summer while Horsfield's Bronze-Cuckoo and Pallid Cuckoo were reported in spring only. Eastern Koel and Channel-billed Cuckoo were reported most frequently in spring (64%). The Pallid Cuckoo was only reported once, in spring. The Shining Bronze-Cuckoo was reported in spring (50%), autumn (20%) and winter (7%).

Spangled Drongo *Dicrurus bracteatus* is a winter migrant and was recorded in or near ATMF in autumn (40%) and in winter (14%).

Both Fairy Martin *Petrochelidon ariel* and Tree Martin *Petrochelidon nigricans* were recorded with overall reporting rates of 30% and 40% respectively. The Fairy Martin was reported most frequently in summer and spring with rates of 42%

and 43% respectively, and then declined in autumn to 10%. Reporting rate in winter was 21%. The Tree Martin had reporting rates of 50% in summer, 60% in autumn, declining to 36% in winter and 29% in spring.

Other migrant species were White-throated Needletail *Hirundapus caudacutus*, White-throated Gerygone *Gerygone olivacea*, Cicadabird *Edolisoma tenuirostris*, Rufous Fantail *Rhipidura rufifrons*, Leaden Flycatcher *Myiagra rubecula* and Black-faced Monarch *Monarcha melanopsis*. Overall reporting rates ranged from 14% to 30%, with highest reporting rates occurring in spring (29% to 64%), lower rates in summer (17% to 42%) and no reports of White-throated Needletail or Cicadabird in autumn. White-throated Gerygone had an overall reporting rate of 30% and was present in spring (64%), summer (42%) and autumn (20%). Rufous Fantail was present in or near ATMF in spring (43%), summer (33%) and autumn (20%). Leaden Flycatcher was recorded in CFSGIF in spring (29%), summer (17%) and autumn (10%). Black-faced Monarch was present in ATMF in spring (50%), summer (42%) and autumn (10%).

The migrants with lowest overall reporting rates (2%-4%) were Latham's Snipe *Gallinago hardwickii* reported in FWC in summer (17%), Rainbow Bee-eater *Merops ornatus* reported during one survey in spring (7%), White-winged Triller *Lalage tricolor* recorded in spring (7%) and autumn (10%) and Satin Flycatcher *Myiagra cyanoleuca* (4%) recorded in CFSGIF in spring 2003 (7%) and summer 2004 (8%).

## Threatened species

Four species listed as threatened under the NSW *Threatened Species Conservation Act 1995* were recorded in the Tank Paddock. Australasian Bittern *Botaurus poiciloptilus* listed as Endangered, was seen in FWC to the south of the Tank Paddock in September 2003. Little Eagle *Hieraaetus morphnoides* listed as Vulnerable, was recorded in February 2003 and January 2004. Little Lorikeet *Glossopsitta pusilla* listed as Vulnerable, was

regularly recorded in CFSGIF in nine of the twelve months, but was not recorded in the summer. More than 50 individuals were recorded in April 2005. Varied Sittella *Daphoenositta chrysoptera* listed as Vulnerable, had an overall reporting rate of 30% and was regularly seen in CFSGIF close to the ridge. The species was recorded in small flocks in seven months of the year, most frequently in April, May and June. Numbers of individuals ranged from one in June 2003, to more than 20 birds, seen in May 2005.

### Breeding records

Observations of probable breeding within the Tank Paddock were recorded for eight species. Adult Purple Swamphen *Porphyrio porphyrio*, Lewin's Honeyeater *Meliphaga lewinii*, Cicadabird and White-breasted Woodswallow *Artamus leucorhynchus*, Leaden Flycatcher, Little Grassbird *Poodytes gramineus* and Mistletoebird *Dicaeum hirundinaceum* were all observed with dependent young. A Shining Bronze-Cuckoo was begging for food and being fed by a White-browed Scrubwren *Sericornis frontalis* on the ground in the ATMF in September 2003. Two other species, for which adults were observed to be accompanied by immature or juvenile birds, may also have bred within the Tank Paddock. These were Black Swan *Cygnus atratus* and Chestnut-breasted Mannikin *Lonchura castaneothorax*.

