





Ku-ring-gai Council Eastern Pygmy-Possum Program Report 2017-2018

Ku-ring-gai Council

1. Acknowledgements

The Eastern Pygmy-possum Program has been running for over four years in collaboration with volunteers. During this time, the program has expanded and adapted to improve outcomes and efficiency. Council recognise the significant contributions by our team of volunteers who have dedicated their time and knowledge to the program. Special mention also to those who have donated nest boxes to the program, particularly Peter Maybury, Janet Harwood and Bob Jones.

This report has been prepared by Chelsea Hankin and Jacob Sife, February 2019.

2. Introduction

The Ku-ring-gai Local Government Area (LGA) with its varied habitats and high rainfall is an area rich with biodiversity. The vegetation communities within the LGA support over 700 native plants and over 300 vertebrate species, including many species listed as threatened under the *Biodiversity Conservation Act 2016* (BC Act).¹

One of the threatened species within the LGA is the Eastern Pygmy-possum (*Cercartetus nanus*) listed as Vulnerable under the NSW BC Act. The Eastern Pygmy-possum (EPP) is a small nocturnal marsupial, known to inhabit multiple vegetation types from heath to rainforest and is rarely observed outside formal surveys.

The Eastern Pygmy-possum Program is part of Ku-ring-gai Council's biodiversity monitoring program. The key aims of the EPP monitoring program are to:

- Improve our understanding of the:
 - o distribution and abundance of EPP; and
 - habitat preference of EPP.
- Provide supplementary habitat for EPP in areas where appropriate hollows are scarce.
- Effectively engage the community and decision makers in biodiversity conservation.
- Promote better management of habitat, and the consideration of EPP in development, or other management/bushland management activities.
- Displaying best practice and providing guidance for other projects.

The program utilises remote cameras and nest boxes and is conducted under Scientific Licence number 100881. The program is aligned with task N2.1.1 of Council's Delivery Program 2017 – 2018 and Operational Plan 2017-2018.

This report summarises the key results from the program between August 2017 and December 2018, and provides recommendations for the future direction of the project.

3. Eastern Pygmy-possum (Cercartetus nanus)

Eastern Pygmy-possums are small diprotodont marsupials of the family *Burramyidae*. Eastern Pygmypossum are native to south-eastern Australia, distributed from southern Queensland to eastern South Australia and Tasmania including Flinders and King Islands. In NSW, EPP distribution extends from the coast inland as far as the Pilliga, Dubbo, Parkes and Wagga Wagga on the western slopes. EPP are associated with a broad range of habitats including temperate rainforest, sclerophyll forest, woodland and heath, but in most areas, where woodlands and heath are present they appear to be preferred habitat.²

¹ Ku-ring-gai Council (2016) Ku-ring-gai Biodiversity and Riparian Lands study v5, Ku-ring-gai Municipal Council.

OEH (2017) Eastern Pygmy Possum Profile, http://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10155

Eastern Pygmy-possums weigh 15 - 43 grams and have a head to body length of 70 - 110 millimetres with a tail length between 75 - 105 millimetres. They are light-brown on top, white underneath with an almost naked, prehensile tail. They have big, forward-facing ears, long whiskers, and large, bulging eyes.

Eastern Pygmy-possum feed primarily on nectar and pollen collected from banksias, eucalypts and bottlebrushes and move pollen around as they feed. In this way they are important pollinators of heathland plants. Eastern Pygmy-possum supplement their diet with arthropods and soft fruit with the fluctuation in abundance of nectar producing plants. Eastern Pygmy-possums shelter in a spherical nest of bark and leaves in a tree hollow or cranny. They appear to be mainly solitary, each individual using several nests, with males having non-exclusive home-ranges of about 0.68 hectares and females about 0.35 hectares.² Whilst young can be born whenever food sources are available, most births occur between late spring and early autumn. Eastern Pygmy-possums enter periods of torpor to reduce energy expenditure, particularly in winter, with their body curled, ears folded and internal temperature dropping to match their surroundings.³

