Science for Saving Species

Research findings factsheet

Project 3.2.2.1



Southern brown bandicoot reintroduction at Booderee National Park

In brief

The southern brown bandicoot (eastern subspecies *Isoodon obesulus obesulus*) is a nationally threatened marsupial.

The bandicoot was once common in Booderee National Park, but became locally extinct about 100 years ago. Following 17 years of fox control by Parks Australia, conditions were considered suitable to trial the reintroduction of bandicoots in 2016 when 11 bandicoots were released. The park is unfenced and intensive fox management remains ongoing. Before this project, there were no published reports on the outcomes of earlier reintroductions of the species, nor guidance to inform future projects. To address this knowledge gap, we monitored the fates of the 11 bandicoots released and investigated dispersal, home range, habitat selection and the factors (e.g., sex, body mass, release order) that influenced survival.

We found that males dispersed more than twice as far as females, but there was no significant sex-bias in the size of home ranges. Within their home ranges, the bandicoots preferred heath and woodland landscapes over forest.

The bandicoots bred successfully. Six months after release, we caught four females and three males from the original 11, and each of the four females had three to four pouch young. The following year saw the first adult bandicoots that had been born in Booderee National Park. These success indicators give encouragement to continue the program of reintroduction of southern brown bandicoots to Booderee National Park.

The southern brown bandicoot

Southern brown bandicoots are a digging marsupial. They occur in a variety of habitats, including native forest, woodland, shrubland and heath. They are territorial, and seek out dense understorey for nesting and to avoid predators, although they often forage in more open vegetation. The species is omnivorous, and forages opportunistically on fungi, invertebrates, small vertebrates and nectar. Males are larger than females (500–1500 g versus 400–1000 g), and established male bandicoots have larger home ranges than females.













Booderee National Park is located on a peninsula in the Jervis Bay Territory of Australia, approximately 200 km south of Sydney on the southern coast of New South Wales. Co-managed by Parks Australia and the Wreck Bay Aboriginal Community, it encompasses 6379 ha of wild, unfenced, predator-managed environment.

Reintroductions in conservation strategies

Reintroductions are increasingly being used to improve the conservation of threatened species. When successful, they can improve the conservation outlook of threatened species and restore ecosystem processes. However, reintroductions can be justified only after threats to the re-establishment of the species have been addressed.

Predation by foxes has been implicated as a threat to the Endangered southern brown bandicoot, along with predation by feral cats, habitat loss and fragmentation and inappropriate fire regimes. Habitat in Booderee is relatively intact and the park managers actively manage fire. A program of poison-baiting to control for introduced red foxes has been underway in Booderee since 1999, with efforts intensifying from 2003. The baiting program has succeeded in reducing numbers of foxes and cats detected in the park, and whenever a predator of either species is detected targeted control follows. This effective management of threats provided ideal conditions in which to trial a reintroduction of southern brown bandicoots.

In collaboration with Parks Australia, we set out to re-establish a selfsustaining population of southern brown bandicoots at Booderee by translocating up to 45 wild-caught individuals over a three-year period. The initial pilot release took place in May 2016 and included just 11 individuals; followed by another 12 in 2017 and 5 in 2018 – a total of 28 over the three years.

Before this project there was anecdotal evidence regarding the success of prior translocations of southern brown bandicoots, but no findings were available in peer-reviewed or grey literature. Our study aimed to address this gap in knowledge by examining factors that influence the survival, dispersal, home range and habitat selection of reintroduced animals.

Monitoring is highly valuable to reintroduction programs. It can:

- evaluate if threats have been effectively addressed and conditions are suitable for a reintroduction
- 2. determine the survival and establishment of translocated individuals and their population growth over time
- indicate if management approaches are working or need to be adjusted
- 4. determine if conditions are suitable to allow further animals to be released.

What we did

We caught six females and five males from wild populations in New South Wales state forests near Eden and translocated them into Booderee National Park. This source population is located approximately 300 km south of Booderee National Park and is the closest viable source population.

An experienced veterinary team examined all the trapped bandicoots for their suitability for translocation, based on factors such as good health, age and reproductive status by both assessing the whole animal, and analysing a suite of diagnostic samples including blood, faeces and swabs. Each animal was fitted with a radio transmitter mounted to the tail. We transported the bandicoots to Booderee by road in custom-made transportation boxes and released them the same day of capture within an hour of dusk.

We had assessed three vegetation types common in the park as suitable habitat - heath, woodland and forest - and released the animals in approximately equal numbers to each vegetation type. The locations were chosen for each having a suitable abundance of grass trees (Xanthorrhoea species), which are important for shelter for southern brown bandicoots. These areas are also characterised by limited vehicular traffic, which can pose a significant threat. Finally, they support good sources of food for bandicoots such as fungi and invertebrates.