### Rare and uncommon species in the Hunter

Five species listed as rare or uncommon residents in the 2013 Hunter Region Annual Bird Report (Stuart 2014) were Australasian Bittern, Satin Flycatcher, Pacific Baza *Aviceda subcristata*, Painted Button-Quail *Turnix varius* and Chestnut-breasted Mannikin. The overall reporting rate for the first four species was low with single birds sighted in summer or spring: Australasian Bittern in September 2003, Satin Flycatcher in November 2003 and February 2004, Pacific Baza in February 2003 and September 2003, and in September 2004, and Painted Button-Quail in February 2007. Both Satin Flycatcher and Pacific Baza were in CFSGIF. A single Satin Flycatcher was present in November 2003 (7%) and February 2004 (8%). The species is rarely recorded in the Lower Hunter region (Stuart 2005). The Painted Button-Quail was foraging along the ridge in an open section of CFSGIF bordering the large cleared area to the north-east of the Tank Paddock. Chestnut-breasted Mannikin had an overall reporting rate of 26%, and were most commonly reported in autumn (50%), winter (29%)

and summer (25%) and less often in spring (7%). Chestnut-breasted Mannikin were feeding in flocks of between 3 and 20 birds at the margins of FWC and SMPF near the eastern end of the Tank Paddock.

### Eagles, hawks and falcons

Of the 21 species of terrestrial birds of prey that are known to be present in the Hunter Region, 13 have been recorded in the Tank Paddock. These were Black-shouldered Kite *Elanus axillaris*, Pacific Baza, White-bellied Sea-Eagle *Haliaeetus leucogaster*, Whistling Kite *Haliastur sphenurus*, Brown Goshawk *Accipiter fasciatus*, Grey Goshawk *Accipiter novaehollandiae*, Swamp Harrier *Circus approximans*, Wedge-tailed Eagle *Aquila audax*, Little Eagle, Nankeen Kestrel *Falco cenchroides*, Brown Falcon *Falco berigora*, Australian Hobby *Falco longipennis*, Peregrine Falcon *Falco peregrinus*. Most of these species were seen foraging over CL in the north and east of the Tank Paddock and over Hexham Swamp adjoining the Tank Paddock. In contrast Pacific Baza and Brown Goshawk were observed in CFSGIF, and Grey Goshawk was seen in SMPF. The most frequently reported species over all the surveys was the Whistling Kite (76%) followed by Swamp Harrier (48%) and White-bellied Sea-Eagle (36%). Both White-bellied Sea-Eagle and Whistling Kite were seen roosting and possibly nesting in taller trees in CFSGIF in the Tank Paddock. Seasonal reporting rates varied greatly without any definite trends. The Little Eagle, listed as Vulnerable under the NSW *Threatened Species Conservation Act 1995*, was reported on two occasions.

### Owls

The only owl species recorded during the surveys was the Southern Boobook *Ninox boobook* which was observed early in the day in April 2004 at the edge of dense understorey in CFSGIF.

### Passeriformes

Including migratory, threatened, rare and uncommon species, 70 passeriformes were identified in the Tank Paddock (see **Appendix 1** for more details). Many resident species were commonly observed in CFSGIF: White-throated Treecreeper *Cormobates leucophaea*, Superb Fairy-wren *Malurus cyaneus*, Variegated Fairy-wren *Malurus lamberti*, White-browed Scrubwren, White-throated Gerygone, thornbills, pardalotes, honeyeaters, Eastern Whipbird *Psophodes*