Factors threatening the survival of the Eastern Pygmy-possum include isolated sub-populations with little opportunity for dispersal, habitat loss and fragmentation, inappropriate fire regimes that remove nectar-producing understorey plants, the loss of nest sites due to land clearing, and predation by foxes and cats⁴. Fires may include prescribed burns (hazard reduction and ecological burns) or wild fires. Within the LGA, prescribed burns for either ecological or hazard reduction purposes are generally restricted in their frequency (depending on the vegetation type and proximity to residential areas), intensity and size (to ensure fauna connectivity of habitat to unburnt areas), however in some circumstances actions determined necessary to protect life and property are unavoidable.

4. Methods

Between August 2017 and December 2018, an additional six boxes were installed for the EPP program giving a total of 34 boxes throughout the LGA. Nest boxes were placed in areas with a dense mid storey including species from the Proteaceae family and with general heathy character where highest observation rates were expected.⁵ Monitoring was conducted at all 34 nest box locations throughout the LGA, with presence or absence of EPP determined via direct nest box checks and/or remote cameras (focused on the nest box or nearby *Banksia ericifolia* spikes when in flower). The period of time cameras were left in place varied between monitoring events based on numerous factors related to staff or volunteer availability, the success or failure of the monitoring location, weather, security of cameras and controlled burning, but generally were left for a minimum period of two weeks. Indirect observations such as fresh nesting material in nest boxes were also recorded as evidence of habitation, though only direct observations (i.e. a photo/video of an EPP or an EPP directly observed in a nest box) have been reported as indicating presence.

In the interests of minimising disturbance to this threatened species, monitoring frequency was reduced from a monthly basis to quarterly since March 2018. Quarterly nest box checks were conducted within the first week of the quarterly monitoring month, ie. 1st-7th March, June, September and December, to be repeated annually to ensure future consistency of the data.

Other species sighted or heard during nest box inspections or in remote camera footage were also recorded.

OEH (2017) Eastern Pygmy Possum Profile, accessed online:

⁵ Law, B., Chidel, M., Britton, A. & Brassil, A. T. (2012) Response of Eastern pygmy-possums, Cercartetus nanus,

³ Turner, J.M., Körtner, G., Warnecke, L. & Geiser, F. (2012) Summer and winter torpor use by a free-ranging marsupial, *Comparative biochemistry and physiology. Part A, Molecular & integrative physiology,* **162** (3), 274-280.

http://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10155

to selective logging in New South Wales: home range, habitat selection and den use, Wildlife Research, 40, 470-481

5. Limitations

This report covers a transitional period where the monitoring frequency was reduced from monthly to quarterly monitoring. In February 2018, the decision was made to reduce the monitoring frequency amid concerns that a high frequency of disturbance may negatively impact EPP. Future reporting will be based on the calendar year to allow comparisons year to year.

Some boxes were installed late in the year (nest boxes 30-32 installed in July 2018 and nest boxes 33-35 installed in September). As such, these sites are limited in that they have not been actively monitored for a full year to determine EPP presence.

Where multiple nest boxes are considered to be within a typical home range for EPP⁶, or located within a single reserve the nest boxes have been grouped into sites to inform presence/absence data (Table 1).

Nest box 25 was removed in March 2018 due to hazard reduction burns carried out in Garigal National Park (Figure 1), and remained inactive until June 2018 when it was reinstalled in adjacent unburnt vegetation. Storms in December 2018 caused the host tree of box 25 to fall, so again the box required relocating adjacent to the existing location. For both relocations the nest boxes were relocated within the same site. Disturbance may have impacted detectability of EPP at this location.

As is the case for all fauna monitoring; presence is confirmed by direct observation while absence is not confirmed through the lack of observation.

