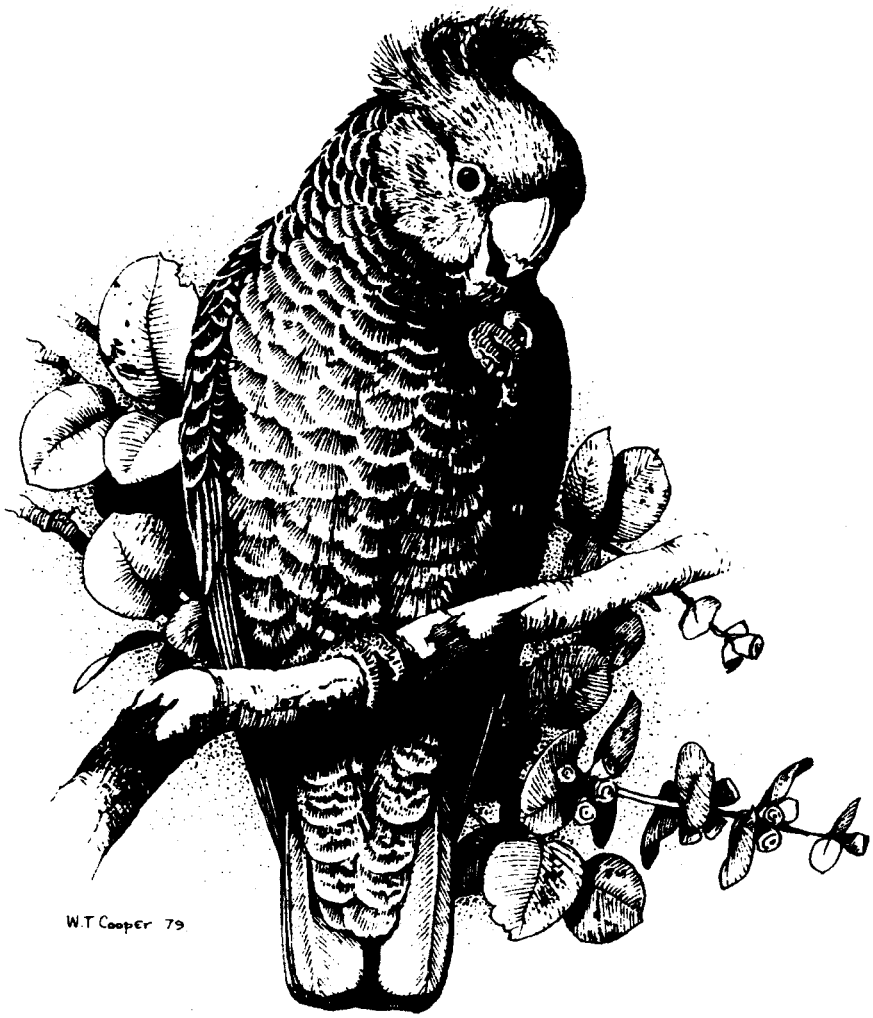
canberra bird notes

ISSN 0314-8211

Volume 27
Number 3
September 2002



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THE BIRDS OF MULLIGANS FLAT NATURE RESERVE

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Summary

This is an abridged version of a report, *The Birds of Mulligans Flat Nature Reserve - a six-year survey*, produced in July 2001 for Canberra Ornithologists Group and Environment ACT (Wildlife Research and Monitoring).

The main reasons for surveying Mulligans Flat Nature Reserve are to describe the distribution and abundance of its avifauna and assess any changes, particularly since its declaration as a Reserve in 1994 and with reference to threatened and endangered species.

In total, 140 species of bird have been recorded at Mulligans Flat since 1986. A number of these species have declined in abundance, particularly species which feed from or near the ground, while a smaller number of species have increased.

The possible reasons for some of these changes in abundance are discussed.

Introduction

Beadle (1981) lists the dominant trees of temperate woodlands. Of the three principal woodland alliances only the Yellow Box *Eucalyptus melliodora 1* Blakely's Red Gum *E. blakelyi* alliance is represented within the ACT. Four principal factors have been identified that are responsible for the modification of the structure of these woodlands: ringbarking, selective clearing, the destruction of seedlings by rabbits and livestock, and responses to disturbance where changes to floristic composition have occurred in response to clearing and grazing.

Threats to the remaining stands of the woodlands have been identified as clearing for agriculture and grazing, provision of urban services and infrastructure, firewood collection, failure of tree regeneration, rural die-back, pasture improvement, grazing by livestock and other animals, invasion by weeds and feral animals and, finally, inappropriate fire regimes (ACT Government 1999).

Frawley (1991) describes Mulligans Flat as the largest and most dense area of remnant open forest, woodland and grassland in the Gungahlin area. The reserve has been identified as an area containing significant stands of Yellow Box/Red Gum grassy woodlands with half of the area of very high conservation value and half of high conservation value (ACT Government 1999).

The Yellow Box/Red Gum grassy woodlands was declared an endangered ecological community in May 1997. In addition, five woodland bird species were declared as vulnerable and one woodland species was declared as endangered (Action Plan No.15: Hooded Robin *Melanodryas cucullata* -

vulnerable, Action Plan No.16: Swift Parrot *Lathamus discolor* - vulnerable, Action Plan No,17: Superb Parrot *Polytelis swainsonii* - vulnerable, Action Plan No.18: Brown Tree-creeper *Climacteris picumnus* - vulnerable, Action Plan No.19: Painted Honeyeater *Grantiella picta* - vulnerable, Action Plan No.20: Regent Honeyeater *Xanthomyza phrygia* - endangered).

The Plans require management actions that include the surveying and monitoring of the fauna associated with the woodlands and various threatened bird species that are dependent on those woodlands. In order to provide this information and to enhance the monitoring activities of Environment ACT (Wildlife Research and Monitoring), the Canberra Ornithologists Group (COG) extended the bird survey protocol that had been conducted at Mulligans Flat since mid 1995.

Mulligans Flat has long been recognised by ornithologists as an area of significant value to birds. Starting in September 1986 a large part of the present reserve was surveyed for three years as part of the COG's ACT Bird Atlas survey, a project conducted under contract to the National Capital Planning Authority and its predecessor the National Capital Development Commission (Taylor and Canberra Ornithologists Group 1992). The area was declared a nature reserve and incorporated into the Canberra Nature Park in 1994. Stock and internal fences were removed by late 1994, By 1995 COG had been involved in surveys and *ad hoc* visits within part of the reserve for nine years.

The aim of the survey was to 1) describe the distribution and abundance of the avifauna within Mulligans Flat Nature Reserve, 2) to assess any changes since 1986 and 3) discuss possible changes since the declaration of the Reserve in 1994. Particular reference will be made to the occurrence and abundance of the six threatened species within the ACT and to the twenty species identified as being of concern in the New South Wales sheep-wheat belt (Reid 1999).

Survey site

Mulligans Flat Nature Reserve

(35°11'S, 149°08'E) covers an area of 765 ha, situated on both sides of Gundaroo Road. The reserve abuts the northern boundary of the ACT. At present it is bordered to the south by grassland, which in the near future will disappear under suburbia.

The vegetation of the area is described by Lepschi (1993) from data collected between 1988 and 1989 with some records from 1991 and 1992, thus the description is based on information prior to the changes in the grazing regime brought about by the change in management in March 1994. In addition the survey did not cover the entire area of the present reserve but covered an area of 275 ha situated in the north-west section east of Gundaroo Road.

Three broad vegetation types occur at Mulligans Flat; open forest, woodland and grassland. The open forest occurs predominantly on the shallow soils of the ridges and slopes. Dominant species are *Eucalyptus. macrorhyncha, E. rossii* and *E. mannifera* with some *E. goniocalyx*. There is much eucalypt

regeneration and small trees such as *Acacia dealbata, A. parramattensis* and *Exocarpus cupressiformis* and various shrub species. The ground layer, where present, consists of various grasses and herb species. On the flatter sites with deeper soils the woodlands are dominated by the endangered Yellow Box /Red Gum grassy woodland community with scattered *E. bridgesiana* and *E. rubida*. The understorey is generally sparse with eucalypt saplings and scattered stands of mainly *A. dealbata* and various shrubs. Grasses and herbs make up the ground cover. In the grasslands *Panicum effusum* var. *effusum* and *Themeda australis* are common components where light grazing has occurred. In areas of heavier grazing *Aira* spp., *Bothriochloa macra* and *Chloris truncata* are common. For a more detailed description of the various vegetation types see Lepschi (1993) who noted that the description was not exhaustive and that many more species could be expected once stock had been removed from the area.

Survey methods

1986-1989

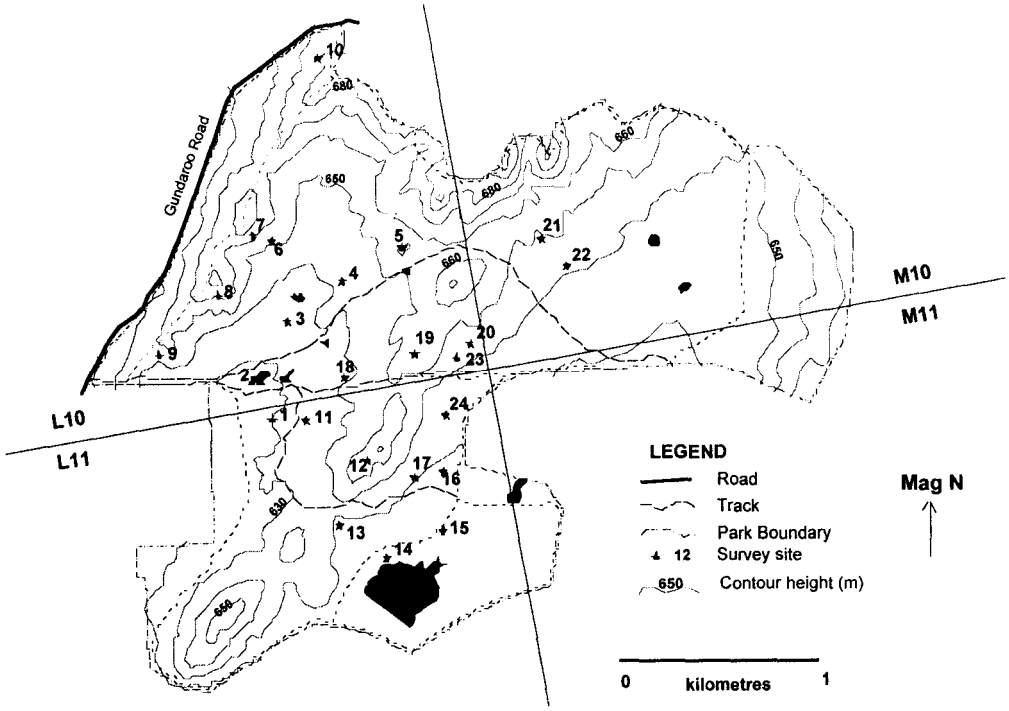
During the survey period of the ACT Bird Atlas project that ran from September 1986 to August 1989, birds were surveyed within a series of 2.5 minute cells each measuring approximately 3.5 km by 4,5 km (Taylor and Canberra Ornithologists Group 1992). Each cell was identified by a unique number. The present reserve is covered by four cells; L10, L11, M10 and L11 although during the atlas survey period virtually all surveys were conducted locations within L10 could be identified it has been possible to identify those surveys from within Mulligans Flat from other surveys within cell L10. The two observers (J. Bounds and B. Lepschi) responsible for virtually all of the observations spent approximately three to four hours during the early hours of the morning recording the presence of all species seen and heard (J. Bounds pers. comm.). For most of the surveys within L10 the two observers remained together as they covered the area. On only a few occasions was only one observer present. During the period, the area was surveyed on 25 occasions.

1995-2000

At the end of 1994, after a successful application for an ACT Heritage Grant and an ACT Environment Grant, a protocol was established to survey the area at least once for each season of the year for a five-year period. The spring season would be surveyed twice to gather as much data on breeding as possible.

After mapping the habitats, 24 survey sites were allocated taking into account the relative area of the different habitats, time constraints and access. The numbered sites were located by habitat as follows: ridge woodland which included the *E. macrorhyncha* and *E. mannifera* habitat (5, 7, 8, 10, 12, 19), open woodlands including the *E. melliodora, E. blakelyi, E. bridgesiana* and *E. rubida* habitat (1, 3, 6, 11, 13, 15, 17), grasslands (9, 16, 24), mixed grass-land/shrub which included the low heath and *A. dealbata* thickets (4, 18, 20, 21, 22, 23) and finally two sites centred on dams (2, 14), see Figure 1.

Figure 1. Map of Mulligans Flat Nature Reserve, with site locations.



In late May 1995 each site was marked with a permanent marker. Five to six teams of between one and three people surveyed the sites for about three hours starting within an hour of sunrise. Each site was surveyed for 15 minutes with the number of individuals of each species seen or heard within a 50-m radius (0.8 ha) of the marker recorded. Species seen or heard outside the circle were recorded separately as was any individual flying overhead or through the plot. Only 48 of the 9981 records (0,5%) were of birds flying overhead or through the plot and are regarded here as having been recorded from within the plot. Each site was surveyed once during each visit. If more than one person surveyed the site only one was the observer. There was no attempt to randomise observers between sites with individuals often surveying their 'favoured' site.

The names of bird species are taken from Christidis and Boles (1994). For scientific names see Appendix I which lists all species recorded at Mulligans Flat during either the 1986-1989 or the 1995-2000 surveys. Records of Grey Falcon, Olive Whistler, Crimson Chat and Pied Cormorant have not been included in the analysis as they have been regarded as errors in identification.

Results

Survey effort

Between June 1995 and September 2000 bird surveys at Mulligans Flat Nature Reserve were conducted by members of COG. Over this period 50 observers were involved with an average of 13 observers per survey. Each survey covering all 24 sites took approximately 3 hours and 30 minutes to complete. All sites were visited on 26 occasions. If an average travel time of 45 minutes to and from the area is included, the total volunteer effort over the six-year period is 1437 volunteer-hours.

Species richness

Over the six years of the woodland survey, 104 species of woodland birds and 27 species of waterbirds were recorded from the survey plots (Table 1). The largest number of woodland species was recorded from within the open woodland habitat with 70 species having been seen over the survey period. The lowest number was recorded from the grassland sites with the remaining three habitats having a very similar number of species, There was a surprisingly large number recorded from the two dam sites, in particular site 14. As would be expected the two dam sites also recorded the

After combining the sites into their respective habitats there was a significant difference between habitats (Wald statistic 28,03, d.f. 4, $p<0.001$). Dunn's multiple comparison of mean ranks indicated that the mean number of species per survey was significantly different between all habitats except between the grassland and the ridge woodland habitats and between the dam and the open woodland habitat (see Figure 2).

Relative abundance

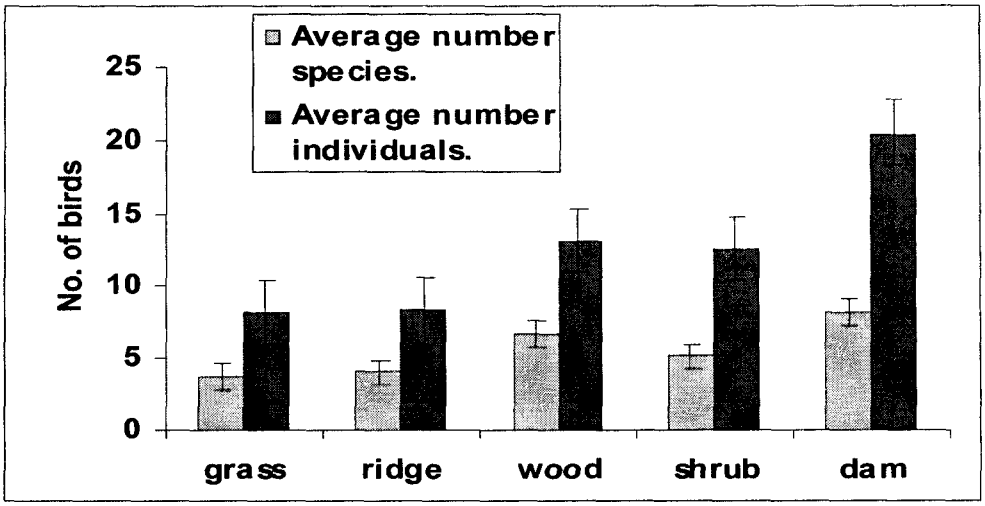
When combining the sites into their respective habitats (Figure 2) there was a significant difference in the number of individuals between habitats (Wald statistic 25.68, d.f. 4, $p<0.001$). Dunn's multiple comparison of mean ranks indicated that the average abundance was significantly different between all habitats except between the grassland and the ridge woodland habitats and between the mixed grassland/shrub and the open woodland habitat.