*olivaceus*, Black-faced Cuckoo-shrike *Coracina novaehollandiae*, Golden Whistler *Pachycephala pectoralis*, Rufous Whistler, Grey Shrike-thrush *Colluricincla harmonica*, Australasian Figbird *Sphecotheres vieilloti*, Olive-backed Oriole *Oriolus sagittatus*, Grey Fantail *Rhipidura fuliginosa*, robins and Mistletoebird. Butcherbirds, Australian Magpie *Gymnorhina tibicen*, Pied Currawong *Strepera graculina*, Australian Raven *Corvus coronoides*, Torresian Crow *Corvus orru*, Magpie-lark *Grallina cyanoleuca* and White-winged Chough *Corcorax melanorhamphos* were often seen in more open areas of CFSGIF. Fairy-wrens, White-breasted Woodswallow, Willie Wagtail *Rhipidura leucophrys*, Silvereyes, finches and Australasian Pipit *Anthus novaeseelandiae* were found around the edges of SMPF and FWC. The presence of 1-5 Double-barred Finch *Taeniopygia bichenovii* (4%) in spring 2004 (7%) and summer 2005 (8%) is a notable record for this species which is rare in near-coastal habitat in the Hunter Region (BirdLife Australia Birdata records accessed 2016). Golden-headed Cisticola *Cisticola exilis*, Tawny Grassbird *Cincloramphus timoriensis* and Little Grassbird *Poodytes gramineus* were commonly seen and heard in or near FWC. Black-faced Monarch, Satin Bowerbird *Ptilonorhynchus violaceus*, Brown Gerygone *Gerygone mouki*, Crested Shrike-tit *Falcunculus frontatus* were found in or near ATMF. Welcome Swallow *Hirundo neoxena*, Tree and Fairy Martins were commonly seen hawking over CL and FWC.

## DISCUSSION

The number and diversity of bird species identified during eight years of surveys of the Tank Paddock highlight the importance of conserving this area as part of the Green Corridor. Despite degradation of parts of the Tank Paddock at the time of the surveys, the existing vegetation supported 153 different species, including four species listed as threatened in NSW, and another four species listed as rare or uncommon in the Hunter Region (Stuart 2014). The range of habitats within and adjoining the Tank Paddock is essential for the protection of these eight bird species. The high species richness (153 species) and regular occurrence of a majority of these species documented for a relatively small area of land (147 ha) at the interface of forest, woodland and wetland habitats indicates that Tank Paddock is an important location for avian diversity.

The Tank Paddock appears to provide an important link between vegetation communities along the Green Corridor, allowing different species to move

from wetlands to the mountains and vice versa. For example, some of the raptors have been observed foraging in Hexham Swamp and using tall trees in the Tank Paddock as roosting and nesting sites. It is believed that other species such as the Sacred Kingfisher, Scarlet Honeyeater, Black-faced Monarch, Leaden Flycatcher, Rose Robin, Rufous Fantail and Rufous Whistler make use of the Tank Paddock during seasonal and altitudinal migrations. Further research should aim to discover how indicator species, such as rare, threatened and keystone species such as predators, use the Tank Paddock and the Green Corridor as habitat.

Although these surveys provide a comprehensive inventory of the birds of the Tank Paddock both overall and seasonally, changes over time could not be investigated as survey effort and reporting differed for earlier and later surveys. During the first few years, surveys were conducted on a monthly basis, whereas from 2006 surveys were conducted quarterly. Early surveys were not as extensive as later surveys, potentially resulting in an under-survey of some of CL, SMPF and ATMF. In addition, estimates of numbers of birds were not recorded during the early surveys. These factors mean that trends in abundance of birds could not be determined. Other factors were likely to affect the species seen. For several months in 2005, the large cleared area to the northeast was turned into a motorbike track, which was used recreationally on weekends, then access to the Tank Paddock by the Hunter Bird Observers Club was withdrawn for part of 2005 and 2006.

Despite these caveats, the results provide a significant historical record of species resident in the Tank Paddock or using it seasonally. It is recommended that future monitoring of avian diversity in the Green Corridor should be carefully designed to facilitate interpretation of results. As urban development of the region continues, information obtained about use of the Green Corridor will be essential to understanding the needs for habitat connectivity of many of the species reported in this study.

