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# WILDTHINGS NSW Hollows Project

# Inspection of Hollows

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## Abstract Executive Summary

WildThings NSW members were concerned about the loss of tree hollows throughout Ku-ring-gai LGA due to land clearing. WildThings NSW applied for an environmental grant through Ku-ring-gai Council to provide additional habitat for local fauna. Local residents were invited to participate in the project by funding the supply of the hollow and providing a location for installation in their yard. The grant funding covered the cost of the installation.

113 Sections of natural hollows were salvaged from tree clearing works, capped at both ends and installed by Fauna Field Ecology between 2016 and 2023 across 14 Ku-ring-gai LGA suburbs.

During this period a small number of the capped hollows were inspected by fauna ecologist Narawan Williams for signs of occupancy with further grant funding acquired by WildThings NSW to bring the total number of hollows inspected to 71 out of the 113 capped hollows that had been installed. 10 of those hollows were inspected twice throughout the monitoring period.

The monitoring provided information on the success of the project with 55% percent of the capped hollows having signs of use by vertebrate fauna and, in addition, 30% percent were also used by invertebrates.

Nine vertebrate fauna species in total used the hollows. The majority of evidence of use was arboreal mammals including common brushtail possums, ringtail possums and sugar gliders. There was evidence of a brown antechinus in one hollow along with a feathertail glider leaf nest in another. Three hollows were used by microbats with one providing roosting shelter for a greater broad-nosed bat. This microbat is a listed threatened species in NSW and rarely uses artificial habitat so it's use is an exciting result. Nesting by bird species was limited, with rainbow lorikeets taking up one of the hollows and evidence of king parrots in another hollow.

It was noted that sugar and feathertail gliders used hollows in locations where there was reasonable tree canopy cover and connectivity throughout the area. This demonstrated the importance of retaining mature trees and connectivity throughout the urban area for wildlife.

Given the site selection for the hollows was dictated by which resident wished to participate in the project rather than species or habitat suitability, the overall results of usage by fauna have been very positive. The capped hollows have successfully provided shelter for a variety of local fauna.

The evident need and competition for shelter and nesting sites means any further additional habitat installed across the Ku-ring-gai LGA suburbs will be of benefit to local fauna. With the installation of habitat there is a commitment to maintain it into the future to continue these positive outcomes.

## Background

**The loss of hollow-bearing trees was listed as a key threatening process in 2007 under the Threatened Species Conservation Act, NSW.**

**NSW Scientific Committee's final determination found that:**

"In NSW, terrestrial vertebrate species that are reliant on tree hollows for shelter and nests include at least 46 mammals, 81 birds, 31 reptiles and 16 frogs (Gibbons and Lindenmayer 1997, Gibbons and Lindenmayer 2002). Of these, 40 species are listed as threatened on Schedule 1 and Schedule 2 of the Threatened Species Conservation Act. "- *NSW Government Department of Environment and Heritage web site, updated 2021"*

Previous to this determination Ku-ring-gai Council instigated a pygmy possum hollow project which involved community members and has been a successful and ongoing project.

In 2016 the volunteer group WildThings NSW embarked on the WildThings NSW Hollows Project, with the broader objective to provide natural hollow habitats for a range of native species that are being impacted by the clearing of vegetation for residential housing and other developments. The group applied for two grants from Ku-ring-gai Council's Environmental Levy Grant Programme which were successful. These grants were for two "demonstration" projects to be instigated in Ku-ring-gai LGA comprising the provision and installation of two types of artificial hollows:

1. "Augmented chainsaw hollows". Augmented chainsaw hollows are cavities carved into the trunk or branch of a tree using a chainsaw. Seven chainsaw hollows were created in a dead tree in Mashmans Quarry Reserve. These created hollows have not yet been monitored and therefore will not be discussed further in this report.

2. "Capped natural hollows", the subject of this report, are salvaged hollows from tree felling works that are modified and capped at both ends to make suitable for arboreal wildlife habitat.

Example of a capped large section of natural hollow installed for possums.

With the aid of a grant from Ku-ring-gai Council, WildThings NSW provided the opportunity for 113 of these ethically sourced capped natural hollows to be provided and installed by Narawan Williams (Fauna Field Ecology) at a relatively small cost to the residents and schools.

It is important to monitor and maintain capped natural hollows and all other types of artificial habitat to ensure the longevity of the habitat that fauna may be reliant on for shelter and nesting. It is also important to measure if the habitat is successfully meeting the criteria for which they were installed. Monitoring can help inform what has been successful for any future projects so resources can be used appropriately and efficiently.

In 2023 WildThings NSW applied for an Environmental Levy Grant from Ku-ring-gai Council to enable the inspection of a total of 71 hollows to measure the success of the hollows project**.**
The grant application was successful and WildThings NSW, engaged Narawan Williams of Fauna Field Ecology to lead the monitoring. Narawan was assisted in the field by WildThings NSW volunteers Chris Smallbone, Phil Demson, Rod Sharples and Mark Ponniah.

This report will introduce you to the geographical project area, a summary of the installation process followed by the monitoring methods, results of the monitoring and discussion of the results.

## INTRODUCTION TO THE HOLLOWS PROJECT SUBJECT AREA

Fauna Field Ecology was engaged by WildThings NSW to supply capped hollows and install them into residents' backyards throughout the Ku-ring-gai LGA between 2017 and 2023. To date, 96 residents have participated in this project with 113 hollows installed across 15 of the 17 suburbs of Ku-ring-gai local government area along with two additional hollows installed in Normanhurst near the western Ku-ring-gai LGA boundary (Refer to Figure 1). 12 residents were keen and purchased more than one hollow.

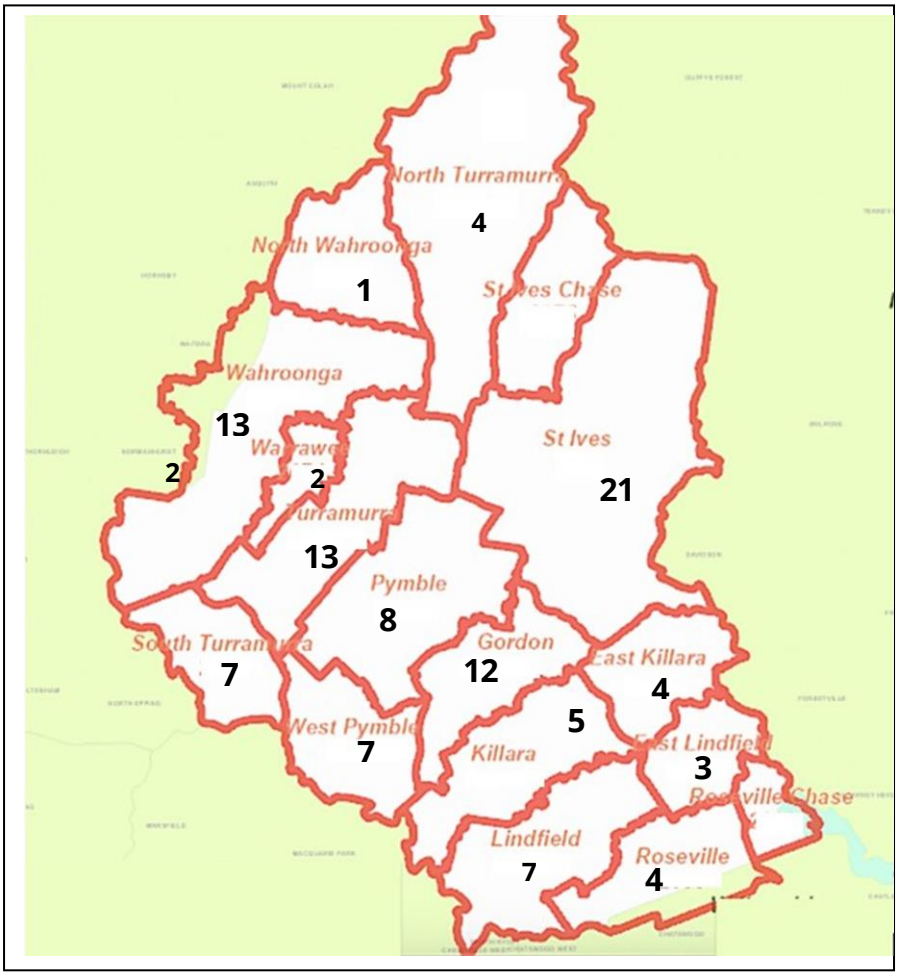



Figure 1. Map of distribution of installed hollows across Ku-ring-gai LGA.

| Year Hollows Installed | Number of Hollows Installed |
|---|---|
| 2017 | 16 |
| 2018 | 33 |
| 2019 | 34 |
| 2020 | 15 |
| 2021 | 10 |
| 2022 | 4 |
| 2023 | 1 |
| Total Number of Hollows Installed | **113** |

**Table 1**. Year and number of hollows installed.

**Ku-ring-gai local government area**

Ku-ring-gai local government area covers 85 square km, and of these 1,160 hectares is open space which includes bushland. The Council area is also bounded by three significant areas of bushland, Ku-ring-gai Chase National Park, Lane Cove National Park, and Garigal National Park. These larger tracts of native


Figure 2. Map of Ku-ring-gai LGA.