6. Results

Distribution of EPP throughout the LGA

Eastern Pygmy-possum were detected at 8 of 34 (24%) monitoring locations between August 2017 and December 2018. Of the unique sites in the LGA, Eastern Pygmy-possum were detected at 5 of the 15 (33%) sites, a decrease since the previous year of monitoring (44%). The distribution of nest boxes and EPP records is provided in Figure 1. The peak detection of EPP activity, either via nest box checks, camera detection or 'signs of visitation' occurred in June (Figure 2).

There was continued presence of EPP at all reserves monitored in 2016-2017 except for Lovers Jump Creek Reserve, St Ives Showground, Green Tip and McIntosh Park. A comparison of presence/absence data since 2015 monitoring is summarised in Table 1. All EPP observations were recorded in the north of the LGA with connectivity to either Ku-ring-gai National Park or Garigal National Park. Despite continued survey effort, EPP remain undetected in the south west of the LGA (reserves with connectivity to Lane Cove National Park).

⁶ Harris, J. M., Goldingay, R. L., Broome, L., Craven, P. & Maloney, K. S. (2007) Aspects of the Ecology of the Eastern Pygmy-Possum Cercartetus Nanus at Jervis Bay, New South Wales. Australian Mammalogy **29** (1), 39–46

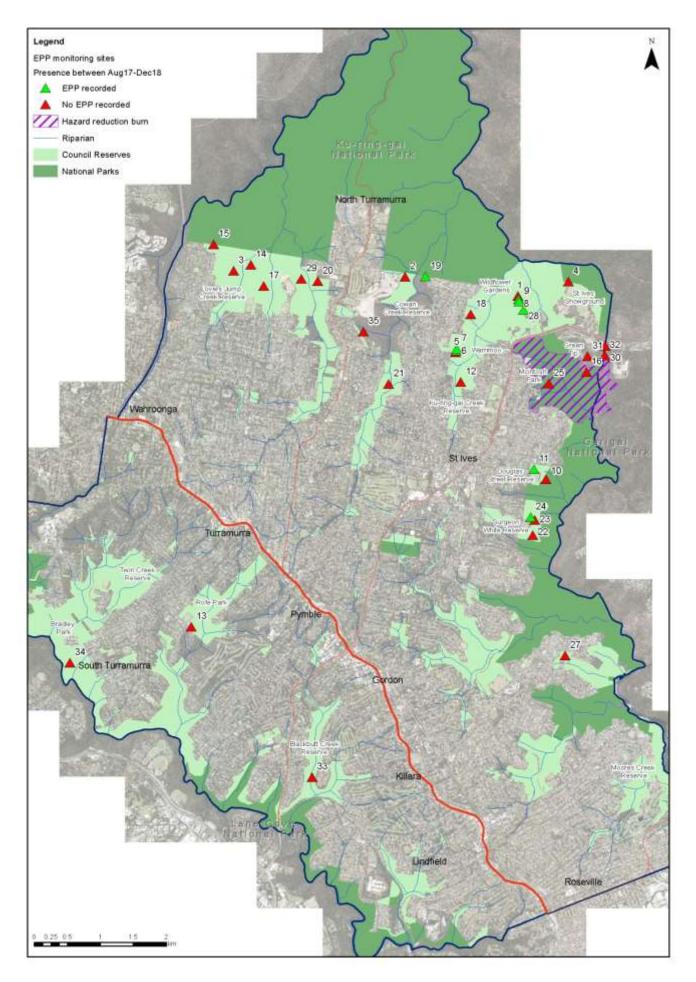


Figure 1 Eastern Pygmy-possum observations between August 2017 and December 2018

Table 1. Distribution of EPP observations throughout the LGA

Area/reserve name	Presence in 2015-2016	Presence in 2016-2017	Presence in 2017- 2018
North of LGA (Ku-ring-gai NP)			
Cowan Creek Reserve	Yes	Yes	Yes
Ku-ring-gai Creek Reserve/ Warrimoo	Yes	Yes	Yes
Ku-ring-gai Wildflower Garden	Yes	Yes	Yes
Lovers Jump Creek Reserve	Yes	Yes	No*
St Ives Showground	Yes	Yes	No
North-east of LGA (Garigal NP)			
Douglas Street Reserve (Acron Oval)	Yes	No	Yes
Green Tip	Yes	Yes	No
McIntosh Park	Not surveyed	Yes	No**
Moores Creek Reserve	Not surveyed	No	Not surveyed
Surgeon White Reserve	Yes	Yes	Yes
South west of LGA (Lane Cove	NP)		
Bradley Park	No	No	No
