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Birds of Black Mountain, 1964–2016

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Abstract. Bird observation records in the Canberra Ornithologists Group Database were used to compile a list of all species recorded in Black Mountain Nature Reserve and species present during the periods 1980–2005 and 2006–2016. A total of 124 species has been observed in the area since 1964 and are typical of the land birds in the wider region. One hundred and seventeen species were recorded from 1980 to 2005 and 75 species from 2006 to the end of 2016. The 30 most frequently observed species were similar in both time periods, although the frequency rank of some species changed, with the rank of four species dropping by >5 places and that of at least five species increasing by >5 places. Twenty-nine species have not been recorded in the area since 2006 and include two vulnerable species (Hooded Robin and Brown Tree-creeper). Records of breeding activity in the periods 1982–2006 and 2007–2016 indicated the Australian Raven and Gang-gang Cockatoo had substantially increased breeding activity in the latter period, while that of the Australian Magpie and Magpie-lark had reduced. While increased human use of the area and management activities such as control burns could explain some of the above changes, the causes of most changes are not known and probably reflect human-induced effects in the wider Canberra area. A quarterly bird survey program in the reserve would help track shifts in the area's avifauna and possibly identify causes of them.

1. Introduction

This paper outlines the occurrence of birds in Black Mountain Nature Reserve since 1964, the frequency of sightings and numbers of each species observed from 1980 to the end of 2016, and breeding activity from 1982 to 2016.

The reserve can be described as an island bounded by Barry Drive on the north, Caswell Drive and the Gungahlin Drive Extension on the west, open pasture on the south-west, and the Australian National Botanic Gardens (ANBG) and Lake Burley Griffin on the south and east. The vegetation is mostly dry sclerophyll forest, with more open woodland on the western side (Marchant 1973; Doherty 2018). A major powerline easement running through the north side of the reserve provides an area with dense shrubland cleared of trees (Bell 1980). There is little mistletoe growth (mainly *Amyema* species) except in pockets on the south-eastern and western sides. The reserve has an unusually high incidence of Cherry Ballart (*Exocarpos cupressiformis*) which is used by seed-eaters (rosellas) and seed-spreaders/fruit-eaters (currawongs, orioles) (Dabb 2017). However, apart from a few species (e.g. Crimson Rosella, White-throated Treecreeper, Pied Currawong and Buff-rumped Thornbill) the environment is poor (in terms of food sources and protective habitat) for most bird species and very poor for others (Dabb 2017).

2. Methods

Most of the data on the distribution, abundance and breeding of bird species has been collected by citizen scientists using a variety of survey methods, and who submit the data to various agencies including Canberra Ornithologists Group (COG), BirdLife Australia, eBird, Canberra Nature Map and Atlas of Living Australia. Each year data from these sources have been incorporated into the COG Database for analysis and the preparation of the COG Annual Bird Reports (e.g. Fennell 2017). The reports have been issued annually since the Group's inception in 1964 (Fennell 2014) and are available at <http://canberrabirds.org.au/publications/canberra-bird-notes/>. In the early years, the report was compiled mainly from anecdotal evidence (rather than systematic surveys) but, beginning in 1982, the collection, compilation, analysis and reporting of bird sightings has become more sophisticated. With the advent of personal computing the Annual Bird Report now provides a range of simple statistics that describe the distribution and relative abundance of each species over the years

of the surveys. The COG Database also holds information related to any breeding activity observed during the surveys.

Although COG has records going back to 1964, systematic records only occur from 1982 onwards, with the bulk of records coming from the period starting with the ACT Bird Atlas (Taylor and Canberra Ornithologists Group 1992) in the late 1980s to the present.

The COG Database contains many records from surveys that include Black Mountain Nature Reserve. Because the reserve is an ‘island’ bounded by a wide variety of habitats, many of these surveys include sightings from the bordering areas, thus contaminating sightings in the reserve itself with species seen in these other habitats but not necessarily within the boundaries of the reserve. These species include many waterbirds (in dams adjacent to the reserve and on Lake Burley Griffin) and species attracted to the exotic plantings in ANBG (such as the Crescent Honeyeater and Bassian Thrush). These extraneous sightings have been excluded, and although making the data set for the analysis less extensive they ensure a better focus on the reserve.

In addition to data from the COG Database, other sources have been used in compiling this paper. They include further information from the COG Annual Bird Reports and systematic surveys reported in the COG journal *Canberra Bird Notes*. The latter include sightings in the Black Mountain area available from the Annual Bird Reports compiled by the ACT Branch of the Royal Australian Ornithological Union for the years 1964 to 1968 (Wilson 1965, 1966, 1967), and a report of surveys carried out in the Black Mountain area in the period 1964–68 (Marchant 1973).

The data were analysed to determine all species recorded in Black Mountain Nature Reserve since 1964. Species recorded in the period 1980–2005 and those recorded in the period 2006–2016 were also determined to allow a broad assessment of change in species presence and observation frequency over time. Similar analyses were carried out for species recorded as breeding in the periods 1982–2006 and 2007–2016.

3. Results

3.1 Presence of Species

Species observed during surveys solely in Black Mountain Nature Reserve are listed in appendices 1, 2 and 3 for the time periods 1980–2016, 1980–2005 and 2006–2016 inclusive. The lists include all sightings for all years in the time period shown, and include the number of records for each species, the total number of individuals observed and the date on which the species was last observed. The scientific name of all species are provided in Appendix 6.

A total of 123 species has been recorded in the reserve from 1980 to 2016 (Appendix 1). In addition, searching through earlier COG Annual Bird Reports back to 1964 and surveys reported in the *Canberra Bird Notes* reveals the Hooded Robin has also been recorded there. One hundred and seventeen species were recorded in the 26-year period 1980–2005 (Appendix 2) and 75 species in the 11-year period 2006–2016 (Appendix 3).

The rank of the 30 most frequently observed species in terms of their frequency of sighting (number of records) in 1980–2005 and 2006–2016 are provided in tables 1 and 2 (respectively) to give an indication of how well each species has fared in the area over the period when records have been kept.

Table 1. Rank order of 30 most frequently observed species, 1980–2005 (from Appendix 2)

Rank	Order ^a	Species	No. of records	No. of individuals observed	Date last seen
1	436	Crimson Rosella	201	2005	10-Dec-03
2	511	White-throated Treecreeper	155	281	10-Dec-03
3	737	Australian Raven	150	286	10-Dec-03
4	723	Pied Currawong	149	570	10-Dec-03
5	527	Superb Fairy-wren	140	805	10-Dec-03

Rank	Order^a	Species	No. of records	No. of individuals observed	Date last seen
6	419	Sulphur-crested Cockatoo	137	1672	10-Dec-03
7	597	Striated Pardalote	137	606	10-Dec-03
8	594	Spotted Pardalote	129	374	10-Dec-03
9	722	Australian Magpie	120	403	10-Dec-03
10	437	Eastern Rosella	119	519	10-Dec-03
11	415	Galah	104	495	10-Dec-03
12	730	Grey Fantail	104	184	10-Dec-03
13	633	Red Wattlebird	103	278	10-Nov-03
14	584	Buff-rumped Thornbill	84	407	10-Dec-03
15	493	Laughing Kookaburra	80	96	10-Dec-03
16	688	Black-faced Cuckoo-shrike	79	122	10-Dec-03
17	589	Brown Thornbill	76	150	10-Dec-03
18	757	White-winged Chough	76	409	10-Dec-03
19	556	White-browed Scrubwren	73	177	10-Nov-03
20	430	Australian King-Parrot	69	189	10-Dec-03
21	753	Magpie-lark	69	234	10-Nov-03
22	767	Scarlet Robin	64	99	16-Jul-00
23	707	Grey Shrike-thrush	60	69	10-Nov-03
24	413	Gang-gang Cockatoo	57	184	10-Dec-03
25	799	Silvereye	57	214	10-Nov-03
26	824	Common Starling	57	558	10-Dec-03
27	608	Yellow-faced Honeyeater	53	494	10-Dec-03
28	666	Noisy Friarbird	53	90	10-Dec-03
29	699	Golden Whistler	53	76	22-Apr-98
30	725	Grey Currawong	52	59	10-Nov-03

^a In tables 1–4, Order refers to the Systematic Taxonomic order for listing bird species adopted by BirdLife Australia (formerly the Royal Australian Ornithological Union) and other international ornithological authorities.

