





# FAUNA RECOVERY in the wheatbelt



A four-year study into the reasons for the recent declines of mammals in the south-west of Western Australia has just been completed. One part of this was a study at Lake Magenta, 400 kilometres south-east of Perth, and results from this research will be used to better manage for fauna conservation in the wheatbelt.



by Keith Morris, Brent Johnson and Bill Muir



**B**efore European settlement, the Western Australian wheatbelt contained some of Australia's highest mammal diversity, with 35 species known to occur here. Following the extensive clearing of this area for cereal crops and sheep grazing, and the introduction of feral cats and foxes, 19 (54 per cent) of these species declined significantly or became extinct. Most of these were medium-sized mammals ranging in body weight from 50 grams to five kilograms.

This pattern was reversed to a certain extent from 1996–2000 when the then Department of Conservation and Land Management started its *Western Shield* fauna recovery program and broadscale fox control, along with the translocation of threatened native species. The *Western Shield* program involves laying meat baits laced with 1080 poison, derived from the native poison pea plant. Native animals have a tolerance to this poison, as they have evolved in the presence of the poison pea, but it is toxic to introduced species.

Several native species responded very positively to fox control and three—the quenda (*Isodon obesulus*),



woylie (*Bettongia penicillata*) and tamar wallaby (*Macropus eugenii*)—were removed from State and Federal threatened species listings. By this time at Lake Magenta, chuditch (*Dasyurus geoffoi*) and woylies had been translocated as part of recovery programs for these threatened species, and quenda and brushtail possum (*Trichosurus vulpecula*) populations had been 'rediscovered' after what appeared to be a successful fox control program.

#### Unexplained declines

Despite early success, by 2000–01, further declines in medium-sized



mammals in the south-west of WA were reported and at that time the *Western Shield* monitoring program was not able to determine the cause or causes of this. At Lake Magenta, the chuditch and possum populations appeared to decline and the quenda and woylie populations became locally extinct. There were several possible causes for these declines at Lake Magenta, and elsewhere, including a reduction in the effectiveness of fox baiting, an increase in feral cat abundance following successful fox control (often referred to as mesopredator release, see box on opposite page), or other factors such as disease or a reduction in resources.

It was most probable that there were several factors operating together.



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**Main** Mallee shrubland east of Lake Magenta.

Photo – Michael James/DEC

**Insets clockwise from top right** Lake Magenta is one of the only sites in Western Australia where heath mice are found. Photo – Bill Muir/DEC; Brent Johnson about to release a chuditch at Lake Magenta. Photo – Keith Morris/DEC; a brushtail possum at Lake Magenta; a honey possum at Dunn Rock Nature Reserve; processing a chuditch at Lake Magenta; a pygmy possum. Photos – Bill Muir/DEC

**Above** A western mouse, Lake Magenta Nature Reserve.

**Above left** Brent Johnson with a possum, Lake Magenta Nature Reserve.

**Left** Brushtail possums were once widespread in the wheatbelt. Photos – Bill Muir/DEC



**Right** A fox caught on camera at Lake Magenta.

Photo - Keith Morris/DEC

**Below right** Feral cats are significant predators of native mammals.

Photo - Jiri Lochman

In 2006, a study into the reasons for the decline of medium-sized mammals at Lake Magenta was started. This was part of a broader study funded by the Department of Environment and Conservation (DEC) and the Invasive Animals Cooperative Research Centre examining the interactions of foxes and feral cats at several sites in the southern part of WA, and their role in fauna declines (see 'Controlling introduced predators in the rangelands: the conclusion', *LANDSCOPE*, Winter 2010).

### The study sites

Lake Magenta was selected as a site for this study as it was a large, 100,000-hectare wheatbelt nature reserve that still had a relatively intact flora and fauna (despite recent mammal declines), it had been fox baited since 1996 and there was a considerable amount of fauna monitoring information. Researchers also selected another large nature reserve nearby, Dunn Rock, as an area where no fox baiting had been undertaken so it was possible to compare native fauna abundances, and the interactions of foxes and cats.

Lake Magenta and Dunn Rock both occur in the southern wheatbelt, in the Mallee IBRA (Interim Biogeographic Regionalisation for Australia) sub-region. They are dominated by mallee shrub and woodlands and botanically diverse heaths. This study was the first time Dunn Rock had been surveyed for vertebrates and it was found to have a diverse reptile fauna, but its small and medium-sized mammal fauna was lower in numbers compared to Lake Magenta.

Interestingly, chuditch and brushtail possums were trapped at Dunn Rock but at much lower frequencies than at Lake Magenta, where fox baiting was occurring. However, it was noticeable that other species such as the red-tailed

### Mesopredator release



Mesopredator release is an increase in the abundance of a subordinate predator following the removal of a dominant predator which previously held the subordinate species in check. In the context of this project, the abundances of feral cats and native predators such as chuditch were examined in relation to reduced fox abundances following baiting.



phascogale (*Phascogale calura*), heath mouse (*Pseudomys shortridgei*), brush wallaby (*Macropus irma*), malleefowl and carpet python (*Morelia spilota*) were present at Lake Magenta but not recorded at Dunn Rock, despite similar habitat types occurring at both reserves. This greater diversity of the larger vertebrates was probably a result of the fox baiting program.