In summary the grassland and the ridge woodland habitats contained a small but similar number of species with a similar number of individuals, whilst for a similar number of species the dam habitat contained many more individuals than the open woodland.

Table 1. Total number of species recorded from five different habitat types at Mulligans Flat Nature Reserve, ACT.

	Grass	Ridge	Wood	Shrub	Dam	**Total**
woodland species	47	56	70	56	60	**104**
waterbird species	1	2	2	3	21	**27**
No. sites	3	6	7	6	2	**24**

Figure 2. The average number of woodland species (+/- s.e.) and average number of individuals within plots per survey for five habitat types at Mulligans Flat Nature Reserve, ACT.



Species prevalence, 1995-2000.

There were 104 species of woodland birds recorded at Mulligans Flat Nature Reserve during the survey period, Depending on their social behaviour, these species occur in flocks of various sizes. Therefore an appropriate way to measure the prevalence of a species is to compare the relative frequency of observation (reporting rate) rather than their relative abundance. The prevalence of the avifauna at Mulligans Flat is detailed in Appendix II. The prevalence is shown for individual sites, averaged for different habitats and averaged over all sites. Of the 104 species recorded there were 20 that were not recorded within the plots.

The most commonly recorded species is the Buff-rumped Thornbill, recorded on average for 9 surveys within a plot, ranging from 22 of the 24 surveys at site 20 to a low of zero surveys at sites 14 and 15. The second most common species was the Crimson Rosella followed by the Striated Pardalote, The Buff-rumped Thornbill was the most common species in the ridge woodland and in the mixed grassland/ shrub habitat, the Crimson Rosella was the most common species in the grass-land and the open woodland whilst the Magpie-lark was the most commonly recorded species at the dam sites.

Grasslands appear to be of particular importance to the Weebill, Noisy Friarbird and Yellow-rumped Thornbill whilst the ridge woodland is important to the White-throated Treecreeper and the Striated Thornbill. The open woodland is important to the Grey Fantail, White-throated Treecreeper, Rufous Whistler, White-throated Gerygone and White-winged Chough. The mixed grassland/shrub is important to the smaller species such as the Buff-rumped Thornbill, Striated Thornbill, Weebill, Yellow-rumped Thornbill and Superb Fairy-wren. The dam habitat

appears to be important to many species including the Galah, Sulphur-crested Cockatoo, Eastern Rosella, Red-rumped Parrot Superb Fairy-wren, Noisy Miner, Restless Flycatcher, Magpie-lark, Willie Wagtail, Dusky Woodswallow, and Common Starling.

Changes in prevalence, 1995-2000

Over the six years of the survey there appears to have been a decrease in both species richness and abundance at Mulligans Flat (Figure 3).

Figure 3. (A) Average number of species per plot (+/- s.e.) and (B) average abundance per plot (+/- s.e.) from 1995 to 2000 at Mulligans Flat Nature Reserve.

(A)

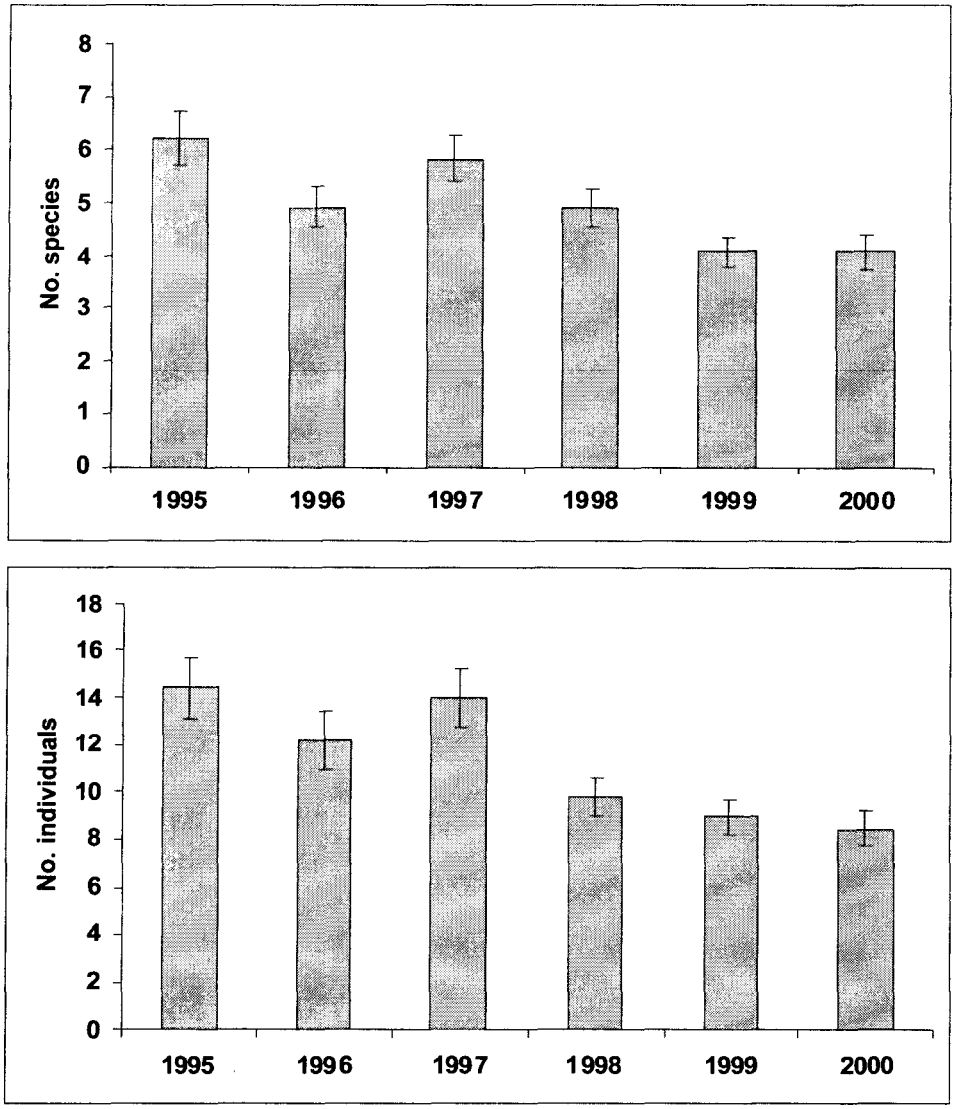


Table 2. Number of individual bird species during each survey at Mulligans Flat Nature Reserve, ACT, 1995-2000. Species listed in order of prevalence (see Appendix II).

Survey Date	25.6.95	24.9.95	5.11.95	3.12.95	31.3.96	30.6.96	29.9.96	3.11.96	8.12.96	6.4.97	22.6.97	28.9.97	9.11.97	14.12.97	29.3.98	28.6.98	27.9.98	8.11.98	6.12.98	28.3.99	27.6.99	26.9.99	5.12.99	25.3.00	2.7.00	17.9.00
Buff-rumped Thornbill	31	22	45	33	22	29	69	35	24	18	44	28	31	38	27	37	34	24	29	30	37	17	12	33	25	19
Crimson Rosella	24	48	39	16	20	18	19	27	31	42	6	33	25	22	14	8	32	13	9	15	22	23	21	11	31	10
Striated Pardalote	4	38	11	6	18	4	18	15	13	12	6	29	7	14	9	0	17	4	0	4	12	11	7	25	3	15
Grey Fantail	0	21	5	10	21	0	18	11	11	13	0	31	4	14	34	0	23	8	3	13	2	13	13	13	1	3
Australian Magpie	11	12	3	25	14	15	11	13	11	13	7	15	7	13	3	7	22	10	16	23	8	11	26	12	1	13
Wh-thr Treecreeper	4	12	8	2	9	7	10	12	7	5	6	9	5	8	2	4	5	9	11	4	2	4	5	8	7	4
Striated Thombill	14	26	38	15	9	30	29	10	37	28	14	23	11	25	0	10	12	18	13	12	18	9	6	10	9	14
Rufous Whistler	1	9	10	16	6	0	9	11	8	2	0	9	10	12	2	0	16	10	12	0	0	4	4	2	0	4
Weebill	13	10	7	8	5	2	6	4	10	7	26	23	5	10	21	16	15	1	3	4	9	2	4	12	8	8
Scarlet Robin	3	13	7	7	5	8	8	7	6	9	16	3	2	6	7	8	4	3	6	8	0	6	4	4	4	3
Noisy Friarbird	0	5	7	13	2	0	1	16	15	17	0	14	7	23	1	0	12	6	18	6	0	1	15	16	0	0
Spotted Pardalote	4	21	7	6	4	0	4	3	1	0	31	14	2	6	8	7	2	4	0	1	3	12	4	1	12	5	13
Eastern Rosetta	8	10	22	4	5	14	8	17	8	15	2	19	14	13	6	4	7	6	5	7	6	4	4	0	1	18
Black-faced C-shrike	0	13	8	11	5	0	0	16	7	6	0	10	11	6	0	0	8	9	6	4	0	9	11	1	0	2
Wh-throat Gerygone	0	6	4	7	0	0	3	11	10	0	0	7	7	10	0	0	14	8	9	0	1	3	5	1	0	2
Sulphur-cr Cockatoo	11	4	5	10	9	18	7	6	11	14	10	10	3	6	0	3	11	14	0	5	8	8	7	1	6	4
Galah	2	3	5	9	2	2	8	1	14	14	0	3	2	3	4	7	5	27	1	11	3	10	9	11	2	2
Yel-rump Thornhill	16	15	28	18	1	14	17	18	2	13	6	4	7	5	5	17	13	5	1	0	4	8	6	16	4	3
Noisy Miner	11	5	7	5	12	11	2	4	4	7	45	10	2	11	5	2	6	4	4	12	13	10	11	4	7	8
White-winged Chough	20	17	26	31	36	12	9	13	12	2	0	4	22	19	0	12	8	44	15	17	0	18	12	0	0	4
Brown Thornhill	10	6	3	3	1	3	7	3	0	3	3	6	3	5	3	1	3	0	0	0	2	1	1	1	3	2
Western Gerygone	0	6	5	6	0	0	4	11	1	0	0	6	1	2	0	0	3	2	3	0	0	5	0	0	0	4
Yel-faced Honeyeater	2	9	0	3	0	2	13	5	1	18	0	12	2	0	0	0	12	1	0	0	1	3	0	2	1	6
Australian Raven	11	2	2	2	3	5	7	3	4	3	2	6	2	2	0	1	1	6	2	4	0	0	0	3	11	0
Australian Magpie-lark	6	7	6	8	9	0	2	3	0	5	2	2	6	0	0	2	3	3	2	2	1	2	2	4	0	9
Leaden Flycatcher	0	0	4	7	0	0	0	12	7	0	0	0	3	8	0	0	1	8	4	0	0	0	3	0	0	0
Olive-backed Oriole	0	0	3	4	2	0	1	3	4	0	0	2	3	4	0	0	4	2	4	0	0	2	4	0	0	4
Grey Shrike-thrush	1	3	3	2	2	0	1	1	3	0	3	3	4	5	1	1	1	2	1	1	0	0	0	1	0	2
Superb Fairy-wren	5	1	12	2	0	8	23	10	2	4	0	15	2	5	4	1	1	0	0	0	0	0	0	1	0	2
Laughing Kookaburra	0	3	0	6	5	2	5	2	1	1	0	0	4	7	0	1	0	7	0	2	4	2	3	0	0	1
Willie Wagtail	2	2	5	3	0	3	3	2	4	1	1	2	0	3	0	2	4	1	3	0	0	2	3	1	0	3
Br-headed Honeyeater	6	11	1	3	3	0	8	7	7	5	8	8	0	5	0	0	4	10	0	0	0	0	1	4	0	0
Grey Currawong	2	2	2	3	2	0	3	1	0	0	0	0	3	1	0	2	3	I	1	1	0	2	2	3	0	0
Red Wattlebird	1	0	0	1	0	0	0	0	0	7	0	1	0	1	10	2	1	2	2	7	0	0	1	1	0	4
Golden Whistler	4	1	0	0	2	1	1	0	0	3	4	2	0	0	2	2	3	0	0	0	1	1	0	0	0	1
Common Starling		4	2	1	0	1	0	5	5	0	0	1	0	8	0	7	4	1	7	3	4	1	0	1	0	1	2	2	0	5
Yellow Thornhill		0	1	3	5	7	0	1	2	2	4	1	0	1	0	2	1	0	0	2	0	0	0	1	0	0	5	0	0
Pallid Cuckoo	0	12	5	0	0	0	1	2	0	0	0	1	3	0	0	0	0	2	0	0	0	2	0	0	0	0
Mistletoebird	0	0	0	4	0	0	0	0	5	0	0	0	2	1	0	0	2	2	0	0	0	3	5	1	0	0
Eastern Spinebill	6	2	0	1	2	3	0	0	0	1	1	1	0	2	0	1	0	0	0	1	0	0	0	3	2	1
Speckled Warbler	0	0	3	1	1	0	1	5	0	1	0	2	2	4	0	3	2	1	1	0	1	1	0	0	1	0

Survey Date	25.6.95	24.9.95	5.11.95	3.12.95	31.3.96	30.6.96	29.9.96	3.11.96	8.12.96	6.4.97	22.6.97	28.9.97	9.11.97	14.12.97	29.3.98	28.6.98	27.9.98	8.11.98	6.12.98	28.3.99	27.6.99	26.9.99	5.12.99	25.3.00	2.7.00	17.9.00
Grey Butcherbird	0	0	1	3	1	0	0	2	0	1	0	1	1	4	3	2	2	2	1	1	1	0	0	3	0	1
Silvereye	0	11	1	0	0	0	36	0	0	5	0	0	0	0	9	0	3	0	0	0	0	0	0	9	2	2
Pied Currawong	0	0	4	0	1	0	2	0	1	3	0	1	1	0	0	0	1	3	1	1	5	1	1	0	0	0
White-winged Tril'er	0	3	3	2	0	0	0	2	0	0	0	0	0	2	0	0	0	2	6	0	0	0	1	0	0	0
Sacred Kingfisher	0	0	2	4	0	0	0	0	5	0	0	0	0	1	0	0	0	3	7	0	0	0	3	0	0	0
Shining Bze-Cuckoo	0	0	1	0	0	0	0	0	0	0	0	1	2	1	0	0	3	2	1	0	0	0	1	0	0	1
Varied Sittel'a	0	3	0	0	0	0	36	5	2	0	0	0	3	0	0	0	4	10	4	0	0	0	0	0	0	3
Dusky Woodswallow	0	0	5	0	2	0	0	2	2	0	0	2	2	0	0	12	0	0	0	0	0	0	2	0	0	1
Wh-plume Honeyeater	0	0	0	1	3	1	0	2	0	0	1	0	0	0	0	0	2	0	1	0	0	0	0	0	5	0
We'come Swa'low	1	0	0	0	16	1	0	0	0	0	0	0	0	1	2	2	0	0	0	0	0	0	5	8	0	0
Hooded Robin	0	2	2	2	1	0	0	3	0	0	0	0	0	1	0	2	0	0	0	0	0	2	0	0	0	0
Horsfield Bze-Cuckoo	0	4	1	0	0	0	1	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Wh-naped Honeyeater	2	0	0	0	0	0	0	1	0	0	0	1	0	0	2	0	1	0	0	0	0	0	0	0	1	1
Restless F'ycatcher	0	0	2	2	0	0	1	0	0	3	0	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Brush Cuckoo	0	0	0	1	0	0	0	1	0	0	0	0	0	2	0	0	0	0	2	0	0	0	0	0	0	0
Rufous Songlark	0	0	2	3	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0
Red-rumped Parrot	0	0	0	0	2	0	2	5	5	0	0	0	0	1	0	8	0	0	0	0	0	0	0	0	0	0
Common Bronzewing	0	0	0	2	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Brown Treecreeper	1	3	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Dollarbird	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	3	1	0	0	0	1	0	0	0
Crested Pigeon	0	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0
Fan-tailed Cuckoo	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1
Wh-eared Honeyeater	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
Painted Button-quail	0	0	1	2	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brown Goshawk	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Eastern Yellow Robin	0	0	1	0	0	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Crested Shrike-tit	0	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Litt'e Friarbird	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0
Double-barred Finch	0	6	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Australian Kestrel	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fuscous Honeyeater	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Whistling Kite	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Common Myna	0	0	0	0	0	0	0	I	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wedge-tailed Eagle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
Gang-gang Cockatoo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Superb Parrot	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jacky Winter	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red-capped Robin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Diamond Firetail	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Little Raven	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coll Sparrowhawk	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Black-shouldered Kite	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tree Martin	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

A significant change in abundance of an individual species is difficult to demonstrate because of the natural changes in abundance during the annual cycle and because the majority of species occur in small numbers. Even so, a visual inspection of the abundance data for each species allows an assessment to be made (Table 2).

