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Nest-box use and preference by sugar gliders (*Petaurus breviceps*) and nest-box competition by introduced species at Coolart Homestead & Wetlands, Somers Vic.



Photos Joy MacDonald

Abstract

Three nest-box designs were evaluated for sugar glider (*Petaurus breviceps*) preference and usage as well as their potential to exclude introduced pest species, particularly honeybees (*Apis mellifera*) at Coolart Homestead & Wetlands, Somers Victoria. Clear preference was shown for the 'box' design; however, study limitations may have negatively influenced data for the 'tube' design. Both the 'box' and 'tube' had a 50mm tube entry; the 'upright' design had an ordinary 50mm hole entry. The 'upright' design was shown to be unsuitable for sugar glider use and was the only design to be occupied by introduced species, the common myna (*Acridotheres tristis*). It should however be noted that tube entries elsewhere were found to provide entry to honeybees and further study should be undertaken to investigate other design parameters of these nest-boxes that appear to have successfully excluded honeybees.

Key words: Tube entry, sugar glider presence/absence, honeybee invasion

Introduction

The extreme time requirements of hollow formation and the time-lag that exists for the replacement of this resource across the landscape, highlights the dire need for management options to be broadened if population crashes in affected species are to be ameliorated in any way (Bennett *et al.* 1994; Beyer and Goldingay 2006; Lindenmayer *et al.* 2003; Vesk and McNally 2006).

As the impacts of natural resource loss become more apparent across fauna habitat, the use of artificial means to support both require research, and understanding of habitat function becomes a more compelling issue. Land clearance for agriculture and urban development has had the most influence on depletion of trees bearing hollows (Smith and Agnew 2000). The number of available hollows in conjunction with other specific habitat requirements can influence whether a species will be present or absent (Lindenmayer *et al.* 1991). Lindenmayer *et al.* (1991) found that Leadbeater's possum (*Gymnobelideus leadbeateri*) required approximately 15 hollows per hectare in order for a 50% chance of possible occurrence.

Studies have shown that nest-site shortage is often the major limiting factor for hole-nesting birds, particularly in areas where intensive forest management has caused the lack of natural hollows (Newton 1994, Gibbons *et al.* 2000). Newton (1994) found that the addition of artificial nest-boxes to nesting sites directly correlates to continued population increases before density eventually levels out when other environmental factors, such as food availability, take over as the limiting factor.

Beyer and Goldingay (2006) looked at the value of nest-boxes as a research tool in the study of hollow-using arboreal marsupials in Australia. Three hundred species or 75% of Australian arboreal marsupials use tree hollows, making the study of this vital component of their habitat highly important in maintaining their contribution to the ecosystem as a whole (Smith and Lindenmayer 1988; Beyer and Goldingay 2006).

Nest-boxes have also been used as a management tool to benefit endangered species survival (Borgo *et al.* 2006). Borgo *et al.* (2006) were able to utilize nest-boxes to enhance breeding success of the red-cockaded woodpecker (*Picoides borealis*), a federally endangered species in the USA, by providing artificial habitat for southern flying squirrels (*Glaucomys volans*) thus limiting their use of natural hollows used by the woodpecker.

There are many ways in which artificial nest-boxes may be used to aid habitat restoration requirements (Beyer and Goldingay 2006). Nest-boxes have been used in specific wildlife reintroduction plans (Beyer and Goldingay 2006; Irvine and Bender 1997; Lindenmayer *et al.* 1991; Menkhorst 1984). The successful reintroduction of sugar gliders to the Organ Pipes National Park relied entirely on the use of nest-boxes to provide artificial nesting habitat in an area that was made up almost entirely of revegetation that was unable to provide hollows (Irvine and Bender 1997).

Researchers can change nest box design parameters, such as entry an cavity size, to more accurately locate specific target species (Ward 2000). Ward (2000) found that the use of nest-boxes to detect the presence of feathertail gliders (*Acrobates pygmaeus*) provides more accurate data than spotlighting. Where nest-boxes are installed in study areas they may enhance behavioural data by providing known nest locations for use with the 'stag-watching technique' which requires researchers to accurately locate hollows. An example of where this could be used is Quin (1995) who followed captured animals on release by foot in order to locate hollows. Ward (2000) findings could warrant the inclusion of nest-boxes in future studies such as Smith *et al.* (1989) which evaluated the 'stagwatching technique' in comparison to spotlighting and trapping to census possums and gliders in tall open forest.

