



Transport
Roads & Maritime
Services

Nest Box Monitoring Annual Report 2018

FOXGROUND AND BERRY BYPASS

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1 INTRODUCTION

Roads and Maritime Services (Roads and Maritime) have upgraded 12.5 km of the Princes Highway between Toolijooa Road north of Foxground, to Schofields Lane (the project) and between Schofields Lane to Croziers Lane south of Berry (Figure 1-1).

NGH Environmental have been engaged by Roads and Maritime to provide post-construction ecological services. Services provided by NGH Environmental include the following:

- Nest box monitoring
- Aquatic monitoring
- Weed monitoring (the subject of this report)
- Summer monitoring
- Specialist advice on ecological matters as required by Roads and Maritime

1.1 PURPOSE OF THE REPORT

Requirements regarding the installation and monitoring of nest boxes during the construction and operational period are outlined in the following documents:

- Minister’s Conditions of Approval (CoA)
- The Roads and Maritime Statement of Commitments (SoC)
- Construction Flora and Fauna Management Plan sub-plan (CFFMP) (Roads and Maritime 2014)
- The mitigation measures listed in the Foxground and Berry Bypass Environmental Assessment (EA) (AECOM, 2012)
- Ecological Monitoring Program (EcMP) (PB 2014),

Foxground and Berry Bypass Princes Highway Upgrade Nest Box Management Plan (NBMP)(Parsons and Brinckerhoff, 2014), , Construction Flora and Fauna Management sub-plan (CFFMP) (Roads and Maritime 2014) and Ecological Monitoring Program (EcMP) (PB 2014) prepared for the Project detail the actions that need to be taken to meet those requirements. The NBMP includes a three-year bi-annual monitoring program (this report).

In accordance with Section 6.2 of the Ecological Monitoring Program (EcMP) (PB 2014), annual reporting is to be completed for all monitoring surveys outlined in the EcMP. This includes nest box monitoring during the construction and post-construction periods.

The EcMP requires that the following monitoring be undertaken during the construction and post-construction periods.

Table 1-1 Nest box monitoring requirements as stated in the EcMP.

Timing and frequency	Monitoring method	Data to be collected	Reporting
Monitoring on all nest boxes at least once during the construction phase and following construction in accordance with the	A visual inspection of each nest box would be conducted. ECMP outlines a 3 year bi annual monitoring program. NBMP (PB 2014) outlines monitoring will	On visual inspection of the nest boxes the following data would be collected: <ul style="list-style-type: none"> • Date of inspection • Weather conditions • Nest box ID 	Results included in Annual Monitoring Report (this report)

Timing and frequency	Monitoring method	Data to be collected	Reporting
NBMP and CFFMP.	occur annually for 3 years post construction in addition to relevant monitoring requirements.	<ul style="list-style-type: none"> • Nest box type • Nest box height and orientation • Presence/absence of occupation • If occupied, the species, age (juvenile/adult), number of individuals and whether it is native/feral. • Signs of use if not occupied • Condition of nest box and whether maintenance is required • Changes in surrounding habitat 	

The annual reports must include the following information:

- **Introduction** – background description and aims of the monitoring (refer to Section 1)
- **Methodology** – description of methodology undertaken including site location and specific survey site locations (refer to Section 2)
- **Results and discussion** – description of monitoring results and comparison of results to performance indicators (refer to Section 3)
- **Review of mitigation measures** – the effectiveness of each mitigation measure will be reviewed (where appropriate) at the end of the monitoring period. Considering the installation of nest boxes is in itself the mitigation measure and that the performance of the nest boxes has been assessed in Section 3, this section has not been included.
- **Recommendations** – suggestion of adaptive responses and contingency measures potentially required (where appropriate) based on the results of the monitoring session such as the implementation of contingency measures or modification of monitoring timing, frequency or methodology (refer to Section 4).

Annual nest box monitoring reports were prepared by NGH Environmental on behalf of Fulton Hogan in accordance with the EcMP and NBMP for the project during construction for the 2015, 2016 and 2017 monitoring periods (NGH 2015, 2017, 2018).

NGH Environmental has prepared this 2018 annual nest box monitoring report on behalf of Roads and Maritime in accordance with the EcMP and NBMP for the project. The report provides recommendations for continued improvement for tree hollow replacement within the Foxground and Berry Bypass Project area and its immediate surrounds.

Due to the scale and geographical range of clearing on the FBB project, clearing was broken up into smaller areas which were cleared progressively over a 10 month period. Following this, other small sections of the project were cleared as required. For each catchment a corresponding location of suitable preserved native bushland was chosen and 70% of nest boxes were installed prior to the removal of the trees from the clearing area. Nest box installation commenced in October 2014 (during construction

phase) and continued through to January 2016 as detailed in Table 1-2 below. Table 1-3 below summarises the dimensions of each nest box as per the NBMP (Parsons Brinckerhoff, 2014). This report provides the results of the first year of the operational phase (2018) and includes results obtained from all areas of the Project and surrounds where nest boxes have been installed including the following properties and land areas:

Table 1-2 Nest box locations and installation dates

Property	Number of nest boxes	Nest box types	Installation date
Broughton Creek BC1 Lots 415 and 416 DP882532/1 and DP3344/9	24	Microbats, arboreal mammals, birds, gliders	November 2014 January 2015 January 2016
Bundewallah Creek Lots 51 and 52 DP1108069/46 and DP815023/7	25	Birds, arboreal mammals, microbats	February 2015
Culvert (DP801512/4)	2	Microbat	Unknown
Cut 2 DP224377/2, DP255171/1, DP377518/A, DP255171/2	55	Birds, gliders, arboreal mammals, microbats	January 2015 January 2016
Cut 7 East DP1029979/33	10	Gliders, arboreal mammals, microbats	Unknown
Downes DP1098617/13	60	Birds, arboreal mammals, gliders, microbats, small terrestrial/arboreal mammals	November 2014 January 2015 January 2016
Gate 8 DP1098617/12	5	Bird	January 2016
Gembroke Lane DP801512/4	18	Birds, arboreal mammals, gliders, small terrestrial/arboreal mammals	Unknown
Lot 11 DP1098617/11	5	Birds	January 2015 January 2016
Lot 177 DP801177/1	5	Birds	January 2015
Lot 81 DP1098617/12	24	Birds, arboreal mammals, microbats,	August 2015 January 2016
Mark Radium Park DP925241/1	5	Birds, arboreal mammals	January 2016
Vanini's DP596879/4	13	Birds, arboreal mammals, microbats, gliders, small terrestrial/arboreal mammals	January 2016
Simons DP615284/4	15	Birds, arboreal mammals, gliders	January 2016
Smarts DP628132/1	8	Birds, gliders, Microbats	January 2016
Tindalls Lane DP1098617/12	26	Birds, arboreal mammals, microbats, gliders, small terrestrial/arboreal mammals	August 2015 January 2016
Total	300		

Table 1-3 Nest box dimensions for target species

Nest box type	Internal dimensions (mm)	Depth of chamber (mm)	Entrance diameter (cm)	Installation height range (m)
Large Forest Owls	400 x 400	600–750	20	4–6
Cockatoo	300 x 400	1200	10-15	5–6
Galah/Corella	250 x250	500	10-15	3–6
Kookaburra	250 x 300	60	11	3–6
Modified King-parrot	250 x 250	1000	10	4–6
Shrike-thrush	150 x150	60	10	2–6
Brushtail Possum	250 x 250	300	10	2–4
Yellow-bellied glider	250 x 300	400	9	4–6
Greater Glider	250 x 250	400	8	4–6
Dollarbird	150 x 200	400	7	4–6
Ringtail Possum	200 x 250	300	6.5	2–4
Owlet Nightjar	150 x 150	300	6.5	2–6
Lorikeet	150 x 150	400	6.5	3–6
Rosella	150 x 200	400	6.5	2–6
Treecreeper	150 x 150	350	6	2–6
Squirrel Glider	150 x250	300	4.5	3–5
Sugar Glider	150 x 200	300	4	3–5
Microbats	n/a	400	3 hole/2 slot	3–5 or under