Table 2. Rank order of 30 most frequently observed species, 2006–2016 (from Appendix 3)

Rank	Order^a	Species	No. of records	No. of individuals observed	Date last seen
1	436	Crimson Rosella	148	1932	02-Oct-15
2	511	White-throated Treecreeper	126	370	25-Oct-15
3	723	Pied Currawong	123	543	25-Oct-15
4	527	Superb Fairy-wren	119	701	15-Nov-15
5	737	Australian Raven	114	345	25-Oct-15
6	597	Striated Pardalote	111	750	02-Oct-15
7	419	Sulphur-crested Cockatoo	99	449	24-Oct-15
8	594	Spotted Pardalote	94	323	15-Nov-15
9	722	Australian Magpie	88	252	19-Apr-16

Rank	Order ^a	Species	No. of records	No. of individuals observed	Date last seen
10	633	Red Wattlebird	79	243	19-Apr-16
11	584	Buff-rumped Thornbill	78	494	19-Apr-16
12	415	Galah	65	276	06-Sep-15
13	666	Noisy Friarbird	57	125	25-Oct-15
14	437	Eastern Rosella	56	1150	24-Oct-15
15	413	Gang-gang Cockatoo	54	120	24-Oct-15
16	688	Black-faced Cuckoo-shrike	54	105	24-Oct-15
17	430	Australian King-Parrot	51	165	12-Sep-16
18	589	Brown Thornbill	50	124	19-Apr-16
19	757	White-winged Chough	50	363	26-Apr-16
20	730	Grey Fantail	49	115	15-Nov-15
21	493	Laughing Kookaburra	40	65	25-Oct-15
22	580	Striated Thornbill	39	190	15-Nov-15
23	556	White-browed Scrubwren	37	100	26-Apr-16
24	568	Weebill	37	133	12-Mar-16
25	711	Olive-backed Oriole	31	49	25-Oct-15
26	699	Golden Whistler	30	55	05-Sep-14
27	707	Grey Shrike-thrush	27	35	05-Oct-15
28	753	Magpie-lark	27	59	19-Apr-16
29	799	Silvereye	27	169	11-Jan-16
30	498	Sacred Kingfisher	26	52	30-Jan-16

^a See footnote to Table 1.

3.2 Breeding records

Species observed to show breeding activity in the reserve in the periods 1982–2006 and 2007–2016 are listed in appendices 4 and 5 (respectively). Breeding activity was recorded for 52 species in 1982–2006 and for 37 species in 2007–2016. Of these, 22 species had more than three breeding records in 1982–2006 (Table 3) compared with 12 species in 2007–2016 (Table 4).

Table 3. Species with >3 breeding records observed, 1982–2006 (from Appendix 4)

Rank	Order ^a	Species	No. of records	No. of individuals	
				observed	breeding
1	722	Australian Magpie	211	581	41
2	436	Crimson Rosella	305	2639	34
3	753	Magpie-lark	141	335	26
4	723	Pied Currawong	238	776	24
5	437	Eastern Rosella	195	677	16
6	633	Red Wattlebird	185	429	15
7	597	Striated Pardalote	205	819	12
8	757	White-winged Chough	131	530	12
9	415	Galah	186	688	11

Rank	Order ^a	Species	No. of records	No. of individuals	
				observed	breeding
10	733	Willie Wagtail	95	136	9
11	419	Sulphur-crested Cockatoo	219	1853	8
12	688	Black-faced Cuckoo-shrike	138	188	8
13	88	Tawny Frogmouth	11	14	7
14	666	Noisy Friarbird	101	173	7
15	725	Grey Currawong	86	93	7
16	824	Common Starling	118	696	7
17	430	Australian King-Parrot	120	290	6
18	527	Superb Fairy-wren	228	1047	5
19	511	White-throated Treecreeper	229	392	4
20	582	Yellow-rumped Thornbill	99	199	4
21	744	Leaden Flycatcher	52	65	4
22	806	Welcome Swallow	91	156	4

^a See footnote to Table 1.

Table 4. Species with >3 breeding records observed, 2007–2016 (from Appendix 5)

Rank	Order ^a	Species	No. of records	No. of individuals	
				observed	breeding
1	436	Crimson Rosella	186	1849	16
2	633	Red Wattlebird	121	534	10
3	737	Australian Raven	133	408	10
4	723	Pied Currawong	147	594	8
5	757	White-winged Chough	73	548	8
6	413	Gang-gang Cockatoo	71	170	7
7	419	Sulphur-crested Cockatoo	119	548	7
8	437	Eastern Rosella	58	1112	6
9	584	Buff-rumped Thornbill	63	404	6
10	722	Australian Magpie	123	374	5
11	753	Magpie-lark	56	128	5
12	556	White-browed Scrubwren	81	296	4

^a See footnote to Table 1.

4. Discussion

4.1 Species recorded 1980–2016 (inclusive)

Of the 123 species recorded in Black Mountain Nature Reserve the most common are locally resident woodland birds. They can often be found moving in, around and through the dry sclerophyll forest and nearly all are species which have adapted to environments affected by human activity. The reserve's avifauna is similar to that in the surrounding Canberra area and can be understood partly as a complementary habitat for the city's urban areas: the latter provides abundant food over much of the year while the former provides roosting sites and breeding hollows. This complementarity could be a contributing factor to the many Crimson Rosellas recorded in the reserve, but may also have a downside, represented by the very large number of Pied Currawongs

supported by the urban areas that can be seen hunting for small birds and nestlings throughout the reserve (Boekel 2017).

A small number of seasonal migrants are included in the list and are among the most frequently observed species, viz Noisy Friarbird, Black-faced Cuckoo-shrike, Grey Fantail, Olive-backed Oriole, Golden Whistler, Silvereve and Sacred Kingfisher. The reserve is also part of one of the routes for Canberra's great honeyeater migrations (Boekel 2017).



Fig. 1. Olive-backed Oriole. Photo: J Robinson.

4.2 Changes in species rank from 1980–2005 to 2006–2016

The rank of the most frequently observed species in tables 1 and 2 are similar, indicating that over the period of the surveys the general composition and relative abundance of the area's bird population has remained relatively stable. The top nine species are the same in each table, although with a few minor variations in their order. A few species however have changed their rank significantly. Species which have dropped more than five places in rank since 2006 include the Scarlet Robin (down 12 places), Grey Fantail (eight places), Magpie Lark (seven places) and Laughing Kookaburra (six places). The Scarlet Robin is an altitudinal migrant and the Grey Fantail a summer migrant, although both species can be found throughout the year.

It is not easy to attribute any causation to these variations. The Laughing Kookaburra reports have been in gentle decline in the Canberra Ornithologist Area of Interest since 2000 (Fennell 2017, p. 51), which matches to a certain extent the decline on Black Mountain. Similarly, reporting of Grey Fantail in the wider area has declined significantly since 2000 (Fennell 2017, p. 76). In contrast, Magpie Lark reporting has been steadily increasing in the wider area over the same period (Fennell 2017, p. 79), while Scarlet Robin reporting there has remained steady, albeit declining slightly (Fennell 2017, p. 80).

Species that have increased in rank by more than five places since 2006 include the Sacred Kingfisher (up 26 places), Olive-backed Oriole (23 places), Noisy Friarbird (20 places), Weebill (14 places) and Gang-gang Cockatoo (nine places). The Kingfisher, Oriole and Friarbird are summer migrants that are seldom seen during winter. The Sacred Kingfisher sightings were mainly in the period 2007–2013, and there has been a significant decline in sightings on Black Mountain since 2014. The reporting of this species in the wider area was similar for the period 2007–2012, and has since steadied. Thus, the prevalence of the Sacred Kingfisher on Black Mountain matches, to a certain extent, the frequency of sightings in the wider area. In contrast, the increase in sightings for the Olive-backed Oriole, Noisy Friarbird, Weebill and Gang-gang Cockatoo are not matched by any increase in sightings in the wider COG Area of Interest.

Six introduced species have been reported from the reserve since 2006: Rock Dove and Common Myna (six records each), Common Starling and House Sparrow (three records each) and Common Blackbird (2 records). The low number of sightings for these species compared with the period 1982–2006 indicates that they are not increasing in abundance, and may well be decreasing. They are generally urban/suburban birds which may transit between the urban and forest environments.