Lindenmayer *et al.* (1991) have studied the possibility of using nest-boxes to aid conservation of the endangered Leadbeater's possum (*G. leadbeateri*). However; there is strong debate as to the long-term benefit of nest-box use as habitat replacement due to the need for ongoing maintenance and the rather short longevity for nest-boxes of only 10 years (Lindenmayer *et al.* 1991; Lindenmayer *et al.* 2003; Irvine *Pers. Comm.* 2006). Despite highlighting difficulties regarding the practicalities involved, Lindenmayer *et al.* (2003) and Harper *et al.* (2005) emphasise the need to explore all options thoroughly to maximise conservation possibilities.

The problems encountered in implementation of nest-boxes at the scale required to support forest habitats should not reflect on their possible use in more easily managed areas. An example would be areas that support the dispersal of animals through corridor networks, or managed remnant and revegetated areas, which are more accessible for the ongoing maintenance required. In corridors this can provide opportunities for population increases and improved population viability within established subpopulations across an increasingly fragmented landscape (Beyer and Goldingay 2006; Smith and Agnew 2002).

Competition for hollows, whether natural or artificial, not only occurs among native species with invasion by pest species such as feral honey-bees (*Apis mellifera*) and the common myna (*Acridotheres tristis*) seen to be a major management problem (Coelho and Sullivan 1994; Irvine and Bender 1997; Harper *et al.* 2005; New 1997). Nest-box design can play a major role in limiting take-over rates by introduced species such as honey-bees (*Apis mellifera*) and the common myna (*Acridotheres tristis*) (Coelho and Sullivan 1994; Irvine and Bender 1997; Harper et al. 2005; Pell and Tidemann 1997, New 1997).

Invasions by honey-bees (*A. mellifera*) are mentioned in many studies as a major inhibitor to the success of nest-box application (Coelho and Sullivan 1994; Harper *et al.* 2005; Irvine and Bender 1997; Suckling and Macfarlane 1983). Suckling and Goldstraw (1989) mention a feral bee infestation rate of 51% and take-over by bees is mentioned by Irvine and Bender 1997 as an ongoing maintenance issue to continually remove hives. The common myna (*A. tristis*) was present in 38% to 45% of boxes in studies by Harper et al. (2005) and Pell and Tidemann (1997).

Smith and Agnew (2002) look at the use of a nest-box designed specifically for bats to attract other small hollow-dependant fauna such as feathertail glider (*A. pygmaeus*), sugar glider (*Petaurus. breviceps*) and yellow-footed marsupial mouse (*Antechinus flavipes*) with the added benefit of appearing to exclude other vertebrate pest species such as introduced birds.

Competition, nest-box design, season, and availability of natural hollows within close proximity will influence nest-box usage (Beyer and Goldingay 2006).

Nest-box use at Coolart

The concept for the study came from observation, at Coolart Homestead and Wetlands (referred to as 'Coolart' throughout this report), of sugar gliders using a nest-box designed with a tube entry specifically for pardalotes. Following discussions raised the management issue of nest-box take-over by honey bees and the hypothesis that honey-bees may not be willing to enter the nest-box via the tube entry.

Distribution of sugar gliders at Coolart was unknown apart from a fauna survey in 2001 when spotlighting recorded 5 sugar gliders (Legg 2002). However it was of interest that there had been an introduction of captive bred sugar gliders in 1987 into the wild population already established at Coolart. This occurred along with similar introductions carried out over approximately a decade at Tower Hill State Game Reserve in 1979 and Blackburn Lake Sanctuary in 1984-85 from the same breeding stock (Irvine *Pers. Comm.* 2006, Suckling and Macfarlane, 1983, Juzva and Peeters 1992). Reintroductions at Organ Pipes National Park which occurred in 1989 had been organised to use the same captive-bred stock as the previous three introductions however it was decided instead to use young non-breeding stock from a wild population captured in the Pyrete Range, Toolern Vale in order to lessen possible deleterious influence on the local gene pool of any possible wild sugar gliders present (Irvine *Pers. Comm.* 2006).

The reason given for the introduction at Coolart was to increase the gene pool of the wild population that apparently was inbreeding. However, no genetic studies were carried out to ascertain if indeed the wild population was in fact inbred. Unlike the Blackburn lake, Tower Hill and the introduction to the Organ Pipes National Park no further study has been undertaken at Coolart to monitor the success or failure of this introduction (Suckling and Macfarlane 1983, Juzva and Peeters 1992). In order to adequately assess the Coolart introduction at this stage it would be necessary to carry out studies to compare DNA from sugar gliders at Tower Hill, which has the only surviving descendants of the captive bred stock, with DNA of the Coolart sugar glider population. Although this study does not have the necessary depth required to thoroughly investigate at this level it has provided an opportunity to assess sugar glider distribution and habitat use at Coolart.

Aims and Objectives

The aim of this study is to attempt to answer the following questions:

- Is there a preference by sugar gliders for nest box design?
- Can nest-box usage indicate sugar glider distribution at Coolart?
- Will the addition of a tube entry inhibit entry of introduced species such as honey-bees into nest-boxes?