Figure 3. Map of Biodiversity corridors across Ku-ring-gai LGA.

vegetation link with urban areas via remnant and planted corridors of vegetation in both private and public land. These corridors provide a variety of habitat for wildlife and facilitate the movement of wildlife throughout the LGA. As mentioned earlier, urban development has led to the clearing of trees and other vegetation important for wildlife and this diminishes the integrity and quality of the biodiversity corridors that are so important to native fauna.

# THE CAPPED NATURAL HOLLOWS

## Sourcing and preparing the hollows

The hollows used for this project were salvaged from vegetation clearing works. This enabled them to be repurposed rather than being chipped or used for firewood. Sections of hollows were selected mostly from the harder timbered trees as they will last longer than softwood trees. The hollows were trimmed, and both ends capped using hardwood timber panels which accommodated most of the target species. The base panel was inset into the hollow to prevent water rotting it. The lid had some overhang over the sides of the hollow to prevent water entering and causing dampness within. Many of the hollows had metal dampcourse added over the hardwood lids to increase protection from water and also prevent light entering microbat target hollows.

For microbat targeted hollows the base of the hollow was either open or partly closed so the bats can enter or exit via the base as well as side entry holes.

The hollows have two attachments fitted to increase safety and longevity of the hollow installed on the tree. The first is a wire loop attachment which sits over a 150mm long galvanised nail which takes the weight of the hollow. The second wire attachment is positioned around the trunk to help hold the hollow against the tree and has two sections formed like a spring to allow expansion of the trunk as the tree grows. A spring formation in the PVC coated wire was used rather than the wire zig zag formation known as ‘habisure’ method commonly used on plywood nest boxes, as this does not hold its form as well on the heavier capped natural hollows.


Example of a capped hollow showing hardwood timber inset base plate, hardwood timber lid and expanding wire spring attachment

## Installation of the capped hollows

- The habitat in the resident's yard was assessed for likely hollow using fauna and the resident was asked what fauna they see around their back yard to assist selection of a capped hollow that may best suit local species.
- A suitable tree or structure was chosen to install the selected capped hollow. E.g., tree trunk or under high veranda.
- Installation of the capped hollows was carried out using an extension ladder, or climbing ropes if access was too difficult to use a ladder.
- A plastic cattle tag was placed over the nail to help identify the presence of the nail to arborists that may work on the tree in the future.

Installing a capped hollow. Two attachments – wire loop over nail with green tag and wire around trunk through hose.

## Limitations on the installation of capped hollows:

- The variety of capped hollows available depended on what hollows were able to be salvaged from clearing works. There was not an endless supply of all hollow sizes available for a resident's yard.
- The location of capped hollows was dictated by where residents who participated in the project happened to live. Some properties had very limited habitat or suitable options for installing hollows, decreasing the likelihood of occupation by fauna.
- Some yards had poor connectivity with canopy trees or larger corridors of remnant vegetation with the surrounding area.
- Suitable food resources for hollow using fauna were not always available which limits the uptake of hollows in those locations.

## MONITORING CAPPED NATURAL HOLLOWS

Since the first hollows were installed in 2017 there have been two main hollow inspection sessions with some opportunistic inspections carried out during installation of additional capped hollows to resident's yard.
A total of 71 hollows were inspected, with ten of these then being inspected a second time making the total number of hollow inspections 81. Additionally, 14 nestboxes were inspected on participating properties, however these are not included in this report.

Inspections included:

- 5 capped hollows were inspected in May 2018
- 36 capped hollows and 12 nest boxes were inspected in June 2021-
- 40 capped hollows and 2 nest boxes were inspected in August 2023

As stated above, fourteen residents had additional habitats, in the form of ply or hardwood nestboxes and these were included in the inspections however these were not included in the results or analysis of this report.

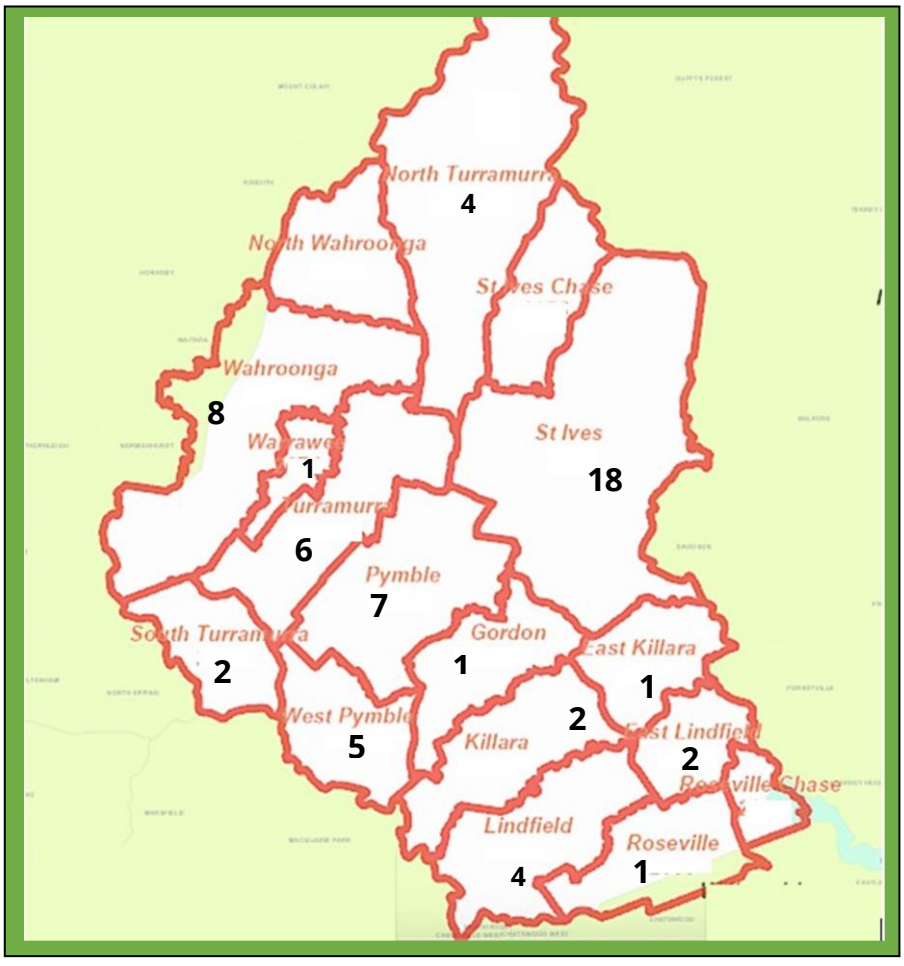



Figure 4: Distribution of hollow inspections across the 14 Ku-ring-gai LGA suburbs involved.

| Suburb | Number of hollows monitored |
|---|---|
| St Ives | 18 |
| Wahroonga | 8 |
| North Turramurra | 4 |
| South Turramurra | 2 |
| Turramurra | 6 |
| Gordon | 10 |
| Warrawee | 1 |
| West Pymble | 5 |
| East Killara | 1 |
| Killara | 2 |
| East Lindfield | 2 |
| Linfield | 4 |
| Roseville | 1 |
| Pymble | 7 |
| **Total** | **71** |

Table 2. Number of hollows monitored in each suburb.

## Methods of monitoring

Due to the majority of lids on the capped hollows being fixed, inspection cameras had to be used to inspect the inside of the hollow for signs of usage. Over the period that inspections were conducted different inspection technologies became available and consequently two types of inspection cameras were used.

The two types of inspection cameras were:

1. The Plumbing inspection camera *Borescope Premium*, which has two different sized camera heads with LED lights and a flexible neck adjustment. The camera has a remote monitor to view and record images.


Plumbing inspection camera

Inspecting hollow with camera on pole

Viewing camera monitor

Sample of poor quality image taken by camera. Detail is enough for a microbat expert to identify as a greater broad-nosed bat.

This camera was used in the 2018 and 2021 hollow inspections along with some hollows in 2023 that have small entry holes. The quality of the images only provides a poor visual record, as can be seen in the sample above, but the camera does enable interpretation by an experienced ecologist.

2. The inspection camera *MK3* produced by Blair Venn (Blairvenn@hotmail.com) is a small, high-resolution camera, with additional LED lights, mounted in a PVC tube which can be attached to a long extension pole. The camera connects to a mobile phone via WIFI dashcam App B1W-CARCVR.

*MK3* inspection camera

Example: MK3 camera inspecting a nest box


Sample of Image using MK3 inspection camera

The camera has a good light source and clearer image. It is, however, not able to fit into the smaller hollow entrances, unlike the plumbing camera. This camera was used in the 2023 hollow inspections and has provided excellent visual records.

