Nest Box Audit

2022

Port of Brisbane Pty Ltd

Report prepared by
Carolyn Ferguson
BEnvMan
DipTeach(Sec)

Hollow Log Homes
ABN: 24 644 659 978
07 5472 3142
0400 831 085
hello@hollowloghomes.com.au

Table of Contents

Photographs in this report were taken during the inspection on 13 December 2022

List of Figures

List of Tables

Figure 1: Arboreal termite mound with Kingfisher chicks inside

EXECUTIVE SUMMARY

The Port of Brisbane Pty Ltd has engaged in a long-term project which provides nest boxes at strategic locations across the buffer zones around the Port. These nest boxes provide additional artificial hollows to complement the naturally-occurring ones in the landscape (Figure 1**). The aim is to continue to provide artificial hollows to stabilise populations of native species.**

The Port of Brisbane (POB) has adopted a Sustainability Strategy [1] which endeavours to ensure that ecological values are maintained and enhanced on their site .

The buffer zones have 43 nest boxes. The program started in 2008, with increases in later years, but a marked decline in the number and functionality of the nest boxes in the past couple of years. Last year's audit report detailed the need to urgently replace 18 nest boxes, and introduce an additional 15-20 new nest boxes each year, preferably front entry ones including Small Parrot, Possum and Glider. Neither of these two recommendations were implemented, and the resultant decline in numbers at this audit shows that.

Four separate species of mammals were recorded in the boxes – gliders, possums, microbats and antechinus. There were eleven documented sightings of colonies of Common Brushtail Possums (*Trichosurus vulpecula*), with an additional three boxes with evidence of use. There were no sightings of Gliders, although five boxes showed signs of use. One box housed Microbats (*Chalinolobus gouldii*) which flew out when the lid was opened, but there was no other evidence across the sites of their use.

There was a nest box with evidence of one bird species, and one sighted occupancy of reptile, being a Carpet Python. One nest box had native bees recorded in it.

The increase in the pest species European Bees in five boxes is concerning, and eradication methods should be used to enable these boxes to be used by native wildlife.

This important sustainability project has been going long-term, but it would appear that it needs to receive renewed interest by POB to bring the area to full productivity of native habitat, which in turn would encourage an increase in native wildlife.

A summary of the most important recommendations includes:

Recommendation 1
A comprehensive appraisal of the existing nest box program with a view to bringing it up-to-date with maintenance and installations, and a clear vision moving forward regarding maintenance of the site and expansion of the program.

Recommendation 2
That a dedicated officer from POB be appointed to liaise with Hollow Log Homes on the implementation of the program going forward.

1.0 Introduction

This report outlines the 2022 audit findings of the nest box inspection program at three sites - Pritchard Street (28 nest boxes) – with five boxes removed; Wynnum North Road (11 nest boxes) with four boxes removed; and Lucinda Drive (4 nest boxes) – all within the buffer zones at the Port of Brisbane Pty Ltd (POB), Queensland.

This is a follow-up audit for fauna monitoring/box inspection continuing the long-term monitoring that commenced in 2008 and has occurred annually since 2010. The POB's 2030 Target Goal within their Sustainability Strategy [1] is to improve the quality of designated environmental areas across Port land, supported by external assessment.

The continuing involvement and improvement in the nest box program will assist in ensuring the ongoing biodiversity and quality of the POB's environmental assets by the continuation of artificial hollow logs, with results determined by external audits and assessment of efficacy.

1.1 Nest Box Monitoring

The nest box condition monitoring was undertaken by Hollow Log Homes personnel on 13 December 2022. An accompanying excel spreadsheet of data (Appendix A) was also prepared.

There are 43 nest boxes (of various types) installed across the three sites on existing tree species including Blue Gum, Moreton Bay Ash, Spotted Gum, Casuarina and Silky Oak.

The audited boxes are 3-7 metres above the ground allowing for ease of monitoring and maintenance whilst situating them within an arboreal habitat.

Figure 2: POB Possums in nest boxes 6, 26 and 20 at Pritchard Street

1.2 Nest Box Function and Types

All boxes are specifically designed to replicate the function of a nesting site usually provided by a tree hollow. All designs are based on research that shows that the species named will use the nest box types if they are in the area [2]. Most are suitable to multiple species and as such the name of the nest box should serve as an indication of the design rather than guaranteeing which species will use the nest box at this specific site.

The newer Hollow Log Homes' boxes are from the Cyplas range constructed from food grade, UV stabilised, 100% Recycled HDPE (High density polyethylene) and Queensland Cypress(Figure 3). The older boxes are constructed from exterior grade plywood, which have a more limited lifespan.

The Habisure™ wiring system is utilised, as it adapts to tree growth up to 1 metre in diameter. These materials are expected to have a lifespan in excess of forty years in situ.

Figure 3: Example of older nest boxes constructed from Plywood – Rear Entry Glider and Front Entry Possum; with the newer Cyplas Boobook Owl/Wood Duck nest box

1.3 Nest Box Auditing

Each nest box's information is recorded (example below) including GPS ID, box number and type, occupying species or evidence of use/nesting, pest species, and other observations of the condition of the box and its securing attachment (Appendix A).

Site address	GPS ID	Photo no.	Box type	Tree species	Material	Box condition	Photo time (hhmm)	Occupancy 1=Yes 0=No	Species (nil if not)	Usage 1=Yes 0= No	Evidence of Use by	Pest/ Insects	Notes
Pritchard St	772	1	REGL	Blue gum	Plywood	Good	9:21	0	nil	0	nil	PEST	Inactive european bee hive, ants
	782	2	REGL	Blue gum	Plywood	Good	924	0	nil	0	nil	INS	Spider wasp nest, ants take grass in
	792	3	ONJ	Blue gum	Plywood	replace	927	0	nil	1	Lorikeet		Old lorikeet nest 1 egg shell

The following process was used at the audit:

- Checking each box for signs of current or past use by wildlife (43 boxes)
- Photographing and/or video recording fauna observations
- Noting any possible changes to nest box type based on observations and use
- Providing a report on the audit

1.4 Nest Box Condition

The monitoring report revealed a total of 43 nest boxes were inspected, with 32 appearing in good condition, eleven require replacing, and nine were removed (Table 1).

All of the nest boxes that were removed due to their dilapidated state, were noted in last year's audit report that they needed replacing, but this work was not commissioned. Further to this, there are an additional eleven noted in this report.

It may be beneficial for POB to assign responsibility for the nest box program to a specific officer, who could then liaise as needed with Hollow Log Homes to ensure that recommendations are implemented.

Table 1: Condition report for 43 Nest Boxes - Port of Brisbane 2022

LOCATION	GOOD CONDITION	REPLACEMENT REQUIRED	NEST BOXES REMOVED –GPS Location
Pritchard St	1, 2, 4, 5, 6, 7, 9, 11, 12, 13, 15, 16, 17, 18, 19, 20, 22, 26, 27, 28	3, 8, 10, 14, 21, 23, 24, 25	842, 852, 912, 1022, 1062
Wynnum Rd	29, 30, 31, 33, 34, 36, 37, 39	32, 35, 38	1181, 1151, 1161, 1201
Lucinda Dr	40, 41, 42, 43	--	--
TOTALS	**32**	**11**	**9**

2.0 Site Details

The Port of Brisbane (POB) operates in an industrial area that is at the mouth of the Brisbane River, immediately adjacent to the Moreton Bay Marine Park and protected RAMSAR wetlands. The port has buffer zones between the industrial site and the residential areas located to its south (Figure 4).

POB is managed and developed by the Port of Brisbane Pty Ltd under a 99-year lease from the Queensland Government and has 29 operating berths and facilitates more than 2600 ships each year [1].

Figure 4: Location of Nest Boxes within the Port of Brisbane site [3]

POB is a heavily developed site, where most regional ecosystem types have been removed, but with pockets of 12.1.2; 12.1.3 Mangroves and Saltmarshes; 12.3.5 melaleuca open forest to woodland; 12.3.8 Wetlands; and the area contains Of Concern and Endangered vegetation remnants in the buffer zones where the nest boxes are located.

