



Koala and habitat response to the 2019-20 wildfires

This brief summarises findings from independent research into the impact of the 2019-20 wildfires on koalas and their habitat in north-east NSW. The research was carried out by the Australian National University and the Department of Primary Industries Forest Science Unit as part of the [NSW Forest Monitoring and Improvement Program](#).

The research found areas with a greater extent of medium or high fire severity experienced larger declines in koala density than areas with only low severity fire. Overall, the research indicates that both local and regional koala populations at the study sites (Figure 1) have been relatively resilient following the 2019-20 wildfires.

The research also offers useful insights into how the nutritional value of koala habitat changes immediately following a fire, with the post-fire regrowth of some key koala feed species shown to have comparatively high nutritional value.

The following sections provide more information about our findings and our broader koala research program.

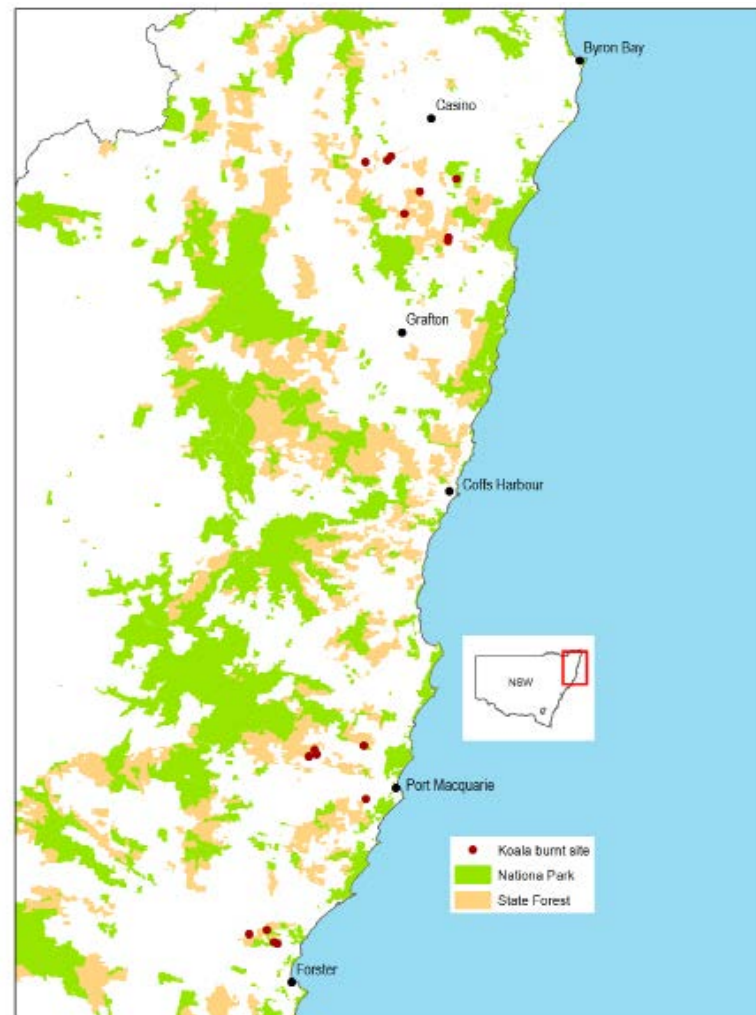


Figure 1: Location of burnt sample sites for koala occupancy (three of these sites – Bril Bril, Kiwarra and Bellangry state forests – were further surveyed for density)



Koala at Kiwarra State Forest, image courtesy of Dr Brad Law, Department of Primary Industries

How did the 2019-20 wildfires affect koala populations?

For local koala populations, the research found that areas experiencing higher fire severity showed larger declines in koala density compared with areas with only low severity fire (Figure 2). Koalas were temporarily absent in some areas where high fire severity dominated the landscape, but koalas had begun to return after a year. In contrast, in unburnt or mainly low fire severity areas, koalas continued to be widespread, with little to no signs of decreased local population density.