There does not appear to be any species that has obviously increased in numbers. Those that have declined are the Striated Thornbill, Rufous Whistler, Sulphur-crested Cockatoo, Yellow-rumped Thornbill, White-winged Chough, Brown Thornbill, and Brown-headed Honeyeater. Species that may have shown a decline are the Crimson Rosella, White-throated Treecreeper, Grey Shrike-thrush and the White-plumed Honeyeater. Species that occur in small numbers and have not been recorded for some time or have been recorded less frequently are the Superb Fairy-wren, Yellow Thornbill, Hooded Robin, Restless Flycatcher, Red-rumped Parrot, Brown Treecreeper, Painted Button-quail, Eastern Yellow Robin and the Double-barred Finch. Eight species occur at Mulligans Flat in surprisingly low numbers considering their general distribution and the range of habitats available in the reserve. These are the Silvereye, White-plumed Honeyeater, Hooded Robin, Red-rumped Parrot, Common Bronzewing, Brown Treecreeper, Crested Pigeon, Jacky Winter and Diamond Firetail.

Comparison of the 1995-2000 survey with the 1986-1989 (Atlas) survey

The survey at Mulligans Flat during the period of data collection for the ACT Atlas (Taylor and COG 1992) was not conducted in the same way as the present survey. The major difference was that the area was surveyed by up to two observers covering the area over a three to four-hour period and recording the species present within an area of the present reserve that is included within the COG grid cell L10. From the 1995 to 2000 survey a sub-set of the data was taken which could be compared with the 1986-1989 survey. Data recorded from both inside and outside the circular plots from the 13 sites located within L10 were identified and the reporting rate compared with the 1986-1989 data.

Because of the difference in survey methods the change in status of a species between the two periods has not been considered unless a species unique to either survey is recorded on more than four occasions. In addition the reporting rate of species recorded during each period must vary by 20% or more. Therefore, there needs to have been a substantial change in the reporting rate before species were regarded as having changed status. Assuming that a true record of the species present has been recorded irrespective of the survey method then interesting differences in the reporting rate of some species emerge when comparing the reporting rate from within the area covered by grid cell L10 only.

During the course of the two surveys 113 woodland species were recorded. There were 16 species recorded during the 1986-1989 survey that were not recorded within cell L10 during the 1995-2000 surveys whilst 14 species were recorded during the 1995-2000 survey but not during the 1986-1989 survey (Table 3).

Table 3. Unique species and numbers of surveys within cell L10 from the 1986-1989 and the 1995-2000 surveys at Mulligans Flat Nature Reserve, ACT.

	1986-1989	1995-2000
European Goldfinch	21	0
Richard's Pipit	9	0
Skylark	7	0
Tree Martin	6	0
Jacky Winter	4	0
Southern Whiteface	2	0
Golden-headed Cisticola	2	0
White-browed Woodswallow	2	0
House Sparrow	2	0
Common Myna	2	0
Peregrine Falcon	1	0
Tawny Frogmouth	1	0
Fork-tailed Swift	1	0
Fairy Martin	1	0
Flame Robin	1	0
Regent Honeyeater	1	0
Grey Butcherbird	0	10
Brush Cuckoo	0	6
Double-barred Finch	0	3
Crested Pigeon	0	2
Peaceful Dove	0	1
Collared Sparrowhawk	0	1
Whistling Kite	0	1
Australian Hobby	0	1
Glossy Black-Cockatoo	0	1
Gang-gang Cockatoo	0	1
Little Corella	0	1
Australian King-Parrot	0	1
Australian Owlet-nightjar	0	1
Fuscous Honeyeater	0	1

Of these 30 species only six were observed during more than four surveys. The November 1996 record of a Glossy Black-Cockatoo is contentious, the observation most likely being of a Yellow-tailed Black-Cockatoo. Species that were surprisingly low in both surveys were the Jacky Winter, Southern Whiteface and the Flame Robin.

Taking the six species that were unique to either survey and recorded for more than four surveys and the species that were recorded on 20% of occasions or more during either survey, then 22 species declined, 11 increased and there was no change for 40 of the species (Table 4).

The 22 species that declined between the 1986-1989 and the 1995-2000 survey appear to have little in common, those that have declined the most are the White-plumed Honeyeater, Brown Treecreeper and European Goldfinch. Some species are insectivorous whilst some are granivorous or nectiverous. Some are solitary whilst others occur in flocks, some migrate others do not. Of interest is that 16 of the 22 declining species (73%) obtain all or most of their food from on or very close to the ground.

The eleven species that have increased also appear to have little in common, with the Olive-backed Oriole, Yellow Thornbill and Eastern Spinebill having increased the most.

Table 4. Change in reporting rate for species recorded in cell L10 during the 1986-1989 and the 1995-2000 surveys at Mulligans Flat Nature Reserve. Reporting rate of a species measured as -(no. of 1986-89 surveys species recorded for/ total number of 1986-89 surveys) + (no. of 1995-00 surveys species recorded for/ total number of 1995-00 surveys).

	1986-1989	1995-2000	change	status
White-plumed Honeyeater	25	3	-0.88	decline
Brown Treecreeper	22	1	-0.84	decline
European Goldfinch	21	0	-0.84	decline
Willie Wagtail	25	10	-0.62	decline
Common Starling	25	13	-0.50	decline
Speckled Warbler	21	10	-0.46	decline
Common Bronzewing	14	3	-0.44	decline
Red-rumped Parrot	13	2	-0.44	decline
Welcome Swallow	13	2	-0.44	decline
Hooded Robin	12	1	-0.44	decline
Magpie-lark	25	16	-0.38	decline
Superb Fairy-wren	25	16	-0.38	decline
Richard's Pipit	9	0	-0.36	decline
Diamond Firetail	9	1	-0.32	decline
Eastern Rosella	25	18	-0.31	decline
Noisy Miner	21	14	-0.30	decline
Skylark	7	0	-0.28	decline
Crested Shrike-tit	7	1	-0.24	decline
Little Raven	7	1	-0.24	decline
Tree Martin	6	0	-0.24	decline
Grey Shrike-thrush	24	19	-0.23	decline
Brown Falcon	6	1	-0.20	decline
Yellow-rumped Thornbill	25	21	-0.19	no change
Brown Goshawk	9	5	-0.17	no change
Rufous Songlark	7	3	-0.16	no change
Little Friarbird	6	2	-0.16	no change
Dusky Woodswallow	6	3	-0.12	no change
White-winged Chough	22	20	-0.11	no change
White-naped Honeyeater	8	6	-0.09	no change
Eastern Yellow Robin	5	3	-0.08	no change
Weebill	25	24	-0.08	no change
Grey Fantail	22	21	-0.07	no change
Black-faced Cuckoo-shrike	21	20	-0.07	no change
Horsfield's Bronze-Cuckoo	7	6	-0.05	no change
Sulphur-crested Cockatoo	25	25	-0.04	no change
Galah	23	23	-0.04	no change
Western Gerygone	17	17	-0.03	no change
Shining Bronze-Cuckoo	10	10	-0.02	no change
Leaden Flycatcher	10	10	-0.02	no change
White-winged Triller	7	7	-0.01	no change
Silvereye	6	6	-0.01	no change
Crimson Rosella	25	26	0.00	no change
Buff-rumped Thornbill	25	26	0.00	no change

Table 4 (continued)	**1986-1989**	**1995-2000**	**change**	**status**
White-throated Treecreeper	25	26	0.00	no change
Australian Magpie	25	26	0.00	no change
		25	0.00	no change
Striated Thornbill	24	25	0.00	no change
		22	0.01	no change
Australian Raven	24	19	0.01	no change
		15	0.02	no change
Brown Thornbill	21	7	0.03	no change
		6	0.03	no change
Noisy Friarbird	18	26	0.04	no change
		26	0.04	no change
Brown-headed Honeyeater	14	17	0.05	no change
		8	0.07	no change
Varied Sittella	6	20	0.09	no change
		5	0.11	no change
White-eared Honeyeater	5	23	0.12	no change
		13	0.14	no change
Scarlet Robin	24	18	0.17	no change
		13	0.18	no change
Striated Pardalote	24	26	0.20	increase
		21	0.21	increase
Yellow-faced Honeyeater	15	13	0.22	increase
		9	0.23	increase
Fan-tailed Cuckoo	6	6	0.23	increase
		12	0.26	increase
Rufous Whistler	17	19	0.33	increase
		10	0.38	increase
Little Eagle	2	17	0.41	increase
		13	0.42	increase
Laughing Kookaburra	19	15	0.46	increase
Mistletoebird	9			

Observations on breeding

Since 1986 when members of the Canberra Ornithologists Group started to survey the avifauna of Mulligans Flat, according to the COG database 48 species have been recorded breeding within the area. From a diary maintained for each visit during the 1995-2000 surveys an additional six species, (Painted Button-quail, Galah, Pallid Cuckoo, Horsfield's Bronze-Cuckoo, Brown-headed Honeyeater, and Regent Honeyeater), have also been noted as breeding.

Breeding was recorded when birds were seen to inspect nest hollows, carry nest material or food, display, copulate, nest build, sit on eggs or when adults were seen with young. In addition, if a nest with eggs or with young were found the species was recorded as breeding. All records were obtained on an opportunistic basis rather than on a thorough investigation of all potential nesting locations. Therefore, the observations cannot be regarded as a definitive comment on the breeding birds of the area.

Not including the breeding notes taken from the diary, 30 species were recorded as breeding during the 1986-1989 survey and 36 species during the 1995-2000 survey (Table 5). Eighteen species were observed breeding during both of the surveys, so of the 48 species, twelve (25%) were recorded as breeding in 1986-1989 but not in 1995-2000 whilst 18 (38%) were recorded as breeding in the 1995-2000 survey but not in 1986-1989. This difference is not due to the fact that the breeding records for the 1995-2000 survey came from a larger area than the previous survey. Removing those breeding records from outside cell L10 only reduced the number of 1995-2000 breeding species by one (Weebill).
Unfortunately neither survey was conducted in a way to satisfactorily quantify breeding success from year to year but they do allow a comparison between surveys for the presence of breeding by individual species.

During the 1995-2000 survey breeding species included the abundant Australian Magpie, Buff-rumped Thornbill, White-winged Chough and Noisy Friarbird. The most unexpected record was that of the Superb Parrot but the observation was of a bird inspecting a hollow and there was no observations of successful breeding. Two Speckled Warbler breeding observations in 1995-96 were of dependent young as were the Hooded Robin breeding observations of 1996-97 and 1998-99.

Of most interest are those species recorded breeding during the three breeding seasons of the Atlas survey but not recorded breeding within the L10 during the five breeding seasons of the 1995-2000 survey. The White-plumed Honeyeater, White-winged Triller, Dusky Woodswallow, Superb Fairy-wren and Restless Flycatcher were recorded nesting whilst the Crested Shrike-tit, Diamond Firetail, Brown Treecreeper, Grey Shrike-thrush, Noisy Miner and Black-faced Cuckoo-shrike were observed with dependent young. The Hooded Robin although only recorded with dependent young in the 1995-2000 survey was recorded as carrying food or with dependent young in 1986-87 and 1987-88 and as a nest with eggs in 1988-89.

Threatened species at Mulligans Flat

Of the six bird species listed as threatened within the ACT, four have been recorded at Mulligans Flat. The Brown Treecreeper was recorded from 22 surveys within L I 0 between 1986 and 1989 yet only once within the same area in 1995-2000 although it was also recorded on seven other occasions from sites outside L10. The Hooded Robin was recorded on 12 surveys from L10 between 1986 and 1989 and only once from L10 during the 1995-2000 survey, though it was recorded on eight other occasions from outside cell L10. The preferred habitat was the mixed grassland/shrub habitat. The Regent Honeyeater was recorded once only during the 1986-1989 survey and not at all during the 1995-2000 survey. In December 1998 two Regent Honeyeaters were reported near site 2 but these sightings were outside the survey period and were not recorded on the COG Mulligans Flat database. The Superb Parrot was recorded once during the 1995-2000 survey but not during the 1986-1989 survey.

Table 5. Breeding woodland bird species at Mulligans Flat, 1986-1989 and 1995-2000. All records from cell L10 except where indicated (*).

	86-87	87-88	88-89	95-96	96-97	97-98	98-99	99-00
Brown Goshawk Sulphur-crested Cockatoo Superb Parrot		1			1			I
Crimson Rosella				1		1	1*	
Eastern Rosella			1		1*	1	1	
Laughing Kookaburra			1			1		
Sacred Kingfisher				1			1	1*
White-throated Treecreeper		1		1		1		
Brown Treecreeper		1						
Superb Fairy-wren			1					
Spotted Pardalote						1		
Striated Pardalote				1				
Speckled Warbler			1	1				
Weebill		1					I*	
Western Gerygone								1
White-throated Gerygone				1			1	
Buff-rumped Thornbill	1		1		1	1	1	1
Yellow-rumped Thornbill	1	1	1	1	1		1*	1*
Striated Thornbill		1			1			1*
Noisy Friarbird		1	1	1	1	1	1	1
Little Friarbird				1	1		1	
Noisy Miner			1					
White-plumed Honeyeater	1							
Jacky Winter				1				
Scarlet Robin	1	1	1		1			
Hooded Robin	1	1	1	?	1		1	
Varied Sittella							I	
Crested Shrike-tit	1							
Rufous Whistler		1	1		1			
Grey Shrike-thrush		1						
Leaden Flycatcher				1	1	1	1	1
Restless Flycatcher			1					
Magpie-lark		1	1			1	1	1
Grey Fantail						1		
Willie Wagtail		1	1	1				
Black-faced Cuckoo-shrike			1					
White-winged Triller	1		1					
Olive-backed Oriole					I*		1	1
Dusky Woodswallow			1					
Grey Butcherbird						1	1	
Australian Magpie	1	1	1	1	1	1	1	1
Pied Currawong					1			
Grey Currawong			1		1	1		
Australian Raven							1	
White-winged Chough	1		1	1	1	1	I	1
Diamond Firetail	1							
Mistletoebird							1	
Common Starling			1		1*		1	

Discussion

With the declaration of Mulligans Flat as a Nature Reserve in 1994 the management of the surrounding area has experienced significant changes. From a management regime that involved some clearing for agriculture in the 1800s to stock grazing and pasture improvement in the last century the area has recently been subject to stock removal, and a policy of low maintenance that allows regeneration of much of the remaining habitat.

Habitat changes

COG collected data systematically over two periods, firstly from 1986 to 1989, during the collection phase of the ACT Bird Atlas project, and again from 1995 to the present. The value of these surveys is that they are able to highlight some possible long-term changes to the avifauna of the area but unfortunately this cannot be readily related to changes in habitat for there are no long-term data that allow any changes to be identified at a level that is significant to the avifauna of the area.

Despite this, visual impressions of the area indicate that the change of management and the likely reduction in rabbit numbers due to the arrival of Rabbit Haemorrhagic Virus Disease to the district in 1996, has resulted in an increased biomass of vegetation, particularly grasses and thatch at the ground layer, a recovery of shrubs from browsing pressure and an increased abundance of fallen timber. Although there is plenty of eucalypt regeneration in the area, it is of interest that Lepschi (1993) quite clearly comments on the eucalypt regeneration that was occurring before the management changes in 1994.

Changes in avifauna

There appears to have been a decline in numbers during the course of the survey; this decline has occurred in all habitats and in all seasons. There was a decline in seven species with a further four whose decline is questionable. In addition a further nine species which occur in small numbers were seen less frequently.

Although difficult to compare because of differences in the way the birds were counted, there have been changes in the avifauna between 1986-1989 conducted before the change of management and the present. Rigorous effort was made to make the results comparable between the two surveys. For those species whose reporting rate has varied by more than 20% between surveys there has been an increase in 11 species and a decrease in 22 species. The most noticeable decliners were the White-plumed Honeyeater, Brown Treecreeper and European Goldfinch. Of those species that were recorded in four surveys or less, there were 12 species recorded in 1986-1989 yet not recorded in the present survey and 12 species not reported in the 1986-1989 survey but recorded in the present survey. The above species may not have been recorded because of their low occurrence, but they have been noted as species of interest.

Those species that have declined between the two survey periods include the Brown Treecreeper and the Hooded

Robin, both listed as vulnerable within the ACT. In addition three species (Speckled Warbler, Diamond Firetail and Crested Shrike-tit) are listed as declining in the New South Wales sheep-wheat belt (Reid 1999). There was one species listed as vulnerable (Superb Parrot), one species listed as endangered (Regent Honeyeater), and two species listed as declining (Jacky Winter, Southern Whiteface) by Reid that were recorded from Mulligans Flat during one of the surveys but on less than four occasions.

