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ARTICLE

Mulga woodland bird assemblages at Thundelarra and Lakeside, two former pastoral leases of the Murchison Region, Western Australia

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Abstract. Mulga (*Acacia aneura*) woodlands dominate the arid interior of Western Australia. Two representative mulga regions, the former pastoral leases, Thundelarra and Lakeside Stations, of the south-central Murchison Region came under control of the Western Australian Department of Parks and Wildlife in 2007 and 2008, respectively, and are now managed as conservation reserves. The avifauna of mulga-dominated sites on the two reserves was intensively surveyed in late July-early August 2013 by volunteers of BirdLife Western Australia, recording 83 species, with 72 on Thundelarra and 64 on Lakeside. Mean richness of sampling sites was 21.0 ± 4.3 species for Thundelarra and 19.6 ± 3.6 species for Lakeside. Of the recorded species 58% were classed as sedentary or locally dispersive with the remainder nomadic or migratory. Ordination analysis revealed a major separation between avian assemblages associated with the two reserves, with major species differences due to the increased frequency of a number of small insectivores on Thundelarra and the presence and increased frequency of nomadic, opportunistic nectarivores on Lakeside. The reduced frequencies of small insectivores and increased frequencies of nectarivores on Lakeside compared to Thundelarra was thought to be related to remaining effects of stock grazing reducing understory shrub density and the increased flowering intensity of *Eremophila* shrubs during the sampling period. The most common avian species of the mulga woodlands of the two localities were Spiny-cheeked Honeyeater, Crested Bellbird, Chestnut-rumped Thornbill, Singing Honeyeater, Red-capped Robin, Southern Whiteface, Slaty-backed Thornbill and Rufous Whistler. These species were typical of the resident assemblages of birds of mulga woodlands elsewhere in the arid interior of Western Australia. Irruptive nectarivores recorded included Black, White-fronted and Pied Honeyeaters. Control of feral goats and protection from fire to increase understory density is essential to improving the conservation value of these arid-zone lands.

Keywords. Arid-zone bird assemblages, geographic variation, insectivory, mulga birds, nectarivory.

Introduction

Avian assemblages in Western Australia have been documented to vary predominantly according to geographic or climatic parameters (Burbidge *et al.* 2000; Bell *et al.* 2007; 2013a) and/or vegetation type (Burbidge *et al.* 2010; Bell *et al.* 2013a, b, 2014). The season of the sample (Collins and Newland 1986; Bell *et al.* 2013b) and the condition of the weather preceding the sample also influences the assemblage of birds (Recher and Davis 1997; Bell *et al.* 2013b). For some groups, such as the honeyeaters, the availability of nectar-bearing species can also affect the composition of bird assemblages (Bell *et al.* 2007). In the arid interior of central Western Australia, the predominant vegetation is woodland dominated by *Acacia* (Johnson and Burrows 1981), and there is a distinctive assemblage of birds that appears to favour association with mulga (*Acacia aneura*) (Cody 1994).

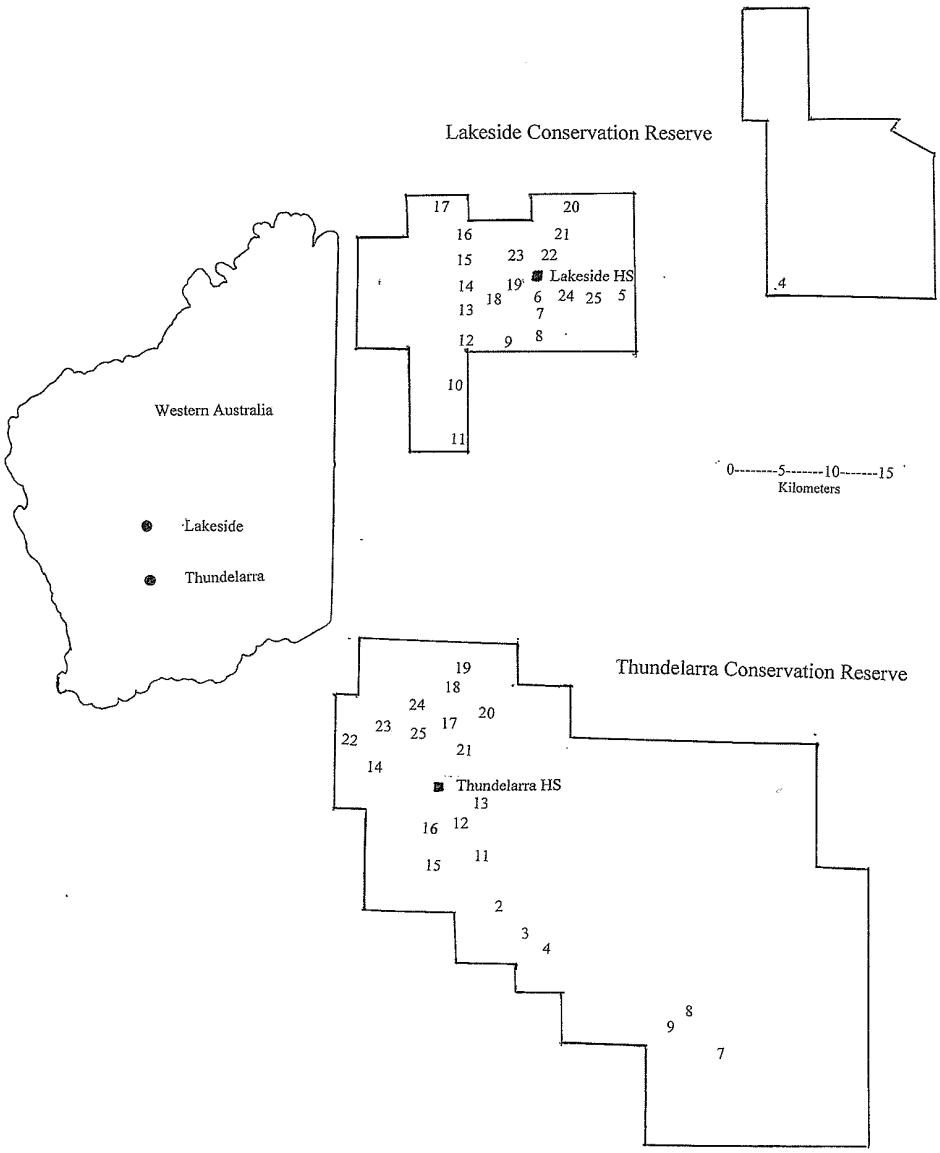

Figure 1. General location map of the study area, highlighting the general location of the two former pastoral stations, and the locations of the intensive sampling plots on Thundelarra and Lakeside.

The objectives of this study were to: 1) document winter avian assemblages of a range of mulga-dominated locations on Thundelarra and Lakeside; 2) determine bird community similarities and differences between the two regions; and 3) relate differences to potential environmental conditions.

