

Counting Glossy Black-Cockatoo for Conservation: Results of a survey in southeast Queensland and northeastern New South Wales

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Counting Glossy Black-Cockatoo for Conservation: Surveys of areas in SEQ and northeastern NSW.

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Summary

The persistence of Glossy Black-Cockatoo, *Calyptorhynchus lathami lathami*, in southeast Queensland and northeastern New South Wales is threatened by habitat loss and fragmentation associated with ongoing urban development. Effective conservation and management strategies for this species therefore require detailed information on, and regular monitoring of its distribution and abundance at a regional level. In order to provide regional conservation agencies with more detailed information related to the distribution and abundance of the species a regional survey was undertaken on 31 October 2010. The survey covered the broader SEQ and northeastern NSW areas and surveyed areas within nine SEQ and two NSW local government areas. This survey built on the pilot survey of the previous year that was held only on the Gold Coast, SEQ. The survey relied extensively on the use of volunteers from within the community to assist regional coordinators in surveying areas for the Glossy Black-Cockatoo. Search areas were chosen based on the interrogation of historical reporting rates from across the region supplemented by local knowledge from conservation managers and community members. A total of 259 1km² grid cells, representing 40% of the 642 km² area of prior sighting locations, were then surveyed from dawn to dusk on a single day by volunteers. A total of 106 birds were observed on the day providing a crude estimate of 0.41 birds / km². Seventeen juvenile birds were recorded representing 16% of the total numbers observed while there was a relatively even number of males (33 birds) and females (30 birds) in the adult cohort.

Introduction

The distribution and abundance of species, and the factors that determine these parameters, remains a central question in current ecological studies (Belovsky *et al.* 2004). Until we are able to increase our understanding of such fundamental questions our ability to implement effective conservation and management strategies will be compromised (Underhill and Gibbons 2002; Guisan *et al.* 2006; Greenwood 2007). Many of the species within the diverse parrot and cockatoo assemblages of Australia are threatened and therefore require strategic conservation actions to ensure their persistence. A species that has been the focus of considerable attention is the Glossy Black-Cockatoo.

The Glossy Black-Cockatoo, *Calyptorhynchus lathami*, is a widespread endemic species occurring throughout eastern and south-eastern Australia (Higgins 1999; Garnett *et al.* 2000). Despite its relatively extensive range, the species is regionally threatened as populations in some areas face ongoing pressure through habitat loss, transformation and climate change (Cameron 2006; 2009). Like other cockatoos, the Glossy Black-Cockatoo nests only in hollows within large, old eucalypt trees, primarily *Eucalyptus* species. If breeding is successful, they raise a single chick every two years (Garnett *et al.* 1999). Further research has been completed to assess population responses to management interventions aimed at improving breeding success (Mooney and Pedler 2005). While there is historical information on the distribution of the species at a broad landscape level (e.g. Barrett *et al.* 2003), there is little information on abundance and trends in population size in most areas, including southeast Queensland (SEQ) and northeastern NSW which are thought to be a regional hotspot for the species, with birds distributed throughout a range of habitats stretching from the coastal zone to the hinterland. This dearth of information on these ecological parameters makes it increasingly difficult to manage populations in an area that is subjected to ongoing development pressure.

One mechanism whereby researchers and managers can assess the distribution of the species is through using an index to quantify their use of feeding sites across the landscape. This method provides a measure of which areas are important for the Glossy Black-Cockatoo (Robinson and Paull 2009), but it also has the potential to estimate population size or density within a region. Estimating population size for a cryptic species that occurs at low density, such as the Glossy Black-Cockatoo, is complex and methods developed for site specific studies are not necessarily applicable at a larger, landscape scale, particularly when the species of interest may be moving quite large distances. Alternative methods for monitoring bird population trends over the medium to long-term include various bird atlas projects (Robertson *et al.* 1995; Gibbons *et al.* 2007) and simultaneous counts of certain species within specified time frames at known locations (Pithon and Dytham 1999, Downs 2005). Bird atlasing projects have been used extensively in many countries to reflect not only the distribution of species (Robertson *et al.* 1995; Harrison *et al.* 1997; Barrett *et al.* 2003), but increasingly the likelihood of occurrence and abundance of populations in these areas (Shukuroglou and McCarthy 2006; Gibbons *et al.* 2007; Greenwood 2007). Simultaneous counts provide estimates of population size, and repeated surveys of the same locations enables researchers to monitor trends within these populations. Examples of such surveys include the annual Glossy Black-Cockatoo surveys on Kangaroo Island, Red-tailed Black-Cockatoo surveys in Victoria and South Australia, and an annual coordinated count that has monitored population size and trend of the threatened Cape Parrot, *Poicephalus robustus robustus* in South Africa since 1998 (Downs 2005).