4.3 Species not observed since 2006

Twenty-nine species recorded in Black Mountain Nature Reserve in 1980–2005 have not been observed since 2006 (Table 5), and comprise 23% of the total recorded in the reserve. The disappearance of those such as Brown Treecreeper, Rufous Fantail and Western Gerygone is of concern, and mirrors the decline of two of the species in the wider region. Many of the species listed, particularly those only sighted once or twice prior to 2006, would probably be vagrants in the Black Mountain area, although some are also declining in the territory. Nevertheless, the lack of observation of these species in the reserve over the last decade suggests there is something of concern relating to habitat degradation in areas surrounding the reserve (for example, the construction of the Gungahlin Drive Extension) as well as in the reserve itself.

Table 5. Species not observed, 2006–2016

Species	No. pre-2006 sightings	Comment
European Goldfinch	11	An introduced species, generally found in grassy areas with weedy seeds. Would be in transit through the margins of any wooded area.
Rufous Fantail	10	An uncommon summer migrant to the wetter gullies in the Brindabellas. Often reported moving through adjacent suburbs (Aranda) in spring.
Crescent Honeyeater	9	An uncommon breeding resident in the area, generally observed during the winter, often in ANU and ANBG.
Tawny Frogmouth	7	More a woodland than a forest species that is observed in most nature reserves around Canberra, and is being reported increasingly. There is no apparent reason for the reduction in its sightings on Black Mountain.
Western Gerygone	5	Reports have been in slow decline over the past 10 years, but the species is still observed in lower woodlands such as Mulligans Flat. Occasionally observed in similar habitat on Mt Ainslie.
Pallid Cuckoo	4	Reporting of this summer migrant in the COG Area of Interest has all but collapsed over the last seven years. Apart from Mulligans Flat, now seldom seen in nature reserves around Canberra.
Fuscous Honeyeater	4	Reporting has declined in recent years, but still found in open woodland including Mt Ainslie, Mt Majura and The Pinnacle nature reserves.
White-bellied Cuckoo-shrike	4	Only occasionally observed in this region.
Peregrine Falcon	2	Common resident in the ACT, but not a forest bird.
Brown Treecreeper	2	In serious decline in the ACT (see section 4.4.2 below)
Little Wattlebird	2	Occasional visitor from the east, not a forest bird.
Crested Shrike-tit	2	Species in general decline since 1990. Few observations in Canberra nature parks except for Lake Ginninderra Peninsula.

Species	No. pre-2006 sightings	Comment
White-browed Woodswallow	2	An occasional visitor to the region from the north and west.
Red-capped Robin	2	The ACT is on the eastern margin of its range, so most sightings are at Mulligans Flat and the western suburbs.
Bassian Thrush	2	Dry sclerophyll forest is not its preferred habitat; species mostly observed in wet forests in the Brindabellas. Also observed in the rain-forest gully in ANBG, from where it may spill over into the adjacent reserve.
Australian Pipit	2	A bird of open grassy spaces.
Stubble Quail	1	A bird of open grassy spaces.
Nankeen Kestrel	1	A bird of open woodlands.
Glossy Black-Cockatoo	1	Found where casuarina food sources are available; uncommon in the ACT.
Rainbow Lorikeet	1	Increasing reporting throughout Canberra suburbs but not a bird of dry sclerophyll forest.
Channel-billed Cuckoo	1	Uncommon visitor.
Barn Owl	1	Local population fluctuates according to the availability of food (generally mice).
Superb Lyrebird	1	A stray from the Brindabellas?
Brown Gerygone	1	An uncommon visitor from the coastal forests.
Spotted Quail-thrush	1	In serious decline (see section 4.4.3 below).
Olive Whistler	1	A bird of the ranges; occasionally seen in ANBG and surrounds.
Masked Woodswallow	1	An occasional visitor to the region from the north and west.
Restless Flycatcher	1	A bird of open grassy woodland; in serious decline throughout the region.
Black-faced Monarch	1	The ACT is on the western edge of its range; species seldom seen here.

4.4 Vulnerable species

The Annual Bird Reports of the ACT Branch of the Royal Australasian Ornithological Union (RAOU) for the years 1964–65, 1965–66 and 1966–67 (Wilson 1965, 1966, 1967) report sightings in the Black Mountain area of three vulnerable species that no longer occur there, or where the number of sightings has been significantly reduced.

4.4.1 Hooded Robin

The Hooded Robin has been in sharp decline in the ACT in recent years (Fennell 2017, p. 81) and probably locally extinct on Black Mountain as far back as 1980. The species' preferred habitat is on the margins of wooded areas, opening on to grasslands. The RAOU reports indicate that the species was a breeding resident in the area:

- 1964–65: *Breeding began early September 1964 in open forest round Black Mt. At least one nest was attended by two males and one female* (Wilson 1965)
- 1965–66: *Second or replacement clutches started at end of November on Black Mt. No records of first clutches* (Wilson 1966)
- 1966–67: *Black Mountain resident, 3-4 breeding pairs* (Wilson 1967)

- 1967–68: *Black Mountain - 3/4 pairs regular, breeding* (Wilson 1967)
- 1964–68: *Resident. Up to four territories held each year, of varied size and position, always rather large and usually extending into dry sclerophyll, at the edge of which birds were inclined to nest* (Marchant 1973).

The development of the Belconnen Town Centre and construction of Barry Drive and Caswell Drive would have been the major driving force in the decline of the Hooded Robin in this area. The increase of human activity in Black Mountain reserve, including bird-watching, may well have been another significant contributor.

4.4.2 *Brown Tree Creeper*

The last record for the Brown Treecreeper in Black Mountain Nature Reserve was 17 Oct. 1993, and only two sightings were included in the COG Database for the period 1980–2006. Earlier reports include:

- 1965–66: *Brown Treecreeper recorded west of Black Mountain* (Wilson 1966)
- 1966–67: *Locally resident in some numbers, e.g. Black Mountain, Rifle Range* (Wilson 1967)
- 1967–68: *Black Mountain - Regular, breeding, up to 12 birds* (Wilson 1967)
- 1964–68: *Colony of about a dozen birds resident. Undoubtedly bred each year, but nests not around or inaccessible* (Marchant 1973).

The Brown Treecreeper, like the Hooded Robin, is disappearing from many of its old haunts, including Black Mountain reserve, with probably the same causation as for the Hooded Robin.



Fig. 2. a) left, Female Hooded Robin and b) right, Brown Treecreeper. Photos: J Robinson.

4.4.3 *Painted Button-quail*

Following the January 2003 Canberra bushfire, there has been a significant increase in control burns in Black Mountain Nature Reserve that has dramatically reduced the amount of decaying wood and the litter layer. Areas where it used to be possible to see hundreds of Painted Button-quail now do not have sufficient remaining litter to see any platelets¹ (Boekel 2017). There have been only two sightings of this species since January 2006, the most recent on 18 Oct. 2009. In the 1960s they were reported regularly:

- 1964–65: *Regularly seen and heard on Black Mt. in last quarter of 1964* (Wilson 1965)
- 1966–67: *Black Mountain. Fairly regular in small numbers* (Wilson 1967)
- 1967–68: *Black Mountain - Regular in March, few later. Two nests, Nov-Dec.* (Wilson 1967)
- 1964–68: *Regular, maximum seen in one day, seven. Two nests found in November 1967* (Marchant 1973).

¹ Small circular cleared areas formed by the birds in the litter.

The Painted Button-quail reporting rate has fluctuated considerably over the years in the COG Area of Interest, and currently is at nearly an all-time low (Fennell 2017, p. 40). The species has retreated from Black Mountain, but may still be found in Mt Ainslie Nature Reserve and Mulligans Flat Nature Reserve (Fennell 2017, p. 40).

4.5 Breeding activity

The list of birds observed breeding in Black Mountain reserve in the period 1982–2006 (Table 3) is what might be expected for the area, although some species would be more likely to be observed nesting in more open woodland. There are, however, significant differences between this list and that for the period 2007–2016 (Table 4), with 21 species (Table 6) having no record of breeding in the area after 2006.

A comparison of the pre-2007 and post-2006 breeding reports shows there has been a large increase in breeding activity for the Australian Raven and Gang-gang Cockatoo. Over these periods the Australian Raven rank has moved from 24th most frequently observed (pre-2007) to 3rd (post-2006). There is no apparent explanation for this, nor for the Gang-gang, where breeding had not been reported prior to 2007. The Gang-gang appears to be on the increase in suburban Canberra, particularly in areas to the east of Black Mountain, including ANBG.