Possible reasons for decline

Any decrease in the abundance of partial or complete migrants may be caused by factors not associated with Mulligans Flat. But, of the 22 species that have declined between 1986-1989 and 1995-2000 and of the additional seven species that showed a decline during the 1995-2000 survey, 86% remain in the area throughout the year. It is thus most likely that the reasons for decline occur within the local region.

There does not appear to have been any major habitat degradation at Mulligans Flat for many years. The last time that timber was cleared from the reserve was in early 1971 (Lindenmayer 1992) and the last fire to go through the area was in February 1979. Thus, prior to the establishment of the reserve in 1994 the habitat appears to have remained in a relatively stable condition affected only by the fluctuating weather and stocking densities. It is therefore unlikely that the decline of some species at Mulligans Flat is due to any habitat changes occurring before 1986. Since then there has been no obvious loss of specific habitats and no increased patch isolation or increase in edge effects. Increased competition from aggressive species is unlikely for the Noisy Miner is virtually restricted to site 14 around the large dam and to nearby site 15 and then indications are that they may have declined since 1986-1989. The Noisy Friarbird, another aggressive competitor occurs as a breeding migrant and is not present throughout the year whilst the Red Wattlebird occurs in small numbers.

It is unlikely that there has been a reduction in the availability of nest sites due to tree loss as there has been no habitat clearing, Disturbance caused by human activity is unlikely to have changed since the area was made a reserve. There is no measure of nest parasitism but there does not appear to have been any increase of the cuckoo populations in the area.

Removal of natural vegetation will lead to a loss of a similar proportion of individuals from a population and so through the effects of random sampling a few species will disappear (Ford *et al.* 2001). Although undoubtedly bird assemblages of the area has in the past declined due to random sampling effects brought about by decreasing amounts of remnant vegetation, there has been no recent significant clearing of native habitat within the local region apart from the replacement of already modified agricultural grazing land with suburbia.

At present suburbia is slowly approaching the southern boundary with the suburb of Amaroo now being built less than 1 km away. Because of the habitat preferences of the declining

species, unless past habitat clearances are still causing species decline it is unlikely that the replacement of modified agricultural land with houses is affecting bird numbers at Mulligans Flat.

The 1995-2000 survey was undertaken by members of COG. The expertise of the volunteers could vary, specially in the ability to identify species by call. There is a possibility that the observers during the latter part of the survey were less experienced than those who participated at the start. The observers of the final three surveys had on average already been involved in 12 previous surveys, There was a consistent core of observers that were involved throughout the surveys so it is unlikely that the decline can be explained by a decline in observer expertise.

The dry period during 1997 and for the first half of 1998 may be responsible for a decrease in numbers. The 1997-98 breeding season may have been affected by the dry period causing poor recruitment leading to a subsequent decline.

If survey technique, natural variation or drought are responsible, the present management of the reserve has nothing to do with the decline in numbers. On the other hand, there are changes that may have happened since the change in management practices in 1994. A reduction in grazing pressure caused by the removal of domestic stock may have caused an increase in the density and height of the ground herbage. At the same time ground predators may have increased. COG has not systematically collected data on ground predators, but *ad hoc* observations suggest that foxes but not cats are common. These observations agree with Fischer (1999) who recorded fox, but not cats in the area.

Thirty-nine percent of species to be found at Mulligans Flat feed on or very close to the ground. Yet, interestingly, of the 22 species that may have declined, 73% obtain all or part of their food from on or very close to the ground. If the additional 13 species that appear to have declined during the 1995-2000 survey are included then the number of declining ground feeding species is 68%. A possible explanation for a decline in some of the species may be associated with an increased ground herbage and/or an increase in the number or hunting efficiency of ground predators.

This does not explain why the resident White-plumed Honeyeater has experienced such a decrease although interestingly the species decline has also been recorded in COG's Garden Bird Survey (COG 2000, Veerman 2002). Goldfinch are usually associated with dense thistle patches as they feed on the thistle seeds. A possible reason for their decline may therefore be due to a decrease in thistle density caused by a different grazing regime brought about by the removal of domestic stock.

Although some species have declined in numbers others have increased. It is difficult to identify any common features with the 11 species that have increased although the Golden Whistler, Eastern Spinebill, Red Wattlebird and Olive-backed Oriole have also been identified as increasing in COG's Garden Bird Survey (COG 2000, Veerman 2002). These species

may increase further as suburban gardens encroach closer to the reserve boundary.

In conclusion, the survey at Mulligans Flat suggests that between 1995 and 2000 there has been no increase in the abundance of any species, although when compared with the 1986-1989 survey there has been an increase in eleven species with an additional twelve not having been recorded in 1986-1989. There has been a possible decrease of seven species between 1995 and 2000 with an additional 22 species recording a decrease in abundance between the 1986-1989 and the 1995-2000 survey and an additional 12 species not recorded in the 1995-2000 survey. Reasons are discussed for the changes and it appears most likely that much of the modification in the avifauna of the area has occurred with changes brought about since the declaration of the area as a reserve in 1994.

Even though it appears that some species have declined and others increased it must be stressed that Mulligans Flat is still a most highly valued area for birds of the local region. Mulligans Flat contains all of the attributes required to maintain high biodiversity. The area is large, relatively undisturbed and contains different habitat types which are complex with marked variation in patchiness. This is important so the area can resist disturbance and maintain its internal dynamics; features not found in other ACT woodland sites.

Freudenberger (1999) notes that 'conservation of large (>100 ha) and structurally diverse woodland remnants (abundant ground cover, a mixture of low shrub, middle-sized shrubs and wattles and eucalypt overstorey) is a high priority for vulnerable woodland birds', all features that are presently provided by the Mulligans Flat Nature Reserve.

Recommendations

The report suggests that between 1986 and 2000 there may have been an increase in the abundance of eleven species and a decrease in the abundance of 29 species. In the case of the seven species that have declined between 1995 and 2000 the decline appears to have happened since the summer of 1998 and has occurred irrespective of habitat or season. Possible reasons for the declines are discussed, the most important of which is that the survey has done no more than detect natural fluctuations in the assemblage of birds at Mulligans Flat or it has highlighted real changes in the abundance of some species. This can only be resolved by continuing with the surveys using the same protocol that has been used over the past six years.

The surveys at Mulligans Flat must continue to not only provide data as an indicator of the success of management practices by the Parks and Conservation Service of Environment ACT but also to provide data to the larger Yellow Box/Red Gum grassy woodland survey conducted at present by members of COG. In addition, as suburbia continues to encroach upon the southern boundary the survey will monitor the inevitable increases in disturbance which may well result in changes to the bird community at Mulligans Flat. It is therefore recommended that the 24 sites continue to be surveyed and that no

consideration be given to reducing the number to the seven open woodland sites only to bring Mulligans Flat in line with the other sites being presently monitored by COG for the Yellow Box/ Red Gum grassy woodland survey.

Broad-scale surveys of the type that can be conducted by amateur bird groups such as COG are able to provide information on the temporal and spatial variation of the common birds of the area and as such any decline or increase in numbers of species can be used as an indicator of the success of management practices in the area. Unfortunately though, managers are also concerned with those species that are threatened and these invariably occur in small numbers and their distribution is patchy, These attributes make it difficult to accurately monitor distribution and abundance with broad-scale surveys. To monitor threatened species it usually requires different survey techniques which in most cases would involve methods specially designed for the species of concern. The type of surveys that can be conducted by bird groups can only provide a general trend of what is occurring in the area. Surveys can highlight those species that may require specific attention. Thus, to adequately monitor the populations of the threatened species within Mulligans Flat now requires different techniques that cannot be provided by amateur bird groups but can be provided by dedicated individuals involved in single-species studies.

The present survey protocol needs to be continued, but consideration needs to be given to randomise observers to the sites rather than particular observers surveying their preferred sites. Any suggestion to increase the size of the plots and survey for 20 minutes to bring the survey protocol in line with the Birds Australia Atlas project will either double the survey time or reduce the number of survey sites, thus increasing the variability. Any changes in species numbers will therefore need to be of a greater magnitude to be regarded as statistically significant.

Consideration needs to be given to improve the information on bird breeding, abundance of ground predators and vegetation changes. To improve on the bird breeding information consideration should be given to replacing the November survey with a survey designed to specifically obtain breeding information. The survey must collect data that provides more than a list of breeding species. It must be designed so that an assessment can be made of the relative importance of each habitat to the breeding success of species. Ideally the survey should be conducted twice during a breeding season to allow for yearly differences in the timing of the breeding season.

Data on ground predators could be improved by recording the distance from the observer to the predator whether the predator be seen whilst at a survey point or whilst the observer is travelling from one survey site to another. If kangaroos were also monitored a record of the grazing pressure on the various vegetation communities at Mulligans Flat could be obtained.

Ideally the vegetation changes need to be monitored as a separate exercise to the bird survey and conducted by a

person with relevant botanical expertise. Yearly measures of changes in biomass and plant composition, density and height of the different vegetation strata needs to be collected in addition to the yearly photographic records, The habitat complexity assessment needs to be repeated annually with all sites being assessed by the one person.

Acknowledgments

COG would like to thank the Parks and Conservation Service of Environment ACT, specifically Canberra Nature Park North for allowing COG access and for assistance in setting up the sites. The enthusiasm of Jenny Bounds needs to be acknowledged for without her hard work, dedication and mud cake it is unlikely that the surveys would have occurred and it is unlikely that such a large group of observers would continue to have routinely give up their Sunday mornings. Many thanks to David Purchase and David Freudenberger who acted as referees and made the report readable and to Nicki Taws who produced the map (Figure 1).

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Appendix I. Birds recorded during the 1986-89 and 1995-2000 surveys at Mulligans Flat (• = considered as waterbirds in text)

Stubble Quail	*Coturnix pectoralis*
Brown Quail	*Coturnix ypsilophora*
• Musk Duck	*Biziura lobata*
• Black Swan	*Cygnus atratus*
• Australian Shelduck	*Tadorna tadornoides*
• Australian Wood Duck	*Chenonetta jubata*
• Pacific Black Duck	*Anas superciliosa*
• Australasian Shoveler	*Anas rhynchotis*
• Grey Teal	*Anas gracilis*
• Hardhead	*Aythya australis*
• Australasian Grebe	*Tachybaptus novaehollandiae*
• Hoary-headed Grebe	*Poliocephalus poliocephalus*
• Darter	*Anhinga melanogaster*
• Little Pied Cormorant	*Phalacrocorax melanoleucos*
• Little Black Cormorant	*Phalacrocorax sulcirostris*
• Great Cormorant	*Phalacrocorax carbo*
• White-faced Heron	*Egretta novaehollandiae*
• White-necked Heron	*Ardea pacifica*
• Nankeen Night Heron	*Nycticorax caledonicus*
• Australian White Ibis	*Threskiornis molucca*
• Straw-necked Ibis	*Threskiornis spinicollis*
• Yellow-billed Spoonbill	*Platalea flavipes*
Black-shouldered Kite	*Elanus axillaris*
Whistling Kite	*Haliastur sphenurus*
Brown Goshawk	*Accipiter fasciatus*
Collared Sparrowhawk	*Accipiter cirrhocephalus*
Wedge-tailed Eagle	*Aquila audax*
Little Eagle	*Hieraaetus morphnoides*
Brown Falcon	*Falco berigora*
Australian Hobby	*Falco longipennis*
Australian Kestrel	*Falco cenchroides*
• Eurasian Coot	*Fulica atra*
Painted Button-quail	*Turnix varia*
• Latham's Snipe	*Gallinago hardwickii*
• Common Greenshank	*Tringa nebularia*
• Sharp-tailed Sandpiper	*Calidris acuminata*
• Black-fronted Dotterel	*Elseyornis melanops*
• Red-kneed Dotterel	*Erythrogonys cinctus*
Masked Lapwing	*Vanellus miles*
Common Bronzewing	*Phaps chalcoptera*
Brush Bronzewing	*Phaps elegans*
Crested Pigeon	*Ocyphaps lophotes*
Peaceful Dove	*Geopelia striata*
Glossy Black-Cockatoo	*Calyptorhynchus lathami*
Gang-gang Cockatoo	*Callocephalon fimbriatum*
Galah	*Cacatua roseicapilla*
Little Corella	*Cacatua sanguinea*
Sulphur-crested Cockatoo	*Cacatua galerita*
Little Lorikeet	*Glossopsitta pusilla*
Australian King-Parrot	*Alisterus scapularis*
Superb Parrot	*Polytelis swainsonii*
Crimson Rosella	*Platycercus elegans*
Eastern Rosella	*Platycercus eximius*
Red-rumped Parrot	*Psephotus haematonotus*
Pallid Cuckoo	*Cuculus pallidus*
Brush Cuckoo	*Cacomantis variolosus*
Fan-tailed Cuckoo	*Cacomantis flabelliformis*
Horsfield's Bronze-Cuckoo	*Chrysococcyx basalis*
Shining Bronze-Cuckoo	*Chrysococcyx lucidus*
Southern Boobook	*Ninox novaeseelandiae*
Tawny Frogmouth	*Podargus strigoides*
Australian Owlet-nightjar	*Aegotheles cristatus*
Laughing Kookaburra	*Dacelo novaeguineae*
Sacred Kingfisher	*Todiramphus sanctus*
Rainbow Bee-eater	*Merops ornatus*
Dollarbird	*Eurystomus orientalis*
White-throated Treecreeper	*Cormobates leucophaeus*
Brown Treecreeper	*Climacteris picumnus*

Superb Fairy-wren	*Malurus cyaneus*
Spotted Pardalote	*Pardalotus punctatus*
Striated Pardalote	*Pardalotus striatus*
Speckled Warbler	*Chthonicola sagittata*
Weebill	*Smicrornis brevirostris*
Western Gerygone	*Gerygone fusca*
White-throated Gerygone	*Gerygone olivacea*
Brown Thornbill	*Acanthiza pusilla*
Buff-rumped Thornbill	*Acanthiza reguloides*
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*
Yellow Thornbill	*Acanthiza nana*
Striated Thornbill	*Acanthiza lineata*
Southern Whiteface	*Aphelocephala leucopsis*
Red Wattlebird	*Anthochaera carunculata*
Noisy Friarbird	*Philemon corniculatus*
Little Friarbird	*Philemon citreogularis*
Regent Honeyeater	*Xanthomyza phrygia*
Noisy Miner	*Manorina melanocephala*
Yellow-faced Honeyeater	*Lichenostomus chrysops*
White-eared Honeyeater	*Lichenostomus leucotis*
Fuscous Honeyeater	*Lichenostomus fuscus*
White-plumed Honeyeater	*Lichenostomus penicillatus*
Brown-headed Honeyeater	*Melithreptus brevirostris*
White-naped Honeyeater	*Melithreptus lunatus*
Eastern Spinebill	*Acanthorhynchus tenuirostris*
Jacky Winter	*Microeca fascinans*
Scarlet Robin	*Petroica multicolor*
Red-capped Robin	*Petroica goodenovii*
Flame Robin	*Petroica phoenicea*
Hooded Robin	*Melanodryas cucullata*
Eastern Yellow Robin	*Eopsaltria australis*
Varied Sittella	*Daphoenositta chrysoptera*
Crested Shrike-tit	*Falcunculus frontatus*
Golden Whistler	*Pachycephala pectoralis*
Rufous Whistler	*Pachycephala rufiventris*
Grey Shrike-thrush	*Colluricincla harmonica*
Leaden Flycatcher	*Myiagra rubecula*
Restless Flycatcher	*Myiagra inquieta*
Magpie-lark	*Grallina cyanoleuca*
Grey Fantail	*Rhipidura fuliginosa*
Willie Wagtail	*Rhipidura leucophrys*
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*
White-bellied Cuckoo-shrike	*Coracina papuensis*
White-winged Triller	*Lalage sueurii*
Olive-backed Oriole	*Oriolus sagittatus*
White-browed Woodswallow	*Artamus superciliosus*
Dusky Woodswallow	*Artamus cyanopterus*
Grey Butcherbird	*Cracticus torquatus*
Pied Butcherbird	*Cracticus nigrogularis*
Australian Magpie	*Gymnorhina tibicen*
Pied Currawong	*Strepera graculina*
Grey Currawong	*Strepera versicolor*
Australian Raven	*Corvus coronoides*
Little Raven	*Corvus mellori*
White-winged Chough	*Corcorax melanorhamphos*
Singing Bushlark	*Mirafra javanica*
Skylark	*Alauda arvensis*
Richard's Pipit	*Anthus novaeseelandiae*
House Sparrow	*Passer domesticus*
Double-barred Finch	*Taeniopygia bichenovii*
Red-browed Finch	*Neochmia temporalis*
Diamond Firetail	*Stagonopleura guttata*
European Goldfinch	*Carduelis carduelis*
Mistletoebird	*Dicaeum hirundinaceum*
Welcome Swallow	*Hirundo neoxena*
Tree Martin	*Hirundo nigricans*
Fairy Martin	*Hirundo ariel*
Rufous Songlark	*Cincloramphus mathewsi*
Brown Songlark	*Cincloramphus cruralis*
Silvereye	*Zosterops lateralis*
Common Starling	*Sturnus vulgari*
Common Myna	*Acridotheres tristiss*

Appendix II. Prevalence of bird species (number of surveys (maximum 26) species recorded within survey plots) at Mulligans Flat Nature Reserve, ACT - listed in order of overall prevalence.

