

Re-establishing critical weight range mammals in the northern wheatbelt of Western Australia: Reintroductions to a safe haven free of introduced predators

In brief

Establishing predator-free “safe havens” is vital to the conservation of Australia’s small to medium-sized mammals in the critical weight range for predation by feral cats and red foxes. The Australian Wildlife Conservancy is undertaking mammal reintroductions at a number of safe havens that they have established. Monitoring and learning from reintroductions will help to improve the success of future programs.

This research has tracked the reintroduction of eight critical weight range mammals to Mt Gibson Wildlife Sanctuary in Western Australia’s northern wheatbelt, which falls within the former range of these species. The results provided new insights into population growth and dispersal, habitat use, comparison of outcomes for wild-sourced and captive-bred animals and impacts on existing species such as birds.

This work provides important evidence of the benefits of safe havens to threatened mammals and guidance to managers considering reintroductions of comparable species.

Background

Around one-third of Australia’s mammals are either extinct or threatened with extinction, with predation by introduced feral cats and red foxes the most significant factor in these declines.

Arid and semi-arid Australia has seen particularly sharp declines in the numbers of native mammal species and the size of their populations. These losses have also led to disruption of the ecological processes in which these species participate.

Many Australian mammals are vulnerable to predation by introduced feral cats and red foxes. As a consequence, large parts of Australia, particularly in the arid and semi-arid zones, are missing a high proportion of their native small and medium-sized mammal fauna in the critical weight range of 50 g to 5500 g that makes them prime targets for these predators.

Reintroducing native mammals to parts of their former range is important not only to conserve those species but also to help restore key ecological processes in which these species participate, including soil pitting, pollination, spore and seed dispersal, herbivory, nutrient and water retention, and predation. The disruptions to these ecological processes have consequences for

other aspects of the ecosystems and for human welfare. The successful reintroduction of small and medium-sized native mammals generally requires the effective control, even elimination, of feral cats and red foxes from the local environment.

The establishment of a network of “safe havens” from which introduced predators have been removed is part of the Australian Government’s Threatened Species Strategy. Australian Wildlife Conservancy (AWC) is a leading proponent of the establishment of safe havens, managing a current network of seven fenced exclosures on the mainland and one island, each of which is supporting reintroduction projects. These reintroductions have improved the conservation futures of a number of species, by increasing both the number of secure populations and the sizes of those populations.

A numbat at Mt Gibson. Photo: Jane Palmer/AWC



Background (continued)

AWC reintroduced eight threatened mammal species between 2015 to 2019 to Mt Gibson Wildlife Sanctuary, a large (7832 ha) fenced feral predator-free area located in the northern wheatbelt of Western Australia. These are the woylie (or brush-tailed bettong), western barred bandicoot, Shark Bay mouse, greater bilby, numbat, red-tailed phascogale, banded hare-wallaby and greater stick-nest rat.

Animals have been translocated to Mt Gibson from a range of sources, as follows:

- woylies – AWC’s Karakamia Wildlife Sanctuary, as well as Whiteman Park and Perup (Western Australia)
- red-tailed phascogales – Western Australia’s wheatbelt and the University of Western Sydney
- bilbies – AWC’s Scotia and Yookamurra Wildlife Sanctuaries (New South Wales and South Australia, respectively) and Thistle Island (South Australia)
- numbats – AWC’s Scotia and Yookamurra Wildlife Sanctuaries, and Perth Zoo

- western barred bandicoots, Shark Bay mice and banded hare-wallabies – AWC’s Faure Island Wildlife Sanctuary (Western Australia), and Bernier and Dorre Islands (both Western Australia)
- greater stick-nest rats – Franklin and St Peter Islands (South Australia) and Alice Springs Desert Park (Northern Territory).

The translocations have been conducted in collaboration with the Western Australian Department of Biodiversity, Conservation and Attractions, the South Australian Department of Environment and Water, Perth Zoo and Alice Springs Desert Park.

The Australian Government’s National Environmental Science Program through the Threatened Species Recovery Hub has contributed funds to AWC for research aimed at improving our understanding of the factors contributing to the success of the translocations and the ecology of reintroduced species.

Prior research

In the earlier stage of this research (Threatened Species Recovery Hub Project 4.1.3), AWC researchers successfully established the eight target species into the Mt Gibson safe haven. Major learnings from Project 4.1.3 were that numbats from zoo and wild sources were similarly successful in their survival and use of habitat, and that woylies rapidly increased the size of their population and made use of the entire range of habitats in the safe haven. We also found that the establishment of the Mt Gibson safe haven, designed to protect its resident native mammal species from introduced predators, has likely also had a positive effect on several surviving native bird species in the region.

Research aims

We set out to address the following key research questions, which aimed to expand on the findings of the earlier research, and were also and ultimately designed to provide an understanding of the carrying capacity of the management area of Mt Gibson, that is, what population sizes it can support:

1. How readily do the woylies survive, disperse and increase their population, and what habitats do they use after being translocated into a semi-arid area?
2. How readily do wild-sourced and captive-bred numbats survive after translocation and do the two groups show any significant differences in the way they use habitat?
3. What is the evidence of an impact of the Mt Gibson safe haven on the surviving native bird fauna?



