Biolinks Alliance
Connecting Central Victoria

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Research to inform management and restoration works for squirrel gliders

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Kylie began with a summary of the ways we can monitor and learn about gliders and the effectiveness of our conservation efforts. She then used her PhD studies of highway crossings in north-east Victoria as a case study of a monitoring program using a variety of methods to evaluate the success of the crossings.

Why most conservation monitoring is, but need not be, a waste of time

There is so much we don't know and this limits our ability to manage for conservation. Monitoring of management actions is needed but we also need to ensure monitoring results are useful and used for management.

Monitoring wildlife is tricky because animals are hard to see and follow. But also there is a perception that monitoring programs are a waste of our time, not because monitoring is bad but because it is done badly.

"The results of inadequate monitoring can be both **misleading and dangerous** not only because of their inability to detect ecologically significant changes, but also because they **create the illusion that something useful has been done**" (Legg and Nagy 2006).

In part this is because we make cuts to monitoring budgets and efforts and hence miss information that might be critical. So many reports end with statements that "we don't know what is happening and more research is needed".

Many tools are available for monitoring gliders: radiotracking, hair sampling, camera trapping, scats and tracks, spotlighting, nest boxes, cage traps and genetics. But whichever tool we use, we need to look at where we do the study, how many animals or observations over how long, and what methods we use to analyse the results. To help design the monitoring study, it helps to come back to three key questions:

1. What are we trying to achieve with our management actions? Are we trying to save a species, conserve a patch, change something about the species or its habitat, or achieve community engagement?
2. Where are the gaps in our knowledge? Are there any assumptions we make in our management program that haven't actually been tested yet? Are we comparing different management options?
3. What will make us confident that our management action was a success? What do we need to show to managers, funders and the public that our actions were significantly better than doing nothing? Should we continue or do something different in the future?

Connectivity and glider conservation

Several considerations help direct our management and research:

- Gliders are fragmentation sensitive; while they are agile aeronauts, they have limits on how far they glide. Species differ and we need to focus on average (rather than maximum) distances for each species.
- Gliders have different types of movement and these are an important focus of many management programs: we can focus on daily, short range movements between resources of food and shelter, or on the broader landscape and longer range dispersal between patches to allow recolonisation.
- Management can have different scales of action: we can look at individual barriers (like roads), or corridors linking patches, or at the broader connected landscape.
- From a glider's perspective we need to decide what actions will improve connectivity :

- Corridors: we can revegetate or we can protect existing remnants such as roadsides and other linear corridors with big trees, or we can enhance existing vegetation with plantings, nest boxes, etc to make them better for gliders to move through.
- Stepping stones: sparse cover or 'isolated' trees may not look good for gliders but gliders do use these to move through the landscape.
- Artificial structures: rope bridges and glider poles help cross barriers, even between patches in paddocks.

When it comes to the effectiveness of these actions, we can look at:

- Presence/absence in patches using cameras, spotlighting, nest boxes
- Movements through corridors using radiotelemetry or marked individuals
- Gene flow by tracking genes and reproduction.

But before we start using these, we need to ask what information we will get from these. If we detect presence, does that tell us if an animal is moving through or just living in a corridor? With radio tracking, we need to have radios on those animals that are moving through. So we need good study design. We might sample before and after to detect spread and recolonisation. We can compare patches that are connected and not connected.

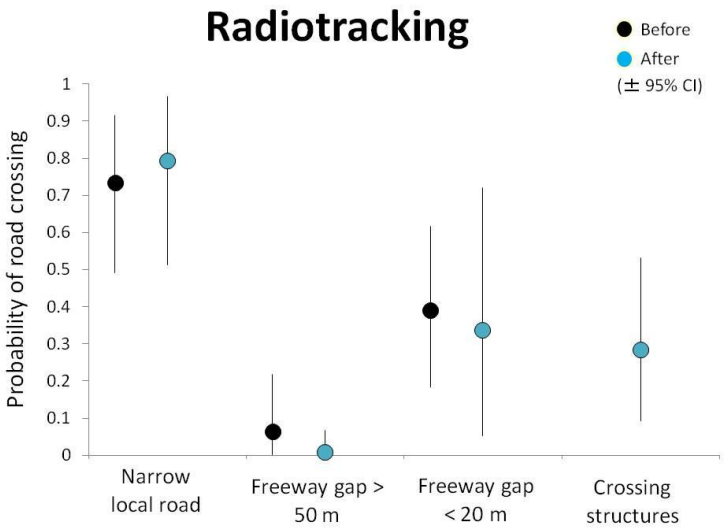
Evaluating the success of wildlife crossing structures on the Hume Freeway

This is a case study using the various techniques to monitor the use of rope bridges and glider poles across the Hume Freeway by Squirrel Gliders.