There have also been some large reductions in rank, for example the common species Australian Magpie (down from first place pre-2007 to 10th place post-2006) and the Magpie-lark (down from 3rd to 11th). Since these birds are territorial and prosper in suburban areas, it is of some interest that records of their breeding activity has decreased in the Black Mountain area. The reserve is suffering from some tree dieback, especially Red Stringybark (*Eucalyptus macrorhyncha*) on the southern flank and mature Blakely's Red Gum (*E. blakelyi*) on the northern side. The latter, which are among the largest mature trees in the reserve, were formerly breeding sites for the Australian Hobby and Little Eagle (Boekel 2017).

The 21 species with no record of breeding in the reserve after 2006 (Table 6) are predominantly those that only breed in the area sporadically or are not expected to frequent and breed in forest vegetation. The main species of concern is the Willie Wagtail, although there is no obvious explanation for the lack of observed breeding activity.

Table 6. Species with no breeding recorded, 2007–2016

Rank	Order	Species	No. of individuals breeding 1982–2006	Comment
10	733	Willie Wagtail	9	Last sighted on 28 Oct. 2012. Of concern that this species has not been observed breeding in the Black Mountain area over the last ten years.
16	824	Common Starling	7	May well be part of the general decline of this species in the wider area over the past few years.
19	511	White-throated Treecreeper	4	There have been few breeding records of this species despite its prevalence in the reserve. Still observed quite frequently in the area, so not clear why breeding reports have dropped, although there were never many for the period 1982–2006.
20	582	Yellow-rumped Thornbill	4	Not expected to frequent or breed in forest areas.
21	744	Leaden Flycatcher	4	Some breeding noted for this species in woodland west of Black Mountain, and on Black Mountain in the late 1960s.
22	806	Welcome Swallow	4	Not expected to frequent or breed in forest areas.

Rank	Order	Species	No. of individuals breeding 1982–2006	Comment
28	445	Red-rumped Parrot	2	A bird of suburban parks and open woodland, not expected to be sighted often in forest areas.
33	623	White-plumed Honeyeater	2	Only two breeding records over the period 1982–2016, so not surprising that breeding was not observed in the latter part of the period.
36	767	Scarlet Robin	2	As above.
38	818	Common Blackbird	2	Introduced species: no comment.
39	852	House Sparrow	2	Introduced species: no comment.
41	253	Little Eagle	1	No reports of this species breeding in the reserve area in the period 1964–68, so subsequent breeding there is not to be expected.
42	468	Horsfield's Bronze-Cuckoo	1	
43	481	Southern Boobook	1	
45	522	Satin Bowerbird	1	
46	598	Eastern Spinebill	1	Only one breeding activity sighted over the period 1982–2016, so not surprising that breeding was not observed in the latter part of the period.
48	653	Crescent Honeyeater	1	
49	702	Rufous Whistler	1	
50	716	Dusky Woodswallow	1	
51	776	Eastern Yellow Robin	1	
52	827	Common Myna	1	Introduced species: no comment.

4.6 General discussion

The opening of the suburb of Aranda in 1967 began the encirclement of Black Mountain Nature Reserve with roadways that would tend to inhibit the movement of bird species in and out of the area and reduce the size of the woodland/forest remnant. The increasing suburbanisation probably increased cat predation pressure in the area (Boekel 2017). The reserve is also under increasing pressure from human usage, most of which is well channelled by management tracks/trails, although some mountain bikers make their own trails (Boekel 2017). This would have a varying effect on species: some that are sensitive to disturbance, such as the Hooded Robin, would quickly disappear, while other species, such as the Australian Magpie and Crimson Rosella which are quite tolerant of human activity, continue to prosper in this environment. It is of interest that the White-throated Treecreeper continues to survive in small patches of forest close to human habitation, as it is not a bird of the suburbs or urban parks and gardens. The control burn program in the reserve since 2003 appears to have adversely affected the Painted Button-quail, and has probably had similar effects on other ground-feeding

species including the White-winged Chough and Buff-rumped Thornbill. Over time it is highly likely that the burns will reduce food resources in an already-poor nutrient environment.

It appears that environmentally sensitive species such as the Hooded Robin and Brown Treecreeper have not been able to adapt to the changing conditions caused by human modification of the local environment in the creation of a national capital. Environmental degradation in other parts of Australia may have had some impact on migrant species, which seems to be the case for the cuckoos, especially the Pallid Cuckoo (which is no longer recorded in the reserve).

The changes in breeding patterns of resident species in the reserve is somewhat of a puzzle. Some of the changes could be attributed to the degree of effort put into the bird surveys, as in recent years those recommended by Birds Australia have been of short duration and over a limited area. In the past, particularly in respect of the ACT Atlas, surveys were much longer and covered a wider area, so the likelihood of discovering more birds and more breeding activity was higher than in later years.

For the future, it would be reasonable to conduct quarterly surveys of the reserve, in spring, early summer, autumn and winter to monitor more regularly the presence and abundance of the birds. This would be like the approach taken with Yellow Box grassy woodland surveys conducted by COG on several sites throughout the ACT (Bounds et al. 2010). Personnel from Friends of Black Mountain could conduct the surveys, submitting the observations through eBird so that the data are stored and can be made available to other interested parties. As more information becomes available in this way, it may become possible to gain some understanding about the shifts in the area's bird population and the changes in breeding patterns.

5. Conclusion

The suite of birds that now occupy Black Mountain Nature Reserve is comprised of the most common birds of the region (excluding water birds and waders). It would appear likely that these species will continue to exist there into the foreseeable future, with those most frequently observed in the last decade remaining steady. However the extent to which the avian status quo prevails will depend on the degree of further encroachment or modification of the Black Mountain environment, both within the reserve and its surrounds, including changes caused by control burns. A quarterly bird survey program in the reserve would help track shifts in the area's avifauna and possibly help identify activities having a negative affect on the conditions for birds there.

6. Acknowledgements

Many thanks to Con Boekel and Geoffrey Dabb for their contribution to the development of this paper.

7. References

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List of species in COG database from Black Mountain Nature Reserve, 1980–2016 (inclusive)

Rank is based on the number of records.

Order refers to the Systematic Taxonomic order for listing bird species adopted by BirdLife Australia (formerly the Royal Australian Ornithological Union) and other international ornithological authorities.

Rank	Order	Species	No. of records	No. of individuals observed	Date last seen
1	436	Crimson Rosella	349	3937	02-Oct-15
2	511	White-throated Treecreeper	281	651	25-Oct-15
3	723	Pied Currawong	272	1113	25-Oct-15
4	737	Australian Raven	264	631	25-Oct-15
5	527	Superb Fairy-wren	259	1506	15-Nov-15
6	597	Striated Pardalote	248	1356	02-Oct-15
7	419	Sulphur-crested Cockatoo	236	2121	24-Oct-15
8	594	Spotted Pardalote	223	697	15-Nov-15
9	722	Australian Magpie	208	655	19-Apr-16
10	633	Red Wattlebird	182	521	19-Apr-16
11	437	Eastern Rosella	175	1669	24-Oct-15
12	415	Galah	169	771	06-Sep-15
13	584	Buff-rumped Thornbill	162	901	19-Apr-16
14	730	Grey Fantail	153	299	15-Nov-15
15	688	Black-faced Cuckoo-shrike	133	227	24-Oct-15
16	589	Brown Thornbill	126	274	19-Apr-16
17	757	White-winged Chough	126	772	26-Apr-16
18	430	Australian King-Parrot	120	354	12-Sep-16
19	493	Laughing Kookaburra	120	161	25-Oct-15
20	413	Gang-gang Cockatoo	111	304	24-Oct-15
21	556	White-browed Scrubwren	110	277	26-Apr-16
22	666	Noisy Friarbird	110	215	25-Oct-15
23	753	Magpie-lark	96	293	19-Apr-16
24	707	Grey Shrike-thrush	87	104	05-Oct-15
25	799	Silvereye	84	383	11-Jan-16
26	699	Golden Whistler	83	131	05-Sep-14
27	767	Scarlet Robin	83	135	26-Jul-16
28	580	Striated Thornbill	79	325	15-Nov-15
29	725	Grey Currawong	78	94	05-Oct-15
30	608	Yellow-faced Honeyeater	73	684	19-Apr-16
31	568	Weebill	70	208	12-Mar-16
32	824	Common Starling	60	584	10-Dec-03
33	598	Eastern Spinebill	58	96	09-May-15
34	711	Olive-backed Oriole	57	79	25-Oct-15
35	582	Yellow-rumped Thornbill	55	161	22-Oct-12
36	567	Speckled Warbler	51	95	10-Nov-03
37	702	Rufous Whistler	49	88	16-Oct-15
38	733	Willie Wagtail	46	100	10-Dec-03
39	744	Leaden Flycatcher	46	69	22-Dec-14
40	498	Sacred Kingfisher	42	70	30-Jan-16
41	806	Welcome Swallow	42	118	26-Jun-15
42	818	Common Blackbird	39	59	10-Nov-03

