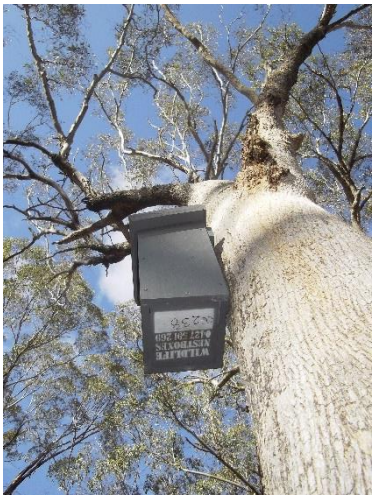
Connecting Country's Nest Box Program

- Summary of Monitoring Results from 2011 to 2016 -

Background

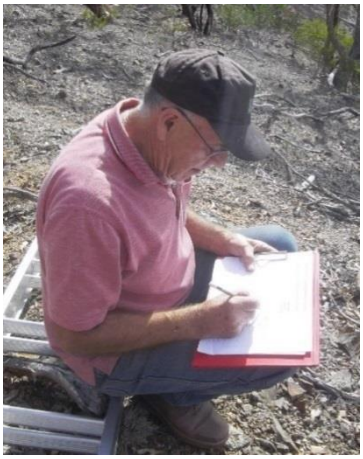


In 2009 Connecting Country commenced its Brush-tailed Phascogale habitat restoration and monitoring project.

From 2009 to 2011, clusters of three nest boxes were installed at approximately 150 sites across the Mount Alexander Shire. The boxes are a tool to monitor the distribution and health of the threatened Brush-tailed Phascogale (also commonly known as the **Tuan**), as well as providing extra habitat for this species.

These specially designed nest boxes were installed on both public and private land, and within large and small patches of native woodland and forest habitat.

Autumn 2016 was the fourth occasion in which nest boxes have been monitored by Connecting Country staff and volunteers. Our official monitoring program involves checking the contents of boxes at 100 sites using a scientifically-rigorous method developed by Professor Andrew Bennett. For the most part, the same 300 boxes at these 100 sites have been checked during 2011, 2012, 2014 and now 2016. However, in 2016, Connecting Country decided to check the boxes at all ~150 sites, many of which were therefore checked for the first time since they were installed 6-7 years ago.



Working alongside Connecting Country this year was La Trobe University PhD candidate, Jess Lawton (see middle picture). Jess is undertaking a detailed study of the 'conservation biology and landscape ecology of the Brush-tailed Phascogale' for her research project. For this part of her study, she installed 100 wildlife monitoring cameras at 50 selected Connecting Country nest box sites. She also collected extensive habitat information at each of the 50 sites. Jess's work will be a real bonus for us, as we will be able to compare her camera monitoring results with our nest box results. We are also expecting that her results will provide the local community new insights into the Tuan's habitat requirements, which may allow us to adapt our on-ground landscape restoration works activities accordingly.

Many thanks to all of the land owners and managers who allowed their nest boxes to be checked by Connecting Country staff and volunteers this year. Each landholder has been sent detailed results specific to their set of boxes.

Thanks also to the many volunteers who assisted Connecting Country and Jess Lawton with the field work. They were Josie Berto, Mal Campbell, Daniele Glover, Fritz Hammersley, Naomi Hewitt-ware, Jeremy Holland, Phil Hopley, Kerrie Jennings, Damian Kelly, Thea King, Tim McCaw, Jane Mitchell, Hannah Nicholas, Jane Rusden, Brent Russell, Sean Smith, Greg Waddell and Eva Zanettini.

A special thanks also to Cara Byrt who designed, and continually refines, our nest box database.

We hope that you enjoy reading the results of this year's surveys. (A further update will be provided later this year when Jessica Lawton's research findings become available).

Max Schlachter, Asha Bannon and Chris Timewell
Connecting Country's 2016 Nest Box Surveyors, 5 July 2016

Summary of 2016 Survey Results

- **This year we surveyed 436 nest boxes**, distributed in groups of three across 147 sites throughout the Shire[1].