## CONCLUSION

The eight years of surveying in the Tank Paddock have highlighted the importance of this area to the conservation of the region's avian populations. The six vegetation communities present provide a wide range of habitats that have been demonstrated to support 153 different resident and migratory species. At least eight of these species have been

recorded breeding in the Tank Paddock. It has also been shown to provide suitable habitat for four species listed as threatened in NSW, and an additional five species that are listed as rare or uncommon in the Hunter Region (Stuart 2014). The results of this long-term study support the view that the Tank Paddock provides a significant avian-rich habitat within the Green Corridor of the Lower Hunter Valley.

## ACKNOWLEDGEMENTS

Many thanks to Neil Fraser for his considerable support, encouragement and advice in writing up this paper. Thanks also to Charles Huxtable for providing Figure 1 with detailed information on the range and distribution of the vegetation communities in the Tank Paddock. Including the authors, the following people were frequent observers during surveys of the Tank Paddock: Grant Brosie, Chris Eastham, Dave Eastham, Jenny Helman, Di Johnson, Nick Livanos, Robert McDonald and Rachael Peake.

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**APPENDIX 1** - List of species recorded in Tank Paddock together with overall reporting rate and seasonal reporting rates

Common Name	Scientific Name	RR all surveys (%)	RR Summer (%)	RR Autumn (%)	RR Winter (%)	RR Spring (%)
Wandering Whistling-Duck	<i>Dendrocygna arcuata</i>	2	0	0	0	7
Black Swan	<i>Cygnus atratus</i>	70	50	70	86	71
Hardhead	<i>Aythya australis</i>	12	0	10	29	7
Australasian Shoveler	<i>Spatula rhynchotis</i>	4	8	0	0	7
Pacific Black Duck	<i>Anas superciliosa</i>	96	92	100	100	93
Northern Mallard	<i>Anas platyrhynchos</i>	2	0	0	0	7
Grey Teal	<i>Anas gracilis</i>	24	0	30	43	21
Chestnut Teal	<i>Anas castanea</i>	72	58	60	79	79
Australian Wood Duck	<i>Chenonetta jubata</i>	36	33	30	57	29
Brown Quail	<i>Synoicus ypsilophora</i>	10	8	10	0	21
Australasian Grebe	<i>Tachybaptus novaehollandiae</i>	12	0	10	7	29
Rock Dove	<i>Columba livia</i>	2	0	10	0	0
Spotted Dove	<i>Streptopelia chinensis</i>	12	25	10	0	21