Rank	Order	Species	No. of records	No. of individuals observed	Date last seen
43	54	Rock Dove	38	205	09-Dec-04
44	63	Common Bronzewing	38	45	01-Jul-15
45	839	Red-browed Finch	37	143	05-Feb-12
46	445	Red-rumped Parrot	35	114	28-Jan-12
47	474	Fan-tailed Cuckoo	33	32	12-Feb-16
48	654	New Holland Honeyeater	33	91	19-Apr-16
49	686	Varied Sittella	33	107	18-Sep-14
50	661	White-naped Honeyeater	31	123	20-Jun-99
51	852	House Sparrow	29	159	10-Dec-03
52	623	White-plumed Honeyeater	28	68	16-Jul-00
53	410	Yellow-tailed Black-Cockatoo	23	122	28-Jun-15
54	776	Eastern Yellow Robin	23	44	10-Dec-03
55	66	Crested Pigeon	20	47	21-Dec-14
56	789	Australian Reed-Warbler	20	49	05-Dec-99
57	403	Silver Gull	19	105	13-Apr-89
58	614	White-eared Honeyeater	19	21	19-Apr-16
59	827	Common Myna	19	66	10-Dec-03
60	626	Noisy Miner	18	74	10-Nov-03
61	244	Brown Goshawk	17	21	18-Oct-09
62	470	Shining Bronze-Cuckoo	17	15	22-Oct-12
63	716	Dusky Woodswallow	17	86	12-May-11
64	502	Dollarbird	14	17	13-Nov-15
65	256	Australian Hobby	12	12	10-May-16
66	364	Painted Button-quail	12	15	18-Oct-09
67	863	European Goldfinch	11	16	13-Jan-91
68	468	Horsfield's Bronze-Cuckoo	10	9	11-Sep-99
69	481	Southern Boobook	10	11	10-Dec-03
70	581	Yellow Thornbill	10	19	24-Oct-15
71	659	Brown-headed Honeyeater	10	21	10-Jul-07
72	727	Rufous Fantail	10	8	01-Mar-90
73	770	Rose Robin	10	11	26-Jun-15
74	829	Mistletoebird	10	11	16-Oct-15
75	252	Wedge-tailed Eagle	9	14	11-Mar-16
76	578	White-throated Gerygone	9	11	10-Nov-03
77	653	Crescent Honeyeater	9	9	09-Dec-04
78	253	Little Eagle	8	7	04-Apr-13
79	88	Tawny Frogmouth	7	8	01-Mar-00
80	245	Collared Sparrowhawk	7	7	12-Sep-13
81	692	White-winged Triller	6	6	10-Dec-03
82	96	Australian Owlet-nightjar	5	5	19-Apr-16
83	240	White-bellied Sea-Eagle	5	6	03-May-09
84	573	Western Gerygone	5	5	01-Jan-90
85	719	Grey Butcherbird	5	5	29-Nov-12
86	832	Double-barred Finch	5	9	16-Jul-00
87	475	Brush Cuckoo	4	3	12-Nov-14
88	477	Pallid Cuckoo	4	2	10-Nov-03
89	522	Satin Bowerbird	4	4	12-Feb-16
90	621	Fuscous Honeyeater	4	12	11-Sep-99
91	689	White-bellied Cuckoo-shrike	4	4	17-Jul-98
92	739	Little Raven	4	203	15-Nov-15

Rank	Order	Species	No. of records	No. of individuals observed	Date last seen
93	793	Rufous Songlark	3	3	12-Apr-08
94	12	Brown Quail	2	3	15-May-06
95	259	Peregrine Falcon	2	2	02-Jul-93
96	418	Little Corella	2	2	17-Jan-13
97	465	Eastern Koel	2	1	22-Dec-14
98	514	Brown Treecreeper	2	3	17-Oct-93
99	613	Little Wattlebird	2		10-Dec-03
100	695	Crested Shrike-tit	2	1	13-Apr-89
101	714	White-browed Woodswallow	2	2	06-Jun-87
102	745	Satin Flycatcher	2	1	10-Nov-03
103	768	Red-capped Robin	2	2	04-Dec-94
104	816	Bassian Thrush	2	3	25-Aug-98
105	854	Australian Pipit	2	2	23-Dec-92
106	11	Stubble Quail	1	1	01-Apr-87
107	103	Fork-tailed Swift	1	11	11-Mar-16
108	254	Nankeen Kestrel	1		10-Dec-03
109	409	Glossy Black-Cockatoo	1	1	09-Mar-03
110	421	Rainbow Lorikeet	1		10-Dec-03
111	432	Superb Parrot	1	2	28-Nov-13
112	467	Channel-billed Cuckoo	1	1	20-Dec-00
113	487	Barn Owl	1	1	18-Nov-00
114	508	Superb Lyrebird	1	1	09-Feb-03
115	552	Pilotbird	1	2	22-May-14
116	569	Brown Gerygone	1		10-Nov-03
117	657	Black-chinned Honeyeater	1	1	23-May-07
118	678	Spotted Quail-thrush	1	1	23-Mar-91
119	696	Olive Whistler	1	2	09-Feb-03
120	713	Masked Woodswallow	1	1	21-Oct-86
121	747	Restless Flycatcher	1	1	01-Sep-86
122	749	Black-faced Monarch	1	1	07-Nov-98
123	769	Flame Robin	1	1	31-Aug-14

Appendix 2

List of species in COG database from Black Mountain Nature Reserve, 1980–2005 (inclusive)

Rank is based on the number of records.

Order refers to the Systematic Taxonomic order for listing bird species adopted by BirdLife Australia (formerly the Royal Australian Ornithological Union) and other international ornithological authorities.

Rank	Order	Species	No. of records	No. of individuals observed	Date last seen
1	436	Crimson Rosella	201	2005	10-Dec-03
2	511	White-throated Treecreeper	155	281	10-Dec-03
3	737	Australian Raven	150	286	10-Dec-03
4	723	Pied Currawong	149	570	10-Dec-03
5	527	Superb Fairy-wren	140	805	10-Dec-03
6	419	Sulphur-crested Cockatoo	137	1672	10-Dec-03
7	597	Striated Pardalote	137	606	10-Dec-03
8	594	Spotted Pardalote	129	374	10-Dec-03
9	722	Australian Magpie	120	403	10-Dec-03
10	437	Eastern Rosella	119	519	10-Dec-03
11	415	Galah	104	495	10-Dec-03
12	730	Grey Fantail	104	184	10-Dec-03
13	633	Red Wattlebird	103	278	10-Nov-03
14	584	Buff-rumped Thornbill	84	407	10-Dec-03
15	493	Laughing Kookaburra	80	96	10-Dec-03
16	688	Black-faced Cuckoo-shrike	79	122	10-Dec-03
17	589	Brown Thornbill	76	150	10-Dec-03
18	757	White-winged Chough	76	409	10-Dec-03
19	556	White-browed Scrubwren	73	177	10-Nov-03
20	430	Australian King-Parrot	69	189	10-Dec-03
21	753	Magpie-lark	69	234	10-Nov-03
22	767	Scarlet Robin	64	99	16-Jul-00
23	707	Grey Shrike-thrush	60	69	10-Nov-03
24	413	Gang-gang Cockatoo	57	184	10-Dec-03
25	799	Silvereeye	57	214	10-Nov-03
26	824	Common Starling	57	558	10-Dec-03
27	608	Yellow-faced Honeyeater	53	494	10-Dec-03
28	666	Noisy Friarbird	53	90	10-Dec-03
29	699	Golden Whistler	53	76	22-Apr-98
30	725	Grey Currawong	52	59	10-Nov-03
31	598	Eastern Spinebill	43	76	10-Dec-03
32	582	Yellow-rumped Thornbill	42	123	16-Feb-03
33	733	Willie Wagtail	41	77	10-Dec-03
34	580	Striated Thornbill	40	135	10-Nov-03
35	806	Welcome Swallow	38	99	10-Dec-03
36	818	Common Blackbird	37	56	10-Nov-03
37	567	Speckled Warbler	35	58	10-Nov-03
38	568	Weebill	33	75	10-Dec-03
39	702	Rufous Whistler	33	43	10-Dec-03
40	54	Rock Dove	32	187	09-Dec-04
41	445	Red-rumped Parrot	32	101	13-Apr-89
42	839	Red-browed Finch	30	116	16-Jul-00

