Technical Report

Breeding ecology of the superb parrot *Polytelis swainsonii* in northern Canberra

Nest Monitoring Report 2015

Laura Rayner, Dejan Stojanovic, Robert Heinsohn and Adrian Manning

Fenner School of Environment and Society
Australian National University

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Disclaimers

The views and opinions expressed in this paper are those of the authors and do not necessarily reflect the views of the Australian Capital Territory Government. Knowledge and understanding of many aspects of the Superb Parrot's ecology and biology may be imperfect, uncertain or non-existent.

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Cover photo: Female superb parrot at her nest in Throsby, northern ACT. **© Henry Cook**

Breeding ecology of the superb parrot *Polytelis swainsonii* in northern Canberra: 2015 Nest Monitoring Report

Executive Summary

We collected data on the breeding and foraging ecology of the superb parrot from September 2015 to January 2016. This included information on nest tree selection, characteristics and dimensions of nesting hollows, breeding productivity, social and breeding behaviour, inter- and intra-specific competition, hollow visitation rates, foraging movements and foraging site selection.

We spent close to 100 hours searching for nest trees at two locations: Throsby and Spring Valley, locating 12 active superb parrot nests during the 2015 breeding season. We provide an updated dataset of all identified potential and known superb parrot nest trees, including spatial coordinates and detailed mapping.

Superb parrots selected for Scribbly Gum *Eucalyptus rossii* or Blakely's Red Gum *Eucalyptus blakelyii* nest trees with a mean diameter of 112 cm. Active superb parrot nest hollows, that successfully fledged at least one young, had an entrance diameter ranging from 8 to 18 cm, a mean chamber depth of 74 cm, and were located 4 - 9 m above ground.

Our data confirm high rates of nest success for superb parrots in the Throsby area. Mean clutch size over the breeding period was 4.6, and we estimate 40 young fledged successfully from at least 57 eggs. We recorded the first case of egg dumping for this species, and observed complex social behaviours (including crèching) that provide an important context for understanding superb parrot breeding requirements.

Over the season we monitored approximately 50 nestlings and banded 38 individuals, comprising 6 adults and 32 nestlings. Camera traps revealed frequent visitation to superb parrot nest hollows by other hollow-nesting species; predominantly species that shared similar hollow size requirements, such as crimson rosella and common starling. We do not provide unequivocal evidence of nest predation in this study. However, based on camera trap data, we believe a predation attempt by a kookaburra was responsible for the death of two nestlings.

We provide detailed information on foraging site selection and movement pathways for breeding superb parrots; the first data of its kind for this species. Tracking data reveals movement of up to 9 km to foraging sites that fall predominantly within the urban greenspace of Canberra. We provide a list of key foraging sites to assist habitat protection and conservation planning for the species.

We discuss the conservation implications of this work for the management of superb parrots in the ACT. This study provides vital baseline information on habitat and breeding requirements of Canberra superb parrots, contributes new evidence of safe and effective tracking techniques for the species, and suggests research priorities to inform future conservation efforts.

Contents

1. Introduction

The Superb Parrot (*Polytelis swainsonii*) is an iconic species of the critically endangered box-gum grassy woodlands of south-eastern Australia. The Australian Capital Territory contains some of the largest and most intact remnants of this endangered ecological community, which are increasingly favoured for rural and peri-urban developments. A key threatening process for the Superb Parrot has been the clearing and modification of the box-gum grassy woodlands that it occupies. Consequently, it is listed as Vulnerable under the EPBC Act, and under relevant Acts in the ACT and NSW, and as Endangered in Victoria. Despite its high public profile, we know surprisingly little about the breeding biology and movements of Superb Parrots. This information is essential for understanding the long-term viability of the Superb Parrot population and identifying areas critical to their persistence. These knowledge gaps represent a major barrier to effective conservation management of this bird, and presently, assessment of ecological impacts on this species are undertaken in the absence of basic ecological information. The species presents challenges in terms of conservation and planning.

As part of the Gungahlin and Molonglo Strategic Assessments, the ACT Government commissioned this research. Our research involved extensive in-field measurement and the latest GPS tracking technology to gain detailed information on the breeding territory, nest site selection and local movements of the Superb Parrot in key areas of the ACT. The work provides urgently needed ecological evidence for future conservation and rural and peri-urban planning in Canberra, and addresses key knowledge gaps that currently hamper effective decision making and management. The data emerging from this study provides a sound baseline for further tracking the progress of the superb parrot in the areas of interest in the long-term.