Rofe Park	No	No	No
Sir Phillip Game Reserve North	Not surveyed	No	Not surveyed
Twin Creek Reserve	Not surveyed	No	Not surveyed
Blackbutt Creek Reserve	Not surveyed	Not surveyed	No

*NSW Atlas records show EPP presence immediately adjacent to the monitoring site

**Nest box was removed due to risk of hazard burns in the area, inactive between March and June 2018

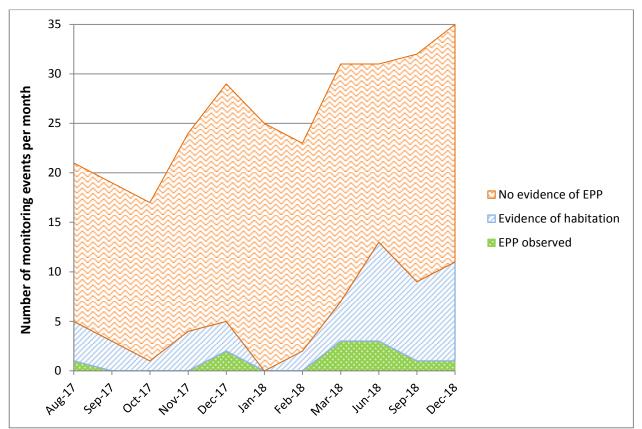


Figure 2. Monitoring events and EPP observations during the monitoring period of August 2017 to December 2018

Vegetation communities surveyed

Monitoring sites were located in a range of vegetation communities, including:

- Coastal Upland Swamp*
- Duffys Forest**
- Sydney Sandstone Gully Forest
- Sydney Sandstone Ridgetop Woodland
- *Endangered ecological community under the state BC Act 2016.

** Endangered ecological community under the state BC Act 2016 and federal EPBC Act 1999.

Eastern Pygmy-possum were recorded in all four vegetation communities, with breeding events recorded in the Sydney Sandstone Ridgetop Woodland and Coastal Upland Swamp communities.

Breeding records

Multiple EPP were recorded in Cowan Creek Reserve (Sydney Sandstone Woodland vegetation community) and Warrimoo (Ku-ring-gai Creek Reserve, Coastal Upland Swamp endangered ecological community), indicating successful breeding in these areas. A juvenile EPP was found inside a nest box in Warrimoo (Figure 3). A photographic record of nest development throughout the seasons is provided in Appendix 1.



Figure 3. Juvenile EPP recorded in Warrimoo

Other species observations

A range of other native species were detected during surveys, including 15 bird species, 12 mammals and one reptile (Table 2). Occasionally invertebrates (ants, grasshoppers and spiders) were found in the nest boxes. Two introduced species were recorded (Black Rat and Red Fox). During the monitoring period, Council undertook fox baiting bi-annually at 12 reserves throughout the LGA. Reporting of fox sightings will continue to be monitored to inform future baiting programs.

