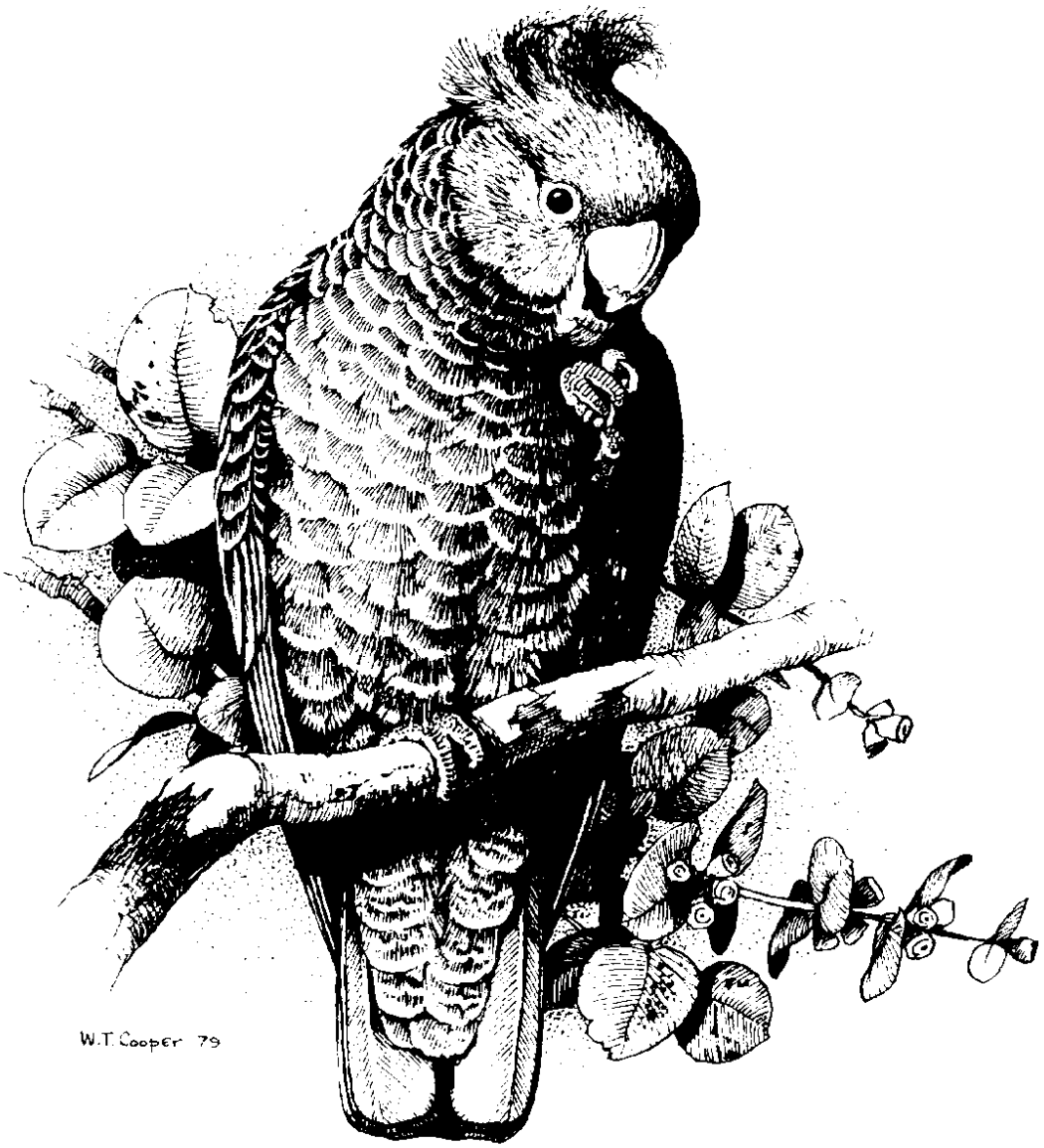
canberra bird notes

ISSN 0314-8211

Volume 37
Number 2
June 2012



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IN MY OPINION

SUPERB PARROT: LIVING ON THE EDGE

Background

The Action Plan for Australian Birds 2010 recommends that the IUCN status of the Superb Parrot be downgraded from Vulnerable *to* Least Concern*; a down-listing of two places. Although at present this does not result in any changes to Commonwealth or State legislation regarding the status of the Superb Parrot there is concern that in the future this may be the case. At present the Superb Parrot is listed as* Vulnerable *under the Environment Protection and Biodiversity Conservation Act, 1999 and listed as* Vulnerable *in both the ACT and NSW and as* Threatened *under Victorian legislation. An edited version of a letter written on behalf of COG has been published in Australian Birdlife 1 (2) June 2012 and follows up on a letter by Bruce Lindenmayer published in Australian Birdlife 1 (1) March 2012. The full unedited letter by COG is reproduced below for those who may not have access to the BirdLife Australia publication and who may wish to express their concerns by writing to BirdLife Australia.*

I would like to thank Dr Adrian Manning, Dr Damon Oliver, Jenny Bounds, Alison Russell-French and Bruce Lindenmayer for help in preparing this letter.
Chris Davey, Canberra, June 2012

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Superb Parrot: Living on the edge

The Action Plan for Australian Birds 2010 recommends that the status of the Superb Parrot be downgraded from Vulnerable to Least Concern, based on IUCN criteria. The criteria do not consider conservation or political ramifications of changes in status nor longer-term threats (beyond three generations). While the former is arguably defensible at the International level, it is an open question whether it is appropriate for Australia's peak bird conservation and advocacy organisation to be so closely involved given its different mandate. Taking into account recent events in the ACT, we detail below our concerns about the future for the Superb Parrot and reflect on the future implications for Birdlife Australia.

Despite having a high profile in the community as a flagship for on-ground conservation efforts across regional inland NSW and Victoria, the Superb Parrot (*Polytelis swainsonii*) continues to be an enigma with our lack of understanding on the abundance, movement and feeding of this threatened species. In the ACT there are few historical records, but from these and personal observations, it would appear that this once common woodland parrot has been decreasing since the late 1940s. In 1993 the nearest known breeding location to the ACT was just south-west of Hall in New South Wales where a small but

unknown number of birds bred in Blakely's Red Gum (*Eucalyptus blakelyi*) hollows (Davey, 1997) with a few other known breeding spots further north.

During the summer of 2005-06 there was an influx of Superb Parrots into the ACT with reports throughout the southern suburbs of Belconnen of dependent young present from early December to early February (Lashko 2006). There were no reports of birds having bred within the ACT during the 2005-06 season. This pattern has continued but the birds are now typically first reported in early September through to late March and some individuals may over-winter. It is now known that the Superb Parrot is breeding in small areas within the Mulligans Flat and Goorooyarroo Nature Reserves (Davey 2010, Davey 2011) and within Throsby and central Molonglo, with both latter areas ear-marked for future urban development. To date the Superb Parrot is occasionally reported from suburbs south of Lake Burley Griffin with the most southerly report from Hoskinstown, NSW.

It is unlikely that the 2005-06 influx was due to birds breeding in the ACT during that season. Had they done so birds would have been first observed in early September and that was not the case. The northern part of the ACT is at the very edge of the range of the Superb Parrot, and it would appear that a relatively small southerly movement has caused an increase in the observation of this species, and a southerly expansion of the breeding range into ACT areas not known to be used for breeding before 2006-07. The birds now appear to behave in a similar manner to that reported in the Riverina where nesting resources are located away from the feeding resources leading to obvious and specific flight corridors, in the ACT nesting in the peri-urban woodlands and feeding within the suburbs, in particular sports ovals and urban nature parks.

It is unknown what has caused this apparent expansion in range. It cannot be assumed that the expansion is due to an increase in the abundance of the Superb Parrot, as there [are] no concurrent measurements of population size and breeding in areas to the west of ACT in the Murrumbateman and Yass region. The woodland habitats in this region continue to decline and suffer from dieback and incremental paddock tree loss which is likely to have strong impacts on the Superb Parrot. Furthermore, the expansion eastward into ACT occurred at the height of the recent decade of drought and this may well have caused birds to move further south at the end of the 2005-06 breeding season leading them to discover what the ACT had to offer in terms of feeding and nesting resources. It should be noted, a new longitudinal study of woodland birds in Canberra, using COG data, has shown that Superb Parrots have been detected in less than 0.3% of surveys between 1998 and 2010 (L. Rayner, pers. comm.). Clearly this does not constitute a huge resurgence in the population.

The Superb Parrot utilizes the landscape in different ways at different times of the year. Although the central part of its range appears to support Superb Parrots throughout the year this is not the case at the edge. During the breeding season they can move considerable distances between their feeding and breeding sites whilst at the end of the season the birds disperse widely throughout the landscape before returning to their overwintering areas to the north.

It is very difficult to get any idea of population size with such a highly mobile species that is so widely scattered and uses the landscape on such a large scale. Certainly, to date, there are no satisfactory long-term estimates of abundance, not least because Atlas surveys

tend to be on public land and, certainly in the South-West Slopes, most Superb Parrots occur on private agricultural land, where threats to their key nesting resource, scattered paddock trees, are much higher. Further, extrapolation of old data from single snap-shot studies collected before the drought of the 2000s, as was done for the Action Plan species status assessment, is worrying given the species is so dynamic and wide-ranging in its movements. Put simply, we don't really know what is going on out there for the Superb Parrot.

On the South-West Slopes, the Superb Parrot's breeding habitat is confined to box-gum woodlands on soils of high fertility, most of which is poorly protected. The species has become the equivalent of the coal mine canary within the agricultural landscape as its population size in the long term is likely to reflect the status of the declining availability of tree hollows within the agricultural matrix. The listing of the Superb Parrot as threatened in the past has been a major driver in reducing the loss of mature hollow-bearing trees through NSW vegetation clearing regulations, with the added flow on protection for all other hollow-dwelling mammal and bird species and woodland biota generally. BirdLife Australia (BLA) must consider what will happen if the new IUCN listing precipitates a reduction in protection for the Superb Parrot and its already declining nest trees. It is clear that there is currently no prospect of landscape-scale restoration of the paddock trees on which this, and many other species, depend. Without such a scheme, even with protection of current trees, the ongoing decline of these vital paddock trees continues. Is this the context in which to delist one of our most iconic species?

The recommendation to downgrade was provided by the Birds Australia Threatened Species Committee and was endorsed by the Birds Australia Council (with the change in status most likely to be reflected in the 2012 IUCN Red List). The reason given for downgrading is that there is 'recent evidence that the population is well over 10,000 mature individuals and there is no evidence of a continuing decline'. This population estimate is not based on monitoring of the species across its range but from extrapolation of one year's data collected before the last drought, which is fraught with error. There is no empirical evidence that Superb Parrot numbers are any larger than the estimated 5000-8000 birds from the last Action Plan ten years ago There is a projected decline in nest hollows of 20-29% over the next 19 years (3 generations) 'but not yet a link between hollow availability and parrot abundance'. Yet, given the issues outlined above, and that the Superb Parrot only nests in tree hollows, it is bizarre that it can be claimed in the Action Plan that there is no link between parrot abundance and hollow availability, especially given what we know about the trends in hollow resources. Surely, there is enough acceptance amongst BirdLife Australia members and Board about the relationship between the loss of mature hollow bearing trees and the decline of hollow-dependent fauna, to ensure that a precautionary approach is adopted when assessing the status of a species?

The Threatened Species Committee assessed the available scientific data, but was not able to take into account the conservation and political consequences of their recommendations. This is the correct approach for such a committee when assessing against IUCN criteria. However, there was serious disagreement with Superb Parrot experts on the implications of the evidence for the long term future of the species, and it is urged that the new peak bird conservation body Birdlife Australia revisit the decision made by Birds Australia in 2011. As Australia's peak bird advocacy and conservation organisation, one of Birdlife Australia's core purposes is to consider the long term

conservation of species. In being so closely involved with the assessment process, did Birds Australia compromise its ability to advocate for the Superb Parrot in the future? I hope not, because the Superb Parrot may not only be living on the edge of its range in the ACT, but in the long-term, the edge of existence.

References

Davey, C. (1997) Observations on the Superb Parrot within the Canberra District. *Canberra Bird Notes* 22: 1-14.

Davey, C. (2010) The distribution, abundance and breeding status of the Superb Parrot *Polytelis swainsonii* during the 2009-10 breeding season, Gungahlin, ACT. *Canberra Bird Notes* 35: 205-216.

Davey, C. (2011) Distribution, abundance and breeding status of the Superb Parrot during the 2010-11 breeding season, Gungahlin, ACT. *Canberra Bird Notes* 36: 141-154.

Lashko, S. (2006) A superb summer: An influx of Superb Parrots into Belconnen in 2005-06. *Canberra Bird Notes* 31: 142-146

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Both, an edited version of Chris Davey's *letter (in full above) and a response from* Stephen Garnett, *on behalf of the BirdLife Australia Threatened Species Committee, were published in Australian Birdlife 1 (2), June 2012 under the joint heading "*A Superb Outcome?*". The response is reprinted below. Many thanks go to Dr Penny Olsen for organising permission to do so.*

The Editor

The Case for Downlisting

Chris Davey raises some important issues when it comes to listing threatened birds and we are grateful for the opportunity to describe the function of the IUCN Red List, and how we assessed the status of the Superb Parrot.

The IUCN Red Listing process attempts to assess a species' risk of extinction based on a set of numerical criteria that have been refined progressively over several decades by some of the world's top population ecologists. The IUCN Red List Index has now been adopted by the Convention on Biological Diversity and the Millennium Development Goals as one of several global measures of progress in biodiversity conservation. It has also been identified by BirdLife Australia as the most appropriate process available to assess Australia's birds. For the Red List Index to have credibility, however, it is important that no exceptions are made when it comes to determining which species meet the criteria for listing. Any suggestion that a listing should be changed because of the political consequences would rightly make policy-makers suspicious of the whole process, and would erode the objectivity and integrity of the list.

In 2010, as in 2000 and 1992, all the species and subspecies of birds in Australia were assessed against the IUCN Red List criteria. The process involved workshops,

correspondence and discussions with knowledgeable people from around Australia. The most recent assessment was guided by the BirdLife Australia Threatened Species Committee (TSC). We are a group of 18 experienced ornithologists spread across the country who can also draw on our networks of local knowledge to validate our opinions. We were able to obtain initial agreement on the status of all but nine taxa out of the 1,448 species and subspecies we assessed. For those nine, there seemed to be a conflict between what species experts were telling us the status should be and the evidence presented in the literature or otherwise available. One of these species was the Superb Parrot.

Under guidance from Professor Mark Burgman, head of the Australian Centre of Excellence for Risk Analysis, we determined the values of parameters used in the Red List assessment by answering up to 105 questions on trends in population size and distribution for each of the nine problematic species. We were greatly assisted for most species by additional experts who undertook the same process, and we were puzzled that Superb Parrot experts declined repeated invitations to participate

We concluded that the Superb Parrot did not meet any of the criteria for listing on the IUCN Red List, even with explicit consideration of our uncertainty around many of the relevant parameter estimates. Of the five Red List criteria, three could immediately be dismissed. The species does not qualify for any of the threatened categories under the criteria relating to a restricted and declining range or a restricted population, because the species occurs over far too large an area and has a population much larger than 1,000 mature individuals. It also does not qualify under the criterion relating to extinction probability based on detailed quantitative population modelling, because there has been no modelling suggesting imminent extinction.

That leaves two other criteria to consider. The first is that there has been, or is likely to be, a decline of more than 30 per cent in any three generation period (22 years for this species) between 1988 and 2032. However we did not find any evidence of recent decline. In fact, the Atlas reporting rate increased by 61 per cent between the averages for 1977-1981 and 1998-2009 and there is no evidence that the increase in the parrot's population in Canberra in the last decade has been accompanied by a loss of birds elsewhere. In the future, the alarming loss of dead trees in which the parrots nest in part of their range—the western slopes of New South Wales—may cause a decline. However, hollows were not limiting Superb Parrot numbers in the only published study, and there is no evidence that loss of hollows would cause the population to decline by nearly a third across the species' entire range in the next two decades. So we decided that listing on the basis of rate of decline alone could not be justified.

The final criterion that might have been satisfied depended on the population numbering fewer than 10,000 adults. In 2000 there was a view that there were about 6,500 Superb Parrots. However, a study systematically sampling 23,000 square kilometres of parrot habitat on the western slopes in 2001 found nearly 1,500 parrots in 53 out of 81 well-separated sites. Furthermore they were reported from throughout the landscape, not just where there were corridors of trees as had previously been thought essential for the species. A simple extrapolation of these results gives a total population of over 400,000 adult birds. While unlikely to be that numerous, we did not think an estimate of fewer than 10,000 credible, even 10 years later.

We remain deeply concerned about the loss of dead trees. If good evidence becomes available that the Superb Parrot is going to decline significantly in the next two decades, then its IUCN Red List status would be promptly changed. We would also need to reassess many other hollow-dependent species not yet listed. As it is, the *Action Plan for Australian Birds 2010* has been extremely cautious, listing any birds suspected of meeting the IUCN Red List criteria even where evidence of decline is poor. But there has to be some adequate evidence. For the Superb Parrot we have seen none.

There will always be disputes about individual species but this should not distract from the underlying message that many Australian birds are in deep trouble and require the full support of BirdLife Australia members if they are to be saved.

STEPHEN GARNETT, on behalf of the BirdLife Australia Threatened Species Committee

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Male Superb Parrot *(David Cook)*

GANG-GANG SURVEY CANBERRA JUNE 2012

JOHN LEONARD

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1. Background

Canberra birdwatchers were invited to submit reports of Gang-Gang sightings and aural records, and nil reports, for the month of June 2012. Records were accepted from the Canberra urban area and nature reserves close to urban areas, but not further away. Nil records were accepted for specific birdwatching trips undertaken in the Canberra urban area and nature reserves close to urban areas, but not for the absence of Gang-Gangs in the suburbs.

The aim was to secure a baseline measurement of Gang-Gang Cockatoo abundance in the ACT using a survey methodology that can easily be repeated from year to year.

2. Results and Discussion

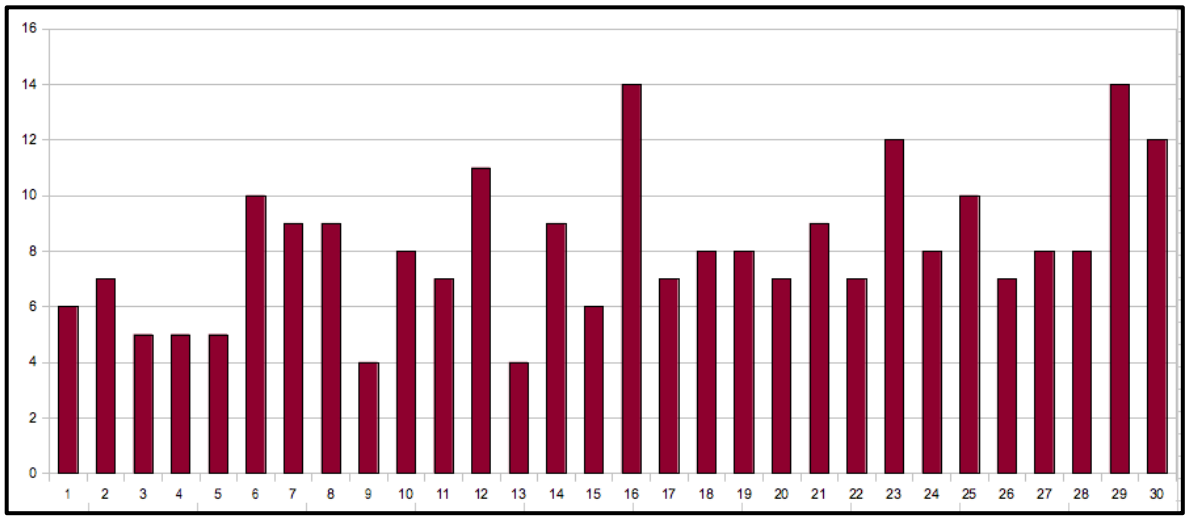
A total of 309 records were received for the month from 52 observers. Of these 251 were positive and 58 were nil reports. Of the positive reports 40 were aural records and 211 sight records. 794 individual Gang-Gangs were reported, although this total will include multiple sightings of the same individuals.

The metric which can be reported from these sightings, and which can repeated from year to year, is

$$\frac{\text{Number of records} - \text{nil records}}{\text{Number of reporters}}$$

giving the result **4.83.**

111 records out of 206 sight records broke down the birds by sex and/or age.



Positive records were spread across the whole month, but their frequency on each day did not correspond with any obvious factor.

Days of high reporting do not correlate with weekends, and days of low reporting do not correlate with poor weather, except perhaps in the first few days. A few observers were away for the first part of the month, meaning total observations for the latter half of the month were more numerous.

The distribution of sightings was recorded by suburb. The suburbs with the highest number of records were

Ainslie	9	Garran	5
ANU	28	Holder	29
Barton	5	Hughes	32
Chifley	5	Lyneham	29
Deakin	38	Narrabundah	19

Apart from this many other suburbs had one or two records. No records were received from any of the Tuggeranong suburbs, only one from the Gungahlin suburbs, and none from the Belconnen suburbs west of Lake Ginninderra. Weston Creek had a few records (apart from those in Holder), as did the Woden valley suburbs and the suburbs north of Ainslie and east of Northbourne Avenue. It was surprising that there were only two records from the Australian National Botanic Gardens, and many nil records from there.

Clearly the inner north and inner south suburbs are hot spots for Gang-Gang sightings, though whether this is because of the abundance of observers resident in these areas or genuine concentrations is difficult to tell from the data. Pieces of information that might indicate that Gang-Gangs are more widely spread are that the number of records for Lyneham is made up largely of the records of two observers resident in the suburb, and that the records from Holder are from one observer.

Two further pieces of information that might support this interpretation of a wider Gang-Gang distribution are: the population of 30 Gang-Gangs resident for some years in the Bruce area noted by Masumi Robertson, and a population of approximately 20 known to be resident in the Lyons area.[1]

As noted, around half of sight records broke the birds observed down by age and/or sex but no conclusions can be drawn from the sex/age composition of groups that were reported, other than that single birds, pairs, family groups and larger agglomerations were all reported.

It is to be expected that Gang-Gangs occurrence will be governed, at least in part, by the availability of food sources. Several series of records were from suburban backyards where Gang-Gangs are fed. Apart from this there were a few references to Gang-Gangs feeding in trees, where specified always species of *Eucalyptus*. Exotic food plants known from elsewhere to be used by Gang-Gangs, such as Cypress (*Cupressus*) or Hawthorns (*Crataegus*), were not mentioned in the records received.

Movements of Gang-Gangs were mentioned by some observers. Sometimes movements by birds in search of roost sites could be suggested, for example there were three records on separate days by two observers of Gang-Gangs from Ainslie (suburb) flying toward Mt

1 Information on these populations was not recorded in the database owing to lack of specific records for June 2012.

Ainslie in the afternoon. There is a pair of records from Chifley of Gang-Gangs in the morning flying away from Mt Taylor, and in the evening flying towards it. However there is not enough data to make any firm pronouncements about movements of birds or likely roosting sites. John Leonard made observations of Gang-Gangs flying over Jensen Street, Hughes, and on separate occasions in the morning recorded movement towards each of the four cardinal points!

2.1 Comparison with 2010 and 2011 Surveys

In August 2010 and July 2011 one hour Gang-Gang surveys were undertaken on one specific day in the inner northern and inner southern suburbs (Leonard 2010, 2011). However, the results are not comparable with this survey.