- **The occupancy rate for Tuan records was much higher** in 2016 (45% of sites with evidence of their presence) compared to all three previous survey periods (which were 31% or less).

- **The proportion of sites with Tuans increased across all parts of the Shire**, with the North East zone recording a particularly strong increase.

- **Boxes in larger vegetation patches (> 50 ha) were more likely to have evidence of Tuans** than smaller patches (< 50 ha).

- **The occupancy rate for Sugar Glider records remained high**, with 85% of sites having evidence of their presence. Their **local population** also appears to be **stable**, as 85% is the same percentage as the 2014 surveys.

- **The number of boxes infested by European Bees remained stable and relatively low** – only 4% of boxes had active feral bee hives.

[1] Single boxes were missing at five of the sites.

Methods

The following results are based on what we found at each survey site. Each 'site' comprises a cluster of three nest boxes, with each of the three boxes spaced about 50 metres from the next nearest. Connecting Country staff carefully observed, documented and photographed the contents of each box. No handling of animals was undertaken and the nest box contents were not physically disturbed in any way.

A site is considered to be 'occupied' by Sugar Gliders or Tuans if Connecting Country staff observe 'evidence' of their presence within one or more of the 3 boxes. 'Evidence' includes the sighting of an actual animal within a box, and also situations where no animal was observed within the box but characteristic nesting material was present. (As you can see and read on pages 5 of this report, Gliders and Tuans have distinctly different nests.). Some sites have evidence of both species.

Results

Tuan & Sugar Glider Occupancy Per Site

Figure 1 shows that there has been a steady increase over the years in the percentage of sites with evidence of Tuans, with a particularly large increase from 2014 to 2016. This is very encouraging result, and is testament to the habitat protection and restoration works being undertaken landholders, Connecting Country, Landcare and other groups and agencies across the Mount Alexander region.

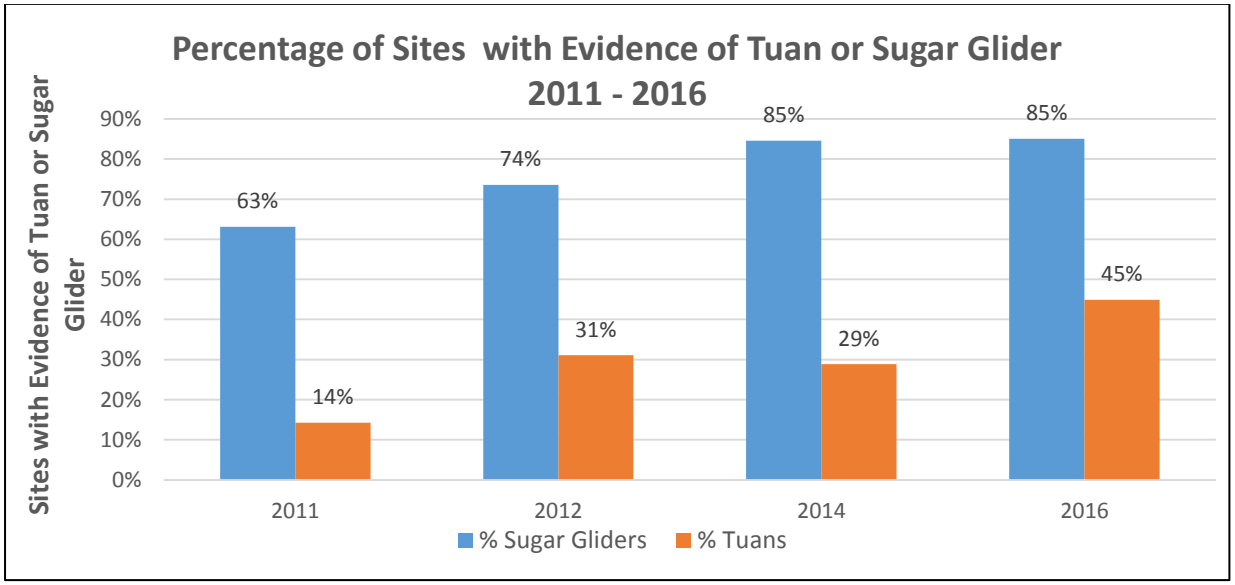


Figure 1. Percentage of Sites with Evidence (Animal or Nest) of Tuans and Sugar Gliders, 2011 – 2016.