Both types of cameras were mounted on an extension pole which extends to around 5.5 meters in length giving an approximate reach of around 6.5 meters.

An extension ladder was used to aid inspection with the camera if the hollow was not able to be inspected from the ground using the camera on a pole.

3. Another method of inspection was also used, primarily for microbat capped hollows which have a fully or partly open base. This was using a bright red/white torch (Wolf-eyes XBeam Procap) with the aid of binoculars which enabled the identification of the species of microbat or other fauna if present. The binoculars utilised were *Vortex Viper HD* 10 x 42.

The details of each hollow inspected, including maintenance notes, were recorded onto an existing hollows excel data sheet, which includes all details of each capped hollow. This full document *'Ku-ring-gai Capped Hollows Data to 2024'* will be provided to Ku-ring-gai Council for their records and a modified record of this document has been provided in Appendix 1.

**Monitoring Limitations**

- Lids of the majority of hollows were fixed, requiring the use of an inspection camera to view inside the hollow rather than physically inspecting the hollow. In some cases, physical inspection is necessary in determining the signs of species usage, such as the presence of scats, nesting material or smell.

- In a small number of hollows, not all the internal cavity could be observed due to the shape of the hollow and therefore evidence could have been missed.

- Not all signs of use are able to be identified to a particular species e.g., couple of eucalypt leaves inside hollow could be sugar glider, feathertail glider or black rat.

- Funding did not allow for all the 113 capped hollows to be inspected.

## RESULTS SUMMARY

Of the 71 capped hollows inspected, 55% had signs of use by the targeted vertebrate species, indicating the hollows were successful in providing habitat. Note, 'signs of use' refers to species present during inspection or evidence of their occupation. 30% of hollows also had invertebrate fauna present.
In 24% of the hollows, vertebrate fauna was present at the time of the inspection and were able to be observed. Of the fauna observed plus signs of use there were a total of nine vertebrate fauna species and five invertebrate phyla recorded using the capped hollows.

The table below lists the fauna species that were observed inside the hollows during the inspection as well as signs of fauna that have utilised the hollow since installation. Observations noted by the resident about fauna observed investigating the hollow have been included e.g., Bird species looking in entrance hollow.

| **Fauna species** | **Number of hollows with animal present** | **Number of hollows with signs of use by animal** | **Signs of use** | **Animal observed investigating hollow by resident.** |
|---|---|---|---|---|
| **Vertebrate fauna** | | | | |
| Gould's wattled bat (x2) | 1 | | | |
| Greater broad-nosed bat (x 1) | 1 | | | |
| Microbat | | 1 | Scats | |
| Common brushtail possum | 5 | 3 | Fur on entry hole, eucalypt leaves, scat | |
| Ringtail possum | 5 | 5 | Stringybark and bracken fern nest material, Skeletal remains | |
| Brushtail or ringtail possum | 0 | 1 | Fur | |
| Sugar glider | 5 | 5 | Eucalypt leaf nests, eucalypt and melaleuca leaf nest | |
| Feathertail glider | 0 | 1 | Eucalypt leaf nest | |
| Sugar glider or feathertail glider | 0 | 1 | Eucalypt leaf nest | |
| Signs unknown species | 0 | 1 | Couple of green leaves | |
| Brown antechinus | 0 | 1 | Eucalypt leaf nest – brown single leaves | |
| Rainbow lorikeet | 0 | 1 | Feathers | 3 |
| King parrot | 0 | 1 | Likely compacted parrot scats | Residents noted king parrots sitting on top of hollow |
| Sugar glider or black rat | 0 | 1 | Green leaf nest - messy | |
| House mouse | 0 | 0 | | |
| Indian myna | 0 | 0 | | |
| Starling | 0 | 0 | | |
| | | | | |
| **Total hollows** | **17** | **22** | | |
| Percentage of total hollows inspected | **24%** | **31%** | | |
| **Percentage of total number of hollows with Vertebrate fauna** both present and signs of use combined | **55%** | | | |

| **Invertebrate fauna** | | | | |
|---|---|---|---|---|
| Huntsman spider egg sac | 3 | | | |
| Huntsman spider | 3 | | | |
| Spider species | 2 | | | |
| Spiderweb | 7 | | | |
| Ants | 5 | | | |
| Millipedes | 2 | | | |
| Beetle species | 1 | | | |
| Cockroach species | 1 | | | |
| Feral bees | 0 | | | |
| Total number | 24 | | | |
| Total percentage of hollows with I**nvertebrates** | **30%** | | | |

## The following is a description of the results divided into vertebrate groupings.

**1. Microbats**

A total of 12 capped, vertical hollows targeting microbats were installed for the project. Of these, microbats were observed in two and additionally numerous microbat scats were observed in a horizontal capped hollow targeting small parrot.

- One of the microbat species was a greater broad-nosed bat *Scoteanax rueppellii* which was using one of the microbat targeted hollows installed on a smooth barked apple, *Angophora costata*, in Pymble (hollow number 113) at the height of five meters. This is a threatened bat species which rarely roosts in artificial habitat and there is limited knowledge about the ecology of this species including roosting behaviours. It is one of the larger microbat species that inhabits the Sydney region, occurring in areas where more continuous tall tree canopy occurs. It is known to forage in the space below the canopy, in the mid storey/shrub layer and along edges of denser forest.

Example: Greater broad nose bat

Greater broad-nosed bat roosting inside this hollow

- Two gould's wattled bats *Chalinolobus gouldii*, a species well adapted to urban environments, were observed in another hollow designed for microbats in June of 2022 (hollow number 102). This capped hollow was installed in a backyard in Gordon on a smooth-barked apple, *Angophora costata* at a height of 4.1 meters. In August 2023 the hollows were inspected again but there were no microbats present, however the cavity was clear with no spider web which can indicate that the microbats were continuing to use the hollow periodically. This backyard is connected to a good gully corridor of natural vegetation.

Example of gould's wattled bat and capped hollow this species roosted in

- Numerous microbat scats were observed in a horizontal hollow installed in a Turpentine, *Syncarpia glomulifera,* at the height of 6.3 meters. The hollow is in a Wahroonga backyard near the back fence adjoining a park with tall, scattered eucalypt trees. It was clear that either a group of microbats used the hollow for a period of time, or individual or small numbers have used the hollow periodically. It was not possible to ascertain which species as only scats were present.

**2. Possums**

A total of 27 capped hollows targeting brushtail and ringtail possums were installed for the project. Of these eight were larger capped hollows targeting brushtail possums. To designate a hollow for ringtail possums as opposed to brushtail possums the entry hole needs to be too small for a brushtail possum to enter. Of the hollows suitable for possums, all could have been used by ringtail possums or other species but only eight of the targeted hollows were suitable for brushtail possums.

- Brushtail possums were observed in five of the larger capped hollows and signs of this species were observed in an additional three capped hollows e.g., two had fur around entrance, one had chewed up eucalypt leaves in the base of the box, and one had a possible scat. It was difficult, however, to confirm what species produced the scat from the inspection camera image. This species readily takes up artificial habitat in urban as well as bushland areas.

Example: Ringtail possum bark nest

Brushtail possum in capped hollow


Evidence of brushtail possum nest

- Ringtail possums were observed in five capped hollows and 5 other hollows showed signs of usage, consisting of stringybark and bracken fern nest material, and one had fur on the entry of a hollow. Often when possums and gliders have to squeeze into entry holes they leave behind fur.
- Ringtail possums often use stringy bark and bracken fern to make nests in tree hollows however they are also able to make nests in vegetation such as dense mid storey and canopy foliage, forks of trees and vine thickets. These are often mistaken as birds nests. This species has survived well in urban areas due to this and the availability of native and non-native food sources.
- Skeletal remains of a ringtail possum were also recorded in a hollow. The resident had observed and photographed a sick ringtail possum near their front door so this deceased possum in the hollow could have been the same possum.

Example: Ringtail possum in stringybark nest


Ringtail possum in capped hollow

Example: Ringtail possum

**3. Gliders**

36 capped hollows suitable for gliders were inspected, 28 of which targeted sugar gliders and the remaining eight targeted feathertail gliders. Sugar glider hollows were also suitable for other species such as small parrots.

- Five capped hollows had sugar gliders present in them, each with one to four individuals.
- In addition, five other capped hollows had fresh eucalypt leaf nests. Sugar gliders bring fresh eucalypt branchlets into hollows and usually make a reasonably neat bowl shape nest. This nesting material can go over the top of the gliders making it difficult to observe if the gliders are present and the number present. In these 5 hollows the nests were an open bowl shape with no gliders visible.
- There were an additional 3 capped hollows that had eucalypt leaf nests that were old and breaking down. All were likely to have been made by sugar gliders, however, these were not included in the table of results as, given their age, it was hard to be certain.
- There was another hollow where it was difficult to determine if the leaf nest was made by a sugar glider or black rat. Black rat's nests are often not as neat as glider nests, and they deposit their scats inside the box. The scats can be difficult to see if leaves have been placed over the top of them.