Here we review the historical distribution of Glossy Black-Cockatoo in the SEQ and NSW regional hotspot area within Australia and present the first bioregional estimate of their abundance, together with information on social structure, and distribution. An all-day census was conducted across the region with the assistance of volunteers.

Study Area

The study was undertaken across the broader SEQ and northeastern NSW region (Fig. 1) extending from (-26.1653S, 152.3472E) in the north-west to (-28.7593S, 153.6132E) in the south-east.

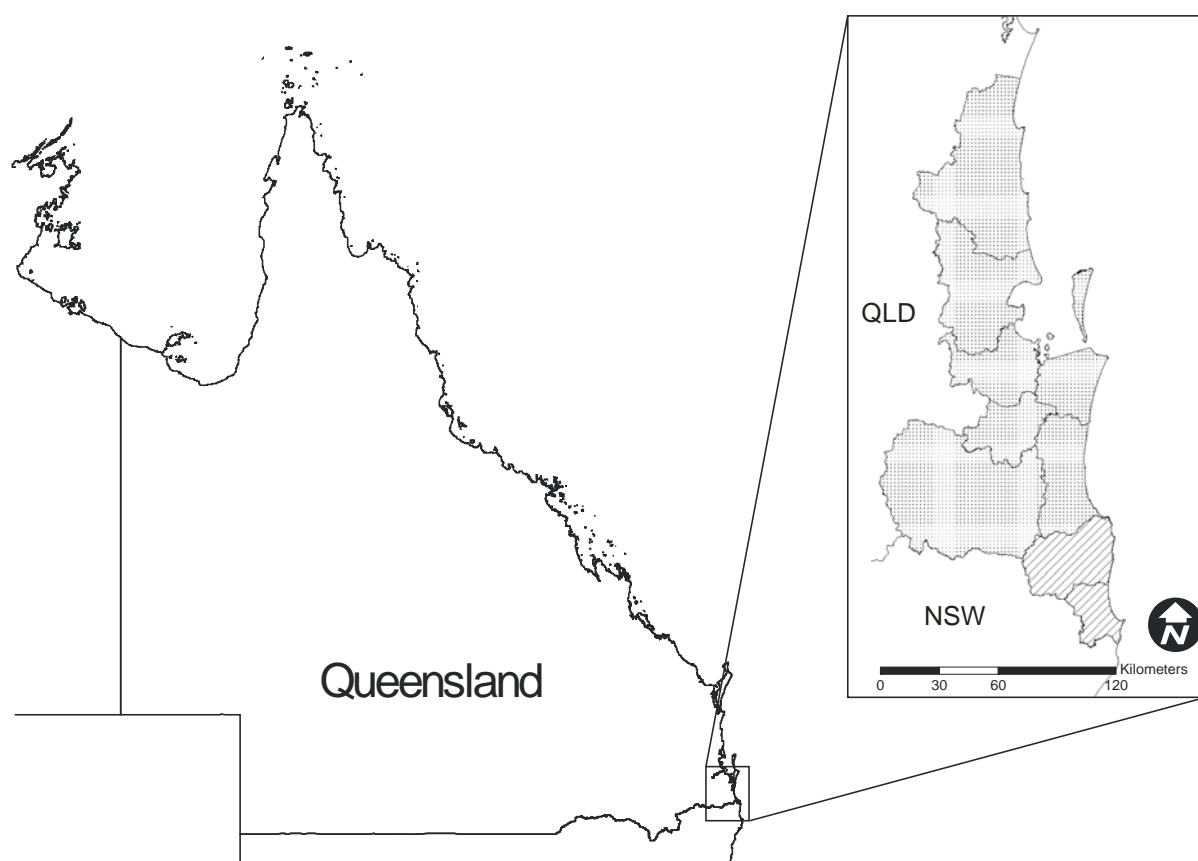


Figure 1: Location of the Glossy Black-Cockatoo study area across regional LGAs in southeast Queensland (stippled) and northeastern NSW (hatched), Australia.

Nine local government areas were surveyed from SEQ and two from NSW. While other LGAs have previously recorded sightings of Glossy Black-Cockatoo the survey was restricted to these areas as regional coordinators were available to assist in the planning and implementation of the survey in these areas (Table 1). The survey was undertaken with the support of the regional Glossy Black Conservancy (www.glossyblack.org.au) which includes a variety of partners and friends interested in the conservation of the cockatoo regionally.