Figure 1 also shows that Sugar Gliders were more commonly occupying nest boxes than Tuans in all years. It is notable though that 2016 is the first year in which Sugar Glider numbers have not increased on the previous monitoring period, remaining stable at 85% of sites. For the 15% of sites without evidence of Sugar Gliders in the boxes, our anecdotal observations suggest these locations often had many natural hollows in trees (which may be used by gliders in preference to the boxes).

Number of Animals seen

Whenever we check the contents of a box, we document what type of nesting material is present and how many individuals of each animal species could be seen. However, because we never touch or otherwise directly disturb the nesting material, it is often not possible to tell whether one or more individual animals are hidden unseen beneath the surface level of nesting material.

- Where no animals could be seen, we wrote that '0' were present, and - where relevant - made an extra note that there may be some animals hidden deeper in the nesting material.
- Where one or more animals could be seen, we recorded the number we could see, and - where relevant - made an extra note that there may be some extra animals hidden deeper in the nesting material.

During our surveys in Autumn, Tuans are almost always seen in the boxes as a single individual. Only on very rare occasions have two Tuans been seen in the same box together. At other times of the year, particularly when females are raising young, multiple Tuans will use the same box.

As well an increase in the percentage of sites with 'evidence' of Tuans in 2016 (as shown in Fig 1), there was also an increase in the number of live Tuans seen, which rose from 10% or less of sites in previous year up to 15% in 2016 (Figure 2).

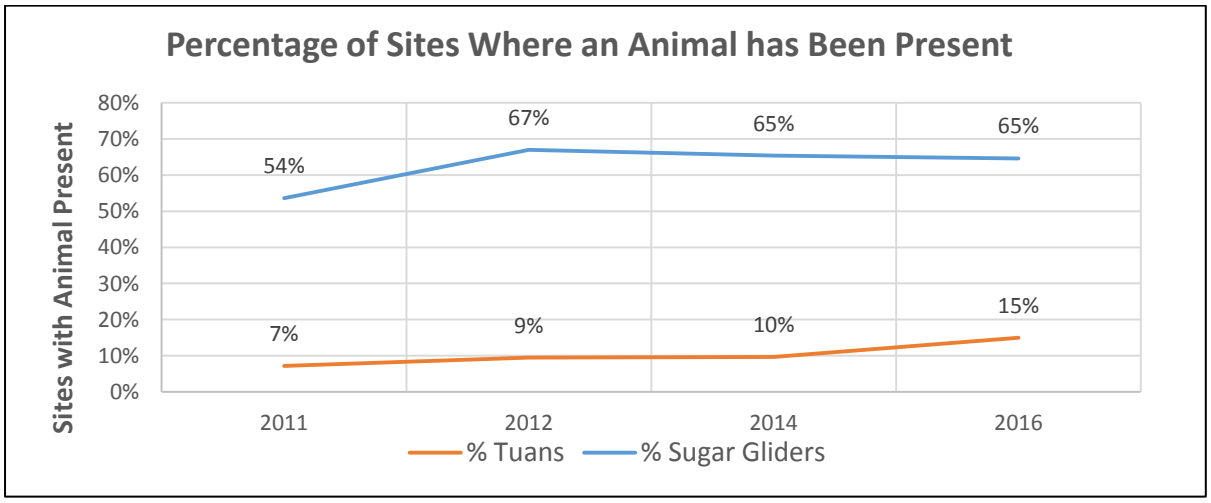


Figure 2. Percentage of sites with observations of actual Tuans during survey (2011 to 2016).