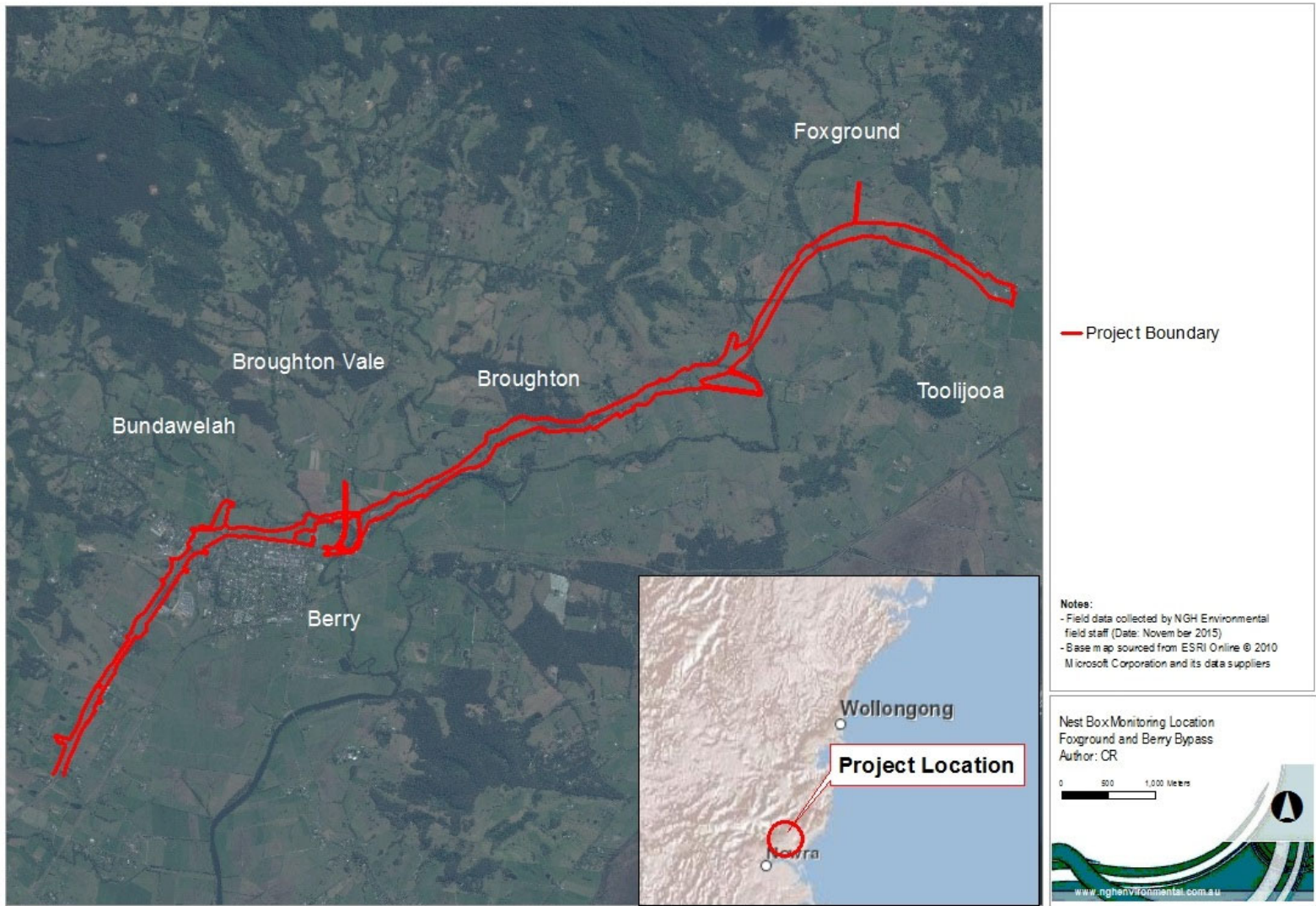


Figure 1-1 Location of the Foxground and Berry Bypass Project

2 SURVEY METHODOLOGY

In order to satisfy the commitments of the *Foxground and Berry Bypass Princes Highway Upgrade Nest Box Management Plan* (Parsons and Brinckerhoff, 2014), the relevant Ministers Conditions of Consent and in response to the Post-construction Ecological Monitoring scope provided by Roads and Maritime, one nest box survey was conducted by NGH Environmental over the entire project area between 30th of October and 1st of November 2018. While previous surveys were conducted in both winter and spring, the results between winter and spring did not differ to a degree that warranted the separation of surveys, thus post-construction (operational) monitoring will occur annually in spring, at the time when nest box utilisation is highest.

Spring Survey

Of the 300 nest boxes mapped as being installed, a total of 290 nest boxes were surveyed during the Spring 2018 survey. Ten boxes were not located, and 16 were unsuitable for habitation (fallen, loose, filled with debris, or containing bees). A total of 241 boxes were inspected with a camera and 8 m extendable pole through the entrance hole or the top opening under the covering lid. Nest boxes that were visible but were located higher than 8 m (totalling 49) were not inspected using the camera and a selection of them were watched during the day for birds or at dusk for birds, arboreal mammals, gliders and microbats to observe usage. This watching period occurred for a period of approximately 30 minutes or until dark for dusk surveys. The data to be collected according to Appendix A was recorded at each nest box location, in accordance with the requirements of the NBMP. The results of the surveys are provided in Appendix A.

Weather conditions were warm and sunny (maximum temperature 29.7°C) during the survey period.

2.1 LIMITATIONS

2.1.1 Nest box survey

Although the nest box surveys were undertaken during the most appropriate survey conditions (during late spring as per the NBMP), a number of survey limitations were apparent.

Winter breeding species may not have been captured as a result of the single annual survey. Additionally, a total of 49 nest boxes (16%) could not be inspected using the camera during the 2018 survey due to height restrictions or vegetation intrusions surrounding the tree or within the nest box. These boxes were installed at a height above the reach of cameras for several reasons, including advice from ecologists that higher boxes may be more effective for some fauna, and the presence of only large mature trees containing high limbs in many areas. A selection of these nest boxes were watched either during the day or at dusk for approximately 30 minutes. This short time period may not have been sufficient for observing potential fauna using the nest box. Furthermore, a total of 10 nest boxes were missing at the time of the surveys.

Species identification or counts may not have been accurate as a result of the use of the inspection camera. As some boxes were difficult to access, optimal camera angles, lighting and focus allowing positive species identification and counting were not always achieved. As such, where multiple animals were detected in boxes, an estimate of animal abundance was made. There is potential that there may have been more animals underneath those identified, including juveniles.

Using a GIS program on an Apple iPad, the locations of some boxes were moved slightly to more accurately represent their location on the ground. Original installation locations had been collected with a hand-held GPS, which during times of high cloud cover or dense canopy can lose accuracy, and typically only have an accuracy of 3-5 metres. The newly collected and identified points have been included in Appendix A of this report. Additionally, where previously points contained multiple nest boxes in trees, these points have now been duplicated, so that each point refers specifically to a nest box, allowing for more accurate comparison of results during future surveys.

Most arboreal mammal and glider species that may occur in the local area such as Common Ringtail Possum (*Pseudocheirus peregrinus*), Common Brushtail Possum (*Trichosurus vulpecula*), Yellow-bellied Glider (*Petaurus australis*), Greater Glider (*Petauroides volans*), Squirrel Glider (*Petaurus norfolcensis*), Sugar Glider (*Petaurus breviceps*), and microbats such as Southern Myotis (*Myotis macropus*), Yellow-bellied Sheath-tail-bat (*Saccolaimus flaviventris*) and Eastern Freetail-bat (*Mormopterus norfolkensis*) use multiple hollows within their home-range (Thomson and Owen 1964, Henry and Suckling 1984, Craig 1985, Cowan 1989, Lindenmeyer *et al.* 1991, Norton 1998) and so may not have been observed using species specific nest boxes during a single inspection of each nest box during the survey period. Furthermore, the monitoring results here are a snapshot in time and target species may not have been using the nest box habitat areas at the time of the surveys.

3 RESULTS AND DISCUSSION

3.1 SURVEY RESULTS

Of the total 300 boxes mapped as occurring, a total of 290 nest boxes were inspected either through use of a remote camera or by observation during the 2018 Spring survey. A total of 251 trees contained one box, while 23 trees had two or more nest boxes installed (totalling 49 boxes).

Nest boxes were located in trees situated outside the project boundary in a range of habitat types (generally close to areas where hollow-bearing trees had been cleared) (Table 3-1).

Table 3-1 Habitat types, abundance and type of fauna using the nest boxes installed.

Habitat type	Number of nest boxes surveyed	Number of used nest boxes ¹	Fauna types using nest boxes
Isolated tree	20	8	Birds, arboreal mammals
Forest	157	59	Birds, arboreal mammals, antechinus, gliders, rats
Woodland	56	23	Birds, arboreal mammals, gliders
Riparian forest	57	18	Birds, arboreal mammals
Total	290	108	37%

¹Use is defined as nest boxes currently occupied by fauna and/or signs of previous use have been detected. Signs of use include presence of scats, nesting material, scratch marks, eggs, chewed entrances of faunal remains.

Nest boxes were located in trees and habitat types that suited the nest box type. For example, microbat type nest boxes were mainly installed in trees within riparian habitat or forest patches, and glider type nest boxes were mainly installed in forest patches.

One-hundred and eight (108) of the 290 nest boxes surveyed during Spring 2018 were observed either being used by fauna or showing signs of use, with 70 individuals from 13 different species (including one unidentified species, not including unidentifiable eggs) being recorded in total (Table 3-2).

Table 3-2 Nest box use by fauna type

Fauna Type	Number of Adults	Number of Juveniles, Chicks or Eggs	Number of Nest Boxes
Common Brushtail Possum	8	2	9
Eggs (unidentified bird)	0	12	8
Sugar Glider	3	0	2
Crimson Rosella	2	0	2
Eastern Rosella	1	0	1
Brown Antechinus	1	0	1

Fauna Type	Number of Adults	Number of Juveniles, Chicks or Eggs	Number of Nest Boxes
*Black Rat	2	0	1
Kookaburra	1	1	1
Total inhabited	-	-	25
Signs of use	-	-	83
Total	18	15	108

*Introduced species

The Common Brushtail Possum (nine nest boxes, 10 individuals) was the most abundant species to be recorded using the most nest boxes. Other common species recorded in numerous nest boxes included the Crimson Rosella (two nest boxes, two individuals) and the Sugar Glider (two nest boxes, three individuals). Eight nest boxes with a total of 12 eggs of unidentified species were observed. Most of the eggs recorded were white and oval in shape, similar to that of the other bird species recorded (for example the Crimson Rosella, Eastern Rosella, and Laughing Kookaburra all have white, oval eggs). No bats were recorded during the survey.