2.2 Status of Gang-Gangs in the ACT Urban Area

The present survey is the largest attempt to date to estimate the size of the ACT urban Gang-Gang population. Although there is no way that reports of 794 sightings over a month by multiple observers (plus information about other populations not included in this total) can be reduced to an actual figure for the population, the fact that some groups seem to be very faithful to certain food-sources makes it unlikely that these records indicate a small, far-ranging population, and make it more likely the population is around 150 individuals, with several population groups faithful to certain suburbs (perhaps 40 in the inner south (Deakin, Hughes) and 40 in the inner north (ANU, O'Connor, Turner).

Although it cannot be proved from this data, the likelihood is also that these observations largely represent sightings of resident local populations, and not the winter visits of a wider regional population that breeds in the Brindabella Ranges or further afield.

2.3 Notable records

Elvis: Elvis is a male Gang-Gang (distinguished by a very droopy crest) observed several times in a Lyneham backyard by Lindsay Northrop. The fact that one Gang-Gang which can be identified as an individual is a constant visitor to a particular spot suggests that many other sightings in the survey are the same individuals seen on successive days. Elvis was observed five times in the period 22-30 June (Lindsay was not observing earlier in the month,) and the company he kept on each visit is an indication of the fluid nature of Gang-Gang social groups (at least in urban Canberra in the winter):

22 June: Elvis observed with 2 imm males, 1 adult male and 4 females
23 June: Elvis observed with 3 females
26 June: Elvis observed with 2 imm males, 1 adult male and 2 females
29 June: Elvis observed with a female (exhibiting pair-bonded behaviour), 1 imm male and 1 adult male
30 June: Elvis observed with a female (exhibiting pair-bonded behaviour)

Tony Lawson's Gang-Gang groups: Tony Lawson submitted 29 records from his house in Holder from 4-27 June 2012. He distinguishes three groups of Gang-Gangs who visit his yard (Groups a, b, and c): group *a* consists of two males and a female, group *b* a male and a female, and group *c* a solitary male. On occasions groups coincide in their visits. On two occasions Gang-Gang groups with immature males were observed, but these could not be identified reliably with any of the named three groups.

Beak and Feather Disease: Two birds suffering from this disease were located in the Deakin area and euthanised by the RSPCA. This occurred on 18 and 19 June.

Allopreening: This was observed between a male and female on 28 June by Geoffrey Dabb

Feeding dependent young: This was observed on 23 June by John Leonard and Peter Murphy (two separate reports of different birds). In the group observed by Peter the female was chewing birch (*Betula*) bark and feeding it to the dy, in the group observed by John the female was feeding the dy by regurgitation.

Gang-Gang 'Parliament': On 14 June around 16:40 in Jensen Street, Hughes, John Leonard observed at least three groups of Gang-Gangs (approximately 12 birds in all sighted) perched high in trees separated by several hundred meters creaking loudly at the other groups. This behaviour may be related to the birds' gathering in flocks in the evening preparatory to roosting.

Large concentrations: Large numbers of Gang-Gangs (>6) were observed during the reporting period as follows:

Date	**Time**	**Number**	**Location**	**Observer**
03/06/12	10:40	20	ANU	Rosemary Blemings
03/06/12	10:00	10	Deakin	Marion Jones
04/06/12	10:00	10	Deakin	Marion Jones
06/06/12	13:00	20	Chifley	Mieke Van den Bergh
09/06/12	09:20	11	Garran, Red Hill	Tony Willis
10/06/12	08:40	8	Holder	Tony Lawson
14/06/12	10:00	12	ANU, Burton Hall	Michael Lenz (similar numbers also reported from this spot at around this time by Peter Cranston several times during the month with 17 on 29/06/12)
14/06/12	16:40	12	Hughes, Jensen Street	John Leonard (see 'Parliament' above)
19/06/12	am & pm	8	Lyneham	Lindsay Nothrop (two separate groups on the same day)
20/06/12	10:40	12	Deakin	Marion Jones
22/06/12	12:00	8	Lyneham	Lindsay Nothrop
28/06/12	09:00	8	Deakin	Marion Jones
28/06/12	11:30	9	Lyneham	Lindsay Nothrop
29/06/12	09:30	7	Deakin	Catherine Hindson
29/06/12	11;50	10	Hughes	Jo Whitten

2.4 Hot Spots

From the reports the following publicly-accessible areas are noted as Gang-Gang 'hot-spots'. (NB I have not noted Gang-Gang concentrations reported from private residences, also the movements and distribution of Gang-Gangs will probably change seasonally, so these spots are only valid for June).

Hot Spot	Time of Day	No. of Reports
ANU Burton Hall	09:00-10:00 weekdays	15
ANU campus generally	various	28 (includes above records)
Jensen Street, Hughes (area north of Hughes Primary generally)	08:00-10:00, 16:00-17:00	17
Deakin, area of Le Hunte/De Chair/Mcgregor Streets	various	19
Narrabundah, Rocky Knob Reserve, Brockman St and surrounding area	16:00-17:00	9
Red Hill (Deakin, Garran) various spots on northern and western sides inc. Federal Golf Club	various	12

Acknowledgements

Thanks go to the following observers:

Barbara Allan, Dennis Ayliffe, Rosemary Blemmings, John Brannan, Mariko Buszynski, Jean Casburn, David Cook, Peter Cranston, Isobel Crawford, Cathy Crompton, Christine D., Geoffrey Dabb, Chris Davey, Lindell Emerton, Paul Fennel, Felicia Fletcher, Bill Grahham, Wayne Gregson, Alberta Hayes, Robin Hide, Catherine Hindson, Jack Holland, Marion Jones, Matthew Larkin, Sue Lashko, Tony Lawson, Michael Lenz, Oliver Leonard, Michael Maconachie, Peter Murphy, Lindsay Nothrop, Peter Ormay, Rob Parnell, Nick Payne, Harvey Perkins, Andrew Reason, Alison Rowell, Margaret Robertson, Alastair Smith, Jenny Smits, Jens Svensson, Julian Teh, Mieke Van den Bergh, Wendy Whitham, Jo Whitten, Benj Whitworth, Tony Willis, and Kevin Windle.

References

Leonard, J.(2010) Central Canberra Gang-gang Census: 1st August 2010. *Canberra Bird Notes* 35: 202-04.

Leonard, J. (2011) 'Central Canberra Gang-gang Census: 5th June 2011. *Canberra Bird Notes* 36: 97-99.

Accepted 9 July 2012

AN ANALYSIS OF BIRD OCCUPANCY AND HABITAT CHANGES AT SIX WOODLAND LOCATIONS - 2003 AND 2010

Report prepared for the Canberra Ornithologists Group (COG)

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The full version of this November 2011 report, including Appendices 3-6, is available on the COG website (http://canberrabirds.org.au) under "conserving birds".

Summary. *Canberra Ornithologists Group (COG) has systematically monitored birds at 66 sites in 6 woodland locations in the ACT since 1998. An assessment of the habitat at each site was made in 2003 and repeated in 2010.*
The greatest changes in habitat between 2003 and 2010 were a decrease in cover of eucalypt regeneration, shrub cover and logs and branches, and an increase in mistletoes and native ground cover. A composite measure of habitat change (the habitat index) was derived from these five variables.
Changes in bird occupancy between 2003 and 2010 were modelled against the habitat index. Of the 51 species with sufficient data, 14 showed no change in occupancy with change in habitat, 27 increased in occupancy with the change and 10 decreased. Of the increasers, one-third are medium to large-bodied species which are common to abundant in agricultural regions of south-eastern Australia.
Additional analyses were undertaken to identify a key habitat variable that was the 'best' single predictor of change in bird occupancy between the two years. Nine species with medium to high odds of occupancy representing a variety of occupancy trends, feeding levels and habitat ranges were selected.
The decrease in shrub cover was the best habitat predictor for five of the nine species. Four species, Striated Thornbill, Buff-rumped Thornbill, White-plumed Honeyeater and Scarlet Robin decreased significantly in occupancy with this habitat change. The Noisy Miner, however, increased significantly.
Other habitat variables which proved to be the 'best' predictors for the other four species were the increase in mistletoe, an improvement in tree health, and a loss of hollows.
The measured changes in habitat between 2003 and 2010 appear to largely reflect the drought conditions of the intervening years. This analysis provides a direct relationship between change in bird occupancy and change in habitat (the likely effect of the drought) at the site level. It does not take account of changes that may have affected occupancy in other parts of a bird's range or outside the site in the wider landscape. It does, however, provide information that can guide management actions at the site level to improve habitat for woodland birds.

1. Background

Commenced in 1996, the Woodland Bird Survey project collects baseline data on woodland bird abundance in the ACT at a number of areas of Yellow Box/Red Gum Grassy Woodland, a plant community which is listed as endangered under the *Nature Conservation Act 1980* (Environment ACT 2004). Areas selected for this project contain

a number of bird species which are declining, including the Hooded Robin, Brown Treecreeper, Varied Sittella and White-winged Triller, which are listed as Vulnerable under the Act (Environment ACT 2004).

The Woodland Bird Survey has carried out several previous data analyses, including analyses of:

- the Mulligans Flat dataset (Davey 2001)
- the full Woodland dataset up to December 2001 (Cunningham 2003), including an assessment of the interaction effects between land tenure status, habitat quality and time
- all data up to the end of 2004 (Cunningham and Rowell 2006)
- all data up to the end of 2005, including a comparison of trends between Mulligans Flat and Goorooyarroo (Bounds, Taws and Cunningham 2007)
- all data up to the end of 2008, including ten years of data from six foundation locations (Bounds, Taws and Cunningham 2010).

The Woodland Bird Survey is ongoing and continues to build up a valuable dataset from which long term trends for individual species can be determined. From the last analysis, long-term (10-year) trends were calculated for 55 species, of which 15 showed a declining trend in occupancy, and 15 showed an increase.

Where trends of concern, either negative or positive, are identified, it is critical that possible reasons for these trends can be determined so that management actions can be better informed and targeted. Determining the relationship between bird species and habitat may help identify possible reasons for trends.

In summer/autumn 2009/2010, COG re-assessed habitat at the six foundation locations, with a view to undertaking a further statistical analysis of bird data and habitat data, for a number of species of interest.

The current exercise aims to analyse relationships between bird occupancy and habitat change, quantify direct relationships between change in occupancy and change in habitat. In particular, it allows the opportunity to examine the data using a rich class of statistical models appropriate for the analysis of longitudinal data.

It should be noted that data from 66 long-term sites has been analysed in this exercise, however, 24 of those sites are in Mulligans Flat NR and not all of those sites are grassy woodland; six sites are in dry forest contiguous with grassy woodland or secondary grassland.

2. Methods

2.1. Bird Surveys

Project bird survey methods are fully described in Bounds *et al* (2010). Survey sites are 50 metre in radius, which is about 0.8 hectares. Each site is surveyed for 10 minutes, four times a year in late March, late June, late September and late November/early December. The number of each bird species seen or heard within the site is recorded. Additionally, the number of each bird species seen or heard outside the site (from 50 to 100 metres) is recorded.

2.2. Habitat Assessment

Data on a range of habitat attributes were collected for each site when the bird surveys were first commenced in 1996. The report by Rowell (2004) contains a comprehensive background of the surveys and habitat data collected, and a list showing the commencement date of surveys at each location. For each site in the six foundation locations, the habitat data was collected again in 2009-2010, using the same methods.

The habitat data analysed in this report were collected in autumn 2003 and summer/autumn 2009-10 (Table 1). Alison Rowell, environmental consultant to the project, collected most of the 2003 habitat data and all of the 2009/10 habitat data, thus reducing problems with observer bias in this habitat dataset. The other habitat data collectors were all biologists or experienced field observers.

Table 1. Dates of collection of habitat data.

Locations	Number of sites	Date of first habitat survey/ surveyors*	Date of second habitat survey (all surveyed by AR)
Castle Hill	9	23 March 2003/ DMcD	5 December 2009
Gooroo North	9	29 March 2003/ NT	12 March 2010
Mt Majura	9	2 April 2003/ AR, IC, AO	21 Dec 2009-3 Jan 2010
Mulligan's Flat	24	30 March 2003/ AR, JB	14 Dec 2009-10 Jan 2010
Red Hill	9	29 March 2003/ AR	21 December 2009
Symonston	6	1 April 2003/ AR	1 December 2009
TOTAL	66		

* David McDonald, Nicki Taws, Alison Rowell, Isobel Crawford, Anthony Overs, Jenny Bounds

The variables measured were the same in 2003 and 2009-10 (Table 2). Additionally, three photographs were taken from the centre of each site during each habitat survey, facing 0º (north), 120 º and 240 º. These allow a qualitative visual comparison of site condition to complement the statistical analysis.

One additional variable was measured in the second survey and, therefore, could not be used in the current analysis. This was the number of 'Indicator species, level 2' in the understorey (Rehwinkel 2007). These are less common species in grassy ecosystems, also sometimes referred to as 'grazing-intolerant' or 'declining' species, many of which are thought to have undergone serious declines from disturbances such as over-grazing and application of fertilisers. The number of such species present gives some indication of the history of the site, its complexity and potential for rehabilitation. Although not used in the analysis, this is regarded as a good indicator of site history and may be useful for future analyses.

2.3. Climatic Data

Rainfall data, monthly actual and long-term average annual, were obtained from the Bureau of Meteorology website, 'Climate Data Online' (www.bom.gov.au/climate), for the Canberra Airport weather station.

2.4. Other Environmental Data

Volunteer surveyors collected useful anecdotal information about changes at their sites over the survey periods. These observations were recorded in the database and some were collated by Jenny Bounds for inclusion in *Gang-gang* (the COG newsletter).

Table 2. Data collected in habitat surveys.

Habitat variables	Categories	Description
Trees >6m tall, % cover	<1% 1-10% 11-40% >40%	None or few Sparse woodland Medium woodland Dense woodland
Eucalypt regeneration, <6m tall, % cover	<1% 1-10% 11-25% 26-50% >50%	None Sparse Moderate Dense Very dense
Number of tree species >6m tall, species name and proportion of cover	1 2-3 4 or more	
Gross tree health: % of eucalypt canopy (all age classes) with significant leaf damage or loss	<10% 11-50% >50%	Most trees healthy Canopy moderately affected Canopy severely thinned
Tall shrub layer (2-6 m, includes small non-eucalypt trees), % cover and species present	<1% 1-10% 11-25% 26-50% >50%	None Sparse Moderate Dense Very dense
Low shrub layer (0.5-2 m), % cover and species	<1% 1-10% 11-25% 26-50% >50%	None Sparse Moderate Dense Very dense
If tot. shrub cov. (0.5-6 m) >20%, % shrub layer that is native	0-25% >26%	
Ground layer (grasses, forbs, subshrubs)		Short and very sparse Short/medium height and density, even. Patchy, tussocky or with many subshrubs. Tall and dense
% of ground cover that is native	<10% 11-50% >50%	Almost all exotic Mixed native/exotic Almost all native
Log/branch/stump % cover	<1% 1-10% >10%	Low Medium High
Number of tree hollows	0 1-5 >6	
Number of mistletoes	0 1-5 6-20 21-40 >40	
Indicator species, level 2 (2009/10 only)	number	
Endangered Yellow Box-Red Gum Grassy Woodland community	Yes No	
Other relevant features		Water sources, clearing, housing, etc., isolation, erosion, other disturbances.

2.5. Data Analysis

The data analysis has 4 major components:

1. The construction of a composite measure of change in habitat (habitat index) between 2003 and 2010
2. Producing estimates of bird occupancy in 2003 and 2010
3. Modelling the relationship between bird occupancy and the habitat index with particular emphasis on within-site relationships over time
4. For a selection of individual bird species, the identification of key habitat variables affecting change in bird occupancy.

The analysis methods are summarised very briefly in this section, and more detail is in Appendix 1.

2.5.1. Measuring change in habitat

Twelve habitat variables were assessed at the 66 sites in 2003 and 2010 (see above). Within some variables not all categories were needed or were used for only a small number of sites. Such categories were amalgamated to provide a more parsimonious representation for analysis of each habitat variable (see Table 3).

The aim was to find which of the variables best discriminated between the habitats of 2003 and 2010. Linear logistic regression was used to obtain a composite index of these variables so that the overall difference between the habitats at each site between 2003 and 2010 was maximised.

2.5.2. A measure of bird occupancy in 2003 and 2010

Seasonal bird observations for the 66 sites were available from spring 1998 to winter 2010. Data were exported from the Access database in which COG stores the Woodland Bird Survey data, into Excel spreadsheet format. The main objective of the project is to monitor woodland birds, so waterbird species were removed from the dataset analysed. Data were checked to ensure that 'true-zero' observations were included, that is, those surveys in which no birds were observed. All data were converted to presence/absence.

The data were used to obtain a 'best estimate' of bird occupancy for each site at time points corresponding to habitat surveys. This was achieved by considering all surveys and all sites simultaneously, modelling trend and seasonal effects, then interpolating values for each site.

For each species, a logistic regression model was used to predict bird occupancy at each site, in each year and each season on a log-odds scale with estimates of variance. Predicted values for spring 2003 and spring 2010 were used to coincide as near as possible with the habitat surveys. Values from the same season (spring) were used to eliminate possible seasonal effects in the analysis of change.

2.5.3. Modelling the relationship between bird occupancy and the habitat index with particular emphasis on 'within site' (over-time) relationships

In this analysis, bird occupancy varies at two levels, 'within site' (over time) and 'between sites'. A statistical model was developed to study relationships at both levels. The sites in the woodland survey are grouped into 'locations', however, for this analysis the 'between location' level was not considered.

Repeat observations 'within site' are expected to be more similar than those of a random sample of observations from across different sites because observations from the same site share the same environmental attributes selected by the birds. This lends particular strength to longitudinal studies such as this one where there is no need to make the strong assumption that the 'between sites' and 'within site' relationships are the same, as is the case with cross-sectional studies.

The model developed fits within the general framework of general linear mixed models (Galway 2006). The results are presented graphically for each species to show the relationships at the 'between sites' level as well as at the 'within site' (temporal) level.

2.5.4. Identification of key habitat variables affecting change in bird occupancy for a selection of individual bird species

Using a composite measure of habitat change can mask the effect of individual variables when investigating relationships with bird occupancy. To further explore changes in habitat and bird occupancy, an additional analysis was undertaken on a selection of individual bird species. The aim was to identify a key habitat variable that was the 'best' single predictor of change in bird occupancy between the two periods.

Nine bird species with medium to high odds of occupancy representing a variety of occupancy trends, feeding levels and habitat ranges were selected:

- Speckled Warbler (increasing, ground-feeder, sedentary)
- Weebill (increasing, canopy-feeder, sedentary)
- Striated Thornbill (stable, canopy-feeder, sedentary)
- Yellow-rumped Thornbill (increasing, ground-feeder, sedentary)
- Buff-rumped Thornbill (stable, ground and shrub feeder, sedentary)
- White-plumed Honeyeater (decreasing, generalist, sedentary)
- Noisy Miner (increasing, generalist, sedentary)
- Scarlet Robin (decreasing, ground and shrub-feeder, partial altitudinal migrant)
- Mistletoebird (stable, specialist-feeder, nomadic).

Several species of interest (declining, rare or threatened species) were not able to be analysed due to low abundance and hence insufficient data. These included Brown Treecreeper, Crested Shrike-tit, Jacky Winter, Hooded Robin and Diamond Firetail. The Grey Shrike-thrush was initially selected as a species for analysis, but showed little change in occupancy during the period.

Analysis involved fitting a weighed least squares regression with Site as a fixed effect and then searching for the best single habitat predictor. Once the 'best' habitat variable was found, the species data were modelled at the 'between sites' and 'within site' levels, similar to the habitat index, except that the best single habitat variable was expressed in binary form.
The model developed fits within the general framework of general linear mixed models (Galway 2006). The results are presented graphically for each species to show the relationships at the 'between sites' level as well as at the 'within site' (temporal) level.
Bird taxonomy follows Christidis and Boles (2008).

3. Results

3.1. Climatic Data

The years which cover the bird data, 1998 to 2010, have been notable by below average annual rainfall (616.8mm) in most years (Figure 1).

The bird survey period started off with three years (1998-2000) of slightly above average rainfall. The years 2001-04 during which the first habitat surveys were made, were well below average. The spring of 2005 was notable for very good rainfall in the Canberra region, but then followed four years (2006-09) of below average rainfall. The second habitat surveys were undertaken in late 2009 to early 2010, before the record-breaking rains of 2010 had a chance to take effect.

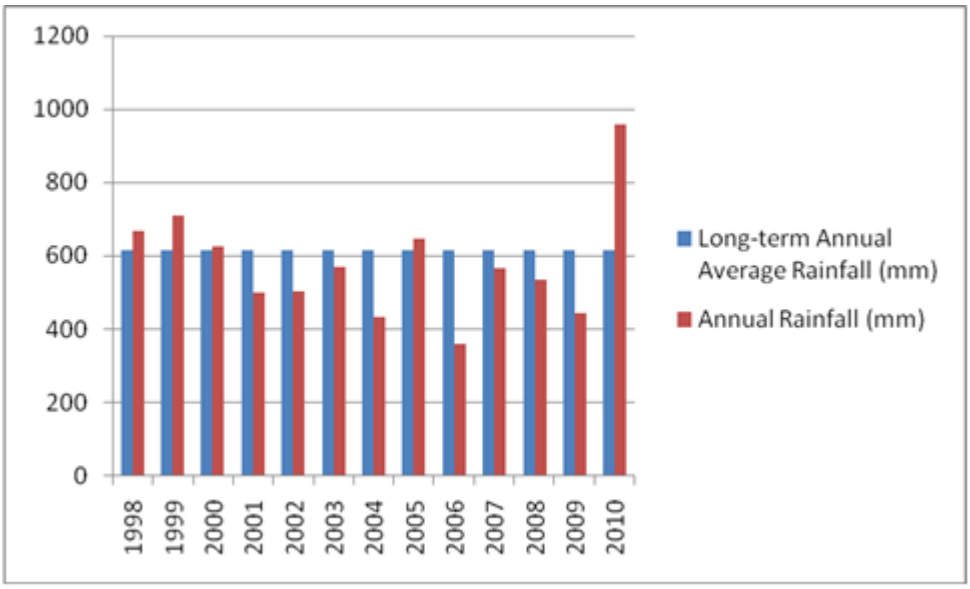


Figure 1 Comparison of annual average rainfall and annual actual rainfall (based on Bureau of Meteorology figures at Canberra Airport, in millimetres).

3.2. Other Environmental Data

Some other observations and anecdotal data on environmental factors which influenced the woodland habitat are collated in this section. More detailed information about changes at the site level is in Appendix 5.

The survey period began just after the major bushfires that reached the west of Canberra city in February 2003, but none of the survey sites were directly affected by the fires. The region also experienced prolonged drought conditions during the period. Significant events and observations of changes during the period included:

- prolonged drought appeared to have killed a number of large trees (with loss of mistletoes and hollows, standing dead timber not measured separately), caused trees and limbs to fall (further loss of mistletoes and hollows, gain in logs/branches), killed some eucalypt regeneration, wattles and other shrubs
- natural progression on some sites from dense eucalypt regeneration to fewer but larger trees (i.e. moved into ‘ more than 6 metre tall’ (>6 m tall) category)

- destocking on several sites, due to drought (leased land) or conversion to reserve (Goorooyarroo, Symonston/Callum Brae); some eucalypt regeneration and recovery of ground layer resulted
- apparent increase in kangaroo grazing pressure in reserves, except for exclusion areas of Mulligans Flat
- fox baiting at Mulligans Flat
- rabbit control at Mt Majura and Symonston
- heavy lerp damage at some sites
- filling and drying of dams near sites
- increased sheet and gully erosion and sparser ground layer at overgrazed sites
- logs/branches added at some Mulligans Flat and Gooroo North sites to enhance habitat (as part of experimental research)
- urban development approaching Mulligans Flat western boundary and lower Mt Majura
- no sites burned during the survey period, but changes at Red Hill sites following 2001 fire
- some loss of shrub layer due to woody weed control at some sites at Mt Majura and Symonston.