As shown in Figure 3, multiple Sugar Gliders regularly were present in a box at the same time.

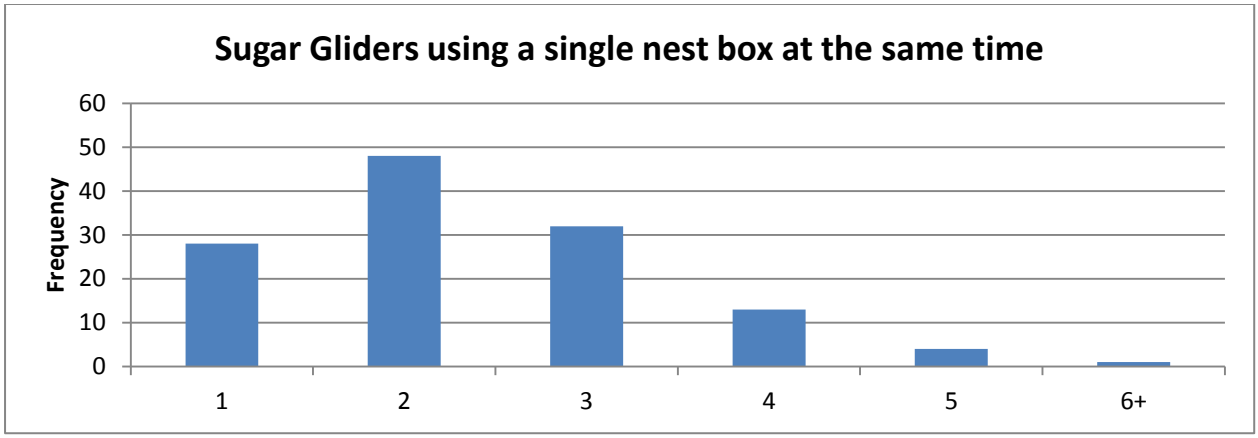


Figure 3. Number of Sugar Gliders seen together in a single box (from the 2016 surveys).

What do the Nests Look Like?

This photo above shows a typical example of the 'messy' nests found within boxes used by ***Tuans.*** *There are feathers and bark, and usually a pile of droppings in the corners. Other 'non-natural' items such as wool and string are also added to Tuan nests, when available.*

This photo above shows a typical bowl-shaped ***Sugar Glider nest.*** *Gliders remove their droppings from the box. In our region, they rarely use any nesting material other than eucalypt leaves.*

Shared Apartments

It was relatively common during the surveys to find that a single box had been used by both Sugar Gliders and Tuans. This shared use of a box took many forms, including boxes with (a) typical Tuan and Sugar Glider nesting material mixed together, (b) one type of nest on top of another, and (c) one type of animal sitting in the others nest. However, we have never found individuals both species present in the same box at the same time.

Although the results show that Sugar Gliders and Tuans compete for nesting sites, we don't know whether one species consistently out-competes the other. Evidence of a Tuan making use of a glider nest seems to be as common as the reverse.

A Tuan sitting in a typical Sugar Glider nest.

A box showing a Tuan nest built on top of a Sugar Glider nest

European Honey Bees

In 2011, we were alarmed to find a high proportion of the boxes being used by feral European Bees (18%).

Feral bees can aggressively take over boxes and natural tree hollows, at the expense of native animals. They also out-compete and exclude native pollinators and nectar-feeders.

For the purposes of our program, it has been very encouraging to see a dramatic decrease in active bee hives within the boxes during subsequent surveys. We removed some hives from boxes between the 2011 and 2012 surveys, and also retro-fitted a small number of boxes to discourage bees. However, we have not actively controlled bees or retrofitted any more boxes since this time – and the infestation of boxes by feral bees has continued to decline and/or remain low.

In 2016, just 4% of boxes (16 out of 436) were occupied by feral bees (Figure 4).