Scientific name	Common name
Birds	
Acanthiza lineata	Striated Thornbill
Acanthiza pusilla	Brown Thornbill
Acanthorhynchus tenuirostris	Eastern Spinebill
Alectura lathami	Australian brushturkey
Anthochaera carunculata	Red Wattlebird
Anthochaera chrysoptera	Little Wattlebird
Geopelia striata	Peaceful Dove [#]
Lichenostomus chrysops	Yellow-faced Honeyeater
Malurus lamberti	Variegated Fairy-wren
Menura novaehollandiae	Superb Lyrebird
Myiagra sp.	Flycatcher sp.
Oriolus sagittatus	Olive-backed Oriole
Phylidonyris niger	White-cheeked Honeyeater
Sericornis frontalis	White-browed Scrubwren
Zosterops lateralis	Silvereye
Mammals	
Acrobates pygmaeus	Feathertail Glider
Antechinus stuartii	Brown Antechinus
Perameles nasuta	Long-nosed Bandicoot
Petaurus breviceps	Sugar Glider
Pseudocheirus peregrinus	Common Ringtail Possum
Rattus fuscipes	Bush Rat
Rattus rattus	Black Rat*
Tachyglossus aculeatus	Short-beaked Echidna
Trichosurus vulpecula	Common brushtail possum
Vulpes vulpes	Red Fox*
Wallabia bicolor	Swamp Wallaby
	Microbat sp.
Reptiles	
Varanus varius	Lace Monitor
*Introduced species	

Table 2. Other species detected during EPP monitoring

*Introduced speci

[#]Heard call only

7. Discussion

Results of this monitoring period indicate a widespread distribution of EPP in the north and east of the LGA with connectivity to either Ku-ring-gai National Park or Garigal National Park. The peak detection of EPP activity, either via nest box checks, camera detection or 'signs of visitation' occurred in June, coinciding with the flowering of *Banksia* species on which they feed.

There was a lower detection rate of EPP compared to the 2016-2017 monitoring period (EPP presence at 33% of unique sites compared to 44% in the previous year), with a couple of key reserves lacking observations of EPP, namely Lovers Jump Creek Reserve, Green Tip and McIntosh Park. Although EPP were not detected at Lovers Jump Creek, there were obvious signs of occupation particularly in September 2017 and December 2018 where fresh leaves had been brought into the nest box (Appendix

1). Additionally, EPP were detected adjacent to NB15 in Ku-ring-gai National Park⁷, so it is considered highly likely EPP remain active throughout this area.

In March 2018, a large hazard reduction burn (110 ha) was carried out in Garigal National Park, impacting the areas where nest boxes were installed at Green Tip and McIntosh Park. These boxes were temporarily removed for the duration of the burn, and then reinstalled in suitable unburnt habitat near to the original box location. It is possible that with the impact of fire on nectar producing plants, EPP in this area may have moved to adjacent bushland in search for foraging resources.

Council staff will increase camera usage in 2019, targeting these key reserves to ensure a decline of EPP population is not occurring.

A number of boxes were impacted by termite damage during this monitoring period, particularly NB21 in Cowan Creek Reserve and NB24 in Surgeon White Reserve. Nest box 21 was replaced and relocated in September 2018. Nest box 24 will continue to be monitored for deterioration and may be replaced in 2019.

8. Recommendations

The EPP monitoring program will continue in 2019 with implementation of the following:

- Monitoring of nest boxes will continue on a quarterly basis (March, June, September and December 2019) to minimise disturbance to EPP. Council staff will increase the use of cameras at nest box sites to capture EPP activity outside of the quarterly monitoring events. Cameras may be made available on request by volunteers for monitoring within proximity of an assigned nest box for a specific site.
- Nest box numbers will be replaced where required (many have fallen off since installation).
- Data will continue to be collected via a data collection application, accessed via smart phones or internet browser. This ensures Council receive all required data, whilst streamlining the process for volunteers.
- All records will continue to be uploaded to relevant databases quarterly as per data licence agreements.

9. Conclusion

Eastern Pygmy-possum remain present in the north and east of the LGA, with evidence of successful breeding. A number of key reserves lacked observations of EPP during this monitoring period, which will be investigated in 2019 surveys. This long term monitoring program continues to provide valuable data and improves our understanding of this unique threatened species.