Methods

Study sites

Two former pastoral leases of the central Murchison District, Thundelarra and Lakeside Stations, became vacant crown land in 2007 and 2008, respectively, destocked and are now managed as part of the conservation estate by the Western Australia Department of Parks and Wildlife (Figure 1). Thundelarra Station Homestead is approximately 70 km southeast of Yalgoo and the pastoral station originally covered 156,286 ha. Lakeside Station Homestead is 50 km southwest of Cue and the station originally covered 51,248 ha. Lakeside Station homestead is approximately 144 km north of Thundelarra Station homestead. Both reserves lie in the Murchison Region of the Eremaen Botanical Province (Beard 1990). Thundelarra lies in the Yalgoo Subregion and Lakeside lies in the Barlee Subregion (Beard 1976). The vegetation on Thundelarra has been characterized as predominantly mulga woodland with occasional york-gum woodland (Beard 1976). The vegetation of Lakeside is predominantly mulga woodland with sections of samphire and saltbush along saline lake margins (Beard 1990). The climate at Thundelarra is semiarid with a winter maximum rainfall with fairly reliable winter rain and some additional summer rain from thunderstorms (Patrick 2001). Mean annual precipitation at Yalgoo (the

closest meteorological station to Thundelarra) averages 259.8 mm (www.bom.gov.au). Mean January maximum and minimum temperatures are 37.8°C and 22.8°C, respectively. Mean July maximum temp-eratures average 18.4°C and mean July minimum temperatures average 6.9°C. The climate at Lakeside is desert, with both winter and summer rainfall peaks, with the summer rain received from tropical cyclones. Mean annual precipitation at nearby Cue is 233.1 mm. Maximum temperatures occur in January with mean daily maxima of 37.2°C and minima of 22.8°C. Mean winter maxima of July are 18.2°C with minima at 6.2°C. Geologically, both regions are part of the Archean Yilgarn Block with mostly gneisses and granites with minor infolded belts of metamorphic, sedimentary and igneous rocks (Beard 1990; Patrick 2001). The soils are mainly shallow earth loams overlying red-brown siliceous hardpan.

Field surveys

Avifauna sampling of 21 July – 4 August 2013 was carried out in mulga-dominated sites on the two reserves (Figure 1, Appendix 1). Fixed-effort sampling techniques were used to document the winter avifauna of the two regions (Rosenstock *et al.* 2002). The surveys utilised 500 m-radius plots sampled for the presence of bird species during a 30-minute period in each of the 90° quadrants of the plots. Four pairs of volunteers from BirdLife Western Australia were employed to obtain avifauna records simultaneously in the four quadrants. Studies on sampling have found that variation in the competence and experience of reasonably well-trained observers does not generally invalidate conclusions regarding major ecological patterns (Lindenmayer *et al.* 2009). All sites were monitored twice, once in the morning and once in the afternoon on different days. Twenty-one mulga-dominated sites were surveyed on Thundelarra and twenty-two mulga sites on Lakeside. At the time of the sampling, flowering of a number of Eremophila species was prolific on Lakeside Station, but flowering was very scarce on Thundelarra.

Avian nomenclature and common English names followed Christidis and Boles (2008). Movement status designations and food resource categories were determined from the works of Frith (1976), Saunders and Ingram (1995), Johnstone and Storr (1998, 2004), Morris and Wooller (2001), Recher and Davis (2002, 2010), Bell *et al.* (2007, 2010) and Burnie and Andrew (2013).

Statistics

Frequency of species occurrence values from the percentage of the eight quadrants (each sampling point with four 90° quadrants, each sampled twice) provided a quantitative indication of the likelihood that a bird species would be encountered. Species level community analyses were performed to aid understanding of the differences in species presence and frequency of occurrence between sites. A one-way permutational multivariate analysis of variance (Anderson 2001a, b) using the PERMANOVA package within PRIMER 6 (Clarke and Gorley 2006) with 999 permutations of the data provided a comparison of species frequencies of occurrence between reserves. The overall pattern in similarity of the bird communities between the individual sites was depicted using non-metric multidimensional scaling (nMDS). All data were analysed using the Bray-Curtis dissimilarity measure because data were equivalent to scaled frequency of occurrences. To determine which species were making the greatest contribution to observed site differences, Canonical Analysis of Principal Co-ordinates (CAP) was used (Anderson and Robinson 2003; Anderson and Willis 2003). The magnitude of the correlation between species frequency of occurrences and the CAP axis then identified those species showing the greatest discrimination between the two stations in either frequency of occurrence or simple presence/absence. Aspects of species richness were also explored. Site richness was the total number of species observed during the two survey periods for each sample site. Comparison of mean avian richness between samples of the two areas employed a Student's *t*-test.

Results

Overall avifauna assemblage

A total of 83 avian species was recorded during the winter survey period with 72 species from Thundelarra (Appendix 2) and 64 species from Lakeside (Appendix 3). The total included 26 non-passerines and 57 passerines. Of the non-passerines, there were eight diurnal raptors, seven parrots and two cuckoos. Of the passerines, there were eight species of the honeyeater and chat family and five species of thornbills. Approximately 69% of the species were wholly or partially insectivorous. Granivores were also common with 12% of the species. Species classed as sedentary or locally dispersive totaled 58% of the species, with those classed as nomadic or migratory totaling 42%.

The most frequently recorded species on Thundelarra included the sedentary and locally-dispersive insectivores, Crested Bellbird, Chestnut-rumped Thornbill, Southern Whiteface and Red-capped Robin and the versatile-feeding species, Singing Honeyeater and Spiny-cheeked Honeyeater, which are both insectivorous and nectarivorous (Table 1). On Lakeside, the sedentary insectivores, Southern Whiteface, Red-capped Robin and the Chestnut-rumped, Yellow-rumped and Slaty-backed Thornbills, were common, but less so than on Thundelarra (r = -

Table 1. Common species of Thundelarra and Lakeside, including movement type, food resource and mean percentage of the number of sampling quadrants with a species recorded. *=significantly different between reserves. Value of $r = 0.331$ is significant at $p<0.05\%$. Negative r indicates Lakeside values are less than Thundelarra; the converse where Thundelarra values exceed those from Lakeside. Loc. disp. indicates locally dispersive.

Species	Movement	Food resource	Thundelarra	Lakeside	*r*
Crested Bellbird	Sedentary	Insectivore	74.40%	61.93%	-0.36
Chestnut-rumped Thornbill	Loc. disp.	Insectivore	73.21%	40.91%	-0.74*
Singing Honeyeater	Nomadic	Nectarivore/Insectivore	63.10%	43.18%	-0.36
Southern Whiteface	Sedentary	Insectivore/Granivore	61.90%	8.52%	-0.81*
Red-capped Robin	Loc. disp.	Insectivore	60.12%	34.66%	-0.57*
Spiny-cheeked Honeyeater	Nomadic	Nectarivore/Insectivore	58.33%	97.16%	0.76*
Slaty-backed Thornbill	Sedentary	Insectivore	39.88%	15.34%	-0.68*
Rufous Whistler	Loc. disp.	Insectivore	29.76%	24.43%	-0.18
Splendid Fairy-wren	Loc. disp.	Insectivore	28.57%	18.18%	-0.29
Redthroat	Sedentary	Insectivore	23.81%	12.50%	-0.24
White-browed Babbler	Sedentary	Insectivore/Granivore	22.62%	22.73%	-0.02
Grey Shrike-thrush	Sedentary	Insectivore/Carnivore	22.02%	23.86%	0.06
Yellow-rumped Thornbill	Sedentary	Insectivore	19.05%	2.27%	-0.59*
Willie Wagtail	Loc. disp.	Insectivore	17.26%	7.39%	-0.29
Australian Ringneck	Sedentary	Granivore	14.29%	22.16%	0.16
Mulga Parrot	Sedentary	Granivore	13.10%	9.66%	-0.13
Inland Thornbill	Loc. disp.	Insectivore	12.50%	22.73%	-0.31
Bourke's Parrot	Nomadic	Granivore	11.31%	11.36%	-0.07
Black-faced Woodswallow	Nomadic	Insectivore	10.71%	5.11%	-0.25
Yellow-throated Miner	Loc. disp.	Insectivore/Nectarivore	9.52%	3.98%	-0.17
Grey-crowned Babbler	Sedentary	Insectivore	8.93%	8.52%	0.09
Crested Pigeon	Sedentary	Granivore	5.95%	9.09%	0.24
Variegated Fairy-wren	Sedentary	Insectivore	2.98%	12.50%	0.52*
White-fronted Honeyeater	Nomadic	Nectarivore/Insectivore	2.38%	60.23%	0.91*
Pied Honeyeater	Nomadic	Nectarivore/Insectivore	0.00%	46.02%	0.84*

