Arnhem Rock-rat. NT DEPWS

Northern Australia Environmental Resources Hub

National **Environmental Science** Programme

Fauna monitoring in Kakadu National Park

Wrap-up factsheet

Animals have been scientifically monitored in Kakadu for 25 years

Fauna monitoring began in Kakadu National Park in 1996 as part of the Three Parks Fireplot Monitoring Program implemented by the Northern Territory Department of Environment, Parks and Water Security (DEPWS), Parks Australia and Traditional Owners. This program was pivotal in detecting the marked declines of small mammal species in the Top End between 1995 and 2005. Capitalising on the availability of new technology such as camera traps, DEPWS redesigned the program in 2017. The revised program can detect population trends in many more species, including some threatened species, and improves the representation of certain habitats such as rainforest.

We tested how well the revised monitoring program performed in Kakadu

Our analysis showed that the revised, optimal design of the monitoring program meant that fewer sites needed to be surveyed in Kakadu, if adequate sites were also surveyed in nearby protected areas with similar habitats, such as national parks and Indigenous Protected Areas. However, sites needed to be surveyed more intensely and frequently to better detect trends. The optimised design saw the number of sites surveyed in Kakadu reduced from 125 to 50, with sites surveyed every 3 years instead of every 5

Key recommendations

- continuing the program long-term is vital to detect any further declines of threatened species and communities, as well as how they respond to targeted management initiatives

- long-term monitoring will continue to play an essential role in the adaptive management of Kakadu National Park and other protected areas in the Top End

- integrated monitoring and research programs will help address knowledge gaps, particularly around our understanding of the key threats to biodiversity in northern Australia.

years. The revised methods included an extra night of live trapping for mammals and reptiles, an increased number of pitfall traps and funnel traps, additional time spent searching for birds and reptiles, and the introduction of motion-sensing camera traps. Automated camera traps can greatly improve the detection of many species. Five camera traps were deployed at each site with 3 different setups to target different fauna.

The revised selection of sites was mostly drawn from the original larger pool of monitoring sites to maintain spatial continuity of monitoring. Final site selection was also undertaken in consultation with Traditional Owners and park managers.

The monitoring program covers several national parks across the Top End.

We surveyed 49 of the 50 sites between April and August 2019 using our new sampling protocol. We collected information on 258 mammal, bird, reptile and amphibian species, including introduced animals such as buffalo and cats. Twelve threatened species were detected (5 mammals, 4 reptiles and 3 birds) – Arnhem rock-rat, black-footed tree-rat, fawn antechinus, northern quoll, pale field-rat, floodplain monitor, Mertens' water monitor, Mitchell's water monitor, yellow-snouted gecko, red goshawk, partridge pigeon and white-throated grasswren. The northern quoll, which almost disappeared from the NT with the arrival of cane toads, was found to be persisting in low numbers across the park.

The revised design has increased our ability to monitor a wider range of animal species. For example, the arrays of 5 camera traps are effective at detecting small mammals, large goannas, feral herbivores, feral cats and dingoes – these species were rarely detected with the previous monitoring design. For the first time, occurrences of feral cats, introduced herbivores and pigs were detected with enough sensitivity for effective monitoring. Threatened species such as the northern quoll and fawn antechinus were detected at some sites by camera trapping but not other methods. Funnel traps caught a variety of snakes and lizards that weren't adequately detected by other methods, providing us with improved data for reptiles. These improvements in detectability, along with the increase in monitoring frequency, will improve the program's ability to assess the current and future state of faunal communities within Kakadu and to track their trajectory of recovery or decline.