The ACT Government identified two key areas of focus for this project:

(1) assess the number of superb parrot pairs displaying breeding behaviour within the Gungahlin and Molonglo (Spring Valley) Strategic Assessment Areas, and,

(2) monitor competitive interactions between these birds and other hollow nesting species.

This report answers specifically to these tasks. We also present information relevant to key commitments given by the ACT Government in relation to superb parrot protection and management (Appendix A). In particular, we serve commitments to:

(1) improve understanding of habitat requirements for foraging and dispersing superb parrots within peri-urban and urban environments; and,

(2) improve understanding of the Superb Parrot population which occurs in the northern ACT in terms of, breeding requirements, nest site fidelity and breeding success.

All bird and tree data contained in this report were collected during the 2015 superb parrot breeding season, between September 2015 and January 2016. Two areas were monitored: Throsby and Spring Valley. In this report, *Spring Valley* refers collectively (unless otherwise stated) to two adjacent properties: “Spring Valley” and “Piney Creek”. Over the study period, only one nest was located in the Spring Valley area, on the “Piney Creek” property. Hence, this report focuses primarily on the Throsby area where most of the breeding and foraging data were collected.

2. Nest identification

2.1 Nest tree searching

Prior to the start of field work, existing data on the location of potential and known superb parrot nest trees were compiled. Superb parrots are known to re-use nest trees between years which gave good reason for assay trees based on past use. All available nest tree records were checked for duplicates and coordinate errors. A resulting dataset of 63 Throsby trees and 4 Spring Valley trees defined our general search areas.

We commenced searching for nest trees at Throsby on 16th September 2015, and at Spring Valley on 23rd September 2015. Searching involved watching and listening for birds, tracking birds through the landscape, and monitoring trees where birds were observed prospecting for hollows. For trees that contained a suitably large hollow, observers would briefly brush or scratch the base of the tree trunk to encourage any individuals that might be in a hollow to approach the entrance where they could be seen and recorded. Over a period of 10 weeks, we spent approximately 50 and 45 hours searching for nest trees at Throsby and Spring Valley respectively.

When a tree was identified as a potential nest tree, we recorded its GPS coordinates and the superb parrot breeding behaviour observed at that tree. Our search efforts added a number of potential nest trees to the baseline dataset, most of which we checked regularly throughout the season (see Appendices B and C for search timeline).

Construction works associated with the Throsby development began in December while superb parrots were provisioning young. The Throsby development area was not comprehensively searched for nest trees. One nest tree was located within the development zone; a 100-metre activity buffer was maintained around this nest tree until nesting was completed.

2.2 Camera monitoring

On 21st September 2015, we began deploying motion activated cameras at trees with repeated signs of superb parrot breeding behaviour; e.g. trees where a female superb parrot was observed inside or entering a tree hollow on multiple occasions. Potential nest trees were climbed using single rope access techniques. Cameras were attached to tree limbs using gaffer tape, at a distance of approximately 1 metre from and facing the hollow entrance.

Camera traps were checked every 1-2 weeks, replacing batteries and digital storage cards as required. Cameras located at potential nest hollows that were later abandoned, or occupied by species other than superb parrot, were retrieved and not redeployed (upon confirmation of absence using camera images). Cameras were retrieved from 5 trees where superb parrot breeding behaviour was observed, but where nesting did not commence.

Over the course of the season, we confirmed 11 active superb parrot nests at Throsby and 1 active superb parrot nest on the “Piney Creek” property adjacent to “Spring Valley”.

3. Superb parrot breeding data

3.1 Breeding effort and chick monitoring

In 2015, the breeding season for superb parrots in Throsby and Spring Valley extended from late September through to mid-December (Figure 1). The first confirmation of an active nest (containing eggs) was at Throsby on 7th October 2015. In total, we located 12 nests that hatched at least one young. We observed additional nesting attempts where eggs were laid but females failed to complete incubation. In these cases, the nest was usurped by another species (2 instances, see Section 5 below), eggs were destroyed (1 instance) or egg dumping by another superb parrot caused nesting failure.