For the first four weeks after the reintroductions, we intensively tracked the bandicoots to monitor their survival, movement and habitat selection during day and night. After this period, bandicoots whose transmitters were still attached were tracked every few days until the transmitters fell off.

Six months after the reintroduction, we conducted targeted trapping of bandicoots over 176 trap nights to determine the number of animals still in the release area, and to assess their health and check for signs of breeding.

Key findings

Dispersal

We expected from previous studies of other marsupials that males, smaller individuals, and those released last would disperse further. Radio tracking found that dispersal distances varied from 203 to 1003 m. Males dispersed twice as far as females (704 metres on average versus 332 metres), but there were no significant associations between dispersal distance and body mass or order of release.

Home ranges

The average size of home ranges was 9.5 ha. While the home ranges of males tended to be larger (15.2 ha versus 4.6 ha) the difference was not statistically significant. The home ranges of different bandicoots overlapped.

Habitat preferences

We released bandicoots into heath, woodland and forest in approximately equal numbers and predicted that they would occupy all three habitat types in proportion to their availability. However, in establishing home ranges, the bandicoots showed a preference for heath and woodland vegetation communities and tended to avoid forest. Within their home ranges (which due to size are likely to include a variety of vegetation communities), bandicoots also selectively used woodland and heath. Previous studies have shown that in Booderee National Park, heath provides the densest understorey and thus the best protection from predators, followed by woodland and then forest, and the protection that heath and woodland shrubby understory affords may thus have influenced the bandicoots' preferences for vegetation type.

Nests

Eight of the 11 bandicoots were tracked to 15 different nests (one to three per bandicoot).

Nests were not shared. For bandicoots with multiple nests, the distance between nests ranged from 24 to 79 metres. Nests were most commonly located in woodland but also occurred in heath. Most nests were under the skirts of Xanthorrhoea grass trees (n = 13), and one bandicoot had two nests under dense grass and sedge. Nests were constructed above ground level from a range of materials, including Xanthorrhoea fronds, grass, leaf and other organic matter, bundled into a round nest of about 40–50 cm in size with a tunnel opening.

Survival

One of the most important findings was that no bandicoots died within the intensive four-week monitoring period and seven of the 11 bandicoots were known to be alive after six months. More data will be required to determine the influence of other factors like body mass and release order on reintroduction success.

Breeding

Monitoring six months after release revealed that all four females caught had three or four pouch young each. Their trap locations were within the boundaries of their estimated home ranges, and the bodyweight of each animal was equal to or greater than its release weight.

Program evaluation

Before the commencement of the program, success was defined as the accomplishment of the following three criteria: (1) in the first year, a population that is stable to increasing plus evidence of breeding; (2) by the second year, an increasing population and the presence of adult animals that have been born in the area; and (3) after five years, a population that is increasing in number and stable in location, with dispersal beyond the initial release area.

Our monitoring demonstrated the success of the initial translocation, and the satisfaction of criterion one. This supported the decision to continue with two more rounds of reintroductions in 2017 and 2018, bringing the total number of animals reintroduced to 28. These further reintroductions were aimed at bolstering numbers and ensuring that the population can be self-sustaining.

Criterion two was also met, and a genetic study is underway to support success in criterion three, the longterm persistence and genetic diversity of the reintroduced southern brown bandicoot population at Booderee National Park.

BELOW: Volunteers radio tracking the southern brown bandicoots released in Booderee National Park in 2016.





Recommendations

Our study outlines factors influencing the establishment of reintroduced bandicoots, including their habitat and spatial requirements, and provides guidance for future bandicoot translocations. As such, our findings contribute new knowledge about translocations of this nationally Endangered marsupial. Our monitoring and published results further validate the decision to continue the bandicoot reintroduction program, as it has successfully met the year one and two criteria for reintroduction success.

We recommend that future bandicoot reintroductions to Booderee National Park take place in heath and woodland vegetation types, and that they take into account that male bandicoots are territorial, need space and should be reintroduced further apart.

RIGHT AND BELOW: Live trapping and monitoring bandicoots. Photo: Natasha Robinson





Further Information

This factsheet summarises findings published in:

Robinson, N. M., MacGregor, C. I., Hradsky, B. A., Dexter, N., and Lindenmayer, D. B. (2018). Bandicoots return to Booderee: initial survival, dispersal, home range and habitat preferences of reintroduced southern brown bandicoots (eastern sub species; Isoodon obesulus obesulus). Wildlife Research **45**:132–142

For more information contact Natasha Robinson, Fenner School of Environment and Society, The Australian National University, natasha.robinson@anu.edu.au