0.81, -0.57, -0.74, -0.59, -0.68, respectively, all $p \leq 0.05$). The nomadic honeyeaters, Pied, White-fronted, and Spiny-cheeked Honeyeaters, however, all were much more frequently recorded on Lakeside (r = 0.84, 0.91, 0.76, respectively, all $p \leq 0.05$). The widely distributed species, Variegated Fairy-wren, was also more frequently recorded on Lakeside (r = 0.52, $p \leq 0.05$). The granivores, Australian Ringneck, Mulga and Bourke's Parrots and the Crested Pigeon, were among the commonly recorded species on both reserves.

General avifauna community structure

The first nMDS ordination axis revealed a major distinction between the avian assemblages of the two conservation reserves (Figure 2). Axis 1 scores of sites from Thundelarra were significantly lower than the scores of sites from Lakeside ($F = 16.35$, $p \leq 0.01$). The second nMDS ordination axis could not be related to features within the separate reserves, such as latitude, longitude, distance between sampling sites or subjective evaluation of the density of mulga or other features of the landscape, such as proximity to drainage lines.

Sample species richness

Mean species richness of all mulga samples was 20.2 ± 4.1 (s.d.) with 21.0 ± 4.3 for Thundelarra sites and 19.6 ± 3.6 for Lakeside sites. There was no statistical difference in mean richness between the site samples

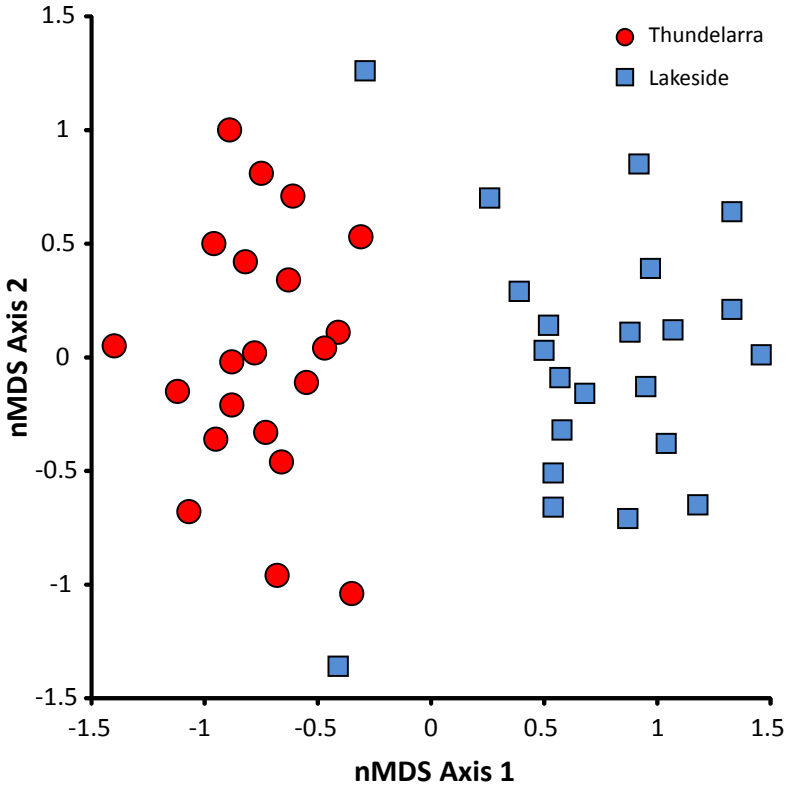

Figure 2. Site ordination showing nMDS axis 1 versus axis 2 scores for Thundelarra (red circles) and Lakeside (blue squares) plot frequency data.

of the two conservation reserves ($t_{41} = 0.69$, p = n.s.).

Discussion

The most common species encountered on the southern Murchison District sites were Crested Bellbird, Chestnut-rumped, Slaty-backed and Yellow-rumped Thornbills, Singing and Spiny-cheeked Honeyeaters, Red-capped Robin and Southern Whiteface. All were species previously reported to be strongly associated with mulga woodlands of central and Western Australia (Table 2). However, some of these 'core mulga species' were not among the frequently recorded species on Thundelarra and Lakeside during the winter sampling period of 2013. Diamond Dove and Jacky Winter were not recorded and observations of Little Crow (3 records), Australian Raven (3), Rufous Songlark (1) and Zebra Finch (1) were very limited. Diamond Dove is generally more a northerly species and Jacky Winter is more common to the southwest of these Murchison Region localities (Johnstone *et al.* 1998, 2004; Barrett *et al.* 2003). The Australian Raven is more common to the south and east, but rarely associated with Western Australian mulga woodlands (Barrett *et al.* 2003). The Rufous Songlark is migratory and arrives in the region in early spring (Frith 1976; Johnstone and Storr 1998, 2004). Also, the Zebra Finch is a species of mulga woodlands of the northern Murchison and Pilbara regions (Bell *et al.* 2013b, 2014), but has been recorded in the southern Murchison region in spring and summer (Bell *et al.* 2013a).

This core resident assemblage of common sedentary insectivorous species associated with mulga is occasionally augmented by a number of arid-zone nomadic nectarivorous species when conditions are favourable (Burbidge and Fuller 2007). Flowering of *Eremophila* spp. most likely influenced the presence and frequency of occurrence of several of these species in the present study. Pied Honeyeater was only recorded on Lakeside and the proportions of the quadrants with Spiny-cheeked Honeyeater, White-fronted Honeyeater and Black Honeyeater were greatly enhanced on Lakeside compared to the proportions recorded on Thundelarra. Spiny-cheeked, Pied, Black and White-fronted Honeyeaters and Yellow-throated Miner have previously been reported to forage for the nectar of *Eremophila* spp. (Read *et al.* 2000; Recher and Davis 2010; Tischler *et al.* 2013). Prolific *Eremophila* flowering was also associated with the presence of nomadic honeyeaters in eucalypt woodlands near Kambalda (Morris and Wooller 2001) and Yellowdine (Recher and Davis 2002). Although bird assemblages were primarily affected by climatic factors across a transect of eucalypt-dominated sites covering the Darling Range, Wheatbelt and Goldfields regions, flowering intensity was a secondary influence to avian community structure (Bell *et al.* 2007).

Table 2. Bird species with affinities to mulga vegetation. Lists from (1) Present study, (2) Cody (1994), (3) Burbidge *et al.* (2010), (4) Bell *et al.* (2013a), (5) Bell *et al.* (2013b) and (6) Bell *et al.* (2013c).