Two species were positively identified as undertaking breeding within the boxes; two juvenile Common Brushtail Possums were identified with a parent in a box, and one Kookaburra flew out of a box containing an egg. Clearly many of the bird species are using the nest boxes for breeding purposes, given the presence of eggs and eggshells.

Crimson Rosellas were recorded in a range of nest boxes including those designed for cockatoo and large glider. Opportunistic species, such as the Black Rat and Common Brushtail Possum were recorded in a variety of nest box types. Sugar Gliders were generally recorded in glider nest boxes. The unidentified eggs were recorded in both bird and possum nest boxes.

Signs of use included gnawing at the hole of the nest box (a behaviour often undertaken by parrots in hollows to keep the hole from growing inwards), vegetative material deposited inside the nest box for nesting, feathers, whitewash, and scats.

Sixteen boxes were found to be unsuitable for habitation during the Spring 2018 survey. Reasons for boxes not being habitable were due to them having fallen down, hanging loosely, being filled with rubbish or debris and four containing evidence of bee hives.

There was evidence of nest box use by pests and non-target species. Four nest boxes appeared to be occupied by European bees (see Section 4 for recommendations on pest removal).

Appendix A shows which nest boxes were surveyed with cameras and those that were deemed too high. All boxes that were deemed too high were diurnally surveyed with a 5-minute observation period at each. Dusk surveys were only conducted in areas where larger densities of 'too high' boxes were present (4-8 boxes). No results from dusk surveys were observed.

Table 1.3 has the recommended installation heights for each box type. There is no data for actual installation height. We can additionally acquire estimated installation heights for each box surveyed during 2019 surveys and include that information in the 2019 Report.

3.1.1 Years 1 - 4

Across the four years there was an increase in the number of nest boxes available and an increase in used nest boxes until year 3, however year 4 has seen a decrease in the number of nest boxes used (Table 3-3). The number of individuals recorded dropped from 126 in 2017 to 35 in 2018. Additionally, the number of species recorded breeding in year 4 was lower than in previous surveys with only nine species being recorded. Two juveniles were positively identified during surveys, and unidentified eggs were not counted as evidence of specific breeding. It is considered highly likely that the number of species utilising the boxes for breeding would be higher than this number indicates, with species such as Crimson Rosella and Eastern Rosella investigating hollows, presumably for breeding purposes.

One-hundred and nine (109) of the 290 nest boxes surveyed in year 4 were observed either being used by fauna or showing signs of use, with 33 individuals from 8 different species being recorded in total during 2018 (Table 3-3).

Table 3-3 Results of Year 1 to Year 4

	Year 1	Year 2	Year 3	Year 4
Number of nest boxes surveyed	161	269	294	290
Number of used nest boxes	29 (18%)	130 (48%)	163 (55%)	109 (38%)
Number of species recorded	6	13	14	9
Number of species recorded breeding	5	9	1 (unidentified)	2

See Appendix A for the type of nest boxes installed and species observed. Further analysis of the relationship between species occupying and box type will be undertaken in 2019 monitoring.

3.2 DISCUSSION

As discussed within the limitations section, it may take local fauna a longer period of time to start using nest boxes for refuge and nesting purposes (Lindenmeyer *et al.* 2009). The rate of fauna utilisation of nest boxes has declined since the 2017 survey, as illustrated in Figure 3-1 below. The occupancy rate of nest boxes was 38% in 2018, compared to 67% in 2017. It is considered likely that this result has occurred due to sampling variability, with previous surveys being conducted twice annually, whereas the current survey being conducted once annually. As species utilise hollow resources for different purposes throughout the year (e.g. winter breeding owls, spring breeding parrots, overwintering microchiropteran bats), it is considered likely that more species and individuals than recorded during the current surveys would be utilising the nest boxes throughout the year. Additionally, climatic variables such as prolonged periods of low rainfall and increasing temperatures may be a factor influencing both population sizes of species and their use of habitat features within a landscape.

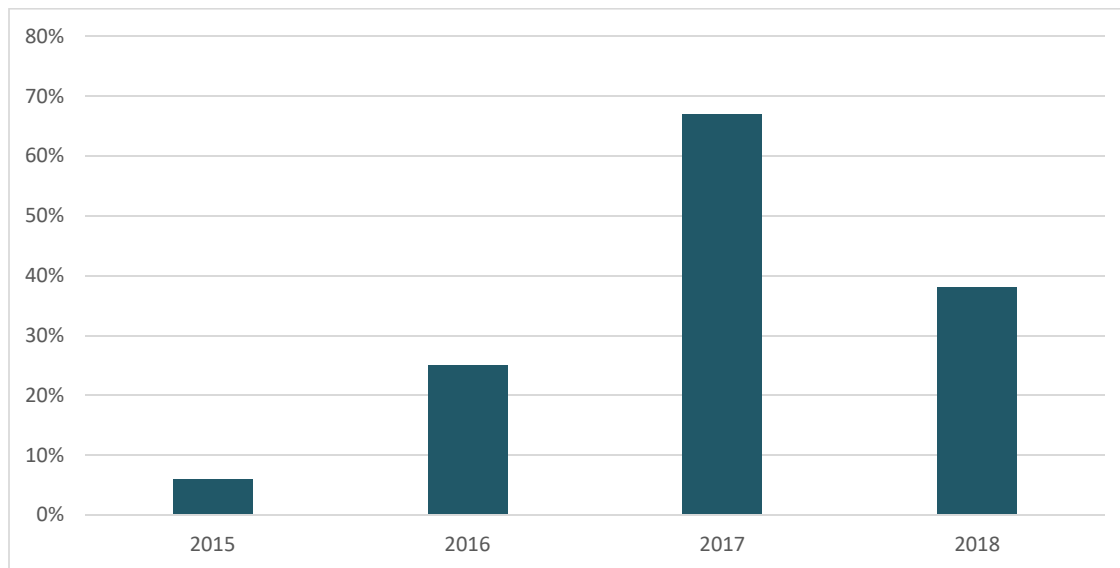


Figure 3-1– Percentage of surveyed nest boxes showing signs of use

The 2015 – 2017 surveys were undertaken across two sampling periods (Spring and Winter), this could be skewing the comparative results as 2018 surveys were undertaken in one session, Spring only. Therefore in addition to the year on year comparison above we have also compared spring monitoring results. Figure 3-2 below shows the results from the Spring surveys only allowing more accurate comparison with the 2018 data set. Important to note, the total number of boxes surveyed in this case excluded those too high to survey to provide a more refined percentage of used boxes. Boxes with signs of use included fauna sightings, chewing marks, leaf litter, feathers, scat, other debris, and faunal remains. Percentage of nest boxes with signs of use increased from 18.6% in Spring 2015, to 41.4% in Spring 2016 and to 65.1% in Spring 2017, however there was a decrease observed in Spring 2018 (47%). This is attributed to a larger number of nest boxes being surveyed in 2018 (230) compared to 2017 (186) where boxes with faunal evidence remained between 13 boxes between the years (121 Spring 2017 and 108 Spring 2018). Similarly to 2018, Spring 2016 had 236 boxes surveyed suggesting that survey error may have occurred in Spring 2017. This can be interpreted two ways; one, if more boxes were surveyed (more closely aligned with the numbers of 2016 and 2018) and few or no boxes with faunal use were detected, this would drop the percentage to a similar value to 2016 and 2017, or two, more boxes to be surveyed may present more sightings of faunal use and therefore increase the percentage further.