Table 1: Regions, organisations and coordinators assisting with the Glossy Black-Cockatoo survey for 2010.

Region	Organisation	Representative
Sunshine Coast	Birds Australia Southern Queensland	Eric Anderson
Brisbane	Birds Queensland	Lyn Cole
Brisbane	Brisbane City Council	Robyn Jones
Logan	BrisBOCA	Rod Bloss
Byron	Byron Shire Council	Scott Hetherington
Gold Coast	Griffith University	Guy Castley
Logan	Logan City Council	Lyndall Rosevear / Nicole Walters
Moreton Bay	Moreton Bay Regional Council	Andrew Evans
Scenic Rim	Mt Barney Lodge	Tracey Larkin
Redland City	Redland City Council	Lisa Bailey
Scenic Rim	Scenic Rim Regional Council	Keith McCosh
Sunshine Coast	Sunshine Coast Regional Council	Conor Jenkins
Tweed	Tweed Shire Council	Tanya Fountain / Pamela Gray

Methods

Historical sighting records

As a first step to identifying target areas for an intensive survey of Glossy Black-Cockatoo on the Gold Coast, we compiled and interrogated a database of historical sighting records for the area. Geographic Information System (GIS) point data layers containing the sighting locations of Glossy Black-Cockatoo were captured from each database and combined into a single consolidated GIS shapefile in ArcGIS 9.3 (ESRI). We then created a uniform grid over each LGA with a cell size of 1 km². Each grid cell was then uniquely identified with an alphanumeric code based on the column and row position. We then enumerated the number of individual sightings of Glossy Black-Cockatoo within each grid cell to provide us with a measure of the relative abundance of the species within the study area. A Google Earth KMZ (zipped Keyhole Markup Language) file was then created of the relative abundance using ArcGIS 9.3 and this was linked to Google Earth via the Glossy Black Conservancy website to enable the interactive interrogation of the survey locations by

volunteers. We were then able to prioritise the selection of birding day survey locations based on the relative abundance and distribution of these historical sightings. We used a hierarchical selection process to assign grid cells to volunteers where those with a higher reporting rate were selected first. In addition we reviewed our site selection process to ensure that we incorporated grid cells from as wide an area as possible to maximise the coverage across the entire study area. We also had a number of potential survey areas chosen by volunteers based on their own interrogation of the Google Earth maps supplemented by local knowledge of the areas being surveyed. For the region surveyed Glossy Black-Cockatoo have been recorded from 642 individual grid cells with the majority (90%) of historical sightings being made from the Gold Coast, Sunshine Coast, Redland City, Scenic Rim and Moreton Bay areas.

Cockatoo birding day

Due to the intensive nature of the survey which required the simultaneous surveying of multiple sites throughout the region we enlisted the assistance of volunteers to participate in the birding day, similar to approaches used in other avian population studies (Pithon and Dytham 1999; Downs 2005). The event was promoted using a combination of radio, internet (Griffith University website, Glossy Black Conservancy website), articles in local and community newspapers, printed material (letter drops in known cockatoo concentration areas), and direct solicitation of participants from existing interest groups, including local birding clubs, environmental societies, schools and community groups. A number of prizes for participating in the 2010 survey were also used to encourage volunteers to sign on. Each regional coordinator generated a database of volunteers who were then assigned to specific grid cell locations as outlined above. To ensure that all participants were familiar with the survey procedures and species of interest we provided each participant with background information about the Glossy Black-Cockatoo and its identification, a detailed survey protocol, datasheets for reporting observations of cockatoos as well as feed trees, and a

map of their assigned grid cell. We also ran a series of workshops where volunteers were instructed on identifying Glossy Black-Cockatoos, specifically focusing on the differentiation of adults and juveniles as well as males and females as sexes are dimorphic. Volunteers were also provided information on the identification of the preferred food trees used by the cockatoo namely, *Allocasuarina* species. Explanations of how to capture data and complete datasheets were also included in materials distributed and workshop presentations.

