

Western Canada White Nose Syndrome Transmission Prevention

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Background

White Nose Syndrome (WNS) is a devastating disease that is destroying bat populations in North America. The cause of this disease is a cold-loving fungus called *Pseudogymnoascus (formerly Geomyces) destructans (P.d.)*, which is expanding its range across North America at an alarming rate. WNS is expected to spread to western North America in the coming years.

Bats are an integral component of the ecosystem; as the primary consumer of night-time insects, bats play an important role in pest control for crops and forests. Bats are long-lived mammals; some species live over 40 years. Bats also have slow reproductive rates; most species have one young per year. Bat populations are vulnerable to WNS because they are unable to quickly bounce back from mass mortality, as has been evidenced in eastern North America.

This document outlines how you can prevent a giant leap of the P.d. fungus to western North America, and minimize the possibility of spreading the fungus within the west if it is already here, or if it arrives in the near future.

Hibernating bats are most at risk to WNS disease. Bats that migrate (e.g. hoary bat) can travel hundreds and even thousands of kilometers, while *hibernating* bats do not tend to travel long distances between summer and winter roosts. There is a significant difference in bat diversity on the east and west side of the Rocky Mountains, suggesting this may be a partial barrier to bat movement. If bat-to-bat transfer remains the mode of spread for this fungus, and humans take precautions to not spread the fungus, the west could remain WNS free for many years. ***Preventing a giant leap of the P.d. fungus is the most important thing humans can do for western bats.***



WNS infected bat in Eastern USA

Preventing a giant leap of the P.d. fungus is the most important thing humans can do for western bats.



Bat ecologist counts bats

Delaying the arrival of WNS to western North America also allows researchers more time to study western bats. Very little is known about the winter ecology of many bat species. The west has a richer species diversity of bats than in the east, and it is not known how WNS will impact western specific species. Biologists require time to learn about where western bat species overwinter, what constitutes critical winter habitat, and what is normal winter ecology and behaviour. By determining these details, western bats will benefit; and mitigation techniques can be developed to help reduce the impact of WNS in the west. At a minimum, enough will be learned about winter ecology to facilitate population recovery post-WNS.

WNS Risk Assessment Tool

Use this tool to determine if you are at risk to transmit WNS, and the actions you should take.