3.3. Index of Habitat Change

Five of the 12 habitat variables contributed to the 'best' composite measure of habitat change. These are listed in Table 3 with a description of the change from 2003 to 2010. Figure 2 contains graphs showing the effect of each of the five contributing variables and a box plot with features of the distribution of the composite score.

In summary, the habitat change measured between 2003 and 2010 was:
- a decrease in cover of eucalypt regeneration, shrubs, and logs and branches, and
- an increase in mistletoes and native ground cover.

A check was made for observer bias in the habitat surveys by counting how many times the variables below (Table 3) changed categories between years when the 2003 and 2009-10 surveys were done by different people, and how often they changed when both surveys were done by the same person (Alison Rowell). There was some difference for mistletoes, with an increase more likely to be recorded if both surveys were not done by the same person. This could be an observer effect, or a feature of the sub-set of sites thus surveyed. Other variables showed no notable differences.

Table 3. The five variables contributing to the index of habitat change (terminology as in Figure 2).

Variable	In 2010 compared to 2003, there was a greater probability of:
Eucalypt regeneration	'None' rather than 'sparse', 'medium' or 'dense'
Ground cover (Grd_nat)	'Native' rather than 'exotic' or 'mixed' (Other)
Log & branch cover (Log_br)	'Low' rather than 'medium' or 'high' (Medium)
Mistletoes	'>20' rather than '20 or less' (<20)
Shrubs 0.5-2m (Shrubs_5_2)	'None' rather than 'sparse' or 'moderate'

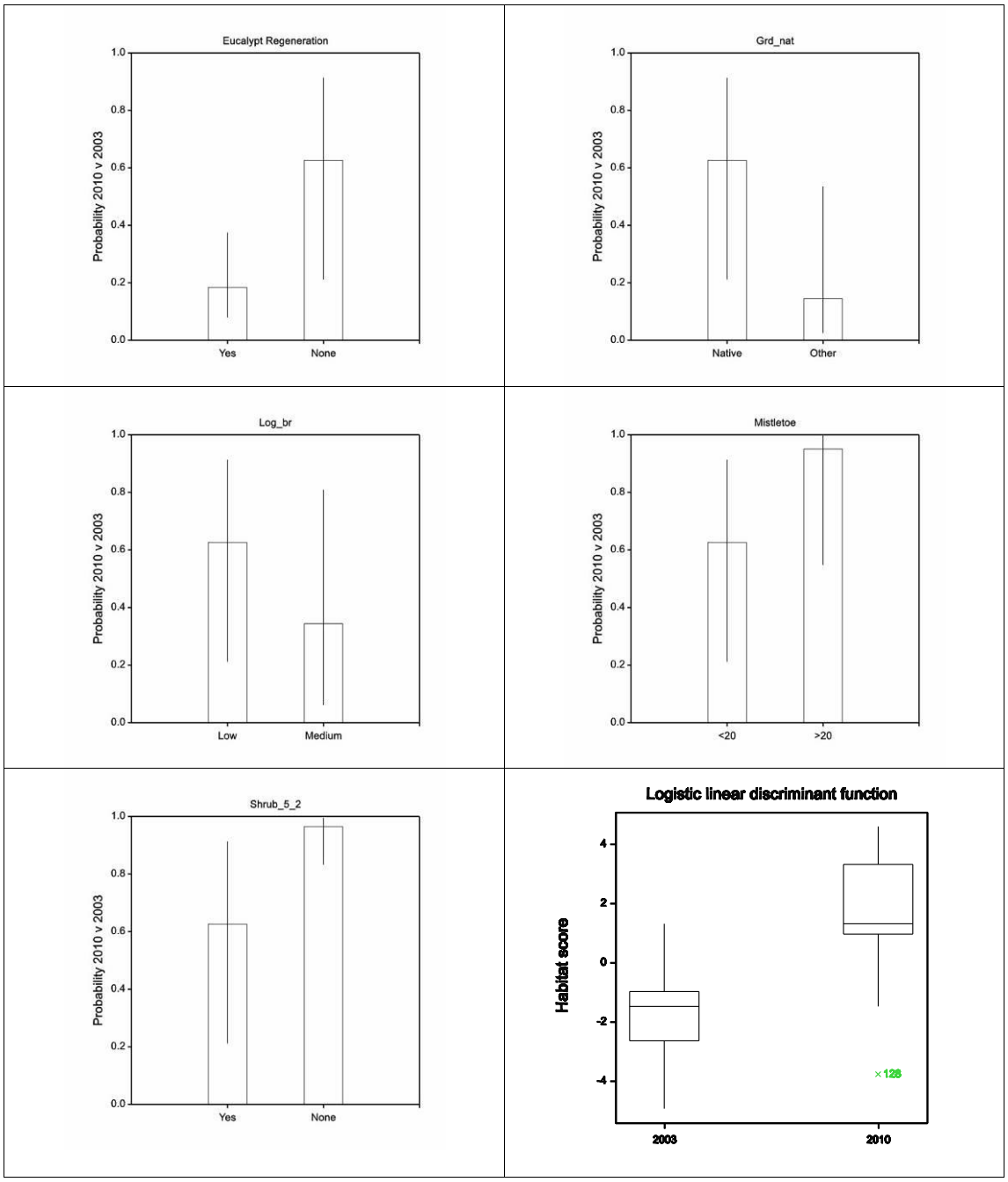


Figure 2. The effect of the five habitat variables, and the features of the composite habitat index (Grd_nat = ground cover, Log_br = log/branch cover, Shrub_.5_2 = shrubs 0.5-2m cover).

3.4. Bird Occupancy and Modelling Relationships With Habitat

Of the 109 land birds in the dataset, sufficient data were available to analyse 51 bird species. The results are presented graphically in Appendix 3 and an example is given for the Scarlet Robin in Figure 3 to illustrate different features of the graph, with a description as follows.

Each coloured dot represents one of the 66 sites with colour coding for each location:

- black = Castle Hill
- red = Goorooyarroo NR
- blue = Majura NR
- green = Mulligans Flat NR
- brown = Red Hill NR
- pink = Symonston.

The sites are arranged along the x-axis according to the Habitat Index; those sites towards the left-hand side have a more '2003-type' habitat and those towards the right-hand side have a more '2010-type' habitat. The thick black line represents the 'Between site slope', or the preference of the bird for sites of different habitat.

The 'between site' slope for the Scarlet Robin is negative which indicates higher odds of occupancy of 2003-type sites. The gradient of the slope is -0.088 +/- 0.0837, or in percentage terms, approximately -9 +/-8%. This means that for every gain in the habitat index of 1 unit, there is a -9% change in the odds of occupancy.

The 'Within site slope' is shown by the small line through each dot. This represents the mean rate of change in bird occupancy with the change in habitat at the sites between 2003 and 2010. In the case of the Scarlet Robin, the slope is negative, showing a 5% (+/- 3%) reduction at any given site with a change in the habitat index of 1 unit. The 'within site' slope represents the direct relationship between change in bird occupancy and change in habitat at a site.

The combination of the 'within site' and 'between site' slopes gives the 'Overall slope'. For the Scarlet Robin which showed decreased odds of occupancy at sites with the habitat change, plus a preference for the 2003-type sites, this combined slope provides stronger evidence ($p=0.049$) that the odds of occupancy decreased with the measured habitat change.

The 'Change in occupancy rate (odds)' is the percent change in the predicted value of the bird (odds of occupancy) between spring 2003 and spring 2010. This measure incorporates the effects of all environmental factors influencing a species' occupancy, not just the habitat variables at the site. For the Scarlet Robin the overall trend was for a 12% decrease, although it was not statistically significant.

The statistics and a brief written summary of the graph for each of the 51 species are given in Appendix 2, and some further species examples are described in the next section.

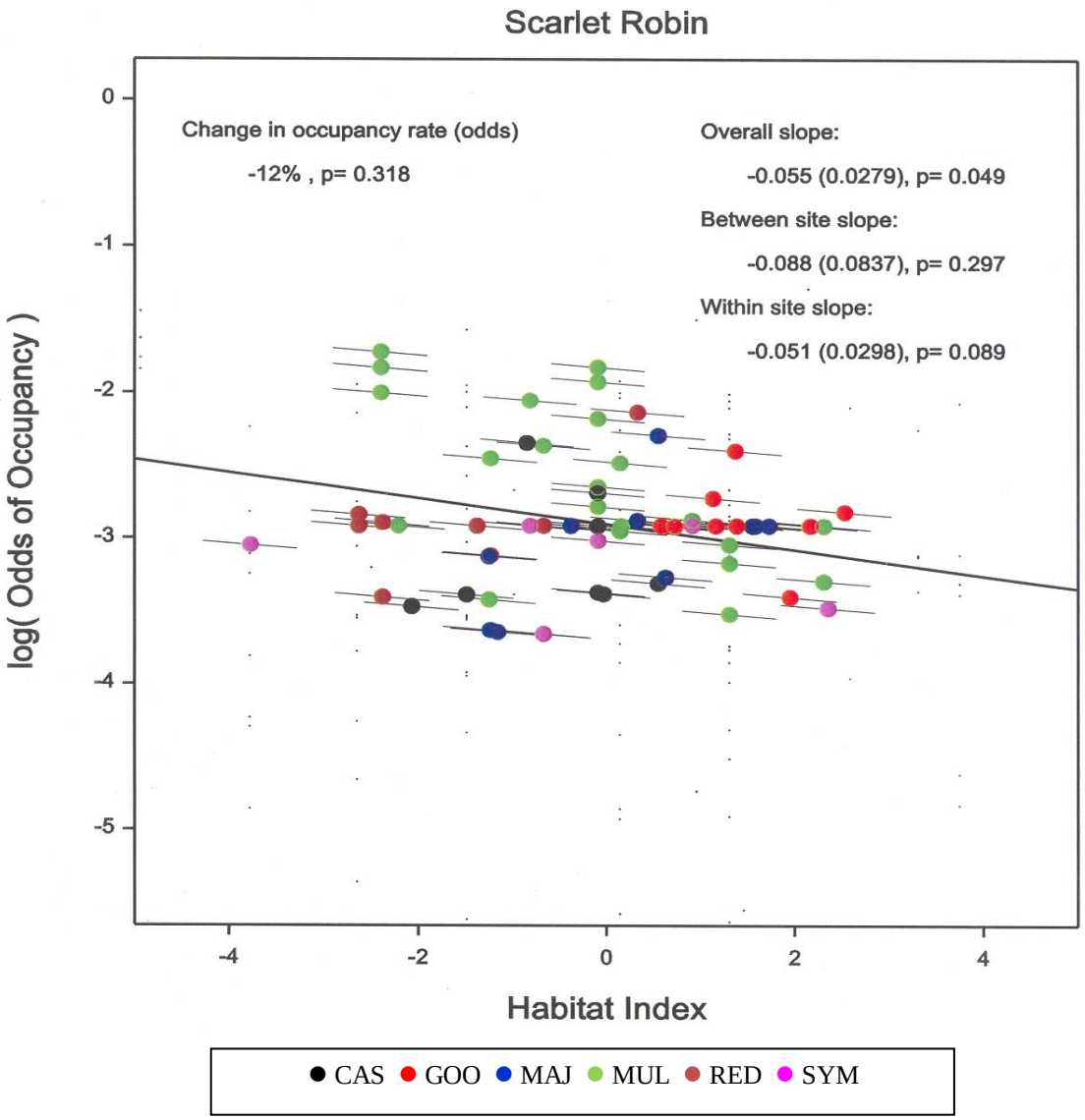


Figure 3. Odds of occupancy for the Scarlet Robin and the change over time 'within sites' and 'between sites'.

Table 4 summarises Appendix 2. The 51 species are grouped according to the change 'within sites' with the change in habitat. The level of change (the 'within site slope') is given as a percentage in parentheses. Fourteen species showed 'no change' (a change of less than 4%), 27 species showed an increase and 10 showed a decrease.

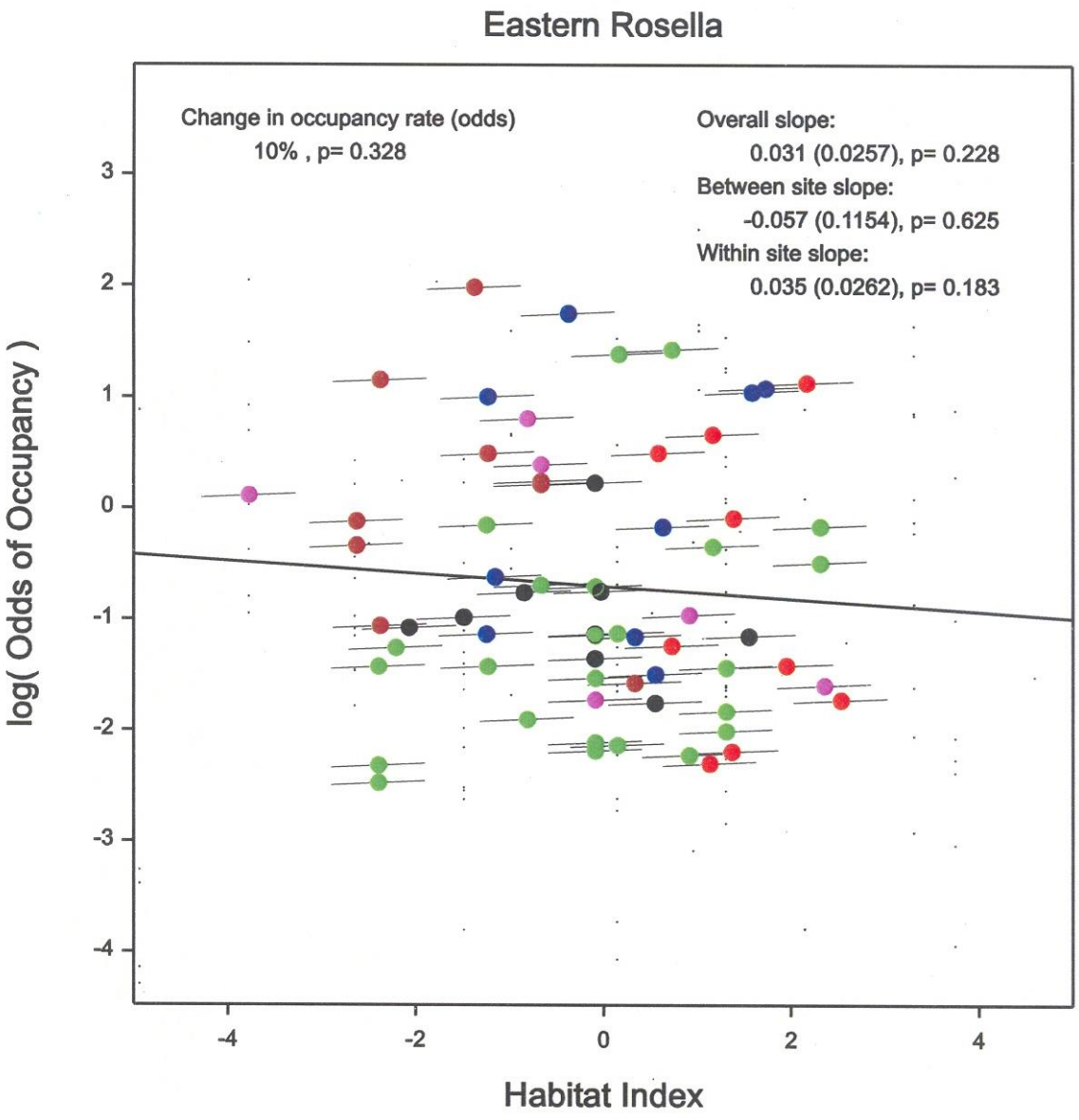
This table also groups the species according to odds of occupancy in sites of different habitat type. Thirteen species showed no preference for particular habitat type, 24 showed higher occupancy of 2003-type habitat, and 14 showed higher occupancy of 2010-type habitat.

Table 4. Summary of changes in odds of occupancy with habitat change, and habitat preference. Species are listed in descending order of percentage change within sites (in parentheses). Species in bold were selected for single habitat variable analysis.

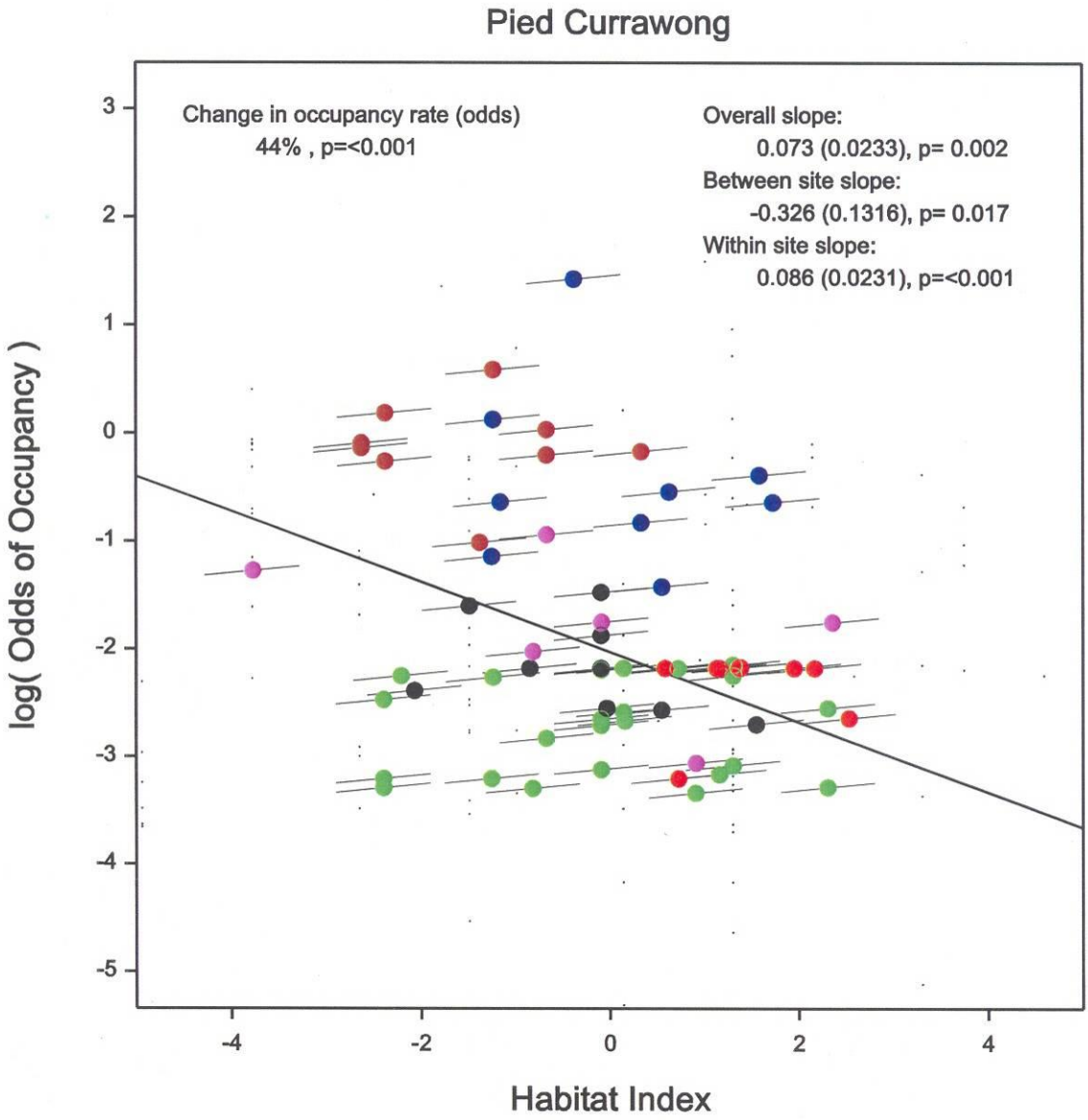
Change in occupancy with change in habitat	Habitat preference		
	Higher occupancy of 2003-type	No habitat preference	Higher occupancy of 2010-type
Increase	Gang-gang Cockatoo (21%) Olive-backed Oriole (17%) Sulphur-crested Cockatoo (13%) Australian Raven (10%) Laughing Kookaburra (9%) Pied Currawong (9%) Galah (9%) Brown Thornbill (6%) Australian Magpie (4%) Eastern Rosella (4%)	Australian King Parrot (21%) White-winged Chough (15%) Speckled Warbler (13%) Varied Sittella (10%) Spotted Pardalote (8%) Grey Butcherbird (6%) Grey Shrike-thrush (4%) Striated Pardalote (4%)	Crested Pigeon (33%) Noisy Miner (26%) Common Bronzewing (18%) Brown-headed Honeyeater (9%) White-eared Honeyeater (7%) Yellow-rumped Thornbill (7%) Rufous Whistler (6%) Yellow-faced Honeyeater (5%) Weebill (5%)
No change	Noisy Friarbird (3%) Western Gerygone (2%) Red Wattlebird (2%) Magpie-lark (1%) Black-faced Cuckoo-shrike (-2%) White-throat. Treecreeper (-2%) Leaden Flycatcher (-2%) Silvereye (-3%)	Crimson Rosella (0%) White-throated Gerygone (-2%) Golden Whistler (-3%)	Mistletoebird (3%) Buff-rumped Thornbill (-3%) Striated Thornbill (-3%)
Decrease	Red-rumped Parrot (-4%) Grey Fantail (-5%) Superb Fairy-wren (-5%) Scarlet Robin (-5%) Common Starling (-10%) White-plumed Honeyeater (-21)	Eastern Spinebill (-5%) Common Myna (-14%)	Willie Wagtail (-10%) Grey Currawong (-12%)

3.5. Species Examples

In this analysis, bird occupancy and habitat attributes vary at two levels, 'within sites' (over time) and 'between sites', making interpretation of the results more complex. The direction of change (increase, no change, or decrease) at the two levels may be the same or opposing for the one species. Some examples are given below to illustrate different effects.

