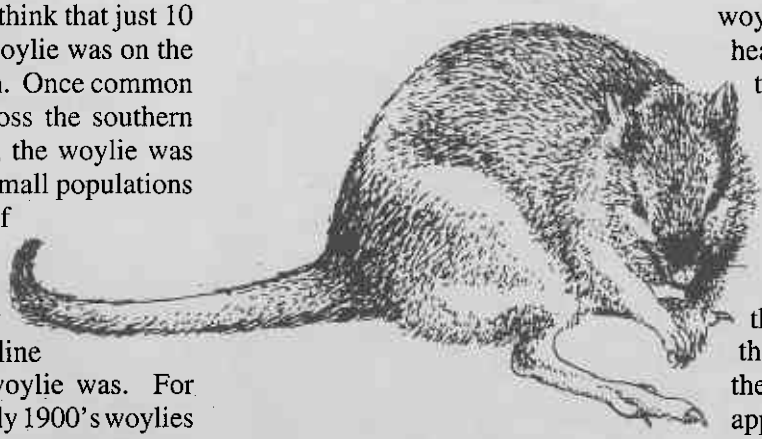
FAUNA

HOPPING SOIL! WOYLIES DIG UP A TREAT IN OUR REMNANT WOODLANDS.

By Mark Garkaklis

IT'S amazing to think that just 10 years ago the woylie was on the brink of extinction. Once common and abundant across the southern third of Australia, the woylie was reduced to a few small populations in the southwest of Western Australia. It is worth reflecting on how dramatic this decline in range of the woylie was. For example, in the early 1900's woylies were sold by the dozen on market days in South Australia. What for? Well, to train greyhounds. By 1925 there were no woylies left on the South Australian mainland and the decline was so fast that it caught everyone, including the SA Museum, by surprise.



Thankfully, conservation measures implemented by CALM aimed at saving this rat-kangaroo have been a success. In 1996 the conservation status of the woylie was reclassified to not threatened, and visitors to conservation reserves, like Dryandra or the Perup, can now see and enjoy these animals. But perhaps the greatest benefit from woylie conservation will be the opportunity we have to learn about how our woodland, forest and rangeland ecosystems function. To do this we need to have all aspects of these systems in place: the plants, the soil and the animals.

I remember taking students on a field-trip to Dryandra in 1993 and getting the chance to observe woylies in large numbers for the first time. It was remarkable to walk around Dryandra and to see the number of diggings that these animals make. The comment we all made was "they dig a lot don't they." Woylies like to dig-up and eat a variety of bulbs like *Haemodorum* (a relative of kangaroo paws) and Guildford Grass. They also bury, or cache, seeds and fruits for example, Quandongs. But perhaps their favourite food is truffles. These truffles are the underground fruits of a group of fungi called mycorrhizae and the spores from the fruits of these fungi can be found in the droppings of woylies. We now know that mycorrhizal fungi have a close association with our woodland and forest flora. In fact, these fungi are believed to be responsible for shunting 25% of the nutrients that eucalyptus trees need to survive and grow. In return the trees provide the fungi with sugars that they have produced from photosynthesis. The trees and fungi appear to rely on each other to maximise their productivity in the nutrient poor Australian soils.

But perhaps there is another link in this relationship. The woylie. For several years researchers have been intrigued by the relationship between woylies, truffles and the vegetation. It would appear that it is a win-win situation for everyone involved. Woylies gain by eating the truffles of the fungi, the fungi gain by having their spores distributed around the woodland by the woylie and the trees gain by having a healthy and diverse group of mycorrhizal fungi. In turn, the woylies also benefit by having a healthy woodland habitat in which to live. The implication of this relationship are obvious - remove one link and we may affect both the fungi and the trees.

But perhaps there is more to woodland ecosystem function than just the woylie, fungi and the vegetation. To eat the fungi the woylies have to dig and it now appears that this may have just as important implications for the management of our woodlands and forests since it could affect another component of southwest Australian ecosystems - the soil.

With the recovery of the woylie we have our first opportunity to examine how these animals interact with the soil. Initial results are surprising to say the least. It turns out that a woylie can make in excess of 100 small diggings a night. Most of these are about 5 cm deep, but they may be as deep as 15 cm when the animal is digging for bulbs. The numbers soon begin to add-up. In a single year a woylie can turn-over in excess of 5 tonnes of soil. This in itself is a remarkable effort. But its what happens after the digging that is really interesting.

The main place where woylie digging has been studied is at Dryandra Woodland, just over 2 hours drive to the southeast of Perth. The soils at Dryandra have a characteristic that is common to many soils on the Swan Coastal Plain and the Wheatbelt. They are water repellent. The reason they are water repellent is that waxes from the leaves of eucalyptus trees and organic compounds from soil fungi coat the soil surface. When rainfall hits this water repellent surface layer it can not penetrate, and it pools and runs-off. Water repellency forms

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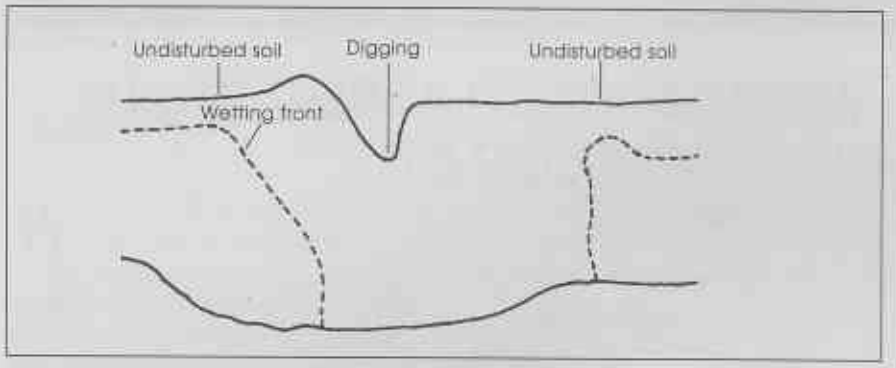
Woylies, continued from page 3