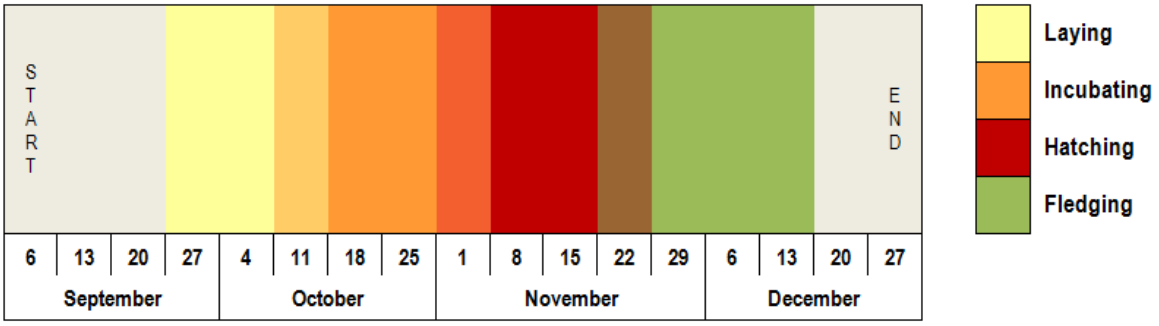

Figure 1. Superb parrot 2015 breeding timeline.

Clutch size and hatchling data are best estimates because hollow depth, cavity shape and incubating females occasionally obstructed visibility of the nest chamber floor. We estimated that 68 eggs were laid and 57 eggs were incubated between late-September and mid-October (e.g. Figure 2). We calculated a mean clutch size of 4.6 over the breeding period. Eggs that failed to hatch were either abandoned (n = 3), ejected from nest hollows (i.e. found at the base of a nest tree, typically very early in the season; n = 8), infertile (i.e. found unhatched inside the nest hollow; n = 2) or dumped (n = 5; see below). From the 12 active superb parrot nests located, we monitored 50 nestlings, of which 32 were banded (e.g. Figure 3, see also Appendix D). We also collected genetic samples and morphology data from all banded nestlings.

Figure 2. Superb parrot eggs and nestlings. These images show eggs laid by a superb parrot at Throsby and nestlings located in a Throsby nest

3.2 Nest success and predation

We estimate that approximately 43 nestlings fledged successfully. Early in the season, we located two dead hatchlings at the base of separate nest trees. We recorded three possible predation attempts: one by a kookaburra that resulted in the death of two nestlings, and two unsuccessful predation attempts by brushtail possums (the possums appeared to be inhibited by hollow entrance size). Only one nest failed (where three nestlings were found emaciated inside the nest hollow), but reasons for failure were unclear. The survival of individuals post-fledging was not monitored in this study.

Figure 3. Nestlings retrieved from Throsby nest tree for banding and measuring. All nestlings shown here fledged successfully from a Throsby nest.

4. Resource selection

4.1 Nest trees

Superb parrot nest trees were either scribbly gum *Eucalyptus rossii* or Blakely's red gum *Eucalyptus blakelyii* of at least 75 cm in diameter (at breast height: 1.35 m) and more commonly above 100 cm in diameter (Table 1). Superb parrot nest trees frequently occurred near to other superb parrot nest trees (8/12 nests were located within 150 m of another nest).

We observed at least three instances where two superb parrot pairs attempted to nest in the same tree. In each of these cases, one pair bred successfully while the other did not. We also found evidence of egg dumping (where a female laid 5 eggs in the nest of another female) but only one clutch hatched, presumably due to a mismatch in the timing of incubation.

While superb parrot adults (and particularly females) defend their nest site aggressively, aggregated nesting appeared to benefit the species during the fledging stage, when we observed adult males provisioning the young of other pairs. We observed strong signs of crèching behaviour within two weeks of fledging among superb parrots, where multiple young (up to 10 individuals) gathered under the care of an unrelated adult.

Table 1. Summary of 2015 nest tree and nest hollow dimensions. Nest tree and hollow data are for nests that hatched at least one young at Throsby.