Rank	Order	Species	No. of records	No. of individuals observed	Date last seen
43	474	Fan-tailed Cuckoo	28	27	11-Sep-99
44	744	Leaden Flycatcher	28	42	30-Oct-97
45	623	White-plumed Honeyeater	27	66	16-Jul-00
46	654	New Holland Honeyeater	27	76	09-Dec-04
47	686	Varied Sittella	26	85	30-Oct-97
48	711	Olive-backed Oriole	26	30	10-Dec-03
49	852	House Sparrow	26	151	10-Dec-03
50	661	White-naped Honeyeater	22	94	20-Jun-99
51	63	Common Bronzewing	20	24	10-Dec-03
52	789	Australian Reed-Warbler	20	49	05-Dec-99
53	403	Silver Gull	19	105	13-Apr-89
54	776	Eastern Yellow Robin	19	39	10-Dec-03
55	470	Shining Bronze-Cuckoo	16	14	10-Dec-03
56	498	Sacred Kingfisher	16	18	10-Dec-03
57	716	Dusky Woodswallow	15	70	13-Apr-89
58	410	Yellow-tailed Black-Cockatoo	13	65	10-Dec-03
59	827	Common Myna	13	39	10-Dec-03
60	66	Crested Pigeon	11	18	10-Dec-03
61	244	Brown Goshawk	11	12	09-Feb-03
62	614	White-eared Honeyeater	11	12	01-Jan-94
63	863	European Goldfinch	11	16	13-Jan-91
64	364	Painted Button-quail	10	14	14-Mar-01
65	727	Rufous Fantail	10	8	01-Mar-90
66	653	Crescent Honeyeater	9	9	09-Dec-04
67	468	Horsfield's Bronze-Cuckoo	8	7	11-Sep-99
68	481	Southern Boobook	8	8	10-Dec-03
69	578	White-throated Gerygone	8	9	10-Nov-03
70	626	Noisy Miner	8	45	10-Nov-03
71	88	Tawny Frogmouth	7	8	01-Mar-00
72	253	Little Eagle	7	6	30-Oct-97
73	256	Australian Hobby	7	6	09-Dec-85
74	502	Dollarbird	7	7	10-Dec-03
75	829	Mistletoebird	6	7	19-Oct-03
76	252	Wedge-tailed Eagle	5	8	12-Mar-02
77	573	Western Gerygone	5	5	01-Jan-90
78	581	Yellow Thornbill	5	9	09-Feb-03
79	692	White-winged Triller	5	5	10-Dec-03
80	770	Rose Robin	5	5	22-Aug-98
81	240	White-bellied Sea-Eagle	4	5	11-Jul-04
82	245	Collared Sparrowhawk	4	4	05-Feb-00
83	477	Pallid Cuckoo	4	2	10-Nov-03
84	621	Fuscous Honeyeater	4	12	11-Sep-99
85	689	White-bellied Cuckoo-shrike	4	4	17-Jul-98
86	832	Double-barred Finch	4	8	16-Jul-00
87	96	Australian Owlet-nightjar	3	3	23-Apr-02
88	475	Brush Cuckoo	3	2	10-Dec-03
89	739	Little Raven	3	202	22-Dec-95
90	259	Peregrine Falcon	2	2	02-Jul-93
91	514	Brown Treecreeper	2	3	17-Oct-93
92	613	Little Wattlebird	2		10-Dec-03

Rank	Order	Species	No. of records	No. of individuals observed	Date last seen
93	695	Crested Shrike-tit	2	1	13-Apr-89
94	714	White-browed Woodswallow	2	2	06-Jun-87
95	768	Red-capped Robin	2	2	04-Dec-94
96	816	Bassian Thrush	2	3	25-Aug-98
97	854	Australian Pipit	2	2	23-Dec-92
98	11	Stubble Quail	1	1	01-Apr-87
99	12	Brown Quail	1	1	12-Nov-05
100	254	Nankeen Kestrel	1		10-Dec-03
101	409	Glossy Black-Cockatoo	1	1	09-Mar-03
102	421	Rainbow Lorikeet	1		10-Dec-03
103	465	Eastern Koel	1		10-Dec-03
104	467	Channel-billed Cuckoo	1	1	20-Dec-00
105	487	Barn Owl	1	1	18-Nov-00
106	508	Superb Lyrebird	1	1	09-Feb-03
107	522	Satin Bowerbird	1		09-Dec-04
108	569	Brown Gerygone	1		10-Nov-03
109	659	Brown-headed Honeyeater	1	1	12-Jul-87
110	678	Spotted Quail-thrush	1	1	23-Mar-91
111	696	Olive Whistler	1	2	09-Feb-03
112	713	Masked Woodswallow	1	1	21-Oct-86
113	719	Grey Butcherbird	1	1	20-Apr-91
114	745	Satin Flycatcher	1		10-Nov-03
115	747	Restless Flycatcher	1	1	01-Sep-86
116	749	Black-faced Monarch	1	1	07-Nov-98
117	793	Rufous Songlark	1	1	29-Oct-95

Appendix 3

List of species in COG database from Black Mountain Nature Reserve, 2006–2016 (inclusive)

Rank is based on the number of records.

Order refers to the Systematic Taxonomic order for listing bird species adopted by BirdLife Australia (formerly the Royal Australian Ornithological Union) and other international ornithological authorities.

Rank	Order	Species	No. of records	No. of individuals observed	Date last seen
1	436	Crimson Rosella	148	1932	02-Oct-15
2	511	White-throated Treecreeper	126	370	25-Oct-15
3	723	Pied Currawong	123	543	25-Oct-15
4	527	Superb Fairy-wren	119	701	15-Nov-15
5	737	Australian Raven	114	345	25-Oct-15
6	597	Striated Pardalote	111	750	02-Oct-15
7	419	Sulphur-crested Cockatoo	99	449	24-Oct-15
8	594	Spotted Pardalote	94	323	15-Nov-15
9	722	Australian Magpie	88	252	19-Apr-16
10	633	Red Wattlebird	79	243	19-Apr-16
11	584	Buff-rumped Thornbill	78	494	19-Apr-16
12	415	Galah	65	276	06-Sep-15
13	666	Noisy Friarbird	57	125	25-Oct-15
14	437	Eastern Rosella	56	1150	24-Oct-15
15	413	Gang-gang Cockatoo	54	120	24-Oct-15
16	688	Black-faced Cuckoo-shrike	54	105	24-Oct-15
17	430	Australian King-Parrot	51	165	12-Sep-16
18	589	Brown Thornbill	50	124	19-Apr-16
19	757	White-winged Chough	50	363	26-Apr-16
20	730	Grey Fantail	49	115	15-Nov-15
21	493	Laughing Kookaburra	40	65	25-Oct-15
22	580	Striated Thornbill	39	190	15-Nov-15
23	556	White-browed Scrubwren	37	100	26-Apr-16
24	568	Weebill	37	133	12-Mar-16
25	711	Olive-backed Oriole	31	49	25-Oct-15
26	699	Golden Whistler	30	55	05-Sep-14
27	707	Grey Shrike-thrush	27	35	05-Oct-15
28	753	Magpie-lark	27	59	19-Apr-16
29	799	Silvereye	27	169	11-Jan-16
30	498	Sacred Kingfisher	26	52	30-Jan-16
31	725	Grey Currawong	26	35	05-Oct-15
32	608	Yellow-faced Honeyeater	20	190	19-Apr-16
33	767	Scarlet Robin	19	36	26-Jul-16
34	63	Common Bronzewing	18	21	01-Jul-15
35	744	Leaden Flycatcher	18	27	22-Dec-14
36	567	Speckled Warbler	16	37	26-Oct-14
37	702	Rufous Whistler	16	45	16-Oct-15
38	598	Eastern Spinebill	15	20	09-May-15
39	582	Yellow-rumped Thornbill	13	38	22-Oct-12
40	410	Yellow-tailed Black-Cockatoo	10	57	28-Jun-15
41	626	Noisy Miner	10	29	29-Mar-08
42	66	Crested Pigeon	9	29	21-Dec-14