The site has been documented by the Queensland Government as containing common fauna and flora [4], but with Endangered species including Central Greater Glider *Petauroides armillatus,* Koala *Phascolarctos cinereus*, land plant *Melaleuca irbyana*; and Vulnerable species including Grey-headed Flying-fox *Pteropus poliocephalus* and White-throated Needletail *Hirundapus caudacutus*. It is also home to many migratory bird species and plays an important role in the balance of ecosystems and habitat for these. A full list of the identified species from this audit is discussed at 4.4 Identified Species and contained in full at Appendix B.

POB have three sites with artificial hollows installed to provide safe places for local wildlife. The following sites were audited, and all have a variety of nest boxes installed to ensure maximum use by native species, see 4.1 Pritchard Street ; 4.2 Wynnum North Road; and 4.3. Lucinda Drive.

3.0 Auditing/Monitoring Methods

The nest box condition monitoring was carried out on 13 December 2022 by Anthony Wentworth and Lexi Farrell (Hollow Log Homes) who have been trained in ecological surveying techniques. The weather [5] for the audit was fine with temperatures between 21.3-29.4°C. At 9.00am the winds were W at 11 km/h, relative humidity was 68% and a temperature of 28.0°C.

Condition monitoring involved carrying out a visual inspection of all 43 nest boxes focusing on the following areas:

i. The overall condition of the boxes including damaged, rotting or splitting timber, condition of lids and clear openings;
ii. The ongoing viability of the mechanisms that secure the boxes to the trees;
iii. Checking and evaluating the surrounding tree growth to ensure that the access points are clear;
iv. Perform minor maintenance as required; and
v. Check for pest species or evidence of pest species such as rats or feral bees.

To minimise disturbance, boxes and their contents were carefully inspected using a ground-based technique of a camera mounted on an extendable pole to ascertain habitation and maintenance requirements. A blue-tooth camera was used to remotely view the condition of the boxes from the ground, internal signs of nest box use (nest materials, live fauna) and wirelessly control the capture of images (Figure 5).

Figure 5: Visual surveillance process using on-ground technique; Glider Rear Entry Nest Box 21 Pritchard St

During the field inspection, findings were recorded using a pro-forma field data app. The images and recordings were later processed on the ground and animals encountered within the boxes identified. Where possible, documents and data were reviewed while on-site and verified. Further identification and statistical analyses were conducted offsite to clarify occupancy and habitation rates per species per box type.

For this report, occupancy is defined as an animal which is present inside the box at the time of audit. Evidence of use is the presence of an animal's recent use of the box such as nesting material, feathers, oil stains, scats and eggshells. When there was evidence of two separate species using a nest box, the most recent occupant was recorded.

Table 2 below shows the number and type of each nest box that has been installed and monitored at the last four audits being 2019, 2020, 2021 and 2022.

A detailed spreadsheet containing information regarding location and condition of each nest box, the occupancy or evidence of use and further field observations are incorporated at Appendix A.

Table 2: Compilation of installed nest box types - POB 2019-2022

	2019 AUDIT			2020 AUDIT			2021 AUDIT			2022 AUDIT		
BOX TYPE	Pri	Wyn	Luc	Pri	Wyn	Pri	Pri	Wyn	Luc	Pri	Wyn	Luc
Possum	6	2	0	5	5	5	4	2	0	3	1	0
Rear-entry Glider	9	5	2	8	8	8	12	4	2	12	2	2
Galah	1	0	0	1	1	1	1	0	0	1	0	0
Small parrot	2	1	0	3	3	3	2	1	0	1	1	0
Boobook Owl/ Wood Duck	4	1	0	4	4	4	5	1	0	5	1	0
Owlet Nightjar	3	2	0	2	2	2	2	2	0	2	2	0
Microbat	5	3	0	4	4	4	7	3	0	4	2	0
Kookaburra	1	2	0	1	1	1	0	2	0	0	2	0
Barn Owl	0	0	2	0	0	0	0	0	2	0	0	2
Unidentifiable	1	1	0	0	0	0	0	0	0	0	0	0
TOTALS	**32**	**17**	**4**	**28**	**28**	**28**	**33**	**15**	**4**	**28**	**11**	**4**
NUMBER OF NEST BOXES		**53**			**47**			**52**			**43**	

The following figures (Figure 6), (Figure 7), and (Figure 8) below present colour-coded maps of the three POB sites, with the types of nest boxes installed at each location.

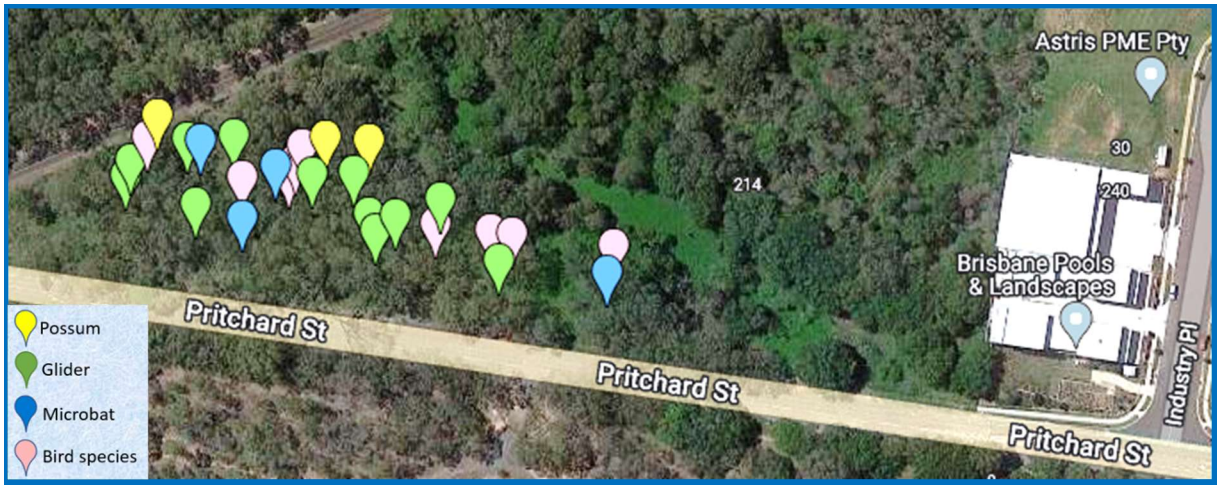


Figure 6: Pritchard Street - 28 nest boxes - Possum (3), Glider (12), Microbat (4), Bird species (9)

Figure 7: Wynnum North – 11 nest boxes - Possum (1), Glider (2), Microbat (2), Bird species (6)

Figure 8: Lucinda Drive - 4 nest boxes - Glider (2), Bird species (2)

4.0 Results

The results of the audit across the 43 boxes showed an overall habitation rate of 55.7% which included gliders, possums, microbats, birds, insects and a snake, with Table 3 highlighting the number of native species and their occupation and evidence of use rates. This compares to an overall habitation rate in 2019 of 68%, 2020 of 51%, and 2021 of 60%.

Table 3: Results for 43 nest boxes - POB 2022

Number of nest boxes	Nest boxes in good condition	Nest boxes requiring replacement	Nest boxes removed	Occupancy Rate	Recent Evidence of Use Rate	Overall Habitation Rate	Number of native species
43	**32** 74%	**11** 26%	**9**	**14** 32.5%	**10** 23.2%	**24** 55.7%	**7** Mammal 4 Insect 1 Bird 1 Reptile 1

There were seven species using 24 of the 43 nest boxes across the POB site, including 14 occupied at the audit. This is a worrying decline in sighted occupancy down from 20 in 2019; 18 in 2020 audit; and 19 from 2021 audit.

For 2022, the species type, number of nest boxes attributed to each species either as occupied or evidence of use, and the percentage are shown in the pie chart below (Figure 9).

