Going nuts for boodies

Once widespread across Australia, the boodie, or burrowing bettong, is being helped by a significant conservation project. And scientists are hopeful that its recovery will aid another declining species too.

By Tamra Chapman and Rhianna King

The boodie (*Bettongia lesueur*), or burrowing bettong, is the only member of the macropod (kangaroo and wallaby) family that digs and inhabits burrows. Boodies are gregarious, highly social and live in a complex warren system with numerous entrances and interconnecting passages. Some warrens can have as many as 90 entrances and can house 20 to 40 boodies. Boodies have a short gestation period and, while they only produce one joey at a time, they may raise up to three young in a year.

Boodies once had one of the largest distributions of any native mammal in Australia. However, they were considered an agricultural pest and fell victim to hunting and poisoning as well as predation by introduced European foxes (*Vulpes vulpes*) and feral cats (*Felis catus*) until they became completely extinct on the mainland by the early 1940s. They are now confined to less that 0.01 per cent of their historical range on six Shark Bay and Pilbara islands, and some mainland fenced enclosures.

Thankfully, an important conservation project at Lorna Glen—a 244,000-hectare former pastoral lease acquired by the Western Australian government in 2000 for conservation—is providing a safe, predator-free haven for boodies, and a number of other mammal species (see 'Into the wild: restoring rangelands fauna', *LANDSCOPE*, Winter 2009). It is also giving scientists from the Department of Parks and Wildlife (DPaW) opportunities to study the reintroduced animals and some of their associated ecological processes. As we know, the decline of a species can never be viewed in isolation and can often have landscape-scale repercussions. One of the boodies' most important ecosystem functions is digging and seed dispersal, and their population decline might explain the decline of another species too.

SANDALWOOD DECLINE

Oil from the sandalwood tree (*Santalum spicatum*) has long been used by aromatherapists and perfumers. During the 1940s, sandalwood earned up to 45 per cent of the colony's export income and today about 2,000 tonnes is harvested in Western Australia each year, under the management of the Forest Products Commission.

Although widely distributed from Shark Bay through the Wheatbelt and arid Goldfields to the south coast, sandalwood has declined due to clearing for agriculture, and remaining stands have low rates of natural recruitment. The reasons for this include grazing, fire, low rainfall and poor seed dispersal and germination, due to the loss of diggers and seed dispersers like boodies.

Sandalwood has smooth, round fruits that are about 15–25 millimetres in diameter with a reddish-brown, leather-like skin which covers a hard, woody nut. The kernels inside the nuts are thought to be one of the boodies' favourite foods and they regularly visit sandalwood trees to check for fallen nuts. Sometimes the boodies eat the nuts where they find them, but most often they take the nuts away (up to 360 metres from the tree) and bury them. To the boodies, they're probably just saving the buried nuts for a rainy day, safe from other hungry animals. To the tree, they're performing a valuable service that plays an important role in the species' propagation.

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Main A boodie.
Inset Nuts of the sandalwood tree.
Photos – Jiri Lochman

Above A boodie at Lorna Glen.
Photo – Judy Dunlop/DPaW

Right Volunteers John and Heather Richardson radio tracking the sandalwood nuts.
Photo – Tamra Chapman/DPaW

GOING NUTS

In order to test the theory that sandalwood distribution could be improved by reintroducing boodies into sandalwood habitats, DPaW research scientist Tamra Chapman attached radio transmitters—or 'nut tags'—onto a number of sandalwood nuts. Getting the 'best' attachment was a process of trial and error (and involved a few blisters). It was necessary to ensure the distance between the nut and the transmitter

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was long enough that when the boodie picked it up, the weight of the transmitter would be supported by the ground so the boodie wouldn't be deterred by the extra baggage. Tamra wanted to determine whether the boodies ate the nuts *in situ* or whether they moved them and buried them away from the parent plant, thereby potentially helping to propagate new trees. So, she attached the radio transmitters, using tiny screw-in eyelets and fishing swivels, to a number of nuts, and placed them under the canopies of sandalwood trees growing on the edge of an active boodie warren inside the 1,100-hectare predator fenced enclosure at Lorna Glen, and a nearby relic warren outside the enclosure (where there were no boodies). She also set up movement-sensing cameras to record activity at the nuts, and, together with volunteers, visited the trees for six mornings to record whether the nuts had been removed, eaten or remained where they were. If the nuts had been moved, she located them with a radio receiver, recorded their positions using a GPS and put another tagged nut in its place.

The results provided some interesting insights. Tamra had expected that because there were no 'non-tagged' nuts underneath the tree canopies (the experiment was conducted in April, outside the October to December fruiting season), that the boodies would eat the nuts *in situ*. But, instead, all the nuts left near the active warren were moved. Some were buried up to four centimetres deep, and some only superficially, but all represented a chance for a sandalwood tree to germinate and thrive as it's unlikely the seeds would have established while lying on the surface under the host tree. The nuts left near the disused boodie warren outside the fenced enclosure were not touched, further suggesting that sandalwood trees and boodies do, in fact, have an important symbiotic relationship.

Based on these results, more detailed investigations of sandalwood use by boodies will be carried out. But there is a definite possibility that sandalwood propagation can be improved by reintroducing boodies into sandalwood habitats and the future health and abundance of sandalwood in Australia's arid rangelands can be improved, along with the conservation status of boodies. These results reinforce that by returning our native animals to their natural habitat we are restoring important natural processes, many of which we are yet to discover.

Above Fishing tackle and picture frame screws were used to attach the radio transmitter to the nut.

Above right Boodies live in complex warren systems that can house as many as 20 to 40 animals.
Photos – Tamra Chapman/DPaW

Right Nuts of the sandalwood tree.
Photo – Jiri Lochman

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