

Australia's threatened bats need protection from white-nose syndrome

January 20 2020, by Christopher Turbill and Justin Welbergen



Three North American little brown bats with signs of white-nose syndrome, which is virtually certain to hit Australian bats without further action. Credit: KDFWR/Terry Derting, CC BY-SA

We already know how deadly this summer's fires have been for mammals, birds, and reptiles across Australia. But beyond this bushfire season, many of those same species—including our [bats](#), which make up around a quarter of all Australian mammal species—are facing another devastating threat to their survival.

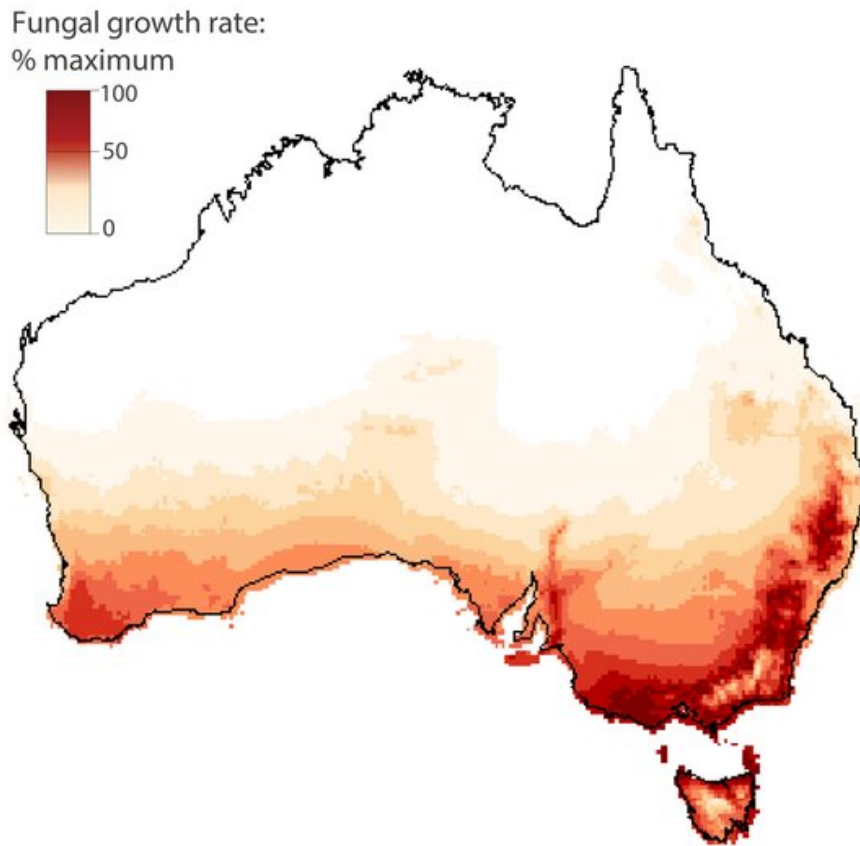
[White-nose syndrome](#) has recently decimated [bat populations](#) across North America. While the [fungal pathogen](#) responsible for this disease, *Pseudogymnoascus destructans*, [currently doesn't occur](#) in Australia, the fungus is [virtually certain](#) to jump continents in the next decade.

Our recent research, published in the journal [Austral Ecology](#), attempted to quantify this risk—and the results are not encouraging. Up to eight [bat species](#) occupy caves in south-eastern Australia that provide conditions suitable for the fungus to grow.

Even before this summer's fires, seven of those types of [bats](#) were listed on state or federal legislation as threatened with extinction. This includes the [critically endangered](#) southern bent-winged bat (*Miniopterus orianae bassanii*), a species whose caves would all provide optimal conditions for growth of the fungus.

Millions of bats wiped out in North America

[White-nose syndrome](#) was first detected in the United States in 2006 at a popular tourist cave in the state of New York. Since then, the disease has [spread](#) across North America, killing millions of bats in its wake, with many local populations experiencing 90 to 100% mortality.



Large parts of southern Australia provides cave habitat suitable for growth by the cold-loving fungus responsible for white-nose syndrome. Credit: Turbill & Welbergen 2019

The [novel pathogen hypothesis](#) explains why *P. destructans* has such catastrophic impacts on North American bats: the immune system of these species is evolutionarily naive to this fungal attack. Accordingly, in Europe and Asia, where *P. destructans* is endemic and widespread, few bats exhibit white-nose [syndrome](#) and mortalities are rare.

Australia's unique wildlife is inherently at risk from invasive novel

pathogens because of its long-term biogeographical isolation. Thus Australian bats, like their distant North American relatives, probably lack an effective immune response to *P. destructans* and would be susceptible to developing white-nose syndrome.

Hibernation is the key risk period

Most fungal pathogens grow best at cool temperatures, and a high body temperature in mammals and birds provides an [effective barrier](#) against fungal diseases. The fungus causing white-nose syndrome is also cold-loving, ceasing to grow at temperatures above 20°C. The only time it can infect and kill bats is when they hibernate.