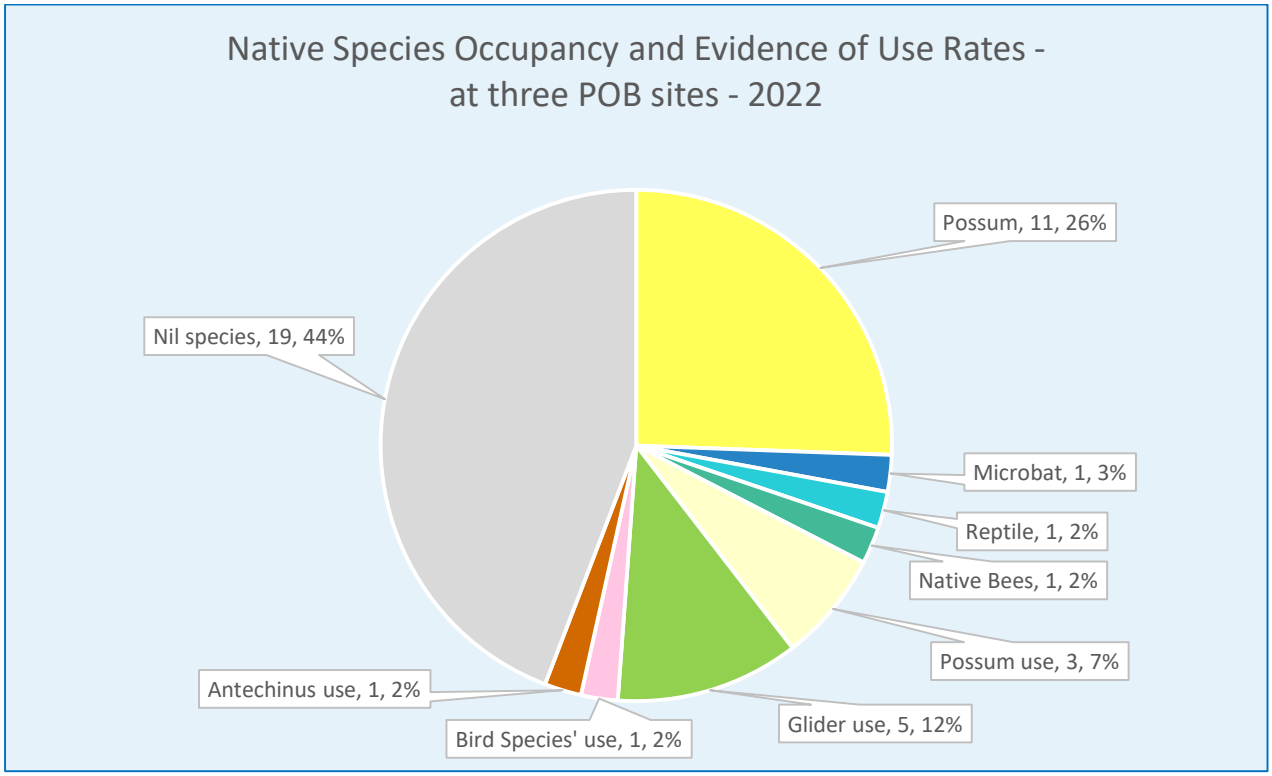


Figure 9: Native species occupancy and evidence of use of nest boxes across three sites, POB 2022

Noting the trend across the audits of the past three years, 2020-2022 (Figure 10), it can be seen that the occupancy rate is steadily declining, and the overall habitation rate has decreased since 2021 down to 56 percent, or just over half of the nest boxes being used.

At the 2021 audit, it was recommended that an on-ground assessment of the quality of the habitat in the buffer zones be undertaken, but there is no evidence that this has occurred, nor that any remedial action has been taken to either reduce the detrimental climatic and anthropogenic influences or to improve the habitat through on-ground remedial environmental action.

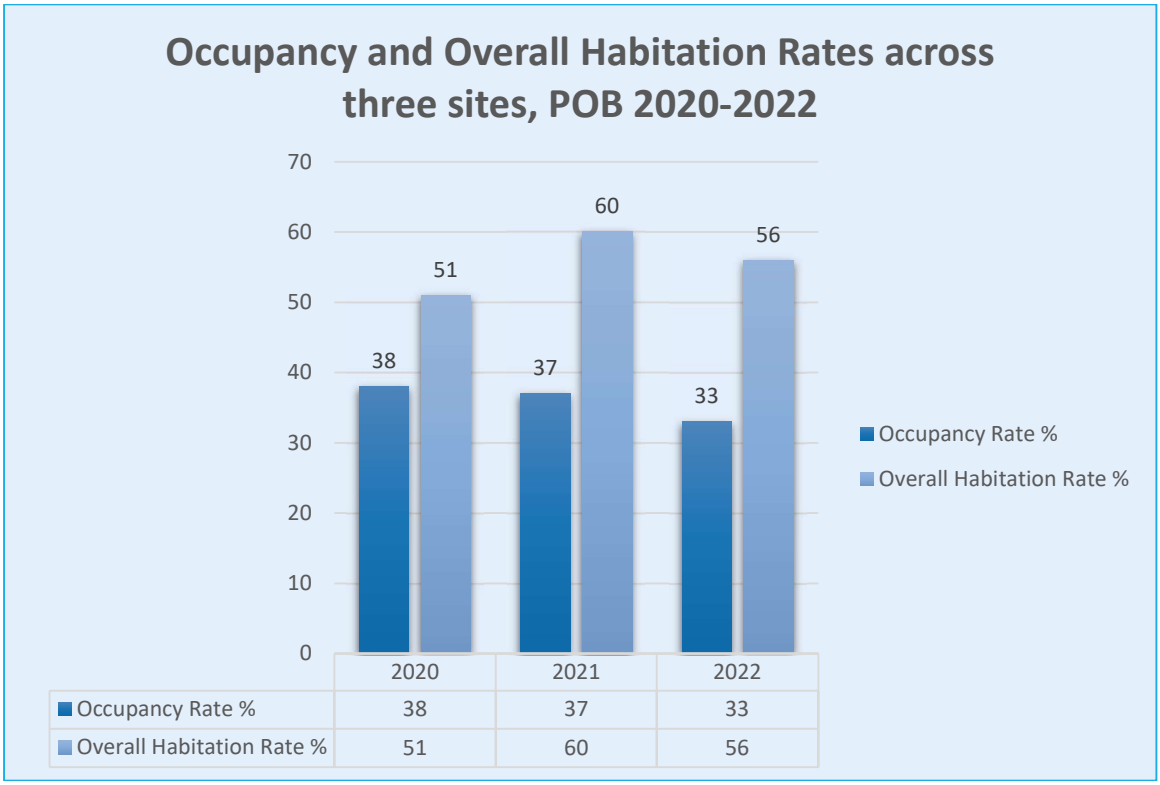
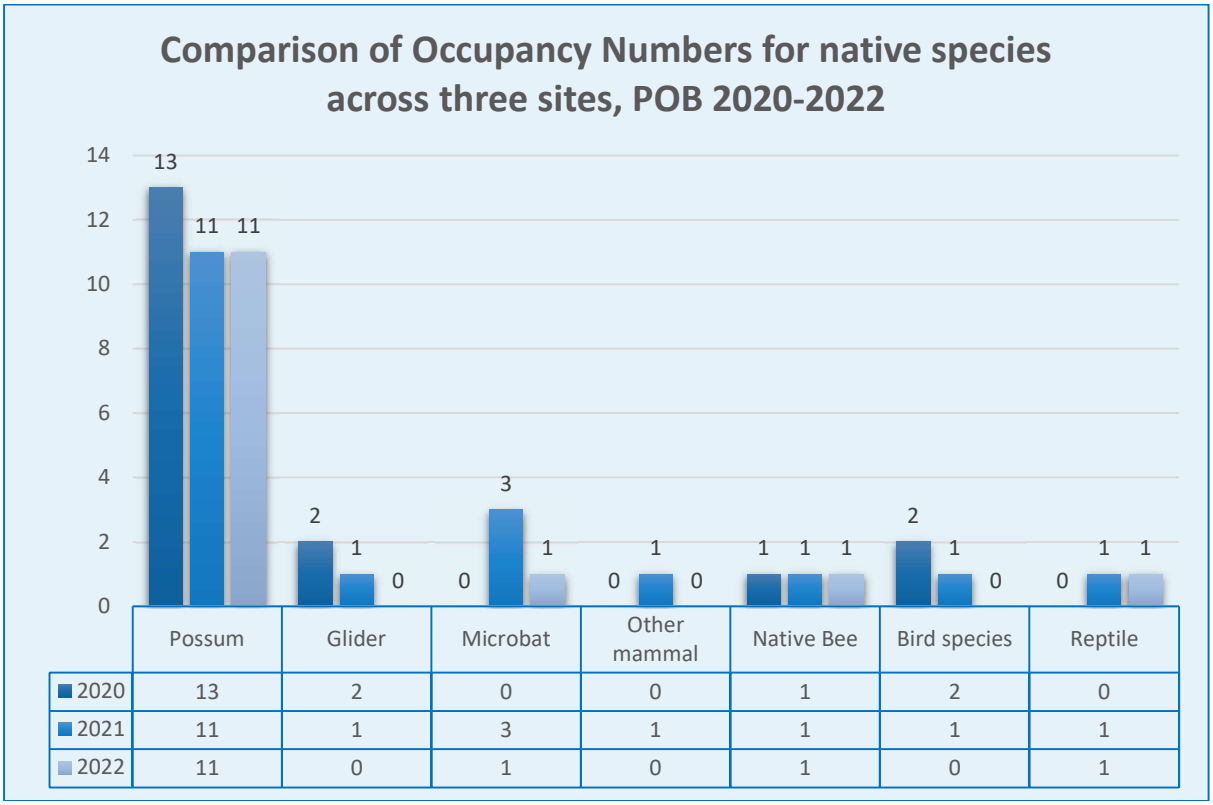