If you would like to find out more about the program, please contact Chelsea Hankin, Natural Areas Officer, on (02) 9424 0000 or <u>chankin@kmc.nsw.gov.au</u>.

⁷ OEH (2018) NSW BioNet. Atlas of NSW Wildlife. Accessed online: https://www.environment.nsw.gov.au/

10. References

Harris, J. M., Goldingay, R. L., Broome, L., Craven, P. and Maloney, K. S. (2007) Aspects of the Ecology of the Eastern Pygmy-Possum Cercartetus Nanus at Jervis Bay, New South Wales. *Australian Mammalogy*, **29** (1), 39–46.

Ku-ring-gai Council (2016) Ku-ring-gai Biodiversity and Riparian Lands study v5 http://www.kmc.nsw.gov.au/Current_projects_priorities/Key_priorities/Environment_sustainability/Bushland_and_w ildlife/Bush_management

Law, B., Chidel, M., Britton, A. and Brassil, A. T. (2012) Response of Eastern pygmy-possums, Cercartetus nanus, to selective logging in New South Wales: home range, habitat selection and den use, *Wildlife Research*, **40**, 470–481.

OEH (2017) Eastern Pygmy Possum Profile, accessed online: http://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10155

OEH (2018) NSW BioNet. Atlas of NSW Wildlife. Accessed online: https://www.environment.nsw.gov.au/

Turner, J. M., Körtner, G., Warnecke, L. and Geiser, F. (2012) Summer and winter torpor use by a free-ranging marsupial, *Comparative biochemistry and physiology*, **162** (3), 274-280.

Appendix 1 – Nest box monitoring photos

NB 1: Wildflower Gardens				
August 2017	September 2017	October 2017	November 2017	
December 2017	January 2018	February 2018	March 2018	
June 2018	September 2018	December 2018		

NB 2: Cowan Creek Reserve			
August 2017	September 2017	October 2017	November 2017
December 2017	January 2018	February 2018	March 2018
Box had been left open due to ants. Closed and put new material in.			
June 2018	September 2018	December 2018	

NB 3: Lovers Jump Creek Reserve				
August 2017	September 2017	October 2017	November 2017	
December 2017	January 2018	February 2018	March 2018	
June 2018	September 2018	December 2018		

NB 4: St Ives Showground			
August 2017	September 2017	October 2017	November 2017
December 2017	January 2018	February 2018	March 2018
June 2018	September 2018	December 2018	

NB 5: Ku-ring-gai Creek Reserve (Warrimoo)			
August 2017	September 2017	October 2017	November 2017
December 2017	January 2018	February 2018	March 2018
June 2018	September 2018	December 2018	

NB 6: Ku-ring-gai Creek Reserve (Warrimoo)				
August 2017	September 2017	October 2017	November 2017	
December 2017	January 2018	February 2018	March 2018	
June 2018	September 2018	December 2018		

NB 7: Ku-ring-gai Creek Reserve (Warrimoo)				
August 2017	September 2017	October 2017	November 2017	
December 2017	January 2018	February 2018	March 2018	
June 2018	September 2018	December 2018		

NB 8: Ku-ring-gai Wildflower Garden			
August 2017	September 2017	October 2017	November 2017
December 2017	January 2018	February 2018	March 2018
June 2018	September 2018	December 2018	

NB 9: Ku-ring-gai Wildflower Garden			
August 2017	September 2017	October 2017	November 2017
December 2017	January 2018	February 2018	March 2018
June 2018	September 2018	December 2018	

NB 10: Douglas Street Reserve			
August 2017	September 2017	October 2017	November 2017
December 2017	January 2018	February 2018	March 2018
June 2018	September 2018	December 2018	

NB 11: Douglas Street Reserve			
August 2017	September 2017	October 2017	November 2017
December 2017	January 2018	February 2018	March 2018
June 2018	September 2018	December 2018	