Nest tree	**Mean ± S.D.**	**Median**	**Range**
Diameter (cm)	112.3 ± 23.2	113.3	75.4 — 151.2
Height (m)	15.7 ± 4.5	15.5	9.0 — 24.6

Nest hollow	**Mean ± S.D.**	**Median**	**Range**
Min. entrance diameter (cm)	10.5 ± 1.5	10.0	8.0 — 14.0
Max. entrance diameter (cm)	13.1 ± 2.9	13.5	8.0 — 18.0
Floor diameter (cm) *	20.5 ± 8.2	20.5	10.0 — 32.0
Depth (cm) *	73.5 ± 30.7	68.0	33.0 — 130.0
Volume (L)	8.8 ± 5.4	7.1	3.4 — 21.5
Height (m)	6.2 ± 1.3	6.5	4.2 — 8.6

* excludes one outlier: 42 cm

4.2 Nest hollows

Superb parrots selected for hollows with near-to-round entrances of approximately 11 cm in diameter (Table 1). Nest hollow depth was variable, but those with a depth exceeding 60 cm were occupied earlier in the season. All nest hollows were located at least 4 m above the ground, in or proximal to the main trunk of the tree. Superb parrots did not obviously select for hollow orientation (Figure 4).

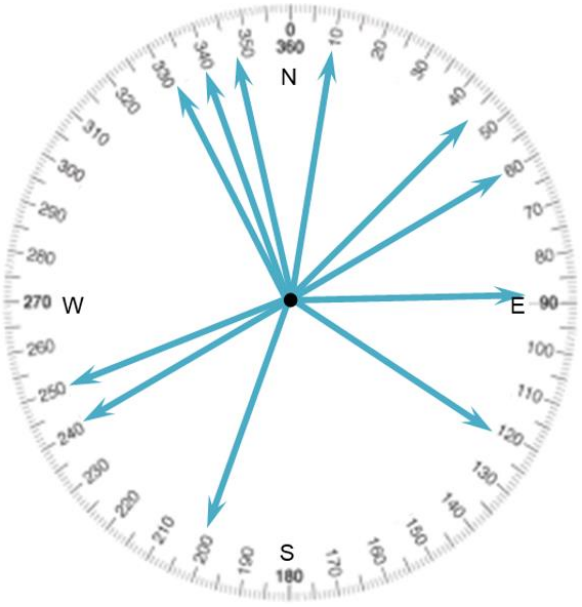

Figure 4. Orientation of nest hollows. Each arrow represents a nest.

Figure 5. Superb parrots at nest. Image captured in the week of fledging.

5. Competitive interactions

5.1 Nest competition

Data summarised in Section 4 are for nests occupied throughout the breeding season by a superb parrot pair that hatched at least one young. We observed many more hollows that were inspected by superb parrots, particularly early in the breeding season. Superb parrot pairs were often seen at or inside a hollow over multiple days (e.g. Figure 5), ultimately, without establishing a nest (see Appendices B and C). Sometimes, hollow abandonment occurred after usurpation by another species. In most cases, however, it was unclear whether superb parrots were outcompeted, or whether they rejected a hollow prior to inter-specific occupation.

Despite such ambiguity, competition clearly occurred frequently and intensely between superb parrots and crimson rosellas, and the cameras revealed frequent agonistic interaction between these species at nests. We estimate that superb parrot pairs were actively excluded from suitable nesting sites by crimson rosellas on at least four occasions. At least one superb parrot nest was usurped by crimson rosellas during the incubation stage (after superb parrots had laid eggs). Common starlings also usurped another superb parrot nest; however other factors, including intraspecific competition, may have contributed to this event.

More commonly, once superb parrots had laid their eggs they were able to defend their nest despite frequent visitation from other hollow nesting species (e.g. Figure 6). Such species included, in a rough order of visitation frequency:

- crimson rosella, *Platycercus elegans* (very often)
- common starling, *Sturnus vulgaris* (very often)
- sulphur-crested cockatoo, *Cacatua galerita* (very often)
- eastern rosella, *Platycercus eximius* (often)
- common myna, *Acridotheres tristis* (often)
- galah, *Eolophus roseicapilla* (occasionally)
- red-rumped parrot, *Psephotus haematonotus* (occasionally)
- nankeen kestrel, *Falco cenchroides* (rarely)
- brushtail possum, *Trichosurus vulpecula* (rarely)
- ringtail possum, *Pseudocheirus peregrinus* (rarely)

Detailed nest occurrence data were collected using cameras as part of this study. Images were scanned to confirm nest occupancy, monitor for predation events, and to identify provisioning adults during field work. However, we have not yet performed an analysis of camera data to calculate visitation and provision rates, or to count competitive interactions. These data are available for access if and whenever required.

