Birds of Forest Road, Duns Creek 2008-2014

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Bird surveys were carried out along a road through a rural sub-division involving acreage blocks near Paterson, New South Wales between 2008 and 2014. A total of 113 bird species was recorded, reflecting the diversity of habitat available adjacent to the road. A number of dams, mostly small, provided habitat for waterbirds, including species seeking drought refuge and normally associated with larger bodies of water. A few shorebirds utilised muddy margins, when these were exposed.

The park-like environment provided by partially cleared acreage blocks was suitable habitat for Grey-crowned Babbler *Pomatostomus temporalis*. Three clans of this species, which is listed as vulnerable under the *Threatened Species Conservation Act 1995* (NSW), were resident, coexisting with aggressive colonies of Noisy Miners *Manorina melanocephala*. The occasional occurrence of species present in surrounding areas of remnant woodland suggested that in conjunction with roadside vegetation the acreage developments provided connectivity between surrounding woodland remnants. Ongoing habitat modification may eventually compromise the important role that areas like Forest Road play in sustaining the avian diversity of the Paterson area.

INTRODUCTION

Roadside vegetation is an important asset for both birds and birdwatchers. For birds it provides habitat and for birdwatchers it provides easily accessible places to watch birds. Previously, I have documented the results of periodic visits to Black Rock Road, Martins Creek (Newman 2014). The success of that study inspired a similar project at Forest Road, Duns Creek; a quiet road in a semi-rural setting near my home, where I could generate a bird list while enjoying an early morning walk.

METHODS AND ANALYSIS

Surveys, 103 in total, were conducted in the morning between July 2011 and February 2014, typically starting about one hour after sunrise. All birds seen and heard were recorded while walking the return trip along Forest Road, Duns Creek near Paterson NSW (32º37'44"S 151º38'44"E). The time taken was variable depending on the amount of bird activity, but typically about 1.5 hours. All birds seen and heard were submitted to BirdLife Australia's (BLA) Birdata archive as 500m area surveys (Birdata site ID 433364).

For analysis the results were broken down into four periods involving between 19 and 31 surveys (**Table 1**). The initial period 2008–2011 involved occasional visits at irregular intervals. Based on the experience gained during this period the frequency of surveys was progressively increased with two or three surveys conducted in most months. These results have been evaluated for the final three fiscal years (July to June) commencing 2011/12. This avoids splitting the breeding season for summer migrants as occurs when results are presented for calendar years. The last survey was in February 2014 and the results for 2013/14 only cover the first 8 months of the 2013/2014 fiscal year.

Table 1. Survey Statistics

	All surv-eys	2008–2011	2011 /12	2012 /13	2013 /14
Number of surveys	103	22	19	31	31
Number of species	113	94	78	92	95
Species per survey	36.5	31.1	34.0	38.2	40.1
Species (RR>80%)	12	7	13	16	20
Species (RR>40%)	40	32	41	42	46

Reporting Rates (RRs) were used to compare the differences in the occurrence of species. The RR, expressed as a percent value, is the number of surveys in which a species was recorded divided by the number of surveys conducted.

RESULTS

A total of 113 species was recorded between August 2008 and February 2014 with typically around 90 to 95 species seen in a single fiscal year. Overall the average number of species seen per survey was 36.5, but this metric progressively increased during the study from 31.1 in 2008–2011 to 40.1 in 2013/14 (**Table 1**).

Twelve species had RRs >80% and an additional 28 species had RRs >40%. These metrics were lower during the initial surveys in 2008–2011 (**Table 1**).

The thirteen most commonly recorded species with RR>80% are shown in **Table 2** ranked in order of frequency of presence (RR). The White-throated Gerygone *Gerygone olivacea*, a summer visitor, has been added to this list based on an RR>40% for the period of approximately 6 months when it was present.

Commonly recorded birds with RRs in the range 40 to 79% are listed in **Table 3**, which contains four summer visitors, based on an RR>20% for the period of approximately six months when they were present.

Table 2. Very commonly recorded species (RR>80%)

Common Name	Scientific Name	All surveys RR (%)	2008–2011 RR (%)	2011/12 RR (%)	2012/13 RR (%)	2013/14 RR (%)
Australian Magpie	*Gymnorhina tibicen*	99.0	100.0	94.7	100.0	100.0
Eastern Rosella	*Platycercus eximius*	97.1	95.5	100.0	93.5	100.0
Magpie-lark	*Grallina cyanoleuca*	94.2	100.0	89.5	90.3	96.7
Willie Wagtail	*Rhipidura leucophrys*	93.2	72.7	100.0	100.0	96.7
Noisy Miner	*Manorina melanocephala*	92.2	77.3	89.5	100.0	96.7
Laughing Kookaburra	*Dacelo novaeguineae*	91.3	86.4	89.5	87.1	100.0
Superb Fairy-wren	*Malurus cyaneus*	91.2	72.7	100.0	93.5	96.7
Pacific Black Duck	*Anas superciliosa*	90.3	90.9	84.2	90.3	93.5
Australian Wood Duck	*Chenonetta jubata*	88.3	81.8	78.9	93.5	93.5
Masked Lapwing	*Vanellus miles*	87.4	72.7	89.5	93.5	90.4
Bar-shouldered Dove	*Geopelia humeralis*	84.5	68.2	89.5	93.5	83.9
Yellow-faced Honeyeater	*Caligavis chrysops*	80.6	59.1	94.7	87.1	80.6
White-throated Gerygone*	*Gerygone olivacea*	43.7	22.7	52.6	29.0	67.7