Habitat	Grass				Ridge woodland							Open woodland									Mixed grsss/shrub							Dam			
Site number	9	16	24	mean	5	7	8	10	12	19	mean	1	3	6	11	13	15	17	mean	4	18	20	21	22	23	mean	2	14	mean	mean
Buff-rumped Thornbill	2	4	7	**4.33**	12	10	3	12	10	10	**9.50**	5	10	10	10	5	0	10	**7.14**	9	13	22	15	12	19	**15.00**	6	0	**3.00**	**9.00**
Crimson Rosella	10	8	8	**8.67**	4	9	4	5	7	6	**5.83**	11	5	7	11	15	16	13	**11.14**	3	15	9	6	5	14	**8.67**	7	12	**9.50**	**8.75**
Striated Pardalote	2	2	2	**2.00**	7	2	3	7	12	6	**6.17**	13	3	3	13	10	8	12	**8.86**	3	9	12	3	3	15	**7.50**	5	11	**8.00**	**6.92**
Grey Fantail	2	3	3	**2.67**	9	6	4	3	6	5	**5.50**	14	15	14	7	8	3	15	**10.86**	5	7	9	4	4	4	**5.50**	10	0	**5.00**	**6.67**
Australian Magpie	7	5	9	**7.00**	5	4	4	1	7	5	**4.33**	9	7	3	10	10	13	3	**7.86**	8	8	2	3	6	5	**5.33**	7	11	**9.00**	**6.33**
White-throated Treecreeper	0	2	1	**1.00**	10	10	3	6	12	4	**7.50**	7	6	12	15	6	0	10	**8.00**	3	11	2	1	0	6	**3.83**	3	2	**2.50**	**5.50**
Striated Thornbill	0	4	4	**2.67**	6	4	1	15	2	9	**6.17**	4	4	8	3	3	0	7	**4.14**	1	10	13	6	4	10	**7.33**	2	0	**1.00**	**5.00**
Rufous Whistler	0	2	0	**0.67**	2	8	2	2	9	0	**3.83**	11	8	6	15	12	2	9	**9.00**	6	3	3	3	4	4	**3.83**	4	1	**2.50**	**4.83**
Weebill	1	11	11	**7.67**	1	1	1	3	2	0	**1.33**	5	8	1	6	8	5	2	**5.00**	3	2	14	5	12	6	**7.00**	3	2	**2.50**	**4.71**
Noisy Friarbird	9	4	8	**7.00**	6	2	3	2	1	4	**3.00**	9	6	3	7	6	3	4	**5.43**	7	4	0	3	2	4	**3.33**	8	2	**5.00**	**4.46**
Scarlet Robin	1	2	2	**1.67**	5	7	1	8	11	3	**5.83**	1	5	8	7	7	0	7	**5.00**	3	6	5	7	3	3	**4.50**	5	0	**2.50**	**4.46**
Spotted Pardalote	0	2	0	**0.67**	5	1	2	5	6	6	**4.17**	6	4	3	5	8	4	9	**5.57**	4	6	8	3	1	7	**4.83**	1	4	**2.50**	**4.17**
Eastern Rosella	6	8	3	**5.67**	2	2	1	1	1	1	**1.33**	3	2	1	1	6	14	1	**4.00**	0	1	1	1	3	4	**1.67**	6	21	**13.50**	**3.75**
Black-faced Cuckoo-shrike	3	5	6	**4.67**	0	2	1	3	3	4	**2.17**	4	6	1	3	10	1	8	**4.71**	6	4	3	4	2	2	**3.50**	3	5	**4.00**	**3.71**
White-throated Gerygone	0	1	1	**0.67**	1	5	1	2	0	0	**1.50**	9	7	10	7	10	3	8	**7.71**	4	5	0	0	0	0	**1.50**	6	4	**5.00**	**3.50**
Sulphur-crested Cockatoo	1	2	3	**2.00**	0	5	3	0	4	1	**2.17**	8	3	5	4	8	3	2	**4.71**	2	3	2	0	1	1	**1.50**	3	16	**9.50**	**3.33**
Galah	6	1	3	**3.33**	2	1	0	0	1	0	**0.67**	3	4	1	6	4	9	2	**4.14**	1	1	0	1	2	1	**1.00**	6	16	**11.00**	**2.96**
Yellow-rumped Thornbill	1	8	7	**5.33**	2	1	0	2	1	0	**1.00**	1	3	3	3	1	0	0	**1.57**	7	1	6	6	11	2	**5.50**	4	0	**2.00**	**2.92**
Noisy Miner	5	5	1	**3.67**	0	2	0	0	0	0	**0.33**	0	0	0	0	7	24	0	**4.43**	0	0	0	0	0	0	**0.00**	0	18	**9.00**	**2.58**
White-winged Chough	0	1	0	**0.33**	2	1	4	3	2	4	**2.67**	7	1	3	12	5	2	2	**4.57**	4	2	0	0	0	2	**1.33**	1	0	**0.50**	**2.42**
Brown Thornbill	0	1	0	**0.33**	4	1	1	2	1	6	**2.50**	2	3	3	2	1	0	2	**1.86**	6	1	5	1	1	4	**3.00**	2	0	**1.00**	**2.04**
Western Gerygone	2	3	3	**2.67**	0	8	1	0	0	0	**1.50**	2	6	5	4	3	1	3	**3.43**	2	0	0	0	3	0	**0.83**	0	0	**0.00**	**1.92**
Yellow-faced Honeyeater	0	0	0	**0.00**	1	3	0	2	1	1	**1.33**	5	6	1	3	0	0	0	**2.14**	4	2	4	2	4	5	**3.50**	1	0	**0.50**	**1.88**
Australian Raven	2	1	1	**1.33**	2	2	1	0	3	0	**1.33**	4	2	2	1	4	3	0	**2.29**	0	3	0	2	0	0	**0.83**	2	9	**5.50**	**1.83**
Magpie-lark	2	0	0	**0.67**	0	1	0	1	0	0	**0.33**	0	1	1	0	3	4	0	**1.29**	0	0	0	0	0	0	**0.00**	10	18	**14.00**	**1.71**
Leaden Flycatcher	0	2	1	**1.00**	1	4	0	0	0	1	**1.00**	6	4	3	3	0	0	5	**3.00**	2	1	0	0	0	3	**1.00**	2	1	**1.50**	**1.63**

Habitat	Grass				Ridge woodland							Open woodland								Mixed grsss/shrub							Dam			
Site number	**9**	**16**	**24**	**mean**	**5**	**7**	**8**	**10**	**12**	**19**	**mean**	**1**	**3**	**6**	**11**	**13**	**15**	**17**	**mean**	**4**	**18**	**20**	**21**	**22**	**23**	**mean**	**2**	**14**	**mean**	**mean**
Olive-backed Oriole	0	2	0	**0.67**	1	0	1	1	2	2	**1.17**	3	1	0	2	5	4	3	**2.57**	3	3	0	0	0	1	**1.17**	2	3	**2.50**	**1.63**
Superb Fairy-wren	0	0	0	**0.00**	0	0	0	0	0	2	**0.33**	2	2	0	0	0	0	1	**0.71**	0	2	5	5	6	3	**3.50**	10	0	**5.00**	**1.58**
Grey Shrike-thrush	0	0	1	**0.33**	1	1	0	1	4	0	**1.17**	3	3	0	4	5	1	3	**2.71**	2	1	1	1	0	2	**1.17**	3	1	**2.00**	**1.58**
Laughing Kookaburra	0	0	2	**0.67**	2	1	0	0	3	2	**1.33**	3	5	1	4	1	5	2	**3.00**	2	2	0	0	0	0	**0.67**	0	2	**1.00**	**1.54**
Willie Wagtail	2	1	0	**1.00**	0	0	0	0	1	0	**0.17**	2	0	0	0	1	5	0	**1.14**	0	0	0	0	0	0	**0.00**	5	18	**11.50**	**1.46**
Brown-headed Honeyeater	0	1	1	**0.67**	1	1	0	0	0	1	**0.50**	3	3	1	1	1	1	2	**1.71**	1	2	1	3	4	2	**2.17**	1	0	**0.50**	**1.29**
Grey Currawong	0	0	0	**0.00**	1	1	0	5	3	1	**1.83**	3	1	1	0	0	2	1	**1.14**	3	0	1	1	1	0	**1.00**	1	1	**1.00**	**1.13**
Red Wattlebird	1	3	2	**2.00**	2	0	0	3	0	1	**1.00**	0	2	0	0	0	3	1	**0.86**	1	0	1	0	1	0	**0.50**	3	2	**2.50**	**1.08**
Golden Whistler	0	0	0	**0.00**	1	1	1	1	1	2	**1.17**	0	0	0	2	3	0	2	**1.00**	0	2	4	0	0	3	**1.50**	1	1	**1.00**	**1.04**
Common Starling	2	0	2	**1.33**	0	0	0	0	0	0	**0.00**	2	0	0	1	0	1	0	**0.57**	0	0	0	0	1	0	**0.17**	3	13	**8.00**	**1.04**
Pallid Cuckoo	2	4	0	**2.00**	1	2	0	0	1	0	**0.67**	2	2	2	1	2	1	2	**1.71**	0	0	0	0	0	0	**0.00**	1	1	**1.00**	**1.00**
Yellow Thornbill	0	0	0	**0.00**	2	1	0	0	0	0	**0.50**	0	2	0	0	1	0	0	**0.43**	7	2	1	3	4	0	**2.83**	1	0	**0.50**	**1.00**
Mistletoebird	0	0	3	**1.00**	3	0	0	1	0	0	**0.67**	1	0	3	1	1	0	0	**0.86**	1	0	3	2	1	2	**1.50**	0	0	**0.00**	**0.92**
Speckled Warbler	0	1	0	**0.33**	0	1	0	2	0	0	**0.50**	0	0	1	1	0	0	0	**0.29**	1	0	1	3	5	2	**2.00**	3	0	**1.50**	**0.88**
Eastern Spinebill	0	0	1	**0.33**	1	0	0	1	0	1	**0.50**	0	1	0	0	0	0	1	**0.29**	0	0	6	4	1	4	**2.50**	0	0	**0.00**	**0.88**
Grey Butcherbird	0	0	0	**0.00**	0	0	0	0	0	0	**0.00**	0	0	0	0	9	5	1	**2.14**	0	1	0	0	0	0	**0.17**	0	5	**2.50**	**0.88**
Silvereye	0	2	0	**0.67**	0	0	1	0	0	1	**0.33**	2	0	0	1	1	1	0	**0.71**	0	0	3	2	2	1	**1.33**	1	0	**0.50**	**0.75**
White-winged Triller	0	0	0	**0.00**	0	0	0	0	0	1	**0.17**	4	0	0	0	3	1	2	**1.43**	0	0	0	0	0	0	**0.00**	2	4	**3.00**	**0.71**
Pied Currawong	1	0	0	**0.33**	1	1	1	0	0	1	**0.67**	0	0	0	3	0	0	1	**0.57**	1	0	0	0	4	3	**1.33**	0	0	**0.00**	**0.71**
Sacred Kingfisher	0	0	1	**0.33**	1	0	0	0	0	1	**0.33**	2	3	1	1	0	0	1	**1.14**	0	1	0	0	0	2	**0.50**	2	0	**1.00**	**0.67**
Shining Bronze-Cuckoo	0	0	1	**0.33**	1	1	0	0	0	0	**0.33**	1	1	2	1	1	1	2	**1.29**	0	0	0	0	0	0	**0.00**	1	0	**0.50**	**0.54**
Varied Sittella	0	1	0	**0.33**	0	0	1	3	0	0	**0.67**	0	1	2	1	0	0	1	**0.71**	0	1	0	0	0	1	**0.33**	0	0	**0.00**	**0.50**
Dusky Woodswallow	0	0	1	**0.33**	0	0	0	0	0	0	**0.00**	1	0	0	0	0	0	0	**0.14**	0	0	0	0	0	0	**0.00**	0	9	**4.50**	**0.46**
White-plumed Honeyeater	0	0	0	**0.00**	0	0	0	0	0	0	**0.00**	2	1	0	0	2	0	1	**0.86**	0	0	0	0	1	0	**0.17**	1	2	**1.50**	**0.42**
Welcome Swallow	1	3	0	**1.33**	0	0	0	0	0	0	**0.00**	0	0	0	0	0	0	0	**0.00**	0	0	0	1	0	0	**0.17**	1	4	**2.50**	**0.42**
Horsfield's Bronze-Cuckoo	0	0	0	**0.00**	1	1	0	1	0	0	**0.50**	0	1	0	0	1	2	0	**0.57**	0	0	0	0	0	0	**0.00**	1	1	**1.00**	**0.38**
Hooded Robin	0	0	0	**0.00**	0	0	0	0	0	0	**0.00**	1	0	0	1	0	0	0	**0.29**	0	0	0	4	2	1	**1.17**	0	0	**0.00**	**0.38**
White-naped Honeyeater	1	0	0	**0.33**	0	1	0	1	1	1	**0.67**	0	0	0	0	0	0	1	**0.14**	0	1	0	0	0	0	**0.17**	0	0	**0.00**	**0.29**
Restless Flycatcher	0	0	0	**0.00**	0	0	0	0	0	0	**0.00**	0	0	0	0	1	0	0	**0.14**	0	0	0	0	0	0	**0.00**	1	5	**3.00**	**0.29**