Species	(1)	(2)	(3)	(4)	(5)	(6)
Australian Raven		X				
Black-faced Cuckoo-shrike	X				X	
Bourke's Parrot	X	X			X	X
Chestnut-rumped Thornbill	X	X	X	X		X
Crested Bellbird	X	X	X	X		X
Crested Pigeon	X			X	X	
Diamond Dove		X				
Galah	X	X			X	
Grey shrike-thrush	X	X				
Hooded Robin	X		X			X
Inland Thornbill	X	X	X	X		
Jacky Winter				X		
Little Crow		X				
Mulga Parrot	X	X			X	
Pied Butcherbird	X		X	X		X
Red-capped Robin	X	X	X	X		
Redthroat	X			X		
Rufous Songlark					X	
Rufous Whistler	X	X	X	X	X	
Singing Honeyeater	X	X	X	X	X	X
Slaty-backed Thornbill	X		X			X
Southern Whiteface	X	X				
Spiny-cheeked Honeyeater	X	X	X			
Splendid Fairy-wren	X	X		X		
Western Gerygone	X	X	X			
White-browed Babbler	X	X				X
Willie Wagtail	X	X	X	X	X	X
Yellow-rumped Thornbill	X	X				
Zebra Finch			X	X		X

However, flowering in eucalypts can show considerable variability in time and space and the presence of obligate nectarivorous honeyeaters has occasionally been shown to have no correlation with flowering (Paton 1985; McKenzie *et al.* 1992; Morris and Wooller 2001). Annual flowering intensity of understory shrubs also can vary considerably, although Davies (1976) claims that many Western Australian arid zone shrub species flower at the same time from year to year. The intensive flowering of *Eremophila* on Lakeside in 2013 may have been associated with fortuitous rain of summer thunderstorms. The patchiness of nectar and temporal variability in flowering mean that obligate nectarivorous honeyeaters cannot be a permanent component of the avian assemblage in arid zone habitats (McKenzie *et al.* 1992). However, retention of honeyeaters as pollinators is an important consideration in maintenance of ecosystem function in conservation reserves (Lambeck and Saunders 1993).

Variation between the two localities was also documented for a number of small insectivores. Higher observation frequencies of Yellow-rumped and Chestnut-rumped Thornbills, Southern Whiteface, Red

-capped Robin and Redthroat were recorded on Thundelarra compared to Lakeside. The reasons could be related to the covering of the understory, as small insectivores, such as these species, have previously been associated with the ground and shrub layers of woodlands (Bell *et al.* 2010) and can be affected by the density of understory shrubs and availability of litter (Cousin 2004). Goat culling was a management priority on Thundelarra Station prior to release of the pastoral lease to the Department of Parks and Wildlife in 2007. Residual impacts of sheep grazing and the continuing presence of feral goats on the shrub-layer density on Lakeside is suspected, as bird species reliant on dense understory are vulnerable to the negative impacts of grazing (Read *et al.* 2000; Martin and Possingham 2005; Martin and McIntyre 2007). Grazing by domestic and feral livestock in native woodlands can have major effects on the ecosystem by decreasing the density of native shrubs and herbaceous perennials and replacing them with exotic grasses and herbs (Pettit *et al.* 1995). Removal of any remaining sheep and feral goats should be a priority for future management of the two reserves.

Studies on fire impacts on the avifauna of mulga woodlands in central Australian indicate foliar insectivores, such as the Yellow-rumped, Inland, Slaty-backed and Chestnut-rumped Thornbills and Splendid Fairy-wren, are almost exclusively found in long-unburned habitats (Leavesley *et al.* 2010). Mulga woodlands are particularly sensitive to fire (Gill *et al.* 2003; Bowman *et al.* 2008). Therefore protection of the Thundelarra and Lakeside mulga woodlands from wildfires should also be a management priority.

The total numbers of avian species recorded for Thundelarra (71 species) and Lakeside (64 species) were similar to other winter surveys of sites from the arid interior of Western Australia. Totals of 72 and 73 species were recorded for July samples of 2003 and 2011, respectively, from the Doolgunna rangelands and 68 and 52 species for the same survey periods on the adjacent areas of the former Mooloogool Station rangelands (Bell *et al.* 2013b). On Mt. Gibson Station, southeast of the present study, 77 species were recorded (Recher and Davis 2010). Sixty-three species were recorded in winter surveys from woodlands near Yellowdine in the eastern Wheatbelt District (Recher and Davis 2002).

Individual site richness values of 21.0 species per sample on Thundelarra and 19.6 for Lakeside were also similar to others reported for Western Australian arid-zone habitats. Mean richness of samples of the avifauna of the Mulga-Eucalypt Line region was 19.5 species (Bell *et al.* 2013a) and those recorded for avifauna of the Pilbara averaged 19.1 species (Burbidge *et al.* 2010). In the Doolgunna and Mool-oogool rangelands, species richness averaged 21.7 species per sample (Bell *et al.* 2013b). Winter samples of richness from woodlands near Yellowdine averaged 16, but varied greatly (Recher and Davis 2002). Species richness has been shown to be similar in a wide range of eucalypt-dominated forests and woodlands throughout Australia (Keast 1985). This also could be true of acacia-dominated Australian woodlands. Limitations in the availability of food resources has been suggested by Cousin and Phillips (2008) to be the cause of such a threshold in species richness despite amelioration in climatic and habitat conditions.

The bird assemblages of the two mulga-dominated regions reported here were dominated by sedentary and locally-dispersive species (58%) augmented by nomadic and migratory species (42%). In the Mulga-Eucalypt Line study of Bell *et al.* (2013a), sedentary and locally-dispersive species also totalled 60% of the recorded species. Studies of woodlands near Yellowdine revealed that 75% of bird species were from sedentary or locally-dispersive species (Recher and Davis 2002). Bird assemblages of woodlands of Mt. Gibson Station are also dominated by sedentary species (Recher and Davis 2010). The 58% sedentary and locally-dispersive species of Thundelarra and Lakeside lies within the range suggested by Keast (1967) for Australian habitats with limited rainfalls.

The majority of species on Thundelarra and Lakeside were insectivores. Insects would be a food resource likely to be available throughout the year. Seeds and sprouts could be expected to be available for granivores for much of the year, but nectar, as a food resource would be restricted to the sporadic periods when *Eremophila* and other understory shrubs are in flower. The availability of a particular food type and its periodicity seem to be an influence on the proportion of insectivores, granivores and nectarivores in the avifauna of these arid-zone regions. In areas with diversely varying flowering patterns, a conservation management strategy with a number of scattered reserves should be encouraged.

This study has found the condition of the understory and the flowering intensity could have a major impact on the species assemblages of the avifauna. With time and protection from grazing by feral goats and wildfires, these areas of the conservation estate should increase in value as refugia for birds of the region. Future re-sampling of the permanent sampling locations could provide valuable data about these aspects of the management of these two reserves (Dickman and Wardle 2012).

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Appendix 1. Thundelarra (TH) and Lakeside (LS) mulga survey site locations and vegetation descriptions.