*Summer Visitor

Table 3. Commonly recorded species (RR in range 40 to 80%)

Common Name	Scientific Name	All surveys RR (%)	2008–2011 RR (%)	2011/12 RR (%)	2012/13 RR (%)	2013/14 RR (%)
Grey Fantail	*Rhipidura fuliginosa*	78.6	63.6	94.7	74.2	83.9
Welcome Swallow	*Hirundo neoxena*	78.6	63.6	94.7	74.2	83.9
Grey-crowned Babbler	*Pomatostomus temporalis*	76.7	59.1	63.2	93.5	80.6
Grey Butcherbird	*Cracticus torquatus*	75.7	72.7	78.9	64.5	87.1
Crested Pigeon	*Ocyphaps lophotes*	72.8	68.2	63.2	80.6	74.2
Pied Butcherbird	*Cracticus nigrogularis*	70.9	77.3	63.2	71.0	71.0
Jacky Winter	*Microeca fascinans*	69.9	63.6	68.4	83.9	61.3
Australian Raven	*Corvus coronoides*	68.9	86.4	68.4	77.4	48.4
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	65.1	63.6	68.4	51.6	77.5
Galah	*Eolophus roseicapilla*	65.0	59.1	73.7	35.5	93.5
Australasian Grebe	*Tachybaptus novaehollandiae*	64.1	22.7	68.4	71.0	83.9

Table 3. Commonly recorded species (RR in range 40 to 80%) cont.

Common Name	Scientific Name	All surveys RR (%)	2008–2011 RR (%)	2011/12 RR (%)	2012/13 RR (%)	2013/14 RR (%)
Cattle Egret	*Bubulcus ibis*	63.1	63.6	68.4	71.0	51.6
Wonga Pigeon	*Leucosarcia melanoleuca*	61.2	72.7	52.6	48.4	71.0
Eastern Whipbird	*Psophodes olivaceus*	60.2	54.5	47.4	64.5	67.7
Red Wattlebird	*Anthochaera carunculata*	60.2	40.9	94.7	61.3	51.6
Grey Teal	*Anas gracilis*	55.4	36.4	52.6	48.4	77.5
White-winged Chough	*Corcorax melanorhamphos*	52.4	54.5	42.1	61.3	48.4
Hardhead	*Aythya australis*	52.4	4.5	68.4	67.7	61.3
Spotted Pardalote	*Pardalotus punctatus*	50.5	36.4	63.2	67.7	35.5
Lewin's Honeyeater	*Meliphaga lewinii*	49.5	36.4	57.9	61.3	41.9
Straw-necked Ibis	*Threskiornis spinicollis*	48.6	36.4	26.3	71.0	48.4
Striated Pardalote	*Pardalotus striatus*	48.5	40.9	63.2	71.0	22.5
White-faced Heron	*Egretta novaehollandiae*	45.6	45.5	42.1	51.6	41.9
Striated Thornbill	*Acanthiza lineata*	44.6	22.7	42.1	51.6	54.8
Rainbow Lorikeet	*Trichoglossus moluccanus*	43.7	50.0	42.1	41.9	41.9
Australian King-Parrot	*Alisterus scapularis*	43.7	27.3	31.6	74.2	32.3
Pied Currawong	*Strepera graculina*	42.7	59.1	31.6	48.4	32.3
Rufous Whistler*	*Pachycephala rufiventris*	36.9	31.8	36.8	29.0	48.4
Sacred Kingfisher*	*Todiramphus sanctus*	34.0	27.3	21.1	22.6	58.1
Eastern Koel*	*Eudynamys orientalis*	26.2	13.6	10.5	19.4	51.6
Dollarbird*	*Eurystomus orientalis*	27.2	22.7	21.1	19.4	41.9

* Summer visitor

Moderately commonly recorded species with RRs in the range 20 to 39% are shown in **Table 4**, which includes three summer migrants, based on an RR of >20% for the period of approximately 6 months during which they were present.