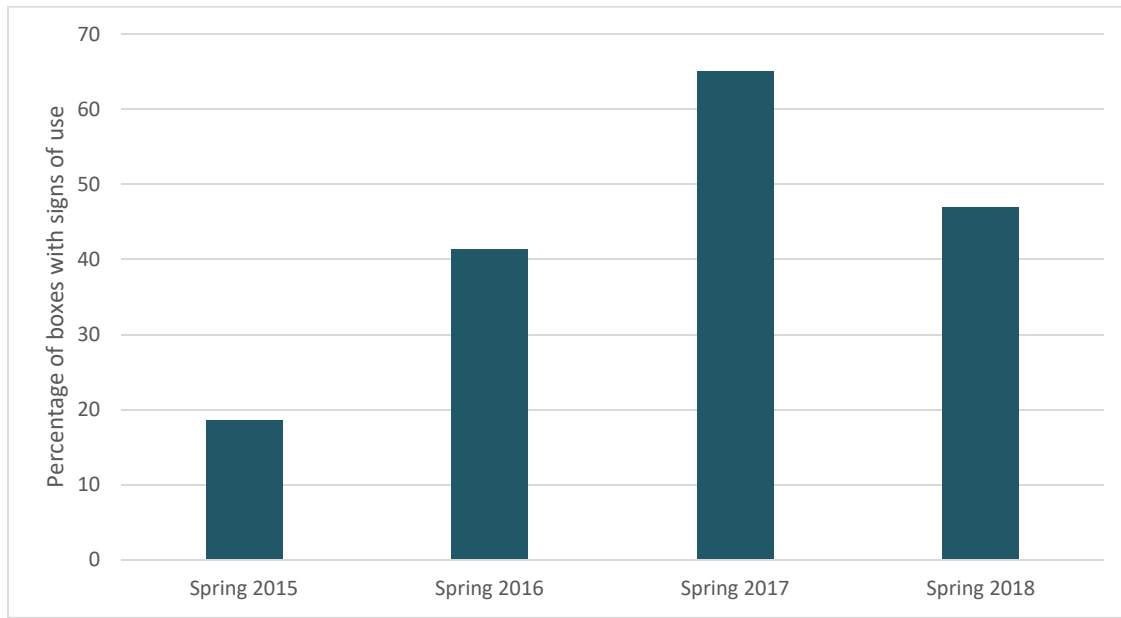


Figure 3-2 Percentage of surveyed nest boxes in Spring showing signs of use

Species diversity decreased in 2018 to 9 species, down from 14 in 2017. Mammals were the predominant faunal group detected, followed by birds. No microbats or reptiles were detected in 2018, and a number of boxes containing unidentifiable eggs were identified. Figure 3-3 below shows these data graphically. The number of boxes showing signs of use has decreased, predominantly where litter was previously present in boxes but has broken down over time. Boxes with external signs of use such as chew and scratch marks have stayed the same.

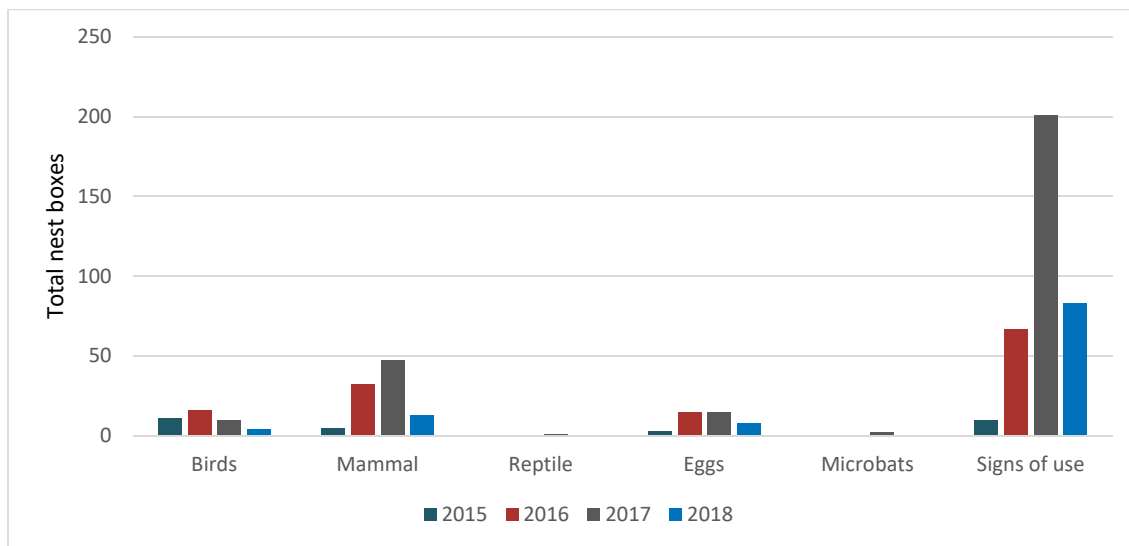


Figure 3-3 – Nest Box occupation by fauna groups over time – note that those shown as showing signs of use exclude those containing fauna

The proportion of boxes not located decreased during the 2018 survey with additional boxes detected, however the number of boxes broken increased. As of spring 2018, a total of 16 boxes have fallen or contain debris and are currently unsuitable for habitation due to the presence of bees. The number of boxes too high to monitor decreased with an improvement in the reach height of the survey equipment.

Nest box installation procedures and specifications can be found in section 3.3 of the *Foxground and Berry Bypass Princes Highway Upgrade Nest Box Management Plan* (Parsons and Brinckerhoff, 2014). Figure 3-4 below illustrates the proportion of nest boxes able to be inspected.

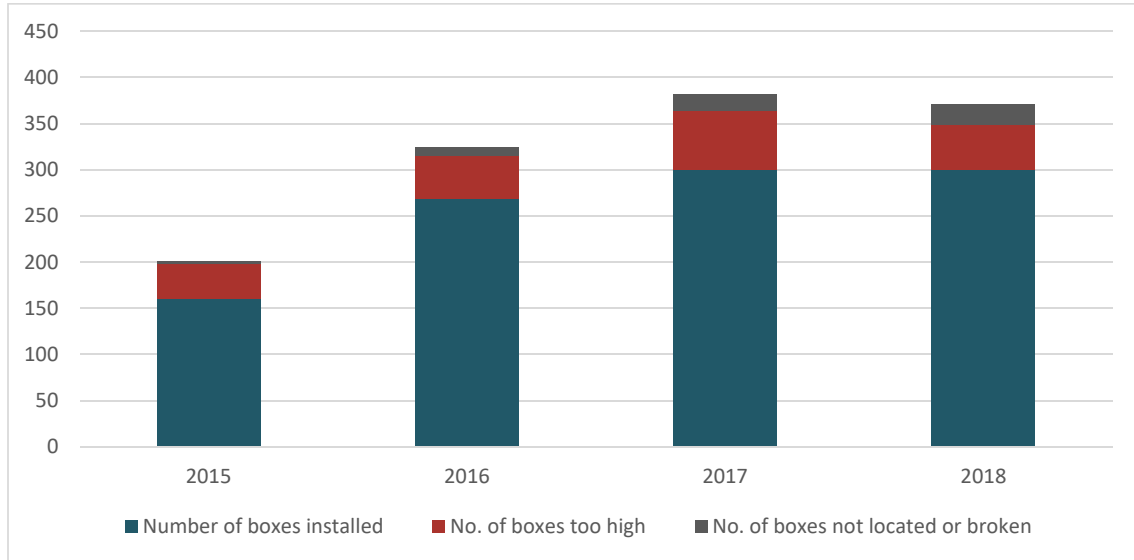


Figure 3-4 - Box condition over time



Nest Box Monitoring Results 2018 Map 1

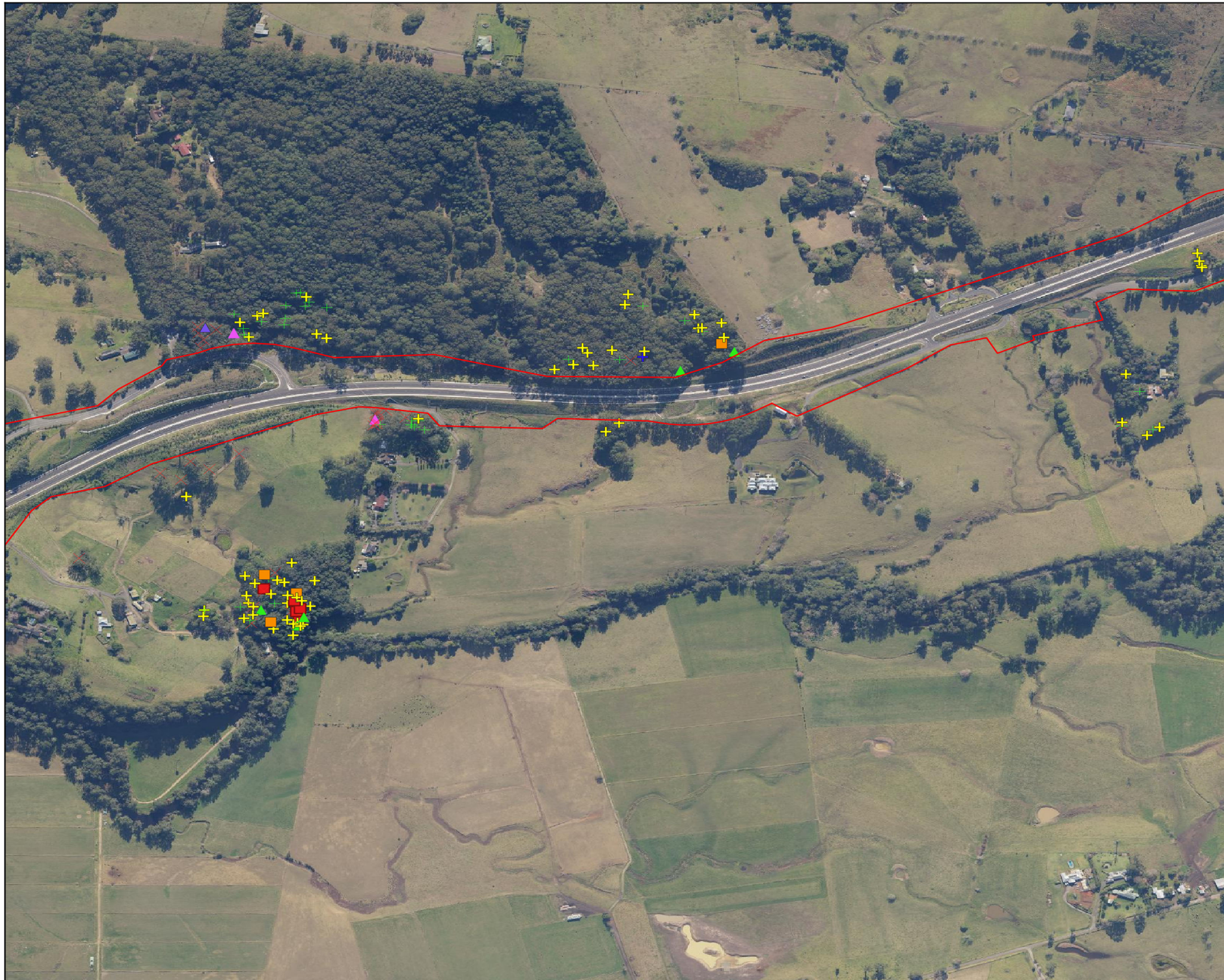
- ▲ Fauna present
- + No signs of use
- Not located
- Requires repair
- ▲ Requires repair, fauna present
- + Requires repair, signs of use
- + Signs of use
- × Too High
- ▲ Too high, fauna present
- ▲ Too high, requires repair
- F2B Project_boundary