Figure 10: Comparison of occupancy and overall habitation percentages, POB 2020-2022

A year-by-year comparison between 2020, 2021 and 2022 is useful as there is a similar number and types of nest boxes installed across the 3 sites. Figure 11 below shows a bar graph of the number of nest boxes that had confirmed occupancy by native species and details the number of each species, which has seen a significant decrease across all species types except possums.

Possum populations has remained relatively stable with 13 sightings in 2020 down to 11 in 2021 and remaining the same at this 2022 audit. They are still the species utilising the greatest number of nest boxes.

The microbats have again reduced considerably, and the ongoing decrease in glider and bird occupancy needs further investigation to ensure that all species have access to healthy habitat with adequate shelter and food sources available to them.



	Possum	Glider	Microbat	Other mammal	Native Bee	Bird species	Reptile
2020	13	2	0	0	1	2	0
2021	11	1	3	1	1	1	1
2022	11	0	1	0	1	0	1

Figure 11: Comparison of occupancy numbers for native species, POB 2020-2022

4.1 Pritchard Street

Pritchard Street has 28 nest boxes installed in the buffer zone, comprised of: 4 Possum; 12 Glider; 7 Microbat; 5 Boobook Owl/Wood Duck; 2 Owlet Nightjar; 2 Small Parrot; 1 Galah.

4.1.1 Initial Nest Box Condition

Just over half of the nest boxes inspected, 16 out of the 28, (approximately 57%) were found to be in good overall condition but showed signs of weathering due to being positioned in the arboreal tree line and having constant exposure to the elements since installation. Eight boxes need to be replaced and five boxes were removed completely.

4.1.2 Nest Box Contents

During this inspection, eight of the 28 nest boxes were found to contain a native species and seven had evidence of use, see Table 4 below. Of these, two boxes had evidence of two different species (Box 8 Possum/Wood Duck; Box 19 Microbats/Glider) (Figure 12). These are noted in Appendix A.

Figure 12: Dual use in nest boxes 8 (Possum/Wood Duck); 19 (Microbats/Glider) at Pritchard Street

Brushtail Possums have the greatest representation with occupancy in seven boxes and use in three, and a habitation rate of 10 nest boxes at 36% (Figure 13).

Figure 13: Brushtail Possums in nest boxes 12 and 15 at Pritchard Street

Gliders were represented in evidence of use in three boxes, making their habitation rate just 10% (Figure 14).

Figure 14: Evidence of Glider use in nest boxes 9 and 18 at Pritchard Street

This is a disappointing outcome for the Pritchard Street site as it appears to be in significant decline from the preceding years. Further investigation must be completed urgently to address the declining populations of native species.

Table 4: Occupancy, Evidence of Use, Overall Habitation by species – 2022 Pritchard Street

Species Present	Occupancy	Nest Box No.	Evidence of Use	Nest Box No.	Overall Habitation	Habitation Rate
Possum	7	6, 12, 15, 20, 25, 26, 27	3	8, 23, 27	10	37%
Glider	0	--	3	7, 9, 18	3	10%
Microbat	1	19	0	--	1	3%
Lorikeet	0	--	1	3	1	3%
Nil species						47%
TOTAL	**8**		**7**		**15**	

The influence of nest box type on occupancy and habitation rates can be seen at Table 5. At Pritchard Street, the most successful nest boxes were the Possum, Galah and Boobook Owl/Wood Duck. Interestingly the microbats were occupying a Glider Rear Entry nest box, rather than the specifically designed microbat ones, which is unusual as there were four to choose from and this differs markedly when compared to other non-POB sites.

Table 5: Occupancy, Evidence of Use and Overall Habitation by nest box type – 2022 Pritchard Street

Box Type	No. of Boxes	Occupied	Evidence of Use	Overall Habitation	Occupancy Rate %	Habitation Rate %
Front-entry Possum	3	2	1	**3**	67%	100%
Rear-entry Glider	12	2	3	**5**	17%	42%
Galah	1	1	0	**1**	100%	100%
Small parrot	1	0	0	**0**	0%	0%
Boobook Owl/ Wood Duck	5	3	2	**5**	60%	100%
Owlet Nightjar	2	0	1	**1**	0%	50%
Microbat	4	0	0	**0**	0%	0%
TOTALS	**28**	**8**	**7**	**15**	**29%**	**54%**

The combination of the sighted occupancy and evidence of use of the 28 nest boxes at the 2022 audit, shows a similar overall habitation to the 2020 audit and a decrease from the 2021 audit. This can be attributed primarily to the decline in all of the mammal species (Figure 15).

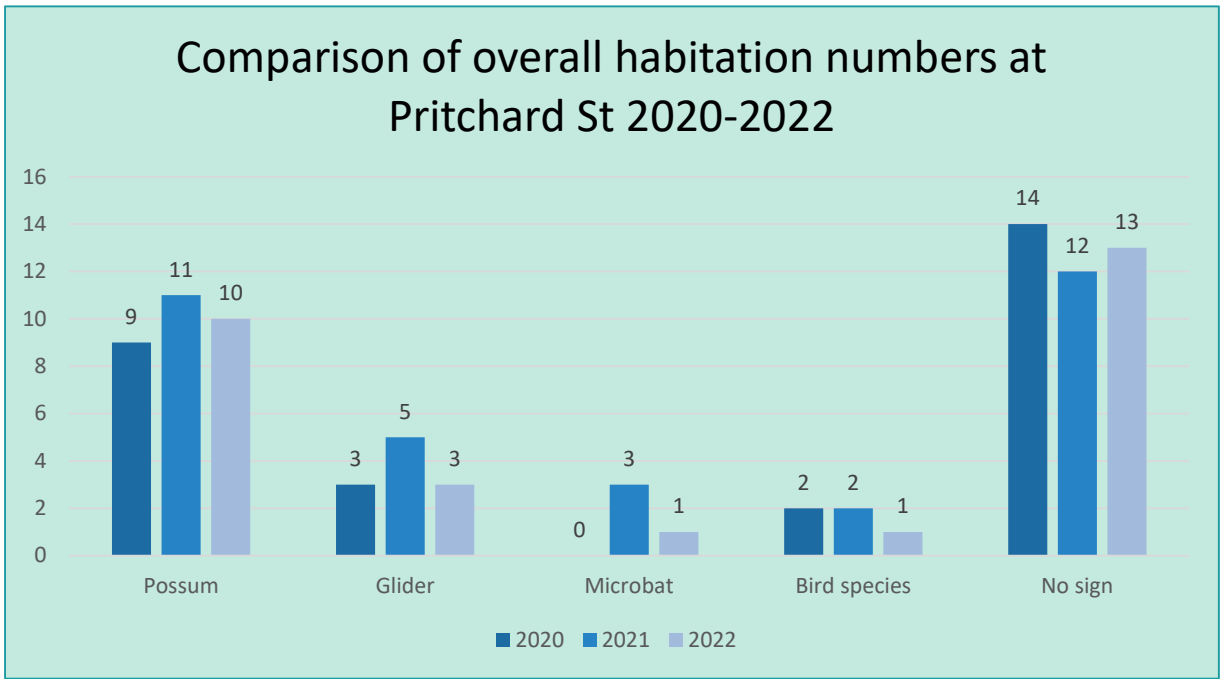


Figure 15: Overall habitation numbers in nest boxes – 2020/2021/2022 audits by species, Pritchard St