Sugar gliders in project hollow

Capped hollow of sugar glider

Example: Sugar glider feeding on sap

Eight capped hollows suitable for feathertail gliders were inspected with one showing evidence of use by this species.

- There was one feathertail glider nest in a small entry capped hollow targeting feathertail gliders/ brown antechinus at the height of 4.5 metres on a Turpentine. Due to the shape of the hollow the internal cavity could not be viewed in its entirety with the inspection camera and so an animal may have been present at the time of inspection. The eucalypt leaf nest was green coloured which usually indicates a feathertail glider rather than brown antechinus. The latter usually collect brown leaves from the ground to make their nest. Feathertail glider nests often have a leaf sticking out of the entry hole or other crevice in the hollow. There was one present in this case.

Example: Feathertail glider

Capped hollow for feathertail glider

**4. Small native mammals (brown antechinus, bush rat, pygmy possum)**

In Ku-ring-gai LGA the only species of small native mammals known to be present that can use hollows are brown antechinus, bush rats and pygmy possums. The boxes designed for these species had very small entry holes, twenty-five to thirty millimetres, to exclude larger species. For this project bush rats were not identified as one of the target species. Pygmy possums and antechinus could also utilise hollows for sugar gliders and other species.

Some nine capped hollows targeted antechinus and pygmy possums and of these, one showed signs of antechinus usage.

- A capped hollow at the height of 1.4 meters with an entry hole of 2.5 cm had signs of use by brown antechinus. A eucalypt leaf nest made of individual brown leaves was present inside the hollow. This species will often use a hollow for a period of time before moving on to another as they often deposit their scats inside their hollow and are piled to one side. Installing a group of at least three hollows/nest boxes for this species is beneficial to provide a variety of options. Antechinus give birth to multiple young, and most individuals only live for one year, the males dying after mating and the females after raising their young.

Example: Brown antechinus


Antechinus/pygmy possum capped hollow

Antechinus nest in hollow capped hollow

**5. Birds**

Parrots, lorikeets, and other bird species use hollows for nesting only, so during the non-breeding season they generally roost in tree canopies or other locations. During the non-breeding season this leaves such hollows open to occupation by other species that may not move on. Competing for hollows can consequently be a more significant issue for bird species that are likely to be competing with more permanent residents such as possums.

Of the 44 hollows inspected suitable for bird species four were for kookaburras and two for pardalotes. 23 of the hollows were suitable for smaller parrots, i.e. lorikeets, and the remaining 15 were for larger species such as rosella or king parrot species, depending on hollow dimensions. Two of the 44 showed signs of use by a parrot species.

- Rainbow lorikeet feathers were present in one capped hollow suggesting that a pair were intending to nest or have nested. No eggshell was observed with the inspection camera image however this does not mean that breeding did not occur.
- At least three residents observed rainbow lorikeets inspecting their capped hollows, however they did not occupy the hollow due to mammal species already using it.
- One hollow had what looked like compacted bird scats in the base of it which suggested a parrot species may have bred in it. King parrots were observed sitting on a hollow by residents which suggests they may have used it, however there were no feathers present inside the hollow to confirm which species. King parrots often prefer large and often deep tree hollows so most of the capped hollows would not suit this species.

Rainbow lorikeet


Rainbow lorikeet feathers in capped hollow

**6. Invertebrates**

Invertebrates provide important food resources for vertebrate and other invertebrate species along with providing many other important ecosystem functions. Capped hollows can provide beneficial shelter and nesting sites for a range of invertebrates and so these have been recorded on the inspection data excel sheet. The presence of spider webs were also noted.

24 hollows showed signs of use by invertebrates. Most commonly spiders or, to a lesser extent, ants. Both of these are commonly found in hollows. Feral honey bees were not found in any of the hollows and this was significant given their presence represents the loss of a hollow to native wildlife.

A list of invertebrate groups in the number of hollows is provided below.

- Huntsman spider and egg sac in six hollows
- Spider unknown species in two hollows
- Ant species in five hollows
- Millipedes in two hollows
- Beetle species in one hollow
- Native cockroach species in two hollows
- Spiderweb present in 14 hollows.

**7. Feral species**

- There were no feral bees observed in any hollow or nest box.
- No black rats or house mice were observed inside any of the capped hollows and no signs of use apart from one hollow which was undetermined if either a black rat or sugar glider leaf nest.
- No evidence of feral bird species such as indian myna or starlings were observed in the capped hollows.

## DISCUSSION OF RESULTS

It was a benefit to the project that there was a broad spread of participation by community members across most of the suburbs of Ku-ring-gai LGA. Hollows were installed where the residents lived and the inspection of these hollows has provided a basis for information about what environments may benefit and influence wildlife habitat needs and the use of hollows in urban areas associated with remnant vegetation and bushland.

This hollows project has been successful in its aim of increasing hollow availability across Ku-ring-gai LGA. The hollows are providing shelter and nesting sites for nine vertebrate fauna species with 55% of the hollows showing signs of use.
This is a good result given it was not possible to select sites for the hollows within the landscape using the preferred method of assessing a location to best suit the targeted species. For this project the site was based on where the residents who chose to participate lived.

The random selection of locations meant that some of the hollows installed in resident's yards were less suitable and were isolated from native vegetation which was expected to reduce the likelihood of fauna encountering, and consequently, utilising the hollow. This is likely to be a significant factor for some of the 45% of hollows that show no signs of use.

The inspection results suggest that connectivity of canopy trees had a positive influence on the diversity and number of fauna species utilising the hollows. For example, the majority of hollows with evidence of glider species had native tree canopy with good connectivity throughout the surrounding areas and some larger bushland areas; of the microbat habitats showing evidence of use, two had good scattered canopy suited to microbats and the other connected to a naturally vegetated gully corridor; the brown antechinus nest was adjacent to a large expanse of natural bushland and surrounded by vegetation.

Unlike sugar gliders, feathertail gliders and antechinus, brushtail possums and ringtail possums are species well adapted to the urban environment but require the availability of vegetation for food as well as shelter. Both of these species are known to feed on native and exotic plant species and will utilise the boundary fences which are commonly vegetated with hedges, native and introduced tall shrubs and small trees. In many of the sites where ringtail and brushtail hollows were successful the habitat was noted to be vegetated in this way. These environments provide protected passages for possums away from dogs and other terrestrial predators as well as sites for ringtail possums dreys.


Capped hollow with sugar gliders

A capped hollow with sugar gliders showing native vegetation with good tee canopy connectivity

Another factor that influenced which species uses a hollow is the competition between different fauna species. There was some evidence of this noted in relation to bird species. Only two hollows showed evidence of use by bird species. From my experience it is common to have a relatively low success rate with bird and microbat species in artificial habitat however I found it surprising that only one hollow showed signs of rainbow lorikeets use. This species is a very common species in the urban landscape and will use a wide variety of cavities, even open tree platforms low to the ground or cavities in brick walls to nest.

Rainbow lorikeets looking into a hollow found to be occupied by sugar gliders.

While three residents had observed pairs of rainbow lorikeets looking into hollows on their properties, they wondered why the lorikeets were not going into the hollow and using it. On inspection of the hollow, it was evident that sugar gliders and ringtail possums were present and using the hollows. This demonstrates the competition for hollows amongst fauna species and why adding more hollows can be of benefit.

One of the characteristics that helps to reduce the level of competition for hollows is the size of the entry. The entry hole size often determines what fauna species is able to enter the hollow and after that it is whichever animal gets in first and can defend it, as long as the hollow also suits their other needs. Hollows were chosen to be installed to target certain species however this does not ensure that the target species would be the species to utilise the hollow.

While it is, as stated, surprising that more hollows were not taken up by rainbow lorikeets, it is reasonable to assume that this is not to the detriment of this species currently as they are abundant throughout Sydney and evidently have adequate breeding habitat. There were other bird species that are less abundant than rainbow lorikeets throughout the urban environment that could have used the hollows such as crimson and eastern rosellas, king parrots, spotted pardalotes, musk and little lorikeets, grey shrike thrush and white throated treecreepers. These species are more likely to be impacted by clearing of native bushland however so far only one of these hollows has had king parrots showing interest in it.

Another factor in the competition for hollows is use by feral species. In this project no hollows were occupied by feral vertebrate or invertebrate species, which is very positive for the Ku-ring-gai LGA. The lack of vertebrate feral species such as indian mynas, starlings and black rats usually signifies a greater integrity of native vegetation structure and the presence of larger areas of intact native habitat. Many hollows however, were installed in more open and urban locations where feral bird and rodent species are likely to be present. These more disturbed and open spaces are also favoured by the native noisy miner species, which have large family groups and indiscriminately defend their territory, chasing both introduced and native species away from potential nesting hollows, even though they do not use hollows themselves. It is possible that the natural capped hollows may be less suitable for the feral species mentioned, however a more extensive project would have to be carried out across different regions to assess this and compare other installed habitat types such as nest boxes.