Figure 6. Examples of visitors to a Throsby nest tree, captured over a 9-day period at THR 028 from 21st and 29th September 2015.

5.2 Interspecific aggression

The most common species engaging in aggressive behaviour with superb parrots during the laying and incubating period were crimson rosellas and other superb parrots; during the fledging period most aggressive encounters occurred with crimson rosellas. Crimson rosellas were particularly aggressive toward juvenile superb parrots.

6. Foraging movements by breeding adults

6.1 Tagging procedure

Adult superb parrots were captured at the nest while provisioning nestlings. Adults were not captured during incubation, or within the first week of young hatching, to eliminate the risk

of nest abandonment. Nest traps were positioned at the hollow entrance in an open position then closed over the hollow entrance after the superb parrot adult entered the hollow to provision. Individuals were removed from the trap at the nest hollow and brought to ground in a bird bag for banding (see Appendix D for band identification numbers) and tagging.

To track adult foraging movements we used Ecotone Alle-60 Short Range UHF GPS loggers. Loggers were attached to the back feathers of adult birds using gaffer tape cut into narrow strips (Figure 7). While it was our intention to recapture all tagged individuals and retrieve the loggers prior to young fledging, the back-feather method was chosen so that in the event we were unable to recapture tagged birds, loggers would be moulted prior to long-distance post-breeding migration movements. This approach was highly successful. We recaptured 5 of the 6 tagged adults, and loggers were removed with very little effort.

Figure 7. Tracking device deployed on six adult superb parrots. This image shows a male superb parrot at the time of tagging and returning to his nest tree (THR 058) the following day to provision young.

6.2 Foraging locations

We tracked the foraging movements of 6 adult superb parrots over a 17-day period from 16th November to 2nd December 2015. The number of days that each individual was tracked ranged from 5 to 16 (average = 10 days). Breeding superb parrots displayed remarkably similar behaviour when foraging. Tagged adults followed very similar pathways of movement and utilised common areas for foraging (Figure 8). It is unclear how social behaviour and landscape connectivity contribute to these observed patterns of movement, and the relative importance of each.

Foraging locations were predominantly located within the urban boundary, among street trees and urban green space. The longest distance travelled was approximately 9 km from Throsby to Kaleen. Only one individual ventured into New South Wales, but this was an isolated occurrence. Superb parrots moved within and outside of reserves, and land tenure did not appear to influence movement patterns.

The primary areas (outside of Throsby) used by breeding adults for foraging were:

- Mullion Park and surrounds, Harrison
- Parkland between Christina Stead Street and Flemington Road
- Gungahlin Cemetery, Mitchell
- Bellenden Street, Crace
- Kaleen District Playing Fields and North Oval, Kaleen
- Fern Hill Park and Australian Institute of Sport and surrounds, Bruce
- Billabong Park and Just Robert Hope Park, Watson