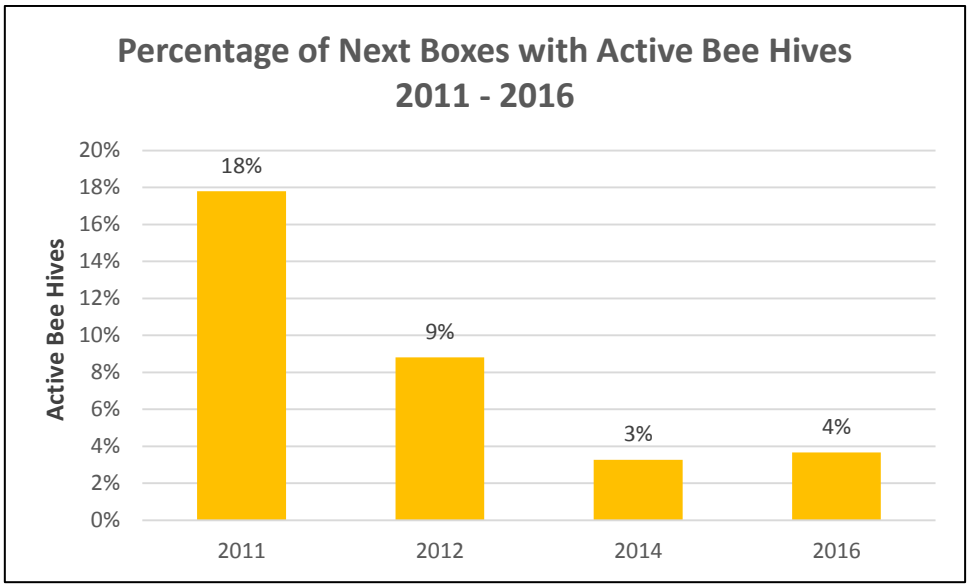


Figure 4. Percentage of Next Boxes with active bee hives 2011 - 2016.

Many boxes have evidence of occupation by a feral bee colony in the past (as shown in both pictures below). Attempts to discourage beehive formation within boxes using carpet have been largely unsuccessful (see yellow-coloured evidence of old honeycomb on the LHS picture below). Perspex on the underside of the lid appears to have had more success as a deterrent.

A small number of boxes were also found to support spiders (particularly huntsman) and ant colonies.

Regional Differences

For the purposes of our nest box monitoring programme, we have subdivided the Mount Alexander shire and surrounds into five survey regions: South East, North East, Central, North West and South West (see Figure 5). There are at least 20 nest box sites within each region.

