

The fire, the fox and the feral cat



National Environmental Science Programme



IMAGE: BRONWYN HRADSKY



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IMAGE: CRAIG MILDWATERS

How do **invasive predators** and **native prey** respond to prescribed **forest fire**?

How do foxes and feral cats fare after forest fire? And what does the loss of protective understorey mean for the native mammals that foxes and cats prey upon? Dr **Bronwyn Hradsky** from the University of Melbourne working with colleagues Craig Mildwaters, Julian Di Stefano, Euan Ritchie and Fiona Christie (in collaboration with Victorian Government land managers) set up an experiment and found out. Here Bronwyn explains what they discovered.

Life's tough when you're a fox. Bandicoots don't just sit around waiting for you to catch them. And when you finally sniff one out, all that dense understorey gets in the way of a speedy chase.

But what happens if there's no understorey in the way? Does the fox's job become easier? Or, to put it another way, do things become a lot tougher for bandicoots? In a land that is increasingly fire-prone, the interaction between predators, fire and native mammals in forest ecosystems is an important knowledge gap for land managers aiming to conserve native fauna. Both planned (or prescribed) fires and wildfires tend to remove a lot of understorey vegetation cover, at least temporarily.

During my PhD with the School of Ecosystem and Forest Sciences at the University of Melbourne, I worked with an Honours student, Craig Mildwaters and land management agencies, to determine how foxes, feral cats and their native prey responded to a prescribed burn.

The study took place in the stringybark-peppermint forests of the Otway Ranges, in

south-western Victoria. It was a before-after control-impact experiment based around a prescribed fire conducted by Parks Victoria and the Department of Environment, Land, Water and Planning (DELWP) in autumn, 2013. Our field work involved using motion-sensing cameras to survey invasive predators and native mammals, and collecting fox scats to analyse what they were eating ('scat' is another term for animal poo).

Fun fact #1: You can still smell fox scats when they're ziplocked in three layers of polypropylene. A collection of 224 of them makes your freezer a bit whiffy!

Our first session of camera surveys took place before the fire, and showed that invasive predators and swamp wallabies were more commonly found at sites with an open understorey. In contrast, smaller native mammals such as bush rats and long-nosed bandicoots were positively associated with understorey cover in unburnt forest.

This supports previous research which has found that foxes and feral cats hunt more

ABOVE: 1. A prescribed burn in the Otway Ranges removes understorey vegetation, making it easier for invasive predators such as foxes (2.) and feral cats (3.) to move around and hunt. The tea-strainers hanging from the marking peg contain peanut butter, golden syrup and oats.

effectively in open habitats, while small native mammals seek out dense cover for protection.

The prescribed fire was patchy. It burnt just over half of the 1200 ha block, and created a mosaic of burnt ridges and unburnt strips of vegetation along gullies. At the burnt sites, understorey cover was reduced by approximately 80%.

Key messages

In unburnt forest, foxes and feral cats were more likely to occur at sites with an open understorey

After fire reduced understorey cover, there was a five-fold increase in the occurrence of invasive predators

At the same time, consumption of medium-sized native mammals by foxes doubled



A motion-sensing camera records a red fox making off with a freshly killed bandicoot in the Otway Ranges.

What does this mean for foxes and cats? Our survey work showed that there was a five-fold increase in the occurrence of invasive predators at burnt sites after the fire (relative to changes at the unburnt control block). Furthermore, foxes began preying heavily on medium-sized native mammals such as echidnas and long-nosed bandicoots, instead of the swamp wallabies which had made up 50% of their diet prior to the fire.

This suggests quite strongly that fire made the forest more suitable habitat for invasive predators, and increased the vulnerability of medium-sized native mammals to fox predation. Such changes are highly concerning, as interactions between threatening processes can exacerbate the risk of extinction, particularly for already vulnerable species.

(Less) fun-fact #2: Three of the most important drivers of decline in Australia’s native mammals are predation by feral cats, predation by red foxes, and inappropriate fire regimes.

Whether or not the changes we observed were large enough to impact the native mammal populations was unclear – this needs further investigation.

Our findings only relate to one fire at one block of forest, and require further replication. Nonetheless, if predation by invasive species limits the recovery of native fauna after fire, integrated management of fire and invasive predators may be essential for biodiversity conservation in flammable forest ecosystems.



A long-nosed potoroo caught by one of the motion-sensing cameras.

I am continuing to research this as a Postdoctoral Research Fellow supported by the TSR Hub, DELWP and Parks Victoria. I’m currently building simulation models of the impacts of fire and fox management on native mammal populations, and working with students to conduct further field studies that have direct relevance to land management decisions.

Australia has an enormous challenge with managing foxes and feral cats. This challenge becomes even greater when you introduce fire into the mix. By continuing to collaborate with land managers to tackle important knowledge gaps regarding the management of invasive predators and fire, our research aims to improve conservation outcomes for threatened species in forest ecosystems.

For further information

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Bronwyn is supported by the Threatened Species Recovery Hub, the Victorian Department of Environment, Land, Water and Planning (DELWP), and Parks Victoria. Her PhD with the Fire Ecology and Biodiversity research group was supported by DELWP, Parks Victoria and the Holsworth Wildlife Research Endowment. To see a copy of her paper on this work please visit [here](#).

Spying on foxes

An old trapper once told me: “It takes three years to learn to catch a fox. Three years, girlie.”

Unfortunate fact #3: he was pretty much right.

To complement these camera-based surveys, I trapped individual foxes and fitted them with GPS-tracking collars. This allowed me to collect high-resolution data on fox ranging behaviour and movement 24 hours a day, something I never could have done if I’d had to track them all on foot. This work, which showed that ‘bush foxes’ are not so different from ‘town foxes’ (or are even the same animal!), is currently in review.

RIGHT: Bronwyn fits ‘Gammy’ the fox with a radio collar.

You can read about what she discovered about Gammy, and the pros and cons of the technology she deployed at Bronwyn’s blog: [Working on the Wild Side at https://wildzoologist.wordpress.com/2014/09/13/technological-musings/](https://wildzoologist.wordpress.com/2014/09/13/technological-musings/)