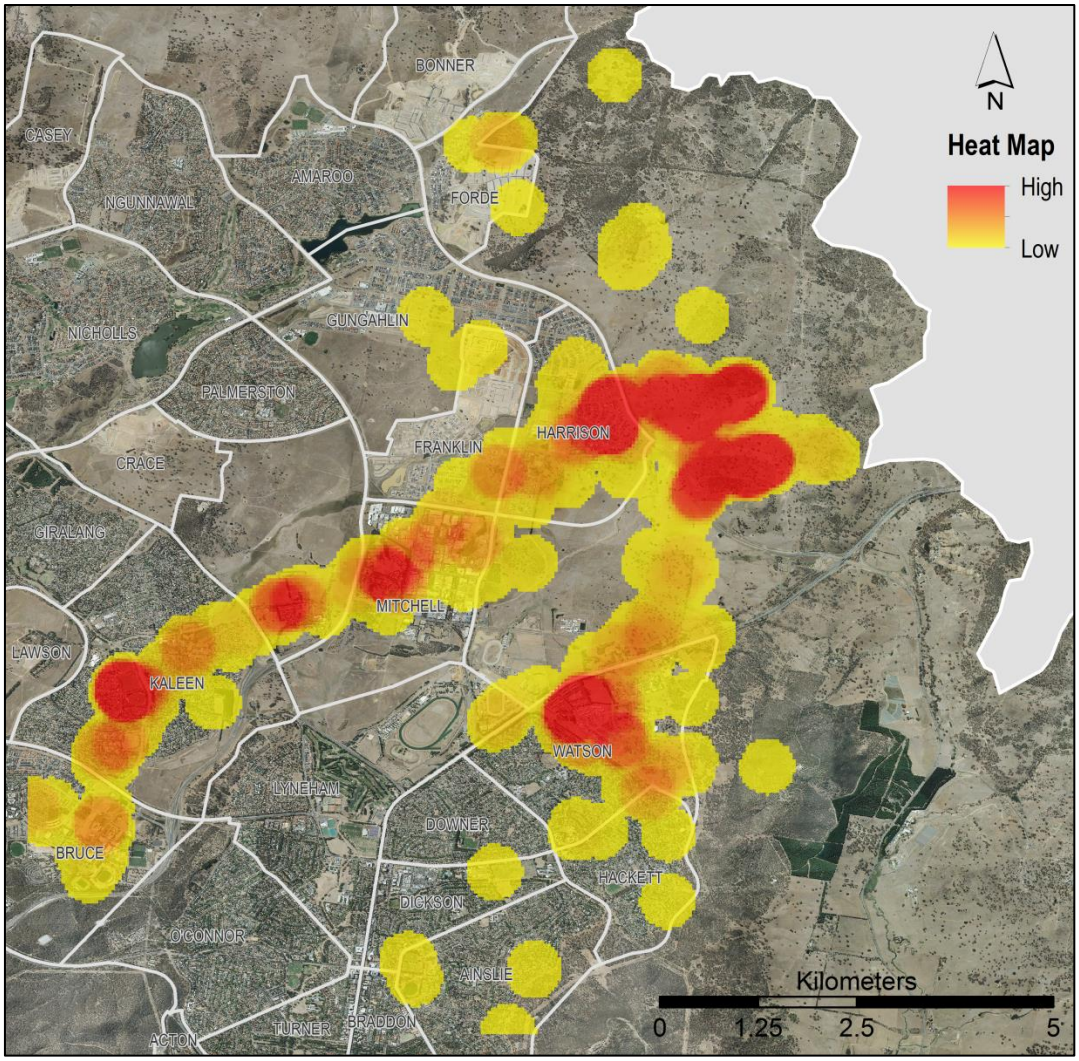

Figure 8. Map of Superb Parrot movements during nest provisioning. Red denotes areas of high occurrence of breeding adult superb parrots.

7. Discussion: conservation implications & future research

This study represents a significant advancement in knowledge on the breeding and movement ecology of superb parrots in the Australian Capital Territory. We have shown the Throsby area to be a highly productive breeding territory for superb parrots, comprising multiple suitable nest trees and supporting high rates of nesting success. We confirmed the Spring Valley area to be used by superb parrots for foraging (likely to include individuals breeding in the Molonglo region), but found little evidence of it being a critical breeding area. Crucially, the data collected in this study provides a baseline for future work, both at the Throsby site and beyond. Specifically:

- spatial data can be used to assess individual return rates;
- nest tree data can be used to identify habitat trees in the wider landscape;
- hollow dimensions can guide nest box design where necessary;
- banding data can be used to determine longevity of individuals;
- camera images can be used to quantify competitive interactions;
- movement data can be used to characterise preferred foraging sites; and
- DNA samples can be used to undertake genetic analysis.

This study was valuable for revealing complex social behaviours of breeding superb parrots, such as crèching and multi-individual use of flight pathways through northern ACT landscapes. Aggregated breeding clearly benefited newly fledged young, and was critically facilitated by the clustering of multiple, large, hollow-bearing trees in the Throsby area. Therefore, the protection of not only large habitat trees, but groups of large habitat trees, may be critical for maintaining breeding superb parrot populations in Canberra.

Evaluating the competitive impact of other hollow-using species on breeding attempts of superb parrots is a labour-intensive task. We found evidence to suggest that crimson rosellas influenced the breeding behaviour of superb parrots, but the frequency of such interactions remains unknown. Camera data from this study is available for such analysis, and we suggest that calculating the rate and nature of competitive encounters from camera data collected at nest sites would enhance our understanding of the demand for hollows across the wider landscape. Almost every hollow-bearing tree located in Throsby was occupied by at least one pair of breeding birds and, in many cases, by more than one species. Hence, information on landscape-scale hollow demand would be highly relevant to the breeding potential, and ongoing management, of superb parrot populations in Canberra.