Table 4. Moderately commonly recorded species (RR 20 to 39%)

Common Name	Scientific Name	All Surveys RR (%)	2008–2011 RR (%)	2011/12 RR (%)	2012/13 RR (%)	2013/14 RR (%)
Satin Bowerbird	*Ptilonorhynchus violaceus*	37.9	18.2	21.1	45.2	54.8
Olive-backed Oriole	*Oriolus sagittatus*	37.8	18.2	52.6	25.8	54.8
Noisy Friarbird	*Philemon corniculatus*	36.9	22.7	42.1	51.6	29.0
Brown Thornbill	*Acanthiza pusilla*	35.9	31.8	15.8	54.8	32.3
Eurasian Coot	*Fulica atra*	35.9	0.0	0.0	25.8	93.5
Dusky Moorhen	*Gallinula tenebrosa*	32.1	0.0	0.0	19.4	87.1
Eastern Yellow Robin	*Eopsaltria australis*	29.1	36.4	15.8	16.1	45.2
White-browed Scrubwren	*Sericornis frontalis*	27.2	36.4	26.3	29.0	19.4
Common Myna	*Acridotheres tristis*	27.2	22.7	21.1	32.3	29.0
Golden Whistler	*Pachycephala pectoralis*	26.2	36.4	31.6	12.9	29.0
Chestnut Teal	*Anas castanea*	25.3	9.1	31.6	51.6	6.5
Eastern Spinebill	*Acanthorhynchus tenuirostris*	24.3	27.3	21.1	25.8	22.5
Grey Shrike-thrush	*Colluricincla harmonica*	21.4	27.3	42.1	19.4	6.5

Table 4. Moderately commonly recorded species (RR 20 to 39%) cont.

Common Name	Scientific Name	All Surveys RR (%)	2008–2011 RR (%)	2011/12 RR (%)	2012/13 RR (%)	2013/14 RR (%)
Red-browed Finch	*Neochmia temporalis*	21.4	9.1	0.0	25.8	38.7
Channel-billed Cuckoo*	*Scythrops novaehollandiae*	19.4	18.2	10.5	9.7	35.5
Leaden Flycatcher*	*Myiagra rubecula*	16.5	0.0	0.0	22.6	32.3
Latham's Snipe*	*Gallinago hardwickii*	12.6	4.5	0.0	16.1	22.5

*Summer migrant

Species which were infrequently recorded with RRs <20% are shown in **Table 5**. An additional species, Pacific Baza *Aviceda subcristata*, was recorded during an informal visit.

Table 5. Infrequently recorded species (RR <20%).

Common Name	Scientific Name	All Surveys RR (%)	2008–2011 RR (%)	2011/12 RR (%)	2012/13 RR (%)	2013/14 RR (%)
Purple Swamphen	*Porphyrio porphyrio*	19.4	4.5	15.8	25.8	25.8
Scarlet Honeyeater	*Myzomela sanguinolenta*	18.5	18.2	42.1	3.2	19.4
Yellow Thornbill	*Acanthiza nana*	18.4	13.6	10.5	22.6	22.5
White-necked Heron	*Ardea pacifica*	18.4	4.5	10.5	9.7	41.9
Black Swan	*Cygnus atratus*	17.4	22.7	36.8	16.1	3.2
Black-fronted Dotterel	*Elseyornis melanops*	16.5	4.5	0.0	19.4	32.3
Mistletoebird	*Dicaeum hirundinaceum*	16.3	44.5	0.0	6.5	16.1
Variegated Fairy-wren	*Malurus lamberti*	13.6	18.2	0.0	12.9	19.4
Blue-faced Honeyeater	*Entomyzon cyanotis*	11.7	18.2	0.0	12.9	12.9
Little Black Cormorant	*Phalacrocorax sulcirostris*	11.7	9.1	10.5	6.5	19.4
Sulphur-crested Cockatoo	*Cacatua galerita*	10.7	18.2	5.3	12.9	6.5
Little Pied Cormorant	*Microcarbo melanoleucos*	8.8	0.0	15.8	12.9	6.5
Fan-tailed Cuckoo	*Cacomantis flabelliformis*	7.8	9.1	5.3	12.9	3.2
Royal Spoonbill	*Platalea regia*	7.8	9.1	10.5	9.7	3.2
Silvereye	*Zosterops lateralis*	6.8	4.5	0.0	9.7	9.6
Rose Robin	*Petroica rosea*	5.8	4.5	10.5	6.5	3.2
Great Egret	*Ardea modesta*	4.9	18.2	5.3	0.0	0.0
Long-billed Corella	*Cacatua tenuirostris*	4.9	4.5	5.3	9.7	0.0
Yellow-tailed Black-Cockatoo	*Zanda funereus*	3.9	9.1	5.3	3.2	0.0
Little Lorikeet	*Glossopsitta pusilla*	3.9	4.5	5.3	6.5	0.0
White-naped Honeyeater	*Melithreptus lunatus*	3.9	4.5	5.3	3.2	3.2
Black-faced Monarch	*Monarcha melanopsis*	3.9	0.0	5.3	6.5	3.2
Musk Lorikeet	*Glossopsitta concinna*	2.9	13.6	0.0	0.0	0.0
Australasian Shoveler	*Anas rhynchotis*	2.9	4.5	0.0	0.0	6.5
Pallid Cuckoo	*Heteroscenes pallidus*	2.9	4.5	0.0	0.0	6.5
Little Corella	*Cacatua sanguinea*	2.9	0.0	5.3	0.0	6.5
Spangled Drongo	*Dicrurus bracteatus*	2.9	0.0	0.0	0.0	9.6
Great Cormorant	*Phalacrocorax carbo*	2.0	0.0	0.0	0.0	6.5
Brush Cuckoo	*Cacomantis variolosus*	1.9	4.5	0.0	0.0	3.2
Cicadabird	*Edolisoma tenuirostris*	1.9	4.5	0.0	3.2	0.0
Crimson Rosella	*Platycercus elegans*	1.9	4.5	0.0	3.2	0.0