The Hume Freeway is 50-100m wide in some places whereas a Squirrel Glider glides about 30-40m, and early studies showed the Freeway was a barrier to movement. A median strip with tall trees reduced the distance in some areas, providing a natural stepping stone. The structures were installed in 2007.

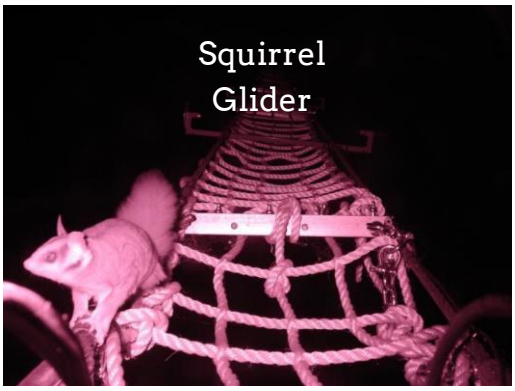
Question 1: Were the structures necessary to allow movement?

Radio tracking before showed a real issue of movement across the Freeway. Further tracking 4 years after the crossing structures were installed showed no change except where the structures were installed; movements across the Freeway were similar for sites with the structures and sites with tall trees in the median strip. However the crossing rates were not as high as across the narrow local roads.



Soanes *et al* (2013) Biol. Cons.

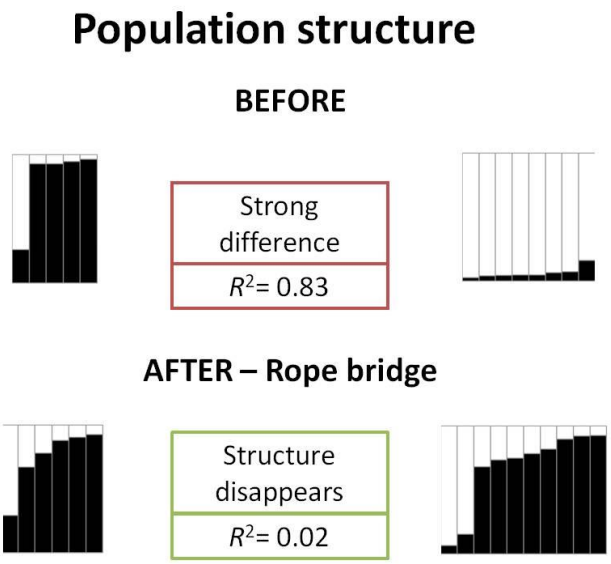
Question 2: Are animals using the crossing structures?



Over five years, cameras have recorded about 2000 crossings by Squirrel Gliders and many more by Sugar Gliders, Brushtail and Ringtail Possums, and also Brush-tailed Phascogales on 6 occasions. Squirrel Gliders and Ringtail Possums were recorded carrying young across the road.

Question 3: Is this having any effect on the genetics of populations?

Populations of Squirrel Gliders living either side of the Freeway were sampled. In the figure, each column represents a different individual and the two colours (black and white) represent different genetic groupings. Before the crossing structures were installed, there was a marked difference in the genetic makeup of populations either side of the road. After structures were installed, the genetic makeup of the populations either side of the road were very similar, indicating they had become one inter-breeding population.



The analysis was further refined by comparing the genetics and movements (based on microchip recordings) of parents and offspring. This showed that animals were crossing the road and mating with animals on the other side to produce offspring.

Conclusion

This case study showed that, by:

- using a carefully considered study design (including responses to changes in resources for the study)
- using the opportunities for before-and-after and treatment-and-control monitoring, and
- using multiple sources of information,

the study was successful in demonstrating the need and effectiveness of crossing structures for Squirrel Gliders.

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Co-authors and contributors included Rodney van der Ree, Peter Vesk, Mick McCarthy, Andrea Taylor, Paul Sunnucks, Melissa Carmody, Silvana Cesarini, Sarah McCall.

More information

Go to Kylie Soanes' website **lifeontheverge**.

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Questions: Kylie's response to a question about nest boxes and monitoring: nest boxes are useful for detecting the presence of gliders but are less useful for assessing population numbers particularly where nest hollows are also available.