

# The first reintroduction of the western barred bandicoot (*Perameles bougainville*) to mainland Australia



By

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*The University of Sydney, New South Wales*

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*I declare that this thesis is my own account of my research and contains work that has not previously been submitted for a degree at any tertiary educational institution.*

.....

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July 2004

## Preface

The publications listed below form the basis for parts of this thesis.

Sections of Chapter 2 are published as:

Richards, J.D. and Short, J. (2003). Reintroduction and establishment of the western barred bandicoot *Perameles bougainville* (Marsupialia: Peramelidae) at Shark Bay, Western Australia. *Biological Conservation* **109**, 181-195.

Jeff Short provided supervision and critical comments on the manuscript.

Sections of Chapter 3 are published as:

Short, J., Richards, J.D. and Turner, B. (1998). Ecology of the western barred bandicoot (*Perameles bougainville*) (Marsupialia: Peramelidae) on Dorre and Bernier Islands, Western Australia. *Wildlife Research* **25**, 567-586.

Data collected on Dorre and Bernier Island by Jeff Short and Bruce Turner provided the basis for this paper, written primarily by me, and for comparison with data collected by me on Heirisson Prong.

Animal ethics approval was obtained from the CSIRO Sustainable Ecosystems Animal Ethics Committee, and was covered by WAAP9 between 1995 and 1997, and 98/99 – 15(2) between 1998 and 2000. Animal ethics approval from the University of Sydney was covered under License No. L04/4 – 99/2/2934.

Research was carried out under Department of Conservation and Land Management Licence Numbers PA000078, TF000721, TF000757, SF002067, SF002448, SF002731 and SF003084, for ‘Authority to enter a prohibited area’, ‘Licence to take fauna for educational or public purposes’, and ‘Licence to take fauna for scientific purposes’.

## Summary

Almost half of the world's mammal extinctions in the last two hundred years have occurred in Australia (Short and Smith 1994). The western barred bandicoot *Perameles bougainville* is one of a suite of species that is currently threatened with extinction, surviving only on two islands in Shark Bay, Western Australia. Reintroduction has been used as a tool in conservation biology to assist in the recovery of threatened species, such as the western barred bandicoot. The aims of this project were to 1) successfully reintroduce and establish a free-ranging mainland population of the western barred bandicoot at Heirisson Prong, Shark Bay, 2) contribute information on the biology of the species, its interactions with introduced species, and its likelihood of persistence as a reintroduced population in the longer-term, and 3) to provide recommendations to assist future reintroductions of the species.

The first reintroduction of the western barred bandicoot from surviving remnant island populations to the mainland, some 60 years after its apparent mainland extinction, was from Dorre Island to Heirisson Prong in 1995. Animals were translocated initially to a predator-free refuge on Heirisson Prong, and then subsequently released to the 12 km<sup>2</sup> peninsula where introduced predators (foxes *Vulpes vulpes* and feral cats *Felis catus*) had been controlled, but European rabbits *Oryctolagus cuniculus* had not. Despite a small founder number and high mortality of free-range bandicoots in the presence of a low-density feral cat population, the bandicoot population successfully established.

The reintroduced population of western barred bandicoots provided an opportunity to study the biology of the species, and to compare it with the remnant island populations and other species of Australian bandicoot. Many population parameters were similar between the island and mainland western barred bandicoot populations, as well as between the western barred bandicoot and other bandicoot species, suggesting that the habitat at the reintroduction site is suitable for long-term persistence of the population. However, there were some notable differences. The western barred bandicoot is the smallest extant species of bandicoot, with fewer young per litter than recorded for other bandicoot species, adult sex ratios were closer to parity, animals reached sexual maturity later, and it is the only species of bandicoot where females are larger than males. Home range size is larger also than recorded for

other species. Some of these differences may be explained in part by trade-offs between island dwarfism, lactational pressures, and nest defence.

The nesting biology of the western barred bandicoot was studied at Heirisson Prong, including during periods of high and low densities of rabbits. Individuals of the species constructed and utilised nests in a similar fashion to other species of Australian bandicoot, nesting amongst litter underneath shrubs. The western barred bandicoot appeared to favour particular shrub species, especially when vegetation condition was poor due to rabbit damage, but displayed flexibility in being able to construct nests under a variety of shrub species where at least some surface litter was present. Grasses were used in nest construction only when rabbit density was low. Nests appear important for protection against temperature extremes and diurnal predators.

Vegetation exclosures around three of the shrub species most commonly used by the western barred bandicoot for nest sites (*Acacia ligulata*, *A. tetragonophylla* and *Melaleuca cardiophylla*) were used to examine the impact of rabbits on vegetation on Heirisson Prong. A high-density rabbit population over the summer of 1997/98 caused in a decrease in canopy cover and the death of mature *A. ligulata*. Subsequent rainfall and low-density rabbit populations allowed *A. tetragonophylla* shrubs to recover their former structure, and *M. cardiophylla* to recover, but not to the same degree. The flexibility of western barred bandicoots in use of nest materials and their omnivorous diet may enable the species to survive in the face of habitat modification by rabbits.

Population viability analysis was used to examine future options for the recovery of the endangered western barred bandicoot. Biological data from the Dorre Island and Heirisson Prong populations were input to the computer simulation program VORTEX. The western barred bandicoot populations were modelled under a variety of scenarios to examine the possible effects of changes in carrying capacity, founder population size, inbreeding depression, and the occurrence of drought and cat predation as catastrophes, on the probability of population extinction. This analysis highlighted the need for eradication of feral cats, above all other management actions. Cat predation was particularly potent when it acted through high loss of juveniles, as well as adult bandicoots. Predator control is considered critical for the long-term persistence of reintroduced populations of the western barred bandicoot.

This study documents the first reintroduction of the endangered western barred bandicoot to mainland Australia. The population had been extant for four years at the

completion of data collection for this thesis, in late 1999 and for over eight years at the finalisation of this thesis in July 2004. The knowledge gained from the reintroduction was used to discuss management recommendations and future options for the recovery of the species. The primary concern for reintroductions of this, and other species of bandicoots, remains the control of introduced predators. For long-term persistence of small, isolated populations, such as those of the western barred bandicoot at Heirisson Prong and the Arid Recovery Project at Roxby Downs in South Australia, and the eastern barred bandicoot *Perameles gunnii* at a range of sites in Victoria, the complete eradication of introduced predators is essential.

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