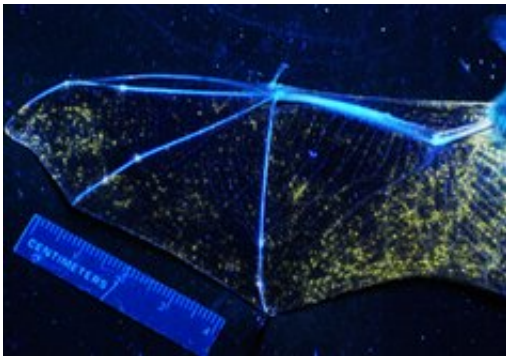
All caves occupied by the critically endangered southern bent-winged bat provide ideal thermal conditions for white-nose syndrome. Credit: Dr Lindy Lumsden

Bats go cold (use [torpor](#)) during hibernation to prevent starvation over winter in temperate climates. Hibernating bats that are infected by *P. destructans* rewarm more frequently than normal. These unscheduled bursts of metabolic heat production prematurely burn up the body fat of overwintering bats. Hence, despite the damage caused by white-nose

syndrome to the bat's skin tissue, they apparently die due to starvation or dehydration.

Hibernation is key to predicting the susceptibility of bat populations to mortality from white-nose syndrome: those with less energy to spare over winter are more at risk. Consequently, white-nose syndrome has fuelled a large research program on the winter ecology and hibernation physiology of North American bats.

Bats in south-eastern Australia do enter a period of winter hibernation, but that is about the extent of what we know. This knowledge gap makes it impossible to predict how they will respond if exposed to *P. destructans*. Even non-lethal impacts, however, will worsen the extinction-bound trajectory of several cave-roosting species, most notably the eastern and southern bent-winged bats.



The infection is easily visible under UV light. Credit: Turner et al. 2014

What can Australia do?

Given the impending arrival of *P. destructans* in Australia, and our study's findings of widespread thermal cave suitability in south-eastern

Australia, we urge immediate action. This includes tightening biosecurity measures and gaining missing information on bat biology so we are better prepared for a possible white-nose syndrome epidemic.

The importance of this threat has not been missed by Wildlife Health Australia, which has produced [guidelines](#) for reporting and response to incursion. Advice is also available from the [Commonwealth](#). Just recently, white-nose syndrome was listed in the [national priority list](#) for exotic environmental pests and diseases, ranking in the top five of native animal diseases and their pathogens.

[Cave enthusiasts](#) have also been proactive in alerting members to white-nose syndrome and the risk of accidentally introducing *P. destructans*, especially when returning from overseas caving adventures. And the [Australasian Bat Society](#) – a strong advocate for bat conservation—has alerted the public and government agencies to this potential new threat.

White-Nose Syndrome

A coordinated response to the devastating bat disease



White-nose syndrome (WNS) is a disease killing hibernating bats.

WNS is confirmed in ...



First documented in **2006** in eastern New York

Afflicted bats may show white fungus on their muzzles and wings, abnormal behavior and eventual death.

90-100% mortality rate in many hibernacula

What can I do?

Observe all cave closures and advisories.



Avoid caves with hibernating bats.

Researchers and cavers should decontaminate before and after visiting caves and mines.



If bats are in your home and you don't want them there, work with your local natural resource agency to remove the bats without harming them.

What's being done?

More than 100 agencies and organizations are collaborating under one plan to address WNS.

The U.S. Fish & Wildlife Service funds research to better understand the fungus, the disease and its effects on bats.

We are collaborating to contain the spread by limiting access to sensitive sites and developing decontamination protocols for researchers and cavers.

Learn more about white-nose syndrome, our research & what you can do to help: www.whitenosesyndrome.org

Learn more about the U.S. Fish and Wildlife Service: www.fws.gov

The U.S. Fish and Wildlife Service's White-nose Syndrome Response Team produced this infographic, including what you can do to help bats.

Action now is critical

At present, there is little that would prevent *P. destructans* from making its way to Australian caves, despite two years passing since experts assessed the risk of incursion as almost certain.

We need effective measures at all levels, from requiring incoming visitors to identify contact with cave environments, to decontamination procedures at caves popular with international tourists.

Predicting the impact of [white-nose syndrome](#) on Australian bats is currently not possible because we know so little about their winter biology. We urge the Australian government to fund specific research to gain this information.

The US Fish and Wildlife Service has injected more than US\$46 million since 2008 into [research](#) and fieldwork to address the threat. Australian researchers can use this work to focus on the critical data needed to inform [models](#) that predict the vulnerability of local bat populations.



A selection of Australia's bat diversity. Top row from left: grey-headed flying-fox; orange leaf-nosed bat; common blossom bat; large-footed myotis. Bottom row: golden-tipped bat; eastern horseshoe bat; common sheath-tailed bat; ghost bat. Credit: Justin Welbergen (grey-headed flying-fox, eastern horseshoe bat); Nicola Hanrahan (ghost bat); Bruce Thomson (golden-tipped bat); Steve Parish & Les Hall for remainder of species

Why we need bats to survive

Bats are incredibly valuable in their own right. But the world needs healthy bat populations: a single insectivorous bat can eat up to half its body mass in insects each night, and together colonies of bats provide a service with an [estimated value](#) to the agricultural industry alone in the billions of dollars per year.

We hope this terrible disease will not threaten Australian bats. But the

precautionary principle dictates we should plan and act now, assuming the worst-case scenario. Alarm bells are ringing.

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