0 100 200 300 400 m

Notes:
 - Data collected by NGH environmental (2018)
 - Copyright NSW Land and Property Information ("LPI")
 - Author E.Elias (2019)

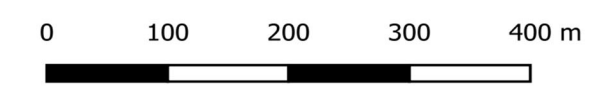


Figure 3-5 Nest box usage and locations 2018 monitoring Map 1.



Nest Box Monitoring Results 2018 Map 2

- ▲ Fauna present
- + No signs of use
- Not located
- Requires repair
- ▲ Requires repair, fauna present
- + Requires repair, signs of use
- + Signs of use
- × Too High
- ▲ Too high, fauna present
- ▲ Too high, requires repair
- F2B Project_boundary



Notes:
 - Data collected by NGH environmental (2018)
 - Copyright NSW Land and Property Information ("LPI")
 - Author E.Elias (2019)

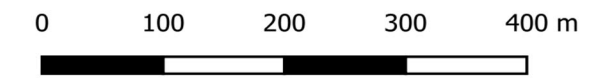


Figure 3-6 Nest box usage and locations 2018 monitoring Map 2



Nest Box Monitoring Results 2018 Map 3

- ▲ Fauna present
- + No signs of use
- Not located
- Requires repair
- ▲ Requires repair, fauna present
- + Requires repair, signs of use
- + Signs of use
- × Too High
- ▲ Too high, fauna present
- ▲ Too high, requires repair
- F2B Project_boundary



Notes:

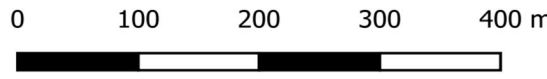
- Data collected by NGH environmental (2018)
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- Author E.Elias (2019)



Figure 3-7 Nest box usage and locations 2018 monitoring Map 3

Nest Box Monitoring Results 2018 Map 4

- ▲ Fauna present
- + No signs of use
- Not located
- Requires repair
- ▲ Requires repair, fauna present
- + Requires repair, signs of use
- + Signs of use
- × Too High
- ▲ Too high, fauna present
- ▲ Too high, requires repair
- F2B Project_boundary



Notes:
 - Data collected by NGH environmental (2018)
 - Copyright NSW Land and Property Information ("LPI")
 - Author E.Elias (2019)



Figure 3-8 Nest box usage and locations 2018 monitoring Map 4

3.3 COMPARISON WITH PERFORMANCE CRITERIA

The following performance criteria relevant to the nest boxes are taken from the EcMP (PB 2014). It should be noted that these relate to the lifetime of the monitoring program, including post-construction.

Table 3-4 Performance criteria

Performance criteria	Performance target	Meeting Target	Comment
High use of bat roost boxes by targeted species	>60% of installed bat boxes used by bats during the life of the monitoring program.	No	<p>Bats were detected in 2017, however none were detected in 2018.</p> <p>Irvine and Bender (1995) found that bat boxes were not occupied within 30 months of installation in regenerating woodland. Goldingay and Stevens (2009) found that bat box occupancy at the same site (Organ Pipes National Park) increased from 15% occupancy in 1994-1995 to >100% occupancy in 2004-2005. Similarly, Boyd and Stebbings (1989) reported a doubling over a 10-year period in a population of brown long-eared bats (<i>Plecotus auritus</i>) supported by roost boxes in managed forest in Great Britain.</p> <p>Installing more boxes wouldn't necessarily increase proportions of bat boxes being used, rather this may make the proportion worse. Besides changing microbat nest box designs or creating/restoring more suitable habitat, not much more can be done about this. Emphasis should be placed on researching microbat box design and only using proven designs for Australian bats in future projects.</p>
High durability of bat roost boxes, with low maintenance requirements.	>90% of installed bat nest boxes persist during the life of the monitoring program.	Yes	None of the bat roost boxes monitored showed any signs of damage. All boxes are serviceable and available for use by microchiropteran bats.
High species diversity and abundance of hollow dependant native fauna occupying nest boxes	>80% of installed nest boxes occupied by target species or other native fauna within 3 years.	No	<p>Of the 290 nest boxes monitored, 109 (38%) were either used or showed signs of use by native fauna with 34 adult individuals from 9 different species being recorded. This is a decrease from the previous surveys, including the first year results where 42 individuals were detected.</p> <p>It is considered unlikely that these results are an accurate reflection of the actual utilisation rate, and that additional survey in different season would generate a significant increase in utilisation results.</p>
High durability of nest boxes	>90% of nest boxes installed persist through monitoring program life	Yes	By the end of Year 4, 22 (7%) of the nest boxes installed and monitored were either missing or showed signs of damage.

4 RECOMMENDATIONS

The following provides recommendations in relation to nest boxes based on the results.

- Four nest boxes were recorded being used or previously used by bees. Nest boxes have been installed with carpet attached to the underside of the nest box lid to deter bees from nesting as per the NBMP (Section 2.1), but it does have varying degrees of success. Bees will move on and the nests will become habitat for fauna, thus no management of bee nests is considered necessary.
- Nest boxes installed on the excluded vector. NBMP states boxes should be installed on north west to east vector. This is to avoid sun and storm impacts. The project has installed boxes on the vector which is not recommended in the plan, but they contain animals. The recommendation is to leave the boxes in place as the assortment of alignments are likely to suit fauna during a variety of conditions.
- It is considered unlikely that a further two years of monitoring will provide any further meaningful results than that already achieved over the past four years. We have therefore proposed two recommendations regarding the way forward for nest box monitoring:
 - **Option 1:** It is recognised that the further two years of nest box monitoring required to fulfil the specifications of the NBMP are not likely to produce substantially different results to those already obtained. Nonetheless, the 3-year operational monitoring program should be completed to allow for a greater data set. The data set will be used for more detailed analysis on species use vs box type, and nest box use (i.e nesting vs roosting).
 - **Option 2:** There are two remaining years of monitoring to fulfil the requirements of NBMP, however, the results are not likely to change significantly. Recent research suggests that nest boxes are not achieving the aim of providing alternative nesting resources for targets species (Lindenmayer *etal.* 2017). It is recommended that the funds committed for the next two years of monitoring are diverted to a research program that includes the development and testing of hollow dependent species nesting resources.

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APPENDIX A 2018 MONITORING SESSION DATA

Box Number	Location	Habitat	Nest box type	Nest box condition	Signs of use	Species in	Number	Comments	Too High	Not Located	Broken	Occupied	Zone	Easting	Northing
1	BC1	Riparian	microbat					Empty					56	294955	6152564
5	BC1	Riparian	owlet-nightjar					Leaf litter					56	294916	6152753
6	BC1	Riparian	owl					Empty					56	294926	6152742
7	BC1	Riparian	owl					Empty					56	294923	6152725
8	BC1	Riparian	kookaburra					Empty					56	294922	6152696
9	BC1	Riparian	microbat					Empty					56	294925	6152691
10	BC1	Riparian	owlet-nightjar					Too high	1				56	294923	6152683
11	BC1	Riparian	ringtail possum					Empty					56	294977	6152513
12	BC1	Riparian	microbat					Empty					56	294927	6152593
13	BC1	Riparian	microbat					Empty					56	294901	6152741
14	BC1	Riparian	ringtail possum					Empty					56	294948.4	6152630
15	BC1	Riparian	microbat					Empty					56	294919	6152649
16	BC1	Riparian	microbat					Empty					56	294930	6152633
17	BC1	Riparian	ringtail possum	Loosened with lid open. Off tree	1			Nesting material					56	294906	6152641
18	BC1	Riparian	small glider		1			Leaf litter, nesting material					56	294943.3	6152639
19	BC1	Riparian	microbat					Empty					56	294931	6152624
20	BC1	Riparian	ringtail possum		1			Leaf litter					56	294936	6152607
21	BC1	Riparian	microbat					Empty					56	294953	6152574
22	Bundewallah Ck	Riparian	dollarbird					Empty					56	289807	6149830