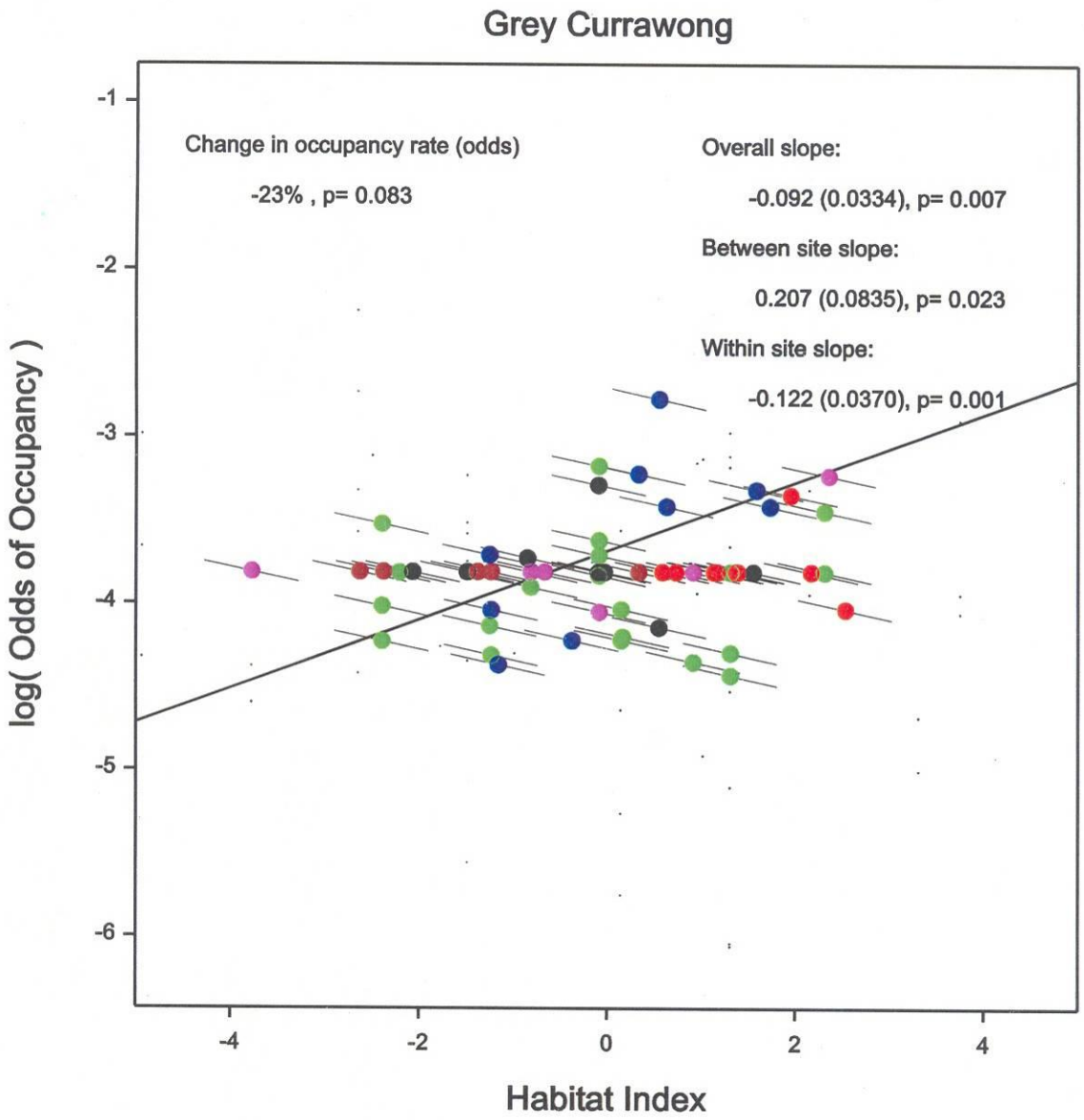


The Eastern Rosella is a common bird in the woodland surveys, and is an example of a species which showed little change. The increase within sites with the change in habitat was only slight (4 +/- 3%) for this species, while the 'between site' slope indicates a slight although variable preference (6 +/-11%) for 2003-type habitat.

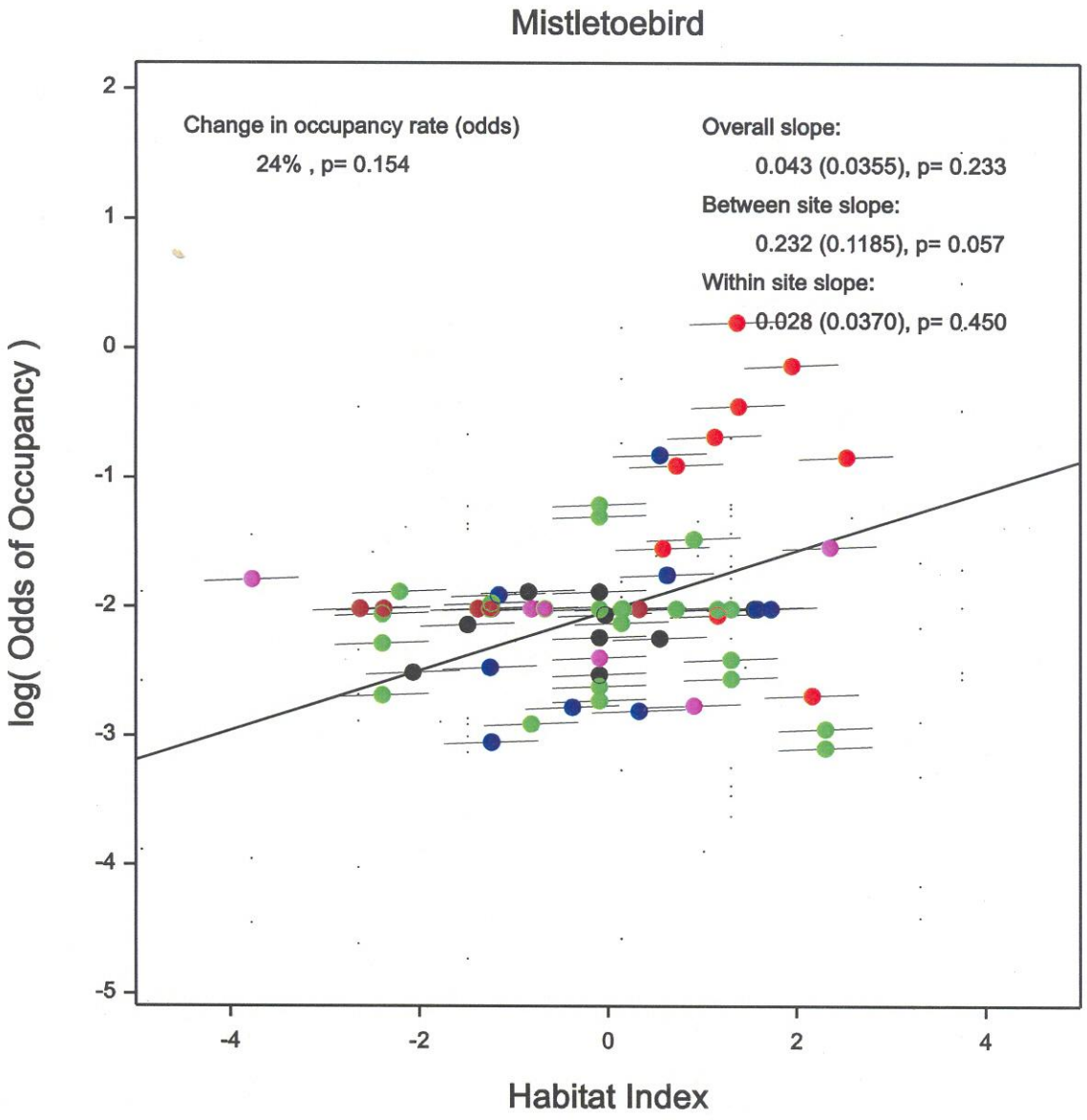


The Pied Currawong showed a significant increase (9 +/-2%) within sites with the change in habitat. This was despite the 'between site' effect going strongly in the opposite direction, the -32 +/-13% slope indicating higher occupancy of the Pied Currawong in sites with 2003-type habitat.

A plausible explanation for this is the influence of Canberra's suburban area. The Pied Currawong was the fourth most abundant species in COG's 2009-2010 Garden Bird Survey (COG 2011). The woodland sites are grouped into 'locations', but the 'between location' effect was not analysed in this project. However, a closer look at the graph indicates that this may be an important effect for the Pied Currawong. The graph shows higher odds of occupancy at those sites from locations within or adjacent to suburbs (Majura – blue and Red Hill – brown) compared to those more distant from established suburbs (Mulligans Flat – green, Goorooyarroo – red, and Castle Hill – black). So the higher occupancy of the Pied Currawong at certain sites may be more strongly influenced by proximity to the suburbs than by habitat at the site. Future surveys may be able to test this association, as surburban development approaches closer to Majura, Mulligans Flat and Goorooyarroo sites.



The Grey Currawong is not common in the woodland surveys and observations were fairly scant, coming largely from two locations, Majura and Mulligans Flat. The graph shows there was a significant decline (-12 +/-4%) in odds of occupancy of the Grey Currawong at sites with the habitat change. Habitat selection showed an opposite effect from that of the Pied Currawong, with 20% increase with each change in the habitat index towards 2010-type habitat.



The Mistletoebird, a specialist feeder on mistletoe fruit, is not common in the woodland surveys. It did show a significantly higher occupancy of sites of 2010-type habitat (that is, those with more mistletoe). There may be a strong location effect for this species, with high odds of occupancy at sites in Goorooyarroo (the red dots) where there are many mistletoe-infested trees.

There was only a very slight (3%) increase in occupancy with the change in habitat, that is, as mistletoe increased at sites, occupancy by Mistletoebirds hardly increased. It could be that those mistletoes that established over the 7 years between habitat assessments did not produce sufficient extra fruit to attract Mistletoebirds, or there could be other unrelated reasons why Mistletoebirds did not increase.

3.6. Individual Habitat Variables

For eight of the nine bird species selected for further analysis, a single habitat variable was found to be the 'best' single predictor of change in bird occupancy between the two years.

For the Scarlet Robin two variables were identified. The results are presented graphically in Appendix 4, with an example below for the Scarlet Robin (Figure 4).

The two habitat variables found to be the best predictors of change for the Scarlet Robin were the cover of shrubs 0.5-2m and tree health. Figure 4 illustrates the effect of the change in shrub cover. The 'within site' effect' is a measure of the effect when sites changed from having some shrubs to none. For the Scarlet Robin, this was a 28% decrease (p=0.052). There was also a tendency for the Scarlet Robin to select sites with shrubs rather than those without, although this was quite variable (the 'between sites effect' -12 +/-43%).

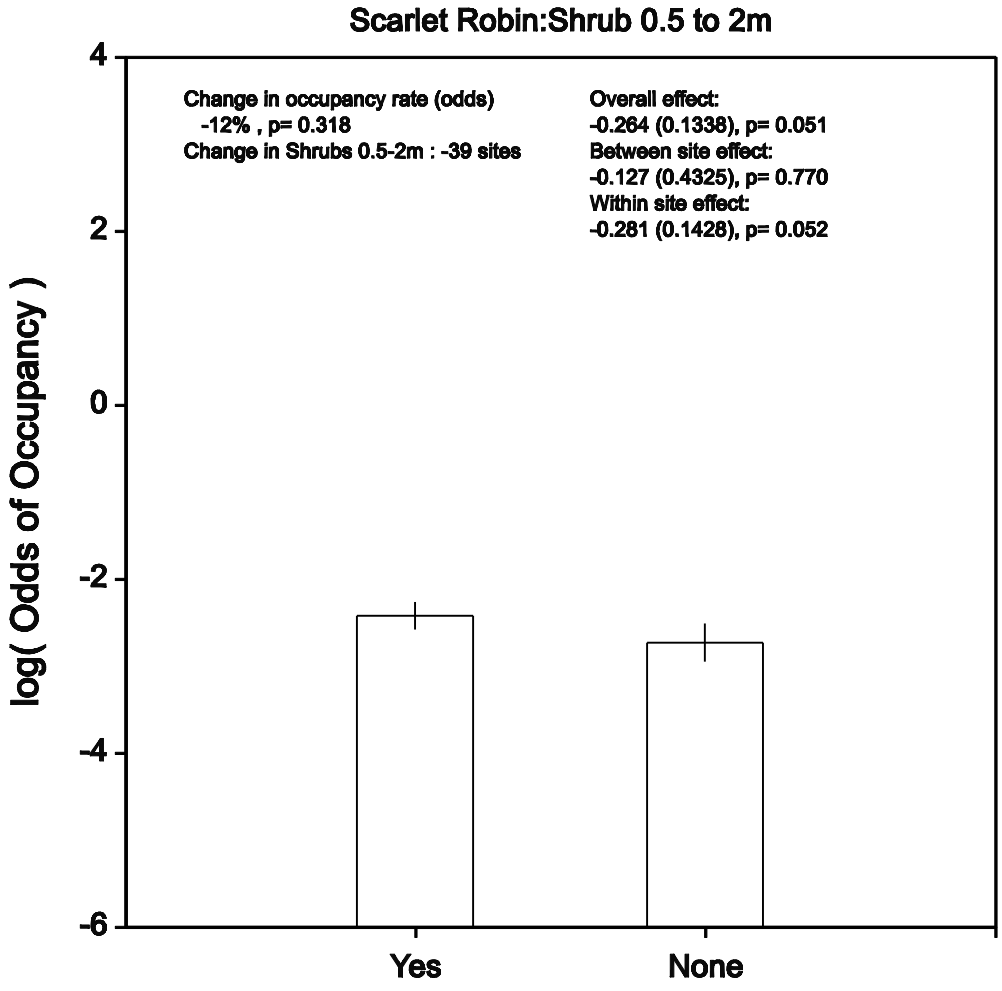


Figure 4. The effect of change in the cover of shrubs 0.5-2m on the odds of occupancy of the Scarlet Robin.

The results for the other eight species are summarised in Table 5. The change in shrub cover was the best predictor variable for the most bird species. In 2003, 46 sites had sparse or moderate cover of shrubs (0.5–2m tall), but in 2010 this had declined to seven sites because from 2003 to 2010 there had been a decrease in shrub density. Four of the selected nine species, Striated Thornbill, Buff-rumped Thornbill, White-plumed Honeyeater and Scarlet Robin, decreased in occupancy with this habitat change. The Noisy Miner, however, increased significantly.

The increase in mistletoe from 20 or less to >20 at eleven sites was the best predictor for two ground-feeding species, Speckled Warbler and Yellow-rumped Thornbill, both of which increased with this habitat change. At eight of these eleven sites, shrub cover also declined, which may increase the available foraging area for these two ground-feeding species.

Tree health, as measured by the % of eucalypt canopy (all age classes) with significant leaf damage or loss, was the best predictor variable for two species, Scarlet Robin and Mistletoebird. Where tree health declined or 'thinned' these two species declined in odds of occupancy.

The change in the number of tree hollows was the best predictor of change for the Weebill. The odds of occupancy for the Weebill decreased at those sites where tree hollows increased between 2003 and 2010.

Table 5. Habitat variables which best predict change in occupancy for 9 bird species.

Species	Best predictor habitat variable	Direction of change	Within site slope	
Speckled Warbler	Mistletoe	Increase at sites where mistletoe increased to >20	0.948	p<0 001
Weebill	Hollows	Decrease at sites where the number of hollows increased	-0.702	p=0.007
Striated Thornbill	Shrubs 0.5-2m	Decrease at sites where shrubs were lost	-0.308	p=0.017
Yellow-rumped Thornbill	Mistletoe	Increase at sites where mistletoe increased to >20	0.837	p<0 001
Buff-rumped Thornbill	Shrubs 0.5-2m	Decrease at sites where shrubs were lost	-0.245	p=0.041
White-plumed Honeyeater	Shrubs 0.5-2m	Decrease at sites where shrubs were lost	-1.081	p<0 001
Noisy Miner	Shrubs 0.5-2m	Increase at sites where shrubs were lost	1.553	p<0 001
Scarlet Robin	Shrubs 0.5-2m	Decrease at sites where shrubs were lost	-0.281	p=0.052
Scarlet Robin	Tree health	Decrease at sites where eucalypt canopy health 'thinned'.	-2.306	p<0 001
Mistletoebird	Tree health	Decrease at sites where eucalypt canopy health 'thinned'.	-2.906	p=0.014

4. Discussion

4.1 Habitat Variables

Five of the 12 measured habitat variables contributed to the 'best' composite measure of habitat change. Cover of eucalypt regeneration, shrubs, and logs and branches decreased, and mistletoes and native ground cover increased. Some of these changes can be seen in representative habitat photographs taken at the beginning and end of the survey period

(Appendix 6). Possible reasons for the changes in these variables include the drier than average conditions during the period 2003-2010.

The decline in the cover of eucalypt regeneration could be a result of the dry conditions killing saplings and suppressing germination, or by growth of the existing regeneration into next height category (>6 metres tall).

Drier than average conditions could be expected to result in the death of shrubs without replacement from new seedlings, thus explaining the decrease in shrub cover (0.5-2 metres tall). Dead native shrubs were noted at one Majura site, and woody weed poisoning/removal occurred at some Symonston, Red Hill and Majura sites. Rabbits and hares were common at several sites, and both will graze shrub seedlings. Silver Wattles at two Mulligans Flat sites that were noted as senescent in 2003 were dead in 2009. One Red Hill site that was burnt in 2001 showed an increase in shrub cover between the surveys, and shrub seedlings were noted for the first time in several years at some local woodland sites after the heavy rain in summer 2010-2011 (A Rowell pers. obs.).

The lower cover of logs and branches in 2010 is more difficult to explain. The opposite effect of increased log and branch cover could be expected under dry conditions, as stressed trees are more likely to have limbs dying and falling to the ground. Logs and large branches have also been added to some Goorooyarroo and Mulligans Flat sites by the ACT Government for habitat enhancement. The change may be a result of other factors such as removal of fallen timber for firewood. Despite the fact that most sites are in nature parks or reserves, illegal removal of timber for firewood does occur. Castle Hill (a grazed leasehold) was the only site for which firewood removal was confirmed during the survey period.

The greater number of mistletoes in 2010 is also unexpected given the dry conditions over the survey period. Mistletoes are dependent on their host's uptake of water and nutrients, and as the tree would suffer under drought conditions it could be expected that mistletoes would also suffer. If the assumption that trees under drought stress could be expected to drop more branches is correct, then it could be expected to find more fallen timber.

However, grazing by possums may be a factor in regulating mistletoe abundance (Watson 2011), and possum numbers may have been affected by the prolonged drought conditions. Butterflies and moths whose larvae develop on mistletoe often rely on other nectar-bearing plants (Watson 2011), and this food source may also have been reduced during the drought. Even low-intensity fires can kill mistletoes and the effect can last for many years, possibly because Mistletoebirds do not visit un-infested stands of trees (Watson 2011). Mistletoe has only recently started to appear in low numbers at Red Hill, which was extensively burnt in 1951-52.

The increase in the number of sites with native rather than mixed or exotic ground cover could be a result of dry conditions which could be expected to favour the survival of native ground cover species rather than exotics.

4.2 Composite Index

The index was developed so that the change in the measured habitat variables was maximised, and bird occupancy at the sites was related to this index of habitat. However, caution is needed when interpreting relationships, as a change in odds of occupancy may

occur for reasons unrelated to habitat change at the site level. This analysis provides evidence only that habitat change occurred at the same time as change in occupancy, not that it caused it.

Factors relating to changed occupancy may be:

- operating outside the site in some other part of the bird's range, e.g. for migratory species such as Western Gerygone, Olive-backed Oriole
- operating outside the site at a landscape scale, e.g. Pied Currawong, Australian King Parrot responding to the adjacent suburban habitat
- found within the site but not measured in the habitat assessment, e.g. litter cover/depth, tree death or ground cover species diversity
- measured in the assessment, but not at the most appropriate scale, e.g. ground cover was grouped into categories rather than recorded as a continuous percentage
- related to factors other than habitat, such as predation or human disturbance.

In addition, we need to be aware of the fact that the habitat variables are correlated. Thus the contribution of one variable in the composite measure may dilute or mask effects of others. For example, the increase in native ground cover at the expense of exotic ground cover may be a positive result for native birds, but the decrease in shrub cover is a greater negative result. The combination of these two factors may dilute the negative effect of shrub loss which could then only be confirmed by analysis of the individual habitat variables.

4.3 Increasers With Habitat Change

A number of the species which increased in occupancy with the change in habitat are medium to large-bodied species which have been increasing in agricultural regions of south-eastern Australia (Reid 1999), including Crested Pigeon, Galah, Sulphur-crested Cockatoo, Eastern Rosella, Noisy Miner, Australian Magpie, Pied Currawong, Australian Raven, and White-winged Chough. The increase in these species in the woodland sites may be a reflection of their overall abundance in the wider landscape as much as the change in habitat.

Two species which increased significantly, the Gang-gang Cockatoo and Australian King Parrot, are species which typically inhabit the wetter mountain forests in spring-summer and move down into lowland areas for the cooler months. The expansion of Canberra's suburbs and maturing of garden vegetation has provided greater food resources for these birds allowing them to increase in abundance in the suburbs (COG 2011). Both species are uncommon in the woodland sites and are recorded mostly from the peri-urban locations (Majura – blue, Red Hill – brown). The change in habitat at the woodland sites is unlikely to have suited these species and their increased occupancy is probably due to proximity to suburbs (location effect) although this was not tested.

Many of the other species which showed an increase in occupancy with the habitat change were smaller-bodied and mostly insectivorous, including Spotted Pardalote, Striated Pardalote, Speckled Warbler, Brown Thornbill, Yellow-rumped Thornbill, Weebill, Rufous Whistler, Brown-headed Honeyeater, Yellow-faced Honeyeater, White-eared Honeyeater and one ACT threatened species, the Varied Sittella.

4.4. Decreasers With Habitat Change

Interestingly, two of the species Reid (1999) defined as increasers, White-plumed Honeyeater and Willie Wagtail, had both decreased significantly with habitat change in the woodland sites. The decrease in White-plumed Honeyeater was found to be best predicted by the decrease in shrub cover, and it may be related to the increase in Noisy Miners, although this was not investigated. The Willie Wagtail is a bird of open country, including open areas within suburbs, and it could be expected that the change in habitat at the woodland sites (loss of shrubs and eucalypt regeneration) would not adversely affect this species. It showed a preference for the 2010-type habitat, yet it decreased significantly with the change in habitat.

The Superb Fairy-wren is a species strongly associated with a shrub layer, so it is not surprising that it showed higher occupancy of 2003-type (more shrubby) habitat, and that it declined within sites with the change in habitat.

The Scarlet Robin decreased within sites with the change in habitat. Further analysis of the individual habitat variables (see below) showed a direct relationship between the loss of shrubs and decreased occupancy, and also a decrease with a decline in tree health.

The Grey Currawong was found to have higher odds of occupancy in 2010-type habitat, but despite this had decreased significantly. It is known to be declining across its range and is a species which tends to avoid urban habitat (Higgins *et al* 2001). Around Canberra it may face possible inter-specific competition with the abundant Pied Currawong.

The Common Starling is a species of open agricultural land, but decreased strongly with the change in habitat and showed significantly higher occupancy of 2003-type habitat. The species is a temperate-climate, ground-feeding generalist, and its food sources of pasture soil invertebrates and seeds could also have been affected by drought and overgrazing during the survey period.

The Common Myna is typically an urban species and its decrease may have more to do with the active, community trapping program conducted within the suburbs than with habitat change.

4.5. Individual Variables

Factors affecting change in occupancy may be operating over local or landscape scales and be difficult to influence even if they can be identified. However, strong evidence of changed occupancy with a single changed habitat variable at the site level indicates that manipulation of that variable may possibly benefit specific birds.

Of the nine individual species analysed, the loss of shrub cover was the most common factor in the decrease of four species, Striated Thornbill, Buff-rumped Thornbill, White-plumed Honeyeater and Scarlet Robin, all small, primarily insectivorous species. The Striated and Buff-rumped Thornbills did not decrease significantly with the habitat index, suggesting that there may have been some positive aspects of the habitat change for these species, for example, the increase in native ground cover and mistletoes.

The loss of shrub cover was also the best predictor of the increase of the Noisy Miner, an aggressive colonial honeyeater. The presence of this species has been found to reduce the

abundance and species richness of woodland-dependent small birds by 60-90% (Maron 2009, Eyre *et al.* 2009), and is considered to be one of the most important processes threatening woodland birds in eastern Australia (Maron *et al* 2011).

The findings have important implications for management of the woodland understorey. Other studies have found that sites with a shrubby understorey, particularly one of bipinnate wattles (eg Silver Wattle, *Acacia dealbata*) are less likely to support Noisy Miners than those without (Hastings and Beattie 2006, Lindenmayer *et al* 2010). Noisy Miners may prefer open sites with less fallen timber because structurally simple territories are easier to defend from predators and competitors (Maron 2009).

The decrease in shrub cover in the woodland sites is probably a result of extended dry conditions, and it is possible that average or wet conditions may result in natural regeneration of shrubs. However, if grazing pressure (from both native and introduced herbivores) is not controlled or a seed source is not available, restoring the shrub layer by planting or seeding would be a necessary management action, especially where woody weed control is also taking place. This would appear to be an activity that could directly benefit four of the nine bird species analysed, and may indirectly benefit other small woodland birds by reducing site occupancy by Noisy Miners. Investigation of relationships between occupancy of the Noisy Miner and other small woodland birds may help inform and direct management actions.