The introduced european honey bee also competes with native fauna for hollows and this has been recognised as a ‘key threatening process’ under the Threatened Species Conservation Act 1995.
There was no evidence of feral bees in any of the inspected hollows which is a positive outcome for the project. Feral honey bees usually require a certain minimum cavity size to build their hive and many of the capped hollows installed are likely too small. There may be other less obvious factors deterring the bees however this would require further investigations.

While native invertebrate species can be sometimes thought of as pest species, they are actually a very important part of the ecosystem, providing many beneficial functions. Some invertebrate species rely particularly on small tree cavities and crevices. For example, ant species will build nests; spiders will shelter and make their egg sacs; and cockroaches shelter inside. The project succeeded in increasing available hollow habitat for Invertebrate species with 30% of the inspected hollows found to be used by these species, adding to the success of the 55% usage by vertebrate species. The high occupation rate by a variety of target species, the lack of feral species and the use of a hollow by a threatened microbat species should demonstrate the value of this project.

As an experienced fauna ecologist, I support this project and believe it is of value to the preservation of native wildlife in the local area. The installation and monitoring of natural capped hollows has facilitated an increase in the natural hollow availability for native wildlife and has also helped to build knowledge of habitat use by fauna in an urban landscape. The WildThings NSW project has brought together a caring community and provided them with an opportunity to assist the local wildlife throughout the Ku-ring-gai Council LGA.

Chris Smallbone, WildThings NSW and one of the school teachers who supported the purchase and installation of hollows for their school.

In addition to this report, pages containing information on the monitoring result of a number of the participating residents' hollows is provided in Appendix 2. There are a sample of twenty of these pages which contain good inspection camera images and copies will be emailed to the respective participants.

### Maintenance observations

- The inspected hollows and their attachments were in very good condition.
- Two hollows had to be moved to a new location due to concern about future, natural decay of the host tree.

## RECOMMENDATIONS

The capped hollows and nest boxes can provide important shelter sites that species become reliant on and therefore it is recommended they are maintained long into the future.
A schedule of visual inspections of the capped hollows can be planned at regular intervals to monitor the condition and usage into the future.

Given that there is clear evidence that these hollows are being used by local fauna, and into the future, this hollows project could be further supported by Ku-ring-gai Council to expand the number of habitats installed. If this is not achievable however, at the very least, supporting the monitoring and maintenance of the existing capped hollows as an environmental asset.

If additional hollows were able to be installed, reaching out to Ku-ring-gai residents along identified green corridors and/or council reserves particularly those that have limited or no hollows would be a valuable targeted approach. This would help support the movement and connection of hollow using fauna species throughout the LGA.

The data collected from this project provides a good basis for a greater detailed analysis of vegetation structure and position in landscape for each hollow to determine species preferences. This could be carried out by a university student or an ecologist if funds are able to be sourced.

**Recommended schedule of maintenance and monitoring:**
Initial maintenance and monitoring inspection five years after installation date and then every two to three years following for a period of at least 20 years.

## ACKNOWLEDGMENTS

I would like to acknowledge:

- The community members who participated in this project, providing funding for the hollow preparation and a location to install the hollow.
- Chris Smallbone, member of WildThings NSW has put much time, effort and dedication into WildThings NSW acquiring the grants for this project. Along with this, planning the installations and monitoring days with the community members participating in this project.
- Chris Smallbone, Phil Demson, Rod Sharples and Mark Ponniah for their dedicated and enthusiastic assistance with the installation and monitoring of the hollows.
- Elizabeth Powell for assisting with this report, volunteering many hours collating information, photos, editing and creating the page descriptions with photos for the appendix of this report.

If you have any questions, please contact me on the details provided.

Kind regards
Narawan Williams
Fauna Ecologist
Microbat specialist

# APPENDIX 1

*Ku-ring-gai Capped Hollows Data to 2024* – the table below is extracted data showing the results recorded for each hollow monitored.

| Capped hollow number | Target species | Box height (m) | Suburb | Date installed | Date inspected | Evidence of fauna usage | Date inspected | Evidence of Fauna usage | Date inspected | Evidence of Fauna usage |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Sugar gliders/possums/birds | 4.2 | St Ives | May 2017 | May 2018 | spider web present | June 2021 | millipedes | | |
| 2 | Sugar glider/small lorikeet | 5.7 | Wahroonga | May 2017 | | | | | Aug 2023 | Eucalypt leaf nest likely sugar glider made. |
| 3 | Gliders/possums/birds | 4.6 | North Turramurra | May 2017 | May 2018 | some scratch marks on outside of hollow - no evidence of use inside | June 2021 | no evidence | | |
| 4 | Small gliders/Antechinus | 1.7 | North Turramurra | May 2017 | May 2018 | No evidence | June 2021 | spider web around entry | | |
| 5 | Ringtail possum/birds | 4.4 | Gordon | May 2017 | | | June 2021 | sugar glider (at least 1 maybe more), eucalypt leaf nest | | |
| 6 | Ringtail possum/small brushtail | 5.7 | St Ives | May 2017 | May 2018 | some fur around entrance so likely possum species | June 2021 | no evidence | | |
| 7 | Sugar glider/small lorikeet | 5.9 | Warrawee | May 2017 | | | | | Aug 2023 | 3 sugar gliders present |
| 8 | Microbats | 6.3 | Wahroonga | May 2017 | | | | | Aug 2023 | clear inside which suggest it could be used on occasion by microbats as no invertebrates present |
| 9 | Rosella/small parrots/gliders | 6.7 | West Pymble | May 2017 | | | | | Aug 2023 | 2 sugar gliders present, leaf nest (not eucalypt leaves), lorikeets had been seen looking in. |
| 10 | Rosella/ringtail possums | 3.75 | St Ives | May 2017 | May 2018 | no evidence - resident next door said that she has seen possums and lorikeets in the tree however no rosellas | June 2021 | spider web across entry | | |
| 11 | Kookaburra | 3.4 | East Killara | May 2017 | | | | | | |
| 12 | Rosella/lorikeet/ringtail possum | 6.4 | Killara | May 2017 | | | | | Aug 2023 | 20 +, microbat scats-species not determined |
| 15 | Sugar glider/lorikeet/ringtail possum | 4.95 | St Ives | May 2017 | | | June 2021 | Eucalypt green leaves - likely sugar glider or feathertail glider | | |
| 17 | Rosella/lorikeet/ringtail possum | 5.2 | St Ives | May 2018 | | | June 2021 | ringtail possum nesting material inside hollow. | | |
| 18 | Brushtail possum | 5.3 | St Ives | May 2018 | | | June 2021 | brushtail possum - Resident has seen Brushtail possum using hollow regularly | | |
| 19 | Ringtail/rosella/king parrot | 4 | St Ives | May 2018 | | | June 2021 | entry hole clear of spiderweb Some possible chewing around it. No fur or evidence of use inside hollow observed. | Aug 2023 | no evidence of use |

| Capped hollow number | Target species | Box height (m) | Suburb | Date installed | Date inspected | Evidence of fauna usage | Date inspected | Evidence of Fauna usage | Date inspected | Evidence of Fauna usage |
|---|---|---|---|---|---|---|---|---|---|---|
| 20 | Microbats | 3.7 | St Ives | May 2018 | | | June 2021 | Huntsman spider and egg sac | Aug 2023 | clear inside which suggest it could be used on occasion by microbats as no invertebrates present |
| 21 | Sugar glider | 4.4 | Gordon | May 2018 | | | June 2021 | spider web | Aug 2023 | cockroach and huntsman egg sac |
| 21a | Microbats /feathertail glider | 5.2 | Gordon | May 2018 | | | June 2021 | likely brushtail possum fur in entry (possum having a look), residents said they saw rainbow lorikeets having a look and possums near hollow. Kookaburras were using natural hollow in tree on other side. | | |
| 23 | Ringtail possum/rosella/lorikeet | 5.6 | Gordon | May 2018 | | | June 2021 | Ringtail possum nesting material (bracken fern), Brushtail possum may use also (dark staining around entry. | | |
| 24 | Ringtail or small brushtail possum/rosella | 6.1 | Turramurra | May 2018 | | | June 2021 | Brushtail possum, has seen mother and young regularly using it. | | |
| 26 | Kookaburra/possums | 3 | East Killara | May 2018 | | | | | Aug 2023 | common brushtail possum |
| 27 | Ringtail possum / medium parrot | 5.9 | East Linfield | May 2018 | | | | | | |
| 29 | Ringtail or brushtail possum | 3.4 | Linfield | May 2018 | | | | | Aug 2023 | skeletal bones in base (likely ringtail possum) which have been pushed aside by other occupant. Resident observed sick looking ringtail possum in April 2023 near front door. |
| 30 | Micro bats / feathertail glider | 5.5 | Wahroonga | May 2018 | | | June 2021 | Ringtail Possum | Aug 2023 | stringybark nesting material - likely ringtail possum nest |
| 32 | Ringtail possum / medium parrot | 3.9 | Gordon | May 2018 | | | June 2021 | Spider x 3, spider web | | |
| 33 | Sugar glider / feathertail glider | 5.3 | Turramurra | May 2018 | | | June 2021 | Common Brushtail Possum | | |
| 34 | Brushtail possum | 5.4 | St Ives | May 2018 | | | June 2021 | Huntsman spider egg sac, no other evidence visible with camera | | |
| 36 | Small parrot / sugar glider | 5.2 | South Turramurra | May 2018 | | | | | | |