4.1.3 Pest Status

There were feral European Bees recorded in nest boxes 1, 14, 16, 17 and 28 during this audit. It is recommended that these pest species be removed as soon as possible so that native wildlife can utilise these boxes (Figure 16). Nest box 22 showed impacts by termites, but the box is still serviceable at this time.

Figure 16: Pest species - European Bees in nest boxes 1 and 16; Termites in nest box 22 at Pritchard St

Several nest boxes also showed signs of insect and spider use, but this is usual and not considered to be detrimental to the native species occupying nest boxes.

4.2 Wynnum North Road

Wynnum North Road has 11 nest boxes installed in the buffer zone, comprised of: 1 Front-entry Possum; 2 Rear-entry Glider; 2 Microbat, 1 Boobook Owl/Wood Duck; 2 Owlet Nightjar; 1 Small Parrot; and 2 Kookaburra.

4.2.1 Initial Nest Box Condition

Three quarters of the nest boxes inspected, eight of the eleven, (approximately 73%) were found to be in good overall condition but showed signs of weathering due to being positioned in the arboreal tree line and having constant exposure to the elements since installation. Three boxes need to be replaced, and another four were removed entirely.

4.2.2 Nest Box Contents

During this inspection, as outlined in Table 6, six of the eleven nest boxes were found to contain a native species and two had evidence of use, giving an overall habitation rate of 73%, see Appendix A.

There were four colonies of possums, and one box with native bees (Figure 17) and another with a carpet python.

There was evidence of gliders in only two boxes.

There was no evidence or occupancy by microbats at this site.

Figure 17: Native Bees in nest box 32 at Wynnum North Road

Table 6: Occupancy, Evidence of Use, and Overall Habitation by species – 2022 Wynnum North Road

Species Present	Occupancy	Nest Box No.	Evidence of Use	Nest Box No.	Overall Habitation	Habitation Rate
Possum	4	33, 36, 37, 39	0	--	4	37%
Glider	0	--	2	31, 34	2	18%
Microbat	0	--	0	--	0	0%
Native Bee	1	32	0	--	1	9%
Snake	1	29	0	--	1	9%
Nil species						27%
TOTAL	**6**		**2**		**8**	

One box had evidence of two different species (Box 29 Carpet Snake/Possum). The Carpet Snake was alive, next to the bones of a dead Possum. Nest Box 36 also had the remains of a dead Possum (Figure 18). This is noted in Appendix A.

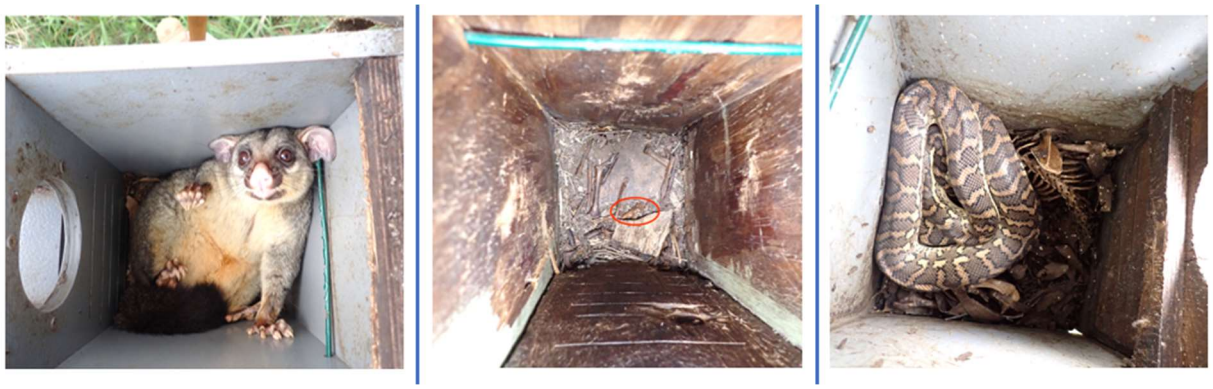


Figure 18: Different outcomes for possums in Wynnum North Rd - alive (33), dead (36 - jawbone circled in red); dead and sharing with Carpet Snake (29)

The influence of nest box type on occupancy and habitation rates can be seen at Table 7. Wynnum North Rd was the most successful site with an overall habitation rate of 73% across the nest boxes. The Owlet Nightjar had a 50% habitation rate, which is one out of the two boxes. Disappointingly, the Microbat boxes had no occupancy and no evidence of use.

Table 7: Occupancy, Evidence of Use and Overall Habitation by nest box type - 2022 Wynnum North Road

Box Type	No. of Boxes	Occupied	Evidence of Use	Overall Habitation	Occupancy Rate %	Habitation Rate %
Front-entry Possum	1	1	0	**1**	100%	100%
Rear-entry Glider	2	0	2	**2**	0%	100%
Small parrot	1	1	0	**1**	100%	100%
Boobook Owl/ Wood Duck	1	1	0	**1**	100%	100%
Owlet Nightjar	2	1	0	**1**	50%	50%
Microbat	2	0	0	**0**	0%	0%
Kookaburra	2	2	0	**2**	100%	100%
TOTALS	**11**	**6**	**2**	**8**	**55%**	**73%**

As noted previously, a review of the types of nest boxes and the surrounding habitat to determine its suitability for microbats would be the preferred next step.

As the number of nest boxes since the previous audits are similar across the audit years of 2020, 2021 and 2022, a useful comparison can be made. Figure 19 below shows a bar graph of the number of overall habitation numbers within nest boxes which has declined in actual numbers from twelve in 2020 to nine in 2021 to eight in 2022 and a percentage decrease from 80% to 72%. This can be attributed primarily to the decline in all mammal species' habitation.

The variability of the evidence of possums could be attributable to the fact that arboreal mammals can use multiple hollows (natural and artificial) and change nesting sites on a regular basis [6]. The current habitat and its ability to provide an ongoing food source for possums, gliders and particularly microbats, should be investigated.