Materials and Methods

Study area

Coolart is situated on the coast between Somers and Balnarring and covers an area of approximately eighty-seven hectares. The area consists of remnant Coast Banksia Woodland with large areas of revegetation designed to enhance original vegetation structure with some emphasis on the habitat requirements of Koalas (*Phascolarctos cinereus*). Average annual rainfall is 905mm.

Surrounding land-use includes farmland and coastal urban areas. Riparian vegetation following Merrick's creek offers some connectivity to surrounding bushland remnants.

Coolart was divided into seven areas based on variation in vegetation types and natural subdivisions made by roads and walking tracks.

Area 1: Arboretum – Consisting mainly of species from Western Australia. No mid storey; ground cover of weedy grasses.
Area 2: Arboretum - Consisting mainly of species from Western Australia. No mid storey; ground cover of weedy grasses.
Area 3: Revegetation consisting mainly of Drooping She-oak (*Allocasurina verticillata*) and Manna Gum (*Eucalyptus viminalis ssp. pryoriana*) with adjacent *Acacia mernsii*; no understorey and a ground cover of weed grass.
Area 4: Revegetation Manna Gum (*Eucalyptus viminalis ssp. pryoriana)* with some Sea-berry Saltbush (*Rhagodia candoleana*) and weed grass. Small pocket of Coast Tea-tree (*Leptospermum laevigatum*).
Area 5: Coast banksia woodland remnant consisting of some large *Banksia integrifolia* with an understorey of Coast Tea-tree (*Leptospermum laevigatum*), Coast Beard heath (*Leucopogan parviflora*), Boobialla (*Myoporum insulare*) with Bower Spinach (*Tetragonia tetragonoides*) and Seaberry saltbush (*Rhagodia candoleana*) forming a thick ground cover interspersed with weed species such as Dolichos (*Cytisus palmensis*), Polygala (*Polygala myrtafolia*) and Smilax (*Myrsiphyllum asparagoides*).
Area 6: Mostly coast banksia woodland remnant consisting of an understorey of Coast Tea-tree (*Leptospermum laevigatum*), Coast Beard heath (*Leucopogan parviflora*), Boobialla (Myoporum *insulare*) with Bower Spinach (*Tetragonia tetragonoides*) and Seaberry saltbush forming a thick ground cover interspersed with weed species such as Dolichos (*Cytisus palmensis*), Polygala (*Polygala myrtafolia*) and Smilax (*Myrsiphyllum asparagoides*). Some revegetation Manna Gum (*Eucalyptus viminalis ssp. pryoriana)* with some Sea-berry Saltbush (*Rhagodia candoleana*) and weed grass.

Area 7: Revegetation Manna Gum (*Eucalyptus viminalis ssp. pryoriana),* Drooping She-oak (*Allocasurina verticillata*) with some Sea-berry Saltbush (*Rhagodia candoleana*) and weed grass. Many small regenerated Banksia (*Banksia integrifolia*)

Nest-box design and installation

Three nest-box designs were selected, two with a tube entry and one without, although all with an entry of 50mm diameter (See photos). The 'box' design was selected because it was known to be suitable for sugar glider use as mentioned previously. The 'tube' design was selected for the durability of PVCU and low cost involved. The 'upright' design also uses PVCU pipe and was chosen to provide a design without the tube entry.

Seven of each design were constructed. Ten nest-boxes of varied design were already installed over the area making a total of thirty-one nest-boxes monitored in the study.

a) b) c)

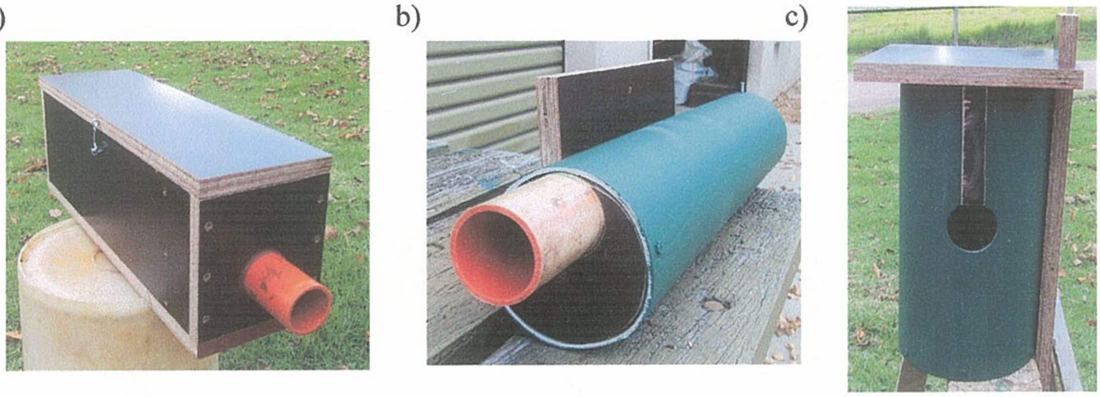


Figure 1: Nest-box design named as a) Box b) Tube and c) Upright **Photos: Steve Wright**