| Capped hollow number | Target species | Box height (m) | Suburb | Date installed | Date inspected | Evidence of fauna usage | Date inspected | Evidence of Fauna usage | Date inspected | Evidence of Fauna usage |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | Micro bat / feathertail glider | 5.2 | Gordon East | May 2018 | | | | | Aug 2023 | huntsman spider otherwise all clear |
| 39 | Feathertail glider/ micro bats | 1.6 | St Ives | May 2018 | | | June 2021 | spider web over entry hole | | |
| 40 | Ringtail or brushtail possum | 5.4 | North Turramurra | May 2018 | | | | | Aug 2023 | chewed up eucalypt leaves in base likely by brushtail possum. Looks like box used regularly. Fresh green leaves. |
| 41 | Sugar glider / small parrot | 5.7 | Linfield | May 2018 | | | | | Aug 2023 | melaleuca and eucalypt leaves likely glider species nest - sugar or feathertail glider. |
| 44 | Micro bat | 1.6 | North Turramurra | May 2018 | | | June 2021 | spider web across part of entry | | |
| 45 | Kookaburra | 5.7 | Roseville | May 2018 | | | | | Aug 2023 | turpentine leaf nest |
| 46 | Spotted pardalote | 2 | Wahroonga | May 2018 | | | | | Aug 2023 | no evidence - resident thinks pardalotes may be nesting on the slope below the box. |
| 47 | Small parrot / sugar glider | 6.1 | Turramurra | May 2018 | | | June 2021 | Sugar glider present (at least 1), deep eucalypt leaf nest, | Aug 2023 | 4 sugar gliders in eucalypt leaf nest. |
| 50 | Antechinus, Eastern pygmy possum, sugar glider | 3.8 | South Turramurra | Sept 2019 | | | June 2021 | spider web filling inside | | |
| 53 | Microbat/feathertail glider | 4.3 | West Pymble | Sept 2019 | | | June 2021 | spider web and huntsman spider | | |
| 54 | Microbat/feathertail glider | 4.7 | West Pymble | Sept 2019 | | | June 2021 | Ants | | |
| 56 | Small parrot / sugar glider | 4.8 | West Pymble | Sept 2019 | | | June 2021 | No signs | | |
| 58 | Small parrot / sugar glider | 5.8 | Turramurra | Sept 2019 | | | June 2021 | No signs, all clear inside | | |
| 60 | Pardalote | 1.5 | Pymble | Sept 2019 | | | | | Aug 2023 | spiderweb |
| 61 | Ringtail possum/rosella | 6 | St Ives | Sept 2019 | | | | | Aug 2023 | stringybark nesting material made by ringtail possum |
| 65 | Small parrot / sugar glider | 5.5 | Pymble | Sept 2019 | | | | | Aug 2023 | leaf nest likely sugar glider. Rainbow lorikeet seen looking into hollow. |
| 66 | Small parrot /Sugar glider | 5.8 | West Pymble | Sept 2019 | | | | | Aug 2023 | huntsman spider egg sac |
| 67 | Brushtail possum | 2.85 | Pymble | Sept 2019 | | | | | Aug 2023 | common brushtail possum |
| 68 | Small parrot / sugar glider | 5.4 | Gordon | Sept 2019 | | | June 2021 | Ants and spider | | |

| Capped hollow number | Target species | Box height (m) | Suburb | Date installed | Date inspected | Evidence of fauna usage | Date inspected | Evidence of Fauna usage | Date inspected | Evidence of Fauna usage |
|---|---|---|---|---|---|---|---|---|---|---|
| 70 | Antechinus, feathertail glider, eastern pygmy possum, microbat | 4.5 | Wahroonga | Oct 2019 | | | | | Aug 2023 | fresh eucalypt leaf nest - likely feathertail glider. |
| 71 | Small parrot / sugar glider | 5.3 | Wahroonga | Oct 2019 | | | | | Aug 2023 | ant nest |
| 74 | Small parrot / sugar glider | 5.4 | Pymble | Oct 2019 | | | | | Aug 2023 | eucalypt leaves in hollow likely sugar glider |
| 79 | Microbat | 4.5 | Turramurra | Oct 2019 | | | June 2021 | no sign of use, 3 strands of spider web across entry (base entry), clear inside | | |
| 82 | Kookaburra | 5.3 | Linfield | Oct 2019 | | | | | Aug 2023 | Ant nest - small black ants |
| 84 | Possum | 5.3 | Turramurra | Feb 2020 | | | June 2021 | possible cemented bird scats in base of hollow, no feathers, residents observed king parrots sitting on top of hollow. Some invertebrates in base material | | |
| 88 | Small parrot / sugar glider | 5.1 | Lindfield | Feb 2020 | | | | | Aug 2023 | old eucalypt leaves and variety of scratch marks on tree above and below likely sugar glider |
| 91 | Ringtail possum/rosella | 2.6 | Wahroonga | Feb 2020 | | | | | Aug 2023 | Ant nest |
| 92 | Antechinus/pygmy possum | 1.4 | St Ives | Feb 2020 | | | June 2021 | likely brown antechinus nest due to dead brown Eucalypt leaves | | |
| 94 | Ringtail possum/rosella | 6.4 | Gordon | Feb 2020 | | | June 2021 | Ringtail possum present, Stringybark and Eucalypt nest, Rainbow lorikeets regularly looking into hollow entrance. | Aug 2023 | ringtail possum adult |
| 95 | Ringtail possum/rosella | 2.7 | St Ives | Feb 2020 | | | June 2021 | millepede and cockroach | | |
| 96 | Antechinus/pygmy possum | 1.4 | St Ives | Feb 2020 | | | June 2021 | no evidence | | |
| 96a | Antechinus/pygmy possum | 1.3 | St Ives | June 2021 | | | June 2021 | no evidence | | |
| 98 | Ringtail possum/rosella | 5 | St Ives | Feb 2020 | | | | | Aug 2023 | couple of eucalypt leaves and possible brushtail possum scat |

| Capped hollow number | Target species | Box height (m) | Suburb | Date installed | Date inspected | Evidence of fauna usage | Date inspected | Evidence of Fauna usage | Date inspected | Evidence of Fauna usage |
|---|---|---|---|---|---|---|---|---|---|---|
| **101** | Small parrot / sugar glider | 4.1 | St Ives | May 2021 | | | | | Aug 2023 | no signs of use |
| **121** | antechinus | 2 | St Ives | May 2021 | | | | | Aug 2023 | Spider web, small scats with invertebrate fragments. Likely invertebrate scats. Invertebrate added material on roof, inside walls and base. |
| **102** | Microbat | 4.1 | Gordon | May 2021 | | | June 2021 | 2 Gould's Wattled Bat | Aug 2023 | clear inside which can indicate still used by microbats at times |
| **103** | Brushtail possum | 4 | Pymble | May 2021 | | | | | Aug 2023 | Ringtail possum |
| **104** | Ringtail possum/rosella | 6.1 | East Lindfield | May 2021 | | | | | Aug 2023 | 3 sugar gliders - possible camphor laurel leaf nest |
| **110** | Ringtail possum/rosella | 5.5 | Wahroonga | June 2021 | | | | | Aug 2023 | Ringtail possum with 2 young |
| **113** | Microbat | 5 | Pymble | June 2021 | | | | | Aug 2023 | 1 Greater broad-nosed bat |
| **115** | Small parrot/sugar glider | 6 | Pymble | June 2022 | | | | | | |
| **116** | small parrot/ sugar and feathertail gliders | | Pymble | June 2021 | | | | | Aug 2023 | no evidence |
| **118** | small parrot/ sugar glider (Same tree as hollow 94) | | Gordon | June 2021 | | | | | Aug 2023 | rainbow lorikeet feathers - likely bred in hollow |
| **119** | Microbat | | Killara | June 2022 | 5 hollows | | 36 hollows | | 40 hollows | no signs of use |

# APPENDIX 2

**Individual Capped Hollow Reports.**

These reports were produced as an additional item to be provided to participants by volunteer Liz Powell. The reports included are those with inspection images showing evidence of use and other visual records.

## Wild Things NSW Habitat Hollow No.7

Suburb location: **Warawee**
Resident: John

### Hollow and Installation

Target species: Sugar glider/small lorikeet
Hollow entry size: 1 x 1.2 cm

Installation date: *May 2017*
Host tree species: *Red Bloodwood*
Tree width at 1 metre (DBH): 30cm
Height of hollow: 5.9 metres
Aspect on tree: South *West*
Aspect of entry: *South West*
Orientation: *Vertical natural hollow*

**Notes:** Red Bloodwood - *Corymbia gummifera*, was noted with sugar glider feeding marks – horizontal incisions around the trunk where sugar gliders have been feeding on the sap. Hence installed a suitable hollow for this species on this tree.