Box Number	Location	Habitat	Nest box type	Nest box condition	Signs of use	Species in	Number	Comments	Too High	Not Located	Broken	Occupied	Zone	Easting	Northing
23	Bundewallah Ck	Riparian	king parrot					Too High	1				56	289813	6149842
25	Bundewallah Ck	Riparian	kingfisher					Too high	1				56	289556	6149928
26	Bundewallah Ck	Riparian	kookaburra - misnamed		1			Debris					56	289500	6149988
28	Bundewallah Ck	Riparian	kookaburra		1			Debris					56	289494	6149996
29	Bundewallah Ck	Riparian	microbat					Empty					56	289837	6149820
30	Bundewallah Ck	Riparian	microbat					Empty					56	289793	6149818
31	Bundewallah Ck	Riparian	small glider		1			Material					56	289785	6149820
32	Bundewallah Ck	Riparian	parrot		1			Askew. Litter					56	289762	6149827
33	Bundewallah Ck	Riparian	kingfisher		1			Sawdust					56	289717	6149859
34	Bundewallah Ck	Riparian	microbat					Empty					56	289702	6149865
35	Bundewallah Ck	Riparian	cockatoo			Brushtail Possum	1					1	56	289695	6149867
36	Bundewallah Ck	Riparian	owl					Broken Lid			1		56	289847	6149798
37	Bundewallah Ck	Riparian	ringtail		1	Egg	1	Eggshell					56	289818	6149800
38	Cut 2	Forest	rosella		1			Chewed entrance					56	296076	6152603
41	Cut 2	Forest	kookaburra	Hanging upside down				Empty					56	295861	6152646
42	Cut 2	Forest	rosella					Empty					56	295742	6152320
43	Cut 2	Forest	small glider	Needs repair. Hanging off tree	1			Leaf litter					56	295760	6152286
44	Cut 2	Forest	small glider		1			Leaf litter					56	295755	6152286
45	Cut 2	Forest	small glider		1			Leaf Litter					56	295776	6152267
46	Cut 2	Woodland	galah					Empty					56	295737	6152783

Box Number	Location	Habitat	Nest type	box condition	Signs of use	Species in	Number	Comments	Too High	Not Located	Broken	Occupied	Zone	Easting	Northing
47	Cut 2	Woodland	galah					Empty					56	295728	6152788
48	Cut 2	Woodland	galah			Brushtail Possum	1	Chewed entrance				1	56	295703	6152763
51	Cut 2	Woodland	king parrot					Empty					56	295633	6152748
53	Cut 2	Woodland	galah		1			Leaf litter					56	295554	6152888
55	Cut 2	Woodland	rosella		1			Leaf litter					56	295569	6152763
58	Cut 2	Woodland	kookaburra					Empty					56	295545	6152733
59	Cut 2	Woodland	large glider		1			Leaf litter					56	295526	6152728
60	Cut 2	Woodland	rosella					Too high	1				56	295535.4	6152752
62	Cut 2	Woodland	large glider					Lid open					56	295542	6152742
63	Cut 2	Woodland	galah					Too high	1				56	295530	6152761
64	Cut 2	Woodland	large glider		1			Leaf litter					56	295519	6152747
65	Cut 2	Woodland	large glider		1			Leaf litter					56	295510	6152752
67	Gate 8	Isolated Tree	galah					Empty					56	293056	6151167
68	Cut 2	Woodland	brushtail possum		1			Leaf litter					56	295664	6152876
69	Cut 2	Woodland	kingfisher		1			Leaf litter full					56	295698	6152857
70	Cut 2	Woodland	rosella			Bees		Bees				1	56	295707	6152845
71	Cut 2	Woodland	owl	Lid open				Empty					56	295724	6152844
72	Cut 2	Woodland	owl					Empty					56	295729	6152871
76	Cut 2	Forest	microbat					Empty					56	295934.7	6152357
78	Downe's	Isolated tree	owl					Empty					56	291685	6150461
79	Downe's	Forest	brushtail possum		1			Debris					56	291736	6150480

Box Number	Location	Habitat	Nest box type	Nest box condition	Signs of use	Species in	Number	Comments	Too High	Not Located	Broken	Occupied	Zone	Easting	Northing
80	Downe's	Forest	ringtail possum					Too high	1				56	291752	6150449
81	Downe's	Forest	owl		1	Egg	1	Eggshell					56	291749.9	6150454
82	Downe's	Forest	king parrot					Not found		1			56	291767.8	6150516
83	Downe's	Forest	owl					Empty					56	291786	6150533
84	Downe's	Forest	Brushtail					Too high	1				56	291814	6150504
85	Downe's	Forest	king parrot					Empty					56	291801	6150489
86	Downe's	Forest	owl	Fallen down									56	291777.9	6150506
87	Downe's	Forest	small glider					Too high	1				56	291806	6150472
88	Downe's	Forest	owl					Not found		1			56	291814	6150473
89	Downe's	Forest	microbat					Empty					56	291744	6150502
90	Downe's	Forest	owl					Empty					56	291747	6150488
91	Downe's	Forest	dollarbird		1			Leaf litter					56	291783.3	6150488
92	Downe's	Forest	owl					Too high	1				56	291768	6150511
93	Downe's	Forest	owl					Empty					56	291755	6150526
94	Downe's	Forest	small glider		1			Lots of nesting material					56	291774	6150536
95	Downe's	Forest	owl					Too high	1				56	291783	6150547
96	Downe's	Forest	ringtail possum		1	Bees		Bees and chewed entrance				1	56	291768	6150543
99	Downe's	Forest	kookaburra			Kookaburra	1	Seen flying out. Small white egg at entrance				1	56	291764.9	6150475
101	Downe's	Forest	owl					Empty					56	291783	6150439

Box Number	Location	Habitat	Nest box type	Nest box condition	Signs of use	Species in	Number	Comments	Too High	Not Located	Broken	Occupied	Zone	Easting	Northing
102	Downe's	Forest	king parrot					Not found		1			56	291818	6150454
103	Downe's	Forest	large glider					Empty					56	291816	6150452
104	Downe's	Forest	large glider			Brushtail Possum	2	Adult and juvenile				1	56	291816	6150446
105	Downe's	Forest	microbat					Empty					56	291810.4	6150427
106	Downe's	Forest	microbat					Empty					56	291823.8	6150448
107	Downe's	Forest	large glider	Lid missing	1			Full of leaf litter			1		56	291823.5	6150468
108	Downe's	Forest	large glider					Empty					56	291833	6150484
109	Downe's	Forest	brushtail possum		1			Leaf litter					56	291818	6150482
110	Downe's	Forest	cockatoo	X				Not found					56	291819	6150479
111	Downe's	Forest	galah - not found					Not found					56	291810.6	6150494
112	Downe's	Forest	brushtail possum	Open lid				Closed lid					56	291813.3	6150509
113	Downe's	Forest	king parrot					Empty					56	291814	6150500
114	Downe's	Forest	ringtail possum					Empty					56	291801	6150504
114	Downe's	Forest	shrike					Empty					56	291801	6150504
115	Downe's	Forest	owl					Empty					56	291838	6150533
116	Downe's	Forest	owl					Empty					56	291796	6150529
117	Downe's	Forest	large glider			Brushtail Possum	1					1	56	291821	6150494
118	Downe's	Isolated tree	microbat					Too high	1				56	291727	6150775
119	Downe's	Isolated tree	cockatoo					Too high	1				56	291687	6150744
120	Downe's	Isolated tree	galah					Too high	1				56	291660	6150759
121	Downe's	Isolated tree	kookaburra					Too high	1				56	291619	6150735

Box Number	Location	Habitat	Nest box type	Nest box condition	Signs of use	Species in	Number	Comments	Too High	Not Located	Broken	Occupied	Zone	Easting	Northing
122	Downe's	Isolated tree	cockatoo					Too high	1				56	291648	6150723
123	Downe's	Isolated tree	king parrot					Too high	1				56	291510	6150569
124	Downe's	Isolated tree	microbat	Lid has been chewed off - galahs?	1						1		56	291656	6150691
125	Downe's	Forest	microbat					Empty					56	291741	6150540
126	Gate 8	Isolated tree	owl	X needs lid to be fixed				Empty			1		56	293050	6151191
127	Gate 8	Isolated tree	owl					Empty					56	293053	6151176
128	Gate 8	Isolated tree	owl		1			Leaf litter					56	293057	6151164
129	Gate 8	Isolated tree	galah					Empty					56	293057	6151164
130	Gembrooke Lane	Forest	large glider					Too high	1				56	291919	6150860
131	Gembrooke Lane	Forest	owl					Too high	1				56	291919	6150856
132	Gembrooke Lane	Forest	king parrot					Too high	1				56	291930	6150863
133	Gembrooke Lane	Forest	owl			Crimson Rosella	1	Poking head out. Too high	1			1	56	291915	6150845
134	Gembrooke Lane	Forest	owl					Too high	1				56	291917	6150841
135	Gembrooke Lane	Forest	brushtail possum					Too high	1				56	291916	6150837
136	Gembrooke Lane	Forest	ringtail possum					Too high	1				56	291918	6150837
137	Gembrooke Lane	Forest	owlet-nightjar		1			Leaf litter					56	291922	6150836
138	Gembrooke Lane	Forest	king parrot					Too high	1				56	291913	6150834
139	Gembrooke Lane	Forest	owl	X - skew	1			Nesting material					56	291975.7	6150844
140	Gembrooke Lane	Forest	small glider		1			Debris					56	291966	6150844
141	Gembrooke Lane	Forest	rosella		1			Leaf litter					56	291965	6150836