Field Sampling

One nest-box of each design was installed in each area to gauge possible box design preference by sugar gliders. The nest-boxes were placed with no particular aspect in mind and at varied heights dependant on the best position offered by the tree. Preference was given to trees that appeared to provide enough height to allow sugar gliders to glide and had access to the best sugar glider habitat to be found within the zone. This may have included the presence of food trees such as *Acacia mernsii* or *Banksia integrifolia.*

The majority of nest-boxes were placed in *Eucalyptus viminalis* because they were often the tallest tree available; two were placed in *Banksia integrifolia* and one each in *Allocasurina verticillata* and an unknown non-indigenous eucalypt.

Data was collected on 10 occasions over a twelve month period by visual examination of the contents of each box via hinged entry. This included 11 boxes that were already in place over the study area although the figures for these boxes are not included in the results for nest-box design preference.

Nest-boxes were constructed and installed in September 2005. Glider use of nest-boxes is determined by actual presence or the presence of a spherical ball-like nest constructed of overlapping Eucalypt leaves (Triggs 1996).

Where nest-boxes were infested with introduced species such as honey-bees or the common myna some attempt will be made to exclude them from the box. Opening boxes, where possible, is often a successful method. Ants can also invade nest-boxes, however, because they are a native species they have been considered part of natural ecosystem function and left alone.

Data analysis

SBSS was used to conduct a Chi-square test of independence to test the association between presence/absence of sugar gliders and the three box designs.

One way ANOVA was used to reveal the most popular nest-box design in each zone. Student-Newman Kuels *post hoc* tests were run where differences were shown to reveal the nature of the difference.

A one-way ANOVA using percentage of box usage was run to give sugar glider distribution in general within the 7 zones.

A Spearman rank correlation was performed to test the correlation between nest-box height and nest-box usage by sugar gliders.

Results

Data was collected on ten occasions over a twelve month period from October'05 to October'06. A total of 10 of the 21 boxes were used at some stage during the study by sugar gliders making up an overall usage of 47%. One 'tube' nest-box was taken up by *Antechinus agilis* over four observations from December'05 to March'06 and one 'upright' was occupied by common mynas from Jan'06 to Feb'06. None of the study boxes were taken over by honey-bees during the study period. Only one box with glider nesting material was never observed as actually occupied at some stage over the twelve month period of data collection. (See Table 1)

Occupied nest-boxes were twice as likely to contain more than one sugar-glider. Actual numbers were not recorded as the animals were not handled in any way. Most occupied nest-boxes contained a fresh spherical sugar glider nest of eucalypt leaves but occasionally no added nesting material was observed.

When looking at the individual box designs and presence/absence data there was a significant deviation from expected ratios of sugar gliders and next-box design (X_2=10.691, df 2, p=.005). Preference was shown for the 'box' design with 86% presence of sugar gliders, followed by the 'tube' design with 43% presence and the 'upright' was not used by sugar gliders at all (Figure 1).

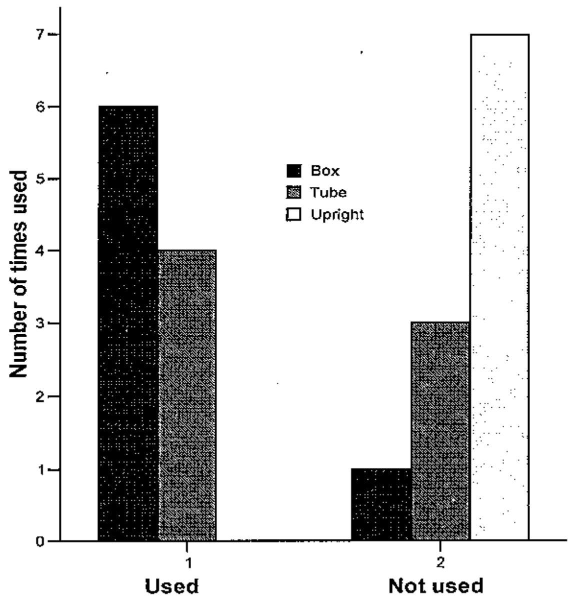


Figure 2: Presence/absence of sugar gliders actually observed in nest-boxes of 'box', 'tube' and 'upright' design over twelve months.

