



## Time-worn koalas

ANY self-respecting koala needs good teeth. Koalas manage to survive on a diet of tough eucalyptus foliage that is low in protein and high in fibre, insect-repelling chemicals and toxins, but to digest this difficult diet the leaf material must first be thoroughly broken down. That's where the koala's impressive molars come into play.

Unfortunately for koalas, their initially immaculate teeth gradually wear down. Murray Logan and Professor Gordon Sanson, of Monash University, have been examining the consequences of this wear. They have reported that to maintain energy intake despite tooth wear, koalas have to increase food intake, spend more time feeding, and 'enhance chewing effort'.

Does this increased investment in feeding come at the expense of other activities? If a koala has to spend more time feeding to compensate for poor teeth, it may have less time and energy to expend on important social interactions and protecting food or other resources.

They investigated this by fitting koalas on Raymond Island (off Victoria) with acoustically sensitive radio collars and recording their activities at various times for 18 days. The koalas, all male, had various degrees of tooth wear.

The koalas with increased tooth wear spent significantly less time sleeping and inactive per 24-hour period. There was a 7.85% decrease in daily inactivity from about 20 hours

to about 18.5 hours per day. It has been suggested that the extraordinarily low levels of activity (and low metabolic rates) in koalas, enough to put Homer Simpson to shame, enable them to conserve energy and hence get by on a poor high-fibre diet. So a 7.85% reduction in inactivity due to tooth wear can be a serious matter for a koala with a delicate energy balance.

Individual koalas with advanced tooth wear also spent less time moving between and within trees and had home ranges a full order of magnitude smaller than those having little tooth wear. They also abandoned social behaviours, such as scent marking and vocalisation, and seemed to range purely for the purpose of obtaining fresh leaves, rather than to maintain a social position.

It seems then that advanced tooth wear, by reducing the time and energy available for non-maintenance activities, has the perhaps unexpected consequence of reducing the social involvement and potentially the reproductive success of male koalas. It's difficult to uncouple the effects of tooth wear and other effects of ageing. However, in wild koalas tooth wear is the major effect of aging and is known to be the main cause of mortality and loss of condition in aged koalas from Raymond Island. Whichever way you look at it, for koalas, worn teeth are bad news.

Logan M and Sanson GD (2002) The effects of tooth wear on the activity patterns of free-ranging koalas (*Phascolarctos cinereus* Goldfuss). *Australian Journal of Zoology*, 50:281-292.

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## Tales of the swamp

AS IF it doesn't have enough problems, the critically endangered western swamp tortoise, *Pseudemydura umbrina*, faces a new threat. There are concerns that the yabby, *Cherax*

*destructor*, introduced to Western Australia from Victoria in 1932, may prey on hatchlings of the rare freshwater turtle at two neighbouring nature reserves, Ellen Brook and Twin Swamps, near Perth airport.

To assess the risk, Paul Bradsell, an honours student in zoology at The University of Western Australia, and his supervisors, studied aggressive encounters between turtle hatchlings and three freshwater crayfish native to WA – the marron, gilgie and koonac – and the yabby.

In a series of 80 aquarium trials, they recorded interactions between crays and hatchlings of the more common oblong turtle, rather than the endangered species. (The aquatic turtle-like behaviour of the flipperless Australian tortoises means that they are referred to as both turtles and tortoises.)

The zoologists found that the yabbies, marron and koonacs, but not the gilgies, all acted aggressively towards the hatchlings and showed predatory behaviour towards them.

Although the turtles tended to move about more in the presence of some crayfish species, they did not appear to have the common sense to actively avoid the predators or to show the normal defensive responses, such as withdrawing the head under the shell. There was no evidence of chemical defence, despite the ability of most freshwater turtles to release a malodorous liquid.

The western swamp turtle inhabits seasonal clay swamps that completely dry up in summer months. It is unlikely that marron, which prefer permanent waters, will move into the nature reserves, while koonacs are rare and restricted within the turtle's range. The introduced yabby, however, is highly mobile and occurs naturally in temporary water bodies. It is the main worry.

Given that the yabby already occurs within 500 metres of the Ellen Brook Nature Reserve, these preliminary findings suggest that the beleaguered western swamp turtle will soon come into contact with a new predator, one to which it seems quite vulnerable. Females of the turtle produce only 2-5 eggs a year and loss of hatchlings to yabbies could prove serious for a species already preyed upon by cats and foxes.

Future management plans for the swamp turtle will need to take into account this imminent yabby invasion of the turtle's habitat.

Bradsell P Prince J Kuchling G and Knott B (2002) Aggressive interactions between freshwater turtle, *Chelodina oblonga*, hatchlings and freshwater crayfish, *Cherax* spp.: implications for the conservation of the critically endangered western swamp turtle, *Pseudemydura umbrina*. *Wildlife Research*, 29:295-301.

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Yabbies are invading the habitat of the western swamp tortoise.