The increase in the number of mistletoes was strongly related to the increase in occupancy of two ground-feeding species, the Speckled Warbler and Yellow-rumped Thornbill. This may be a result of an increase in the nutrient-rich litter which falls from mistletoes improving the foraging quality for ground-feeding birds, or because of the provision of additional nesting sites for the Yellow-rumped Thornbill, in particular.

Watson (2002) found significantly fewer woodland bird species in a site from which mistletoe had been deliberately removed compared to the adjacent woodland which had received no mistletoe removal, showing that mistletoe density had a significant positive effect on species richness. The COG project did not examine species richness, but did find a significant increase in occupancy of two of the species analysed with an increase in mistletoe density. Interestingly, the increase in number of mistletoes was not the best predictor variable for the Mistletoebird, the one species which could be expected to be most closely linked to mistletoe abundance.

Change in the number of tree hollows was the best habitat variable predicting change in Weebill occupancy, an unexpected result as Weebills are not hollow-nesting species. As the number of tree hollows increased at a site, odds of occupancy by Weebills decreased. The formation of tree hollows in the 7 years between habitat assessments is only likely to occur by the breaking of tree limbs exposing a hollow interior. The loss of tree limbs may have reduced canopy cover which could have adversely affected occupancy by Weebills. This result may also be a chance correlation with no real causal relationship.

A decline in tree health was a significant predictor for the decrease in odds of occupancy of two species, Scarlet Robin and Mistletoebird. Poor tree health may be caused by a wide range of factors including the dry conditions. Drought stress cannot be managed for at the site level, however, it emphasises the need to retain and restore woodlands in lower parts of the landscape on deeper, more fertile and well-watered soils where the vegetation will

be more resilient to drought. Occupancy by the Noisy Miner has also been implicated in poor tree health (Higgins *et al.* 2001). The Noisy Miner drives away smaller insectivorous birds which help control leaf-eating and sap-sucking insects. These insects may then proliferate to a point where they are damaging tree health.

Since the major 2003 bushfires in the ACT, a new bushfire management plan has been adopted which sets out fuel management standards for fire management zones involving reduction of tree density, shrub layer and grass length by physical methods or prescribed burning (ACT Government 2009). Such fuel management would affect many of the habitat variables measured in this survey. Where suburbs are close to reserves, the variable-width fuel management zone is likely to be within the reserve area. Fuel management burning would reduce logs, litter, mistletoe and hollows. Burning may initially reduce the shrub layer then stimulate dense growth of shrubs such as wattles or Bitter-pea (*Davesia* sp). Physical reduction of the shrub and ground layer and the tree canopy would also be likely to affect many bird species.

Acknowledgements

The statistical analyses and preparation of this report was assisted by an ACT Environment Grant (2010/11). A list of acknowledgements for the COG Woodland Bird Survey project appeared in the 2010 project report (Bounds *et al* 2010).

References

ACT Government (2009) *Strategic Bushfire Management Plan for the ACT.* Emergency Services Agency, Canberra.

Bounds, J., Taws, N. and Cunningham, R. (2007) A Statistical Analysis of Trends in Occupancy Rates of Woodland Birds in the ACT, 1998 to 2005. *Canberra Bird Notes* 32(2): 73-98.

Bounds, J., Taws, N. and Cunningham, R. (2010) A Statistical Analysis of Trends in Occupancy Rates of Woodland Birds in the ACT, December 1998 to December 2008. The Ten Year-Data Analysis. *Canberra Bird Notes* 35(3): 158-191.

Bureau of Meteorology website, 'Climate Data Online: www.bom.gov.au/climate, accessed August 2011.

Canberra Ornithologists Group (2011) Annual Bird Report 1 July 2009 to 30 June 2010. *Canberra Bird Notes* 36 (1): 1-80.

Christidis, L. and Boles, W.E. (2008) *Systematics and Taxonomy of Australian Birds*. CSIRO Publishing, Collingwood.

Collett, D. (1991) *Modelling Binary Data*. Chapman and Hall / CRC.

Cunningham, R. (2003) *A statistical assessment of the status and trends of woodland birds in the ACT:* a report to Canberra Ornithologists Group (COG), September 2003.

Cunningham, R.A. and Rowell, A.M. (2006). A Statistical Analysis of Trends in Detection Rates of Woodland Birds in the ACT, 1998 to 2004. *Canberra Bird Notes* 31(2): 73-110.

Davey, C. (2001) The Birds of Mulligans Flat Reserve – a six-year survey. A report to Canberra Ornithologists Group.

Environment ACT (2004) *Woodlands for Wildlife: ACT Lowland Woodland Conservation Strategy Action Plan No 27*. March 2004.

Eyre, T.J., Maron, M., Mathieson, M.T. and Haseler, M.(2009) Impacts of grazing, selective logging and hyper-aggressors on diurnal bird fauna in intact forest landscapes of the Brigalow Belt. *Austral Ecology* 34 (6): 705-718.

Galway, N.W. (2007) *Introduction to Mixed Modelling: Beyond Regression and Analysis of Variance*. John Wiley and Sons, Ltd.

Kenward, M.G. and Roger, J.H. (1997) Small sample inference for fixed effects from restricted maximum likelihood. *Biometrics* 53: 983-997.

Hastings. R.A. and Beattie, A.J. (2006) Stop the bullying in the corridors: Can including shrubs make your revegetation more Noisy Miner free? *Ecological Management and Restoration* 7(2*)*: 105-112.

Higgins, P.J., Peter, J.M. and Steele, W.K. (Eds.) (2001) *Handbook of Australian, New Zealand and Antarctic Birds*, Vol. 5. Oxford University Press, Melbourne.

Lindenmayer, D.B., Knight, E.J., Crane, M.J., Montague-Drake, R., Michael, D.R. and Macgregor, C.I. (2010) What makes an effective restoration planting for woodland birds? *Biological Conservation* 143: 289-301.

Maron, M. (2009) Nesting, foraging and aggression of Noisy Miners relative to road edges in an extensive Queensland forest. *Emu* 109: 75-81.

Maron. M., Main, A., Bowen, M., Howes, A., Kath, J., Pillette, C and McAlpine, C.A. (2011) Relative influence of habitat modification and interspecific competition on woodland bird assemblages in eastern Australia. *Emu* 111: 40-51.

Rehwinkel, R. (2007) *A Method to Assess Grassy Ecosystem Sites: Using floristic information to assess a site's quality*. NSW Department of Environment and Climate Change, November 2007.

Reid, J.R.W. (1999) Declining Birds in the NSW Sheep-Wheat Belt 1. Diagnosis, Characteristics and Management. Report for the NSW National Parks and Wildlife Service.

Rowell, A. (2004) *Canberra Ornithologists Group Woodland Bird Survey Progress Report, 2000-2003*. Canberra Ornithologists Group.

Watson, D.M. (2002) Effects of mistletoe on diversity: a case-study from southern New South Wales. *Emu* 102: 275-281.

Watson, D.M. (2011) *Mistletoes of Southern Australia*. CSIRO Publishing, Collingwood.

APPENDIX 1. Data Analysis (Ross Cunningham)

Our analysis has 4 major components

1. The construction of a composite numeric measure of change in habitat between 2003 and 2010
2. The interpolation of estimates of bird occupancy in 2003 and 2010
3. Modelling the relationship between bird occupancy and the composite habitat index with particular emphasis on within site, temporal relationships.
4. For a selection of individual birds the identification of key habitat variables effecting change in bird occupancy.

1. Constructing a numeric index of change in Habitat

Habitat data available for analysis consisted of 12 categorical variables recorded on 66 sites in 2003 and 2010.

We used linear logistic regression to identify variables, from among the 12 available categorical variables, that best discriminated between habitats of 2010 and 2003. The outcome from this analysis was a linear predictor (a composite of significant variables) that characterised habitat for each site in the two periods in a quantitative way such that separation between 2003 and 2010 means, relative to site variability, was a maximum. Table 6 gives a summary of this analysis.

Table 6. Habitat variables, parameters estimates and associated statistics, contributing to the 'best' composite measure of habitat change.

Habitat variable	Parameter estimate	s.e.	t(*)
Constant	-1.486	0.487	-3.05
Eucalypt regeneration none	2.003	0.835	2.40
Ground cover mixed or exotic	-2.290	0.725	-3.16
Log/branch cover medium	-1.160	0.571	-2.03
Mistletoe >20	2.44	1.06	2.30
Shrub cover 0.5-2m none	2.793	0.564	4.95

Parameters for factors are differences compared with the reference level:

Factor	Reference level
Eucalypt regeneration	Yes
Ground cover	Native
Log/branch cover	Low
Mistletoe	<20
Shrub cover 0.5-2m	Yes

Positive values:

- No eucalypt regeneration
- Ground cover native
- Log/branch cover low
- Mistletoe >20,
- Shrub Cover 0.5-2m none

Negative values:

- Some eucalypt regeneration
- Ground cover mixed or exotic
- Log/branch cover medium
- Mistletoe <20,
- Shrub Cover 0.5-2m some

2. The interpolation of estimates of bird occupancy in 2003 and 2010

The principal objective here was to obtain a 'best' estimates of bird occupancy for each site at time points corresponding to habitat surveys. This was achieved by considering all surveys and all sites simultaneously and modelling trend and seasonal effects and interpolating values for each site. This approach is preferable to taking observed bird occupancy rates close to the times at which habitat data were collected.

In brief the statistical approach was as follows:

For each bird a statistical model (similar to the model used in previous COG studies) was a logistic regression model with fixed effect terms Site, Season, Time (as a linear effect) and Site by Linear Time. This model facilitates prediction at each site, each year and each season, of bird occupancy, on a logit scale, together with estimates of the variance of predicted values. We used values at each site for spring 2003 and spring 2010, coinciding with (as near as possible) the habitat surveys.

A detailed account of modelling binary data can be found in Collett (1991). The logistic model assumes that the underlying odds of detection of a given species for different sites are proportional and likewise for the different survey times. For a number of compelling statistical reasons it is more appropriate to work with odds ratios rather than with 'probabilities' when modelling proportions or binary data.

For interpolation it is convenient to assume that observations on successive points in time are independent after accounting for long–term trends and mean effects due to season. The effect of serial correlation, or indeed of any dependence between observations, on parameter estimates is typically small but the effect on estimated standard errors can be considerable. These considerations are important if we were to use our modelling for inferences relating to trend, and seasonal effects.

3. Modelling the relationship between bird occupancy and the composite habitat index with particular emphasis on within site, temporal relationships

The following description is of a statistical model formulated to study relationships at the 'between sites' as well as at the 'within site' (temporal) level.

Our data are two-levels and the response variable 'occupancy by a given bird species' varies at two levels; 'within site' and 'between site' (within a location). For the purposes of these analyses we have not considered the 'between location' level. The same applies to the candidate explanatory variables representing habitat.

We recognise in our statistical analysis that observations within the same site share common spatial factors, which may make their results more homogeneous than those of a random sample of observations drawn across sites. That is, repeat observations on the same site share the same environmental attributes selected by the avian fauna, so we expect that repeat observations within a site will be more homogeneous than observations between sites. It is important that our proposed statistical model reflect the sampling design and so we must specify and account for the dependence structure. This suggests that the factors Site should be regarded as random effects in our model.

A feature of our study is that our two-level data allow us to segregate inferences pertaining to regression relationships at different levels. We can estimate the difference in bird occupancy between sites which differ by one unit in habitat score at the site average level. Further we can estimate effect sizes for the expected change in the bird response over time per unit change in the habitat variable, over all sites.

A particular strength of longitudinal studies is that we do not have to make the strong assumption that the between site and within site relationships are the same, as is the case with cross-sectional studies. The within site regression coefficient is estimated by comparing and individual responses at two times assuming the given habitat variable changes with time. For most responses there is considerable variability across individuals due to unmeasured geographic and environmental characteristics. These tend to persist over time and their influence is cancelled in the estimation of the within- site relationship, but they obscure the estimation of the between-site relationships.

To distinguish effects at the different levels and to take account of the dependence structure, our statistical model has the form set out below.

Bird occupancy = constant + average habitat effect+ site random effect + change in habitat effect +within-site random error

where H_s denotes the vector of H means for each site which varies only at the site level; ; and H_w is the vector of differences between repeat observations and the relevant site H mean, which varies only at the observation level.

$H_s + H_w$ represent the totality of components of the original vector of H.

The above model fits within the general framework of general linear mixed models (Galway, 2006). Restricted maximum likelihood is used to estimate variance components and weighted least squares for estimating fixed effects. Statistical significance of effects was assessed by calculating adjusted Wald statistics (Kenward & Roger, 1997). Extrinsic weights were 1 /Var (predicted logit occupancy). Where necessary, variables were scaled by square roots or natural logarithms to better meet linearity assumptions. General model checking procedures were routinely used to identify aberrant data and to check the model assumptions.

4. For a selection of individual birds the identification of key habitat variables effecting change in bird occupancy

For each of the nominated birds of interest we have undertaken an additional analysis for the purpose of identifying a key habitat variable that is the 'best' single predictor of change in bird occupancy between the two years. This involves fitting a weighed least squares regression with Site as a fixed effect and then searching for the best single predictor using the Akaike information criterion (Aic) and the Schwarz information criterion (Sic). Given the selected 'best' habitat variable, the between-site, within-site modelling is the same as above except that the explanatory variable is now the best single predictor of change, expressed in a binary form.

APPENDIX 2. Effect of habitat change on occupancy of 51 bird species in 66 woodland sites between 2003 and 2010. (Taxonomy follows Christidis and Boles (2008)).
Species in uppercase were selected for single habitat variable analysis.
*= change in occupancy with change in habitat, ↑ = increase, ↓ = decrease.
oc = occupancy; hc = habitat change

Note: *Some statistics have been omitted from this table but can be seen in the full report on the COG website (http://canberrabirds.org.au) under "conserving birds".*

*	Species	Within site slope		Between site slope		Description of graph
↑	Common Bronzewing	0.180 (0.0297)	p=<0.001	0.180 (0.1425)	p=0.217	Low oc. but a signif. 18% incr. in odds of oc within sites with hc. Strong pref. for 2010-habitat.
↑	Crested Pigeon	0.326 (0.0395)	p=<0.001	0.134 (0.1511)	p=0.382	Low oc. but a highly signif. incr. of 33% in odds of oc. within sites with hc. Pref. for 2010-type habitat.
↑	Gang-gang Cockatoo	0.207 (0.0262)	p=<0.001	-0.443 (0.1792)	p=0.027	Low oc but highly signif. incr. of 20% within sites with hc. This was despite a very strong pref. for 2003-type habitat. Also possible 'location effect' with most obs. at locations close to suburbs (Majura, Red Hill).
↑	Galah	0.085 (0.0274)	p=0.003	-0.070 (0.1085)	p=0.524	High oc and 9% incr. within sites with hc. Slight though variable tendency (-7 +/-11%) for 2003-type habitat.
↑	Sulphur-crested Cockatoo	0.129 (0.0284)	p=<0.001	-0.085 (0.0917)	p=0.361	Moderate oc with a signif. 13% incr. with hc within sites. Pref. for 2003-type habitat.
↑	Australian King Parrot	0.205 (0.0339)	p=<0.001	0.023 (0.1501)	p=0.879	Low oc but a highly signif. 20% incr. with hc within sites. No habitat pref. but possible 'location effect' with most obs. at locations close to suburbs (Majura, Red Hill, Symonston).
	Crimson Rosella	0.000 (0.0251)	p=0.987	-0.095 (0.0760)	p=0.216	High oc which remained unchanged with hc. Pref. for sites of 2003-type habitat, may be a 'location effect' reflecting higher oc of locations nearer the suburbs.
↑	Eastern Rosella	0.035 (0.0262)	p=0.183	-0.057 (0.1154)	p=0.625	High oc with only a slight incr. with hc. Slight but variable (6 +/-11%) pref. for 2003-type habitat.
↓	Red-rumped Parrot	-0.040 (0.0352)	p=0.254	-0.171 (0.4372)	p=0.705	Low oc with few rec. Slight decr. with hc within sites. Strong but variable (-17 +/-43%) pref. for 2003-type habitat.
↑	Laughing Kookaburra	0.089 (0.0386)	p=0.023	-0.045 (0.0975)	p=0.649	Low oc with a 9% incr. within sites with hc. Slight but variable (5 +/-10%) pref. for 2003 habitat.
	White-thr. Treecreeper	-0.018 (0.0247)	p=0.469	-0.153 (0.0930)	p=0.106	Low oc with no change. Pref. for 2003-type habitat.
↓	Superb Fairy-wren	-0.049 (0.0328)	p=0.138	-0.294 (0.1366)	p=0.039	Moderate oc with a 5% decr. with hc within sites. Combined with strong pref. for 2003-type habitat, the overall evidence is for a decrease with hc.
↑	SPECKLED WARBLER	0.127 (0.0312)	p=<0.001	0.028 (0.1001)	p=0.778	Low oc but a signif. 13% increase with hc within sites. No habitat pref..

*	Species	Within site slope		Between site slope		Description of graph
↑	WEEBILL	0.047 (0.0298)	p=0.121	0.097 (0.0781)	p=0.220	High oc with 5% incr. with hc within sites. Combined with a pref. for 2010-type sites, evidence for an overall increase with hc is strong.
	Western Gerygone	0.024 (0.0292)	p=0.423	-0.147 (0.0890)	p=0.109	Low oc with no change within sites with hc. A strong pref. for 2003-type habitat.
	White-throated Gerygone	-0.022 (0.0388)	p=0.565	0.035 (0.1028)	p=0.732	Moderate oc with no change within sites with hc. No signif. habitat prefe.
	STRIATED THORNB.	-0.032 (0.0243)	p=0.191	0.195 (0.1077)	p=0.075	Moderate oc with a slight decr. with hc within sites, despite a strong pref. for 2010-type habitat.
↑	YELLOW-RUMPED. THORNB.	0.066 (0.0298)	p=0.030	0.129 (0.0841)	p=0.134	Low oc, but a 7% incr. with hc within sites. A pref. for 2010-type habitat.
	BUFF-RUMPED THORNB.	-0.032 (0.0240)	p=0.184	0.064 (0.0871)	p=0.467	Moderate oc. Slight decr. (3%) with hc within sites. Slight pref. (6%) for 2010-type habitat.
↑	Brown Thornbill	0.056 (0.0325)	p=0.087	-0.086 (0.1229)	p=0.491	Low oc. Slight incr. with the hc within sites, but a pref. for 2003-type habitat.
↑	Spotted Pardalote	0.075 (0.0253)	p=0.004	-0.031 (0.0587)	p=0.604	Moderate oc, 8% incr. with hc within sites. No habitat pref..
↑	Striated Pardalote	0.036 (0.0277)	p=0.202	0.013 (0.0657)	p=0.839	High oc with only slight (4%) incr. with hc within sites. No habitat pref.
↓	Eastern Spinebill	-0.052 (0.0262)	p=0.048	0.032 (0.1535)	p=0.838	Low oc with 5% decr. within sites with hc. No habitat pref..
↑	Yellow-faced Honeyeater	0.048 (0.0261)	p=0.067	0.052 (0.0832)	p=0.536	Low oc. with a 5% incr. with hc within sites. Slight (5%) pref. for 2010-type habitat.
↑	White-eared Honeyeater	0.070 (0.0408)	p=0.091	0.049 (0.0909)	p=0.594	Low oc but a 7% incr. with hc within sites. Slight (5%) pref. for 2010-type habitat.
↓	WHITE-PLUMED HONEY-EATER	-0.209 (0.0240)	p=<0.001	-0.318 (0.2414)	p=0.201	Low oc and a highly signi. decrease (21%) with hc within sites, and a very strong (-32%) pref. for 2003-type habitat.
↑	NOISY MINER	0.262 (0.0320)	p=<0.001	0.110 (0.1855)	p=0.556	Moderate oc, but a large (26%) and highly signif.incr. within sites with hc. Also pref. for 2010-type habitat.
	Red Wattlebird	0.020 (0.0357)	p=0.568	-0.222 (0.0853)	p=0.012	Moderate oc with no change. Strong pref. for sites of 2003-type habitat, but this may also be a 'location effect' reflect. higher oc of locations nearer suburbs.
↑	Brown-head. Honeyeater	0.085 (0.0298)	p=0.005	0.128 (0.0878)	p=0.155	Low oc but a 9% incr. within sites with hc. Strong pref. for 2010-type habitat.
	Noisy Friarbird	0.033 (0.0292)	p=0.265	-0.076 (0.0675)	p=0.263	Low oc with little change with hc. Slight pref. for 2003-type habitat.
↑	Varied Sittella	0.097 (0.0379)	p=0.012	-0.026 (0.0815)	p=0.756	Low oc but a 10% incr. within sites with hc. No habitat pref.
	Black-faced Cuckoo-shrike	-0.017 (0.0312)	p=0.590	-0.131 (0.0480)	p=0.009	Low oc with no change within sites with hc. There was a signif. pref. for 2003-type habitat.
	Golden Whistler	-0.031 (0.0300)	p=0.302	-0.036 (0.0773)	p=0.644	Low oc with only a slight decr. (3%) with hc within sites. Slight pref. for 2003-type habitat.

*	Species	Within site slope		Between site slope		Description of graph
↑	Rufous Whistler	0.059 (0.0276)	p=0.037	0.044 (0.0888)	p=0.619	Medium oc. A 6% incr. with hch within sites. Slight but variable (4 +/-9%) pref. for 2010-type habitat.
↑	Grey Shrike-thrush	0.039 (0.0340)	p=0.259	0.009 (0.0879)	p=0.921	Low oc with only a slight incr. (4%) with hc within sites. No habitat pref..
↑	Olive-backed Oriole	0.171 (0.0350)	p=<0.001	-0.158 (0.1232)	p=0.207	Low oc but a signif.incr. of 17% within sites, despite a strong pref. for 2003-type habitat.
↑	Grey Butcherbird	0.055 (0.0353)	p=0.124	0.030 (0.1185)	p=0.803	Low oc. Slight incr. with hc within sites. No habitat preference.
↑	Australian Magpie	0.038 (0.0258)	p=0.141	-0.059 (0.0791)	p=0.458	High occupancy. Slight increase with habitat change within sites. Slight pref. for 2003-type habitat.
↑	Pied Currawong	0.086 (0.0231)	p=<0.001	-0.326 (0.1316)	p=0.017	Moderate oc with a 9% incr. within sites with hc. A large (33%) and signif. pref. for sites of 2003-type habitat but this may also be a 'location effect' reflecting higher oc of locations nearer the suburbs.
↓	Grey Currawong	-0.122 (0.0370)	p=0.001	0.207 (0.0835)	p=0.023	Low oc. A highly signif. 12% decr. within sites with hc, despite a strong pref. for 2010-type habitat.
↓	Grey Fantail	-0.048 (0.0316)	p=0.131	-0.055 (0.0825)	p=0.509	High oc, but a 5% decr. within sites with hc combined with a pref. for 2003-type sites gives evidence of decline with hc.
↓	Willie Wagtail	-0.104 (0.0333)	p=0.002	0.133 (0.2706)	p=0.681	Low oc and a 10% decr. with hc within sites, despite a pref. for 2010-type habitat.
↑	Australian Raven	0.096 (0.0295)	p=0.002	-0.115 (0.0590)	p=0.058	Low oc but a signif. 10% incr. within sites with hc, despite a strong pref. for 2003-type habitat.
	Leaden Flycatcher	-0.020 (0.0481)	p=0.676	-0.081 (0.1118)	p=0.477	Very low oc with no change within sites with hc. Pref. for 200-3-type habitat.
	Magpie-lark	0.009 (0.0251)	p=0.714	-0.075 (0.1557)	p=0.635	Low oc with no change within sites with hc. Pref. for 200-3-type habitat.
↑	White-wing. Chough	0.153 (0.0325)	p=<0.001	-0.009 (0.0768)	p=0.904	Low oc, but a signif. 15% increase within sites with hc. No habitat pref..
↓	SCARLET ROBIN	-0.051 (0.0298)	p=0.089	-0.088 (0.0837)	p=0.297	Low oc. A 5% decr. with hc within sites combined With a pref. for 2003-type habitat gives strong evidence of a decline with hc.
	Silvereye	-0.032 (0.0284)	p=0.257	-0.159 (0.0947)	p=0.101	Low oc with little change with hc. A strong pref. for 2003-type habitat.
↓	Common Starling	-0.101 (0.0339)	p=0.004	-0.352 (0.1883)	p=0.074	Moderate oc but a 10% decr. within sites with habitat change. A very strong (35%) preference for 2003-type habitat.
↓	Common Myna	-0.145 (0.0450)	p=0.002	0.044 (0.2422)	p=0.857	Low oc and a signif. 15% decr. within sites' with hc No habitat pref.
	MISTLE-TOEBIRD.	0.028 (0.0370)	p=0.450	0.232 (0.1185)	p=0.057	Low oc with slight (3%) incr. within sites with hc. A strong pref. for sites of 2010-type habitat.