The census was conducted on Sunday 31 October 2010, when the majority of volunteers surveyed their grid cell from dawn till dusk, arriving at their assigned location at approximately 6am and surveying the area at hourly intervals until 6pm. A total of 295 volunteer observers took part in the birding day covering 259 areas from those identified in the historical analysis (40%). The observers were well distributed throughout the region and surveyed a range of areas from those with relatively high sighting frequencies to those with low sighting frequencies. Volunteers surveyed their area by following accessible routes through natural habitat, parkland and roadside reserves, looking and listening for Glossy Black-Cockatoo. Volunteers were required to report on the number of birds observed, sex (male, female, unknown), age (adult, juvenile), activity of the birds (feeding, perching, flying, drinking, preening, roosting), time of observation, direction of flight. Since volunteers conducted repeated observations of areas within their grid cell we accounted for possible duplicate sightings by comparing the time, location, sex and age structure of each group observed. Volunteers also indicated whether they felt that these were the same birds or not. Any potential duplicate observations were removed prior to analysis. Volunteers were also required to search under *Allocasuarina* trees for orts, distinctive cone remnants that feeding Glossy Black-Cockatoos leave underneath the tree after stripping the cone of seeds. Orts vary in their persistence within the environment, and change colour with age. Volunteers recorded approximate abundance (0, 10, 100 or 1000 etc.) and ort colour (whitish-green – fresh, few weeks – red-brown, few months – brownish-grey and old – grey).

Results

A total of 106 Glossy Black-Cockatoo was recorded from across the region on the (Table 2) with observers completing over 2800 hours of search effort throughout the region. The sightings were made from only 31 of the 259 grid cells searched with a success rate of 12%. The majority of birds were seen from the Sunshine Coast while only two LGAs, Logan and Moreton Bay, recorded no observations of the cockatoo (Table 2). The majority of the birds were adults (n=89) with a relatively even separation of male (n=33) and female (n=30) birds among those that could be sexed. Many of those that went unsexed were birds in flight. Seventeen juvenile birds were reported suggesting that approximately half of the adult pair had bred in the current or previous season. A crude estimate of the density of Glossy Black-Cockatoo across the region can be calculated at 0.41 birds / km². Evidence of Glossy Black-Cockatoo feeding was also observed at 60 sites with 70% of this activity being recorded from sites that did not detect birds during the survey itself.

Table 2: Summary statistics of Glossy Black-Cockatoo observed during a single survey of LGAs in the southeast QLD and northeastern NSW regions.

Region	Observers	Cells Surveyed	Birds Seen	Adults			Juveniles		
				Male	Female	Unknown	Male	Female	Unknown
Gold Coast	44	44	9	5	4	0	0	0	0
Brisbane	24	16	2	1	1	0	0	0	0
Scenic Rim	26	28	32	9	9	7	1	0	6
Sunshine Coast	64	45	48	13	11	18	0	0	6
Moreton Bay	7	8	0	0	0	0	0	0	0
Logan	36	24	0	0	0	0	0	0	0
Redland Bay	16	16	2	1	1	0	0	0	0
Byron	16	15	2	1	1	0	0	0	0
Tweed	62	63	11	3	3	1	2	2	0
Totals	295	259	106	33	30	26	3	2	12

A total of 328 trees recorded from 60 sites showed signs of Glossy Black-Cockatoo feeding evidence. Eighty-two percent of feeding signs ($n = 269$ trees) was recorded from *Allocasuarina littoralis* (black she-oak), while 17.6 % of feeding was recorded from *A. torulosa* (forest oak) ($n = 58$ trees). Feeding was only reported from underneath a single coastal she-oak. Feeding effort was quantified by the estimated number of chewings underneath these trees which totalled 49 256, while the trees themselves were estimated to have in excess of 86 186 cones available (Table 3).

Table 3. Numbers of chewings and cones observed from from *Allocasuarina littoralis* and *Allocasuarina torulosa* feed trees at 60 locations across SEQ and northeastern NSW.

Summary data feed trees	Number of trees	Number of Chewings	Number of Cones	Mean # Chewings	Mean # Cones
Gold Coast	38	12991	25580	342	673
Brisbane	10	2280	7580	228	758
Scenic Rim	51	11130	7556	218	148
Sunshine Coast	116	200	400	2	3
Moreton Bay	0	0	0	-	-
Logan	15	4350	2100	290	140
Redland Bay	16	6635	16500	415	1031
Fraser Coast	4	1700	650	425	163
Byron	11	150	3500	14	318
Tweed	67	9820	22320	147	333
Totals	328	49256	86186	150	263