Nest-box selection in relation to nest-box design over the twelve months based on number of times a nest-box was occupied again found that there was a preference for the 'box' design ($F_{(2,18)}$=4.846, p= 0.021). *Post hoc* tests revealed a preference for the 'box' design (SNK < 0.05) over the 'tube' and 'upright' design (SNK > 0.05) (Figure 3).

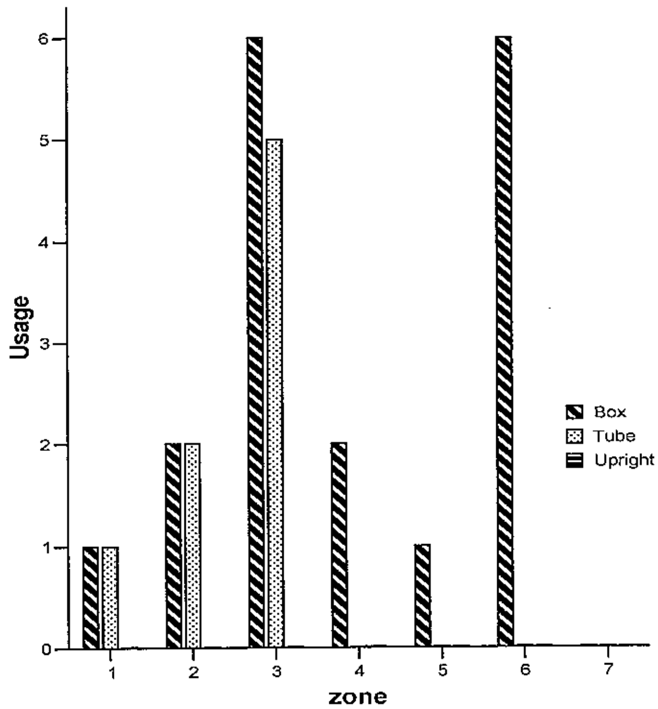


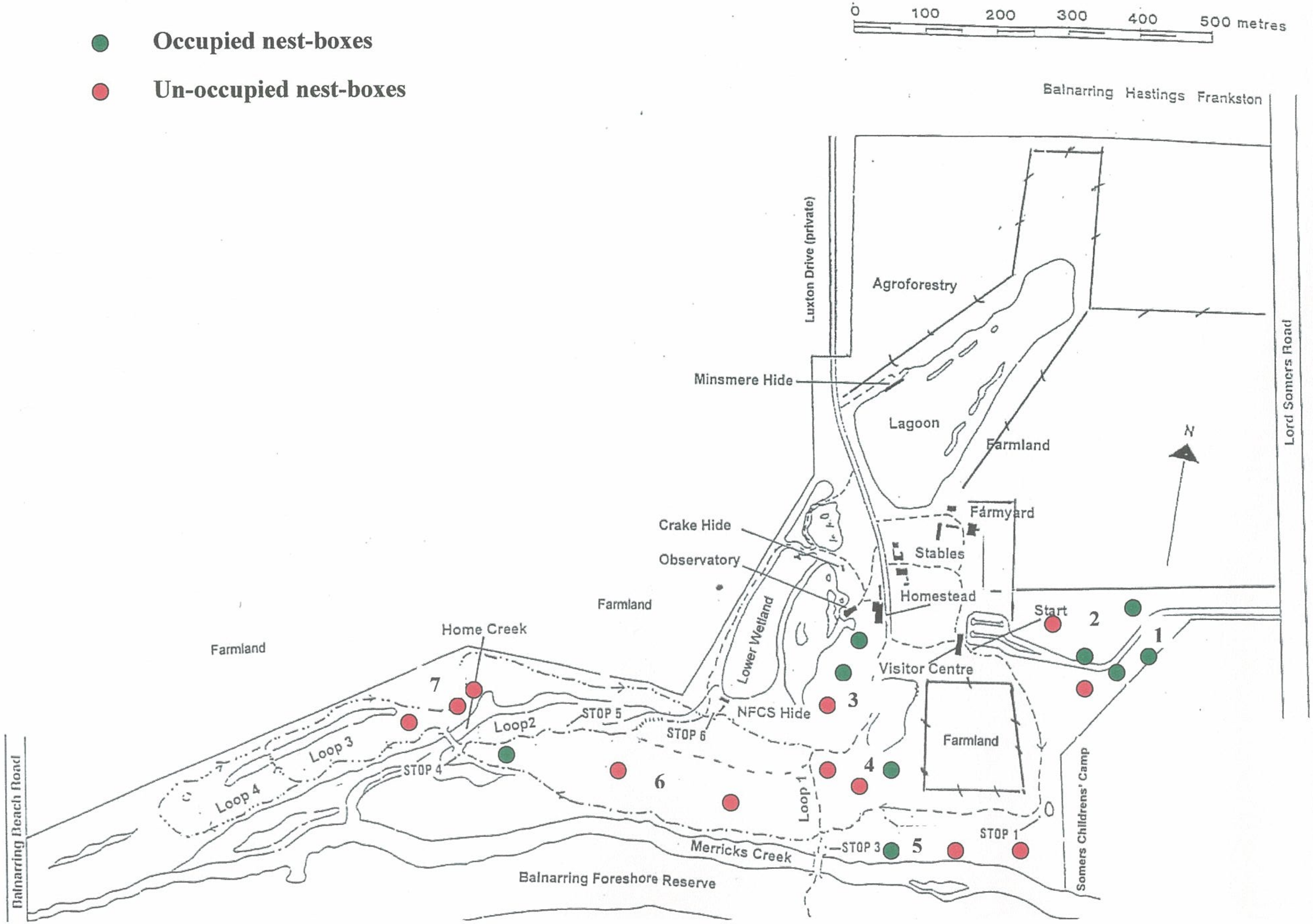
Figure 3: Usage of nest-boxes by sugar gliders over twelve months (10 data collections) showing box design preference over the seven zones.

