



# RESEARCH FINDINGS 2011

*The quenda or southern brown bandicoot  
(Isoodon obesulus).*

## Role of Australian digging mammals in ecosystem health

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**M**ammals that move or manipulate soil for food or to create shelter can completely change the biotic and abiotic characteristics of their habitat, potentially creating multiple benefits to the overall health of the ecosystem. The main digging mammals within Australia, bandicoots and bettongs, create small, conical-shaped holes while foraging for unground fungi, earthworms and tubers. The majority of Australian digging mammals have undergone drastic range and population contractions within the last 100 years. Where ecosystems have lost digging mammals, key processes may be reduced and this may contribute to declines in ecosystem health. Our project will investigate the ecological impacts of mammal foraging pits on soil condition, water infiltration, seedling recruitment, fungi dispersal and fire dynamics.

'Ecosystem engineers' are organisms that substantially modify the physical structure of their habitat and thus the availability of resources for other species. This disturbance can have multiple benefits to the overall ecosystem<sup>1</sup>.

Foraging pits created by digging mammals may:

- 1) alter the physical properties of soil condition including soil compaction and water infiltration<sup>2,3</sup>;
- 2) influence seed dispersal and germination via seed caching or accidental seed capture<sup>1</sup>;
- 3) effect the dispersal of mycorrhizal spores which are important for soil and plant associations in an ecosystem<sup>4</sup>; and
- 4) alter litter build-up that subsequently affects the patchiness of fire.

The majority of Australian digging mammals (bettongs, potoroos, bilbies and bandicoots) have suffered drastic declines in mainland populations and substantial range contractions.



*Hannah Anderson with one of the bandicoots she is studying.*

Only 16 of the 21 digging mammal species are still present in Australia today. Over two-thirds of digging mammal species (11 species) are of conservation concern and half of these (five species) are now critically endangered or endangered. Digging mammals that were once common in ecosystems are now rarely observed or entirely absent. For example, a hundred years ago, woylies (*Bettongia penicillata*) were described as 'common' over a wide geographic range<sup>5</sup>. However, due to disease, habitat loss and introduced predators, the range of the woylie has drastically



Study site location at Lake Martin, Yalgorup National Park.

## How much soil does a quenda dig when a quenda does dig soil?

Although quenda (southern brown bandicoot; *Isodon obesulus*) have declined in their range and density<sup>5</sup>, populations have persisted in wetlands and dampland areas on the Swan Coastal Plain. We examined the foraging activities of quenda at Lake Martin, Yalgorup National Park, where these digging mammals are fairly numerous and their digging activities are easily recognisable. Population estimates were carried out (surveys using cage traps and mark-recapture techniques) to determine the number of quenda utilising the study area. Additionally, the numbers of diggings made overnight were estimated for 10 x 10m plots. Finally, the physical properties of the foraging pits were determined by recording the depth and amount of soil displaced (from plaster of Paris moulds of 45 individual diggings). These data indicate that an individual bandicoot (averaging 1.5kg) can displace more than 3 cubic meters of soil per year (or about the same size as a small spa)! Their digging activities are therefore a critical component of soil ecosystem processes, contributing to physical soil turnover, leaf litter disturbance, movement of fungal spores, and creating fertile patches for seedling recruitment.



Foraging pit created by a bandicoot.

declined and the species is now considered endangered, being locally extinct from many areas and occupying only a fraction (<1 %) of its original range<sup>5</sup>.

With the exception of woylies<sup>2,3</sup>, very little research has examined physical properties of mammal-caused foraging pits, or the potential flow-on effects of mammal digging. Understanding the relationship between forest health and mammals is essential for conservation management of both mammal species and restoration of the woodlands.

For more details on this project, contact **Leonie Valentine**

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