Site Name	Latitude	Longitude	Vegetation Type
TH 02	29° 01' 00.4"	117° 14' 14.3"	Mulga woodland, rocky soil
TH 03	29° 02' 29.4"	117° 15' 22.9"	Mulga woodland, rocky soil
TH 04	29° 02' 31.0"	117° 49' 20.9"	Open mulga woodland
TH 07	29° 05' 55.6"	117° 25' 02.6"	Mulga woodland
TH 08	29° 04' 42.9"	117° 49' 20.9"	Mulga woodland
TH 09	29° 04' 30.3"	117° 25' 18.1"	Mulga woodland
TH 11	28° 55' 23.7"	117° 10' 08.5"	Mulga woodland
TH 12	28° 54' 41.6"	117° 09' 23.2"	Open mulga woodland
TH 13	28° 53' 38.7"	117° 49' 20.9"	Open mulga woodland
TH 14	28° 52' 49.7"	117° 05' 36.1"	Dense mulga woodland
TH 15	28° 56' 41.0"	117° 07' 55.0"	Mulga woodland
TH 16	27° 55' 37.8"	117° 07' 54.8"	Mulga woodland
TH 17	28° 50' 39.6"	117° 08' 10.2"	Mulga woodland near creek edge
TH 18	28° 48' 30.1"	117° 10' 05.0"	Open mulga woodland
TH 19	28° 47' 39.9"	117° 10' 26.3"	Creek side mulga woodland
TH 20	28° 50' 11.5"	117° 11' 18.1"	Mulga woodland
TH 21	28° 51' 37.1"	117° 09' 36.9"	Open mulga woodland
TH 22	28° 50' 37.7"	117° 03' 14.6"	Mulga woodland
TH 23	28° 51' 19.7"	117° 04' 59.3"	Mulga woodland
TH 24	28° 50' 14.0"	117° 07' 03.8"	Mulga woodland
TH 25	28° 51' 34.7"	117° 06' 51.2"	Mulga woodland
LS 04	27° 38' 01.8"	117° 41' 08.4"	Open mulga woodland
LS 05	27° 38' 39.2"	117° 32' 20.3"	Mulga woodland
LS 06	27° 38' 12.7"	117° 29' 20.5"	Mulga woodland
LS 07	27° 39' 12.4"	117° 29' 23.7"	Mulga woodland
LS 08	27° 40' 47.6"	117° 29' 28.5"	Mulga woodland
LS 09	27° 41' 43.8"	117° 27' 13.9"	Mulga woodland
LS 10	27° 43' 27.1"	117° 25' 57.4"	Mulga woodland
LS 11	27° 45' 02.0"	117° 25' 58.4"	Mulga woodland
LS 12	27° 40' 54.5"	117° 26' 03.0"	Mulga woodland
LS 13	27° 39' 53.8"	117° 26' 00.1"	Mulga woodland
LS 14	27° 38' 27.8"	117° 25' 56.0"	Mulga woodland
LS 15	27° 37' 34.5"	117° 25' 55.0"	Mulga woodland near breakaway
LS 16	27° 36' 08.8"	117° 25' 49.2"	Mulga woodland
LS 17	27° 34' 52.2"	117° 25' 00.8"	Mulga woodland near creek edge
LS 18	27° 39' 08.9"	117° 26' 57.8"	Mulga woodland
LS 19	27° 38' 32.5"	117° 28' 01.8"	Mulga woodland
LS 20	27° 34' 57.0"	117° 31' 06.6"	Mulga woodland
LS 21	27° 36' 00.6"	117° 30' 45.4"	Mulga woodland
LS 22	27° 36' 51.2"	117° 30' 01.6"	Mulga woodland
LS 23	27° 37' 24.6"	117° 29' 17.9"	Mulga scrub
LS 24	27° 38' 19.5"	117° 30' 21.3"	Dense mulga woodland
LS 25	27° 38' 41.1"	117° 31' 39.3"	Open mulga woodland

Appendix 2. Thundelarra mulga plots percentage occurrence values in the 21 intensive survey plots during the July-August 2013 survey period. Dispersal codes: N, Nomadic; S, Sedentary; LD, Locally dispersive; M, Migratory. Foraging codes: H, Herbivore; G, Granivore; F, Frugivore; N, Nectarivore; I, Insectivore; C, Carnivore; O, Omnivore.

nMDS Axis 1 Score				-0.82	-0.31	-1.07	-0.66	-1.40	-0.95	-0.96	-0.89	-0.75	-0.41	-1.12	-0.61	-0.88	-0.68	-0.35	-0.88	-0.47	-0.73	-0.63	-0.55	-0.78			
nMDS Axis 2 Score				0.42	0.53	-0.68	-0.46	0.05	-0.36	0.50	1.00	0.81	0.11	-0.15	0.71	-0.21	-0.96	-1.04	-0.02	0.04	-0.33	0.34	-0.11	0.02			
Common Name	Disp. code	Foraging code	Outside plots	TH02	TH03	TH04	TH07	TH08	TH09	TH11	TH12	TH13	TH14	TH15	TH16	TH17	TH18	TH19	TH20	TH21	TH22	TH23	TH24	TH25	No. sites	Freq. % mean	Freq. % SD.
Emu	N	F	X	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.00%	0.00%
Grey Teal	N	H	X	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.00%	0.00%
Pacific Black Duck	M	H	X	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.00%	0.00%
Australasian Grebe	N	H	X	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.00%	0.00%
Common Bronzewing	S	G		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	50.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	3	3.57%	11.28%
Crested Pigeon	S	G		0.0%	0.0%	25.0%	25.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	25.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	12.5%	0.0%	12.5%	7	5.95%	9.37%
Wedge-tailed Eagle	S	C		0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2	1.19%	3.76%
Whistling Kite	N	C		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	1	0.60%	2.73%
Brown Goshawk	LD	C	X	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.00%	0.00%
Brown Falcon	S	C/I		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	2	1.19%	3.76%
Nankeen Kestrel	N	I/C	X	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.00%	0.00%
Australian Hobby	LD	I/C	X	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.00%	0.00%
Black-fronted Dotterel	S	I/C	X	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.00%	0.00%
Red-kneed Dotterel	S	I/C	X	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.00%	0.00%
Banded Lapwing	S	I/C	X	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.00%	0.00%
Red-tailed Black-Cockatoo	N	G/I	X	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.00%	0.00%
Galah	N	G		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	25.0%	12.5%	0.0%	12.5%	0.0%	0.0%	12.5%	4	2.98%	6.74%
Major Mitchell's Cockatoo	S	G		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.00%	0.00%
Cockatiel	N	G	X	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.00%	0.00%
Australian Ringneck	S	G		0.0%	25.0%	0.0%	0.0%	0.0%	12.5%	0.0%	12.5%	0.0%	12.5%	25.0%	0.0%	12.5%	37.5%	50.0%	0.0%	12.5%	0.0%	0.0%	50.0%	50.0%	11	14.29%	18.24%
Bourke's Parrot	N	G		0.0%	0.0%	25.0%	25.0%	0.0%	0.0%	0.0%	25.0%	0.0%	12.5%	50.0%	12.5%	12.5%	0.0%	0.0%	12.5%	25.0%	25.0%	12.5%	0.0%	0.0%	11	11.31%	13.64%
Mulga Parrot	S	G		0.0%	12.5%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	37.5%	37.5%	25.0%	12.5%	37.5%	0.0%	25.0%	0.0%	25.0%	37.5%	0.0%	0.0%	12.5%	11	13.10%	15.04%
Black-eared Cuckoo	M	I		0.0%	25.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	25.0%	0.0%	0.0%	12.5%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	4	3.57%	8.05%
Horsfield's Bronze-Cuckoo	M	I		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1	0.60%	2.73%
White-browed Treecreeper	S	I		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	50.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1	2.38%	10.91%
Western Bowerbird	S	I/C	X	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.00%	0.00%
Variegated Fairy-wren	S	I		0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	12.5%	0.0%	0.0%	5	2.98%	5.46%
Splendid Fairy-wren	LD	I		25.0%	50.0%	0.0%	0.0%	0.0%	0.0%	62.5%	37.5%	75.0%	37.5%	37.5%	62.5%	25.0%	0.0%	25.0%	12.5%	25.0%	25.0%	37.5%	25.0%	37.5%	16	28.57%	22.06%
Redthroat	S	I		37.5%	87.5%	0.0%	0.0%	0.0%	25.0%	25.0%	50.0%	37.5%	37.5%	0.0%	12.5%	12.5%	0.0%	12.5%	37.5%	50.0%	12.5%	25.0%	12.5%	25.0%	16	23.81%	21.97%
Weebill	S	I	X	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.00%	0.00%
Western Gerygone	M	I		12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	25.0%	0.0%	25.0%	12.5%	5	4.17%	8.23%
Slender-billed Thornbill	S	I		12.5%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2	1.19%	3.76%