Brown Cuckoo-Dove	<i>Macropygia phasianella</i>	6	0	0	0	21
Wonga Pigeon	<i>Leucosarcia melanoleuca</i>	4	0	10	0	7
Crested Pigeon	<i>Ocyphaps lophotes</i>	44	92	40	36	21
Bar-shouldered Dove	<i>Geopelia humeralis</i>	12	8	10	14	14
Pheasant Coucal	<i>Centropus phasianinus</i>	26	50	10	7	43
Eastern Koel	<i>Eudynamis orientalis</i>	26	42	0	0	64
Channel-billed Cuckoo	<i>Scythrops novaehollandiae</i>	26	42	0	0	64
Horsfield's Bronze-Cuckoo	<i>Chalcites basalis</i>	4	0	0	0	14
Shining Bronze-Cuckoo	<i>Chalcites lucidus</i>	20	0	20	7	50
Fan-tailed Cuckoo	<i>Cacomantis flabelliformis</i>	54	25	60	50	79
Brush Cuckoo	<i>Cacomantis variolosus</i>	10	8	0	0	36
Pallid Cuckoo	<i>Heteroscenes pallidus</i>	2	0	0	0	7
Tawny Frogmouth	<i>Podargus strigoides</i>	2	0	10	0	0
Australian Owlet-nightjar	<i>Aegotheles cristatus</i>	2	0	10	0	0
White-throated Needletail	<i>Hirundapus caudacutus</i>	14	25	0	0	36
Buff-banded Rail	<i>Hypotaenidia philippensis</i>	6	8	10	0	14
Purple Swamphen	<i>Porphyrio porphyrio</i>	88	100	80	71	100
Dusky Moorhen	<i>Gallinula tenebrosa</i>	12	33	10	7	0
Eurasian Coot	<i>Fulica atra</i>	2	0	0	0	7
Black-winged Stilt	<i>Himantopus leucocephalus</i>	6	0	0	0	21
Masked Lapwing	<i>Vanellus miles</i>	82	67	70	100	86
Latham's Snipe	<i>Gallinago hardwickii</i>	4	17	0	0	0
Painted Button-Quail	<i>Turnix varius</i>	2	8	0	0	0
Silver Gull	<i>Chroicocephalus novaehollandiae</i>	2	0	10	0	0
Australian Pelican	<i>Pelecanus conspicillatus</i>	52	33	60	64	50
Australasian Bittern	<i>Botaurus poiciloptilus</i>	2	0	0	0	7
Nankeen Night-Heron	<i>Nycticorax caledonicus</i>	2	8	0	0	0
Cattle Egret	<i>Bubulcus ibis</i>	66	100	40	50	71
White-necked Heron	<i>Ardea pacifica</i>	50	25	50	43	79
Eastern Great Egret	<i>Ardea alba modesta</i>	36	17	40	43	43
Intermediate Egret	<i>Ardea intermedia</i>	12	25	0	7	14
White-faced Heron	<i>Egretta novaehollandiae</i>	88	83	100	93	79
Australian White Ibis	<i>Threskiornis moluccus</i>	94	83	100	93	100
Straw-necked Ibis	<i>Threskiornis spinicollis</i>	78	67	90	86	71
Yellow-billed Spoonbill	<i>Platalea flavipes</i>	4	8	0	7	7
Royal Spoonbill	<i>Platalea regia</i>	18	25	10	14	21
Little Pied Cormorant	<i>Microcarbo melanoleucos</i>	20	25	10	14	29
Great Cormorant	<i>Phalacrocorax carbo</i>	12	17	10	0	21
Little Black Cormorant	<i>Phalacrocorax sulcirostris</i>	14	25	10	0	21