Habitat	Grass				Ridge woodland							Open woodland								Mixed grsss/shrub							Dam			
Site number	9	16	24	mean	5	7	8	10	12	19	mean	1	3	6	11	13	15	17	mean	4	18	20	21	22	23	mean	2	14	mean	mean
Red-rumped Parrot	0	0	0	**0.00**	0	0	0	0	0	0	**0.00**	0	0	0	0	0	0	0	**0.00**	0	0	0	0	0	0	**0.00**	0	6	**3.00**	**0.25**
Brush Cuckoo	0	0	0	**0.00**	0	0	0	1	0	1	**0.33**	0	0	0	2	0	0	0	**0.29**	2	0	0	0	0	0	**0.33**	0	0	**0.00**	**0.25**
Rufous Songlark	1	0	0	**0.33**	0	0	0	0	0	0	**0.00**	2	0	0	0	0	0	0	**0.29**	0	0	0	0	0	0	**0.00**	1	2	**1.50**	**0.25**
Common Bronzewing	0	0	0	**0.00**	0	0	0	1	0	0	**0.17**	0	0	0	0	1	0	0	**0.14**	0	1	0	0	0	0	**0.17**	1	1	**1.00**	**0.21**
Dollarbird	0	0	0	**0.00**	1	0	0	0	0	0	**0.17**	1	0	0	0	0	0	0	**0.14**	0	0	0	0	0	0	**0.00**	0	3	**1.50**	**0.21**
Brown Treecreeper	0	0	0	**0.00**	0	0	1	0	0	0	**0.17**	0	0	0	0	2	0	0	**0.29**	0	0	0	0	0	0	**0.00**	0	2	**1.00**	**0.21**
Crested Pigeon	1	0	0	**0.33**	0	0	0	0	0	0	**0.00**	0	0	0	0	0	3	0	**0.43**	0	0	0	0	0	0	**0.00**	0	0	**0.00**	**0.17**
Fan-tailed Cuckoo	0	0	0	**0.00**	0	0	0	0	0	0	**0.00**	0	1	1	0	0	0	0	**0.29**	0	2	0	0	0	0	**0.33**	0	0	**0.00**	**0.17**
White-eared Honeyeater	0	0	0	**0.00**	0	0	0	0	1	0	**0.17**	0	0	0	1	0	0	1	**0.29**	0	1	0	0	0	0	**0.17**	0	0	**0.00**	**0.17**
Brown Goshawk	0	0	0	**0.00**	1	1	0	0	0	0	**0.33**	0	0	0	1	0	0	0	**0.14**	0	0	0	0	0	0	**0.00**	0	0	**0.00**	**0.13**
Painted Button-quail	0	0	0	**0.00**	0	0	0	0	0	0	**0.00**	0	0	0	0	0	0	0	**0.00**	0	1	0	1	1	0	**0.50**	0	0	**0.00**	**0.13**
Little Friarbird	0	0	0	**0.00**	0	0	0	0	0	0	**0.00**	1	0	0	0	0	0	0	**0.14**	0	0	0	0	0	0	**0.00**	1	1	**1.00**	**0.13**
Eastern Yellow Robin	0	0	0	**0.00**	1	0	0	0	2	0	**0.50**	0	0	0	0	0	0	0	**0.00**	0	0	0	0	0	0	**0.00**	0	0	**0.00**	**0.13**
Crested Shrike-tit	0	0	0	**0.00**	0	0	0	0	0	0	**0.00**	1	0	0	0	0	0	1	**0.29**	0	0	0	1	0	0	**0.17**	0	0	**0.00**	**0.13**
Double-barred Finch	0	0	0	**0.00**	0	0	0	0	0	0	**0.00**	0	0	0	0	0	0	0	**0.00**	0	0	1	0	0	0	**0.17**	2	0	**1.00**	**0.13**
Whistling Kite	0	0	0	**0.00**	0	0	0	0	0	0	**0.00**	0	0	0	0	0	0	0	**0.00**	0	0	0	0	0	0	**0.00**	0	2	**1.00**	**0.08**
NankeenKestrel	0	0	0	**0.00**	0	0	0	0	0	0	**0.00**	1	0	0	0	0	1	0	**0.29**	0	0	0	0	0	0	**0.00**	0	0	**0.00**	**0.08**
Fuscous Honeyeater	0	0	0	**0.00**	0	0	0	0	0	0	**0.00**	0	0	0	0	0	0	0	**0.00**	0	0	1	0	0	1	**0.33**	0	0	**0.00**	**0.08**
Common Myna	0	0	0	**0.00**	0	0	0	0	0	0	**0.00**	0	0	0	0	0	0	0	**0.00**	0	0	0	0	0	0	**0.00**	0	2	**1.00**	**0.08**
Black-shouldered Kite	0	0	0	**0.00**	0	0	0	0	0	0	**0.00**	0	0	0	0	0	0	0	**0.00**	0	0	0	0	0	0	**0.00**	0	1	**0.50**	**0.04**
Collared Sparrowhawk	0	0	0	**0.00**	0	0	0	0	0	0	**0.00**	0	0	0	0	0	0	0	**0.00**	0	0	0	0	0	0	**0.00**	1	0	**0.50**	**0.04**
Wedge-tailed Eagle	0	0	0	**0.00**	0	0	0	0	0	0	**0.00**	0	0	0	0	0	0	0	**0.00**	1	0	0	0	0	0	**0.17**	0	0	**0.00**	**0.04**
Gang-gang Cockatoo	0	0	0	**0.00**	0	0	0	0	0	1	**0.17**	0	0	0	0	0	0	0	**0.00**	0	0	0	0	0	0	**0.00**	0	0	**0.00**	**0.04**
Superb Parrot	0	0	0	**0.00**	0	0	0	0	0	0	**0.00**	0	0	0	0	1	0	0	**0.14**	0	0	0	0	0	0	**0.00**	0	0	**0.00**	**0.04**
Jacky Winter	0	1	0	**0.33**	0	0	0	0	0	0	**0.00**	0	0	0	0	0	0	0	**0.00**	0	0	0	0	0	0	**0.00**	0	0	**0.00**	**0.04**
Red-capped Robin	0	0	0	**0.00**	0	0	0	0	0	0	**0.00**	0	0	0	0	0	0	0	**0.00**	0	0	0	0	1	0	**0.17**	0	0	**0.00**	**0.04**
Little Raven	0	0	0	**0.00**	0	0	0	0	0	0	**0.00**	0	0	0	0	0	1	0	**0.14**	0	0	0	0	0	0	**0.00**	0	0	**0.00**	**0.04**
Diamond Firetail	0	0	0	**0.00**	0	0	0	0	0	0	**0.00**	0	1	0	0	0	0	0	**0.14**	0	0	0	0	0	0	**0.00**	0	0	**0.00**	**0.04**
Tree Martin	0	0	0	**0.00**	0	0	0	0	0	0	**0.00**	0	0	0	0	0	0	0	**0.00**	0	0	0	0	0	0	**0.00**	0	1	**0.50**	**0.04**

Habitat	Grass				Ridge woodland							Open woodland									Mixed grsss/shrub						Dam		
Site number	9	16	24	mean	5	7	8	10	12	19	mean	1	3	6	11	13	15	17	mean	4	18	20	21	22	23	mean	2	14	mean
Stubble Quail	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0.00
Brown Quail	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0.00
Little Eagle	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0.00
Brown Falcon	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0.00
Australian Hobby	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0.00
Peaceful Dove	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0.00
Glossy Black-Cockatoo	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0.00
Little Corella	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0.00
Little Lorikeet	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0.00
Australian King-Parrot	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0.00
Southern Boobook	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0.00
Australian Owlet-nightjar	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0.00
Rainbow Bee-eater	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0.00
Southern Whiteface	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0.00
Flame Robin	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0.00
White-bellied Cuckoo-shrike	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0.00
White-browed Woodswallow	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0.00
Pied Butcherbird	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0.00
Richard's Pipit	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0.00
European Goldfinch	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0.00	0	0	0.00

BIRDS IN THE AUSTRALIAN HIGH COUNTRY

Steve Wilson
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It is many years since Betty Temple Watts (1979) told her part in the story of the publication of *Birds in the Australian High Country*. As several of its authors are no longer with us, it seems appropriate to provide my perspective on the events.

Dr Robert Carrick came from Scotland in 1953 and was a senior research scientist with the Wildlife Survey Section, CSIRO. One of the tasks which fell to him was to set up the Australian Bird Banding Scheme. It was Robert who suggested to Betty, who was then living in Melbourne, that she should do the illustrations for a book on ACT birds. She completed one plate, of ibises and spoonbills, before moving to Canberra in 1958 with her husband Hal, a geologist with the Bureau of Mineral Resources.

The Wilsons moved here in 1959 and it was not long before we were banding a lot of local birds in the Brindabella Range, the Australian National Botanic Gardens, at that time years from being open to the public, and at Lake Road, Lake George. It was not long before we met Betty who by this time was well advanced with the plates for the book. Robert Carrick and Warren Hitchcock, who was by now responsible for the day-to-day running of the Bird Banding Scheme, visited us at our Narrabundah home and asked me to write the text for the passerines. Robert called every Saturday to see what I had written and constantly asked me to provide more detail especially regarding our banding results. He did not provide a format to be followed for each species. If this text had been used it would have been a two-volume publication.

Much later when I finished the passerines, it emerged that Robert expected me to write the remainder of the text. I was not prepared to do this as there were many genera of birds with which I was inexperienced.

Betty Temple Watts was busy in 1965 and 1966 illustrating a book Dr Harry Frith was writing on waterfowl in Australia; and from 1968-1970 she prepared plates for his work on pigeons and doves. At the same time we and other recently arrived ornithologists were adding new species to the list of birds of the ACT which therefore had to be included in Betty's plates for the ACT book, and in the text. This situation carried on for years. Late in 1968 Harry asked Betty if there was anything he could do to get the book on ACT birds published. Betty didn't answer but on returning home rang me to see what she should say. Harry Frith was a forthright character and one not likely to make a comment like that without practical ideas. Betty and Hal came to our place and after talking to Nonie and me, it was decided that Betty and I should meet Harry and see what he had in mind.

This happened quickly and Harry said that he felt he could get CSIRO authority to regard the book as an official project and have the text written to a format by

his staff. Robert Carrick, who by this time had been seconded to the Mawson Institute of Antarctic Research in Adelaide, was quite happy with the proposed arrangement. He wrote the species account for the Australian Magpie which he had studied extensively.

Approval was quickly obtained and Harry allocated the task of writing to 12 CSIRO employees, including himself, to Ken Simpson and myself. His message was quite typical: Drop everything and write these species accounts. I want the book in the hands of the publishers in three months.' In the three months the text was written, edited by Harry and delivered to the publishers, A.H. and A.W. Reed. Harry gave it the title *Birds in the Australian High Country* to broaden its appeal.

The book was printed in Japan. One of the Reed directors was in Japan and saw the plates arranged for printing. This was done in multiples of eight which when folded make a continuous text. He realised that four of the explanatory pages for the illustrations would not come out opposite the appropriate plate and this was pointed out to the printers, Nevertheless, when the consignment arrived in Canberra, four of the plates in every book had the wrong facing (explanatory) pages. Delivery was refused and only 15 copies were kept - one for each author and one for Betty. So an entire reprint had to be made before the book went on sale in 1969. My copy of the wrongly printed book and of the issued book are both autographed by each of the authors and Betty. The whole process from Betty's starting the illustrations to publication had taken about 12 years, an amazing and very frustrating period.

Birds in the Australian High Country was later reprinted and a revised edition was published in 1976 with several species added, and with some additional text provided by Mark Clayton.

Reference

Temple Watts B (1979). Notes on the background of Birds in the Australian High Country. *Canberra Bird Notes* 4(8): 2-6.

Birds in the Australian High Country
Plate 16
Lorikeets and cockatoos
BTW 1958

THE SPRING MIGRATION OF HONEYEATERS INTO THE CANBERRA REGION: WHAT DO WE REALLY KNOW?

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Introduction

This will be a 'state of progress' report on the spring honeyeater migration into the Canberra region. More results are expected and, for certain, the more we find out, the more questions there will be to answer.

There are three parts to this summary:

- the discovery of the outward migration of honeyeaters from the ACT in 1950; subsequent surveys and thinking about return routes;
- knowledge and experimental results from elsewhere;
- the discovery of a concentrated inward migration in 2000.

The outward migration

We need to look briefly at what is known of the outward migration of honeyeaters from the Canberra region in order to set the return migration in context, since the return has received scant mention. All attention has been on the outward movement.

The autumnal migration was first reported just over 50 years ago. This migration along the Murrumbidgee River in early April was observed and recorded by Lamm and White (1950) and Lamm and Calaby (1950). Some flocks flew north, others went from west to east. Canberra at that time was a small town in two parts, on each side of the willow-fringed Molonglo river. There was no Scrivener Dam, no Lake Burley Griffin and no spread of suburbs towards the Murrumbidgee to impede the birds' preferred migration routes.

Over the next three decades, both city and interest in honeyeaters grew swiftly. Banding of species in the Brindabella Range and on the Murrumbidgee River started in the 1960s (Wilson 1998), and an ornithological society, later to become the Canberra Ornithologists Group (COG), was formed (Wilson 1999). Annual Bird Reports were issued, and by the early 1980s it was possible to mount both a general and a 'blitz' survey of honeyeater movement (Davey 1986).

In 1985, the general survey confirmed that outward migration was spread over not just days, but weeks — honeyeaters were moving through the area from 23 March to 11 May, and it was a diurnal migration. If conditions were favourable, some birds would start moving soon after 6:00 h, but the peak times were between 8:00 and 14:00 h, tailing off and stopping at around 18:00 h. Weather and the passage of fronts were clearly important factors, and there were some days when very little movement occurred.

The **'blitz' survey** was designed to get more in-depth data. Migrating honeyeaters were counted at 18 sites over five hours on the same day, 28

April 1985. Five sites were along the Murrumbidgee as far south as Point Hut (at that time clear of suburbs). The majority of the sites were in northern Canberra, already largely built up.

Results and numbers were intriguing. Among the river sites, Kambah Pool to the south had higher total numbers (4326) than Point Hut further south (3360). Tralee, away from the river, had more migrants than the two river sites put together. The Mt Ainslie ─ Mt Majura saddle to the north had 3247. There were two major species identified: Yellow-faced Honeyeaters *Lichenostomus chrysops* were in the majority, with White-naped Honeyeaters *Melithreptus lunatus* making up the remainder, in differing proportions at different sites.

The general direction of movement was from west to east, but with local variations. In north Canberra it was more north-easterly, and skirted the northern flank of Black Mountain. Further south, the birds were using the river corridor, but flying south and upstream before turning away from the Murrumbidgee, in a more easterly direction.

The **Murrumbidgee River Corridor Bird Survey,** started in mid-1985, was undertaken by COG on behalf of the National Capital Development Commission, and ran for a year. Birds were monitored monthly at 18 sites, four of them south of Point Hut, as far as Angle Crossing. One of the findings was that the corridor in the ACT was a major trunk route for the autumn migration of honeyeaters (Taylor 1987). Of the 130 species of avifauna found in the Corridor, the Yellow-faced Honeyeater had the highest abundance of any species, I 0.98/ha, compared with 7.46/ha for Superb Fairy-wrens *Malurus cyaneus,* 1.67/ha for Yellow-rumped Thornbill *Acanthiza chrysorrhoa,* 1.55/ha for Pacific Black Duck *Anas superciliosa,* 0.36/ha for White-naped Honeyeaters, 0.03/ha for Red Wattlebirds *Anthochaera carunculata* and <0.1/ha for many other species.

This survey brought out the ubiquity of migration along the river and the importance of the central and southern exit routes for migrating honeyeaters. It also noted for the first time the presence of spring migrating honeyeaters. Two small flocks of White-naped Honeyeaters were recorded migrating upstream at Gigerline and Angle Crossing in the far south.

Ten years later another Corridor survey was conducted by COG members, for Environment ACT. The **Murrumbidgee River Corridor Honeyeater Survey 1997** involved three 'blitz' days at weekly intervals in April (Taws 1999). Twelve sites were monitored from 8:00 to 13:00 h by teams of three people, At least one person in each team was experienced in counting methods and identifying species of honeyeaters by sight and call (a great learning experience for the rest of us! The speed of flight of the migrating flocks was impressive, and a challenge to count). Total honeyeaters migrating on the three days, varied from over 39000 (April 13) to 9088 (April 20), and to nearly 22000 (April 27). Small flocks of Red Wattlebirds featured in the second and third weeks.

The proportion of each of the three main species varied over the weeks. Yellow-faced Honeyeaters dominated at first, nearly 90%, dropping to 41% by the end of April. The White-naped Honeyeaters increased to 52% by the third week and the Red Wattlebirds to 7%. Variability over time is very much part of the migration scene, and underlines some of the difficulties of doing surveys using different methods and under differing weather conditions.

We learned quite a bit about migrating bird behaviour on this survey. 'On good .. days when large flocks were moving.. .the honeyeaters moved in "rolling" flocks, with some birds joining the flock as it passed and others dropping out to rest or feed or wait for the next flock. Towards the end of the morning when fewer birds were moving, direction was less defined, and some small flocks were even seen heading in the opposite direction'(Taws 1999).

Another important feature of the migration was the use made by the birds of tree-lines and shrubs when approaching or flying away from the river. Their choice of route seemed to be determined partly by topography and vegetation.

Outcomes and questions

The approximate timing of the autumn exodus is now known, and something of its numbers. It has been described as a post-breeding activity, but what triggers the start of migration we do not know. The species involved and the order in which they tend to migrate is known, at least for the present.

What we do not know for sure is where they all come from, and where they eventually go and by what routes. When do they return? We have been seeing some small flocks in Canberra this September. The generally accepted wisdom is that they filter back in small groups: 'Spring return less conspicuous' (Pizzey and Knight 1997), referring to the White-naped Honeyeater,

Knowledge and experimental results from elsewhere

Field guides since Frith (1969) refer to a marked migration of some honeyeaters in south-eastern Australia. Morcombe (2000) gives the status for the Yellow-faced Honeyeater as 'migratory: large flocks move N in autumn following Great Divide and coast ─ winter in northern NSW and SE ()Id, return to breed in southern forests in spring'.

There exists a huge literature on bird migration emanating mainly from the northern hemisphere, where certain species have been known for centuries to migrate southwards, some of them to the southern hemisphere. Northern scientists have been doing experiments on orientation in migratory birds, many of them nocturnal migrants, to see what helps them navigate and whether it is solely the geomagnetic field or some sort of endogenous map.

Some of these scientists have teamed with scientists at Armidale, NSW, to help investigate what is happening with our relatively short-distance diurnal migratory birds (Munro and Wiltschko 1992; Wiltschko et al. 2001). The 1992 experiment involved Yellow-faced

Honeyeaters captured in the Armidale area, and was the first attempt to analyse the orientation behaviour of a southern hemisphere migrant in captivity. It showed that the honeyeaters 'were able to derive their migratory direction in the absence of celestial clues' (e.g. setting sun, pattern of polarised light), and that like many holarctic species, might be able to orient using a magnetic compass.

In the following year, using Emlen funnels again and captive Yellow-faced Honeyeaters, the researchers made the most interesting discovery that 'during early migration (March to April) the birds preferred a north-easterly course, while in the latter stage of autumn migration (May to July) a mean north-westerly direction was recorded' (Munro, Wiltschko and Ford 1993). They inferred that this reflected the route that birds migrating along the Dividing Range would take towards Brisbane, where a change is necessary because the coastline veers north-west. This in turn would mean that landscape features had had an important influence on the 'mental' map or endogenous programming of these diurnal migrants,

The researchers next experimented on another migratory species, Silvereyes *Zosterops lateralis lateralis* from Tasmania (Munro et al. 1997). They used adult birds which had already made migrations, and another group, all young inexperienced silvereyes that had not yet done so (they were specially transported from Tasmania to Armidale).