Table 5. Infrequently recorded species (RR <20%) cont.

Common Name	Scientific Name	All Surveys RR (%)	2008–2011 RR (%)	2011/12 RR (%)	2012/13 RR (%)	2013/14 RR (%)
Tree Martin	*Petrochelidon nigricans*	1.9	4.5	0.0	0.0	3.2
Wedge-tailed Eagle	*Aquila audax*	1.9	4.5	0.0	0.0	3.2
Hoary-headed Grebe	*Poliocephalus poliocephalus*	1.9	0.0	0.0	3.2	3.2
Pheasant Coucal	*Centropus phasianinus*	1.9	0.0	0.0	3.2	3.2
Whistling Kite	*Haliastur sphenurus*	1.9	0.0	0.0	3.2	3.2
White-bellied Cuckoo-shrike	*Coracina papuensis*	1.9	0.0	0.0	3.2	3.2
Australasian Figbird	*Sphecotheres vieilloti*	1.0	4.5	0.0	0.0	0.0
Double-barred Finch	*Taeniopygia bichenovii*	1.0	4.5	0.0	0.0	0.0
Regent Bowerbird	*Sericulus chrysocephalus*	1.0	4.5	0.0	0.0	0.0
Swift Parrot	*Lathamus discolor*	1.0	4.5	0.0	0.0	0.0
Torresian Crow	*Corvus orru*	1.0	4.5	0.0	0.0	0.0
Brown Goshawk	*Accipiter fasciatus*	1.0	0.0	5.3	0.0	0.0
Brown-headed Honeyeater	*Melithreptus brevirostris*	1.0	0.0	0.0	0.0	3.2
Collared Sparrowhawk	*Accipiter cirrocephalus*	1.0	0.0	0.0	0.0	3.2
Common Starling	*Sturnus vulgaris*	1.0	0.0	5.3	0.0	0.0
Crested Shrike-tit	*Falcunculus frontatus*	1.0	0.0	5.3	0.0	0.0
Little Egret	*Egretta garzetta*	1.0	0.0	0.0	3.2	0.0
Shining Bronze-Cuckoo	*Chalcites lucidus*	1.0	0.0	0.0	0.0	3.2
Spotted Dove	*Streptopelia chinensis*	1.0	0.0	0.0	3.2	0.0
Topknot Pigeon	*Lopholaimus antarcticus*	1.0	0.0	5.3	0.0	0.0
White-headed Pigeon	*Columba leucomela*	1.0	0.0	0.0	3.2	0.0

Habitat description

Starting from the junction with Duns Creek Road (**Figure 1**) there are paddocks on both sides of the road which is fringed by rows of trees with a limited shrub layer. There is a large dam on the left side of the road which is used for irrigation purposes, on which cattle were intermittently present. Water levels often fell in summer providing muddy margins. A smaller dam, on the opposite side of the road, became progressively choked with water hyacinths during the study, but was cleared after the surveys ceased. There was only one dwelling in this area, a house on the right-hand side near the road junction.

Approximately 500 m from the junction the land was subdivided into large acreage properties. In most instances the dwellings were set well back from the road. The extent to which the land had been cleared was variable. Two creeks crossed the road at extremities of this zone and both were fringed by dense understorey vegetation, including Lantana. Beyond the second of these creeks the area opened up with more paddocks and a dam set back from the road on the left side of the road. Horses grazed this area, their sheds providing roosts and nest sites for some species. Food provided for egg-laying hens attracted some bird species and towards the end of the study a new resident to the area started feeding birds, attracting a number of species including cockatoos and pigeons.

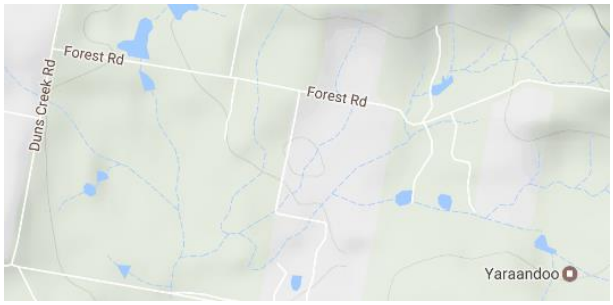

Figure 1. Surveys involved walking Forest Road from the junction with Duns Creek Road to an area beyond the second dam on the northern side of road as shown above.