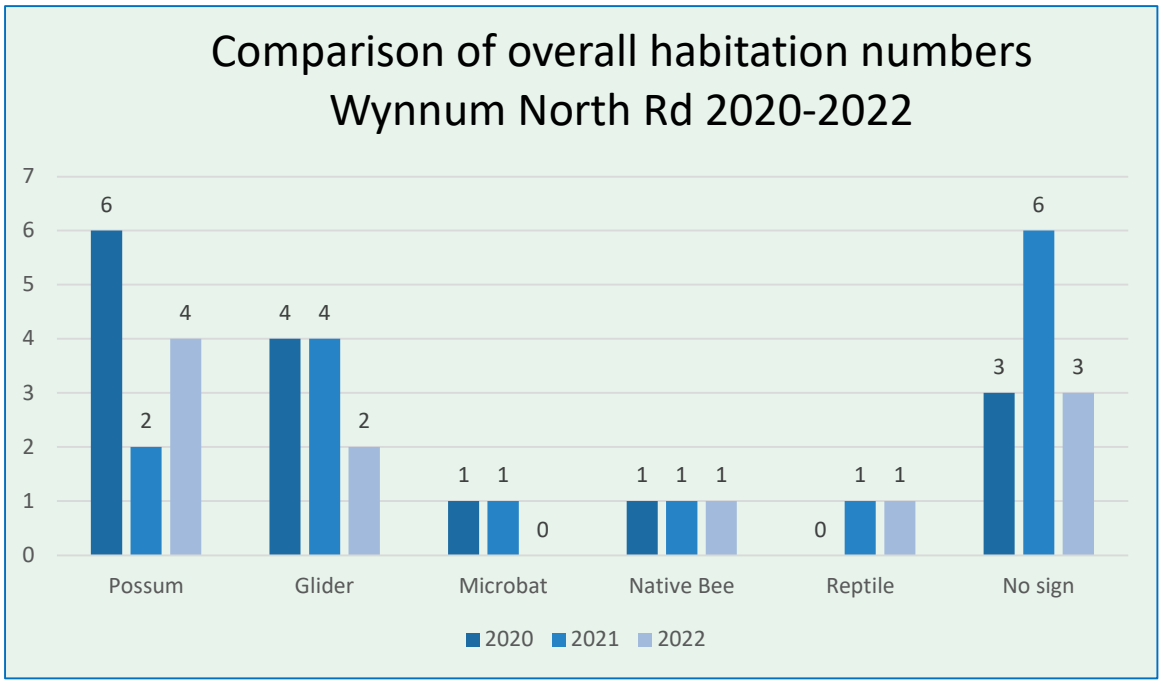


Figure 19: Overall habitation numbers in nest boxes – 2020/2021/2022 audits by species, Wynnum North Rd

4.2.3 Pest Status

There were no pest species recorded during this audit. Several nest boxes showed signs of insect and spider use, but this is usual and not considered to be problematic to native wildlife.

4.3 Lucinda Drive

Lucinda Drive has four nest boxes installed in the buffer zone, comprised of: 2 Glider Rear Entry and 2 Barn Owl. All of the nest boxes inspected were found to be in good overall condition.

4.3.1 Nest Box Contents

During this inspection, there were no occupancy sightings and only one of the four nest boxes showed evidence of use, as noted in Table 8.

The nest contained silky oak leaves and cannot be conclusively identified, but it may have been used by a small mammal, possibly an Antechinus. This is consistent with the 2021 audit.

Figure 20: Nesting materials, possibly an Antechinus, in nest box 42

Table 8: Occupancy, Evidence of Use, and Overall Habitation by species – 2022 Lucinda Drive

Species Present	Occupancy	Nest Box No.	Evidence of Use	Nest Box No.	Overall Habitation	Habitation Rate
Small arboreal mammal	0	--	1	42	1	25%
Nil species						75%
TOTAL	**0**		**1**		**1**	

The influence of nest box type on occupancy and habitation rates can be seen at Table 9. Due to the small number of installed nest boxes it is difficult to extrapolate reasons for the lack of success, as there were two of each type - rear entry boxes and front entry boxes.

Table 9: Occupancy, Evidence of Use, and Overall Habitation by nest box type – 2022 Lucinda Drive

Box Type	No. of Boxes	Occupied	Evidence of Use	Overall Habitation	Occupancy Rate %	Habitation Rate %
Rear-entry Glider	2	0	1	**1**	0%	25%
Barn Owl	2	0	0	**0**	0%	0%
TOTALS	**2**	**0**	**1**	**1**		**25%**

As the number of nest boxes since the previous audits are similar across the audit years of 2020, 2021 and 2022, a useful comparison can be made. Figure 21 below shows a bar graph of the number of overall habitation numbers within nest boxes which is stable, but low. A review of the suitability of surrounding vegetation should be conducted to ascertain what improvements could be made to increase the use of nest boxes by native species.

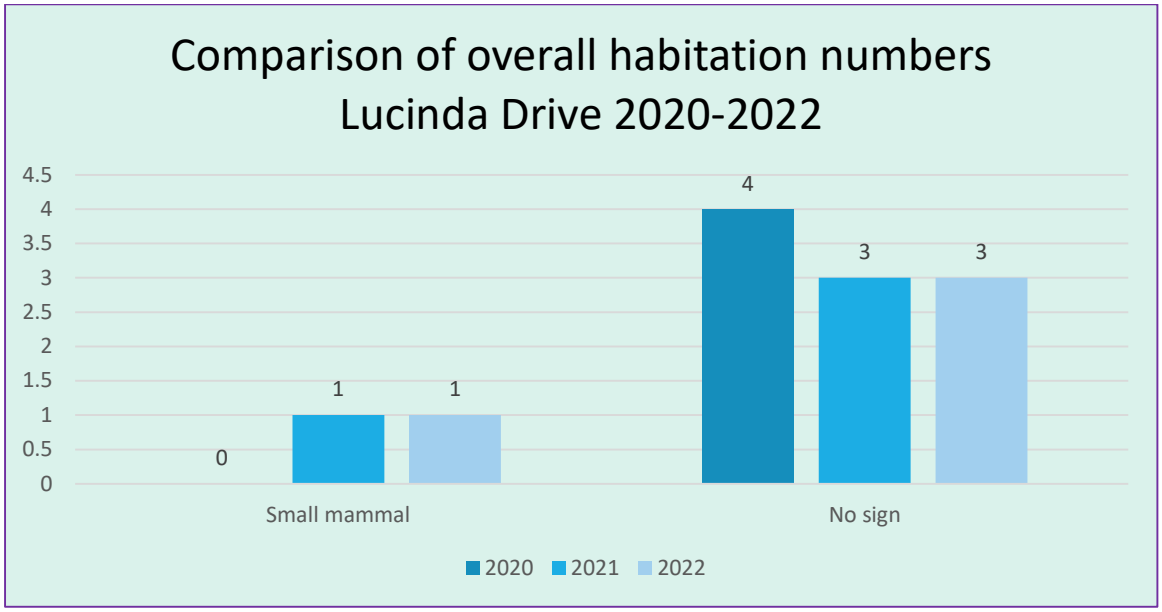


Figure 21: Overall habitation numbers of nest boxes – 2020/2021/2022 audits by species, Lucinda Drive

4.3.2 Pest Status

All four nest boxes showed signs of insect use, but this is usual and not considered to cause problems for native species.

Figure 22: Insects such as wasps, ants and spiders inside nest boxes 40, 41, 43 at Lucinda Drive

4.4 Identified Species

Appendix B lists the identification notes and habits of the native species identified at this audit. The mammal list includes the most common found in this location.

After close examination of the photographs, it was still too difficult to differentiate between glider species, so the information for Squirrel Glider (*Petaurus norfolcensis*) has been included as it is the more common of the two species [7].

4.5 Habitation Rate according to Box Type

The choice of type of nest box which would be most suitable to attract native species is predicated on the type of species that would usually be in a location and the ability of animals to find suitable habitat and reliable food sources [8].

That said, at each audit it is important to check on which type of nest boxes are being used by native animals and whether any adjustments to positioning may need to occur [8].

The 2021 audit shows that the nest boxes gaining the highest habitation rates tend to be the bird species boxes (Galah, Boobook Owl/Wood Duck; and Kookaburra). The Front-entry Possum also had 100% habitation with the Rear-entry Glider, Owlet Nightjar and Small Parrot achieving only 50%.

There are six Microbat nest boxes, and had no signs of habitation at all, neither did the two Barn Owl nest boxes. Further consideration as to their placement to allow for expanding colonies may require possible repositioning. Table 10 provides a breakdown of the types of nest boxes and their habitation rates across the three sites at the Port of Brisbane.

