

6 million hectares of threatened species habitat up in smoke

January 20 2020, by Michelle Ward, Aaron Greenville, April Reside, Ayesha Tulloch, Brooke Williams, Emily Massingham, Helen Mayfield, Hugh Possin



At least 250 threatened species have had their habitat hit by fires. Credit: Gena Dray

More than [one billion mammals, birds, and reptiles](#) across eastern Australia are estimated to have been affected by the current fire catastrophe.

Many animals and [plants](#) have been incinerated or suffocated by smoke and ash. Others may have escaped the blaze only to die of exhaustion or starvation, or be picked off by predators.

But even these huge losses of individual animals and plants do not reveal the full scale of impact that the recent fires have had on biodiversity.

Plants, invertebrates, freshwater fish, and frogs have also been affected, and the impact of the fires is likely to be disproportionately greater for threatened [species](#).

To delve deeper into the conservation impact, we used publicly available satellite imagery to look at the [burnt areas](#) (up to January 7, 2020) and see how they overlapped with the approximate distributions of all the threatened animals and plants listed under the Environment Protection and Biodiversity Conservation Act.

We restricted our analysis to the Mediterranean and temperate zone of south-east and south-west Australia.

The bad news

We found that 99% of the area burned in the current fires contains potential [habitat](#) for at least one nationally listed [threatened species](#). We conservatively estimate that six million hectares of threatened species habitat has been burned.

Wildlife will be impacted by the fires in four major ways:

1. Direct mortality



Countless animals will die from incineration, radiant heat and smoke inhalation during the fires. Many species shelter from fires in burrows, cracks in the soil and under rocks, but the intensity of these fires is so great that even these refugia provide little protection.

2. Starvation and predation

Many animals that survive the fire-front or escape the flames will soon die from starvation, exposure or predation. Their food sources will have been incinerated and without vegetation, hollows or logs for shelter, they are vulnerable to environmental extremes and predators.

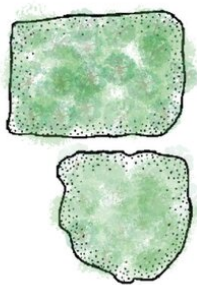


3. Long-term loss of resources

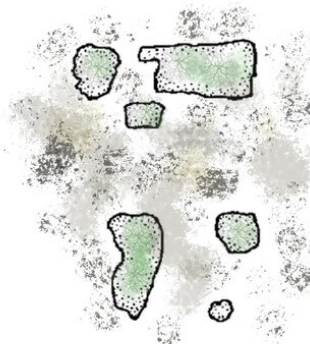
Long-term recovery after fire depends on availability of suitable habitat features that provide food and shelter. The size and intensity of these fires means that vast areas will be devoid of key resources, such as nectar, shrubby vegetation and tree hollows, some of which will take decades or centuries to recover.

4. Fragmentation

The extent of the fires has turned intact tracts of forest into many small isolated fragments of varying quality, depending on fire intensity. Individuals in these fragments are vulnerable to local extinction and may be unable to move across burnt landscapes to re-populate habitat as it recovers.



Intact habitat tracts before fires



Habitat fragmentation after fires

Given that many fires are still burning and it is not yet clear how severe the burning has been in many areas, the number of species affected and the extent of the impact may yet change.

What we do know is that these species are already on the brink of extinction due to other threats, such as land clearing, [invasive species](#), climate change, disease, or previous fires.

Approximately 70 nationally threatened species have had at least 50% of their range burnt, while nearly 160 threatened species have had more than 20% of their range burnt.