Mt Gibson fence line. Photo: Brad Leue/AWC

What we did

The research team translocated the eight species of mammals to pre-determined release sites at Mt Gibson, following the approved translocation plans for each species, which were developed by AWC. We then developed and enacted methodologies for the research program, gathered and analysed the information we collected, and published it.

For research question 1 (woylies), we conducted a reintroduction program for woylies, translocating 162 individuals to Mt Gibson over three years. We monitored the animals to see how well they survived after they were released, how their population grew and dispersed around the safe haven, and what habitats they preferred of those available to them within the safe haven.

For research question 2 (numbats), we translocated wild-born and captive-bred individuals to Mt Gibson. We then monitored them via radio-tracking to gather information about their survival and behaviour before and after translocation. This allowed us to compare how various factors (e.g., sex and whether wild-born or captive-bred) influenced their survival and establishment in the new environment.

For research question 3 (non-target bird fauna), we conducted bird surveys over six years at Mt Gibson, detecting 91 species in total across four major vegetation types. After the first three years, the Mt Gibson Wildlife Sanctuary was established, with the consequence that half the survey sites were enclosed by the fence that excluded introduced predators, while the rest remained outside the fence and exposed to hunting by feral cats and red foxes.

Key findings

For research question 1, we found that reintroduced woylies spread across the entire area of the safe haven over the three-year period. They had very high rates of survival immediately after translocation, and they made use of all the habitat types found within the safe haven. We conclude from this that woylies appear to be readily adapted to reintegration into semi-arid environments as long as they are free from the predation pressures associated with feral cats and red foxes.

For research question 2, we found that captive-bred numbats were equally able to survive after translocation as were wild-sourced numbats, with no significant differences between the sexes, and that they made similar use of the habitats that were available. This means that if predation by feral cats and red foxes is removed, and they

are provided with suitable habitat, numbats may be successfully sourced from either wild or captive-bred populations. This provides greater flexibility to managers seeking to reach a desired number of founder individuals with an appropriate genetic mix.

For research question 3, about the impact of safe haven on birds, we found considerable variation between species, but the overall finding was that the safe haven most likely had either no impact or a positive impact on the populations of birds. While it was difficult to find patterns among the bird species that were positively impacted, due to low numbers of detections, they were all small to medium-sized insectivorous species. Most notably, the variety and number of birds appeared to increase in woodland and shrubland habitats inside as opposed to outside the safe haven.



AWC Ecologist Chantelle Jackson releasing a red-tailed phascogale at Mt Gibson. Photo: Brad Leue/AWC

Implications

The positive results of these reintroductions are contributing significantly to the conservation of the eight target threatened mammal species, with the findings of most relevance to conservation managers in Australia conducting reintroductions of threatened mammals. AWC has shared detailed information on the translocations with relevant recovery teams and published the results in the scientific literature.

Our research provides guidance for future translocations of other, comparable species, especially those like woylies that are commonly monitored by cage trapping. This is important because the establishment of safe havens is an objective of the Australian Government's Threatened Species Strategy. Research such as this into the factors contributing to the success of translocations will help improve outcomes for translocations and increase the confidence of conservation organisations in undertaking this kind of important work.

Further, as our results from research question 3 show, preventing predation by introduced feral cats and red foxes to conserve threatened small to medium-sized native mammals can have positive impacts on non-target species, such as local birds. In this way, safe havens may provide additional natural resource management benefit.

Cited material

Kanowski J, Roshier D, Smith M, Fleming A (2018) Effective conservation of critical weight range mammals: reintroduction projects of the Australian Wildlife Conservancy. In: *Recovering Australian Threatened Species: A Book of Hope* (Eds S Garnett, P Latch, D Lindenmayer, J Woinarski) pp. 269-279. CSIRO, Melbourne.

Palmer, N., M. Smith J., L. Ruykys, C. Jackson, G. Volck, N. Riessen, A. Thomasz, C. Moir, and B. Palmer. 2020. Wild-born versus captive-bred: a comparison of survival and refuge selection by translocated numbats (*Myrmecobius fasciatus*). Online first. *Wildlife Research*.

Smith, M. J., L. Ruykys, B. Palmer, N. Palmer, G. Volck, A. Thomasz, and N. Riessen. 2020a. The impact of a fox- and cat free safe haven on the bird fauna of remnant vegetation in south-western Australia. *Restoration Ecology* 28:468–474.

Smith, M. J., G. Volck, N. Palmer, C. Jackson, C. Moir, R. Parker, B. Palmer, and A. Thomasz. 2020b. Conserving the endangered woylie (*Bettongia penicillata ogilbyi*): Establishing a semi-arid population within a fenced safe haven. Online first. *Ecological Management & Restoration*.

AWC Science team and Badimaya Traditional Owners releasing a woylie at Mt Gibson. Photo: Brad Leue/AWC



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