

Some animals have excellent tricks to evade bushfire but others may be naive to the dangers

August 19 2021, by Dale Nimmo, Alex Carthey, Chris J Jolly, Daniel T. Blumstein



Credit: AI-generated image ([disclaimer](#))

The new report by the Intergovernmental Panel on Climate Change paints a sobering picture of the warming climate in coming decades. Among the projections is an increase in fire weather, which will expose

Earth's landscapes to more large and intense [megafires](#).

In our paper, published today in [Global Change Biology](#), we considered what this fiery future might mean for the planet's wildlife. We argue a lot can be learned by looking at how wildlife responds to a very different threat: [predators](#).

Australia has seen the brutal consequences that occur when native wildlife is exposed to introduced predators. Australian animals have not evolved alongside introduced predators, such as cats and foxes, and some are what scientists call "[predator naive](#)"—they simply aren't equipped with the evolutionary instincts to detect and respond to introduced predators before it's too late.

Now, let's take that idea and apply it to fires. Some animals have evolved excellent tricks to detect when a bushfire is nearby. But some areas where infernos were once rare are growing increasingly bushfire-prone, thanks to [climate change](#). The wildlife in these spots may not have the evolutionary know-how to detect a fire before it's too late.

Just as being "predator naive" has decimated Australian wildlife, will being "fire naive" wreak havoc on our native species?

Behavior forged in fire

A growing list of studies show the tricks animals from fire-prone areas use to [survive the flames](#).

[Sleepy lizards](#) have been shown to panic at the smell of burnt pastry, [reed frogs](#) leap away from the crackling sounds of fire, and [bats](#) and [marsupials](#) wake from torpor after smelling smoke.

And one [study](#) found that, when exposed to smoke, [Mediterranean](#)

[lizards](#) from fire-prone areas reacted more strongly than Mediterranean lizards from areas where fire was rare.

Lizards survive fires by smelling them!

The ability to quickly detect fires by smell enhances survival; smoke acts as a cue for fire avoidance in lizards by [@Lola_alr](#) at [@BehavEcol](#)

Fire-driven behavioral response to smoke in...

<https://t.co/HDQLOPkIui> <https://t.co/EbH5XW096l>
pic.twitter.com/yqpv92MbQF

— juli g pausas (@jgpausas) [April 6, 2021](#)

These studies show some animals can recognize the threat of fire, and behave in a way that increases their chance of survival. Those that can are more likely to live through fire and pass on those abilities to their offspring.

That's where the parallels between fire and predation become striking—and potentially worrying.

Reading the cues

It's well known predators and prey are in an ongoing [evolutionary race](#) to outmaneuver one another.



Research has shown the Mediterranean skink can smell a fire. Credit: [By Balles2601 / Wikimedia Commons / CC BY-SA 4.0, CC BY-SA 4.0, CC BY](#)

One tool prey draw upon to avoid becoming predator food is to recognize cues—such as smells, sights and sounds—that indicate a predator is lurking nearby. Once they do, prey can [change their behavior](#) to minimize the risk of becoming dinner.

[Decades of research](#) has shown that when prey evolve alongside a predator, they can become highly adept at recognizing their predator's cues, such as a scent markings or territorial calls.

But what about animals that *haven't* evolved alongside these lethal threats?

When a new predator enters an ecosystem, prey that have not evolved with it can be [naive](#) to its cues. They might fail to recognize the threat implied by the new predator's scents, signs, or sounds, placing them at substantial risk.

This "[predator naivety](#)" helps explain why introduced predators are [global drivers](#) of extinction. Naive prey just don't hear, smell, or see them coming.

Which species are 'fire naive'?

Research on how animals respond to fire cues has focused on animals from fire-prone regions, probably because that's where you'd expect to find the strongest responses. But more research is needed about animals from regions that rarely burn.

- Do these animals also recognize the cues of fire as an approaching lethal threat?
- Do they have finely tuned behaviors that help them survive fire?
- Are they "fire naive"?

We don't know. And that's a worry because recent changes in [global fire activity](#), [triggered](#) by a [warming and drying climate](#), are seeing fires [enter ecosystems](#) long regarded as "fire-free."

If they are naive to fire, species in these ecosystems might be more at risk than previously thought.

The search for fire naivety

We urge researchers around the world to assess fire naivety of [animals](#), particularly in areas experiencing a change in their [fire regimes](#), such as from rare to frequent fire or increased fire [severity](#).

[Evidence suggests](#) recognition of [predator](#) cues is at least partly genetic. It will be important to determine whether the capacity to recognize and respond to fire also has a genetic basis.

If those behaviors can be passed on from one generation to the next, then perhaps we could take fire-savvy individuals from fire-prone areas and place them into [fire](#) naive populations, in the hope their favorable behaviors will spread rapidly via genes passed onto their offspring. Scientists call this "[targeted gene flow](#)".

As the world continues to warm and megafires rage across the globe, we will need all the knowledge and tools at our disposal to help avoid an acceleration of Earth's biodiversity crisis.

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