NB 12: Ku-ring-gai Creek Reserve			
August 2017	September 2017	October 2017	November 2017
December 2017	January 2018	February 2018	March 2018
June 2018	September 2018	December 2018	

NB 13: Rofe Park			
August 2017	September 2017	October 2017	November 2017
December 2017	January 2018	February 2018	March 2018
June 2018	September 2018	December 2018	
		na	

NB 14: Lovers Jump Creek Reserve				
August 2017	September 2017	October 2017	November 2017	
December 2017	January 2018	February 2018	March 2018	
June 2018	September 2018	December 2018		

NB 15: Lovers Jump Creek Reserve				
August 2017	September 2017	October 2017	November 2017	
December 2017	January 2018	February 2018	March 2018	
		ALL SALE		
June 2018	September 2018	December 2018		

NB 16: St Ives Green Tip			
August 2017	September 2017	October 2017	November 2017
December 2017	January 2018	February 2018	March 2018
June 2018	September 2018	December 2018	

NB 17: Lovers Jump Creek Reserve			
August 2017	September 2017	October 2017	November 2017
December 2017	January 2018	February 2018	March 2018
June 2018	September 2018	December 2018	Dec 2018 new nesting material added

NB 18: Ku-ring-gai Creek Reserve			
August 2017	September 2017	October 2017	November 2017
December 2017	January 2018	February 2018	March 2018
June 2018	September 2018	December 2018	

NB 19: Cowan Creek Reserve			
August 2017	September 2017	October 2017	November 2017
December 2017	January 2018	February 2018	March 2018
June 2018	September 2018	December 2018	

NB 20: Lovers Jump Creek Reserve				
August 2017	September 2017	October 2017	November 2017	
December 2017	January 2018	February 2018	March 2018	
			March 2018	
June 2018	September 2018	December 2018		

NB 21: Cowan Creek Reserve				
August 2017	September 2017	October 2017	November 2017	
		No image		
December 2017	January 2018	February 2018	March 2018	
June 2018	September 2018	December 2018		
		No image		

NB 22: Surgeon White Reserve				
August 2017	September 2017	October 2017	November 2017	
December 2017	January 2018	February 2018	March 2018	
June 2018	September 2018	December 2018		

NB 23: Surgeon White Reserve			
August 2017	September 2017	October 2017	November 2017
December 2017	January 2018	February 2018	March 2018
June 2018	September 2018	December 2018	

NB 24: Surgeon White Reserve			
August 2017	September 2017	October 2017	November 2017
December 2017	January 2018	February 2018	March 2018
June 2018	September 2018	December 2018	

NB 25: McIntosh Park			
August 2017	September 2017	October 2017	November 2017
December 2017	January 2018	February 2018	March 2018
June 2018	September 2018	December 2018	
		Tree with nest box attached had fallen since the recent storms. Box re-installed nearby.	

NB 27: Old She Oak Reserve			
August 2017	September 2017	October 2017	November 2017
December 2017	January 2018	February 2018	March 2018
June 2018	September 2018	December 2018	

NB 28: Ku-ring-gai Wildflower Garden			
August 2017	September 2017	October 2017	November 2017
	A CONTRACTOR	No contraction of the second s	A Contraction of the contraction
December 2017	January 2018	February 2018	March 2018
		No and No.	THE REAL PROPERTY OF THE REAL
June 2018	September 2018	December 2018	

NB 29: Lovers Jump Creek Reserve			
August 2017	September 2017	October 2017	November 2017
December 2017	January 2018	February 2018	March 2018
June 2018	September 2018	December 2018	

NB 30: HART (installed July 2018)		
July 2018 (installation)	September 2018	December 2018

NB 31: Green Tip (installed July 2018)		
July 2018 (installation)	September 2018	December 2018



NB 33: Blackbutt Reserve (installed September 2018)		
September 2018 (installation)	December 2018	



NB 35: Darri track (installed September 2018)	
September 2018 (installation)	December 2018