Rank	Order	Species	No. of records	No. of individuals observed	Date last seen
43	659	Brown-headed Honeyeater	9	20	10-Jul-07
44	661	White-naped Honeyeater	9	29	29-Oct-12
45	614	White-eared Honeyeater	8	9	19-Apr-16
46	502	Dollarbird	7	10	13-Nov-15
47	686	Varied Sittella	7	22	18-Sep-14
48	839	Red-browed Finch	7	27	05-Feb-12
49	54	Rock Dove	6	18	28-Jan-12
50	244	Brown Goshawk	6	9	18-Oct-09
51	654	New Holland Honeyeater	6	15	19-Apr-16
52	827	Common Myna	6	27	27-Nov-11
53	256	Australian Hobby	5	6	10-May-16
54	474	Fan-tailed Cuckoo	5	5	12-Feb-16
55	581	Yellow Thornbill	5	10	24-Oct-15
56	733	Willie Wagtail	5	23	28-Oct-12
57	770	Rose Robin	5	6	26-Jun-15
58	252	Wedge-tailed Eagle	4	6	11-Mar-16
59	719	Grey Butcherbird	4	4	29-Nov-12
60	776	Eastern Yellow Robin	4	5	26-Oct-08
61	806	Welcome Swallow	4	19	26-Jun-15
62	829	Mistletoebird	4	4	16-Oct-15
63	245	Collared Sparrowhawk	3	3	12-Sep-13
64	445	Red-rumped Parrot	3	13	28-Jan-12
65	522	Satin Bowerbird	3	4	12-Feb-16
66	824	Common Starling	3	26	09-Feb-08
67	852	House Sparrow	3	8	28-Jan-12
68	96	Australian Owlet-nightjar	2	2	19-Apr-16
69	364	Painted Button-quail	2	1	18-Oct-09
70	418	Little Corella	2	2	17-Jan-13
71	468	Horsfield's Bronze-Cuckoo	2	2	10-Sep-07
72	481	Southern Boobook	2	3	30-Oct-10
73	716	Dusky Woodswallow	2	16	12-May-11
74	793	Rufous Songlark	2	2	12-Apr-08
75	818	Common Blackbird	2	3	28-Oct-12
76	12	Brown Quail	1	2	15-May-06
77	103	Fork-tailed Swift	1	11	11-Mar-16
78	240	White-bellied Sea-Eagle	1	1	03-May-09
79	253	Little Eagle	1	1	04-Apr-13
80	432	Superb Parrot	1	2	28-Nov-13
81	465	Eastern Koel	1	1	22-Dec-14
82	470	Shining Bronze-Cuckoo	1	1	22-Oct-12
83	475	Brush Cuckoo	1	1	12-Nov-14
84	552	Pilotbird	1	2	22-May-14
85	578	White-throated Gerygone	1	2	07-Oct-07
86	623	White-plumed Honeyeater	1	2	12-Apr-08
87	657	Black-chinned Honeyeater	1	1	23-May-07
88	692	White-winged Triller	1	1	07-Oct-07
89	739	Little Raven	1	1	15-Nov-15
90	745	Satin Flycatcher	1	1	07-Oct-07
91	769	Flame Robin	1	1	31-Aug-14
92	832	Double-barred Finch	1	1	28-Oct-12

Appendix 4

Species with breeding activity observed in Black Mountain Nature Reserve, 1982–2006 (inclusive)

Rank is based on the number of records.

Order refers to the Systematic Taxonomic order for listing bird species adopted by BirdLife Australia (formerly the Royal Australian Ornithological Union) and other international ornithological authorities.

Rank	Order	Species	No. of records	No. of individuals	
				observed	breeding
1	722	Australian Magpie	211	581	41
2	436	Crimson Rosella	305	2639	34
3	753	Magpie-lark	141	335	26
4	723	Pied Currawong	238	776	24
5	437	Eastern Rosella	195	677	16
6	633	Red Wattlebird	185	429	15
7	597	Striated Pardalote	205	819	12
8	757	White-winged Chough	131	530	12
9	415	Galah	186	688	11
10	733	Willie Wagtail	95	136	9
11	419	Sulphur-crested Cockatoo	219	1853	8
12	688	Black-faced Cuckoo-shrike	138	188	8
13	88	Tawny Frogmouth	11	14	7
14	666	Noisy Friarbird	101	173	7
15	725	Grey Currawong	86	93	7
16	824	Common Starling	118	696	7
17	430	Australian King-Parrot	120	290	6
18	527	Superb Fairy-wren	228	1047	5
19	511	White-throated Treecreeper	229	392	4
20	582	Yellow-rumped Thornbill	99	199	4
21	744	Leaden Flycatcher	52	65	4
22	806	Welcome Swallow	91	156	4
23	584	Buff-rumped Thornbill	136	556	3
24	594	Spotted Pardalote	190	488	3
25	737	Australian Raven	239	431	3
26	256	Australian Hobby	18	21	2
27	445	Red-rumped Parrot	85	163	2
28	493	Laughing Kookaburra	136	155	2
29	567	Speckled Warbler	63	91	2
30	568	Weebill	55	106	2
31	589	Brown Thornbill	125	220	2
32	623	White-plumed Honeyeater	70	111	2
33	711	Olive-backed Oriole	50	52	2
34	739	Little Raven	5	210	2
35	767	Scarlet Robin	93	129	2
36	799	Silvereye	120	342	2
37	818	Common Blackbird	100	127	2
38	852	House Sparrow	79	227	2
39	244	Brown Goshawk	17	17	1
40	253	Little Eagle	11	10	1
41	468	Horsfield's Bronze-Cuckoo	13	12	1
42	481	Southern Boobook	21	21	1
43	502	Dollarbird	21	21	1

Rank	Order	Species	No. of records	No. of individuals	
				observed	breeding
44	522	Satin Bowerbird	3	2	1
45	598	Eastern Spinebill	93	130	1
46	626	Noisy Miner	19	93	1
47	653	Crescent Honeyeater	15	14	1
48	702	Rufous Whistler	61	71	1
49	716	Dusky Woodswallow	33	88	1
50	776	Eastern Yellow Robin	51	69	1
51	827	Common Myna	23	65	1
52	863	European Goldfinch	42	47	1

Appendix 5

Breeding observations in Black Mountain Nature Reserve, 2007–2016 (inclusive)

Rank is based on the number of records.

Order refers to the Systematic Taxonomic order for listing bird species adopted by BirdLife Australia (formerly the Royal Australian Ornithological Union) and other international ornithological authorities.

Rank	Order*	Species	No. of records	No. of individuals	
				observed	breeding
1	436	Crimson Rosella	186	1849	16
2	633	Red Wattlebird	121	534	10
3	737	Australian Raven	133	408	10
4	723	Pied Currawong	147	594	8
5	757	White-winged Chough	73	548	8
6	413	Gang-gang Cockatoo	71	170	7
7	419	Sulphur-crested Cockatoo	119	548	7
8	437	Eastern Rosella	58	1112	6
9	584	Buff-rumped Thornbill	63	404	6
10	722	Australian Magpie	123	374	5
11	753	Magpie-lark	56	128	5
12	556	White-browed Scrubwren	81	296	4
13	527	Superb Fairy-wren	160	1021	3
14	580	Striated Thornbill	46	212	3
15	256	Australian Hobby	4	5	2
16	415	Galah	74	271	2
17	597	Striated Pardalote	108	653	2
18	626	Noisy Miner	20	83	2
19	666	Noisy Friarbird	53	103	2
20	688	Black-faced Cuckoo-shrike	58	108	2
21	711	Olive-backed Oriole	35	53	2
22	839	Red-browed Finch	20	80	2
23	88	Tawny Frogmouth	2	4	1
24	244	Brown Goshawk	7	10	1
25	430	Australian King-Parrot	68	222	1
26	474	Fan-tailed Cuckoo	11	11	1
27	493	Laughing Kookaburra	58	93	1
28	502	Dollarbird	5	7	1
29	567	Speckled Warbler	13	34	1
30	568	Weebill	43	149	1
31	589	Brown Thornbill	72	168	1
32	594	Spotted Pardalote	104	347	1
33	654	New Holland Honeyeater	47	219	1
34	686	Varied Sittella	7	24	1
35	725	Grey Currawong	29	40	1
36	730	Grey Fantail	79	218	1
37	799	Silvereye	50	282	1

Scientific names of species

The scientific names and Systematic Taxonomic Order (Order) of species follow those adopted by BirdLife Australia (formerly the Royal Australian Ornithological Union) and other international ornithological authorities.