Beyond the paddocks on the left-hand (northern) side of the road (**Figure 1**) the terrain was highly wooded and rose steeply to an extensive area of undeveloped land, which was mainly regrowth forest. On the other side there were patches of lowland woodland in a network of large acreage properties and small farms extending to the Butterwick flood plain, adjacent to the Paterson River located beyond the property Yaraandoo.

DISCUSSION

Typically around 90 species were recorded each year, involving between 19 and 31 surveys (**Table 1**). The number of species/survey increased during the study from 31.1 in 2008-2011 to 40.1 in 2013/14, the final year of the study. This increase probably reflects the gradual transition of data collection from occasional casual surveys (2008–2011) to a more rigorous project style. In addition, as familiarity with the area and survey frequency increased the niches of elusive species were known, and their presence was targeted, resulting in more efficient detection of some species. This is apparent from the increases in the average number of species observed per survey and the increased number of commonly observed species with RRs greater than 80% and 40% (**Table 1**). In 2013/14, all the surveys were conducted in the first 8 months of the year when summer migrants were present and breeding birds were vocal, providing a bias to increased species lists.

In the similar study involving an almost identical number of surveys (104) conducted at Black Rock, located approximately 7 km to the north, 124 species were recorded with an average of 49.3 species/survey; 23 and 52 species having RRs > than 80 and 40% respectively (Newman 2014). These metrics are all higher than at Forest Road, which partly reflects the longer duration and increased size of the area surveyed at Black Rock.

Very common species (RR>80%)

Most of the 13 species in **Table 2** also had RRs >80% in the surveys at Black Rock (Newman 2014) and are species well adapted to a highly modified and fragmented rural landscape. Indeed, species like the Noisy Miner *Manorina melanocephala* and Eastern Rosella *Platycercus eximius* thrive in the park-like conditions created by the clearing of vegetation for small scale and hobby farming (Newman 2010). The Pacific Black Duck *Anas superciliosa* was the only species in **Table 2** which was appreciably more frequently recorded in this study, reflecting the increased availability of waterbird habitat at Forest Road compared with the Black Rock study area.

Commonly recorded species (RR in range 40 to 79%)

A total of 31 species fall into this category when the four summer migrants are included (**Table 3**).

The Grey-crowned Babbler *Pomatostomus temporalis* (RR 76.7%) was particularly well represented, which is discussed further in the threatened species section. White-winged Choughs *Corcorax melanorhamphos* (RR 52.4%), like the babblers, are a ground-foraging species suited to lightly-timbered areas with limited understorey. This species bred regularly at one location. Both are communal breeding species and the choughs form larger aggregations in winter which forage over an extended area.

Jacky Winter *Microeca fascinans*, another woodland species, found the combination of light timber at the interface with open paddocks ideal, where fence lines provided perches when foraging. In winter, like the choughs, this species formed flocks in paddocks on adjacent properties (Newman 2012) like Yaraandoo (**Figure 1**).

The larger of the two dams frequently supported waterbirds including Australasian Grebe *Tachybaptus novaehollandiae* (RR 64.1%), Grey Teal *Anas gracilis* (RR 55.4%) and Hardhead *Aythya australis* (RR 52.4%). The period 2012–2014 when these two duck species were regularly present appears to have corresponded to an influx of these species into the Hunter Region (Birdata statistics; portal accessed December 2016). Hardhead, which are usually associated with larger water bodies (Stuart 2016), were also occasionally present on two much smaller dams on Forest Road.

Moderately commonly recorded species (RR 20 to 39%)

The 17 species in this category include three summer migrants (**Table 4**). Most of these species fall into two categories: woodland birds which were mainly restricted to a small belt of relatively unmodified woodland with creek-side understorey vegetation, located near the middle of the area surveyed; and waterbirds found on the dams. Species in this category include the Eastern Yellow Robin *Eopsaltria australis* (RR 29.1%), Golden Whistler *Pachycephala pectoralis* (RR 26.2%) and Grey Shrike-thrush *Colluricincla harmonica* (RR

21.4%), all of which were probably resident in the riparian creek-side vegetation, but infrequently detected because of limited suitable habitat immediately adjacent to the road. The Olive-backed Oriole *Oriolus sagittatus* (RR 39.2%) was more broadly distributed across the study area, but less frequently recorded in winter.

Several species associated with the dams featured in this group including Eurasian Coot *Fulica atra* (RR 35.9%) and Dusky Moorhen *Gallinula tenebrosa* (RR 32.1%). Coots are normally associated with larger bodies of water. Occurrence of the more elusive Dusky Moorhen was almost exclusively restricted to a smaller dam, whereas Latham's Snipe *Gallinago hardwickii* (RR 12.6%), a summer visitor, preferred the muddy margins of the largest dam, where it was seen on five occasions between September and December in 2012/13, in contrast to 2013/14 when five of the six occurrences were between late November and late January.