Not all fauna species are detected by this general ecological monitoring program. Many species that are rare or restricted to specific habitats need more targeted monitoring and specific sampling methods. This survey identified several threatened species, such as the white-
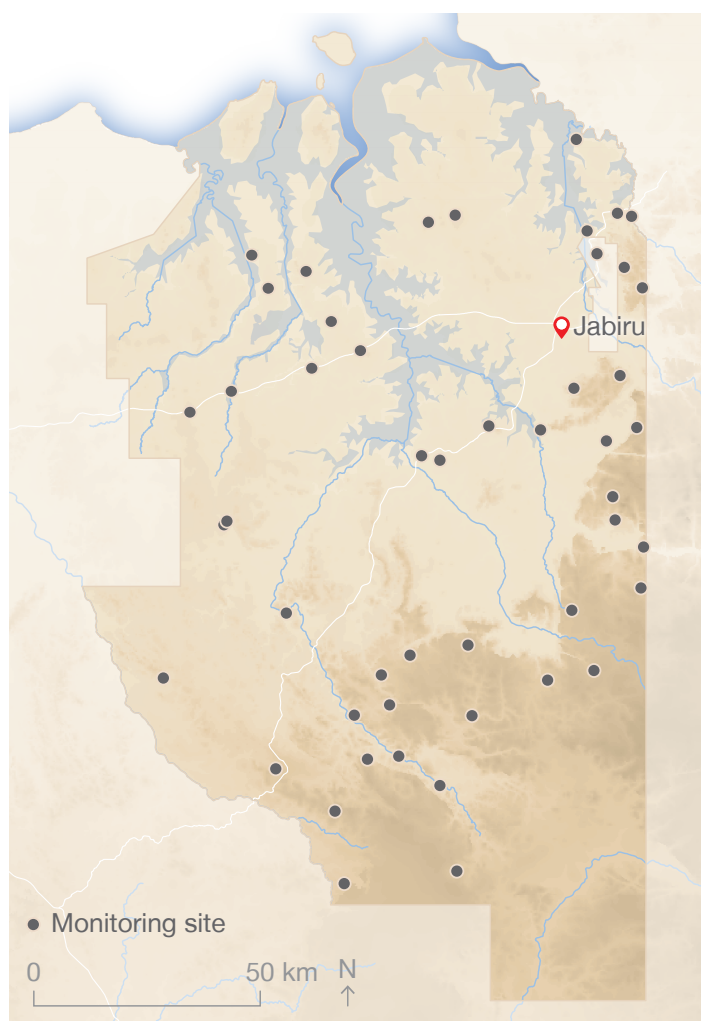

Chris Jolly

The yellow-snouted gecko was one of several threatened species detected by the surveys.

throated grasswren, northern brush-tailed phascogale, floodplain monitor and Arnhem rock skink, that may be high priorities for additional targeted monitoring.

In addition to providing a valuable update on the long-term trends of fauna, we gained more robust information on habitat condition and threatening processes (e.g. occurrence of feral herbivores, feral cats, weeds and fire intensity). This information will enable better interpretation of patterns of change in species occurrence and faunal assemblages across the park that are attributable to these threatening processes.

Small mammals have not recovered in Kakadu National Park

A key outcome of the previous fauna monitoring in Kakadu was detecting and reporting on the marked decline of small and medium-sized mammals. The 2019 surveys built on the previous monitoring undertaken in Kakadu, Nitmiluk and Litchfield national parks, allowing us to update the long-term trends for these species. We found that the mammal community has not recovered from declines that occurred between 1995 and 2005, and that mammal declines have continued in lowland woodland and sandstone woodland habitats. Yet populations of small mammals have persisted in some parts of the landscape. Mammal declines were

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Small native mammals, such as savanna gliders, have not recovered from previous population declines.

more gradual in or near areas that had not been burnt for 5 or more years. Currently, these long-unburnt areas are often found in rugged and rocky terrain and wetter habitats such as rainforest. Our results also reaffirmed that the arrival of cane toads was a major contributing factor in the decline of the northern quoll, but we found no evidence of them contributing to other mammal declines.

Locations of the 49 monitoring sites surveyed in Kakadu National Park.

Key outcomes

- the revised monitoring program continues to build on a long history of biodiversity monitoring in Kakadu National Park

- changes to the design of the monitoring program (e.g. camera traps, funnel traps, more frequent sampling) have increased the detectability of many species, and the sensitivity and power of monitoring data

- small mammal communities have not recovered, yet are persisting in some parts of the park, especially in more rugged or wetter areas that have not been burnt for 5 or more years

- the monitoring program provides both the Australian and Northern Territory governments with high-quality information on ecological condition in Kakadu National Park and supports the activities of park managers and Traditional Owners

- some species that are difficult to detect can be better monitored by expanding the program or by implementing targeted monitoring.

Each site was surveyed for 4 days and nights during the dry season.

These findings complement other recent studies contributing more broadly to increasing our understanding of the factors responsible for northern Australian mammal declines. Importantly, they provide further evidence that inappropriate fire regimes have and continue to negatively influence mammal diversity in Kakadu. This information should assist Kakadu in developing its management plans and evaluating their effectiveness.

Monitoring programs allow park managers to assess the effectiveness of their actions

The higher-quality data generated by the revised monitoring program provides robust evidence to help refine and adapt management activities in Kakadu. The monitoring program will assist Parks Australia to assess the effectiveness of the park's overall management plan, as well as management activities directed at specific threats to fauna from feral animals, weed invasion and altered fire regimes.

This ecological monitoring in Kakadu is a component of a wider integrated program in other national parks and protected areas across the Top End of the Northern Territory. Combining data collected from all these protected areas means this monitoring program can contribute to informing on-going management of other protected areas across the Top End beyond Kakadu.

Further information

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This factsheet and further information are available from the project webpage at nespnorthern.edu.au/projects/nesp/monitoring-kakadu-animals