Lastly, this study was a proof-of-concept in the use of GPS transmitters for tracking the local movements of superb parrots in Canberra. Our tagging method was highly successful for this purpose, with all tracking data retrieved successfully. Our tracking data revealed the importance of urban green space as preferred foraging sites for breeding adults. The tracking technology and attachment method detailed in this report is suitable for superb parrot applications elsewhere in the species' range.

8. Appendices

Appendix A. The management objectives identified by the ACT Government under the Gungahlin Strategic Assessment, including commitments, monitoring tasks and research objectives deemed necessary for the conservation of superb parrots.

The key **commitments** given by the ACT Government in relation to Superb Parrot are:

- Persistence of a breeding population in northern ACT in the long term;
- Improved management of potential habitat in order to support recovery of Superb Parrots;
- Improved understanding of habitat requirements for foraging and dispersing Superb Parrots within peri-urban and urban environments; and
- Improved understanding of the Superb Parrot population which occurs in the northern ACT in terms of, breeding requirements, nest site fidelity and breeding success.

The key monitoring tasks are:

- The numbers of pairs of Superb Parrots displaying breeding behaviour within the Gungahlin Strategic Assessment area; and
- The competitive interaction that these birds have with other hollow nesting species.

The main areas identified for **research** are:

- Understanding why Superb Parrots select particular breeding locations, nest site fidelity, fecundity and whether these are impacted by nearby urban development, and how management actions may improve the suitability of habitat and breeding success.
- If monitoring of competitive interactions indicates a link towards declining Superb Parrot breeding behaviour observations then methods of control will be researched, and applied where appropriate.

Appendix B. Search history of Throsby trees. Trees at Throsby (THR) were monitored for breeding superb parrots from September to December 2015. This list includes active nests (Y) confirmed by tree climbing. Trees were checked (X) by scratching the base of tree trunks to encourage any individual within a hollow to approach the entrance.

X	Tree checked, no sign of superb parrot
X	Tree checked, superb parrot at hollow entrance
Y	Superb parrot nest confirmed active

Tree ID	16 Sep	17 Sep	18 Sep	22 Sep	05 Oct	06 Oct	23 Oct	27 Oct	13 Nov	16 Nov	Active nest?
THR 001									X		N
THR 002									X		N
THR 003									X		N
THR 004									X		N
THR 005		X	X	X					X		N
THR 007									X		N
THR 008									X		N
THR 009	X	X	X	X	X		X	X			N
THR 010	X	X	X	X	X		X	X			N
THR 011	X	X	X	X				X			N
THR 012					X		X	X		X	N
THR 013					X		X	X			N
THR 014	X	X	X	X	X	X	X	X			N
THR 015					X		X	X			N
THR 016	X		X		X		X	X			N
THR 017					X	X				X	N
THR 018	X	X	X	X	X	X	X	X			N
THR 019				X	X		X	X			N
THR 020	X	X	X	X	X	X	X	X			Y
THR 022					X		X	X			N
THR 023		X		X	X	X					Y
THR 024	X	X	X	X	X	X		X			N
THR 025		X	X		X		X	X			N
THR 026		X	X	X	X	X	X	X			Y

THR 027				X	X		X				N
THR 028			X	X	X	X		X			Y
THR 029		X	X		X	X	X	X			N
THR 030		X	X		X	X					N
THR 031		X	X		X	X	X	X			N
THR 032		X	X	X	X	X	X	X			N
THR 033									X		N
THR 034		X	X	X					X		N
THR 035								X		X	N
THR 036		X					X	X		X	N
THR 037		X	X	X	X		X	X		X	N
THR 038		X	X	X	X		X	X			N
THR 039	X	X	X	X			X	X			N
THR 040	X	X	X	X	X		X	X			N
THR 041							X	X			N
THR 042	X	X	X	X	X		X	X			N
THR 043	X	X	X	X	X		X	X			N
THR 044							X	X			N
THR 045	X	X	X	X	X	X	X	X			N
THR 046					X		X	X			N
THR 047	X	X	X	X			X	X			N
THR 048						X	X	X			N
THR 049											N
THR 050		X				X	X	X			N
THR 052	X	X	X	X	X	X	X	X			N
THR 053					X		X	X			N
THR 054		X	X	X	X	X	X	X			N
THR 055		X	X	X	X	X	X	X			Y
THR 056					X	X	X	X			N
THR 057					X	X	X	X			N
THR 058				X	X	X	X	X			Y
THR 059		X		X	X	X	X	X			N
THR 060				X	X	X	X	X			N
THR 061					X	X	X	X			N