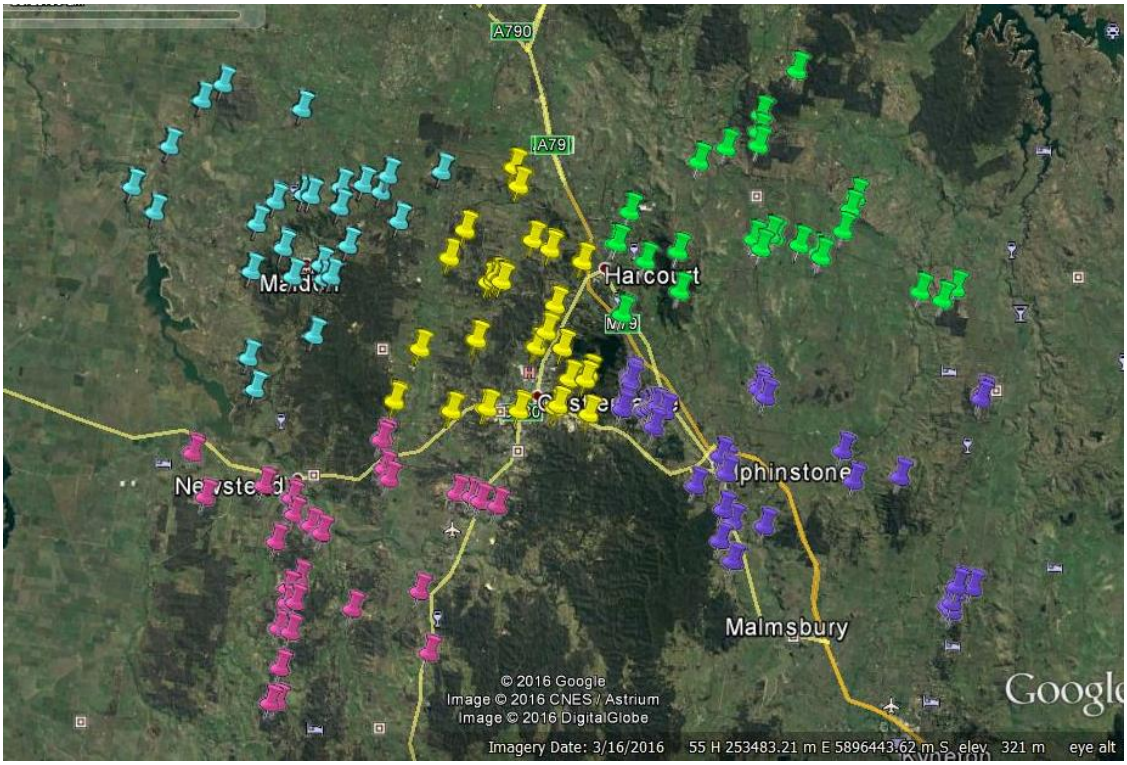


Figure 5. Nest box monitoring sites. The region is separated into 5 zones: Central (Yellow), North West (Light Blue), North East (Green), South East (Violet) and South West (Magenta).

Figure 6 shows that across the survey period, Tuans have been recorded most often in the South West region, closely followed by the Central and North West regions. Of note in the 2016 surveys is a sharp rise in records for the North East area.

In 2016, (a) all regions recorded increased evidence of Tuans compared to the 2014 surveys, and (c) all except the South-East region had their highest results ever across the across the four survey periods.

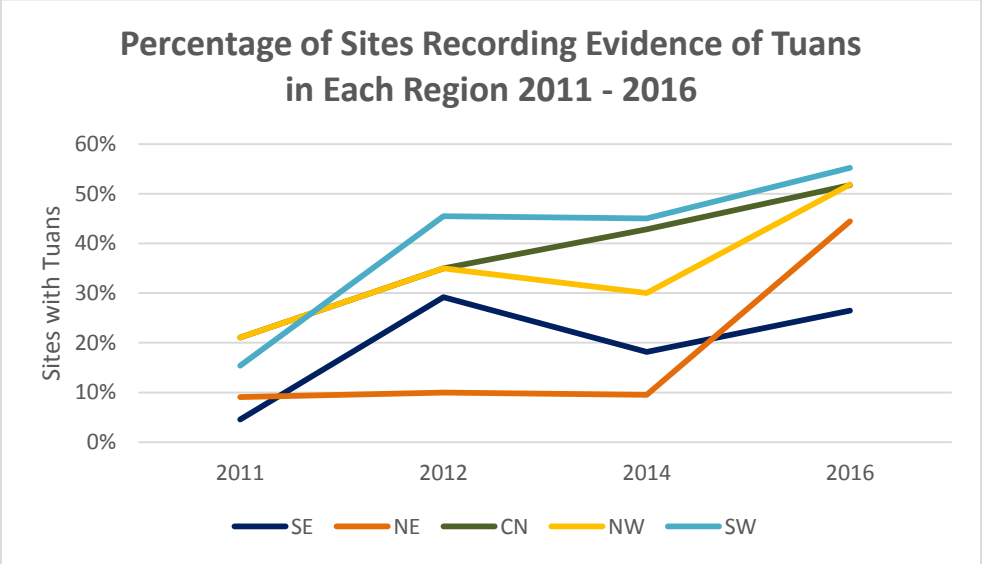


Figure 6. Percentage of boxes recording evidence of Tuans in each Region 2011 - 2016.

The Effect of 'Patch Size'

While some studies have suggested that Tuans need very large areas of continuous bushland to thrive, there have also been studies in north-eastern Victoria where they are relatively abundant in small roadside woodland remnants.