Infrequently recorded species

Many of the 53 species in this category (**Table 5**) plus the additional record of the Paciifc Baza, were seen in a number of years, indicating their intermittent occurrence in the area as opposed to occasional residence. The Spangled Drongo *Dicrurus bracteatus* was an exception, taking temporary residence in a belt of trees in February 2014.

It is interesting that there were so few records of the smaller cuckoo species, the Fan-tailed Cuckoo *Cacomantis flabelliformis* (RR 7.8%) being the most reported species, but much less frequently than for contemporary surveys at Black Rock (Newman 2014). There was just one record of the Shining Bronze-Cuckoo *Chalcites lucidus*. Perhaps this reflects the limited breeding habitat available to their hosts as well as the apparent widespread decrease of this guild of species (see comment for Fan-tailed Cuckoo in Stuart 2016).

The Double-barred Finch *Taeniopygia bichenovii* was only recorded once in keeping with its patchy occurrence in the Paterson area (Newman 2014). However, it was recorded reasonably frequently (RR 19%; n=36) at a 2-ha survey site approximately 500 m beyond the end of Forest Road at the time of these surveys.

The single record of a Regent Bowerbird *Sericulus chrysocephalus* compared with the Satin Bowerbird *Ptilonorhynchus violaceus* (RR 37.9%) reflects not only the relative abundance of these two species in the Paterson area, but the reluctance of the former species to move outside its forest habitat. In contrast the Satin Bowerbird appears to have benefitted from habitat modification.

The largest lagoon attracted short-term visits from a number of waterbirds including Royal Spoonbill *Platalea regia* (RR 7.8%), egret and cormorant species. Increased use for irrigation in 2012/13 and 2013/14 resulted in less use by a pair of Black Swan *Cygnus atratus* (RR 17.4%) which bred locally and increased occurrence of Black-fronted Dotterel *Elseyornis melanops* (RR 16.5 %), which appreciate the muddy margins created by rapidly falling water levels.

Annual variations

For many species an increase in annual RR is apparent in **Tables 2**–**5**. Often the increase was a consequence of two types of observer bias. In 2013/14 the surveys ceased at the end of February resulting in a disproportionately high number of surveys during the spring and summer months, when many species are breeding and more easily detected and summer migrants are present. Secondly, I became increasing familiar with specific locations where I could locate elusive species, the Dusky Moorhen being an example.
However, for other species the annual variations reflect changes in species' status, examples of which have been highlighted above. These changes may be a consequence of environmental conditions such as the balance between coastal and inland rainfall resulting in the Hunter Region becoming a drought refuge for waterbirds. Local management may also contribute, such as the use of dams for irrigation, infestation of dams by weeds, clearing of vegetation and changes in the availability of food provided for poultry and wild birds, all of which occurred during this study.

Threatened species

While three species listed as vulnerable under the *Threatened Species Conservation Act 1995* (NSW) were recorded during the study, only the Grey-crowned Babbler (RR 76.7%; **Table 3**) was common. This is an exceptionally high RR for the Hunter Region, where the long-term RR is 8.7% across the species' range (Stuart 2016). During the period 2012–2014 three clans of this communal species were present at Forest Road; two at the extremities of the road and one near the centre. Each of these territories was shared with Noisy Miners and disputes were frequent, with the

babblers relatively unconcerned by the aggressive behaviour of the miners.

Three other studies provide RRs for Grey-crowned Babblers in the Paterson area: 66% at a Butterwick Cattle Property (Newman 2007); 19% in woodland at Green Wattle Creek (Newman 2009); and 1% at Black Rock (Newman 2014). In these studies the survey duration and area surveyed were two to three times higher than at Forest Road, highlighting the suitability of the habitat at Forest Road for babblers. The decreased occurrence of Grey-crowned Babbler, Noisy Miner and Grey Butcherbird at Green Wattle Creek following the removal of cattle and the increased growth of understorey vegetation (Newman 2010) provides insights into why the habitat at Forest Road is suitable. The babbler territories appear centred on acreage blocks which have been partially cleared and are largely devoid of understorey vegetation, providing a combination of ground-foraging opportunities, nest sites and cover. In this park-like situation they are not directly competing for resources with the Noisy Miners, which predominantly forage in foliage. It is possible babblers may derive some benefit from co-habiting with miners in terms of early detection and deterrence of predators and exclusion of competing ground-feeding avian species. The Butterwick cattle property (RR 66%) adjacent to the Green Wattle Creek study site superficially has similar attributes to Forest Road where about 15% remnant vegetation in fragmented patches provides nest sites and cover, but the rank grass of the open areas is often unsuitable; overall, farmland appears less suitable than acreage properties with more continuous tree cover. At Black Rock the habitat involved a combination of farmland, larger patches of remnant woodland and fewer, more isolated dwellings than at Forest Road. Grey-crowned Babblers (RR 1%; Newman 2014) were absent other than one sighting at the extremity of the survey area. However, immediately below the survey area they were present in acreage blocks similar to those along Forest Road. Collectively these observations suggest Grey-crowned Babblers thrive in fragmented modified habitat, but only if there is continuity of suitable habitat, as occurs around Paterson. Indeed, large congregations involving up to 20 birds have been seen on the Paterson golf course, which again involves a park-like environment.