Discussion

Distribution and abundance of Glossy Black-Cockatoo

The current survey is the first of its kind that reports on the size of the Glossy Black-Cockatoo population across the broader southeast Queensland and northeastern NSW region. The survey expands on the survey completed in 2009 that concentrated efforts on the Gold Coast (Castley & Stock 2010). It is not possible to make a direct comparison among these two surveys given that the complete survey area, timing of the survey, as well as overall survey effort were not similar. While it may be possible to standardise for survey

effort across the entire region using the grid cells and total survey time, the seasonal variation in distribution and abundance patterns may still confound any comparative analysis. The survey in 2010 was completed in October in an effort to capture the reproductive performance of the regional population as chick would be out with parents at this time of the year. Therefore while some areas may report higher activity levels during late Autumn (May) it may not be possible to provide an accurate reflection of breeding success in terms of the proportion of juveniles within the population. A number of volunteers made specific mention of the fact that the timing of an October survey was not appropriate for their region (e.g. Redland Bay, Gold Coast) as the cockatoo were no longer in these areas. However, other regions noted that this was the most appropriate time to conduct the survey (e.g. Sunshine Coast, Scenic Rim). A possible solution to the timing of the survey would be to undertake two surveys each year throughout the entire region (i.e. in both May and October) but it is likely that this would be demanding both on volunteer time as well as Glossy Black Conservancy partners in relation to coordination and preparation. Alternative, and given that the species is long lived it may be possible to alternate the timing of surveys from one year to the next. Nonetheless at a recent Conservancy meeting it was decided that the next survey would take place on 22 May 2011 (Sunday).

The survey continues to provide valuable information on the distribution and abundance of the species and the ongoing long-term monitoring of the regional population in this manner supplemented with ongoing reporting of sightings throughout the year will facilitate a more detailed investigation of the essential habitats required by the Glossy Black-Cockatoo. There are undoubtedly a number areas that are regional hotspots which local councils should take cognisance of and the recently published Glossy Black-Cockatoo Conservation Guidelines (GBC 2010) provide various recommendations to capture these requirements in local planning initiatives

Prizes for 2010 Volunteers

A number of prizes were generously donated for this year's Glossy Black-Cockatoo Survey. These included a mid-week country getaway at Mt Barney Lodge in the Scenic Rim, two adult passes to Australia Zoo, a family pass (2 adult and 2 children) to Currumbin Wildlife Sanctuary, the book "Cockatoo" by Matt Cameron (donated by Griffith University), and memberships to Birds Australia South Queensland and BOCA (Bird Observers and Conservation Australia). Our lucky prize winner drawn at random from all those who participated at a recent Glossy Black Conservancy meeting were;

Joanna Garnder and Peter Symonds (Tweed) – Mt Barney stay
Kelley Jessen (Gold Coast) – Currumbin Wildlife Sanctuary pass
Karolyn Campbell (Redland Bay) – Australia Zoo pass
Barb Veal-Sinclair (Sunshine Coast) – BOCA annual membership
Ratnadeep Nagarkar (Brisbane) – Birds Australia SQ membership
Judy Leitch (Logan) – "Cockatoo" by Matt Cameron

Well done to all of our winners! We look forward to all of you participating in next year's survey.

Acknowledgements

I would like to take this opportunity to thank a number of people without whom this regional survey would not have been possible. Firstly to all the volunteer observers who took part I express my sincere appreciation. It is through the continued efforts of concerned members of the community such as yourselves that we will be able to conserve not only species like the Glossy Black-Cockatoo, but also many others. To the Glossy Black Conservancy partners and in particular the regional coordinators, your support and desire to see the event promoted as widely as possible was critical to the success of the regional event. I could not have done this without you. A number of conservation groups assisted at various times to support the event and included the Logan and Albert Conservation Association,

Tweed Bird Observers Club, Wildlife Preservation Society Queensland, Land for Wildlife, SEQ Catchments and DERM. A further word of thanks to our wonderful sponsors who kindly donated prizes for the event. I would also like to thank a number of people who assisted behind the scenes in preparing the materials for the regional survey. These include Rebecca Sims who compiled the spatial grid cell layers and analysis of historical reporting rates providing the basis for the survey throughout the region, and Alexa Mossaz who assisted with liaising with volunteers on the Gold Coast. Undoubtedly there were many others in each of the other regional areas whom I have not mentioned but who contributed much of their time to ensure that the event was a success. Thank you! Lastly, the ongoing monitoring and research of the Glossy Black-Cockatoo on the Gold Coast is grateful to have the support of the Gold Coast City Council who have provided funding to support these research initiatives since 2006.

