

# White-nose syndrome and the risk to Australian bats



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White-nose syndrome (WNS) is a fungal disease caused by *Pseudogymnoascus destructans* that has caused significant mortalities of insectivorous bats in North America.

Since WNS was first recognised in New York State in 2006, it has spread through eastern USA and Canada, causing the collapse of numerous bat populations, with mortality estimates of over 6 million bats.<sup>1,2,3</sup> In March 2016, the fungus was detected in Washington State, more than 2,000 km from prior detections in the eastern states.<sup>4</sup>

The *P. destructans* fungus has been found across Europe and in north-east China, but without

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the mass mortalities observed in North America.<sup>5,6</sup>

*P. destructans* has not been identified in Australia. Exclusion of WNS in suspect cases has previously been reported in AHSQ (Vol. 15 Issue 1; Vol. 17 Issue 3; Vol. 18 Issue 3; Vol. 19 Issue 1).

WNS is a disease of hibernating insectivorous bats, causing wing damage that leads to

physiological disturbance and depletion of fat reserves over winter.<sup>7</sup> Clinical signs include:

- white or grey powdery fungus on the fur, skin or wings
- wing membrane damage, such as membrane thinning, depigmented areas, flaky appearance or non-traumatic holes
- mass mortality
- aberrant behaviour, such as flying during the day or increased frequency of arousal or activity during a period of torpor or hibernation (lowering of body temperature to conserve energy).

*P. destructans* requires low temperatures to grow and can persist in the environment for long periods, even in the absence of bats.<sup>8</sup> Humans have been implicated in the spread of the disease by transferring fungal

1 Frick WF, Pollock JF, Hicks AC, Langwig KE, Reynolds DS, Turner GG, Butchkoski CM, Kunz TH (2010). An emerging disease causes regional population collapse of a common North American bat species. *Science* 329(5992): 679–682

2 US Fish & Wildlife Service, 2016. White-Nose Syndrome Fact Sheet, May 2016 [www.whitenosesyndrome.org/sites/default/files/resource/white-nose\\_fact\\_sheet\\_5-2016\\_2.pdf](http://www.whitenosesyndrome.org/sites/default/files/resource/white-nose_fact_sheet_5-2016_2.pdf)

3 Turner GG, Reeder DM, Coleman JTH (2011). A five-year assessment of mortality and geographic spread of white-nose syndrome in North American bats and a look to the future. *Bat Research News* 52(2): 1327

4 US Geological Survey (2016). Bat with white-nose syndrome confirmed in Washington state. News Release, 31 March 2016 [www.usgs.gov/news/bat-white-nose-syndrome-confirmed-washington-state](http://www.usgs.gov/news/bat-white-nose-syndrome-confirmed-washington-state)

5 Puechmaître SJ, Wibbelt G, Korn V, Fuller H, Forget F, Mühlendorfer K, Kurth A, Bogdanowicz W, Borel C, Bosch T, Cherezy T (2011). Pan-European distribution of white-nose syndrome fungus (*Geomyces destructans*) not associated with mass mortality. *PLoS One* 6(4):e19167

6 Hoyt JR, Sun K, Parise KL, Lu G, Langwig KE, Jiang T, Yang S, Frick WF, Kilpatrick AM, Foster JT, Feng J (2016). Widespread bat white-nose syndrome fungus, northeastern China. *Emerging Infectious Diseases* 22(1): 140–142.

7 Verant ML, Meteyer CU, Speakman JR, Cryan PM, Lorch JM, Blehert DS (2014). White-nose syndrome initiates a cascade of physiologic disturbances in the hibernating bat host. *BMC Physiology* 14(1): 10.

8 Lorch JM, Muller LK, Russell RE, O'Connor M, Lindner DL, Blehert DS (2013). Distribution and environmental persistence of the causative agent of white-nose syndrome, *Geomyces destructans*, in bat hibernacula of the eastern United States. *Applied and Environmental Microbiology*, 79(4): 1293–1301.



**Little brown bat; fungus on wing membrane, Oct. 2008, New York (Photo: Ryan von Linden/New York Department of Environmental Conservation)**

spores on boots and equipment.<sup>9</sup> Guidance on decontamination of clothing, footwear and equipment has been developed in North America.<sup>10</sup> There are no known human health risks from WNS.

### Risk assessment

Australia is home to many species of insectivorous bats, or microbats, and a number of these live in caves ranging from small splits or crevices through to extensive caverns. In 2015-16, Wildlife Health Australia (WHA), with funding from the Australian Government Department of Agriculture and Water Resources, coordinated a project to assess the risk of WNS for Australian bats. This initiated ongoing work to improve Australia's preparedness for a potential incursion of this disease.

A qualitative risk assessment for introduction of WNS into Australia was conducted by a team of

Australian experts.<sup>11</sup> The assessment found there was a non-negligible risk of introduction of WNS into Australia and the most likely method of entry of *P. destructans* is via fomites (contaminated objects), such as clothing, footwear or equipment used in affected caves overseas; for example, by a caver, researcher or tourist.

While the susceptibility of Australian bat species to WNS is not known, cave-dwelling insectivorous bats in the colder southern parts of Australia are considered likely to be at risk of WNS if introduced, in particular the southern bent-winged bat (*Miniopterus orianae bassanii*), a critically endangered species, and the eastern bent-winged bat (*M. orianae oceanensis*).