Order	Species	Scientific Name
11	Stubble Quail	<i>Coturnix pectoralis</i>
12	Brown Quail	<i>Coturnix psilophora</i>
54	Rock Dove	<i>Columba livia</i>
63	Common Bronzewing	<i>Phaps chalcoptera</i>
66	Crested Pigeon	<i>Ocyphaps lophotes</i>
88	Tawny Frogmouth	<i>Podargus strigoides</i>
96	Australian Owlet-nightjar	<i>Aegotheles cristatus</i>
244	Brown Goshawk	<i>Accipiter fasciatus</i>
245	Collared Sparrowhawk	<i>Accipiter cirrocephalus</i>
252	Wedge-tailed Eagle	<i>Aquila audax</i>
253	Little Eagle	<i>Hieraaetus morphnoides</i>
254	Nankeen Kestrel	<i>Falco cenchroides</i>
256	Australian Hobby	<i>Falco longipennis</i>
259	Peregrine Falcon	<i>Falco peregrinus</i>
364	Painted Button-quail	<i>Turnix varius</i>
409	Glossy Black-Cockatoo	<i>Calyptorhynchus lathami</i>
410	Yellow-tailed Black-Cockatoo	<i>Calyptorhynchus funereus</i>
413	Gang-gang Cockatoo	<i>Callocephalon fimbriatum</i>
415	Galah	<i>Eolophus roseicapillus</i>
418	Little Corella	<i>Cacatua sanguinea</i>
419	Sulphur-crested Cockatoo	<i>Cacatua galerita</i>
421	Rainbow Lorikeet	<i>Trichoglossus haematodus</i>
430	Australian King-Parrot	<i>Alisterus scapularis</i>
432	Superb Parrot	<i>Polytelis swainsonii</i>
436	Crimson Rosella	<i>Platycercus elegans</i>
437	Eastern Rosella	<i>Platycercus eximius</i>
445	Red-rumped Parrot	<i>Psephotus haematonotus</i>
465	Eastern Koel	<i>Eudynamys orientalis</i>
467	Channel-billed Cuckoo	<i>Scythrops novaehollandiae</i>
468	Horsfield's Bronze-Cuckoo	<i>Chalcites basalis</i>
470	Shining Bronze-Cuckoo	<i>Chalcites lucidus</i>
474	Fan-tailed Cuckoo	<i>Cacomantis flabelliformis</i>
475	Brush Cuckoo	<i>Cacomantis variolosus</i>
477	Pallid Cuckoo	<i>Cacomantis pallidus</i>
481	Southern Boobook	<i>Ninox novaeseelandiae</i>
487	Barn Owl	<i>Tyto alba</i>
493	Laughing Kookaburra	<i>Dacelo novaeguineae</i>
498	Sacred Kingfisher	<i>Todiramphus sanctus</i>
502	Dollarbird	<i>Eurystomus orientalis</i>
508	Superb Lyrebird	<i>Menura novaehollandiae</i>
511	White-throated Treecreeper	<i>Cormobates leucophaea</i>
514	Brown Treecreeper	<i>Climacteris picumnus</i>
522	Satin Bowerbird	<i>Ptilonorhynchus violaceus</i>
527	Superb Fairy-wren	<i>Malurus cyaneus</i>
552	Pilotbird	<i>Pycnoptilus floccosus</i>

Order	Species	Scientific Name
556	White-browed Scrubwren	<i>Sericornis frontalis</i>
567	Speckled Warbler	<i>Chthonicola sagittata</i>
568	Weebill	<i>Smicronis brevirostris</i>
569	Brown Gerygone	<i>Gerygone mouki</i>
573	Western Gerygone	<i>Gerygone fusca</i>
578	White-throated Gerygone	<i>Gerygone olivacea</i>
580	Striated Thornbill	<i>Acanthiza lineata</i>
581	Yellow Thornbill	<i>Acanthiza nana</i>
582	Yellow-rumped Thornbill	<i>Acanthiza chrysorrhoa</i>
584	Buff-rumped Thornbill	<i>Acanthiza reguloides</i>
589	Brown Thornbill	<i>Acanthiza pusilla</i>
594	Spotted Pardalote	<i>Pardalotus punctatus</i>
597	Striated Pardalote	<i>Pardalotus striatus</i>
598	Eastern Spinebill	<i>Acanthorhynchus tenuirostris</i>
608	Yellow-faced Honeyeater	<i>Lichenostomus chrysops</i>
613	Little Wattlebird	<i>Anthochaera chrysoptera</i>
614	White-eared Honeyeater	<i>Lichenostomus leucotis</i>
621	Fuscous Honeyeater	<i>Lichenostomus fuscus</i>
623	White-plumed Honeyeater	<i>Lichenostomus penicillatus</i>
626	Noisy Miner	<i>Manorina melanocephala</i>
633	Red Wattlebird	<i>Anthochaera carunculata</i>
653	Crescent Honeyeater	<i>Phylidonyris pyrrhopterus</i>
654	New Holland Honeyeater	<i>Phylidonyris novaehollandiae</i>
657	Black-chinned Honeyeater	<i>Melithreptus gularis</i>
659	Brown-headed Honeyeater	<i>Melithreptus brevirostris</i>
661	White-naped Honeyeater	<i>Melithreptus lunatus</i>
666	Noisy Friarbird	<i>Philemon corniculatus</i>
678	Spotted Quail-thrush	<i>Cinclosoma punctatum</i>
686	Varied Sittella	<i>Daphoenositta chrysoptera</i>
688	Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae</i>
689	White-bellied Cuckoo-shrike	<i>Coracina papuensis</i>
692	White-winged Triller	<i>Lalage tricolor</i>
695	Crested Shrike-tit	<i>Falcunculus frontatus</i>
696	Olive Whistler	<i>Pachycephala olivacea</i>
699	Golden Whistler	<i>Pachycephala pectoralis</i>
702	Rufous Whistler	<i>Pachycephala rufiventris</i>
707	Grey Shrike-thrush	<i>Colluricincla harmonica</i>
711	Olive-backed Oriole	<i>Oriolus sagittatus</i>
713	Masked Woodswallow	<i>Artamus personatus</i>
714	White-browed Woodswallow	<i>Artamus superciliosus</i>
716	Dusky Woodswallow	<i>Artamus cyanopterus</i>
719	Grey Butcherbird	<i>Cracticus torquatus</i>
722	Australian Magpie	<i>Cracticus tibicen</i>
723	Pied Currawong	<i>Strepera graculina</i>
725	Grey Currawong	<i>Strepera versicolor</i>
727	Rufous Fantail	<i>Rhipidura rufifrons</i>
730	Grey Fantail	<i>Rhipidura fuliginosa</i>
733	Willie Wagtail	<i>Rhipidura leucophrys</i>
737	Australian Raven	<i>Corvus coronoides</i>
739	Little Raven	<i>Corvus mellori</i>
744	Leaden Flycatcher	<i>Myiagra rubecula</i>
745	Satin Flycatcher	<i>Myiagra cyanoleuca</i>

Order	Species	Scientific Name
747	Restless Flycatcher	<i>Myiagra inquieta</i>
749	Black-faced Monarch	<i>Monarcha melanopsis</i>
753	Magpie-lark	<i>Grallina cyanoleuca</i>
757	White-winged Chough	<i>Corcorax melanorhamphos</i>
767	Scarlet Robin	<i>Petroica boodang</i>
768	Red-capped Robin	<i>Petroica goodenovii</i>
769	Flame Robin	<i>Petroica phoenicea</i>
770	Rose Robin	<i>Petroica rosea</i>
776	Eastern Yellow Robin	<i>Eopsaltria australis</i>
793	Rufous Songlark	<i>Cincloramphus mathewsi</i>
799	Silvereye	<i>Zosterops lateralis</i>
806	Welcome Swallow	<i>Hirundo neoxena</i>
816	Bassian Thrush	<i>Zoothera lunulata</i>
818	Common Blackbird	<i>Turdus merula</i>
824	Common Starling	<i>Sturnus vulgaris</i>
827	Common Myna	<i>Sturnus tristis</i>
829	Mistletoebird	<i>Dicaeum hirundinaceum</i>
832	Double-barred Finch	<i>Taeniopygia bichenovii</i>
839	Red-browed Finch	<i>Neochmia temporalis</i>
852	House Sparrow	<i>Passer domesticus</i>
854	Australian Pipit	<i>Anthus novaeseelandiae</i>
863	European Goldfinch	<i>Carduelis carduelis</i>