References

- Barrett, G., Silcocks, A., Barry, S., Cunningham, R., and Poulter, R. (2003). 'The new atlas of Australian birds.' (Royal Australian Ornithologists Union, Hawthorn East, Victoria.)
- Belovsky, G.E., Botkin, D.B., Crowl, T.A., Cummins, K.W., Franklin, J.F., Hunter, M.L., Joern, A., Lindenmayer, D.B., MacMahon, J.A., Margules, C.R., and Scott, J.M. (2004). Ten suggestions to strengthen the science of ecology. *Bioscience* 54, 345-351.
- Cameron, M. (2006). Nesting habitat of the glossy black-cockatoo in central New South Wales. *Biological Conservation* 127, 402 – 410.
- Cameron, M. (2009). The influence of climate on Glossy Black-Cockatoo reproduction. *Pacific Conservation Biology* 15, 65-71.
- Castley, J.G., and Stock, M.J. 2010. Estimating the distribution and abundance of Glossy Black-Cockatoo on the Gold Coast, Australia, using a systematic survey. Unpublished report, Environmental Futures Centre, Griffith School of Environment, Griffith University. 28pp.
- Downs, C.T. (2005). Abundance of the endangered Cape parrot, *Poicephalus robustus*, in South Africa: implications for its survival. *African Zoology* 40, 15-24.
- Garnett, S.T., Pedler, L.P., and Crowley, G.M. (1999). The breeding biology of the glossy black-cockatoo *Calyptorhynchus lathami* on Kangaroo Island, South Australia. *Emu* 99, 262 – 279.
- Garnett, S.T., Crowley, G.M., Pedler, L.P., Prime, W., Twyford, K.L., and Maguire, A. (2000). Recovery plan for the south-Australian subspecies of the Glossy Black-Cockatoo (*Calyptorhynchus lathami halmaturinus*): 1999-2003 – Version 4.0. Report to the Threatened Species and Communities Section, Environment Australia.
- Glossy Black Conservancy 2010. *Glossy Black-Cockatoo Conservation Guidelines for South-Eastern Queensland and far North-eastern New South Wales*. Glossy Black Conservancy, Capalaba. 38pp.
- Gibbons, D.W., Donald, P.F., Bauer, H.G., Fornasari, L., and Dawson, I.K. (2007). Mapping avian distributions: the evolution of bird atlases. *Bird Study* 54, 324-334.

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- Greenwood, J.J.D. (2007). Citizens, science and bird conservation. *Journal of Ornithology* 148, Suppl (1) 77-124.
- Guisan, A., Lehmann, A., Ferrier, S., Austin, M., Overton, M.C., Aspinall, R., and Hastie, T. (2006). Making better biogeographical predictions of species' distributions. *Journal of Applied Ecology* 43, 386-392.
- Harrison, J.A., Allan, D.G., Underhill, L.G., Herremans, M., Tree, A.J., Parker, V., and Brown, C.J. (Eds) (1997). 'The Atlas of Southern African Birds.' (Bird Life South Africa, Johannesburg).
- Higgins, P.J. (Ed) (1999). 'Handbook of Australian, New Zealand and Antarctic Birds. Volume 4: Parrots to Dollarbirds.' (Oxford University Press, Melbourne).
- Mooney, P.A., and Pedler, L.P. (2005). Recovery plan for the South Australian subspecies of the Glossy Black-Cockatoo (*Calyptorhynchus lathami halmaturinus*): 2005-2010. (Department of Environment and Heritage, South Australia).
- Pithon, J.A. and Dytham, C. (1999). Census of the British Ring-necked Parakeet *Psittacula krameri* population by simultaneous counts of roosts. *Bird Study* 46, 112-115.
- Robertson, A., Simmons, R.E., Jarvis, J.M. and Brown, C.J. (1995). Can bird atlas data be used to estimate population size? A case study using Namibian endemics. *Biological Conservation* 71, 87-95.
- Robinson, T., and Paull, D. (2009). Comparative evaluation of suburban bushland as foraging habitat for the Glossy Black-Cockatoo. *Corella* 33, 7-12.
- Shukuroglou, P. and McCarthy, M.A. (2006). Modelling the occurrence of rainbow lorikeets (*Trichoglossus haematodus*) in Melbourne. *Austral Ecology* 31, 240-253.
- Underhill, L., and Gibbons, D. (2002). Mapping and monitoring bird populations: their conservation uses. In 'Conserving Bird Biodiversity: General Principles and their Application.' (Eds) K. Norris and D.J. Pain pp 34-60. (Cambridge University Press, Cambridge).

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