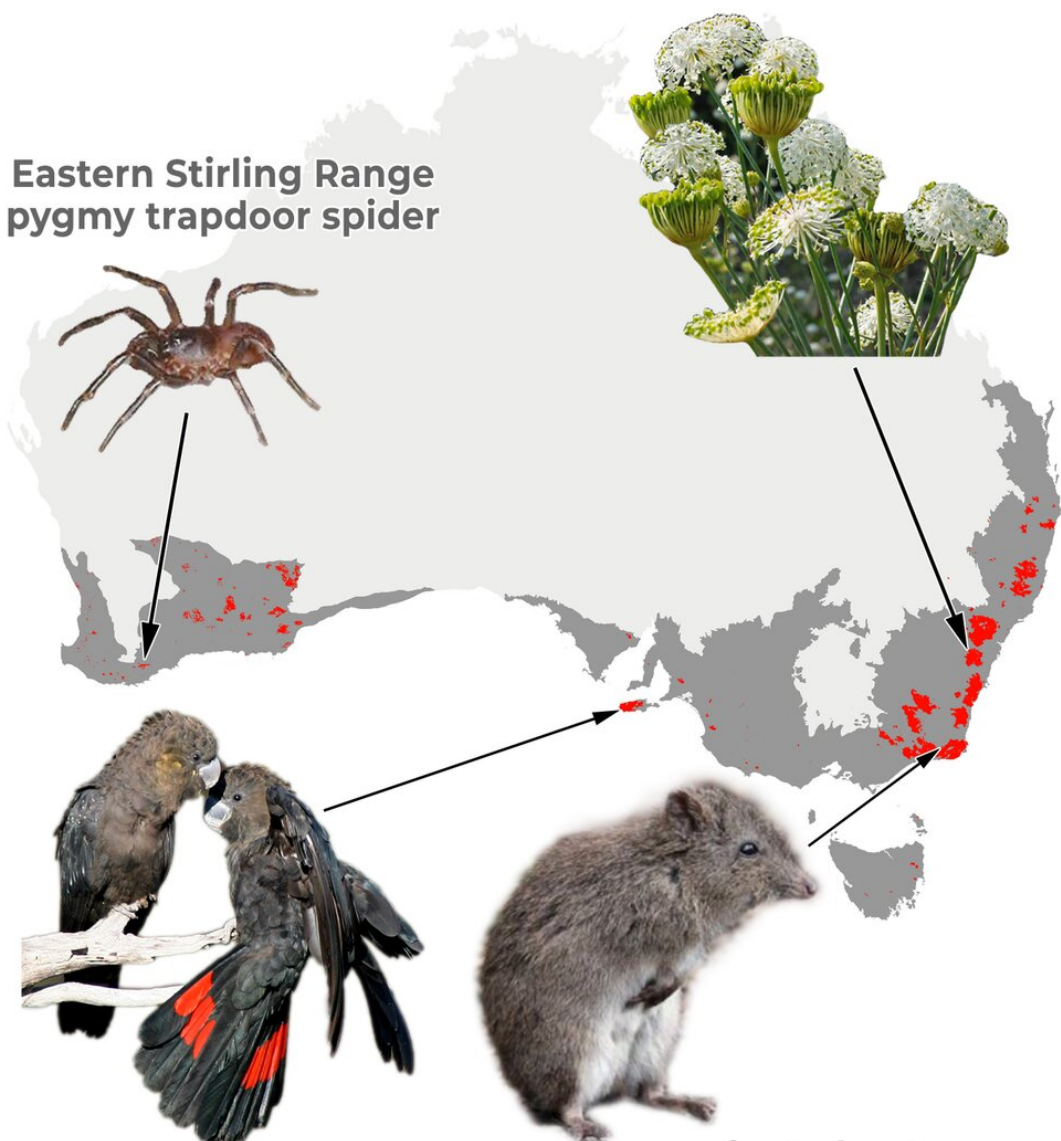
More threatened plants have been affected than other groups: 209 threatened plant species have had more than 5% of their range burnt compared to 16 mammals, ten frogs, six birds, four reptiles, and four freshwater fish.

Twenty-nine of the 30 species that have had more than 80% of their range burnt are plants. Several species have had their entire range consumed by the fires, such as the Mountain Trachymene, a [fire-sensitive](#) plant found in only four locations in the South Eastern Highlands of NSW.

Distribution of threatened species habitat burnt since August 2019 in temperate forest and woodland biome

Mountain Trachymene

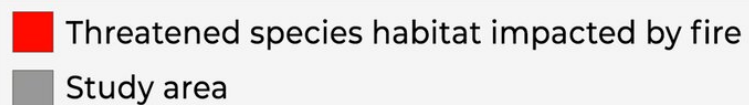
Eastern Stirling Range
pygmy trapdoor spider



Kangaroo Island glossy
black cockatoo



Long-footed potoroo



Map: Author provided

Image: Eastern Stirling Range pygmy trapdoor spider supplied by the Western Australian Government