Appendix 2. Continued.

Common Name	Disp. code	Foraging code	Outside plots	TH02	TH03	TH04	TH07	TH08	TH09	TH11	TH12	TH13	TH14	TH15	TH16	TH17	TH18	TH19	TH20	TH21	TH22	TH23	TH24	TH25	No. sites	Freq. % mean	Freq. % SD.
Yellow-rumped Thornbill	S	I		12.5%	0.0%	12.5%	12.5%	25.0%	25.0%	50.0%	12.5%	0.0%	12.5%	12.5%	50.0%	37.5%	12.5%	37.5%	12.5%	12.5%	37.5%	0.0%	12.5%	12.5%	18	19.05%	15.11%
Inland Thornbill	LD	I		12.5%	50.0%	12.5%	0.0%	0.0%	0.0%	25.0%	25.0%	25.0%	12.5%	12.5%	25.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	25.0%	12.5%	12.5%	13	12.50%	13.11%
Slaty-backed Thornbill	S	I		25.0%	25.0%	37.5%	75.0%	50.0%	50.0%	37.5%	25.0%	75.0%	25.0%	50.0%	62.5%	50.0%	12.5%	12.5%	62.5%	25.0%	25.0%	25.0%	37.5%	50.0%	21	39.88%	18.80%
Chestnut-rumped Thornbill	LD	I		75.0%	87.5%	50.0%	75.0%	62.5%	87.5%	75.0%	100%	100%	62.5%	62.5%	87.5%	75.0%	50.0%	37.5%	75.0%	62.5%	75.0%	62.5%	100%	75.0%	21	73.21%	16.90%
Southern Whiteface	S	I/G		25.0%	12.5%	12.5%	87.5%	75.0%	37.5%	62.5%	87.5%	75.0%	50.0%	62.5%	37.5%	87.5%	62.5%	87.5%	75.0%	87.5%	62.5%	62.5%	75.0%	75.0%	21	61.90%	24.20%
Striated Pardalote	M	I		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	37.5%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	12.5%	0.0%	12.5%	12.5%	5	4.17%	9.13%
Pied Honeyeater	N	I/C	X	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.00%	0.00%
Singing Honeyeater	N	N/I		25.0%	62.5%	75.0%	62.5%	12.5%	25.0%	87.5%	62.5%	62.5%	50.0%	62.5%	50.0%	75.0%	87.5%	100%	37.5%	100%	75.0%	62.5%	75.0%	75.0%	21	63.10%	23.54%
White-fronted Honeyeater	N	N/I		0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	12.5%	0.0%	0.0%	4	2.38%	5.03%
Yellow-throated Miner	S	I/N		0.0%	12.5%	12.5%	12.5%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	50.0%	12.5%	12.5%	25.0%	12.5%	25.0%	12.5%	11	9.52%	12.44%
Spiny-cheeked Honeyeater	S	N/I		37.5%	62.5%	25.0%	87.5%	50.0%	62.5%	12.5%	25.0%	50.0%	75.0%	62.5%	50.0%	62.5%	75.0%	100%	62.5%	87.5%	75.0%	25.0%	87.5%	50.0%	21	58.33%	23.83%
Red Wattlebird	N	N/I		0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1	0.60%	2.73%
Black Honeyeater	N	N/I		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	1	0.60%	2.73%
White-browed Babbler	S	I/G		0.0%	12.5%	0.0%	12.5%	0.0%	0.0%	50.0%	87.5%	50.0%	12.5%	25.0%	25.0%	0.0%	25.0%	25.0%	0.0%	87.5%	0.0%	0.0%	12.5%	25.0%	13	21.43%	26.85%
Grey-crowned Babbler	S	I		0.0%	0.0%	0.0%	12.5%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	12.5%	12.5%	25.0%	37.5%	37.5%	0.0%	0.0%	0.0%	12.5%	12.5%	12.5%	10	8.93%	11.95%
Chestnut Quail-Thrush	S	I		0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1	0.60%	2.73%
Chestnut-breasted Quail-Thrush	S	I		0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	2	1.19%	3.76%
Varied Sittella	S	I		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1	0.60%	2.73%
Black-faced Cuckoo-shrike	M	I		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	12.5%	0.0%	25.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3	2.38%	6.40%
White-winged Triller	M	I		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	12.5%	0.0%	0.0%	2	1.19%	3.76%
Rufous Whistler	LD	I		25.0%	0.0%	50.0%	75.0%	12.5%	37.5%	25.0%	12.5%	12.5%	50.0%	12.5%	12.5%	62.5%	50.0%	0.0%	50.0%	37.5%	37.5%	12.5%	25.0%	25.0%	19	29.76%	20.72%
Grey Shrike-thrush	S	I/C		50.0%	25.0%	37.5%	25.0%	0.0%	25.0%	50.0%	0.0%	0.0%	25.0%	0.0%	37.5%	0.0%	37.5%	37.5%	37.5%	12.5%	12.5%	37.5%	0.0%	12.5%	15	22.02%	17.64%
Crested Bellbird	S	I		100%	87.5%	87.5%	75.0%	75.0%	100%	87.5%	37.5%	50.0%	100%	87.5%	37.5%	87.5%	37.5%	62.5%	62.5%	75.0%	87.5%	62.5%	62.5%	100%	21	74.40%	21.09%
Black-faced Woodswallow	N	I		0.0%	0.0%	12.5%	0.0%	25.0%	12.5%	25.0%	0.0%	0.0%	12.5%	25.0%	12.5%	25.0%	0.0%	0.0%	12.5%	37.5%	0.0%	0.0%	0.0%	25.0%	11	10.71%	12.05%
Grey Butcherbird	S	O		12.5%	25.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	25.0%	12.5%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	6	4.76%	8.36%
Pied Butcherbird	S	I/C		0.0%	12.5%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	25.0%	0.0%	0.0%	0.0%	0.0%	12.5%	5	3.57%	7.01%
Australian Magpie	S	G		0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	12.5%	0.0%	12.5%	25.0%	5	3.57%	7.01%
Grey Fantail	N	I		0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	25.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	4	2.98%	6.74%
Willie Wagtail	S	I		12.5%	25.0%	50.0%	25.0%	0.0%	37.5%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	37.5%	50.0%	37.5%	25.0%	25.0%	12.5%	0.0%	12.5%	0.0%	13	17.26%	17.44%
Aistralian Raven	S	O		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	37.5%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	3	2.98%	8.75%
Torresian Crow	S	O		0.0%	12.5%	0.0%	0.0%	12.5%	12.5%	0.0%	0.0%	0.0%	37.5%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	50.0%	7	7.14%	13.45%
Little Crow	N	O		0.0%	0.0%	0.0%	0.0%	0.0%	25.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	2	1.79%	5.98%
Magpie-lark	S	I/C		0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1	0.60%	2.73%
Red-capped Robin	LD	I		50.0%	62.5%	37.5%	87.5%	75.0%	62.5%	37.5%	25.0%	37.5%	62.5%	62.5%	37.5%	75.0%	62.5%	87.5%	62.5%	25.0%	87.5%	75.0%	75.0%	75.0%	21	60.12%	20.01%
Hooded Robin	S	I		0.0%	0.0%	0.0%	12.5%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	12.5%	12.5%	0.0%	0.0%	6	3.57%	5.79%