Table 10: Habitation by nest box type – Port Of Brisbane 2022

BOX TYPE	Total number of nest boxes	Overall habitation number	Habitation Rate
Front-entry Possum	4	4	100%
Rear-entry Glider	16	8	50%
Galah	1	1	100%
Small parrot	2	1	50%
Boobook Owl/ Wood duck	6	6	100%
Owlet Nightjar	4	2	50%
Microbat	6	0	0%
Kookaburra	2	2	100%
Barn Owl	2	0	0%
TOTALS	**43**	**24**	**55.7%**

The 2021 audit shows that 19 nest boxes were not utilised with the locations of these spread across the entire site, see Table 11. The six unused microbat nest boxes were at the Pritchard Street and Wynnum North Road sites, and further monitoring should occur to ascertain what level of microbat activity there is around these sites.

Table 11: Nest Box Type with nil habitation – Port Of Brisbane 2022

BOX TYPE	Nil species	Pritchard St	Wynnum North Rd	Lucinda Dr
Front-entry Possum	0	-	-	n/a
Rear-entry Glider	8	1, 2, 5, 13, 16, 17, 21	-	40
Galah	0	-	n/a	n/a
Small parrot	1	24	-	n/a
Boobook Owl/Wood Duck	0	-	-	n/a
Owlet Nightjar	2	14	30	n/a
Microbat	6	4, 10, 11, 22	35, 38	n/a
Kookaburra	0	n/a	-	n/a
Barn Owl	2	n/a	n/a	41, 43
TOTALS	**19**			

n/a - not applicable

5.0 Summary and Recommendations

The 2022 nest box monitoring inspection and audit at Port of Brisbane found that the remaining nest boxes are continuing to offer hollow dependent fauna with a den resource. The large number of boxes that have fallen into disrepair or had to be removed is concerning, and an urgent review of the program is needed.

5.1 Nest Box Replacement/Repair

i. 11 replacement nest boxes to be installed due to their considerable deterioration (Appendix A) – Cyplas range is recommended due to their longevity compared to traditional types.
ii. Install 9 nest boxes to compensate for the ones that were removed at this audit due to complete dilapidation (Appendix A).
iii. Introduction of additional new nesting boxes (15-20 per year), outside of the infrastructure footprint, to facilitate opportunities for native species to access where there is less disturbance. These should be located in habitat that is conducive to the type of species that are targeted if using new areas [8]. Recommended that small parrot boxes, front-entry possum boxes and front-entry glider boxes in the Cyplas range be installed.

5.2 Maintenance

i. Potential maintenance should be identified during inspections to ensure nest boxes remain a functional resource for wildlife species [8]. Approval is sought for this work to be completed at a later date by Hollow Log Homes.

ii. Ongoing pruning of trees and weeding/grass removal at base by POB staff to ensure that the nest box entrances are accessible, and to improve the habitat.
iii. Eradication of pest species European Bees by POB staff or contractors, as a matter of urgency.

5.3 Nest Box Monitoring/Auditing

i. Annual monitoring and reporting to occur to check maximum effectiveness and uptake of boxes [8].
ii. Ongoing consideration of whether target species are utilising the nest boxes and further investigation of the habitat for other suitable species that could be targeted [2] [8].
iii. An on-ground assessment of the quality of the habitat in the buffer zones should be conducted. This assessment should consider the past and current climatic and anthropogenic influences which may be causing detrimental impacts, with a suitable rectification plan prepared and enacted [2].

6.0 Conclusion

The 2022 Audit of nest boxes at the Port of Brisbane showed stable usage by native species. This was represented by both a presence in the box and indications that nest boxes are being utilised, as seen by nesting leaves and other materials, presence of eggshells, scratches, droppings and general interior usage.

Since the original installation in 2008, the overall habitation rate had risen to a peak in 2013 of 83% down to the lower rate of 55% in this audit. As noted in the recommendations at 5.3 (p.26), an on-ground assessment of the quality of the habitat in the buffer zones should be conducted with a view to reducing negative anthropogenic impacts and building in resilience to deal with climatic changes.

There were seven species using 24 of the 43 nest boxes across the POB site, including 14 occupied at the audit. The overall habitation by possums is still the most prevalent. The decrease in gliders and microbats is concerning, suggesting that barriers to access such as food is occurring. Consideration of nest box types to improve access by gliders and bird species is necessary before a large improvement in their usage patterns may be seen.

A sustainable food source alongside adequate shelter and nesting sites is a key indicator for the ability of native species to reproduce [8]. The decreasing habitation rate suggests the surrounding areas are not necessarily providing a suitable habitat for relevant food species which supports native fauna and affords adequate shelter to ensure breeding cycles continue.

Identification and eradication of feral pests and weeds that may hamper the availability of suitable food species to support the native fauna should be further enhanced by POB ground staff.

The ongoing conservation work that is being done on this site has important implications for the survival and promotion of native wildlife species in an area which has a wider residential setting and urban usage patterns. POB should consider a review and upgrade of this program to benefit native wildlife populations.

The recommendation to increase the nest box project over coming years should also be complemented by ongoing sympathetic native species plantings and maintenance projects that encourage the growth of the surrounding bushland, with the promotion of naturally-occurring hollows to be a longer-term goal.

7.0 References

[1] Port of Brisbane Pty Ltd, “Sustainability Strategy,” 2022. [Online]. Available: https://www.portbris.com.au/sustainability/our-commitment/. [Accessed 22 December 2022].

[2] Franks, A & S, Boxes for Wildlife - a practical guide, Melbourne VIC: Bloomings Books, ISBN: 9780648800507, 2006.

[3] Google Earth Pro, “Port of Brisbane, Queensland (lat -27.383716, long 153.167903),” 2022. [Online]. Available: https://www.google.com/earth/versions/. [Accessed 23 December 2022].

[4] Department of Environment and Science, “Species List,” Queensland Government, 2022. [Online]. Available: https://apps.des.qld.gov.au/report-request/species-list/. [Accessed 17 December 2022].

[5] Bureau of Meteorology, “Brisbane Airport, Queensland - December 2022 Daily Weather Observations,” Australian Government, 2022. [Online]. Available: http://www.bom.gov.au/climate/dwo/IDCJDW4020.latest.shtml. [Accessed 26 December 2022].

[6] Lindenmayer, DB, Welsh, A, Donnelly, C, Crane, M, Michael, D, Macgregor, C, McBurney, L, Montague-Drake, R & Gibbons P, “Are boxes a viable alternative source of cavities for hollow-dependent animals? Long-term monitoring of nest box occupancy, pest use and attrition,” *Biological Conservation,* vol. 142, pp. 33-42, 2009.

[7] Queensland Museum, Wildlife of Greater Brisbane, Brisbane, QLD: Queensland Government, ISBN: 9780648800507, 2020.

[8] Biodiversity Conservation Trust, “Guideline for Artificial Hollows,” New South Wales Government, 2020. [Online]. Available: https://www.bct.nsw.gov.au/sites/default/files/2020-08/BCT_Artificial%20Hollow%20Guidelines_Final%20for%20publication.pdf. [Accessed 19 October 2022].

[9] Slater, P, Slater, P & Slater, R, The Slater Field Guide to Australian Birds, Sydney, NSW: Landsdowne Publishing Pty Ltd, ISBN: 0947116990, 1996.

[10] Department of Environment and Science, “Regional ecosystems,” Queensland Government, 2022. [Online]. Available: https://www.qld.gov.au/environment/plants-animals/plants/ecosystems. [Accessed 17 December 2022].