There were single records of the other two Threatened Species, the Swift Parrot *Lathamus discolor* and Little Lorikeet *Glossopsitta pusilla*.

Introduced species

The Common Myna *Acridotheres tristis* (RR 27.2%) was the only introduced species regularly present, usually found around the cleared areas. There were single sightings of the Spotted Dove *Streptopelia chinensis* and the Common Starling *Sturnus vulgaris*. Noisy Miners may play an important role in preventing the occurrence of Common Starlings (M. Newman unpublished results).

Absent species

Most of the woodland birds regularly recorded and presumed resident in the Paterson area (Newman 2007, 2009, 2012a, 2014 and 2015) were recorded in this study. Notable absentees in this study included the Varied Sittella *Daphoenositta chrysoptera* and Speckled Warbler *Chthonicola sagittata*, which are both listed as vulnerable under the *Threatened Species Conservation Act 1995* of NSW (Roderick & Stuart 2016). It is perhaps surprising that the Varied Sittella was not recorded as it is known to occur in roadside vegetation in fragmented landscapes (Newman 2015). In addition to the Speckled Warbler, other species from the guild of small ground-feeding birds were either absent (Buff-rumped Thornbill *Acanthiza reguloides* and Yellow-rumped Thornbill *Acanthiza chrysorrhoa*), or scarce (Double-barred Finch RR 1.0%). The absence of the Yellow-rumped Thornbill was particularly surprising as this is a relatively common species, which is well distributed in the Hunter Region and favours open woodland (Stuart 2016). The Yellow-tufted Honeyeater *Lichenostomus melanops* is another widespread species which was not recorded, although a colony existed approximately 0.5 km from the uphill end of the study area. Similarly absent was the White-throated Treecreeper *Cormobates leucophaea*, regularly present in continuous woodland surrounding Forest Road. Its absence is consistent with the well-known issues associated with the dispersal of treecreepers in fragmented landscapes (Doerr *et al*. 2011).

No nocturnal species were recorded, although Tawny Frogmouth was breeding at the time (H. McCall pers. comm.)

Forest Road in perspective

When this study commenced, the objectives were limited: namely to survey birds while undertaking an early morning walk along a quiet road near my home. Soon the potential for generating an

inventory of a local bird population became apparent. Hence, the concept of this paper was born.

As the study progressed I built friendships with other walkers and was able to draw on their knowledge of the area. Gradually a partial understanding emerged of how ongoing anthropogenic habitat modification was shaping the local bird population.

Four habitat types make unique contributions to the variety of bird species recorded. Paddocks provide open spaces for aerial hawkers like Welcome Swallows and larger ground-feeding species such as Cattle Egret and Straw-necked Ibis. Dams provide opportunities for waterbirds and their edges intermittently support shorebirds like Latham's Snipe. Roadside vegetation involving narrow strips of trees and understorey vegetation along the edges of paddocks provide not only foraging opportunities, but assist the movement of a number of smaller species between the patches of remnant woodland and the continuous woodland on the escarpment on the northern side (**Figure 1**) and beyond the end of the road. Partially cleared acreage blocks provide a park-like environment which supports a variety of woodland birds, ranging from small species favouring the dense riparian undergrowth of creek lines (e.g. Superb Fairy-wren and Red-browed Finch) to the more open areas favoured by Noisy Miner, Grey-crowned Babbler and White-winged Chough.

Previous sections highlighted the occurrence and absence of various species based on the results of long-term studies of surrounding areas, including studies of remnant woodland (Newman 2009), farms with remnant vegetation (Newman 2007, 2012a and 2012b) and fragmented rural landscape (Newman 2014). The interaction between these various components of the Paterson area's landscape is dynamic with habitat modifications in each component impacting on the bird populations of the others.

Changes which affect bird populations are both natural and anthropogenic. The influences of rainfall patterns are well known, with both annual and seasonal variations important (Newman 2012c). The changes in bird populations from these variations are complex as exemplified by variations in Grey Fantail *Rhipidura fuliginosa* numbers at nearby Green Wattle Creek (Newman 2012c). This study demonstrated that local fluctuations of an apparently resident species may be influenced by environmental conditions outside the Hunter Region. This is more apparent in influxes of waterbirds seeking drought refuge to dams along Forest Road as discussed above for Hardhead and Eurasian Coot. Increasingly frequent and ferocious storms periodically uproot roadside trees, progressively degrading the amount of this dwindling feature of rural landscapes: a situation exacerbated by the removal of trees considered to constitute public risk.