Appendix 2. Continued.

Common Name	Disp. code	Foraging code	Outside plots	TH02	TH03	TH04	TH07	TH08	TH09	TH11	TH12	TH13	TH14	TH15	TH16	TH17	TH18	TH19	TH20	TH21	TH22	TH23	TH24	TH25	No. sites	Freq. % mean	Freq. % SD.
Rufous Songlark	M	I		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	1	0.60%	2.73%
Welcome Swallow	M	I		0.0%	0.0%	62.5%	0.0%	0.0%	37.5%	0.0%	0.0%	0.0%	0.0%	62.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	12.5%	0.0%	0.0%	5	8.93%	19.82%
Tree Martin	M	I	X	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.00%	0.00%
Mistletoebird	N	F/I		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	75.0%	50.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2	5.95%	19.21%
Australasian Pipit	S	I		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	12.5%	25.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3	2.38%	6.40%
	Total species			Site species richness																					Total survey Richness		
	72		17	17	23	17	20	14	23	15	16	15	26	27	21	21	21	25	21	22	28	22	20	28	55		

Appendix 3. Lakeside mulga plots percentage occurrence values in the 21 intensive survey plots during July-August 2013 survey period. Dispersal codes: N, Nomadic; S, Sedentary; LD, Locally dispersive; M, Migratory. Foraging codes: H, Herbivore; G, Granivore; F, Frugivore; N, Nectarivore; I, Insectivore; C, Carnivore; O, Omnivore. Opp., Opportunistic observations outside plots.

nMDS Axis 1 Score				-0.41	0.54	1.46	1.33	0.92	1.07	0.39	-0.29	1.33	1.18	0.95	0.58	1.04	0.54	0.57	0.87	0.26	0.50	0.97	0.88	0.52	0.68			
nMDS Axis 2 Score				-1.36	-0.66	0.01	0.21	0.85	0.12	0.29	1.26	0.64	-0.65	-0.13	-0.32	-0.38	-0.51	-0.09	-0.71	0.70	0.03	0.39	0.11	0.14	-0.16			
Common Name	Disp. code	Forag. code	Opp.	LS04	LS05	LS06	LS07	LS08	LS09	LS10	LS11	LS12	LS13	LS14	LS15	LS16	LS17	LS18	LS19	LS20	LS21	LS22	LS23	LS24	LS25	No. sites	Freq. mean	Freq. SD.
Emu	N	F	X	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.00%	0.00
Common Bronzewing	S	G		0.0%	0.0%	0.0%	12.5%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	12.5%	0.0%	0.0%	5	2.84%	0.05
Crested Pigeon	S	G		0.0%	12.5%	12.5%	12.5%	12.5%	0.0%	0.0%	0.0%	25.0%	0.0%	0.0%	25.0%	25.0%	12.5%	25.0%	0.0%	0.0%	0.0%	0.0%	12.5%	12.5%	12.5%	12	9.09%	0.10
Australian Owlet-Nightjar	S	I/C	X	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.00%	0.00
Wedge-tailed Eagle	S	C		12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	5	2.84%	0.05
Black-breasted Buzzard	S	C	X	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.00%	0.00
Whistling Kite	N	C	X	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.00%	0.00
Brown Falcon	S	C/I		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	1	0.57%	0.03
Nankeen Kestrel	N	I/C		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2	1.14%	0.04
Peregrine Falcon	S	C/I	X	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.00%	0.00
Australian Bustard	N	O		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1	0.57%	0.03
Galah	N	G		12.5%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	12.5%	0.0%	12.5%	12.5%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	8	4.55%	0.06
Australian Ringneck	S	G		0.0%	50.0%	12.5%	25.0%	0.0%	37.5%	0.0%	0.0%	0.0%	37.5%	37.5%	50.0%	75.0%	62.5%	25.0%	0.0%	0.0%	50.0%	0.0%	0.0%	0.0%	25.0%	12	22.16%	0.24
Bourke's Parrot	N	G		12.5%	12.5%	25.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	37.5%	75.0%	12.5%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	50.0%	9	11.36%	0.20
Mulga Parrot	S	G		0.0%	0.0%	12.5%	0.0%	12.5%	12.5%	12.5%	0.0%	0.0%	50.0%	0.0%	50.0%	0.0%	25.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	12.5%	12.5%	10	9.66%	0.15
Black-eared Cuckoo	M	I		0.0%	12.5%	0.0%	12.5%	0.0%	25.0%	0.0%	0.0%	0.0%	0.0%	25.0%	0.0%	25.0%	0.0%	12.5%	12.5%	0.0%	0.0%	0.0%	0.0%	12.5%	37.5%	9	7.95%	0.11
Horsfield's Bronze-Cuckoo	M	I		0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1	0.57%	0.03
White-browed Treecreeper	S	I		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	37.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1	1.70%	0.08
Western Bowerbird	S	I/C		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2	1.14%	0.04
Variegated Fairy-wren	S	I		0.0%	0.0%	0.0%	37.5%	37.5%	12.5%	12.5%	12.5%	25.0%	0.0%	25.0%	12.5%	0.0%	0.0%	25.0%	0.0%	12.5%	0.0%	25.0%	12.5%	12.5%	12.5%	14	12.50%	0.12
Splendid Fairy-wren	LD	I		0.0%	12.5%	0.0%	12.5%	25.0%	12.5%	25.0%	12.5%	50.0%	25.0%	37.5%	12.5%	37.5%	25.0%	25.0%	0.0%	25.0%	12.5%	0.0%	12.5%	37.5%	0.0%	17	18.18%	0.14
White-winged Fairy-wren	LD	I	X	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.00%	0.00
Redthroat	S	I		0.0%	0.0%	0.0%	37.5%	37.5%	12.5%	12.5%	12.5%	25.0%	0.0%	25.0%	12.5%	0.0%	0.0%	25.0%	0.0%	12.5%	0.0%	25.0%	12.5%	12.5%	12.5%	14	12.50%	0.12
Western Gerygone	M	I		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1	0.57%	0.03
Yellow-rumped Thornbill	S	I		0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	37.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2	2.27%	0.08
Inland Thornbill	LD	I		0.0%	0.0%	12.5%	25.0%	37.5%	25.0%	37.5%	0.0%	25.0%	0.0%	37.5%	0.0%	37.5%	25.0%	62.5%	0.0%	37.5%	25.0%	37.5%	25.0%	25.0%	25.0%	16	22.73%	0.17
Slaty-backed Thornbill	S	I		25.0%	12.5%	0.0%	0.0%	12.5%	37.5%	12.5%	50.0%	0.0%	25.0%	12.5%	0.0%	25.0%	25.0%	12.5%	0.0%	12.5%	12.5%	12.5%	0.0%	37.5%	12.5%	16	15.34%	0.14
Chestnut-rumped Thornbill	LD	I		75.0%	25.0%	50.0%	25.0%	62.5%	25.0%	37.5%	50.0%	50.0%	0.0%	25.0%	50.0%	25.0%	62.5%	50.0%	12.5%	62.5%	50.0%	37.5%	25.0%	37.5%	62.5%	21	40.91%	0.19
Southern Whiteface	S	I/G		12.5%	0.0%	0.0%	0.0%	0.0%	12.5%	37.5%	37.5%	0.0%	12.5%	0.0%	25.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	12.5%	25.0%	0.0%	0.0%	9	8.52%	0.12
Banded Whiteface	N	I		0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1	0.57%	0.03
Pied Honeyeater	N	N/I		0.0%	50.0%	87.5%	75.0%	0.0%	50.0%	25.0%	0.0%	62.5%	75.0%	62.5%	62.5%	87.5%	62.5%	50.0%	50.0%	0.0%	12.5%	50.0%	75.0%	37.5%	37.5%	18	46.02%	0.29

