SURVEYING MIRIMA:
Capturing change

Main Mirima National Park's geology is very similar to that of the Bungle Bungle Range. **Above** A prescribed burn at one of the Mirima survey sites in early 2010.
Photos – Ian Radford/Parks and Wildlife

A research project started in 2008 to document the impact of fire on native plants and animals at Mirima National Park has also provided some interesting information about the impact of cane toads.

by Ian Radford and Richard Fairman

Mirima National Park is like a mini version of Purnululu National Park with its interesting rock formations and pretty hidden valleys. It is home to a few small and medium-sized mammals, including a number of native mouse and rat species as well as several types of bats. But what makes this park particularly special is its interesting array of reptiles, amphibians and invertebrates.

In 2008, Parks and Wildlife's predecessor, the Department of Environment and Conservation, began research into the impact of fire on native plants and animals in the park, concentrating on the pindan sandy woodlands surrounding the rocky areas. Four surveys were carried out between 2008 and 2011 providing important data about the area's plants and animals. An additional four surveys have been carried out in the years since offering a useful comparison for land managers.

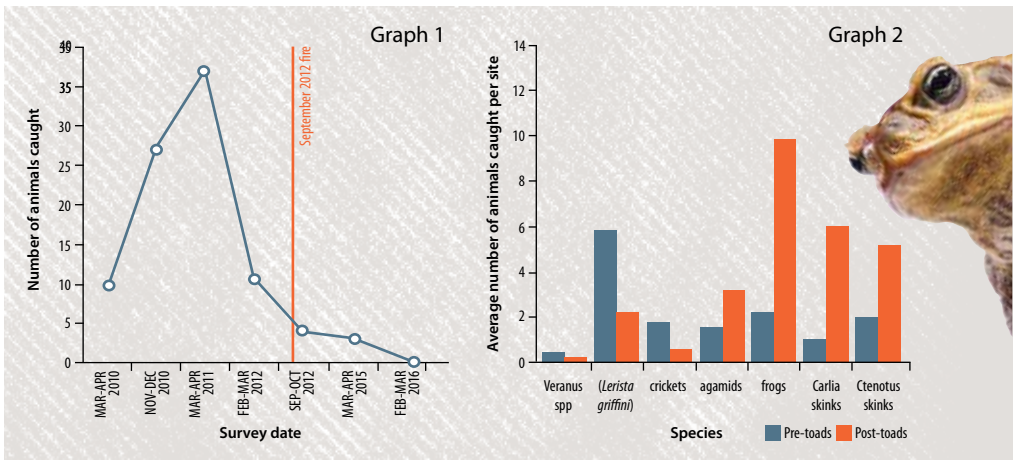
FIERY IMPACT

In September 2012, a deliberately lit high-intensity fire burnt through almost all of Mirima National Park. The most obvious impact of this fire, and successive fires in 2013 and 2014, was the loss of the pindan wattle (*Acacia tumida*) in many areas of the park and surrounds (including three of our 10 survey sites). A dominant tree, this loss has effectively transformed the pindan vegetation structure from relatively dense woodland of about 20 to 35 per cent canopy cover, to an open savanna of around only five per cent canopy cover. Some seeding trees and shrubs such as pindan wattle require sufficient time between fires to enable seedlings to mature and produce their own seeds before the occurance of any future fires.

On the other hand, much of the wildlife that occurs in Mirima National Park appears to be resilient to the effects of most fires. Fire has increased captures of many species of dragon lizards (*Diporiphora magna* and *D. pindan*), skinks and invertebrates, probably due to reduced shelter and fewer ground-based obstacles leading to increased trapping. Very large *Ctenotus* skinks (more than 20 centimetres long) become scarce after fire probably because they are highly visible in a burnt landscape with no cover and get eaten by birds of prey.

Small mammals are seriously affected by the impacts of fire as revealed in 2016 surveys. In Mirima these include rodents like the western chestnut mouse (*Pseudomys nanus*) and the pale field rat (*Rattus tunneyi*), and small dasyurids including planigales. When the numbers of mammals captured in the surveys before 2012 are compared to the numbers of the three surveys carried out since, it is clear that mammals have declined after this single September fire. Despite four years of vegetation recovery in some areas, mammal numbers have remained very low (zero to four in every 720 traps), compared to between 10 and 32 (in 720 traps) before September 2012. The pale field rat has not been recorded since this fire. Mammals caught in Mirima have fallen below one in every 100 traps, similar to the level now seen in post-mammal collapse Kakadu survey sites.

"Goannas are adversely affected by cane toads through poisoning, and in 2015 at Mirima they were less than half as abundant as they were before toads."



Above left *Ctenotus robustus*.
Photo – Kathryn Radford/Parks and Wildlife

Above right and above centre A comparison of the survey sites in 2009 and 2015 show the change from high pindan wattle canopy cover to an almost complete removal of the species by fire between 2012 and 2015.
Photos – Ian Radford/Parks and Wildlife

Above Response of species to cane toad arrival.

RECOMMENDATIONS FOR FIRE REGIMES IN MIRIMA

Since the large September 2012 fire, the lack of older cured grass fuel early in the dry season has hampered attempts to reintroduce early season prescribed burning to mitigate further wildfire impacts. Consequently, large fires burnt much of Mirima National Park again in 2013 and 2014. However, the opportunity to reintroduce prescribed burning arose by early 2016 because little was burnt in Mirima National Park in 2015 (probably due to low grass growth with a below average wet season in 2014–15). Burning strips of vegetation in a grid pattern has provided the best chance of breaking up

grass fuels early in 2016 to reduce larger and more intense fires from occurring later in the year. Early results of this work have been promising.

TREACHEROUS TOADS

Goannas are adversely affected by cane toads through poisoning after consumption, and in 2015 at Mirima National Park they were less than half as abundant as they were before toads (see Graph 2). Crickets also declined along with one species of burrowing skink – the stout sandslider (*Lerista griffini*). However, the cane toad invasion also resulted in increases in frogs, dragon lizards and a number of other skinks (Graph 2), perhaps due to fewer goannas as top predators. This phenomenon has been observed in some other studies. It's possible that increased competition for resources above ground, or increased predation by large skinks, has also led to the decreases in the stout sandslider at Mirima sites (Graph 2). These animals are probably not directly predated by cane toads as they are small and spend most of their time below ground in the sand.

It appears from these studies that indirect impacts of cane toad invasion results in changes in abundance, rather than total disappearances of species. But one thing is for sure, collecting short- and long-term data is imperative so we can build a profile of our environment from species to landscape-scale. By building a picture of the present, we can observe changes that occur in the short and long-term, which is extremely helpful to land managers who are faced with complex variables such as fire and invasive pests.

Top left Ornate burrowing frog.
Photo – David Bettini

Top Spiny-tailed gecko.

Above Cane toad.
Photos – Kathryn Radford/Parks and Wildlife

Above centre Rock pool in Mirima National Park.
Photo – Andrew McInnes

Above left Pindan wattle.
Photo – Jiri Lochman

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