THR 062										N
THR 063										N
THR 064					X		X	X		N
THR 065	X	X			X	X	X	X		N
THR 066		X			X	X	X	X		N
THR 067		X			X	X	X	X		N
THR 068			X		X		X	X		N
THR 069				X	X	X	X	X		Y
THR 070					X	X	X	X		Y
THR 071					X	X	X			N
THR 072					X	X	X	X		Y
THR 073						X	X	X		N
THR 074				X	X	X		X		N
THR 075				X	X	X		X		Y
THR 076				X	X	X			X	N
THR 077							X	X		Y

Appendix C. Search history of Spring Valley trees. Trees at Spring Valley (SPV) and Piney Creek (PNC) were monitored for breeding superb parrots from September to December 2015. This list includes active nests (Y) confirmed by tree climbing. Trees were checked (X) by scratching the base of tree trunks to encourage any individual within a hollow to approach the entrance.

X	Tree checked, no sign of superb parrot
X	Tree checked, superb parrot at hollow entrance
Y	Superb parrot nest confirmed active

Tree ID	23 Sep	24 Sep	13 Oct	20 Oct	29 Oct	09 Nov	Active nest?
PNC 001	X	X	X	X	X		N
PNC 002	X	X	X	X	X		Y
PNC 003			X	X	X		N
PNC 004					X		N
PNC 005						X	N
PNC 006						X	N
PNC 007							N
SPV 003		X	X	X	X		N
SPV 004					X		N
SPV 005		X	X	X			N
SPV 006	X	X		X			N
SPV 007	X	X		X			N
SPV 008	X	X		X			N
SPV 009	X	X		X			N

Appendix D. Band identification numbers for adult and nestling superb parrots. Tree codes indicate the nest tree from which individuals were collected. All bands listed below were applied as part of the current study. DNA samples were collected from all banded individuals.

Tree ID	Date	Age	Band ID
THR 020	17/11/2015	Nestling	240-33-814
THR 020	17/11/2015	Nestling	240-33-815
THR 020	17/11/2015	Nestling	240-33-816
THR 020	17/11/2015	Nestling	240-33-817
THR 028	25/11/2015	Nestling	240-33-836
THR 028	25/11/2015	Nestling	240-33-837
THR 028	25/11/2015	Nestling	240-33-838
THR 028	25/11/2015	Nestling	240-33-839
THR 055	16/11/2015	Nestling	240-33-807
THR 055	16/11/2015	Nestling	240-33-808
THR 055	16/11/2015	Nestling	240-33-809
THR 055	16/11/2015	Nestling	240-33-810
THR 055	16/11/2015	Nestling	240-33-811
THR 058	16/11/2015	Nestling	240-33-802
THR 058	16/11/2015	Nestling	240-33-803
THR 058	16/11/2015	Nestling	240-33-804
THR 058	16/11/2015	Nestling	240-33-805
THR 069	17/11/2015	Nestling	240-33-822
THR 069	17/11/2015	Nestling	240-33-823
THR 069	17/11/2015	Nestling	240-33-824
THR 069	17/11/2015	Nestling	240-33-825
THR 069	17/11/2015	Nestling	240-33-826
THR 069	17/11/2015	Nestling	240-33-827
THR 072	25/11/2015	Nestling	240-33-829
THR 072	25/11/2015	Nestling	240-33-830
THR 072	25/11/2015	Nestling	240-33-831
THR 072	25/11/2015	Nestling	240-33-832
THR 075	17/11/2015	Nestling	240-33-819
THR 075	17/11/2015	Nestling	240-33-820
THR 075	17/11/2015	Nestling	240-33-821
THR 077	25/11/2015	Nestling	240-33-834

THR 077	25/11/2015	Nestling	240-33-835
THR 020	17/11/2015	Adult	240-33-813
THR 028	17/11/2015	Adult	240-33-818
THR 055	16/11/2015	Adult	240-33-812
THR 058	16/11/2015	Adult	240-33-806
THR 070	25/11/2015	Adult	240-33-833
THR 072	25/11/2015	Adult	240-33-828