NOISY MINERS IN THE COG GARDEN BIRD SURVEY

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1. Introduction

As Coordinator of the COG Garden Bird Survey (GBS) I was recently asked to provide information about the changes in the status of the Noisy Miner *Manorina melanocephala* based on the data collected in the Survey. This request was related to current consideration of the Noisy Miner as a nuisance species, noting research which has shown that by 'bullying' insectivorous bird species they are not only reducing the numbers of those species but also permitting increased numbers of insect pests (See for example http://www.aceas.org.au/index.php?option=com_content&view=article&id=84:beating-the-bullies&catid=35:working-groups&Itemid=86; Clarke et al 1995).

The principle purpose of this article is to present some of the data available in the GBS in ways which may indicate some changes have occurred in the Noisy Miner population over the period of the GBS in the catchment area of that Survey. It will conclude with some speculations on how these changes may relate to received knowledge about Noisy Miners.

2. Abundance and Frequency

There are a number of ways of presenting the annual summary results of the GBS of which the two most commonly used are:

- A (for Abundance): the aggregate number of birds of a given species reported each active survey site-week – typically, but not necessarily, covering all sites; and
- F (for Frequency): the proportion of sites in a given period - typically a year - in which the species was reported at least once.

Noisy Miner *(Michael Lenz)*

Figure 1. Noisy Miner, all sites: values A (abundance) and F (frequency).

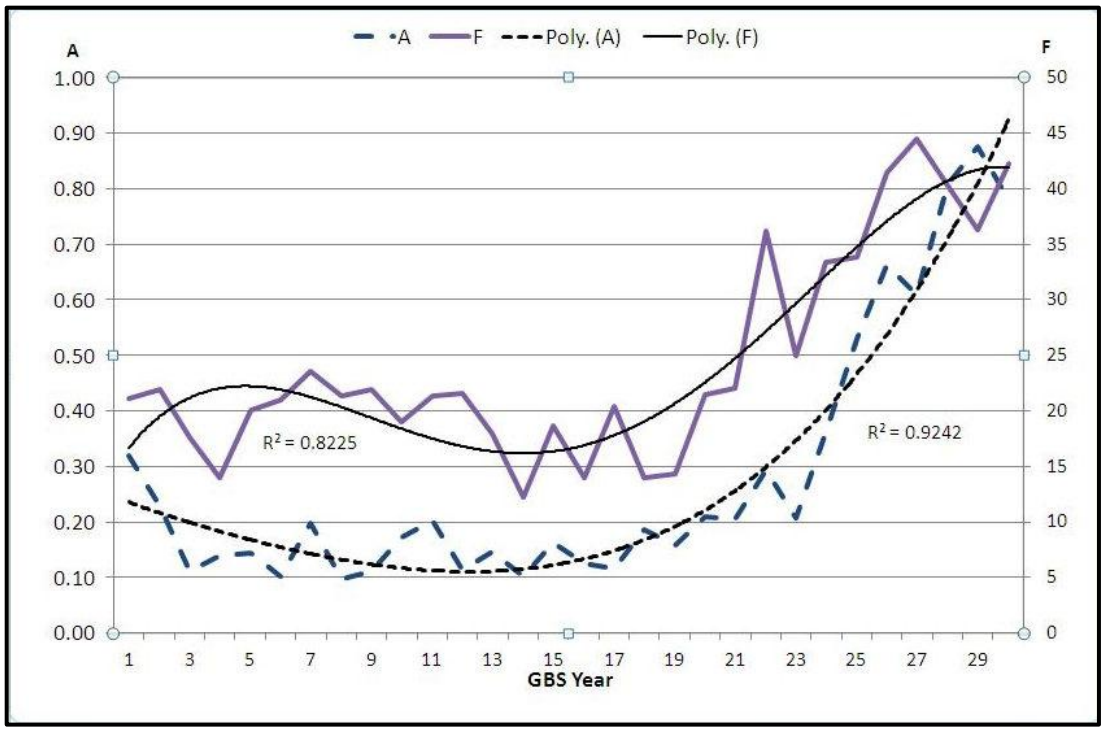


Fig. 1. shows these two summary statistics for each of the 30 years of the GBS. (Note that each year begins on 3 July and Year 1 was 1981-82.)

The smooth lines are the 4th order polynomials delivered by EXCEL, which I find a convenient way of smoothing out the 'noise' in the series. In both cases the values of R^2 suggest the smoothed lines are a good fit to the raw data. The broad picture offered by both series is similar: a reasonably constant level of reporting until about year 19 (1999-2000) followed by a strong increase since then.

3. Constant Sites

An issue of concern was that this pattern was in some way influenced by changes in the composition of the Survey panel in the later years. Since the sites are self-selecting (i.e. anyone who wishes to participate is welcome to do so) it might be possible that something had happened to change the nature of the set of sites.

A simple way of compensating for such effects is to use a subset of sites which have participated in the survey for a large number of years. 29 sites have been in the GBS for more than 15 of the 30 years: restricting the analysis to these sites seemed a 'reasonable' way of ensuring that changes in the results should not be unduly affected by changes in the panel. Typically they contributed between 25% and 30% of the set of sites active in a year, although this was higher (above 50%) when the overall survey participation went through a low patch in the late 1990s.

I calculated both numerators and denominators for A and F (as defined above) for the subset of sites active for more than 15 years. The next two charts compare the values of These two summary statistics for all sites (as shown above) with the equivalent statistics for the >15 year sites.

Not surprisingly the charts for the >15 year series (Fig. 2) are a little less stable than for the wider sample (Fig. 3). However, allowing for the possible differences between the two series the degree of agreement is very good. I therefore conclude that the pattern shown in Fig. 1 is not an effect of sample composition, but due to some other effect.

Figure 2. Noisy Miner A values: all sites and sites reporting for >15 years.

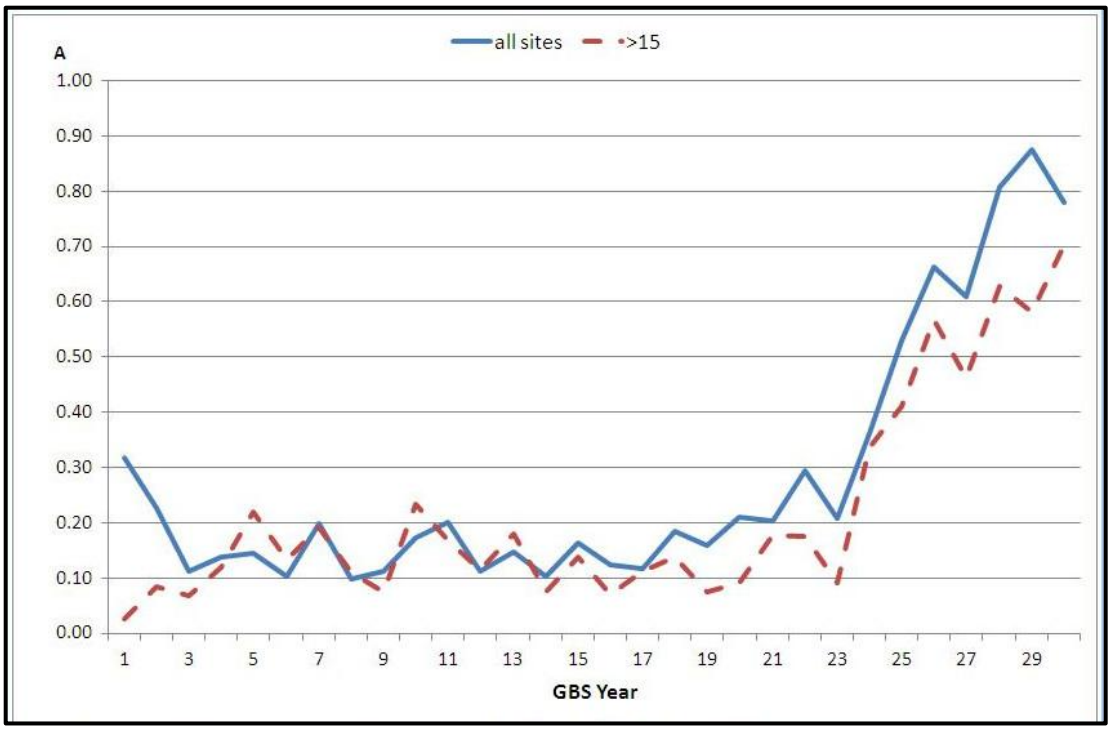


Figure 3. Noisy Miner F values all sites and sites reporting for >15 years.

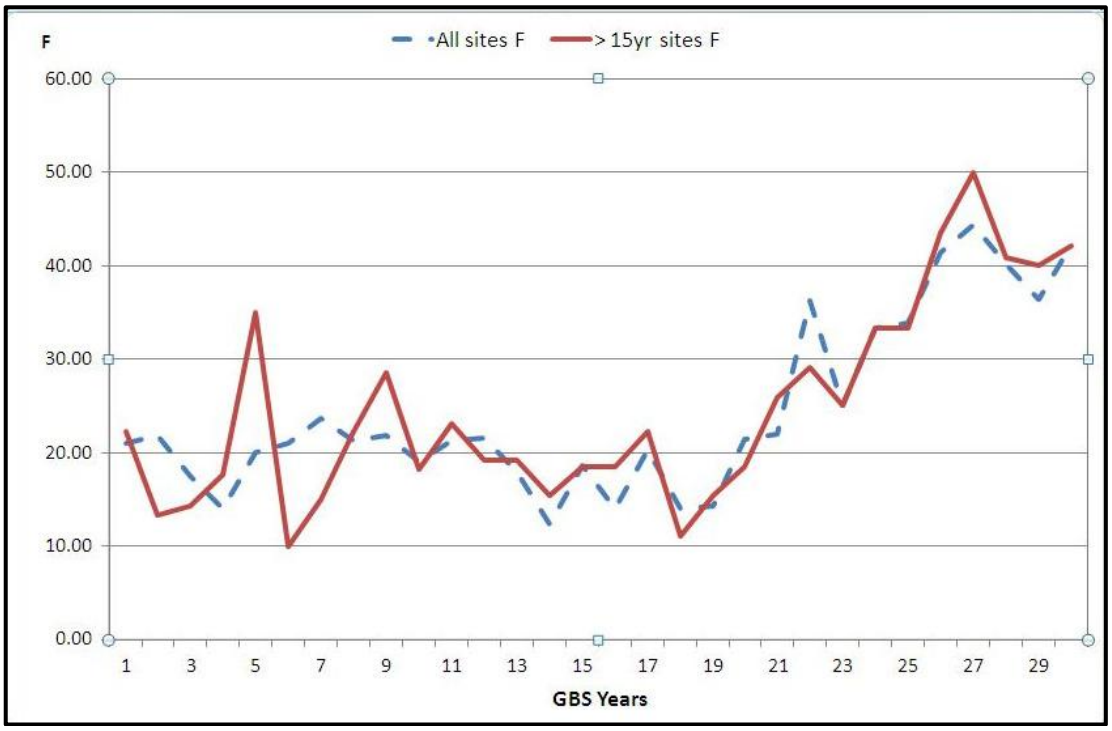
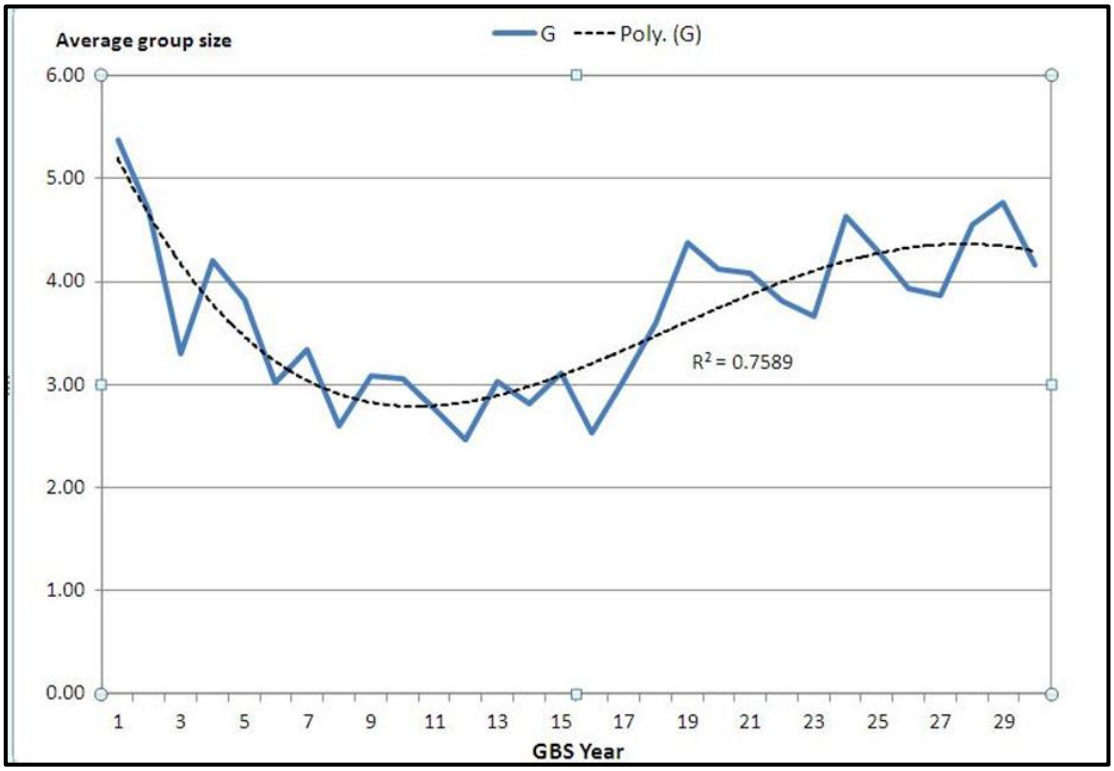


Figure 4. Noisy Miner: Average Group size x GBS year.



4. Changes in Flock Size

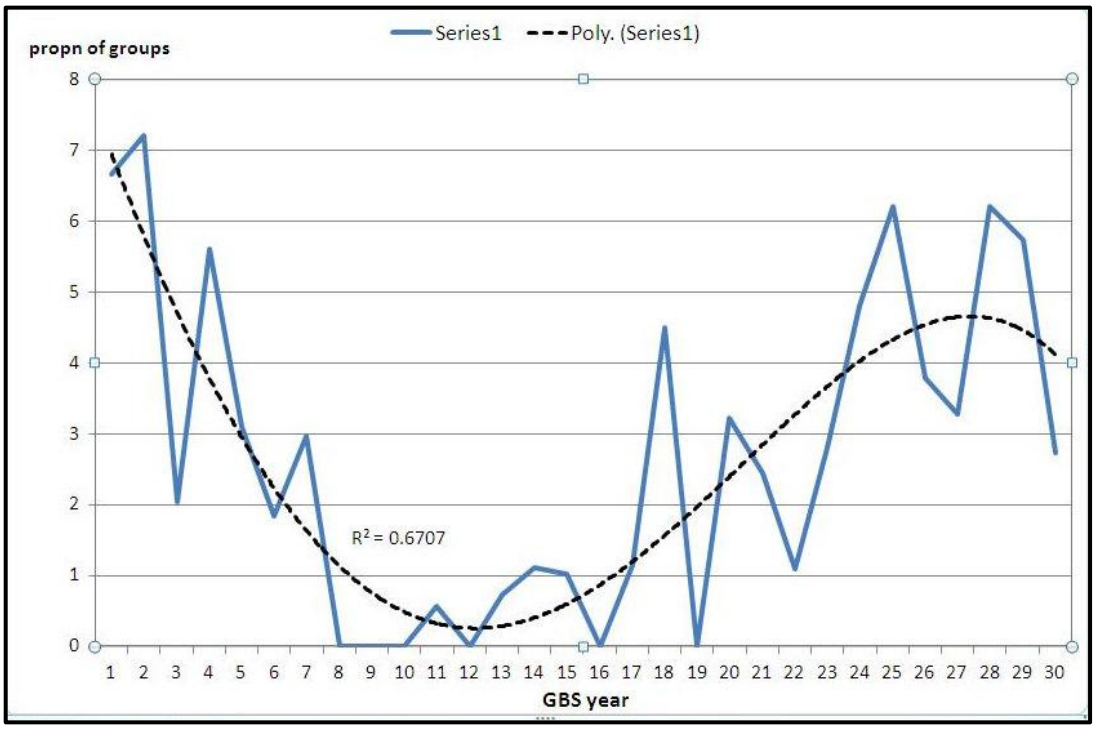
Reviewing Fig. 1 suggests that the value of A is rising faster than the value of F. This implies that flock size is increasing as well as the frequency of observing the species. Within the GBS Summary statistics, G (Group size) shows the average flock size by year (Fig. 4).

Fig. 4 suggests that, after a drop from high values in the first years of the Survey, group size has been increasing gradually over the last few years. Knowing that the species is usually encountered in modest sized flocks (related to the territory of a breeding male - Higgins *et al.* 2001) , but in winter the groups can aggregate to quite large flocks (probably a 'coalition' within a single 'coterie' as described in Higgins *et al.* (2001).

I charted the proportion of total flocks with >10 birds (Fig. 5). While the result is rather unstable in recent years the smoothing polynomial shows a reasonable increase in recent years (particularly during the drought years).

On examining the detailed information for each year, the first year of the GBS contained information for a site in Wanniassa with Noisy Miners in every week, often in groups of 10 or more and a site in Fraser with several groups of 10+. The site in Wanniassa only reported in year 1 and while the site in Fraser also reported relatively high numbers in Year 2 the number of Miners decreased thereafter.

Figure 5. Noisy Miner: Proportion of groups >10 birds.



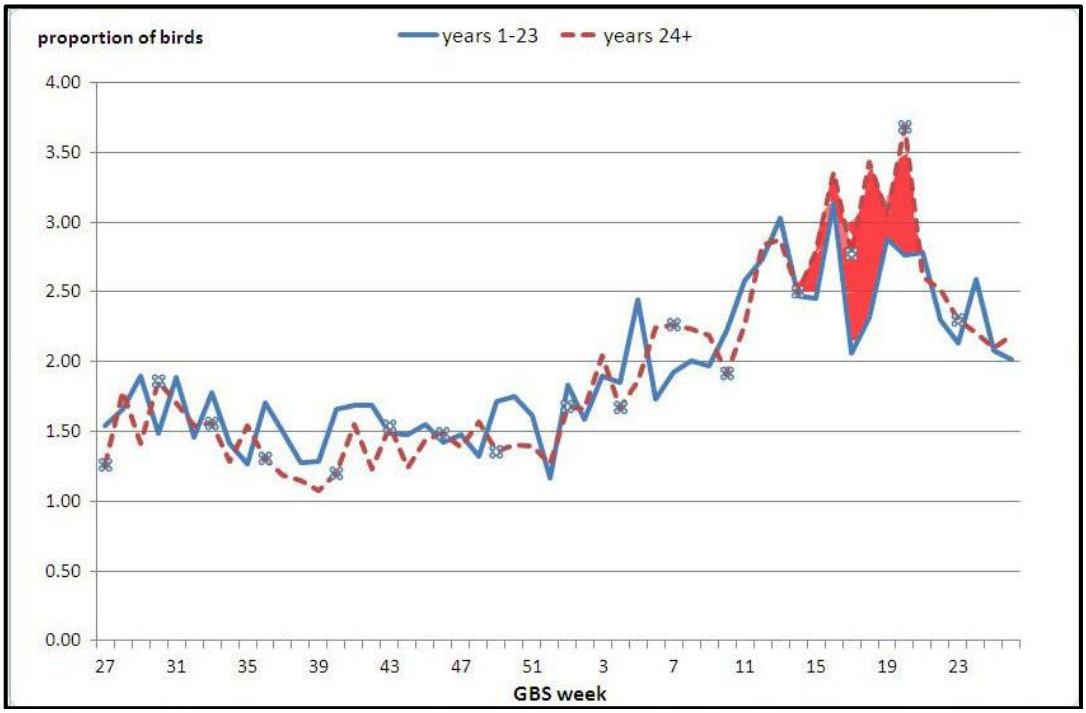
At the other end of the time series a site in Ainslie also regularly reported flocks of 10+ birds in years 28 and 29. The site reported few such flocks in year 30. It is noteworthy that another site in much the same area reported an increase in numbers of Red Wattlebirds in year 30 as the nearby Noisy Miners had gone, allowing the Wattlebirds to move in (S. Haygarth, *pers. commun.*).

Both cases of significant declines in the number could well reflect a factor leading to the coterie dropping below a critical size for group maintenance, as described in *Clarke et al*.

5. Seasonality

I have also examined the seasonality of reports tracking the aggregate number of birds reported each week. As the number of birds reported 'jumped' significantly between years 23 (2003-04) and 24 (2004 – 05) with no significant changes in panel composition. It is interesting, but not provable by me, that the increase in numbers of miners occurs in the year following the January 2003 bushfires. This may reflect birds being driven into suburbs with GBS sites due to the unavailability of winter food in their previous haunts.
I have plotted information for years 1 – 23 and 24+ separately in Figure 6.

Figure 6. Noisy Miner proportion of birds x GBS week – recent and early years.



For both series a higher proportion of the year's birds occurs in late Autumn. This might coincide with:

1. a migration out of the high country following the onset of colder weather; or
2. simply an aggregation of breeding groups into Coalitions for cooperative feeding as with the mixed feeding flocks of other species.

As HANZAB (Higgins *et al.* 2001) rates the species as sedentary or at least resident with most suggestions of seasonal movement dating from before 1950 it seems that the feeding flock hypothesis is more likely. (HANZAB defines *sedentary* as "most individuals not moving more than 50km" and *resident* as "most individuals non-migratory (i.e. do not regularly move between breeding and non-breeding ranges though some may move long distances.").

In March 2012 it was reported on the COG chatline by N. Taws that in Goorooyaroo (ACT) *"Noisy Miners were also abundant, roaming in mobs beyond their normal haunts to areas they are not normally recorded and feeding in the heavily-flowering mistletoe."* This adds weight to the 'feeding flock' hypothesis.

6. Discussion

These data show that the numbers of Noisy Miners observed in an area can change over time without any deliberate human intervention. The changes observed are almost certainly not a regular movement between breeding areas and non-breeding areas and could fit the cited definition of sedentary *or* resident.

It should be noted that most research into Noisy Miners has been undertaken in rural sites with different vegetation and levels of human activity to the sites covered by the GBS.

An online brochure (Grey and Clarke 2011) appears to imply that human removal of Noisy Miners is the best solution to the problems caused by their presence. This brochure also states: "*Culling is the most humane, practical, cost-effective and time-efficient method of reducing the impact of Noisy Miners, as translocation simply moves the problem to a new locality and causes the displacement of other birds.*"

However there has not been to my knowledge any organised culling of Noisy Miners in the suburbs of Canberra suggesting that the birds may move out of such an area without culling.