**Appendix 1** - List of species recorded in Tank Paddock together with overall reporting rate and seasonal reporting rates (continued)

Common Name	Scientific Name	RR all surveys (%)	RR Summer (%)	RR Autumn (%)	RR Winter (%)	RR Spring (%)
Pied Cormorant	<i>Phalacrocorax varius</i>	2	0	0	0	7
Black-shouldered Kite	<i>Elanus axillaris</i>	10	0	10	14	14
Pacific Baza	<i>Aviceda subcristata</i>	6	8	0	0	14
Wedge-tailed Eagle	<i>Aquila audax</i>	10	8	10	21	0
Little Eagle	<i>Hieraaetus morphnoides</i>	4	17	0	0	0
Swamp Harrier	<i>Circus approximans</i>	48	42	40	57	50
Grey Goshawk	<i>Accipiter novaehollandiae</i>	14	25	20	7	7
Brown Goshawk	<i>Accipiter fasciatus</i>	10	8	20	0	14
White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>	36	25	60	36	36
Whistling Kite	<i>Haliastur sphenurus</i>	76	75	90	64	71
Southern Boobook	<i>Ninox boobook</i>	2	0	10	0	0
Rainbow Bee-eater	<i>Merops ornatus</i>	2	0	0	0	7
Dollarbird	<i>Eurystomus orientalis</i>	34	75	0	0	64
Sacred Kingfisher	<i>Todiramphus sanctus</i>	42	83	10	0	79
Laughing Kookaburra	<i>Dacelo novaeguineae</i>	90	100	80	86	93
Nankeen Kestrel	<i>Falco cenchroides</i>	24	8	40	36	14
Australian Hobby	<i>Falco longipennis</i>	22	42	30	7	14
Brown Falcon	<i>Falco berigora</i>	20	17	10	43	7
Peregrine Falcon	<i>Falco peregrinus</i>	6	0	20	7	0
Yellow-tailed Black-Cockatoo	<i>Zanda funereus</i>	14	8	20	14	14
Galah	<i>Eolophus roseicapilla</i>	74	92	80	64	64
Long-billed Corella	<i>Cacatua tenuirostris</i>	14	25	10	14	7
Little Corella	<i>Cacatua sanguinea</i>	34	42	40	36	29
Sulphur-crested Cockatoo	<i>Cacatua galerita</i>	94	100	90	100	86
Australian King-Parrot	<i>Alisterus scapularis</i>	8	8	10	0	14
Red-rumped Parrot	<i>Psephotus haematonotus</i>	14	0	10	14	29
Eastern Rosella	<i>Platycercus eximius</i>	100	100	100	100	100
Musk Lorikeet	<i>Glossopsitta concinna</i>	2	0	0	0	7
Little Lorikeet	<i>Glossopsitta pusilla</i>	38	25	70	29	43
Rainbow Lorikeet	<i>Trichoglossus moluccanus</i>	70	42	70	93	71
Scaly-breasted Lorikeet	<i>Trichoglossus chlorolepidotus</i>	6	8	10	0	7
Satin Bowerbird	<i>Ptilonorhynchus violaceus</i>	10	17	20	0	7
White-throated Treecreeper	<i>Cormobates leucophaea</i>	94	100	100	100	79
Variiegated Fairy-wren	<i>Malurus lamberti</i>	88	83	80	93	93
Superb Fairy-wren	<i>Malurus cyaneus</i>	82	75	90	86	79
Southern Emu-wren	<i>Stipiturus malachurus</i>	20	25	10	21	21
Scarlet Honeyeater	<i>Myzomela sanguinolenta</i>	62	67	60	36	86
Striped Honeyeater	<i>Plectorhyncha lanceolata</i>	10	0	10	29	0
Noisy Friarbird	<i>Philemon corniculatus</i>	58	25	80	64	57
Brown Honeyeater	<i>Lichmera indistincta</i>	2	0	10	0	0
White-naped Honeyeater	<i>Melithreptus lunatus</i>	72	42	90	79	79
Eastern Spinebill	<i>Acanthorhynchus tenuirostris</i>	80	58	100	79	86
Lewin's Honeyeater	<i>Meliphaga lewinii</i>	96	100	100	86	100
Red Wattlebird	<i>Anthochaera carunculata</i>	18	0	50	21	7
Fuscous Honeyeater	<i>Ptilotula fusca</i>	14	0	20	36	0
Yellow-faced Honeyeater	<i>Caligavis chrysops</i>	96	83	100	100	100
Bell Miner	<i>Manorina melanophrys</i>	100	100	100	100	100
Noisy Miner	<i>Manorina melanocephala</i>	100	100	100	100	100
Spotted Pardalote	<i>Pardalotus punctatus</i>	88	67	100	100	86
Striated Pardalote	<i>Pardalotus striatus</i>	20	8	10	29	29
Brown Gerygone	<i>Gerygone mouki</i>	76	58	90	86	71

**Appendix 1** - List of species recorded in Tank Paddock together with overall reporting rate and seasonal reporting rates (continued)