### Monitoring techniques

The study focused on examining the responses of foxes and feral cats to current and modified fox baiting programs. However, these predators are very difficult to monitor as they are not readily trapped. As a practical alternative, sand plots stretched across tracks at 400 to 500-metre intervals, and running for 10 to 20 kilometres, have been shown to be an effective way of monitoring the activity of

foxes, feral cats and other fauna across the landscape. There is some debate, however, about whether the activity indices derived are a good surrogate for animal abundance. It has been argued, for example, that when fox numbers are reduced through a toxic baiting program, the survivors are more wide-ranging. This gives the impression that activity stays the same or increases, instead of decreasing.

However, novel techniques to collect hair samples at sand plots, and DNA technologies to identify species and individuals, are now being used to validate and help interpret sand plot activity information (see 'Sand plots and sticky wickets—how the survey was done' in 'Controlling introduced predators in the rangelands: the conclusion', *LANDSCOPE*, Winter 2010). This provides more confidence about the effectiveness of pest animal





control programs. Researchers are also able to look at the pattern of fox activity along the sand plot transects and estimate the numbers of foxes using that particular track or transect.

In addition to being used to monitor the activity of foxes and feral cats, sand plots can be used to monitor fox behaviour in relation to uptake of baits. It was found that where a fox encountered a bait on a sand plot, it did not always take the bait, suggesting that some foxes are either avoiding the baits or finding them unpalatable. Foxes will investigate novel objects and it is possible that changing bait types regularly might improve bait uptake. It was also found that bait uptake 100 metres off tracks was very low in the densely vegetated heaths and mallee shrublands. This suggests that foxes prefer to use the cleared firebreaks and tracks to access Lake Magenta, rather than force their way through dense vegetation. These results indicated that while fox baiting had resulted in some benefits to the native fauna at Lake Magenta, baiting efficacy could be improved through modifications to the baiting program.

### Fox baiting program

Another area of investigation was to examine the 11 years of fox baiting history, from 1996 to 2006. The *Western Shield* fox baiting prescription for Lake Magenta required aerial baiting to occur every 90 days, with synchronised reserve perimeter ground baiting. In addition, the internal tracks and fire breaks were ground-baited once a year. It was found that due to operational limitations to

**Top far left** Quenda tracking at Lake Magenta Nature Reserve.

**Top left** Sticky wickets set up at Lake Magenta.

**Centre far left** Checking a rain gauge at Dunn Rock Nature Reserve.

**Centre left** Installing pit traps at Lake Magenta.

*Photos - Bill Muir/DEC*

**Left** Volunteers checking pit traps.  
*Photo - DEC*



**Right** Chuditch release at Lake Magenta.  
Photo – Bill Muir/DEC

**Below right** Mallee heath at Lake Magenta.  
Photo – Keith Morris/DEC



aircraft use and poor weather, aerial baiting was not consistently undertaken at 90-day intervals. Also, the ground baitings were not always timed to coincide with the aerial baiting.

During the first two years of the program, researchers also assessed the activity of foxes and feral cats, through the use of sand plots at both Lake Magenta and Dunn Rock. They found that fox activity at Lake Magenta was approximately half that at Dunn Rock, but that feral cat activity was higher at Lake Magenta. This suggested that although the fox baiting program at Lake Magenta was not as regular as it could have been, it was effective in reducing fox activity. Of some concern was the apparent increased activity of feral cats at Lake Magenta compared to Dunn Rock, raising the question: was this evidence of mesopredator release?

To see if fox activity could be further reduced at Lake Magenta, in 2008 a modified fox baiting program was commenced whereby aerial baiting was undertaken strictly between 90 and 100 days, and all the perimeter and internal tracks were baited at the same time as the aerial baiting took place. This resulted in a further 50 per cent reduction in the activity of foxes at Lake Magenta compared with Dunn Rock, where fox activity remained unchanged. This relatively simple change to the fox baiting program appeared to have improved fox control and has provided the opportunity to see if there is a consequent recovery of native fauna populations at Lake Magenta.

### Quenda reintroduction

The real test as to whether the 'new' simultaneous aerial and ground fox baiting program was effective was in how the native fauna responded. Ongoing *Western Shield* monitoring of the small and medium-sized mammals will continue, and quenda have been re-introduced to Lake Magenta after an absence of 10 years.

In October 2009, 41 quenda were released at Lake Magenta and monitored for the next three months. During that time, it was determined that five died, but not as a result of fox or cat predation. It is most likely that they were unable to find adequate food and shelter.

Most of the others spread out up to a few kilometres from their release site, and were occupying areas of Lake Magenta that they were originally found in. These are generally sandy shrubland sites, with an understorey of grasses, small shrubs and sedges among which the quenda dig for food and find shelter. It was also pleasing to find that many of the quenda had increased in body weight and the females had retained the pouch-young they had when released. More recently, additional quenda have been taken from areas to be cleared in the south-west and released at Lake Magenta and it is anticipated that these will help establish one of the most inland populations of this species.

### The future

While this study has not confirmed the role of feral cats in the decline of native fauna at Lake Magenta, other studies in the south-west have shown that in the presence of fox control, feral cats are a significant predator of species such as woylies and western ringtail possums. Other work undertaken in the rangelands as part of the mesopredator research program has shown that annual cat baiting, with some supplementary fox baiting, can effectively control both feral cats and foxes.

There are issues surrounding the potential uptake of the more palatable

cat bait by non-target species such as chuditch, dibblers and quenda, and the impact of this in the south-west of WA needs to be determined. Once this has been resolved and cat baiting is shown to not detrimentally impact on native species, cat baiting should be used at sites such as Lake Magenta and the original vision of reconstructing the mammal fauna here should be progressed. In the meantime, a regular and coordinated aerial and ground fox baiting program will also help with fauna recovery in this important natural remnant of the WA wheatbelt.



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