Box Number	Location	Habitat	Nest type	Nest box condition	Signs of use	Species in	Number	Comments	Too High	Not Located	Broken	Occupied	Zone	Easting	Northing
142	Gembrooke Lane	Forest	antechinus		1			Leaf litter full					56	291970	6150832
143	Gembrooke Lane	Forest	ringtail possum		1			Debris					56	291984	6150827
144	Gembrooke Lane	Forest	galah					Empty					56	291975	6150848
145	Gembrooke Lane	Forest	ringtail possum					Too high	1				56	291957	6150850
146	Gembrooke Lane	Forest	ringtail possum					Too high	1				56	291915	6150857
147	Lot 11	Woodland	galah		1			Leaf litter					56	291071	6151018
148	Lot 11	Woodland	possum	Not found				Not Found		1			56	291153	6150993
149	Lot 11	Woodland	kookaburra					Empty					56	291025	6150906
151	Lot 11	Woodland	kookaburra			Black Rat	2					1	56	291140	6150988
152	Lot 177	Riparian	cockatoo					Empty					56	290920	6150552
153	Lot 177	Riparian	galah			Crimson Rosella	1	Too high but sticking its head out				1	56	290932	6150485
154	Lot 177	Riparian	kookaburra					Too high	1				56	290916	6150490
156	Lot 81	Forest	owl			Eggs	1	Eggshell and 1 speckled egg				1	56	292411	6150987
157	Lot 81	Forest	king parrot			Bees	1	Bees				1	56	292393	6151002
158	Lot 81	Forest	king parrot					Empty					56	292396	6151014
159	Lot 81	Forest	king parrot		1			Chewed hole on inside					56	292366	6151025
160	Lot 81	Forest	ringtail possum					Empty					56	292360	6151031
161	Lot 81	Forest	dollarbird					Empty					56	292365	6151032
162	Lot 81	Forest	owl	Fallen							1		56	292392	6151042
163	Lot 81	Forest	ringtail possum			Brushtail Possum	1					1	56	292354	6151057

Box Number	Location	Habitat	Nest type	box	Nest box condition	Signs of use	Species in	Number	Comments	Too High	Not Located	Broken	Occupied	Zone	Easting	Northing
164	Lot 81	Forest	owl			1			Leaf litter					56	292341	6151045
165	Lot 81	Forest	owl	Yes		1			Leaf litter, scats at entrance					56	292282	6151072
166	Lot 81	Forest	king parrot			1	Agile Antechinus	1	Agile Antechinus					56	292337	6150949
167	Lot 81	Forest	microbat						Empty					56	292241	6150986
168	Lot 81	Forest	dollarbird						Empty					56	292257	6151074
169	Lot 81	Forest	kookaburra		Loose, hanging off the tree	1			Nesting material					56	292284	6150974
170	Lot 81	Forest	owl						Empty					56	292286	6150985
171	Lot 81	Forest	king parrot				Eggs	1	Broken eggshells and feathers				1	56	292252	6150968
172	Lot 81	Forest	owl		Nothing present				Empty					56	292215.8	6150956
173	Lot 81	Forest	owl			1			1 feather					56	292181	6150967
174	Lot 81	Forest	microbat						Empty					56	292188	6150957
175	Lot 81	Forest	dollarbird				Sugar Glider	2						56	292162	6150947
176	Lot 81	Forest	microbat						Empty			1		56	292207	6150980
177	Lot 81	Forest	owl		Found, nothing present, point moved, 45 degree angle				Empty					56	292200	6150990
178	Lot 81	Forest	king parrot		Hanging on an angle				Empty					56	292261	6151094
179	Lot 81	Forest	owl						Too high	1				56	292267	6150967
180	Mark Radium Park	Isolated tree	kookaburra						Too high	1				56	288217	6149460
181	Mark Radium Park	Isolated tree	possum			1			Debris					56	288212	6149427

Box Number	Location	Habitat	Nest box type	Nest box condition	Signs of use	Species in	Number	Comments	Too High	Not Located	Broken	Occupied	Zone	Easting	Northing
182	Mark Radium Park	Isolated tree	possum		1			Debris					56	288180	6149393
183	Mark Radium Park	Isolated tree	kookaburra			Brushtail Possum	1	Brushtail Possum x 1				1	56	288174	6149381
184	Mark Radium Park	Isolated tree	rosella		1			Chewed entrance. Debris					56	288203	6149386
185	Paninis	Forest	microbat					Empty					56	288020	6149136
186	Paninis	Forest	small glider					Too high. No lid. On backwards	1				56	288006	6149135
187	Paninis	Forest	rosella	X	1			Nesting material					56	288013	6149133
188	Paninis	Forest	possum					Missing		1			56	287999	6149144
189	Paninis	Forest	small glider			Bees	1	Bees				1	56	288013	6149152
190	Paninis	Forest	antechinus		1			Debris					56	288018	6149156
191	Paninis	Forest	owl	X	1			Debris. Lid missing			1		56	288018	6149162
192	Paninis	Forest	kookaburra		1			Leaf litter					56	287974	6149118
193	Paninis	Forest	brushtail possum		1			Leaf litter					56	288000	6149147
195	Paninis	Forest	rosella		1			Nesting material					56	287968	6149118
196	Simons	Woodland	possum		1			Debris					56	287578	6148535
197	Simons	Woodland	owl					Empty					56	287778	6148564
198	Simons	Woodland	owl					Lid missing			1		56	287767	6148562
199	Simons	Woodland	rosella		1			Chewed Entrance					56	287734	6148562
200	Simons	Woodland	owl					Empty					56	287729	6148527
201	Simons	Woodland	owl		1			Lid missing. Leaf litter			1		56	287734	6148491
202	Simons	Woodland	rosella		1			On its side. Debris feathers					56	287665	6148489

Box Number	Location	Habitat	Nest box type	Nest box condition	Signs of use	Species in	Number	Comments	Too High	Not Located	Broken	Occupied	Zone	Easting	Northing
203	Simons	Woodland	large glider		1			Debris					56	287654	6148495
204	Simons	Woodland	possum		1			Debris feathers					56	287636	6148501
205	Simons	Woodland	kookaburra					Too high	1				56	287647	6148512
206	Simons	Woodland	owl					Too high. No lid and hanging off cord	1		1		56	287674	6148562
207	Simons	Woodland	kingfisher					Empty					56	287615	6148530
208	Simons	Woodland	small glider					Not Found		1			56	287738	6148499
209	Smarts	Forest	small glider		1			Chewed inside entrance. Empty					56	292976	6150923
210	Smarts	Forest	kookaburra			Brushtail Possum	1					1	56	292956	6150956
211	Smarts	Forest	kingfisher		1			Nesting material					56	292952	6150856
212	Smarts	Forest	shrike					Too high	1				56	292953	6150858
213	Smarts	Riparian	rosella					Chewed entrance					56	292996	6150850
214	Smarts	Riparian	galah	Y		Brushtail Possum	1					1	56	293005	6150855
215	Smarts	Riparian	owl	X same as last				N			1		56	292988	6150839
216	Tindalls Lane	Forest	galah					Too high	1				56	291670	6150978
217	Tindalls Lane	Forest	brushtail possum					Too high	1				56	291673.6	6150993
218	Tindalls Lane	Forest	lorikeet					Too high	1				56	291666	6151006
219	Tindalls Lane	Forest	owl					Too high	1				56	291665	6151018
220	Tindalls Lane	Forest	brushtail possum					Too high	1				56	291690	6151013
221	Tindalls Lane	Forest	cockatoo		1			Nesting material					56	291714.5	6151044

Box Number	Location	Habitat	Nest box type	Nest box condition	Signs of use	Species in	Number	Comments	Too High	Not Located	Broken	Occupied	Zone	Easting	Northing
222	Tindalls Lane	Forest	ringtail possum					Empty					56	291723	6151028
223	Tindalls Lane	Forest	rosella wrong antechinus-fallen	X				Missing		1			56	291728	6151016
224	Tindalls Lane	Forest	large glider - incorrect, rosella?					Empty					56	291736	6151000
225	Tindalls Lane	Forest	small glider		1			Nesting material					56	291729.5	6151004
226	Tindalls Lane	Forest	cockatoo		1			Nesting material					56	291753	6151030
227	Tindalls Lane	Forest	microbat	Rosella box				Empty					56	291746.7	6151041
228	Tindalls Lane	Forest	antechinus		1			Leaf litter					56	291813	6151061
229	Tindalls Lane	Forest	king parrot					Empty					56	291814	6151079
230	Tindalls Lane	Forest	antechinus		1			Leaf litter					56	291818	6151069
231	Tindalls Lane	Forest	antechinus		1			Leaf litter					56	291800	6151086
232	Tindalls Lane	Forest	small glider wrong, lorikeet?			Eggs	1	Chewed hole. 2 white oval eggs				1	56	291805.7	6151087
233	Tindalls Lane	Forest	ringtail possum		1			Leaf litter. Possible scat					56	291843	6151059
234	Tindalls Lane	Forest	small glider		1			Debris, scats					56	291786	6151062
235	Tindalls Lane	Forest	kingfisher		1			Leaf litter, full					56	291785.8	6151037
236	Tindalls Lane	Forest	antechinus		1			Leaf litter, full					56	291784.5	6151025
237	Tindalls Lane	Forest	rosella			Eastern Rosella	1	Too high. Rosella seen entering box	1			1	56	291715	6151007
238	Tindalls Lane	Forest	cockatoo		1			Nesting material. Hanging on by one cord					56	291675	6151017