### Inspection Results

| | |
|---|---|
| **Date** | 21 August 2023 |
| **Absence/Presence** | 3 Sugar gliders present - pictured |
| **Notes:** | Connecting canopy with host tree. From house looking around there is connecting canopy in all directions. Thus there is no reason for gliders to have to go to ground to access box location. |

### Recommendations

## Wild Things NSW Habitat Hollow No.70

Suburb location: **Wahroonga**
Resident: Julie

### Hollow and Installation

Target species: Antechinus/eastern pygmy possum/sugar glider/microbat

Hollow entry size: 4 cm
Installation date: *21 Oct 2019*
Host tree species: *Turpentine*
Tree width at 1 metre (DBH): 45 cm
Height of hollow: 4.5 metres
Aspect on tree: South East
Aspect of entry: North East
Orientation: *Vertical natural hollow*

**Notes. -**

### Inspection Results

| **Date** | **Absence/Presence** |
|---|---|
| 21 August 2023 | fresh Eucalypt nest - likely feathertail glider. |
| **Notes:** | |
| | |

### Recommendations

## Wild Things NSW Habitat Hollow No.74

Suburb location: **Pymble**
Resident: Colette

### Hollow and Installation

Target species: Small parrot/sugar glider
Hollow entry size: 4 cm
Installation date: *21 Oct 2019*
Host tree species: *Swamp mahogany*
Tree width at 1 metre (DBH): 130cm
Height of hollow: 5.4 metres
Aspect on tree: East
Aspect of entry: East
Orientation: *45º angle natural hollow*

**Notes. -**

### Inspection Results

| **Date** | **Absence/Presence** |
|---|---|
| 22 August 2023 | eucalypt leaves in hollow likely sugar glider |
| **Notes:** | hollow on swamp mahogany and just above the hollow there is whitish patch and warn looking bark. Likely where animal landing on trunk. |
| | |


### Recommendations

## Wild Things NSW Habitat Hollow No.91

Suburb location: **Wahroonga**
Resident: Annabel

### Hollow and Installation

Target species: Ringtail possum/rosella

Hollow entry size: 7 cm
Installation date: 27 Feb *2020*
Host tree species: ?
Tree width at 1 metre (DBH): ? cm
Height of hollow: 2.6 metres
Aspect on tree: North West
Aspect of entry: North West
Orientation: *Vertical natural hollow*

**Notes.**

### Inspection Results

| **Date** | **Absence/Presence** |
|---|---|
| 21 August 2023 | stringybark nesting material - likely ringtail possum nest |
| **Notes:** | |
| | |

### Recommendations

## Wild Things NSW Habitat Hollow No.98

Suburb location: **St Ives**
Resident: Janet

### Hollow and Installation

Target species: Ringtail possum/rosella

Hollow entry size: 7 cm
Installation date: 28 Feb *2020*
Host tree species: *Jacaranda*
Tree width at 1 metre (DBH): 57
Height of hollow: 5 metres
Aspect on tree: *West*
Aspect of entry: Jacaranda
Orientation: *Vertical natural hollow*

**Notes**

### Inspection Results

| Date | Absence/Presence |
|---|---|
| 20 August 2023 | couple of Eucalypt leaves and possible brushtail possum scat |
| | No inspection photo taken |
| **Notes:** | good connectivity to Sheldon Forest which has lots of hollows |


### Recommendations

## Wild Things NSW Habitat Hollow No.101

Suburb location: **St Ives**
Resident: Chris

### Hollow and Installation

Target species: Ringtail possum/rosella
Hollow entry size: 6 cm
Installation date: 8 May *2021*
Host tree species: *Rainforest tree*
Tree width at 1 metre (DBH): 20cm
Height of hollow: 4.1 metres
Aspect on tree: *South South West*
Aspect of entry: *South South West*
Orientation: ? *natural hollow*

**Notes**

### Inspection Results

| **Date** | **Absence/Presence** |
|---|---|
| 20 August 2023 | no signs of use |
| **Notes:** | trunk hollow is dying so moved onto a dead stag. Recorded now as 101a |


### Recommendations

## Wild Things NSW Habitat Hollow No.103

Suburb location: **Pymble**
Resident: Mark

### Hollow and Installation

Target species: Brushtail possum
Hollow entry size: 12 cm
Installation date: 8 May *2021*
Host tree species: *Jacaranda*
Tree width at 1 metre (DBH): 50? cm
Height of hollow: 4 metres
Aspect on tree: *South East*
Aspect of entry: ?
Orientation: ? *natural hollow*

**Notes : Also Inspected other boxes resident has installed**

### Inspection Results

| Date | Absence/Presence |
|---|---|
| 22 August 2023 | Ringtail possum |
| **Notes:** | Also checked other plywood boxes this day- stringybark and Eucalypt leaves in plywood possum box<br>Plywood box 115 - B2 - evidence of occupation, bird house - leaves present however no animal present. |


### Recommendations

## Wild Things NSW Habitat Hollow No.104

Suburb location: **Linfield**
Resident: Judy

### Hollow and Installation

Target species: Ringtail possum/rosella
Hollow entry size: approx. 4.5 cm

Host tree species: *Eucalyptus sp.*
Tree width at 1 metre (DBH): 30-40cm
Height of hollow: 6.1 metres
Aspect on tree: East
Aspect of entry: East ?
Orientation: *vertical natural hollow*

**Notes:. Good canopy and mid storey connection. Tree flowering.**

### Inspection Results

| Date | Absence/Presence |
|---|---|
| 22 August 2023 | Sugarglider x 3 |
| **Notes:** | Checked other nest boxes: Possible camphor laurel leaf nest.<br>Also inspected plywood box - stringy bark and bracken fern nest material made by ringtail possum. |


### Recommendations

I would recommend that if camera monitoring opportunity arises there is a good spot on deck to set fauna camera.

## Wild Things NSW Habitat Hollow No.110

Suburb location: **Wahroonga**
Resident: Michelle

### Hollow and Installation

Target species: Ringtail possum/rosella
Hollow entry size: 7 cm
Installation date: 10 June 2021
Host tree species: *Angophera costata*
Tree width at 1 metre (DBH): 45 cm
Height of hollow: 5.5 metres
Aspect on tree: *North*
Aspect of entry:?
Orientation: *Vertical natural hollow*

**Notes The owner has seen two dead ringtail possums , snakes and other species indicating diversity**

### Inspection Results

| Date | Absence/Presence |
|---|---|
| 21 August 2023 | Ringtail possum with 2 young |
| **Notes:** | |
| | |


### Recommendations

## Wild Things NSW Habitat Hollow No.113

Suburb location: **Pymble**
Resident:Penny

### Hollow and Installation

Target species: Microbat
Hollow entry size: open base with part covered
Installation date: 10 June 2021
Host tree species: *Angophera costata*
Tree width at 1 metre (DBH): 35 and 50 cm
Height of hollow: 5 metres
Aspect on tree: *North East*
Aspect of entry: down
Orientation: *Vertical natural hollow*

**Notes**

### Inspection Results

| **Date** | **Absence/Presence** |
|---|---|
| 22 August 2023 | Greater broad nosed bat x 1 |
| **Notes:** | Photo from plumbing camera - poor quality however can see the bat |
| | Also noted - Site has tall canopy with open mid-storey. |

## Wild Things NSW Habitat Hollow No.121

Suburb location: **Gordon**
Resident: Chris

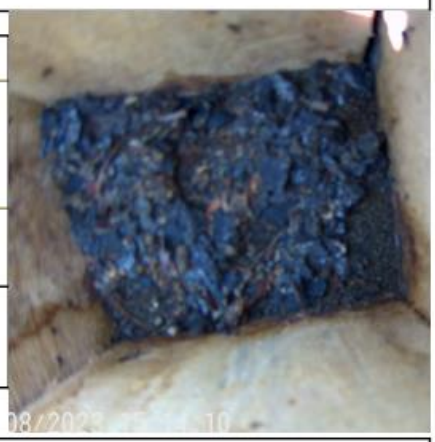
### Hollow and Installation

Target species: Microbat/ antechinus
Hollow entry size: 5 cm
Installation date: ?
Host tree species: *Midstorey tree*
Tree width at 1 metre (DBH): ? cm
Height of hollow: 2 metres
Aspect on tree:
Aspect of entry west
Orientation: ? *natural hollow*

**Notes**

### Inspection Results

| Date | Absence/Presence |
|---|---|
| 20 August 2023 | spider web, small scats with invertebrate fragments . Could be invertbrate scats. Invertebrate added material on roof, inside walls and base. |
| **Notes:** | No Inspection photo |
| | |