It was accepted that a fundamental difference exists in the control of migration between juveniles on their first migration, and adults. Juvenile migrants heading towards the unknown rely exclusively on an innate program that provides the compass course of their migration (Berthold 1988). Geering (2002) has made the point that our diurnal migratory honeyeaters do not need to put on weight beforehand like long-distance migrants. Yellow-faced Honeyeaters are generalist foodeaters, and presumably have learned over hundreds/thousands of years that they are certain of finding food if they follow particular compass routes. Adult birds with migration experience have developed in addition a navigational map. Munro et al, (1997) by judicious use of pulse-remagnetization showed that magnetite particles in the experienced birds' heads were used as a component of the navigational map, not of the compass mechanism. The magnetic compass of the juveniles was not affected.

I mention this last finding as I wonder if the hesitant behaviour of some small groups of autumnal migratory birds might be explained by the fact that we have been looking at groups of juveniles who are doing a compass-only journey, without a map of local detail, and that they occasionally choose to retrace the route and to look at features or to look for or link up with a more experienced group. The back-tracking in the autumn occurs not only in the Murrumbidgee Corridor. I have seen it in other places, including the Shoalhaven Valley, 70 km to the southeast.

Then again could the agitated behaviour of some migrating honeyeaters at Moruya Heads reported by Perkins (2002) be a parallel to the behaviour in the 1993 Armidale experiment, reflecting

a change in routing for honeyeaters that have just arrived from inland? They are not likely to be birds migrating from further south, probably from Victoria, which some of us have seen in the Bega Valley (NSW) and along the southern NSW coast already holding a pretty steady course.

We need more time to sort this out, but for now **I** will turn to findings on the return flight of the honeyeaters.

The inward return of migrating honeyeaters in the year 2002 in the Upper Shoalhaven Valley

On 17 September 2000 **I** was literally stopped in my tracks by a most unexpected sight. We were cruising along back roads southwest of Braidwood gathering data for as-yet unsurveyed grid squares for the new Atlas of Australian Birds, when suddenly there was a mass of birds above tree-top height flying southwest away from us. My doughty driver (not a birdo) described it as 'clouds of fast-flying small birds'. They were 80% Yellow-faced Honeyeaters and 20% Red Wattlebirds in single-species flocks. I counted a total of 2000 in 20 minutes, and there were more ahead, and more behind. It reminded me instantly of the Murrumbidgee outward migrations, and thinking in terms of rivers, I stuck my neck out and suggested that they might have come back up the Shoalhaven River (Brookfield 2000). The migration was still going on three days later, at a reduced rate, and with groups of White-naped Honeyeaters adding to the numbers.

This news was received with caution, and it was suggested that maybe weather conditions had resulted in a bank-up of honeyeaters that would normally have returned in less conspicuous numbers. This could obviously only be proved or disproved by observing what happened in succeeding years. Meantime **I** thought I'd have a look in autumn to see if the birds used the same route. They did, quite massively (Brookfield 2001). Over 5000 went past, fast, in 45 minutes. This trans-Shoalhaven route would appear to be a familiar path that according to the above theories has been built into the honeyeaters' endogenous memory over hundreds and thousands of years.

This time I saw where they went. They did not turn down the Shoalhaven (never hypothesize without sufficient evidence!). They were on a southeasterly route, with some small groups occasionally back-tracking. It looked as though the main migration was heading for the Araluen and Deua Valleys, including some unsure juveniles. So maybe that was the route by which they would return next spring?

Spring 2001 was crucial to the project, but I was overseas. Elizabeth and Bill Compston stepped in with incredible vigour and quartered the area between 10 and 20 September, finding thousands of migrating birds in the original area at Warragandra on Jerrabattgulla Creek, and thousands more back at Neringla Creek, off the Araluen Valley. On 15 September David McDonald organised small groups from COG to monitor vital points, and again the main concentration was in the Warragandra area, with some movement at other places (Compston et al. 2001). One conclusion was that the

flocks baulked at flying over open areas, and another was that the general line of movement was east-west. It was not clear what happened further west once the stream got to the Tallaganda Forest area, or indeed whether the bulk of the birds reached the ACT. It did now seem probable that the phenomenon in the Shoalhaven valley was not a one-off event.

This year in spring 2002, on 22 September, there was a repeat of my spring 2000 experience on the Kain Road. I was stunned at the numbers of honeyeaters streaking past, and at the seeming determination of the flight (they would have all been birds experienced in at least one one-way migration, with no totally inexperienced juveniles, as they are not known to breed in Queensland). I counted 7500 plus honeyeaters in one hour, all Yellow-faced Honeyeaters except for about 30 Red Wattlebirds. And there were more behind me, and as we found later, more using the trees along the crest of the ridge. There could have been 10000 an hour altogether during the peak hours, and a total for the day could have been as high as 50000. The Compston team then reported thousands in the same area on the previous day,

It seems therefore that a chanelled return flight does exist, at least in parts, very similar to the outward migration from the Murrumbidgee, in fact almost a mirror image, but about 70 kms to the southeast. Whether they spread out on a broad front in between we do not know, nor whether they are the same populations that we see further west,

I took particular note this time of what they did at what I will call the staging point at Warragandra, This is where we have reported them congregating in the bare willows and poplars in previous years. They are confronted there by about one kilometre of open paddocks, over which raptors occasionally glide, before they can reach tree-lined gullies which lead up to the Tallaganda Forest. This year there was a Brown Goshawk *Accipiter fasciatus* around for a while, and a cessation of honeyeater movement during that time. Migration continued once it had gone, with the honeyeaters whirling around higher and higher, sometimes swooping back for reinforcements or perhaps reassurance, then when a sufficient mass was airborne, they climbed so high that they went out of sight; but were headed in a westerly direction. There had to be at least a group of 500 gathered before they made the final dash.

Another question arises. There are enormous numbers involved, so what might the overall population be? Certainly more than the numbers we see in our local region. So do the flocks seen in the Shoalhaven valley go on through to the western slopes and Victoria? Steve Wilson (1999) has already asked of the Yellow-faced Honeyeaters 'where do they originate (numbers in transit probably exceed the total population of the Brindabella Ranges) and where do they spend the winter?' We have yet to find out.

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ODD OBS

Do Australian King-Parrots breed within the Canberra Nature Park?

Records of the Australian King-Parrot in the ACT have increased considerably over the past few years. Records from the Garden Bird Survey indicate there has been a steady population increase with numbers having risen more than seven-fold from Year 1 (1981-82) to Year 18 (1998-99) (Veerman 2002).

Breeding records have also been on the increase. An examination of records presented in the Annual Bird Reports over the last ten years indicates that virtually all are of dependent young recorded from the Garden Bird Survey. The exceptions are of two records of birds inspecting hollows (16 October 1994, west of Curtin, GrJ14; 16 December 1998, The Pinnacle, GrIl3) and one record of a bird carrying food. This latter record should be regarded as an error as parrots carry food in the crop and so carried food is not visible.

Records of dependent young do not indicate that the birds have bred locally. Therefore, over the last ten years there have been two observations only to indicate the possibility that Australian King-Parrots breed within the Canberra Nature Park.

Having recently observed a female Australian King-Parrot entering a tree hollow within a section of the Black Mountain Reserve, I wonder whether there are any further indications of the possibility that the Australian King-Parrot has started to breed in the dry sclerophyll woodlands of the Canberra Nature Park.

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Recent breeding records of the Spotted Turtle-Dove in Queanbeyan

The Spotted Turtle-Dove *Streptopelia chinensis,* a native of Asia, is infrequently reported in COG's area of concern, but has established large, entrenched feral populations in a number of urban areas interstate. Wilson (1999, p. 35) summarised its status in the ACT in 1999 as '...seen from time to time, but there is no established population, all birds being regarded as having been released or escaped'. Veerman (2002, pp, 55-6) stated, with respect to data from COG's Garden Bird Survey 1981-1999, that '...most records are in recent years and include many where the species is regularly present.. .The species is clearly increasing, although it is still rare, with only occasional observations of more than one individual.'

In the absence of any confirmed breeding records, some commentators have concluded that all observations are of escaped or released birds; that no feral population has been established in this area; and as a result we need not be concerned about their potential impacts on native birds or on people's amenity.

Others have taken the opposite view, arguing from the same data that we should apply the precautionary principle and initiate control measures now, before a feral population becomes established locally. The precautionary principle states that, 'When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically' (quoted in Appell 2001, p. 18).

We report two breeding records of the Spotted Turtle-Dove within COG's area of concern. On 14 July 2002 one of the authors (BR) observed a newly-fledged Spotted Turtle-Dove feeding in a car park in the commercial district of Queanbeyan, NSW. It was very young, with down still protruding through the feathers. A search of the immediate vicinity did not reveal any other turtle-doves. On 9 October 2002, BR took DM and Geoffrey Dabb to the vicinity of a five metres high Roman Cypress tree at the top of Stornoway Road, Queanbeyan. He leaned a ladder against the tree and an adult Spotted Turtle-Dove flew out, landing about 10-15 m away on a power pole. We climbed the ladder and observed, inside the foliage at the point from which the bird had exited, a flat stick nest with its surface cemented together with excreta. The nest contained two oval, white eggs that matched the description of those of the Spotted Turtle-Dove (Higgins and Davies 1996, p. 861). The eggs were warm. A video of the nest was taken.

These breeding observations foreshadow the development of a feral population in Queanbeyan. They are empirical evidence supporting calls for the early initiation of a program to eradicate the Spotted Turtle-Dove from the Canberra-Queanbeyan area. In our view, this should be a joint activity of Environment ACT and the NSW National Parks and Wildlife Service, supported by COG and members of the public who can fill an invaluable role in monitoring the bird's abundance and distribution.

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Winter birds in the high country

The article by David McDonald (2002), 'Stubble Quail at 1 460 metres', has jogged my memory of birds that **I** have seen in the Tantangara/Bimberi area of the Kosciuszko National Park. I have been bushwalking in this area most winters since 1980 and although the birding is generally abysmal, there is the occasional unusual sighting.

I have seen two Stubble Quails *Coturnix pectoralis* in the Tantangara area. One

was on Blanket Plain in summer (25 February 1986) (35° 50' S 148 ° 42' E, and at 1,380 metres); the other was on Nungar Plain in winter (28 June 1989) (35 ° 53' S 148 ° 35' E and at 1,350 metres) on a very inclement day. Both were in tussock grass. The first was at the edge of the tree line wandering across the fire trail; the second was flushed out in the open.

On the same day that I saw the Stubble Quail on Nungar Plain I also saw a Richard's Pipit *Anthus novaeseelandiae* nearby. Both these birds are 'summer residents' in the high country according to Green and Osbourne (1994).

On 7 July 2002 **I** saw a flock of Yellow-faced Honeyeaters *Lichenostomus chrysops* at Peden's Hut (35° 46' S 148° 42' E at 1,220 metres). In over 20 years of observations this is the first time I have seen this species in winter anywhere in the mountains. They were in low scattered trees in a protected valley at the edge of the plain. There was a small restless flock of about 20 birds moving from tree to tree seemingly in 'migration mode' making the 'chip chip' contact call. The weather was rather unpleasant and there was some snow in the near vicinity. Green and Osbourne also state that this bird is a 'summer resident'.

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Overwintering honeyeaters

On Sunday 14 July 2002 **I** saw a large mixed flock of honeyeaters at nearly 1200 m, about halfway along the road from Michelago over the Tinderries, It was cold, with a few snow patches in hollows. There were several groups of about ten White-naped Honeyeaters *Melithreptus lunatus,* ten Yellow-tufted Floneyeaters *Lichenostomus melanops,* one Fuscous Floneyeater *Lichenostomus fuscus,* one Yellow-faced Floneyeater *Lichenostomus chrysops,* four White-eared Honeyeaters *Lichenostomus leucotis,* maybe 70 birds overall, and all in foliage seeking insects. They were flying from south to north, but taking their time. Tourists rather than migrants? The Queanbeyan River at the bottom of the hill had quite thick ice on it.

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Superb Lyrebird in an odd location

On 8 September 2002, at 11:45 h, on Sentry Box on southern Namadgi National Park, I heard a Superb Lyrebird *Menura novaehollandiae* in fine voice and in a very dry patch of snow gum/teatree at 1650 m asl. Both the altitude and vegetation struck me as unusual. Sentry Box has some puddles in the bare granite at this level and it may have been that the bird had come up for water. As we approached, it flew off and landed a little lower down, but certainly not in its typical habitat.

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Superb Parrot roadkill

For the past three years I have made weekly trips between Murrumbateman (just north of the ACT border) and Frogmore (26 km north of Boorowa), via the Lachlan Valley Way to Boorowa, then via Rugby Road to Frogmore. Between September and February it is common to see Superb Parrots *Polytelis swainsonii* on the wing along the entire route. Groups of between five and eight birds are common. In September/October they can often be seen foraging in groups of between two and ten birds beside the road. Some years they can be seen well into the new year, taking advantage of grain spilled from trucks during the grain harvest.

Between 20 and 28 September 2002 I had occasion to make the trip daily, sometimes twice daily. During these trips **I** was dismayed by the number of dead Superb Parrots **I** observed on the Lachlan Valley Way. Along with countless Crimson Rosellas *Platycercus elegans,* Eastern Rosellas *Platycercus eximius* and Galahs *Cacatua roseicapilla,* and a lesser number of Australian Magpies *Gymnorhina tibicen* and Sulphur-crested Cockatoos *Cacatua galerita,* I saw fresh dead Superb Parrots on six of the nine days I spent travelling. The worst sighting was five dead in one spot. On another day **I** saw two in one spot, and on each of the other four days I saw one — a total of 11 birds.

I assume the parrots are attracted by emerging seeding grasses on the roadside verge. Having observed the spots where they did most of their foraging, I was especially careful, but on a number of occasions was forced to brake hard to avoid a collision. Despite being so spectacular in flight, they are almost invisible when feeding by the roadside, until they explode into view in front of one's vehicle.

What I found interesting was that, in almost every case, by the following day no trace of the Superb Parrot bodies remained. The volume of traffic may have obliterated all trace, or maybe predators had carried them off overnight. Travellers collecting skins would not explain their disappearance because most were struck on narrow, winding, double-lined parts of the highway that prevented any pulling over for several kilometres either side.

Over the preceding three years I hadn't seen a single Superb Parrot road kill along this route. More frequent travel may have revealed otherwise, based on my observations between 20-28 September 2002. **I** am not sure what this tells us, if anything, about the actual numbers killed in road collisions, especially when their foraging can extend from spring through to the grain harvest.

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An influx of terns, Jerrabomberra Wetlands

Four species of terns are on the list of birds found in COG's area of concern, namely the Gull-billed Tern *Sterna nilotica,* Whiskered Tern *Chlidonias hybridas,* Caspian Tern *Sterna caspia,* and White-winged Black Tern *Chlidonias leucopterus.* All of these but

the Whiskered Tern are on COG's current list of unusual birds,

In spring 2002 an unusual influx of terns was observed at Kellys Swamp in Jerrabomberra Wetlands, Canberra and the adjacent Fyshwick Sewage Works. According to reports to the Canberra Birds email list http://www.topica.com/lists/canberrabirds, the first observation of this influx was made by Frank Antram who reported one Whiskered Tern flying up and down a pond at the sewage works on 10 September and one (the same bird?) at the same spot the following day. On 26 September Bob Rusk observed seven of this species at Kellys Swamp, and he mentioned that someone else had observed at least 40 Whiskered Terns there the previous evening, feeding on swarms of insects that were flying low over the water. I observed seven Whiskered Terns at Kelly's Swamp on 27 September, with others reporting them at Kelly's Swamp and/or the sewage works in numbers ranging from one to 20 in the period to 1 October. Furthermore, on 26 September Bob Rusk saw 28 of these birds hawking for insects on newly prepared soil in the nearby turf farm. (Some wag suggested that the collective noun for Whiskered Terns is 'a beard of terns'!)

Gull-billed Terns were also present, albeit briefly, with two reported by a number of observers (including the author) at Kellys Swamp on 27 September.

Whiskered Terns are rare in the ACT but are reported regularly — usually one or two records annually - from the Lake Bathurst/Lake George area, Their unofficial common name 'Marsh Tern' reminds us of their inland distribution. The Gull-billed Tern, on the other hand, is very rare in COG's area, with this report being the first in the ACT in over two decades. Only six Gull-billed Tern records are to be found covering the whole of COG's area of concern in the Annual Bird Reports dating back to 1984, all from Lake Bathurst, the most recent being from October 1991. Almost all our tern records are from the months September to December.