Box Number	Location	Habitat	Nest box type	Nest box condition	Signs of use	Species in	Number	Comments	Too High	Not Located	Broken	Occupied	Zone	Easting	Northing
239	Tindalls Lane	Forest	king parrot					Too dark to see					56	291830	6151008
240	Tindalls Lane	Forest	cockatoo					Empty					56	291844	6151000
241	Culvert	Riparian	microbat					Empty					56	292254	6150846
242	Culvert	Riparian	microbat					Empty					56	292236	6150829
243	Cut 7 east ?	Forest	Glider					Empty					56	290808	6150240
244	Cut 7 east ?	Forest	Glider	Missing				Not Found	1				56	290817	6150240
245	Cut 7 east ?	Forest	Glider					Empty					56	290926	6150320
246	Cut 7 east ?	Forest	Ringtail					Empty					56	290936	6150327
247	Cut 7 east ?	Forest	Glider	Loose				Empty		1			56	290972	6150352
248	Cut 7 east ?	Forest	Glider		1			Chewed Entrance					56	290992	6150363
249	Cut 7 east ?	Forest	Glider		1			Chewed entrance. Too dark inside					56	291006	6150371
250	Cut 7 east ?	Forest	Microbat					Empty					56	291051	6150391
251	Cut 7 east ?	Forest	Glider					Too high	1				56	291059	6150397
252	Cut 7 east ?	Forest	Glider	On angle				Too high	1				56	291052	6150397
253	Paninis	Forest	Microbat					Empty					56	287920.6	6149046
254	Cut 2	Woodland	Ringtail		1			Leaf litter					56	295683.6	6152865
255	Smarts	Forest						Empty					56	292952.8	6150863
256	Simons	Woodland	Rear entry glider					Spider					56	287734.3	6148588
257	Simons	Woodland	Glider					Spider					56	287639.9	6148517
258	Bundewallah Ck	Riparian	Bat					Empty					56	289816.2	6149805

Box Number	Location	Habitat	Nest box type	Nest box condition	Signs of use	Species in	Number	Comments	Too High	Not Located	Broken	Occupied	Zone	Easting	Northing
259	Bundewallah Ck	Riparian	Owl					Empty					56	289786.4	6149815
260	Bundewallah Ck	Riparian	Possum		1			Leaf litter					56	289781.9	6149826
261	Bundewallah Ck	Riparian	Possum		1			Debris					56	289787.7	6149836
262	Bundewallah Ck	Riparian	Rosella			Egg	1	Eggshells				1	56	289815.7	6149838
263	Bundewallah Ck	Riparian	Dollar bird?					Empty					56	289816.3	6149842
264	Downe's	Forest	Ringtail					Empty					56	291805.4	6150567
265	Downe's	Forest	Microbat					Empty					56	291820.2	6150445
266	Downe's	Forest	Large glider					Empty					56	291824.6	6150463
267	Downe's	Forest	Large glider			Egg	5	5 white eggs				1	56	291810.2	6150449
268	Downe's	Forest	Brushtail					Empty					56	291801.6	6150457
270	Downe's	Forest	Ringtails					Empty					56	291741.5	6150458
271	Tindalls Lane	Forest	Lorikeet box?					Empty					56	291754.9	6151046
272	Gembrooke Lane	Forest	Antechinus					Debris					56	291966.3	6150836
100A	Downe's	Forest	ringtail possum		1			Litter					56	291778.8	6150452
100B	Downe's	Forest	small glider					Lid up on Possum box					56	291778.8	6150452
150A	Lot 11	Woodland	cockatoo					Empty					56	291077	6150968
150B	Lot 11	Woodland	cockatoo					Empty					56	291077	6150968
155A	Lot 177	Riparian	shrike					Shrike box empty					56	290891	6150594
155B	Lot 177	Riparian	kookaburra		1			Nesting material in kookaburra box.					56	290891	6150594
194A	Paninis	Forest	possum					Empty					56	287996	6149151

Box Number	Location	Habitat	Nest box type	Nest box condition	Signs of use	Species in	Number	Comments	Too High	Not Located	Broken	Occupied	Zone	Easting	Northing
194B	Paninis	Forest	kingfisher					too high	1				56	287996	6149151
24A	Bundewallah Ck	Riparian	King Parrot		1			Nesting material					56	289788	6149829
24B	Bundewallah Ck	Riparian	Dollarbird					Missing		1			56	289788	6149829
27A	Bundewallah Ck	Riparian	Owl					Owl too high	1				56	289490	6149989
27B	Bundewallah Ck	Riparian	Kingfisher			Brushtail Possum	1	Kingfisher had BP				1	56	289490	6149989
2A	BC1	Riparian	Microbat					Empty					56	294910	6152768
2B	BC1	Riparian	Microbat					Empty					56	294910	6152768
39A	Cut 2	Forest	rosella					Empty					56	295899	6152655
39B	Cut 2	Forest	shrike					Empty					56	295899	6152655
3A	BC1	Riparian	Owl					Empty					56	294907	6152769
3B	BC1	Riparian	Dollarbird					Too high	1				56	294907	6152769
40A	Cut 2	Forest	kookaburra					Empty			1		56	295886	6152655
40B	Cut 2	Forest	shrike					Too high	1				56	295886	6152655
49A	Cut 2	Woodland	shrike thrush					Empty					56	295724	6152741
49B	Cut 2	Woodland	rosella		1			Litter					56	295724	6152741
49C	Cut 2	Woodland	kookaburra			Egg	1	3 white eggs				1	56	295724	6152741
4A	BC1	Riparian	Rosella					Empty					56	294910	6152769
4B	BC1	Riparian	Ringtail Possum					Too high	1				56	294910	6152769
50A	Cut 2	Woodland	galah		1			Leaf litter					56	295639	6152748
50B	Cut 2	Woodland	large glider					Empty					56	295639	6152748
52A	Cut 2	Woodland	king parrot					Parrot empty					56	295628	6152770

Box Number	Location	Habitat	Nest type	box condition	Signs of use	Species in	Number	Comments	Too High	Not Located	Broken	Occupied	Zone	Easting	Northing
52B	Cut 2	Woodland	shrike					Shrike too high.	1				56	295628	6152770
54A	Cut 2	Woodland	galah		1			Galah box leaf litter					56	295554	6152776
54B	Cut 2	Woodland	shrike					Shrike empty					56	295554	6152776
56A	Cut 2	Woodland	small glider					Empty					56	295568	6152717
56B	Cut 2	Woodland	large glider					Empty					56	295568	6152717
57A	Cut 2	Woodland	large glider					Empty					56	295549	6152715
57B	Cut 2	Woodland	large glider					Empty					56	295549	6152715
61A	Cut 2	Woodland	large glider					Too high	1				56	295531.7	6152744
61B	Cut 2	Woodland	small glider		1			Litter					56	295531.7	6152744
66A	Cut 2	Woodland	small glider					Empty					56	295469	6152780
66B	Cut 2	Woodland	small glider					Empty					56	295469	6152780
73A	Cut 2	Woodland	owl	Missing owl box				Not found		1			56	295742	6152869
73B	Cut 2	Woodland	kookaburra					Empty					56	295742	6152869
74A	Cut 2	Forest	small glider					Empty					56	295936.1	6152358
74B	Cut 2	Forest	king parrot					Empty					56	295936.1	6152358
74C	Cut 2	Forest	large glider					Empty					56	295936.1	6152358
74D	Cut 2	Forest	rosella					Empty					56	295936.1	6152358
75A	Cut 2	Forest	owl					Empty					56	295776	6152439
75B	Cut 2	Forest	owl					Empty					56	295776	6152439
77A	Downe's	Isolated tree	small glider			Sugar Glider	1					1	56	291686	6150473
77B	Downe's	Isolated tree	brushtail possum		1			Lots of leaf litter					56	291686	6150473

Box Number	Location	Habitat	Nest type	box	Nest box condition	Signs of use	Species in	Number	Comments	Too High	Not Located	Broken	Occupied	Zone	Easting	Northing
97A	Downe's	Forest	Owl						Empty					56	291753.8	6150465
97B	Downe's	Forest	ringtail possum						Empty					56	291753.8	6150465
98A	Downe's	Forest	King Parrot						Too high	1				56	291754	6150481
98B	Downe's	Forest	Ringtail Possum						Empty					56	291754	6150481