### Recommendations

## Wild Things NSW Habitat Hollow No.2

Suburb location: **Wahroonga**
Resident: Chris

### Hollow and Installation

Target species: sugar glider, small lorikeet
Hollow entry size: 40 - 45 mm
Installation date: *May 2017*
Host tree species: *Turpentine*
Tree width at 1 metre (DBH): 53 cm
Height of hollow: 5.7 metres
Aspect on tree: North
Aspect of entry:
Orientation: *Vertical natural hollow*

### Inspection Results

| Date | Absence/Presence |
|---|---|
| 21/8/2023 | Eucalypt leaf nest likely sugar glider. |
| | |
| **Notes:** | Property backs onto tree'd creek line - good connection with other bushland. |


### Recommendations

## Wild Things NSW Habitat Hollow No.8

Suburb location: **Wahroonga**
Resident: David

### Hollow and Installation

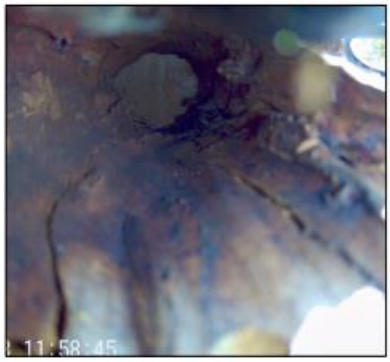
Target species: Microbat
Hollow entry size: 3 cm

Installation date: *May 2017*
Host tree species: *Turpentine*
Tree width at 1 metre (DBH): 50cm
Height of hollow: 6.3 metres
Aspect on tree: North East
Aspect of entry:
Orientation: *Vertical natural hollow*

**Notes:**

### Inspection Results

| **Date** | **Absence/Presence** |
|---|---|
| 21 August 2023 | clear inside |
| **Notes:** | It could be used on occasion by microbats as no invertebrates present.<br><br>David is going to have a go at some dusk watches. |



### Recommendations

## Wild Things NSW Habitat Hollow No.29

Suburb location: **Linfield**
Resident: Jill and Bruce

### Hollow and Installation

Target species: Ringtail or brushtail possum
Hollow entry size: 9 x 9 cm

Installation date: *May 2018*
Host tree species: *Melaleuca*
Tree width at 1 metre (DBH): 60 cm
Height of hollow: 3.4 metres
Aspect on tree: *South East*
Aspect of entry: *East*
Orientation: *Vertical natural hollow*

**Notes**
Bones looked clean so left inside. Resident observed sick looking ringtail possum in april 2023 near front door.

### Inspection Results

| Date | Absence/Presence |
|---|---|
| 24 August 2023 | Skeletal bones in base - likely ringtail possum. |
| **Notes:** | Bones have been pushed aside by other occupant. |
| | |

### Recommendations

## Wild Things NSW Habitat Hollow No.45

Suburb location: **Roseville**
Resident: David

### Hollow and Installation

Target species: Kookaburra
Entry hole size:10 x 9 cm
Installation date: *May 2018*
Host tree species: *Turpentine*
Tree width at 1 metre (DBH): 50mm
Height of hollow: 5.7 metres
Aspect on tree: *North East*
Aspect of entry: ?
Orientation: *Horizontal natural hollow*

**Notes.**

### Inspection Results

| Date | Absence/Presence |
|---|---|
| 24 August 2023 | turpentine leaf nest |
| **Notes:** | Inspection showed a few turpentine leaves present that would have been brought into hollow for nesting material, possibly possum. |
| | |

### Recommendations

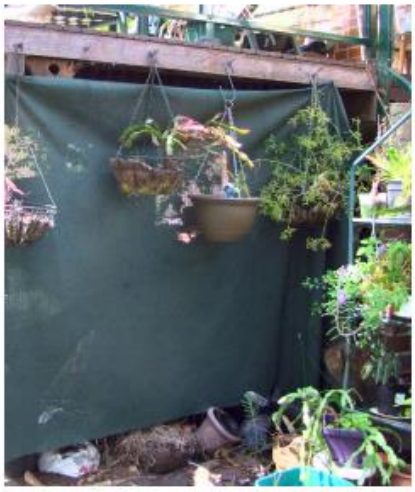
## Wild Things NSW Habitat Hollow No.60

Suburb location: **Pymble**
Resident: Jan

### Hollow and Installation

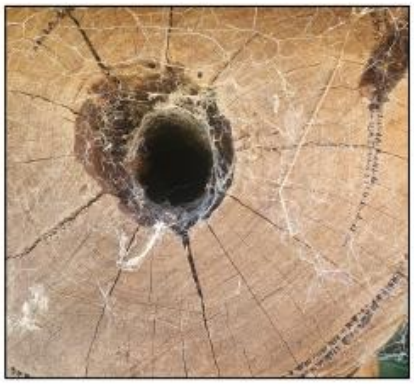
Target species: Pardalote
Hollow entry size:4 cm
Installation date: *11 Sept 2019*
Host tree species: under deck
Tree width at 1 metre (DBH): NA
Height of hollow: 1.5 metres
Aspect on tree: North
Aspect of entry:
Orientation: *Horizontal natural hollow*

**Notes. -**



### Inspection Results

| Date | Absence/Presence |
|---|---|
| 22 August 2023 | spiderweb |
| **Notes:** | |
| | |



### Recommendations

Noted very limited options for box types in backyard due lack of trees on their property however backs onto good bush. Would replace hollow with different box if tree available.

## Wild Things NSW Habitat Hollow No.61

Suburb location: **St Ives**
Resident: Brigade College

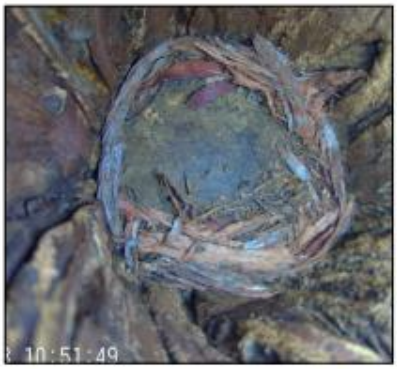
### Hollow and Installation

Target species: Ringtail possum/ rosella
Hollow entry size: 7 cm
Installation date: *12 Sept 2019*
Host tree species: *Stringybark/Mahogany*
Tree width at 1 metre (DBH): 34 cm
Height of hollow: 6 metres
Aspect on tree: *North East*
Aspect of entry: North
Orientation: *Vertical natural hollow*

**Notes. -**

### Inspection Results

| Date | Absence/Presence |
|---|---|
| 24 August 2023 | Stringybark nesting material made by ringtail |
| **Notes:** | May be worth changing position in a year or 2. |
| | |




### Recommendations and notes

May be worth changing position in a year or 2.

Also inspected:
1. large red gum natural hollow (10 42 30) - nothing observed, hard to see bottom.
2. ply nest box (10 44 47)- stringybark nesting material - ringtail possum nest
3. ply nest box (10 48 29 ) - no evidence of use

## Wild Things NSW Habitat Hollow No.65

Suburb location: **Pymble**
Resident: Liam

### Hollow and Installation

Target species: Small parrot sugar glider
Hollow entry size: 4 cm
Installation date: *13 Sept 2019*
Host tree species: *Angophora costata*
Tree width at 1 metre (DBH): 86cm
Height of hollow: 5.5 metres
Aspect on tree: *East*
Aspect of entry: North East
Orientation: *Vertical natural hollow*

**Notes.**

### Inspection Results

| **Date** | **Absence/Presence** |
|---|---|
| 22 August 2023 | leaf nest likely sugar glider |
| **Notes:** | lorikeet seen looking in hollow. ringtail drey observed in mid-story near by. |
| | |


### Recommendations

Note sparse canopy in area. Maybe worth changing position in a year or 2.

## Wild Things NSW Habitat Hollow No.66

Suburb location: **West Pymble**
Resident: Chris

### Hollow and Installation

Target species: Small parrot , sugar glider
Hollow entry size: 4 cm
Installation date: *13 Sept 2019*
Host tree species: *Magnolia*
Tree width at 1 metre (DBH): 55 cm
Height of hollow: 5.8 metres
Aspect on tree: *South East*
Aspect of entry: North East
Orientation: *Vertical natural hollow*

**Notes.**

### Inspection Results

| **Date** | **Absence/Presence** |
|---|---|
| 22 August 2023 | huntsman spider egg sac |
| **Notes:** | |
| | |


### Recommendations

## Wild Things NSW Habitat Hollow No.67

Suburb location: **Pymble**
Resident: Peter

### Hollow and Installation

Target species: Brushtail possum
Hollow entry size: 10 x 9 cm
Installation date: *13 Sept 2019*
Host tree species: *Camelia*
Tree width at 1 metre (DBH): 8 -15 cm
Height of hollow: 2.85 metres
Aspect on tree:NA
Aspect of entry: East
Orientation: *Vertical natural hollow*

**Notes.**

### Inspection Results

| **Date** | **Absence/Presence** |
|---|---|
| 22 August 2023 | common brushtail possum |
| **Notes:** | still hears possum in roof . |
| | |


### Recommendations