Appendix A: Excel spreadsheet data of POB Nest Boxes - 2022

Site address	GPS ID	Photo no.	Box type	Tree species	Material	Box condition	Photo time (hhmm)	Occupancy 1=Yes 0=No	Species (nil if not)	Usage 1=Yes 0= No	Evidence of Use by	Pest/ Insects	Notes
Pritchard Street													
	772	1	REGL	Blue gum	Plywood	Good	9:21	0	nil	0	nil	PEST	Inactive european bee hive, ants
	782	2	REGL	Blue gum	Plywood	Good	924	0	nil	0	nil	INS	Spider wasp nest, ants take grass in
	792	3	ONJ	Blue gum	Plywood	replace	927	0	nil	1	Lorikeet		Old lorikeet nest 1 egg shell
	18	4	3 Microbat	Blue gum	Cyplas	Good	0	0	nil	0	nil		No signs of recent activity
	812	5	REGL	Blue gum	Plywood	Good	931	0	nil	0	nil		
	802	6	Possum FE	Blue gum	Plywood	Good	933	1	BT Possum	Occ	Occ		Brush tail possum
	822	7	REGL	Blue gum	Plywood	Good	935	0	nil	1	Glider	INS	Spider wasp nest, glider nest
	862	8	Boobook/WD	Blue gum	Plywood	replace	939	0	nil	1	BT Possum, wood duck		Nesting material pushed to the sides by possum, egg shells from failed wood duck nesting
	5301	9	REGL	Blue gum	Cyplas	Good	942	0	nil	1	Glider		Glider nest
	872	10	1 Microbat	Moreton Bay Ash	Plywood	replace	0	0	nil	0	nil		No evidence of use no photo, no top on box
	210	11	3 Microbat	Blue gum	Cyplas	Good	0	0	nil	0	nil		No evidence of use no photo
	882	12	Boobook/WD	Blue gum	Cyplas	Good	952	1	BT Possum	Occ	occ		Brushtail Possum
	932	13	REGL	Blue gum	Cyplas	Good	953	0	nil	0	nil	INS	ants
	902	14	ONJ	Blue gum	Plywood	replace	955	0	nil	0	nil	PEST	euro bees, no photo
	942	15	Possum FE	Blue gum	Plywood	Good	957	1	BT Possum	Occ	occ		Brush tail possum
	310	16	REGL	Blue Gum	Plywood	Good	1002	0	nil	0	nil	PEST	In active bee hive
	952	17	REGL	Blue gum	Plywood	Good	0	0	nil	0	nil	PEST	euro bees, no photo
	5231	18	REGL	Blue gum	Plywood	Good	1008	0	nil	1	Glider		Evidence of glider
	992	19	REGL	Blue gum	Plywood	Good	1010	1	Microbat	occ	occ		This box was full of microbats that flew out as we approached, glider nest
	1002	20	Galah	Blue gum	Cyplas	Good	1012	1	BT Possum	Occ	Occ		Brush tail possum
	1012	21	REGL	Blue gum	Plywood	replace	1014	0	nil	0	nil		no lid on box, no signs of recent use
	5191	22	3 Microbat	Moreton Bay Ash	Cyplas	Good	0	0	nil	0	nil	PEST	Termites
	1032	23	Boobook/WD	Blue gum	Plywood	replace	0	0	nil	1	BT Possum		Evidence of brushtail possum
	1042	24	Small parrot	Blue gum	Plywood	replace	1021	0	nil	0	nil		
	1052	25	REGL	Blue gum	Plywood	replace	1022	1	BT Possum	Occ	Occ		Brush tail possum jumped out, no photo
	510	26	Boobook/WD	Blue gum	Cyplas	Good	1026	1	BT Possum	Occ	Occ		Brush tail possum and joey
	1072	27	Boobook/WD	Moreton Bay Ash	Cyplas	Good	1031	1	BT Possum	Occ	Occ		Brush tail possum and joey
	922	28	Possum FE	Blue gum	Plywood	Good	1037	0	nil	1	BT Possum	PEST	Evidence of brush tail possum, euro bees started a hive but abandoned
5 boxes removed	852, 842, 912, 1022, 1062												

Site address	GPS ID	Photo no.	Box type	Tree species	Material	Box condition	Photo time (hhmm)	Occupancy 1=Yes 0=No	Species (nil if not)	Usage 1=Yes 0= No	Evidence of Use by	Pest/ Insects	Notes
Wynnum North Road													
	1191	29	Possum FE	Blue gum	Cyplas	Good	1049	1	carpet python	Occ	Occ		Carpet snake and possum remains
	1231	30	ONJ	Blue Gum	Cyplas	Good	1056	0	nil	0	nil		No evidence of use, piece of hose was removed
	1221	31	REGL	Blue Gum	Plywood	Good	1057	0	nil	1	Glider	INS	Glider nest, ants
	1211	32	ONJ	Blue Gum	Plywood	replace	1059	1	native bee	Occ	Occ		Native bee hive
	1141	33	Boobook/ wood duck	Blue Gum	Cyplas	Good	1104	1	BT Possum	Occ	Occ		Brush tail possum
	1171	34	REGL	Spotted Gum	Cyplas	Good	1107	0	nil	1	Glider	INS	Glider nest ants
	1092	35	1 bat	Blue Gum	Plywood	replace	0	0	nil	0	nil		No evidence of use no photo
	1102	36	Small Parrot	Moreton bay Ash	Plywood	Good	1111	1	BT Possum	0	nil		Possum remains, Jaw bone circled in image
	1112	37	Kookaburra	Spotted Gum	Cyplas	Good	1114	1	BT Possum	0	Glider		Brush tail possum, sitting on glider nest
	1122	38	1 bat	Blue Gum	Plywood	replace	0	0	nil	0	nil		No evidence of use no photo
	1132	39	Kookaburra	Blue Gum	Cyplas	Good	1117	1	BT Possum	Occ	Occ		Brush tail possum
4 boxes removed	1181, 1151, 1161, 1201												

Site address	GPS ID	Photo no.	Box type	Tree species	Material	Box condition	Photo time (hhmm)	Occupancy 1=Yes 0=No	Species (nil if not)	Usage 1=Yes 0= No	Evidence of Use by	Pest/ Insects	Notes
Lucinda Drive													
	762	40	REGL	Casuarina	Cyplas	Good	1211	0	nil	0	nil	INS	ants
	752	41	Barn owl	Casuarina	Cyplas	Good	1213	0	nil	0	nil	INS	No evidence of vertebrate use
	742	42	REGL	Silky oak	Cyplas	Good	1216	0	nil	1	Antechinus	INS	Silky oak leaves bout in by small arboreal mammal, antechinus maybe
	732	43	Barn owl	Casuarina	Cyplas	Good	.	0	nil	nil	nil	INS	No evidence of use
0 boxes removed													

Appendix B: Native Species Identification [7] [9]

Species	Scientific Name	NCA Status	Habits
Possums	Common Brushtail *Trichosurus vulpecula*	C	Common. Nocturnal. Uses a large range/size of nest boxes for shelter/breeding up to 30 boxes per family. Possums remove the wood-chip mulch and leave a wide pair of scratch marks throughout the box and an oily resin throughout the inner walls when inhabited long enough (>6 months). Body length of 50cm with a long, black bushy tail and large, pointed ears.
Gliders	Squirrel Glider *Petaurus norfolcensis*	--	Common. Nocturnal. Each colony uses up to 5 nesting hollows. Colonies are loosely family based with up to 12 Gliders in each colony, 3-5 individuals using one hollow.
Microbats	*Gould's Wattled Bat*	--	Common in southern-eastern Australia. Roosting by day, first of the nocturnal animals to alight, often just before dusk, and returning just after dawn. May use hollows to rest and digest food.
Scansorial Mammals	Yellow-footed Antechinus *Antechinus flavipes* OR Brown Antechinus *Antechinus stuartii*	C	Common throughout SEQ. Nocturnal. Species favour most bracken, creek verges and dry eucalypt forest. Nests contain foliage from a variety of tree species such as melaleucas.
Birds	Rainbow Lorikeet *Trichoglossus moluccanus*	C	Common. Found in all habitats, ranging from rainforest to urban parks. Aggressively competes for hollows and nest boxes. Nests have red coloured down feathers, containing 1-3 white eggs and splattered stool throughout base due to nectar diet. Small parrot - length 30cm, Green body with bright blue head, red/blue/green belly, with red beak
Sugar Bag Bee	Native Bee *Trigona carbonaria*	--	Common throughout SEQ. Stingless native bee inhabits nest boxes, covering entrance hole with wax. Build nests of wax and resin with a horizontal spiralled brood comb. 3-5mm in length, black with white hairs.
Snake	Carpet Python *Morelia spilota*	--	Semi-arboreal tree snakes, largely nocturnal but can be active at daytime. Shelter in hollow tree limbs, abandoned burrows. Lays up to 47 eggs.

*NCA Status C = Least Concern