The large-scale mortalities seen in North America are considered less likely to occur in Australia due to the difference in climate, but lower mortality rates due to WNS could still be significant for the survival

of species such as the southern bent-winged bat.

### Preparedness

A number of activities are underway to prevent the introduction of WNS, and to better prepare Australia for any incursion of this exotic disease.

Response guidelines have been developed to assist response agencies in the event of an incursion of WNS. The guidelines were developed in consultation with stakeholders, including Australian, state and territory government agencies for agriculture and environment, Animal Health Australia, biosecurity emergency management experts, the Australasian Bat Society and universities involved in relevant research. The guidelines describe management activities that can be considered in the event of an outbreak.

An information document on how to recognise and report a suspect case of WNS has been developed for people who come into contact with microbats, such as bat and wildlife carers, ecologists, cavers,

9 Reynolds HT, Ingersoll T, Barton HA (2015). Modeling the environmental growth of *Pseudogymnoascus destructans* and its impact on the white-nose syndrome epidemic. *Journal of Wildlife Diseases*, 51(2): 318-331.

10 US Fish & Wildlife Service (2016). National White-Nose Syndrome Decontamination Protocol. [www.whitenosesyndrome.org/topics/decontamination](http://www.whitenosesyndrome.org/topics/decontamination)

11 Holz P, Hufschmid J, Boardman W, Cassey P, Firestone S, Lumsden L, Prowse T, Reardon T, Stevenson M (2016). Qualitative risk assessment: White-nose syndrome in bats in Australia. [www.wildlifehealthaustralia.com.au/ProgramsProjects/BatHealthFocusGroup.aspx](http://www.wildlifehealthaustralia.com.au/ProgramsProjects/BatHealthFocusGroup.aspx) - WNS

cave managers, park rangers and members of the public, and made available via the WHA website.<sup>12</sup>

Guidelines are also available for veterinarians on how to collect and submit appropriate samples from suspect cases for exclusion of WNS.<sup>13</sup> Advice has been provided to Australian and visiting cavers by the Department of Agriculture and Water Resources on how to avoid introducing WNS into Australia.<sup>14</sup> The department also considered the effectiveness of border disinfection protocols against this fungus, and developed an alternative protocol to ensure risk items would be adequately decontaminated.

When the 17th International Congress of Speleology was held in Sydney in July 2017, its program included a number of field trips to Australian caves that were attended by international speleologists, who study caves or explore caves for sport. The Department of Agriculture and Water Resources, WHA and congress organisers worked together to reduce the risk of visitors bringing contaminated clothing and equipment into Australian caves, and to minimise the chances of an incursion of this disease. This included a suite of communication activities, culminating in a letter from the Australian Chief Veterinary Officer to congress participants shortly before the congress, and collaborative planning of biosecurity measures for pre- and post-congress field trips to Australian caves.

The event also served as an opportunity to raise awareness of

12 Wildlife Health Australia. How to report a suspect case of white-nose syndrome. [www.wildlifehealthaustralia.com.au/ProgramsProjects/BatHealthFocusGroup.aspx](http://www.wildlifehealthaustralia.com.au/ProgramsProjects/BatHealthFocusGroup.aspx) - WNS

13 Wildlife Health Australia. National guidelines for sample submission for WNS exclusion testing. [www.wildlifehealthaustralia.com.au/ProgramsProjects/BatHealthFocusGroup.aspx](http://www.wildlifehealthaustralia.com.au/ProgramsProjects/BatHealthFocusGroup.aspx) - WNS

14 Australian Government Department of Agriculture and Water Resources. White nose syndrome in cave-hibernating bats. [www.agriculture.gov.au/pests-diseases-weeds/animal/white-nose-syndrome](http://www.agriculture.gov.au/pests-diseases-weeds/animal/white-nose-syndrome)



**Bat showing symptoms of white-nose syndrome (Photo: Marvin Moriarty/USFWS)**

the disease and the prevention and preparedness work undertaken by WHA and the Department of Agriculture and Water Resources.

## Conclusion

If introduced to Australia, WNS could pose a significant threat to insectivorous bats, including one species that is critically endangered. Australia has taken steps to mitigate the risk of introduction of WNS, and to better prepare for a possible incursion of this disease. This work also provided a useful model for Australia's approach to managing the risk of exotic wildlife diseases of primary biodiversity concern.

Further information on WNS:

- [Wildlife Health Australia fact sheet<sup>15</sup>](#)
- [Australian Government Department of Agriculture and Water Resources website<sup>16</sup>](#)
- [USGS National Wildlife Health Center website<sup>17</sup>](#)
- [White-noseSyndrome.org website<sup>18</sup>](#)

15 [www.wildlifehealthaustralia.com.au/FactSheets.aspx](http://www.wildlifehealthaustralia.com.au/FactSheets.aspx)

16 [www.agriculture.gov.au/pests-diseases-weeds/animal/white-nose-syndrome](http://www.agriculture.gov.au/pests-diseases-weeds/animal/white-nose-syndrome)

17 [www.nwhc.usgs.gov/disease\\_information/white-nose\\_syndrome/index.jsp](http://www.nwhc.usgs.gov/disease_information/white-nose_syndrome/index.jsp)

18 [www.whitenosesyndrome.org](http://www.whitenosesyndrome.org)