Sugar glider distribution over the 7 zones at Coolart found that zones 3 and 6 showed the highest levels of overall nest-box occupation over the study period both with boxes occupied above 60% of the time. There were no sugar gliders observed in zone 7 at any time over the study period (Figure 3)(See Map). Data was not collected to measure density as sugar gliders were not handled at all and accurate counts are difficult because of the nesting behaviour of gliders as they conglomerate together into one mass of heads, tails and bodies. However there were approximately 6 to 11 individual sugar gliders observed on each data collection, sometimes as individuals but usually in groups.

There was no correlation shown between nest box height and usage by sugar gliders ($r = 0.220$, $df = 7$, $p = 0.291$) ($p > 0.05$). There may be insufficient data to provide an accurate statistical correlation.

Nest-box occupation by sugar gliders (*Petaurus breviceps*) at Coolart

- Green dot: Occupied nest-boxes
- Red dot: Un-occupied nest-boxes



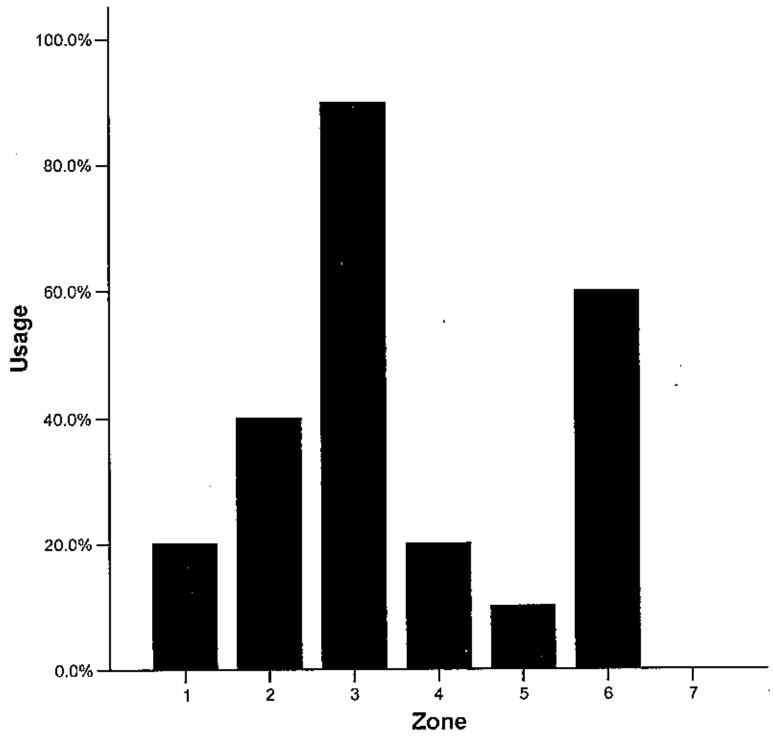


Figure 4: Distribution of sugar gliders over the seven zones at Coolart based on occupation of nest-boxes over twelve months.

Of the 10 boxes that were already in place 50% were infested with honey-bees. These were blocked where possible; however this was largely unsuccessful with reinvasion occurring soon after. Two of these nest-boxes were taken down to remove all honeycombs and a tube entry was installed in order see if reinvasion would occur through the tube. On the last data collection which occurred in October '06 (during swarm season) one of these boxes was reinvaded by honey-bees via the tube entry (See Table 1).