To learn more about the habitat requirements of Tuans in our area, we aimed to monitor an approximately equal number of sites within small patches of native vegetation (less than 50ha) and large patches of native vegetation (more than 50ha).

Figure 7 shows that there has been an increase in Tuan records for both large and small patch sizes since the 2014 surveys. It also suggests that Tuans are more likely to use boxes at sites in large patches bushland.

Every year since surveys have commenced, large patches of bushland have increased their usage by Tuans. The usage of smaller patches of bushland by Tuans has fluctuated up and down over the four survey periods, which suggests that these might be less reliable habitats.

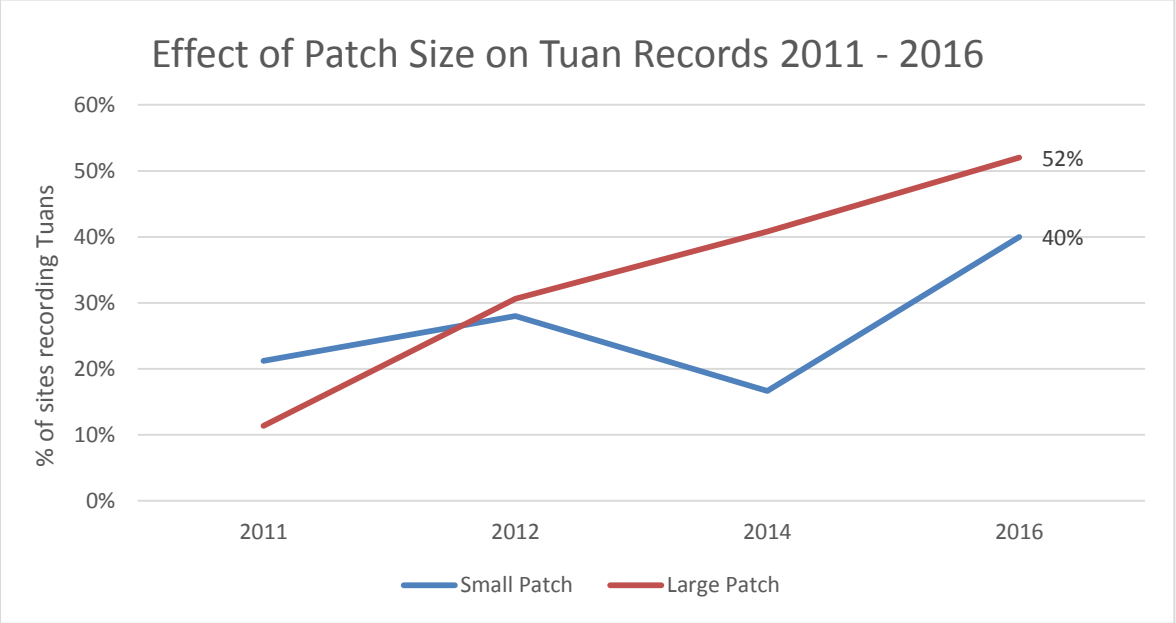


Figure 7. Percentage of sites recording evidence of Tuans, based on the patch size of the site location. A large patch has greater than 50 Ha on continuous native vegetation and a Small Patch is less than 50 Ha.

Conclusion

The 2016 monitoring results suggest that Tuan numbers are increasing, and its area of occupancy within each region is expanding. The consistent growth of Tuan records in large vegetation patches, compared to fluctuating populations in small patches, suggests that Tuans in large patches are better able to cope with seasonal variations (but this requires further investigation).

The high but stable records for Sugar Glider across the 2014 and 2016 surveys suggest that the glider population may have reached an upper limit (at 85% of sites). Jessica Lawton's research may shed light on the factors hindering gliders from using the remaining 15% of sites (e.g. limited food resources).

The 2016 nest box monitoring surveys were supported by Connecting Country's 'Connecting Landscapes Across the Mount Alexander Region' program, which receives funding support from the Australian Government.