Common Name	Scientific Name	RR all surveys (%)	RR Summer (%)	RR Autumn (%)	RR Winter (%)	RR Spring (%)
White-throated Gerygone	<i>Gerygone olivacea</i>	30	42	20	0	64
White-browed Scrubwren	<i>Sericornis frontalis</i>	94	92	90	100	93
Yellow-rumped Thornbill	<i>Acanthiza chrysorrhoa</i>	22	17	40	21	14
Yellow Thornbill	<i>Acanthiza nana</i>	90	92	90	93	86
Striated Thornbill	<i>Acanthiza lineata</i>	68	50	80	79	64
Brown Thornbill	<i>Acanthiza pusilla</i>	94	83	100	100	93
Varied Sittella	<i>Daphoenositta chrysoptera</i>	30	17	70	29	14
Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae</i>	94	92	100	93	93
Cicadabird	<i>Edolisoma tenuirostris</i>	20	33	0	0	50
White-winged Triller	<i>Lalage tricolor</i>	4	0	10	0	7
Rufous Whistler	<i>Pachycephala rufiventris</i>	58	92	50	0	93
Golden Whistler	<i>Pachycephala pectoralis</i>	92	83	100	100	86
Grey Shrike-thrush	<i>Colluricincla harmonica</i>	90	83	90	93	93
Crested Shrike-tit	<i>Falcunculus frontatus</i>	24	17	30	21	29
Eastern Whipbird	<i>Psophodes olivaceus</i>	100	100	100	100	100
Australasian Figbird	<i>Sphecotheres vieilloti</i>	6	8	0	14	0
Olive-backed Oriole	<i>Oriolus sagittatus</i>	40	58	40	0	71
Pied Currawong	<i>Strepera graculina</i>	52	25	50	64	57
Australian Magpie	<i>Gymnorhina tibicen</i>	98	100	100	93	100
Pied Butcherbird	<i>Cracticus nigrogularis</i>	94	100	100	93	86
Grey Butcherbird	<i>Cracticus torquatus</i>	92	92	90	93	93
White-breasted Woodswallow	<i>Artamus leucorhynchus</i>	42	75	40	0	64
Spangled Drongo	<i>Dicrurus bracteatus</i>	12	0	40	14	0
Willie Wagtail	<i>Rhipidura leucophrys</i>	94	100	100	79	100
Rufous Fantail	<i>Rhipidura rufifrons</i>	24	33	20	0	43
Grey Fantail	<i>Rhipidura fuliginosa</i>	100	100	100	100	100
Torresian Crow	<i>Corvus orru</i>	2	0	10	0	0
Australian Raven	<i>Corvus coronoides</i>	100	100	100	100	100
Leaden Flycatcher	<i>Myiagra rubecula</i>	14	17	10	0	29
Satin Flycatcher	<i>Myiagra cyanoleuca</i>	4	8	0	0	7
Magpie-lark	<i>Grallina cyanoleuca</i>	100	100	100	100	100
Black-faced Monarch	<i>Monarcha melanopsis</i>	26	42	10	0	50
White-winged Chough	<i>Corcorax melanorhamphos</i>	34	17	60	36	29
Rose Robin	<i>Petroica rosea</i>	34	0	50	79	0
Eastern Yellow Robin	<i>Eopsaltria australis</i>	86	92	80	93	79
Mistletoebird	<i>Dicaeum hirundinaceum</i>	84	100	90	71	79
Chestnut-breasted Mannikin	<i>Lonchura castaneothorax</i>	26	25	50	29	7
Red-browed Finch	<i>Neochmia temporalis</i>	98	100	100	93	100
Double-barred Finch	<i>Taeniopygia bichenovii</i>	4	8	0	0	7
Australasian Pipit	<i>Anthus novaeseelandiae</i>	4	8	0	0	7
Golden-headed Cisticola	<i>Cisticola exilis</i>	66	75	70	64	64
Tawny Grassbird	<i>Cinclorhamphus timoriensis</i>	38	58	30	7	57
Little Grassbird	<i>Poodytes gramineus</i>	60	58	50	43	86
Australian Reed-Warbler	<i>Acrocephalus australis</i>	48	67	40	0	86
Fairy Martin	<i>Petrochelidon ariel</i>	30	42	10	21	43
Tree Martin	<i>Petrochelidon nigricans</i>	40	50	60	36	29
Welcome Swallow	<i>Hirundo neoxena</i>	82	75	90	86	79
Silvereye	<i>Zosterops lateralis</i>	98	100	100	100	93
Common Starling	<i>Sturnus vulgaris</i>	28	33	10	29	43
Common Myna	<i>Acridotheres tristis</i>	30	42	40	14	36