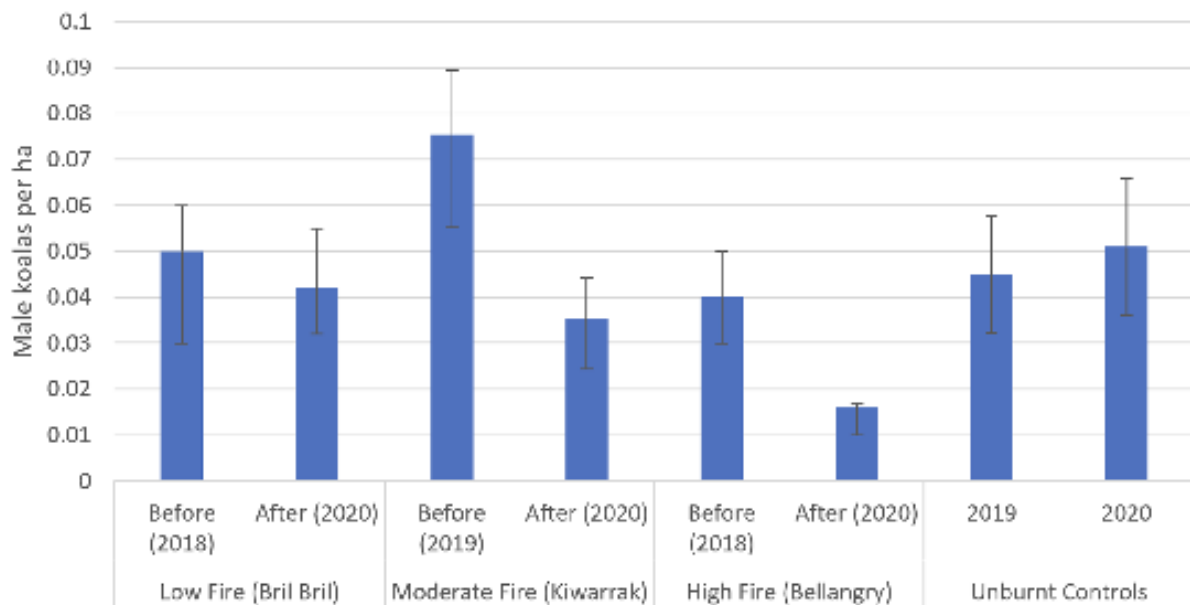


Figure 2: Mean male koala density before and after fires at the three study areas with different severity and unburnt controls

At the regional scale, there was no overall decline in post-fire koala occupancy detected for the broader north-east NSW koala population compared with pre-fire trends (Figure 3). However, while the overall regional occupancy can appear stable, there may still be increasing and decreasing subpopulations as a result of disturbance and recolonisation.

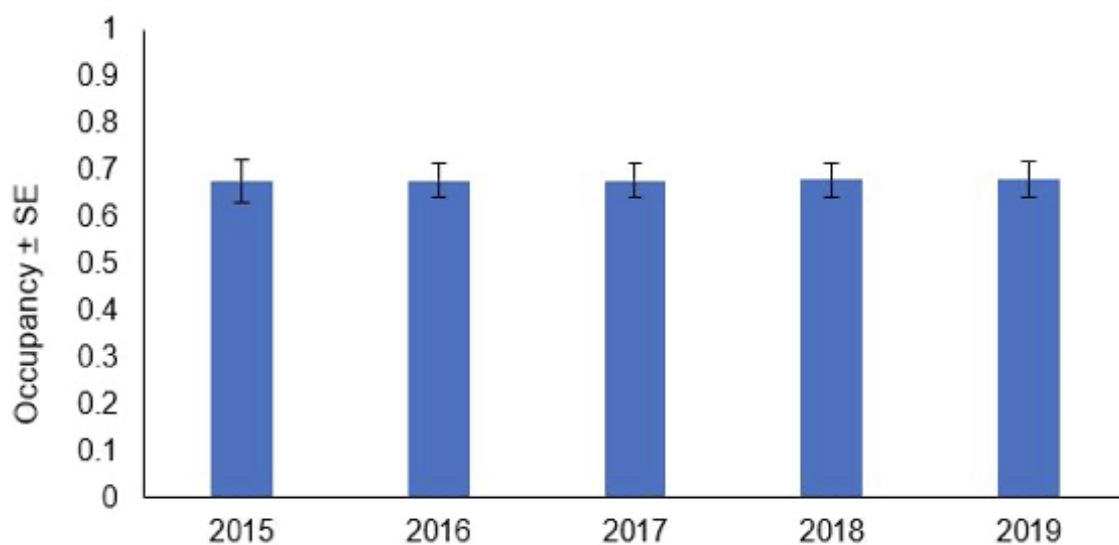


Figure 3: Koala occupancy trend in north-east NSW pre-fire (2015-18) and post-fire (2019)