The main anthropogenic change involves the removal of mature trees offset to a limited extent by re-planting of trees and shrubs; however, the balance tends to result in a net loss of both canopy and understorey cover and increased fragmentation. Plantings of larger flowering shrubs increase the numbers of larger aggressive honeyeater species, the Blue-faced Honeyeater *Entomyzon cyanotis* (RR 11.7%) being an example.

The extent to which the existing balance of sub-habitats supporting the current diverse bird population will be sustained is questionable. Perhaps the greatest risk is the ongoing net loss of mature trees as property ownerships change and landscape modifications are made reflecting the different lifestyle aspirations of successive owners. Loss of mature trees and understorey vegetation may result in the increased dominance of aggressive species and colonisation by introduced species, which were mainly absent during the study (e.g. Common Myna, Spotted Dove and Common Starling). Such changes might be detrimental to Grey-crowned Babblers, in many ways the signature species of the area, as well as decreasing Forest Road's function as a corridor facilitating the movement of birds between woodland remnants.

Collectively, the contemporaneously generated data sets for Forest Road and surrounding habitats provide insights into the relative ability of different species to exist in and move through a fragmented, modified habitat. Species poorly represented in the Forest Road surveys, but known to be locally abundant nearby, may have difficulty surviving in a fragmented landscape; for instance, when local populations are eliminated by wildfires in a remnant woodland patch recolonization may not occur. A few examples have been discussed in the previous sections, but a more comprehensive evaluation than appropriate to the scope of this paper appears warranted.

Neither the Speckled Warbler nor Varied Sittella was recorded at Forest Road, although both are present on Yaraandoo property (**Figure 1**) at the

end of Forest Road (M. Newman unpublished results). Their absence in these surveys might suggest sustainability issues in a fragmented landscape, supporting their vulnerable status under the NSW *Threatened Species Conservation Act 1995*. Studies like this may highlight other at-risk species; for instance, the Crested Shrike-tit *Falcunculus frontatus*, for which there was only one record.

CONCLUSIONS

Acreage properties, farmland and roadside vegetation along Forest Road near Paterson, NSW support a diverse bird population. Over a six-year period 113 species were recorded during 103 surveys conducted in the early morning. This diverse, but highly modified habitat, supported three permanent clans of the Grey-crowned Babbler, a species classified as vulnerable under the NSW *Threatened Species Conservation Act 1995*. The babblers coexisted with aggressive colonies of Noisy Miner, both species favouring open-canopy woodland with limited understorey vegetation.

Many species occurring in surrounding woodland were recorded intermittently suggesting that the area provides important connectivity between woodland remnants in a fragmented rural landscape. Continual modification of vegetation, both natural (e.g. storm damage) and anthropogenic (e.g. clearing and the planting of exotic species) will inevitably cause ongoing environmental changes impacting on the area's bird population and its effectiveness as a corridor facilitating the movement of birds.

A number of dams, mostly small, provided habitat for waterbirds, including species seeking drought refuge and normally associated with larger bodies of water. Shorebirds utilised muddy margins when these were exposed.

Regularly repeated bird surveys conducted in conjunction with recreational exercise proved exceptionally effective in characterising a local bird population and the opportunity to provide advocacy for birds and their habitat requirements within the local community.

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REFERENCES

Doerr, V.A.J, Doerr, E.D. and Davies, M.J. (2011). Dispersal behaviour of Brown Treecreepers predicts functional connectivity for several other woodland birds. *Emu* **111**: 71-83.

Newman, M. (2007). Bird population of a cattle property near Paterson, NSW – an eleven-year study. *The Whistler* **1**: 21-31.

Newman, M. (2009). Birds of Green Wattle Creek - monthly surveys 1996-2009. *The Whistler* **3**: 14-29.

Newman, M. (2010). Association between breeding Noisy Miners and Grey Butcherbirds and the adverse impact of understorey. *The Whistler* **7**: 55.

Newman, M. (2012a). Olive groves - habitat for Speckled Warbler and other birds. *The Whistler* **7**: 49-53.

Newman, M. (2012b). Flocking of Jacky Winter in paddocks during winter. *The Whistler* **6**: 61-62.

Newman, M. (2012c). Fluctuations in numbers of Grey Fantails in the Hunter Region of New South Wales. *Australian Field Ornithology* **29**: 57-76.

Newman, M. (2014). Birds of the Black Rock area near Martins Creek in the Hunter Valley (1999-2013). *The Whistler* **8**: 39-50.

Newman, M. (2015). Varied Sittellas in the Hunter; distribution, habitat and threats. *The Whistler* **9**: 10-22.

Roderick, M. and Stuart, A. (2016). Threatened bird species in the Hunter Region: 2016 status review. *The Whistler* **10**: 33-49.

Stuart, A. (Ed.) (2016). Hunter Region of New South Wales Annual Bird Report Number **23** (2015). (Hunter Bird Observers Club Inc.: New Lambton, NSW.)