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BOOK REVIEW

Magpie alert: learning to live with a wild neighbour by Darryl Jones. UNSW Press 2002 paperback, 157 pp., colour photographs, other illustrations, $29.95. ISBN 0868406686.

This book discusses the Australian Magpie, why it sometimes attacks us and what we can do about it. I don't intend to summarise it as it is easily readable. The writing style is clear, even conversational, but repetitive in places, As any Australian person known to have an interest in birds may be asked about magpie attacks, this book will be useful at some time to all of us.

There are eight pages of colour photos (though one might question how necessary colour is in a book about magpies). There are also eight excellent evocative magpie sketches by Nick Cilento. The book provides results from a team of people who worked with the author in investigating the issue of magpie attacks. Most of the work was done in Brisbane and, strangely, the next most frequently mentioned location appears to be Canberra. Unfortunately the cumulative results of COG's Garden Bird Survey, which show how remarkably stable the population of this bird is in Canberra, were not available at the time of writing. The 1995 study by Chris Davey, published in *Canberra Bird Notes* 20: 25-31, is a notable omission from the references.

There are many interesting points raised and clearly explained for a non-technical audience. They include how magpies are well suited to suburban life, how they listen for their food, the importance of territory to their lifestyle, the insight that particular birds tend to specialise in the targets that they prefer to attack and the success rates of returns to their territory relative to the distance of removal of problem birds. The book is not just about the birds; it largely deals with the issues of handling human responses to the birds, with many examples described. The book takes till the end to inform us of the best way of avoiding attack from moderately aggressive individual birds.

There are two ideas that I would have liked to see mentioned but were not. They are the 'Macbeth phenomenon': the possibility that variation in extent of aggression by different male magpies may be due to variation between females in the level of incitement they provide to their partners. The other is whether magpies 'rescued' as fledglings mature to become the more (or indeed less) aggressive defenders as adults. These matters would be difficult to investigate. I would also have liked to see included a little more basic biology of the species and its close relatives. I feel that a description of its direct flight style, which is so important in its attack method, should also have been mentioned. Other aspects appeared to be well covered.

In my view, the book reveals too great a concern with individual magpie welfare, particularly in the matter of rescuing early-fledged juveniles, whose mortality is of little consequence. Also in discussing the removal of very aggressive birds, I suggest it is overly pushing the welfare issue to suggest that the cost of transporting the bird to a

sufficiently distant location to ensure it does not return is better cost/benefit (in terms of the limited finances and many calls on the funds of wildlife agencies) to the simple option of destroying the bird. A bird released in a new location is likely to have a tough life.

The book contains a few minor errors. Pages xi and xii are transposed. The photographer Eric Hosking is referred to as 'Eric Hastings'. The appendix, which to me hardly seems necessary, omits many species despite its claim to list 'names of all species mentioned in the text'; it also has some spelling errors. The text states that the magpie does not occur in the extreme tips of the Northern Territory but the map appears to show that it does. The text and more obviously the appendix do not use standard capitalisations of any of the birds' names. A simple addition to the labelling of chapters (either including the chapter number on the page margins or the chapter name in the 'notes' section), would make the hard task of finding footnotes much easier. The layout could easily be condensed, saving several pages.

Although the Australian Magpie is rarely very dangerous, the fear of magpie attack concerns many people. This book is a fine outcome from a team research project. I recommend the book as a good read, easy to get through, useful and interesting to any Australian birdo and suburban dweller.

Philip A. Veerman

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COLUMNISTS' CORNER

The views expressed by our columnists are personal views and do not necessarily represent the views of COG

Birding in cyberspace, Canberra-style

It's spring, the migrants have returned, and most birders are wondering what they will give - and hope to receive - as Christmas gifts. Enter e-commerce: the use of the internet for diverse business purposes, especially buying and selling. Perhaps your first stop will be The Birding Shop <http://www.thebirdingshop.com>

described (accurately) as 'Australia's premier birding-related retail outlet'. Droll over the optics (for which special prices are usually available); peruse the book titles; and even look at the stocking stuffers like toys and clothes. An extra bonus here is the section containing reviews of some of the items sold, including books and optics. Knowing that a proportion of your expenditure goes to Birds Australia should be an extra incentive to buy there.

Further away from home, but instantly accessible from your computer, are the delights of the American Birding Association; visit <http://www.americanbirding.org> and click on 'Birding Store'. While the many US-specific resources there will be of limited interest to most of us, the birding accessories are just great! They stock heaps of things that you did not previously know existed but now cannot live without, such as a binocular strap that keeps your neck cold! I have purchased from this site items not available in Australia, with great success.

One way of knowing that it is spring is to see the Rainbow Bee-eaters back here to breed; recall that they build a nest at the end of a tunnel that they excavate, typically in sandy slopes or banks such as those at the Tharwa sandwash. Someone asked, on the national birding email list Birding-Aus, how long a Bee-eater's breeding tunnel is. In reply, a subscriber quoted HANZAB:

> Length of tunnel: throughout range, 89.4 cm (23.4; 40-150; 43), with no difference between nests in vertical banks (87.33+18.2) and in flat ground (90.5+18.4).

(The 89.4 cm is the mean; 23.4 is the standard deviation, 40-150 the range and 43 the sample size.)

Andrew Taylor was not impressed. He commented:

> This is one of my pet peeves. The specification of bee-eater tunnel length [to 0.1 cm] is rather too precise. ..Mind you this is all pedantry as the range (40-150cm) is likely what [the enquirer] wanted to know.

He makes a good point. We see false precision so often: last weekend I saw about 20,000 mutton birds then I saw another; total 20,001!

The illegal trade in Australia's native birds continues to be of great concern. Trade in wildlife is regulated under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (C1TES); find details at <http://www.ea.gov.au/biodiversity/trade -use/index.html>. An idiot

himself 'Bird Hunter' and using the email address birdhunter70@hotmail.com, recently posted the following message (which I have quoted verbatim) on Birding-Aus:

> hi, ive been looking on the net for bird expoters and breeders, most from the U.s, which were extremely expensive would u be able to export any birds to other countries, specifically Crimson rosellas?
> if u do please e-mail me the prices, i have no problems getting the birds into my country legally.
>
> Thanx a lot.

Perhaps a hoax; perhaps real. In any case, the details have been provided to the authorities. Maybe 'Bird Hunter' has by now received a knock on the door from the wildlife protection authorities? I hope so.

Do Emus swim? Now there's a good question for your next bird trivia night! David Farrar posted this observation to Birding-Aus:

> I was camping at Murray-Kulkyne Regional Park/National Park in Victoria on the Murray River at a campsite known as the Boiler. It was 09:45 and I observed around 100 meters away an animal enter the river and it took me a few seconds to relate to my brain what this animal was? Thinking of Nessy and the Bunyip or the biggest Darter I have ever seen. I realised that the animal swimming very well from NSW into Victoria against a reasonable current was an Emu. I was amazed and after a few minutes the Emu made the bank on the Vic side and had a quick shake and went on its way, slowly moving through vegetation looking on the ground for food. I expect Emus swim all the time,.. Has anybody else seen this behaviour in the wild? It was great to see I must admit.

He received a number of confirmatory responses:

> I've seen Emus having a dip in the Coorong in South Australia. No problem for them on the way in but getting out, in a rather waterlogged state, was a bit harder (Judy Philip).

and

> On the drive [from Adelaide] to Mildura, we were astounded by the number of Emus seen between Renmark and Mildura. There were several hundred, maybe more than 500, seen in groups of 50 or more spread along most of the open farmlands on the North side of the Sturt highway. The interesting thing is that this is just a few kilometres south of the Murray River and all of these birds must have swum the river to get down to this area. I read a posting recently about Emus swimming, but this must have been akin to those wildlife scenes we see of the vast herds of Wilderbeest fording the Zambesi (or whatever)!! (Bob Cook).

Bob later reported:

> Further to my last posting, I was discussing the Emu numbers with a Mildura local who related that he knows a pastoralist in that area (between Renmark and Mildura) who says that he currently has around 2500 sheep on his property and around 5000 Emus! His understanding is that the Emus can only swim the Murray River when it is quite low (as at present) but when the flow is swifter, if they try to swim across they are pushed back to the Northern side. I presume they mostly swim back when times are better further North.

So ... Nessie may actually be an expatriate Emu after all!

Let's end with word meanings. Someone asked the Birding-Aus list for the meaning of 'pardalote' - where does the word come from? Helen Horton replied, 'I believe it comes from the Greek, *pardalitos*, meaning spotted like a leopard'. Canberra birder Philip Veerman enlarged on her response, saying 'Yes, as in LEO PARD which is spotted lion. The scientific name of Spotted Pardalote *Pardalotus punctatus* meaning: spotted (in Greek) spotted (in Latin). I guess the namer was impressed by the spots.' I like the word `pardalote'; sounds nicer than 'spotted'.

Remember this column's motto: while birding in cyberspace holds many delights, birding in the field is better for body and soul. Good spring birding to all!

T alba

Details on how to subscribe to *Birding-Aus*, the Australian birding email discussion list, are on the web at http://www.shc.melb.catholic.edu.au/home/birding/index.html. A comprehensive searchable archive of the messages that have been posted to the list is maintained by Andrew Taylor at http://www.cse.unsw.edu.au/birding-aus. To join the *Canberra Birding* email discussion list, send a blank email message to canberrabirds-subscribe@topica.com, or join online at http://www.topica.com/lists/canberrabirds. At this site can also be found a searchable archive of messages posted to the canberrabirds list.

EDITORS' NOTE

In the previous issue of *Canberra Bird Notes*, 27 (2) June 2002, on page 65, we inadvertently aged David Bourne's degree by ten years. The actual date of awarding of his Bachelor of Applied Science degree was 2001. In the context of David's paper, 'Birds of the Upper Molonglo Floodplain, NSW', we also alert readers to the fact that the status of species provided in Steve Wilson's 1999 volume, *Birds of the ACT two centuries of change*, applies specifically to the ACT and should not be considered equally valid for COG's broader area of concern.

RARITIES PANEL NEWS

The drought has been instrumental in bringing to Canberra a number of species more generally seen well to the inland. One of the highlights has been the **Red-backed Kingfisher,** first discovered by Mat Gilfedder and by now seen and photographed by a large number of COG members and other birdos. The bird was seen in the vicinity of the horse paddocks at the end of Addison Road. According to Rarities Panel records, the most recent previous sighting of this species was on 5 October 1989, at Acacia Inlet. Identification tips for this species are, of course, the deep rusty back, but also the greyish streaking on the crown and the complete white collar. It might be worthwhile checking all kingfishers carefully over the coming months.

Another drought specialty is the **Turquoise Parrot,** seen in Campbell Park and Mt Ainslie, Previous confirmed sightings were in the spring of another drought year, 1994, also in Campbell Park and Mt Ainslie, as well as at Mulligans Flat. Distinctive features of this parrot are its small size, smaller for example than the familiar Red-rumped Parrot, its blue wing coverts, blue facial markings, green tail and rump. Its call is a soft, bell-like 'fink'.

Kellys Swamp and the sewage works continue to turn up unusual species. Amongst the recent influx of Whiskered Terns, a varying number of **Gull-billed Terns** has been reported anecdotally; the first confirmed record is included in this list. They were last seen in the ACT at Jerrabomberra in October 1979, though a more recent (October 1991) sighting of the species at Lake Bathurst was endorsed. The Gull-bills are a much larger, stockier bird than the Whiskered, and in breeding plumage are charaterised by a complete black cap and a black bill.

The most curious record in this list is surely that of the **Lewin's Rail,** a species rarely recorded at all, let alone in winter. Identification tips for this species are the chunkier build than the crakes, the longer bill, the red-brown colour of the head, neck and nape, grey back and frequently dangling legs. The wet tussocky habitat of Rendezvous Creek is characteristic.

At its most recent meeting, the Rarities Panel decided to remove the **Common Koel** from the list of 'unusual' species and not to require reporting of it or the **Spotted Turtle-Dove** to the Panel for endorsement. In the case of the koel, a sufficient number of reports has been presented every year over the last five years to convince the Panel that it is now a regular summer visitor, albeit probably in small numbers. The introduced Spotted Turtle-Dove has clearly established itself and is breeding in the Queanbeyan region and is seen regularly if sporadically throughout much of eastern Canberra. Hence it can be tracked in future via regular COG datasheet or incidental record reports. It is important that we continue to monitor these two species, and in particular the spread of the turtle-dove, so members are encouraged to continue to report all sightings, but not to the Rarities Panel.

ENDORSED LIST NO. 56, OCTOBER 2002

Magpie Goose *Anseranas semipalmata*
5; 15 Jun 87; Malcolm Fyfe; Rowes Lagoon (GrU4)
Freckled Duck *Stictonetta naevosa*
1; 17 Aug 02; David McDonald; Kellys Swamp (GrL14)
Pied Cormorant *Phalacrocorax varius*
3; 7 Jul 02; Harvey Perkins; Lake Tuggeranong (GrJ16)
2; 14 Jul 02; John Layton; Lake Ginninderra (GrJ12)
Spotted Harrier *Circus assimilis*
1; 1 Sep 02; Jack Holland; Monkman St, Chapman (Grl 15)
1; 30 Sep 02; David McDonald; Fyshwick Sewage Works (GrL14)
Grey Goshawk *Accipiter novaehollandiae*
1 (white morph); 14 Jul 02; Philip Veerman; CSIRO offices, Black Mountain (Gr K13)

1 (white morph); 14 Jul 02; Malcolm Fyfe; Australian National Botanic Gardens (ANBG)(GrK13)

Lewin's Rail *Rallus pectoralis*
1; 11 Aug 02; David McDonald; Rendezvous Creek, Namadgi (GrG23) **Gull-billed Tern** *Sterna nilotica*

2; 27 Sep 02; David McDonald; Kellys Swamp (GrL14)

Diamond Dove *Geopelia cuneata* - probable escapee
1; 14 Jul 02; John Layton; Lake Ginninderra (GrJ12)
spotted Turtle-Dove *Streptopelia chinensis*
4; 28 Jul 01; Julie McGuiness; Piddington St, Watson (GrL12)

1; 09 Oct 02; David McDonald; Stornoway Rd, Queanbeyan (Gr N15)
Major Mitchell's Cockatoo *Cacatua leadbeateri* - escapee

1; 13 Oct 02; Deborah Fuller; Threlfall St, Chifley (GrJ15)
Budgerigar *Melopsittacus undulatus* - probable escapee
1; 22 Jun 02; Bruce Lindenmayer; Molonglo corridor (GrJ14)
T**urquoise Parrot** *Neophema pulchella*

1; 13 Oct 02; Peter Miller; Mt Ainslie (GrL13)
1; 13 Oct 02; Marnix Zwankhuizen; Campbell Park (GrM13)
Common Koel *Eudynamys scolopacea*
1; 1-3 Dec 01; Brendan Wilson; Kambah (GrI16)
1; 14 Dec 01; Brendan Wilson; Mt Taylor (GrJ16)
1; 3 Dec 01-1 Jan 02; Harvey Perkins; Kambah (GrJ16)
Red-backed Kingfisher *Todiramphus pyrrhopygia*
1; 12 Oct 02; Mat Gilfedder; Addison Road (Gr M14)
1; 12 Oct 02; David McDonald; Addison Road (GrM14)
Little Wattlebird *Anthochaera chrysoptera*
1; 04 Aug 02; Philip Veerman; ANBG (GrK13)
1; 24 Sep 02; Mat Gilfedder; also David McDonald; ANBG (GrK13)
White-bellied Cuckoo-shrike *Coracina papuensis*

1 (light morph); 29 Jun 02; Harvey Perkins; Summerland Cct, Kambah (GrJ 1 6)

The COG office is located at Room 5, Griffin Centre, Bunda Street, Civic. If you wish to visit, please call 6247 4996 to arrange a suitable time.

Canberra Bird Notes is published by the Canberra Ornithologists Group Inc and is edited by Harvey Perkins and Barbara Allan, Major articles of up to 5000 words are welcome on matters of the distribution, identification or behaviour of birds occurring in the Australian Capital Territory and surrounding area. Contributions on these topics should be sent to Harvey Perkins, 42 Summerland Circuit, Kambah ACT 2902, or via email to harvey.perkins@anu.edu.au. Short notes, book reviews and other contributions should be sent to Barbara Allan, 47 Hannaford Street, Page ACT 2614 or via email to allanbm@ozemail.com.au. If you would like to discuss your proposed article in advance, please feel free to contact Harvey on 6231 8209 or Barbara on 6254 6520.

Canberra Bird Notes 27 (3) September 2002