The findings suggest that local or regional extinctions are unlikely in these hinterland forests where connectivity and refugia remain, although predicted increases in fire frequency and intensity pose a risk to these habitat features.

How does fire affect the nutritional value of koala habitat?

The post-fire regrowth of some species was found to have higher nutritional quality than mature leaves from the same trees. Many species preferred by koalas as feed trees displayed this characteristic, including Sydney blue gum, small-fruited grey gum, northern grey ironbark, red mahogany and tallowwood. In these species, regenerating foliage had higher levels of protein (digestible nitrogen) and higher moisture content.

In contrast, the nutritional quality of other species such as blackbutt, white stringybark, and broad-leaved white mahogany – which are typically not preferred koala browse species – decreased after fire, with lower protein availability in the epicormic regrowth.

These findings indicate that forests with a high abundance of the specified preferred koala browse species may be particularly important for maintaining koala habitat nutritional quality following wildfires.

How was the research undertaken?

The research used the following methods:

- local koala density – acoustic array surveys, each spanning around 400 hectares, including at three sites subject to different fire severity, and scat DNA analysis
- regional koala occupancy – annual passive acoustic monitoring at 50 sites from 2015-18 and immediately after the 2019-20 wildfires – including 16 burnt sites across state forests, national parks

and private property (10 high severity and 6 low severity) – and at further sites in spring 2020

- nutritional value of trees and sites for koalas – leaves were resampled in February 2021 for nutritional analysis from 150 previously sampled trees across six sites that burnt in 2019, and six paired unburnt sites, all located in state forests.

Pre-fire data came from existing sources, including from the Commission's [Koala Research Program](#) and annual koala monitoring carried out by the NSW Department of Primary Industries. Post-fire data was collected using the same survey and sampling methods.

Why was this research undertaken, and how will it be used?

This research was initiated as part of the [NSW Forest Monitoring and Improvement Program](#) to address knowledge gaps around the effects of fire on koalas and their habitat, triggered by the unprecedented 2019-20 wildfires. It presented a unique and cost-effective opportunity to combine existing and new data to generate new insights in response to an unforeseen event.

Evidence from this research will be used to help improve knowledge and management of north coast koala populations, particularly as [recent research](#) indicates future fires may increase in frequency and intensity under climate change. This is likely to result in significant adverse effects on koalas as habitat quality, connectivity, and refuge areas may decrease and koalas may have less opportunity to recolonise between fire events.

Who is involved in this research?

The research was carried out by eminent scientific researchers from the Australian National University and the Department of Primary Industries Forest Science Unit.

The Commission independently oversaw the research with a [Steering Committee](#) comprising NSW agencies and independent ecological and forestry experts.

The results of the research on koala density outlined in this brief were recently published in the journal *Global Ecology and Biogeography* titled [Fire severity and its local extent are key to assessing impacts of Australian mega-fires on koala \(*Phascolarctos cinereus*\) density](#).

What other research is being done?

Under the NSW Koala Strategy, the Commission has been delivering independent research to better understand how koalas and their habitat are responding to timber harvesting.

Our [Koala Research Program](#) has delivered initial [research](#) focusing on the impact of selective harvesting practices in state forests on the NSW north coast, and is continuing to expand its assessment of the impact of timber harvesting practices on koalas and their habitat.

Where to find more information?

Summary reports outlining the key findings of all our koala research projects can be found on the [Commission's website](#). If you would like to receive updates regarding this work, you can also sign up to our [mailing list](#) via our website.



Acoustic recorder set up in the field



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