When all nest-boxes installed at Coolart are included four mammal species, one bird species and two invertebrate species were observed (see Table 1).

Species	**No. of times observed in use**
Sugar glider (*Petaurus breviceps*)	31
Agile antechinus (*Antechinus agilis*)	4
Common Ringtail possum (*Pseudocheirus peregrinus*)	3
Common Brushtail Possum (*Trichosurus vulpecular*)	1
Common myna (*Acridotheres tristis*)	2
Honey-bees (*A. mellifera*)	42
Ants (Sp. Unknown)	23

Table 1: The number observations of any species in nest-boxes including both the nest-boxes for this study and the ten nest-boxes that were already in place at Coolart.

Discussion

The purpose of this study was to ascertain any preference for nest-box design by sugar gliders and to see if the addition of a tube entry would be successful in excluding introduced species from nest-boxes. Occupancy level and the position where occupancy occurred has also been able to give an idea of sugar glider distribution at Coolart.

The overall occupancy rate of 47% by sugar gliders was comparable to nest-box occupancy for brushtail possums found by Harper *et al.* (2005) with 43%. Occupancy was higher than Lindenmayer *et al.* (2003) and Harper *et al.* (2005) whose studies found similar levels of nest-box usage in study sites of forests of the Central Highlands of Victoria and urban remnants in Melbourne, with 25% and 39% occupation rates respectively.

The study figures become more powerful when the significant preference for nest-box design is taken into account. If data for the 'upright' box design, which was clearly shown to be unsuitable for glider use, is taken out of the data set there was an overall 78% take-up rate of the 'box' and 'tube' design nest-boxes. Such a high nest-box take-up rate is a great divergence from the 19 of 96 (20%) nest-boxes taken up in Lindenmayer's (2003) study conducted in the Central Highlands of Victoria.

This may suggest a lack of suitable hollows has been a limiting factor for sugar gliders at Coolart. This can be reasonably assumed when the high percentage of revegetation unable to offer hollows at Coolart is considered; much of the vegetation is no older than three decades (Thomas *Pers. Comm.* 2006). Sugar gliders are known to be fairly adaptive in their use of habitat variation and may have moved into the nest-boxes so rapidly because they offered better accommodation than has been offered at Coolart up to this point. This may be a similar reaction to changes in habitat quality as was noted at Organ Pipes National Park. When nest-boxes installed for sugar gliders became no longer usable due to a lack of maintenance, sugar gliders moved into nest-boxes designed for micro bats; when more suitable nest-boxes were returned to the site the sugar gliders returned to these in preference (Irvine *Pers. Comm.* 2006).

Preference for the 'box' design was shown clearly over 4 of the 7 zones with zones 1 to 3 also showing favour for the 'tube' design. 'Tube' boxes in zones 5 and 6 were taken over by ants and in zone 7 by *A. agilis* for four months which may have excluded sugar glider use (Figure 3). The 'tube' in zone 4 was the only box that contained sugar glider nesting material but was never observed with actual sugar gliders present. Rendering three of the possible seven boxes of the data set unusable may have had a significant effect on the data for this design. Based on the available data, a larger data set may have shown this design to be quite popular. Study over a longer time frame should account for such anomalies in the data.

The main design issue for the 'upright' nest-box may have been the position of the entry in the middle of the cylinder rather than higher which may not have allowed enough room below to provide suitable nesting habitat for sugar gliders. The only 'upright' box to be used was by common mynas during their nesting season, although two of these nest-boxes had marked scratches around the entry suggesting that there was some attempt, by something, to widen the entry.

The size of the entry hole appears to have been successful in excluding larger mammals such as the common ringtail possum and the common brushtail possum which are both known to be common at Coolart (Legg 2002). Both were observed in two of the original nest-boxes that have slightly larger entries (see Table 1). Ants were observed in nest-boxes on 23 occasions; however, their presence was often intermittent with only one nest-box recording ants on every data collection (see Table 1). On two occasions ants were observed in a particular nest-box on one data collection and sugar gliders were observed in the same nest-box on the following data collection.

The designs with tube entries appear to have been successful in preventing nest-box take-over by the common myna with only the 'upright' design providing suitable nesting habitat for this species.

Honey-bees continued to be prevalent in the original nest-boxes throughout the study period (see Table 1). The fact that none of the study nest-boxes were invaded by honey-bees, however, requires further discussion. A field trip was undertaken to Organ Pipes National Park after reading that Sadler and Ward (1999) had installed tube entry to nest-boxes there to scan transponders inserted under the skin of sugar gliders in order to monitor entry and exit of nest-boxes (Beyer and Goldingay 2006). Observation of these nest-boxes revealed a high rate of take-over by honey-bees which were obviously using the tube to enter and leave the nest-box. We were able to confirm this in the study at Coolart when honey-bees entered one of the original nest-boxes with an added tube entry.