Appendix 3. Continued.

Common Name	Disp. code	Forag. code	Opp.	LS04	LS05	LS06	LS07	LS08	LS09	LS10	LS11	LS12	LS13	LS14	LS15	LS16	LS17	LS18	LS19	LS20	LS21	LS22	LS23	LS24	LS25	No. sites	Freq. mean	Freq. SD.
Singing Honeyeater	N	N/I		100%	50.0%	25.0%	37.5%	12.5%	25.0%	50.0%	75.0%	50.0%	62.5%	12.5%	37.5%	12.5%	25.0%	37.5%	50.0%	12.5%	87.5%	50.0%	62.5%	37.5%	37.5%	22	43.18%	0.24
White-fronted Honeyeater	N	N/I		0.0%	37.5%	87.5%	87.5%	75.0%	87.5%	50.0%	0.0%	100%	87.5%	37.5%	75.0%	75.0%	75.0%	50.0%	62.5%	0.0%	62.5%	75.0%	75.0%	62.5%	62.5%	19	60.23%	0.29
Yellow-throated Miner	S	I/N		0.0%	25.0%	0.0%	12.5%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	6	3.98%	0.07
Spiny-cheeked Honeyeater	S	N/I		87.5%	100%	100%	100%	100%	100%	87.5%	75.0%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	87.5%	100%	100%	22	97.16%	0.07
Black Honeyeater	N	N/I		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	2	1.14%	0.04
Crimson Chat	N	I/N		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1	0.57%	0.03
White-browed Babbler	S	I/G		0.0%	12.5%	37.5%	12.5%	37.5%	0.0%	12.5%	25.0%	0.0%	0.0%	62.5%	37.5%	37.5%	12.5%	37.5%	25.0%	50.0%	25.0%	25.0%	25.0%	25.0%	0.0%	17	22.73%	0.18
Grey-crowned Babbler	S	I		37.5%	12.5%	25.0%	12.5%	0.0%	0.0%	0.0%	12.5%	0.0%	25.0%	12.5%	0.0%	12.5%	0.0%	12.5%	12.5%	0.0%	12.5%	0.0%	12.5%	12.5%	12.5%	14	10.23%	0.10
Chestnut-breasted Quail-Thrush	S	I		12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1	0.57%	0.03
Chiming Wedgebill	S	I		0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1	0.57%	0.03
Varied Sittella	S	I		12.5%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	25.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3	2.27%	0.06
Black-faced Cuckoo-shrike	M	I		0.0%	25.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1	1.14%	0.05
White-winged Triller	M	I		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	50.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3	3.41%	0.11
Rufous Whistler	LD	I		0.0%	25.0%	0.0%	25.0%	0.0%	25.0%	25.0%	0.0%	0.0%	0.0%	25.0%	37.5%	25.0%	37.5%	62.5%	62.5%	37.5%	50.0%	25.0%	0.0%	50.0%	25.0%	15	24.43%	0.21
Grey Shrike-thrush	S	I/C		0.0%	12.5%	12.5%	0.0%	0.0%	37.5%	25.0%	0.0%	25.0%	0.0%	87.5%	62.5%	25.0%	0.0%	62.5%	50.0%	12.5%	12.5%	12.5%	37.5%	25.0%	25.0%	16	23.86%	0.24
Crested Bellbird	S	I		62.5%	62.5%	50.0%	37.5%	50.0%	50.0%	75.0%	25.0%	12.5%	75.0%	87.5%	75.0%	75.0%	75.0%	75.0%	100%	50.0%	50.0%	37.5%	75.0%	62.5%	100%	22	61.93%	0.22
Black-faced Woodswallow	N	I		12.5%	12.5%	12.5%	0.0%	0.0%	0.0%	12.5%	0.0%	12.5%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	12.5%	0.0%	12.5%	9	5.11%	0.06
Masked Woodswallow	N	I		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2	1.14%	0.04
Little Woodswallow	S	I		0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1	0.57%	0.03
Grey Butcherbird	S	O		0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	12.5%	0.0%	0.0%	12.5%	0.0%	12.5%	0.0%	0.0%	0.0%	12.5%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	6	3.41%	0.06
Pied Butcherbird	S	I/C		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	1	0.57%	0.03
Australian Magpie	S	O	X	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.00%	0.00
Grey Fantail	N	I		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	25.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2	1.70%	0.06
Willie Wagtail	S	I		12.5%	37.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	12.5%	25.0%	12.5%	12.5%	12.5%	12.5%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	10	7.39%	0.10
Torresian Crow	S	O		12.5%	0.0%	12.5%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	12.5%	12.5%	0.0%	12.5%	0.0%	0.0%	12.5%	0.0%	0.0%	37.5%	0.0%	12.5%	9	6.25%	0.09
Little Crow	N	O		25.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1	1.14%	0.05
Magpie-lark	S	I/C		0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1	0.57%	0.03
Red-capped Robin	LD	I		12.5%	50.0%	0.0%	12.5%	12.5%	25.0%	12.5%	12.5%	12.5%	25.0%	37.5%	75.0%	75.0%	87.5%	62.5%	50.0%	37.5%	37.5%	12.5%	25.0%	50.0%	37.5%	21	34.66%	0.24
Hooded Robin	S	I		25.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	4	2.84%	0.07
Welcome Swallow	M	I		0.0%	0.0%	12.5%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3	1.70%	0.04
Mistletoebird	N	F/I		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1	0.57%	0.03
Zebra Finch	N	G		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1	0.57%	0.03
Australasian Pipit	S	I		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	1	0.57%	0.03
	Total species			Site species richness																						Total survey		
	64		7	18	25	18	19	16	23	22	14	16	18	25	25	22	23	25	18	17	17	17	23	19	25	57		