Water infiltration pattern after rainfall in the vicinity of a woylie digging.

as a crust-like feature at the soil surface, whilst underneath the soil is water absorbent. When woylies dig for food they break through this water repellent crust and expose the water absorbent soils. The result is that water from rainfall is able to infiltrate the soil via the woylie diggings. Take the woylies out of the system and we lose this unusual characteristic of our soils.

It appears as though many characteristics of our soils are affected by woylie digging. These include the bulk density, the distribution of gravels at the surface and the behaviour of soil nutrients. It would be fair to say that when we look and appreciate woylies as they are going about their business we are, in fact, looking at a part of our soils. They make our soils 'patchy' in terms of their characteristics and behaviour. But the story will not end with woylies. With Western Shield now in-place there is the real chance that other animals, such as boodies, bilbies and our often forgotten rodents, will make a come back. These animals don't just dig - they burrow! How these animals interact with our soils we can only guess.

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Further reading:

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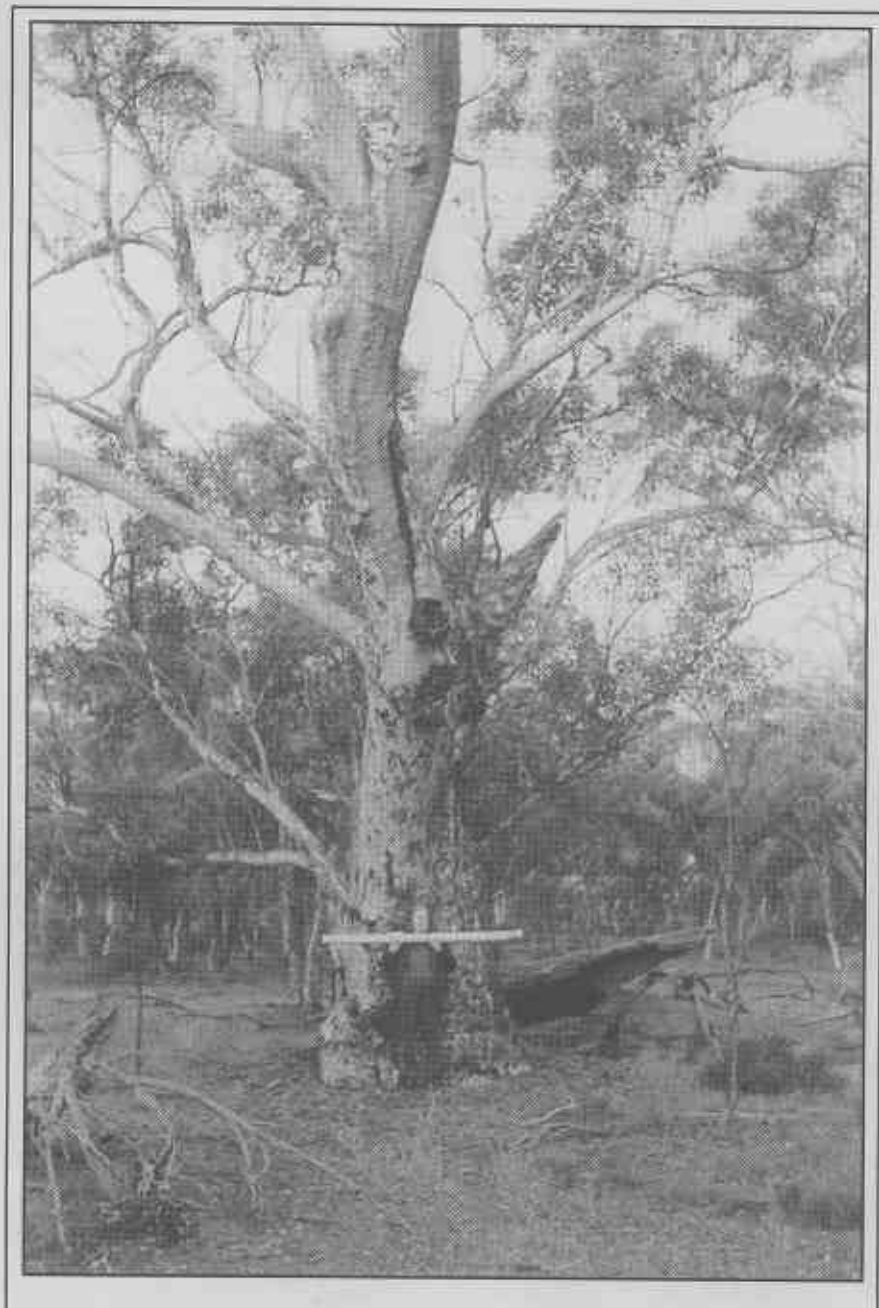

Is this the oldest Inland Wandoo in WA?

Agnes is standing in front of 'Wonder Tree' in our bushland at Dudinin. The pole she is holding is six feet long. How old does that make the tree? 1000 years? The table in "How to Manage Your Wandoo Woodlands" doesn't get that far!

Toby Goodhart