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RELICT BETTONG WARRENS IN WESTERN AUSTRALIA'S PASTORAL LANDS

by Jim Noble

TWO species of rat kangaroos or bettongs, the brush-tailed bettong or woylie (*Bettongia penicilata*) and the burrowing bettong or boodie (*Bettongia lesueur*), were originally the most widespread native mammals on the Australian mainland. These medium-sized marsupials disappeared very rapidly following European settlement, usually after just two decades in the pastoral areas - only one intact specimen of the burrowing bettong exists in the Australian Museum in Sydney and this was collected in 1879 at "Tindarey", halfway between Cobar and Bourke.

There has been increasing interest recently in the landscape ecology of these now rare animals, many of which like the boodie, at one stage only survived on islands off the WA coastline. Research on the woylie for example, which still survives on the mainland as isolated populations in some sclerophyll forests of WA, suggests that this marsupial has an important role in forest nutrition by dispersing special fungal spores which infect tree roots and enhance nutrient uptake by the tree. They may also help in seed dispersal and establishment of grasses and other plants.

My main interest, however, currently lies in the possibility that the bettongs, in association with periodic fire, may have had a role in preventing shrub populations increasing to the densities we now recognise as posing woody weed problems in semi-arid woodlands and rangelands. By gaining a better understanding of how woody weed problems have developed over time, it may help us in turn devise more efficient means of rehabilitating affected areas by employing integrated shrub management systems.



The Burrowing Bettong, (Bettongia lesueur). Photo: WA Museum, Pingelly, 1942.

The idea that bettongs may have had an impact on shrubs regenerating after fire is not new. Eric Rolls in his book "A Million Wild Acres" describes how another species, the rufous bettong, together with fire kept the cypress pine under control in the Pilliga Scrub of northern NSW. Similarly, the quokka is another medium-sized marsupial that has prevented woody plants recovering from fire on Rottnest Island.

If bettongs were influential in this respect, they would have needed to be present in sufficient numbers to significantly affect shrub densities. The woylie only builds surface nests out of grass and tree litter and so it has left little trace of its past occupancy making it virtually impossible to gain any realistic insights into its possible influence on various landscape processes. The boodie however, often built major warren systems that are still highly visible in some areas and it is these relict features which may enable us to gain some idea as to its original distribution and abundance.

These warrens were readily parasitised by invading rabbits at the turn of the century and it has

been suggested that if these prefabricated residences had not been available, the rabbit would not have been able to cover the semi-arid pastoral areas as rapidly as it did, nor to survive recurrent droughts so effectively. This was particularly the case in "hard red" country where the powerful boodie was able to excavate extensive warrens by digging through weak zones in the underlying limestone or calcrete rock. Unlike rabbit warrens in sandy soils, these did not collapse during drought and the calcrete provided both structural reinforcement and insulation from high temperatures.

One way of possibly getting a better idea of its past presence throughout a region is by locating relict burrowing bettong warrens. These can usually be identified by means of certain key characteristics, the first of which is to look closely at old rabbit warrens, especially where they are known to exist in areas with shallow soils such as 'hard' mulga country. These are commonly semi-circular in shape, more or less like a giant horse-shoe, and up to 30 m in diameter. In those sites where there has been minimal burial by windblown soil over time, there is often a central rock 'lens' overlying individual burrows dug in the past. In the mulga lands of eastern Australia, the warrens often show plenty of white limestone material lying on top of the perimeter mound, with distinctive calcrete lens exposed in the centre.

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