The lack of invasion by honey-bees of the study nest-boxes, may be simply put down to time; or perhaps there is some other design parameter that excludes honey-bees. It is thought that honey-bees like to have some height above the entry to construct honeycomb which may not be provided by the 'box' and 'tube' designs. Continued monitoring of the study nest-boxes will take place in an attempt to answer these questions.

Of interest is the fact that, although sugar gliders will use 'bat boxes' which have a slit entry at the base, no honey-bee infestation has taken place at Organ pipes National Park over twenty years after installation (Irvine *Pers. Comm.* 2006). This was confirmed by Smith and Agnew (2002) who found only spiders, cockroaches, ants and a few mud wasp nests in their bat boxes.

Personal communication with Robert Irvine regarding experiences at Organ Pipes National Park brought to attention the possibility of artificial nest-boxes increasing sugar glider populations where availability of nest hollows has been a limiting factor. At Organ Pipes National Park numbers of introduced sugar glider crashed severely in response to two factors involving artificial habitat creation. Firstly, a lack of nest-box maintenance causing the eventual demise of a vital nesting resource and, secondly, the simultaneous senescence of food trees such as *Acacia mernsii* that were planted decades earlier and thwarted in regeneration due to over-browsing by macropods. This is relevant to management at Coolart where it would be advisable to ensure that staggered plantings of food trees is integrated into revegetation regimes along with ongoing maintenance of the nest-boxes. Lindenmayer *et al.* (1991) place the longevity of nest-boxes at 10 years giving some idea of the management implications of installing nest-boxes as artificial habitat.

Future studies could include a survey of natural hollows over the study area to ascertain availability before the installation of further artificial nesting resources.

Conclusion

This study has provided solid data on nest-box design preference of sugar gliders for the study designs implemented and has been able to give some base data for sugar glider distribution at Coolart. In addition, the trip to Organ Pipes National Park has highlighted some important management issues regarding vegetation requirements and the importance of ongoing nest-box maintenance.

Monitoring of the nest-boxes at Coolart will continue into the future in the hope of shedding further light on habitat usage of sugar gliders and nest-box invasion by exotic species.

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Photo by Steve Wright

THE AGE, Monday 13 April 1987

Tempting a threatened species with the sweet taste of survival

Pictures: JOHN WOUDSTRA

By LEITH YOUNG
environment reporter

At dusk tonight in the bush near Somers, 15 young sugar glider possums should be enticed by the smells of apricot jam, condensed milk and honey to squirm out of their nest boxes and explore.

By next weekend, they will start to glide short distances from the two large manna gums which have become home, extending the range as they begin to know the area. Eventually, they will travel for up to a kilometre each night and return before dawn.

Finally, they will abandon the four nest boxes and move into hollows in the old tree trunks.

The possums, brought from Melbourne by a breeder, Mr Des Hackett, are part of a plan to reintroduce sugar gliders to the Coolart wildlife sanctuary on the shores of Westernport Bay.

Once quite common, the gliders have been reduced to a rare species in Victoria because of the destruction of their habitat and feral cats. Coolart had about six species, but genetic isolation led to inbreeding and they were not a viable population. Without the fresh gene pool introduced by Mr Hackett's animals, they would have died out rather than proliferate.

Coolart's resident warden, Mr Steve Yorke, who spent Saturday climbing ladders to nail the nest boxes to high branches, says the property will sustain about 100 sugar gliders.

With other Coolart workers, he is managing an intensive program to restore the old property's native habitat, dredging lakes to replace the 500-hectare swamp drained by settlers and replanting native trees and grasses.

Last year, they planted 6000 manna gums to provide food for koalas. About 400 surplus seedlings were given to Somers residents for backyard planting.

On the sandy strip where the gliders were released, all the old manna gums have tin guards around the base, protection, Mr Yorke said, from a "massive koala problem".

Koalas brought from French Island bred and multiplied to the point where they were eating the trees to death. Coolart lost one third of its manna gums.

Although it will be 10 years before the leaves of the newly-planted trees are edible, the trees will form a wildlife corridor linking Westernport Bay with the central Mornington Peninsular.

A sugar glider possum yesterday at the suburban home of Mr Des Hackett, a wildlife naturalist. Below: Mr Steve Yorke, the warden of Coolart, fastens a temporary nest for a sugar glider to a gum tree on the Coolart Estate.

The major problems to be confronted in relation to gliders at the Park are that there are few old trees which could provide nesting hollows, so artificial hollows are to be set up at various sites.

Then there are the feral cats which occasionally make kill in the area. Few have been spotted recently, and it is to be hoped that their numbers can be kept down.