It is recommended in Clarke *et al* (1969) that culling be restricted to areas where either:

1. The species being out-competed by the Noisy Miners is endangered (e.g. Regent Honeyeater); or
2. There are endangered plant species being affected by the increase in insects following Noisy Miner bullying of smaller birds.

That report also shows that as Noisy Miners are far less of a problem when the understorey is dense, a better solution may be to restore a higher quality understorey. I have been unable to establish whether the two areas in which the GBS shows Noisy Miners to have decreased dramatically have also developed such an understorey (e.g. through gardens maturing) making the sites less attractive to Miners. (This does seem unlikely for the site in Ainslie as most gardens in that suburb were mature well before the GBS commenced, but possibly equivalent changes have occurred in the nearby Mt Ainslie component of Canberra Nature Park.)

References

Clarke, M.F. Clarke, M.F., Grey, M.F., Britton, D.R. and Loyn, R.H. (1995) *The Noisy Miner Manorina melanocephala and Rural Dieback in Remnant Eucalypt Woodlands,* RAOU Report No. 98

Grey, M.J. and Clarke. M.F.j. (2011) *The Noisy Miner: Challenges in managing an overabundant species:* *http://www.latrobe.edu.au/zoology/research/behavecol/Final%20low%20res%20LR%20LatrobeUni%20Birds%20Broch.pdf* .

Higgins, P.J. Peter, J.M., and Steele, W.K. (Eds.) (2001) *Handbook of Australian, New Zealand and Antarctic Birds.* Vol. 5, Oxford University Press, Melbourne.

Accepted 11 June 2012

ODD OBS

EASTERN KOEL CHICK IN THE NEST OF A RED WATTLEBIRD

During summer 2011/12 there was a lot of Red Wattlebird (*Anthochaera carunculata*) [later called 'Wattlebird'] activity around my residence in Higinbotham Street, Watson. They had nested in September and October in the street trees (*Eucalyptus polyanthemos*) in front of our house. On each occasion they successfully fledged two chicks. During this time an Eastern Koel (*Eudynamys* orientalis) [later called 'Koel'] was heard most mornings and evenings but in the distance. In early January I noticed another Wattlebird nest approximately five metres off the ground in the tree opposite our lounge room. This pair could have been the same pair that had bred previously in adjoining trees. Several Koels were now being heard on a regular basis and much closer.

Early in January I noticed the Wattlebirds regularly attending the nest feeding chicks which were begging. Also around this time the adult Wattlebirds successfully defended the nest and chicks from Pied Currawong (*Strepera graculina*) attack. Afterwards it appeared that the nest may have been abandoned as all activity around the nest appeared to cease.

However, the Wattlebirds returned to feed a chick whose begging call was a quiet *trill* unlike the *bzzt bzzt* call of a Wattlebird chick. I started to observe the nest more closely as I suspected that the nest had been parasitised by a Koel. On the 19 January I observed one of the adult Wattlebirds removing a dead Wattlebird chick from the nest. The nest was a typical Wattlebirds nest, i.e. so frail that you could see right through it. Even so it was difficult to distinguish the chick because of the leaf cover and the height of the nest. However, on 1 February I clearly observed the chick's head and breast to confirm that it was indeed a Koel.

The chick was being fed irregularly. On cloudy days the adult Wattlebirds were hardly seen giving the impression that the Koel chick had been abandoned. On sunny days both adult Wattlebirds actively fed the Koel chick which seemed to be getting quite large. Its begging call was a quiet raspy *trill.*

On 13 February I noticed that the Koel was missing from the nest. I heard a loud *weeop* call and after a lengthy search I found the well camouflaged chick in our front garden begging to be fed. It had clearly fallen out of the nest and was too immature to fly. In addition it had badly injured one of its legs but still managed to flutter around. This attracted the attention of a cat from over the road. I rescued the chick and located it to our backyard where the resident Australian Magpie (*Cracticus tibicen*) family had a little pick at it. The adult Wattlebirds defended the chick vigorously and the Magpies paid no further attention to the chick.

It was interesting to note that once the chick was out of the nest its begging call was the typical loud *weeop*

The chick was fed until 15 February when it disappeared along with the Wattlebirds. The young Koel may have become the victim of a cat after all, or the 'family' may have moved well out of its original territory in search of food for the ever hungry Koel (see Lenz et al 2009).

In recent years young Koels at the fledgling stage have been reported in various parts of Canberra (Lenz et al. 2009; COG 2010, 2012), the observations from Watson are the first of a Koel chick found still in the host nest.

References

COG (2011) Annual Bird Report: 1 July 2009 to 30 June 2010. *Canberra Bird Notes* 36: 1-80.

COG (2012) Annual Bird Report: 1 July 2010 to 30 June 2011.*Canberra Bird Notes* 37: 1-88.

Lenz, M., Haygarth, S. and Oren, Y. (2009) The first breeding record for the Eastern Koel *Eudynamys orientalis* in Canberra. *Canberra Bird Notes* 34: 93-102.

Accepted 9 June 2012

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LATE-NESTING WHITE-WINGED TRILLERS

In the February 2012 edition of Gang-Gang, Jack Holland wrote that any records of the White-winged Trillers (*Lalage sueurii*) [later called "Triller(s)"] in the next couple of months would be significant. So, we were alerted at Callum Brae on 5. February when W. Compston found a male Triller sitting on a nest. The Triller had led him to the nest, which was very high on the branch of a eucalypt and difficult to see. We decided to follow progress of the nesting.

The following observations were made by E. and W. Compston (EWC) and Julian Robinson (JR).

The locality, at 35.3568º S, 149.1456º E, was close to the deeply incised stream that runs into the lowermost dam fenced off at the east edge of the Nature Reserve.

Tuesday, 7. February (EWC): The male Triller was still sitting on the nest. We did not see a female.

Saturday, 11. February (EWC): We were in the vicinity of the nest for an hour and no triller went in or out.

Tuesday, 14. February (EWC): The female Triller was occasionally feeding a single chick in the nest. The male was singing nearby. When the female flew away, the chick slipped further down into the nest out of sight. It might have been there on 11. February but not visible.

Wednesday, 15. February (JR): Julian reported that a female Triller was feeding a large chick, frequently, at the Callum Brae locality. We assumed that this chick must be 'our' chick, but when we (EWC) visited Callum Brae with Julian later, it turned out that he had found a second nest in the same tree.

Friday, 17. February (EWC): We saw a large chick in our nest. It was fed twice in 30 minutes by the female Triller. In between feeds, the chick was flexing its wings. At no time did the chick or the parent call.

Monday, 20. February (EWC): There was no sign of any Trillers during a 30 minute period so we assumed that our chick fledged on 18. February, give or take a day. This would imply it had hatched about 6. February..

Friday, 9. March (WC): Bill saw a female Triller in low scrub near the nest locality in the company of another bird that he could not identify. He did not see the chick or parent on the nest. A male Triller was calling nearby.

Saturday, 10. March (JR): Photos of a family of Trillers taken, (see Photo below).

White-winged Triller family at Callum Brae *(Julian Robinson)***: Male in eclipse plumage (left), juvenile (centre), female (right).**

Thursday, 15. March (JR): Two families of Trillers, each with one juvenile, observed. One of the juveniles was still dependent. At another time five Trillers were hawking for insects from the one tree.

Sunday, 18. March (JR): One family of three Trillers still present, the juvenile being still dependent. The nestling that he had been watching would be about seven weeks old and independent now, about the same age as Elizabeth's juvenile. The presence of this most recent dependent juvenile confirms that there were three breeding events. The fact that the families of the older two juveniles were not seen suggests that they had all departed north as soon as the young birds were capable, sometime between 15. and 18. March.

Sunday, 25. March: Sandra Henderson reported a female and an eclipse male in the area. This was the last Triller sighting despite several subsequent visits to check, so we assume that the third family departed in the last week of March.

To put our observations into perspective, previously, in our region dependent young have been reported no later than 26. February (Ian Anderson) and the last observation of the species in the season dates from 13. March (David McDonald).

We thank Paul Fennel for making these records from the COG data base available.

Accepted 11 June 2012

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LATE BREEDING ATTEMPT BY HOARY-HEADED GREBES

The Hoary-headed Grebe (*Poliocephalus poliocephalus*) is a common breeding resident in our region usually found on larger bodies of water (Frith 1969). It is somewhat nomadic, and numbers can vary greatly at any given location. In response to rainfall, flocks of thousands can arrive at inland swamps shortly after a rise in water level (Marchant and Higgins 1990). The species tends to breed (but not exclusively) in colonies which, under favourable conditions, can number several hundred pairs. Such large breeding colonies have been established in some years at Lake Bathurst (Frith 1969, M. Lenz unpubl.).

Eggs have been recorded across the breeding range in SE and SW Australia between August and March, although most clutches are initiated from September to January (Marchant and Higgins 1990).

In March 2012 Lake Bathurst and the Morass partially re-filled to levels not seen for around 15 years. On 18 March 2012 a total of 128 Hoary-headed Grebes were present (across all parts of the Lake Bathurst/Morass system). Interestingly, two birds were observed diving for and carrying nest material at different points into stands of flooded Serrated Tussock (*Nassella trichotoma*) in a shallow bay of the eastern basin of the lake. The birds were not tracked closely, and hence the exact nest locations were not discovered. However, the sites did not seem suitable for nesting. Based on past experience, nests are usually constructed along islands at a water depth that would prevent land predators from reaching the nests.

Indeed, by 16. April 2012 the water level had slightly dropped and the sites chosen by the grebes for nesting had fallen dry. No further signs of breeding activity were detected on the eastern basin of the main lake. Numbers of Hoary-headed Grebes had increased from March to around 950 birds in total for the lake system, with 680 alone on the eastern basin. However, on the Morass 24 birds were sitting on nests which were distributed alongside two small islands. There may have been more nests since only the eastern sides of the islands were in full view. It was impressive to see how strong the stimulus of a re-filled lake is in triggering breeding behaviour, even so late in the season.

A check on 5 May 2012 found all nests abandoned. One of the two islands was quite close to shore and with a slight drop in water level since mid-April, a fox could have waded through to the nests. However, since the other nests around the second island, more distant from the shore and surrounded by deeper water, were also given up, the most likely cause for the grebes abandoning their nests would have been the onset of cold weather. Birds sitting on clutches in April are at the extreme end of breeding recorded from inland sites with milder winter climate than here in the Southern Tablelands. It would have been very exceptional indeed if the adults on the Morass had succeeded in rearing young so late in the season.

References

Frith, J.H. (1969) *Birds in the Australian High Country,* 2nd ed., Angus & Robertson Publ., Sydney.

Marchant, S. and Higgins, P.J. (Co-ords.) (1990) *Handbook of Australian, New Zealand and Antarctic Birds,* Vol. 1. Oxford University Press, Melbourne.

Accepted 11 June 2012

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Hoary-headed Grebes (*Geoffrey Dabb*)

COLUMNISTS' CORNER

YEARNING TO BE FREE: ESCAPES, RELEASES AND INVASIONS

Among the COG community, few topics give rise to more intense debate than the origin of some of our local species. Where did the corellas come from for example?

So far as the Little Corella is concerned, the first recorded here were assumed to be escaped aviary birds. Since then, its remarkable expansion makes it seem more likely that it is just one of those species that has spread and spread – like the Crested Pigeon. Perhaps those first seen here were the early colonisers.

However stories persist that the very first records were of birds set free by a disillusioned aviarist in the inner south suburb of Griffith. Perhaps so. In any event, the handful of Long-billeds sometimes interspersed with the Littles is a long way from the home of that species, and might well represent escapers, or their hybridised offspring.

Similar uncertainty surrounds the present crop of Rainbow Lorikeets. Are all or any of these birds from local escapes? As a result of natural expansion the lorikeet is now abundant in Sydney, NSW south coast and Melbourne, and that expanded, apparently contiguous, range now embraces Canberra. On the other hand, the large Perth population must have originated from captive birds.

Then there is the odd unfamiliar parrot that turns up from time to time. If this is obviously foreign, like an African lovebird or the Indian Rose-ringed Parakeet, or an obvious mutant of a native species, it is reasonable enough to attribute its presence to an insecure aviary not too far away. However, ordinary-looking Australian parrots not far out of their usual range are another matter. Examples are the Cockatiel and Budgerigar when they are seen here not showing any of the colour variations met with in aviary birds.

Clues might be the number of such wanderers seen on any occasion, and the location in the Canberra area they appear, but, in the absence of other information, no firm conclusion might be possible on where they came from. The Zebra Finch is another species that might be of ambiguous origin when it appears here.

Naturally enough, it is the commonly-kept species that present this problem. A species such as the famous White-fronted Honeyeater of Kambah, although well out of usual range and habitat, is just assumed, if not definitely known, to be an erratic wanderer.

The occurrence of local concentrations – or 'island populations' – can be perplexing. For some years the Little Corellas were restricted to a relatively small area of south Canberra, centred on feeding stations in Griffith and the old zoo on Mugga Lane. That pattern suggested they were favouring an original release site or sites. Similarly, the first Rainbow Lorikeets seemed localised, perhaps depending on feeders in one suburb or other.

On the other hand, a look at a recent range map for those two species suggests those 'islands' are just concentrations within an expanding range. By contrast, the Emu population in the Tidbinbilla area is a true island, where a few breeding individuals are separated from other free-ranging populations by many emu-free kilometres: hence, they are regarded as entirely of captive origin.

That hypothesis would need to be revised if truly wild emus were discovered within commuting distance of the Tidbinbilla birds. With emus, 'truly wild' is an important qualification. Apparently wild birds seen in farming country might be the result of escapes or releases from breeding ventures, past or current.

The best recent examples of the island hypothesis are the Blue-billed Ducks at Fyshwick Sewage Ponds. It remains a mystery why that species has been regularly found there over more than 10 years while not appearing anywhere else in our area. That consideration has been put forward as a reason, if not a conclusive one, for believing the original stock to have been released there.

A knotty question for tickers was posed by the Plumed Whistling-Duck that frequented the eastern end of Lake Burley Griffin a few years ago. Although the species is on the ACT list and is known for erratic appearances, that particular individual tended to show up whenever bread was being offered and generally showed signs of a previously pampered lifestyle.

The origins of some of our *exotic* species are also a puzzle. Here, the issue is whether the species was released locally, or spread here from populations further afield. For example, the Eurasian Skylark is said to have been introduced at Ginninderra in 1881, but whether all the local skylarks trace their ancestry to that introduction is anyone's guess.

Similarly unknowable is how many local pigeons (Rock Doves) are descended from the long-standing feral population or are the progeny of birds owned by more recent generations of Canberra pigeon-fanciers.

Much less numerous in our suburbs are the detested Spotted Doves. Writing some 14 years ago, Steve Wilson was able to conclude that all reported birds in the ACT were the result of releases or escapes. Recent reports confirm we have a small breeding population in Canberra suburbs, perhaps former kept birds, perhaps colonists from nearby Queanbeyan, perhaps both.

The infamous introduction of the Common Myna is generally dated to the three years following November 1968, when more than 100 birds were deliberately released in the suburb of Forrest. However as Steve Wilson points out in his book, there is evidence for the earlier occurrence of the species in the Canberra area. Wherever from, the considerable numbers of this disliked species are being reduced by an enthusiastic trapping program.

The precise origin of the breeding peafowl in Narrabundah/Griffith has not been definitely established. It seems likely they came from captive birds on a rural lease in Symonston via the long-stay caravan park on Narrabundah Lane.

There is less mystery about the feral ducks and geese that turn up on urban lakes. No doubt most of these are the result of disaffected duck-owners coming to the view their pets will be better off somewhere other than in the back-yard. Most of these are variations on the mallard theme or its domestic strains. However, examples of the Muscovy type are occasionally seen.

At the time of writing, a fine example of the domestic goose is haunting the eastern end of Lake Burley Griffin. If this is the bird that has been reported over several years, it will be of an age where a sharp knife and strong teeth will be needed if it is ever claimed as someone's Christmas dinner.

A more interesting sight was the Egyptian Goose that appeared at the other end of LBG in 2007. Its period of freedom was brief, after the zoo staff were alerted by a helpful Canberra birdwatcher. No mystery about that one.

Stentoreus

BIRDING IN CYBERSPACE, CANBERRA-STYLE

It is completely understandable that you might be confused about what is the 'official' list of Australian birds. The Canberra Ornithologists Group (COG) uses the 2008 Christidis and Boles list (Christidis, L & Boles, W 2008, *Systematics and taxonomy of Australian birds*, CSIRO Publishing, Collingwood, Vic., http://en.wikipedia.org/wiki/List_of_birds_of_Australia), as does Birdlife Australia at present. The Wikipedia article states (correctly) that this list '…has strong local support, but deviates in important ways from more generally accepted schemes'.

Birdlife International, the parent body of Birdlife Australia, has its own global checklist which includes Australian birds: BirdLife International (2012), *The BirdLife checklist of the birds of the world, with conservation status and taxonomic sources,* http://www.birdlife.org/datazone/info/taxonomy .

The Commonwealth Government maintains the Australian Faunal Directory http://www.environment.gov.au/biodiversity/abrs/online-resources/fauna/afd/taxa/Aves .

Then there is the long-standing Clements checklist, maintained by the Cornell Laboratory of Ornithology http://www.birds.cornell.edu/clementschecklist/ . This and various other lists are searchable at the Avibase website http://avibase.bsc-eoc.org/checklist.jsp.

Contributors to the national email birding discussion list, Birding-Aus, have been giving much attention to the recently-updated International Ornithologists' Union checklist: Gill, F & Donsker D (eds) 2012, *IOC World Bird Names (v 3.1)*, www.worldbirdnames.org . They have discussed the differences between this list and Christidis & Boles', and their relative strengths and weaknesses. Attention is being paid to both the underlying taxonomies and the English names used.

I understand that a new Birdlife Australia Working List of Australian Birds is at an advanced stage of development. It will be fascinating to see how this proliferation of checklists plays out. The decisions made by individual birders about which list to use are being driven, in part, by the increasing availability of checklist software used on mibile digital devices such as iPhones, integrated with various databases maintained online or on desktop computers. Some of these applications have been discussed in previous columns in this series. Some birders find that, once they commit themselves to using a particular list, it becomes too burdensome a task to move to another, with all the splitting and lumping, changed nomenclature, etc., involved.

For more than a century Birdlife Australia has published the journal *Emu—Austral Ornithology*, accurately self-described as 'The premier journal for ornithological research and reviews related to the Southern Hemisphere and adjacent tropics'. As previously discussed in this column, the abstracts of articles published in *Emu* are available online at the publishers' website http://www.publish.csiro.au/nid/96.htm.

Copies of single articles can be purchased there for what can only be considered an exorbitant price! A debate is ranging in academic circles about publishers charging for access to scientific journals, with increasing numbers boycotting journals that do not provide free, open access to the public: http://theconversation.edu.au/academics-line-up-to-boycott-worlds-biggest-journal-publisher-5384 . Why should you pay CSIRO Publishing (a Commonwealth Government entity) $25 for access to a pdf of an article, considering that the marginal cost to the publisher of you downloading the article is almost nil, the research underlying the article was paid for by someone else (probably a government agency), the reviewers have provided their time and expertise gratis, and the authors receive no remuneration from the sale of the article? Surely scientific knowledge should be treated as a public good, available to the public without charge, not something that publishers sell for exorbitant prices!

An interesting feature at *Emu*'s website is its listing of the most read articles. What is the most read article from *Emu* over its 112 years of publishing, you are probably asking? The answer (at the time of writing) is Holdsworth M, Dettmann B & Baker B 2011, 'Survival in the Orange-bellied Parrot (*Neophema chrysogaster*)', *Emu*, vol. 111, no. 3, pp. 222-8. I am sure that this is an important article, but how come it is the most read of the thousands of articles published over the years? Perhaps the answer lies in the way the rankings are developed, and it tells us something important about the role of the internet in contemporary publishing. The publisher explains that 'The Most Read ranking is based on the number of downloads from the CSIRO Publishing website of recently published articles. Usage statistics are updated daily'. A quick scan of the 50 'most read' articles—actually those most frequently downloaded from the publisher's website—reveals that all were published in 2010, 2011 or 2012. Perhaps what we are observing is the increasing use of online sources of scientific information? I wonder what is really the most read *Emu* article since the journal's volume 1, number 1 was published way back in 1901?

An outstanding free birding resource is the website of the Cornell Laboratory of Ornithology. I draw particular attention to the online version of its quarterly birding magazine *Living Birds* http://www.allaboutbirds.org/page.aspx?pid=1085 . As well as book reviews, information from the Lab, letters, etc., feature articles in the current edition (Spring 2012) include:

- 'Seabirds off the Beaten Path: With the penguins and albatrosses on the faraway islands of Aotearoa'
- 'Last Chance for the World's Rarest Eagle: A captive-breeding program offers new hope for the Philippine Eagle'
- 'Nothing to Do but Soar? The curious expansion of the Mississippi Kite'
- 'What Travel Taught Me About Birding—and Vice Versa: Serendipitous encounters of the best kind' and
- 'Whence Came Caps?: When did baseball caps become the rage among bird watchers?'.

How do you keep up-to-date with news and the scientific literature about birds? The internet has diverse resources for doing so. One strategy is to try to remember to visit key portals every month or so. Top spots are the Ornithological Worldwide Literature (OWL) and the Searchable Ornithological Archive (SORA) databases. The Ornithological Worldwide Literature (OWL) site http://www.birdlit.org/OWL/ '…is a compilation of citations and abstracts from the worldwide scientific literature that pertain to the science of ornithology. A major attraction is its coverage of the "grey" literature, which are not

abstracted by commercial databases such as Zoological Record or the Science Citation Index…OWL is a joint effort between the American Ornithologists' Union and the British Ornithologists' Union and Birds Australia [now Birdlife Australia]. The database is hosted by the Cornell Lab of Ornithology, based in Ithaca, New York, USA'.

SORA, the Searchable Ornithological Archive http://elibrary.unm.edu/sora/ , is based at The University of New Mexico, Albuquerque. It indexes the contents of about 13 journals, predominantly American but some international.

Having to remember to visit and search these types of indexes is problematic. It is more efficient to set up alerts that automatically 'push' new information to you. One option is to set up RSS feeds from the publishers of your favourite journals using your web browser or a dedicated tool such as Google Reader http://support.google.com/reader/bin/answer.py?hl=en&answer=113517 . Another option, one that I favour, is to use Google Scholar http://scholar.google.com/ . For example, if you are fascinated by, say, Swift Parrots, you could set up a Google Scholar alert that will advise you by email whenever anything is published in the scientific literature on this species. But there may be items of interest that are not in scientific journals, such as media reports or new web pages on the Swift Parrot. To be alerted to new information in these media, again by email, simply record your interest in Google Alerts http://www.google.com/alerts .

If you have other ways of using the internet to keep up-to-date with what's happening in the birding world, please email our editor at cbn@canberrabrds.org.au to share your experiences.

T. Javanica

This column is available online at http://cbn.canberrabirds.org.au/. There you can access the web sites mentioned in the column by clicking on the hyperlinks in the online version of *CBN*.

Details on how to subscribe to *Birding-Aus*, the Australian birding email discussion list, are on the web at http://www.birding-aus.org/ . A comprehensive searchable archive of the messages that have been posted to the list is at http://bioacoustics.cse.unsw.edu.au/archives/html/birding-aus.

To join the *CanberraBirds* email discussion list, send an email message with the word 'subscribe' in the subject line to canberrabirds-subscribe@canberrabirds.org.au. The list's searchable archive is at <http://bioacoustics.cse.unsw.edu.au/archives/html/canberrabirds
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BOOK REVIEWS

The Complete Guide to Finding the Birds of Australia. By **Richard Thomas, Sarah Thomas, David Andrew and Alan McBride**
CSIRO PUBLISHING, Collingwood, 2011, ISBN 9780643097858, Second Edition,
480 pp., Paperback, AU $49.95.