Image: Mountain Trachymene supplied by the New South Wales Government

Image: Glossy black cockatoo from the South Australian Government

Image: Long-footed potoroo from The Australian Museum

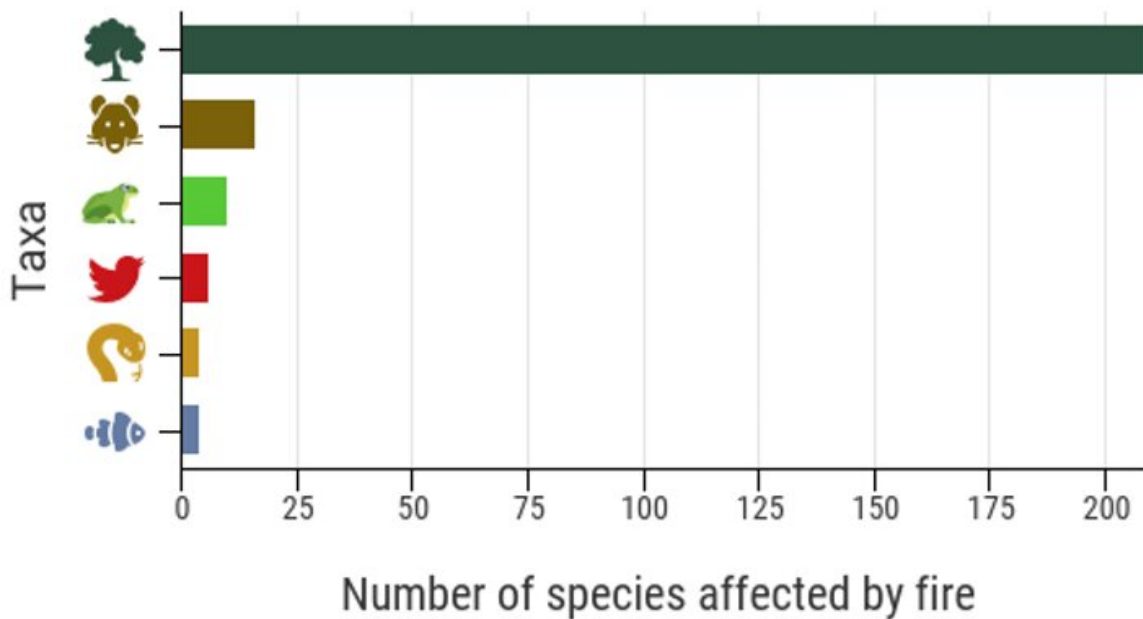
Other species that have been severely impacted include the Kangaroo Island dunnart and the Kangaroo Island glossy black cockatoo. These species' entire populations numbered only in the hundreds prior to these bushfires that have burned more than 50% of their habitat.

Glossy black cockatoos have a highly specialized diet. They eat the seeds of the drooping sheoak ([Allocasuarina verticillata](#)). These trees may take anywhere from 10 to 50 years to recover enough to produce sufficient food for the black cockatoos.

The populations of many species will need careful management and protection to give their habitats enough time to recover and re-supply critical resources.

The figures above do not account for cumulative impacts of previous fires. For example, the critically endangered western ground parrot had around 6,000 hectares of potential habitat burnt in these fires, which exacerbates the impact of earlier extensive fires in 2015 and early 2019.

Threatened species vary in their ability to cope with fire. For fire-sensitive species, almost every individual dies or is displaced. The long-term consequences are likely to be dire, particularly if vegetation composition is irrevocably changed by severe fire or the area is subject to repeat fires.



More than 50% of the habitat of several species known to be susceptible to fire has been burnt—these include the long-footed potoroo and Littlejohn's tree frog.

Some species are likely to thrive after fire. Indeed, of the top 30 most impacted species on our list, almost 20% will likely flourish due to low competition in their burnt environments—these are all re-sprouting plants. Others will do well if they are not burnt again before they can set seed.

Rising from the ashes

For fire-sensitive threatened species, these fires could have substantially

increased the probability of extinction by virtue of direct mortality in the fires or reducing the amount of suitable habitat. However, after the embers settle, with enough investment and conservation actions, guided by evidence-based science, it may be possible to help threatened species recover.

Protection and conservation-focused management of areas that have not burned will be the single most important action if threatened species are to have any chance of persistence and eventual recovery.



The Kangaroo Island glossy black cockatoo has had more than 50% its habitat impacted by fire. Credit: Mike Barth

Management of threatening processes (such as weeds, feral predators, introduced herbivores, and habitat loss through logging or thinning) must occur not just at key sites, but across the landscapes they sit in.

Maintaining only small pockets of habitat in a landscape of destruction will lock many species on the pathway to extinction.

In some cases, rigorous post-[fire](#) restoration will be necessary to allow species to recolonize burnt areas. This may include intensive weed control and assisted regeneration of threatened flora and specific food sources for fauna, installing nest boxes and artificial cover, or even targeted [supplementary feeding](#).

Unconventional recovery actions will be needed because this unique situation calls for outside-the-box thinking.

Playing the long game

These fires were made larger and more severe by [record hot, dry conditions](#). Global temperatures have so far risen by approximately 1°C from pre-industrial levels.



The endangered long-footed potoroo has had more than 50% of its potential habitat impacted by fire. Credit: George Bayliss



For species on the brink of extinction, insurance populations need to be established. Captive breeding and release can complement wild populations, as occurs for the regent honeyeater. Credit: Dean Ingwersen / BirdLife Australia

[Current projections indicate that we are on track for a 3°C increase.](#)

What will that look like?

We are in a moment of collective grief for what has been lost. A species lost is not just a word on a page, but an entire world of unique traits, behaviors, connections to other living things, and beauty.

These losses do not need to be in vain. We have an opportunity to transform our collective grief into collective action.

Australians are now personally experiencing climate impacts in an unprecedented way. We must use this moment to galvanize our leaders to act on climate change, here in Australia and on the world stage.

The futures of our beloved plants and animals, and our own, depend on it.

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