Reviewed by DANIEL MANTLE, Maitland, SA

Seventeen years after the much-loved first edition of 'The Complete Guide to Finding the Birds of Australia' was privately published and distributed, CSIRO Publishing released a revised and revamped edition last year. Whilst retaining much of the original format and layout, the new volume has the slick professional appearance expected from an established publishing group, complete with some outstanding colour photographs and importantly much updated and revised content.

The original edition, first published in 1994 by Richard and Sarah Thomas, had become something of a collector's item within Australian birding circles and has helped numerous local and overseas birders to plan birding trips and holidays and to target some of the more elusive species across the continent. The privately published nature of the original volume and the addition of the author's own experiences and sightings throughout the text added a very personal touch and charm to the book that often read like an extended trip report. This is certainly not meant as a criticism, in fact it made the book all the more enjoyable. It was a site guide you could pick up and 'just' read – being a great story as much as it was a resource.

This revised edition adopts a less personalised approach, however, much of the formatting, layout and ethos of the original are retained. The authors have selected what they consider to be either the best and most accessible birdwatching sites and those that give the best chances of seeing some of the more localised, scarcer, or more cryptic species. However, they have neatly avoided the pitfall of many of the super-specific European guides that nearly lead the reader to the nest site of various vulnerable or easily disturbed species. Compared to many of the modern European and American birding site guides that only cover a single county, state or smaller region this guide covers a whole continental landmass as well as all of Australia's islands and external territories. It was thus always going to be a tough task to choose which sites to leave out when confronted with the limitations of a single volume. As such this guide only covers the most important sites in each region and is of limited value to birders who rarely stray beyond their local area – they will probably know the area better and know more sites. This guide should be of most value to those visiting from overseas or interstate, particularly as a trip planner. To this end a short directory is included with basic information on accommodation, travel within Australia, climate and general hazards.

Also included is a comprehensive Bird Finder Guide that allows the reader to quickly digest the best locations and the status of individual species.

Overall this book is a considerably more useful but less engaging volume than the original and certainly warrants a place on the bookshelf of all keen birdwatchers who travel throughout Australia. Although more and more birding trip reports are freely available on the internet, few contain the detailed information, notes on access and particularly the

many maps that are collated in this one volume. However, as useful as these maps are, they could be much improved. They are overly simplified and lacking in detail – it is occasionally difficult to distinguish roads, tracks, rivers or coastlines on some maps. I also felt the lumping of all the colour bird photos, which are mostly of extremely high quality, into a single section in the middle of the book added little value. The reader would gain more if the images were scattered through the book with species relevant to a particular site being illustrated next to that text.

Undoubtedly publishing costs have driven many of the formatting decisions (black-and-white maps and grouping together of all the colour images) but these were overcome by the most readily comparable guide book - the 'Southern African Birdfinder' compiled by Cohen, Spottiswoode, and Rossouw. It covers a region similar in size but considerably more diverse than Australia. As a full-colour volume it is immediately able to accommodate more useful and detailed maps and also relates these maps to the text in a far more constructive and user-friendly manner. This, along with the far greater volume of information squeezed into a similarly sized book, demonstrate that the 2nd edition of the 'Complete Guide to Finding the Birds of Australia' whilst extremely useful has not quite lived up to its potential.

***Capturing the Essence: Techniques for Bird Artists*.** By **William T. Cooper**
CSIRO PUBLISHING. Collingwood, 2011, ISBN 9780642276803, 128 pp., Hardback, Au $59.95
Also available as Paperback: 2012, ISBN 9780643107220, AU $34.95

Reviewed by GEOFFREY DABB, Narrabundah, ACT

For many people, the pursuit of a bird *photograph* is now a main part of looking for or at birds. At almost any well-known birdy spot you can find snappers snapping away: the photographer who has discovered birds, the birdwatcher who has discovered photography, and the new camera-owner, hardly bird-aware but gratified by the ease with which a once-impossible subject can now become a digital image.

So who needs to *draw* a bird? Perhaps not all that many people. Most of the bird artists I know of are professionals, who fill the need, not quite fully met by the photographer, for book illustrations – for bird books ranging from field guides to heavy volumes intended for the coffee table, or perhaps aimed at the collector. A rather small number of professionals, I would think, will be quite enough to meet that need.

But how would I know? There might yet be hundreds of amateur bird artists out there, quietly sketching or painting away, the final product being its own reward, intended only for strictly private viewing.

The fact is that painting a bird is really difficult, far more difficult for the amateur than a sea-scape or a homely still life. As an example, I would point to the efforts of Ellis Rowan (1848-1922), the justly celebrated flower painter. In some of her paintings she included birds, but the trouble was she drew them like flowers, with something not quite right about the head and the bill.

It is not surprising that famous Australian artists like Clifton Pugh, Sydney Nolan and Brett Whitely did not attempt photographic reality when it came to birds but merely offered the general idea of a bird, or something from the imagination.

However, if you do want to draw birds for a private purpose, this guide by William Cooper will be of help to you, no question about it. Perhaps more relevantly, if you are interested in birds but have no intention of drawing one, you'll probably be interested to see how Cooper goes about it. The book can be read by the non-artist simply as a book about birds from the viewpoint of a much-admired illustrator. Cooper says it was fellow bird artist (and a Canberran), Peter Marsack, who suggested he write this guide.

The first part of the book deals with 'the basics', with lots of advice on things like equipment, principles of painting, and bird anatomy, and with tips on sketching from life: 'it is important that the feet are at the centre of gravity, otherwise your bird will look as though it is falling over'. Quite a few other things are important too, like getting the feathers right. There are many examples of useful sketches made in the field.

I was interested in the comments on the limitations of photographs as an aid to illustration. Many photographs, perhaps most, are not typical of the bird's posture as it is 'normally' seen, that is as an illustrator would wish to present it. Then there are those colours. 'The flare of light on a black bill can make it appear pale blue or white', and there are other reasons a digital photograph may not show the true colours of a bird.

The second part of the book gives advice on painting in each of the usual media, with the stages illustrated by particular projects: Red-capped Robins in watercolour, Squatter Pigeons in acrylics, and Raggiana Birds of Paradise in oils.

The blurb from one of the publishers describes the book as 'stunningly beautiful'. This, I think, is overstatement. The illustrations are certainly informative and attractive, but if you want to admire Cooper's work you would be better off with a book with a collection of finished drawings, such as the early *A Portfolio of Australian Birds* (1968, text by Keith Hindwood) or *Australian Parrots* (first published 1969, text by Joe Forshaw). Then there are the later more expensive ones covering whole families, with subjects drawn from remote corners of the world and laid out handsomely in those delicious plates. If I were a bird, and I had to be painted, I would want William Cooper to do it.

Yet another book in collaboration with Joe Forshaw is in preparation. This is on pigeons and doves of Australia, and is likely to appear in 2014. William Cooper says that will be his last illustrated book.

As it happens there is already a movie of *Capturing the Essence* – well, a short video anyway, available at http://v33327840imeo.com/ . If you can find this you will see William Cooper discussing his work and the book, and applying a few brush-strokes.

A Bush Capital Year: A Natural History of the Canberra Region. By **Ian Fraser and Peter Marsack**

CSIRO PUBLISHING, Collingwood, 2011, ISBN 9780643101555, xiii, 218pp. Paperback, AU $49.95

Reviewed by ROBIN HIDE, Ainslie, ACT

This is a superb book. Naturalist Ian Fraser, artist Peter Marsack and CSIRO Publishing have combined their talents, skills and experience to produce a most attractive book that reveals, season by season, month after month, a wonderful cast of animals, birds, plants and other creatures of the ACT region. Experienced naturalists will enjoy Marsack's beautiful illustrations, and find much food for thought in Fraser's wonderfully detailed accounts and musings. Newcomers to Canberra, and would-be naturalists, will find this a mine of invaluable information. The book is handsomely, and strongly - the pages are sewn not glued - produced, and its makers and supporters (both authors acknowledge the support of ACT Government Environment Grants) are to be congratulated. There are also obvious debts to Canberra Ornithological Group expertise: Marsack's list of acknowledgements is full of familiar COG surnames.

Fraser writes that the book's aim is to "help anyone who is interested to discover and celebrate the plants and animals that make the ACT…so very special…(and) it introduces many parts of the reserve system, and places outside it, in the hope that that more people …will get to know it better" (p. xii). These modest aims are far outstripped by the achievements of this book. I wish it had been available when I first came to Canberra.

The book is organised by the four major seasons, summer through to spring, with each subdivided by month, in calendrical order. Within each monthly section, Fraser writes ten mini-essays, usually focused on a single species, but occasionally covering two or more. Each essay is squarely located in some specific part of the ACT region (Botanic Gardens, Mulligans Flat, Gudgenby Valley etc.). These are little gems of compression: within a page and a half, each sketches significant features of the environment at that time of the year, and gives central emphasis to the selected species, its appearance, its feeding, reproductive and migratory behaviour if an animal, its flowering and other ecological characteristics if a plant. Other species, either closely related ones, or predators or prey of the main one described, have walk-on roles that deepen one's understanding of the intricate webs of relationships in Canberra's natural history.

Of each month's ten essays, birds take pride of place with three to seven essays (totaling some 55 birds for the whole year), and plants second place with one to four essays (27 for the year). Eleven essays treat mammals, and the rest are divided among insects, amphibians and fish. These represent an extraordinary display of the range and depth of Fraser's knowledge. There are plenty of surprises among the more expected candidate species – for instance, nibbling silverfish in the books in Fraser's home library, prompt an insightful musing on the ethics of killing, on the evolutionary history of these insects, and exotic status; and the extraordinary uniqueness of the Black Mountain Velvet Worm or Peripatus bring the hidden recesses of the leaf litter around Black Mountain logs alive.

Fraser's writing brings his subjects alive, and the intricate details of their lives and habitats are woven into a text that is interspersed with his imaginative grasp of their status and changing circumstances, both in evolutionary and historical terms, at levels from the very local to the continental. History is never far from the present. The aboriginal presence is

lightly painted, touching on food plants and the harvesting of resin from Grass trees. Much more prominent is his appreciation of dramatic change since European settlement: "The shadow of the plough, the superphosphate bag, the massed hoofs of sheep and cattle, aggressively invading weeds and the incessant grinding advance of suburbia …" (p. 202). There is an elegiac note in several of the essays. Rapid and recent changes amongst bird populations in the ACT such as Galahs, and Crested Pigeons are recounted, and throughout threatened species are flagged.

Marsack's paintings are a delight, and there are plenty of them- not quite, but almost one per essay. As with Fraser's essays, birds predominate. Each season is announced with a double-paged spread: Summer with Pink-eared Ducks (the only pictured species lacking its own essay), Autumn with White-throated Needletails, Winter with a Platypus, and Spring with a branch full of White-winged Choughs (which does double duty as the cover picture). There are 10 full page paintings: seven are birds (including Australian Magpie, Glossy Black-Cockatoo, and Wedge-tailed Eagle), three are mammals (Brush-tailed Wallaby, Greater Glider), and one a plant (Soft Tree-fern). Of the eight half-page plates, four are birds, two are mammals, and one each a butterfly and a plant. The majority of the illustrations, however, are small insets in the text, jewels of colour, character and movement lightening up the pages and presenting to the reader's eye a feast of apt images. Each season includes some 22 to 25 of them, with over 90 in all. At least 45 are of birds.

A minor grouch: I would have liked two further things in the book. First, even though every entry is tied to a specific named location, there is no map. While most Canberra-based readers can be expected to have ready access to such aids as local maps, Google Earth, smart phone maps, or other internet mapping sources, I still regret the absence of a handy map inside the book for rapid location of site names. Second, there is no index. While the main animals or plants featured in the monthly entries are easily found via the detailed table of contents, many other species appear in the book and it would be good to be able to find them via an index. A useful species list (by common name and including scientific names) forms an appendix, but would have been that much more valuable if it had included indexation to pages. A note to the publishers: perhaps a second edition, and surely this book will have many editions, could include a map and an index? Perhaps also, if CSIRO Publishing moves, as many publishers of international journals now have, towards website-based supplementary information, Ian Fraser could provide an online listing of the undoubtedly imposing lists of references to the published research that underwrite his magnificently detailed micro-portraits of animals and plants. This would be a most useful guide to those seeking sources to further information.

To sum up, I consider this book is a must for anyone interested in the Canberra environment, valuable to experts and beginners alike. It is not a book for a single reading but will rather reward the reader who returns time and time again to browse and dip into for delight and instruction. I recommend it highly.

Australian High Country Owls. By **Jerry Olsen**
CSIRO Publishing, Collingwood, 2011, ISBN 9780643097056 , 366 pp., Paperback, AU $69.95.

Reviewed by HARVEY PERKINS, Kambah, ACT.

Jerry Olsen is an expert on owls. He is also a consummate story teller and in this book he weaves his vast and intimate scientific knowledge with personal experiences over many years of owl research, to produce an evocative, informative, and very enjoyable read.

The book immediately grabs the reader's attention through the baleful yellow gaze of the Powerful Owl on the front cover, but I must confess at the outset that I was bemused on first perusing the contents as to what the book covered, who its audience was, and particularly its title. A first glance suggests a grab-bag of chapters, jumping as they do from species to species – Southern Boobooks to Snowy Owls, Powerful Owls to Spotted Owls, Great Horned Owls to Little Owls – and between continents – Australia, North America, Europe and Asia. There's no doubt that the book represents a compendium of the author's research, experiences and interests, but it just isn't clear at first how it all hangs together. But then ecology itself can be like that too. It isn't until the second chapter, where Jerry makes the point that Australia has only two genera of owls, *Ninox* and *Tyto*, which occupy niches often filled by a larger number of genera and species in more owl-rich regions that the relevance of the approach begins to become apparent. And on page 53, when introducing diet and hunting, the author makes things plain by explaining that comparisons with certain North American and European owls can help to "better understand diet and hunting in Australian owls". Such comparisons continue through subsequent chapters and sections of the book.

Speaking of chapters, there are many of them, forty-five of them in fact. While this is a lot, their shortness, usually just 5-6 pages, has the effect of dividing the book up into very accessible bite-size chunks and makes reading both easy and enjoyable.

Jerry's writing style also contributes strongly to the readability of the book, transitioning as it does, regularly and seamlessly, between descriptive prose, scientific data and statistics, and personal narrative. Evocative descriptions of experiences in the field invite the reader into the life of a field researcher and keep the reader fully engaged.

Each chapter is liberally supported with photographs, diagrams, tables and graphs to illustrate the points made in the text. The 23 colour photographs occupying the central 16 pages of the book are beautiful and well-chosen to illustrate points made as well as to highlight the diversity of the world's owls.

The book is structured into several main themes, or sections. The first three chapters introduce owls in general and Australian owls more particularly. The major sections then cover the study of owls, diet and hunting, breeding, conservation, and culminate with the author's research on owls of Wallacea, including the description of a new species.

From the outset, the author makes it clear that researching owls is not easy, particularly in Australia. This is due mainly to their nocturnal and often secretive habits. As a consequence, much owl research tends to be based on inference and deduction - relying on indirect means such as vocalisation mapping or radio telemetry to determine owls'

locations and examination of regurgitated pellets to ascertain dietary intake - rather than by direct observation.

Chapter 13 (Winter Boobook diet) highlights some of the problems associated with determining diet based on such indirect evidence. It also suggests a soupçon of professional rivalry and a hint of intrigue. The author claims that two other researchers inappropriately examined boobook crops to determine their dietary intake, noting that owls don't have crops and that gizzards should have been examined instead. This is fair comment, and I have my own reservations about the researchers' interpretations and assessment; however it belies the fact that the published article states that gizzards were in fact examined. Perhaps Jerry was privy to an earlier draft, leading to an acknowledgment in the article that "anonymous referees made valuable *criticisms* on the manuscript" [my italics], and all pure speculation on my part.

The book progresses through its largest section on breeding, covering such aspects as territory defence, nest and breeding habits, pair behaviour, and fledging. It was fascinating to read how aggressive Southern Boobooks can be to neighbouring adults in defence of their breeding territories, yet how tolerant the same adults can be of their rivals' fledgling offspring if they wander into their territory, even when they have young of their own.

Owl conservation is touched on in chapters 36 to 40, drawing on examples from the Spotted Owl of the North American west, and the small owls of the genus *Athene*, before outlining conservation issues as they relate to the Australian situation.

The final section covers the experiences of the author and colleagues in Wallacea, mainly on the Indonesian island of Sumba in the Lesser Sundanese archipelago, culminating in their locating and describing a new species, the Little Sumba Hawk-Owl *Ninox sumbaensis*. What a privilege. And here you get the personal take on the whole adventure which is of course totally missing from the *Emu* article that describes the holotype.

There are two impressively large appendices, which to me are misnamed and qualify as parts of the book in their own right. The first is a detailed field-guide style description (and distribution map) for each of the nine Australian owls (the Tasmanian boobook is not separated from the mainland Southern Boobook in this treatment) with emphasis on those aspects of the species' taxonomy, distribution or biology that are still unclear. The second appendix provides valuable practical information for carers on rehabilitating injured or orphaned owls.

The book is thus a wide-ranging foray into the world of owls, their biology, ecology and behaviour, but with a focus on Southern Boobooks, particularly those of Aranda and Black Mountain in the ACT that have been the subject of the author's research and passion for so long. Hence the title of the book I guess, but I'm still not convinced.

I learned two new words from this book: *orts* – fragments or scraps left over from a meal, in this context the discarded uneaten remains of prey; and *jess* – a short leather strap put around the leg of a bird in falconry. And I was so pleased to see included with the introduction of each species an interpretation of the bird's scientific name. Though in most cases, because owls of many types seem to have been well known, and named, by the Greeks and Romans, the etymologies tend to have more historical than neologistic interest.

I was also fascinated to learn that some owls have ear openings positioned asymmetrically on the sides of their skulls. Jerry explains that this assists in triangulating the distance and direction of the sounds of moving prey, though provides no further detail on how this is achieved. On broader reading it seems the asymmetry of the ears enables differential detection of sound intensity in the vertical plane, which in conjunction with the temporal (time) differential between ears for horizontal positioning allows the owl to pinpoint precisely the location of the sound, even in total darkness. That such an adaptation exists in several genera of owls, in both families Tytonidae and Strigidae, implies the trait has evolved independently on several occasions.

Vancouver being in south-east Canada, *strixg* (page 89 - rather than the Greek *strigx* or *strix*), and an apparent mis-referencing on page 17 to chapters 8 (Telemetry) and 9 (Spotted Owls) for further discussion on boobook diet, were the only errors I detected.

From a purely physical perspective I found the book very pleasing, though I will be covering it to protect its soft covers. Its 376 pages are cut to very convenient dimensions (245 mm x 170 mm) which, together with its weight (952 g), make for a very solid and satisfying feel in the hands. Evidently the gsm density of its pages is as impressive as their information density.

At nearly $70 the book is not inexpensive, but this is in line with other current natural history offerings from CSIRO publishing. I did, however, find it available on the web for prices ranging to as low as $46.90.

Given that the author is perhaps even better known for his work on diurnal raptors, especially eagles and falcons, I wonder if Jerry might also publish a companion volume on diurnal raptors (noting that he has already published *Some Time with Eagles and Falcons* in 1994).

A long-standing question remains in my mind – given the size of the Australian landmass, and the fact that owls in other parts of the world have filled virtually every conceivable habitat and niche from dense forest to open grassland, desert to polar regions, and with diets from mammals, to fish, to small invertebrates – why is it that Australia has so few owls? Jerry mentions the low number of owl species and genera in Australia at the beginning of the book and again at the start of Appendix A. Australia's nine or ten owls represent just 4% of the world's total (based on the IOC listing v3.1). A little conjecture on this would have been very welcome.

Australian High Country Owls is an eminently readable volume and should appeal equally to owl researchers, ecologists, and interested amateur birders with a penchant for owls. COG members, particularly those who may have attended Jerry's many talks at monthly meetings over the years, will find a lot to like about this book.

RARITIES PANEL NEWS

A short list of endorsed records on this occasion, but some significant ones. The **Spotted Nightjar** is, to the Panel's understanding, the first record of this species in the ACT. And by very good fortune, its spotter, David Rees, had a video camera with him at the time. There have been regular though infrequent records of the White-throated Nightjar *Eurostopodus mystacalis* in COG's area of interest since 1959, when according to Steve Wilson (1999) a road accident specimen was collected near CSIRO Gungahlin, but none of its near relative, the Spotted Nightjar, until now. The White-throated is principally a bird of the east coastal regions, but can be found west of the Divide where it overlaps with the range of the more widespread inland species, the Spotted.

David's bird was found on a rocky ridge in fairly open woodland in Goorooyarroo Nature Reserve. It flushed from close range, and repeatedly flew a short distance then dropped. He was of the view it did not want to leave the area and may have been breeding; however he was unable to locate it again despite many attempts.

Nightjars do not often give observers the opportunity to observe the finer points of identification. However, in the case of the Spotted, it does have one feature which David's camera captured nicely, namely a bold white patch in the outer wing, visible in flight. It is also a tad smaller and less dark than the White-throated, with more prominent and larger spotting on the uperwing coverts.

The Panel received three records of an **Eastern Osprey,** and endorsed two of them. They possibly refer to the same bird, as both were recorded along our western rivers within a few days of each other. It is possible that it is the same bird that was the subject of the first endorsed ACT record of the species, by Duncan McCaskill last May. The most prominent feature for identification purposes is its seriously prominent dark eye stripe. Compared with a juvenile White-bellied Sea-Eagle, with which the Osprey can be confused, the Osprey is more slender while the Sea-Eagle is a much heavier bird.

The **Grey-crowned Babbler** record was a surprise, as the closest known colony of this species is near Booroowa. Furthermore, the species is not usually found singly – though that said, the last ACT record was of the one bird which resided at Duntroon 2004-05. The Grey-crowned is the largest babbler, with a broad white eyebrow over a black mask. While it does have a grey crown, this may not be a good field characteristic. It is always useful, when reporting babblers, to provide a size comparison with other nearby species, as this observer did.

The Panel received, but was unable to endorse, a record of a **Red-chested Button-quail**. The species has been recorded in the ACT previously. Mark Clayton recalls banding a juvenile in summer 1969 in a wheatfield at the site of what is now the Lyneham hockey centre. Unfortunately button-quail do not usually hang around to give observers a good look, so the Panel was reluctant on this occasion to endorse the record on the basis of a brief glimpse. Ideally one would like to see the red chest for positive identification; buff rather than white flanks are insufficient to distinguish from some Little Button-quail females. The Panel is nevertheless grateful for all such records, even if they are not endorsed, as they provide a useful background for future possible sightings.

ENDORSED LIST 80, June 2012

Eastern Osprey *Pandion cristatus*

1; 31 Mar 12; Daniel Hoops; Cotter River, S of bridge; GrG14
1; 4 Apr 12; Con Boekel; Sturt Island, confluence of Molonglo and Murrumbidgee Rivers; GrH12

Spotted Nightjar *Eurostopodus argus*

1; 18 Sep 11; David Rees; Goorooyarroo NR; GrM11

Grey-crowned Babbler *Pomatostomus temporalis*

1; 6 May 12; Leo Berzins; Gundaroo – NE of town common; GrO7

Spotted Nightjars, Round Hill NSW, October 2011 (*Rhonda Hansch*)

Canberra Bird Notes

Canberra Bird Notes is published three times a year by the Canberra Ornithologists Group Inc. and is edited by Michael Lenz. Major articles of up to 5000 words are welcome on matters relating to the distribution, identification or behaviour of birds in the Australian Capital Territory and surrounding region. Please discuss any proposed major contribution in advance. Shorter notes, book reviews and other contributions are also encouraged. All contributions should be sent to cbn@canberrabirds.org.au.

CANBERRA BIRD NOTES 37 (2) JUNE 2012

Printed July 2012