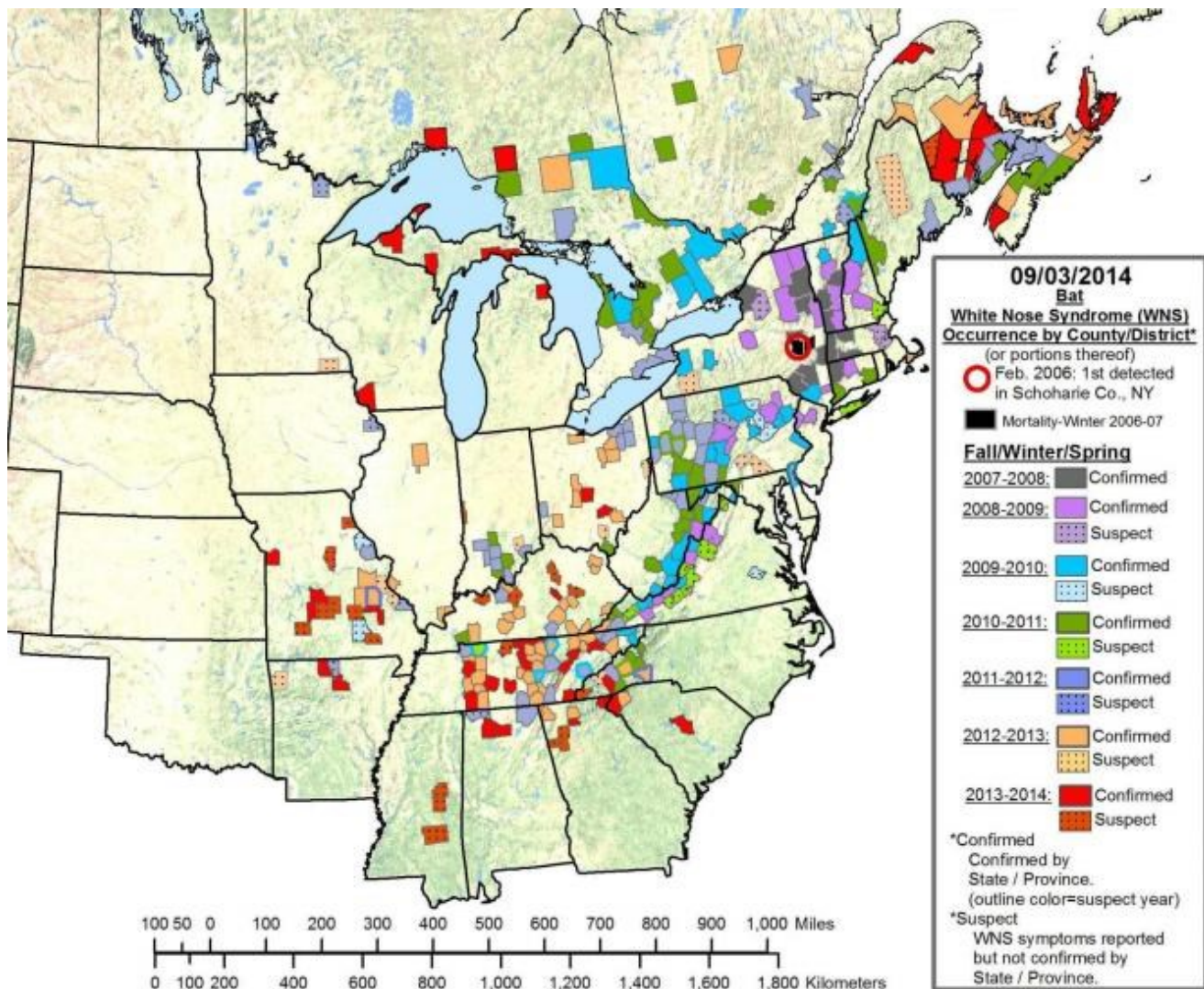
Scenario	Risk Level	Action	Description
You have been underground in western North America where <i>P.d.</i> is not known to occur; bats or bat signs (e.g. guano, skeletons) were observed in the site.	Low	Report It Clean It	Report your sightings, your information is critical to research. Thoroughly wash equipment, clothing & body. Ensure you are not bringing soil/ debris to another cave.
You have been underground in western North America where <i>P.d.</i> is not known to occur; no bats and no bat signs were observed at the site.	Low	Clean It	Thoroughly wash equipment, clothing & body. Ensure you are not bringing soil/ debris to another cave.
You have been underground outside of western North America. The area you visited is not known to have <i>P.d.</i> This includes, but is not limited to: Manitoba, American mid-West, and Mexico	Moderate	Decontaminate It	Thoroughly wash equipment, clothing, and body; dispose of materials where possible instead of re-using (eg. soiled gloves), and decontaminate everything that is to be reused underground.
You have been in a cave/mine that has more than 10 recently dead bats evident	High	Report It Swap It	Do not re-use your equipment/ clothing in an underground location in an area that is not known to have <i>Pd.</i> Equipment used in High Risk areas should not go underground in western North America
You have been in a cave/mine that has bats that show signs of WNS	High	Report It Swap It	
You have been underground in an area known to have <i>Pd.</i> This includes, but is not limited to: eastern North America, Europe, and Asia	High	Swap It	

Purpose

In caves housing WNS-infected bats, spore levels are high and thus the chance of having spores on equipment and clothing is high. The greatest density of spore contamination is likely to occur on anything that enters into a WNS positive cave. Fungal spores are very resistant and are easily spread; risk of infection is extremely high if decontamination is not adequate. **Cavers should not go underground in the West with equipment or clothing that has been used underground in the East because of the high likelihood that this equipment has P.d. spores.**

Cavers want to ensure they are not the vector that spreads this disease. While decontamination techniques have been developed, their effectiveness in all situations on all substrates, is not proven. Decontamination techniques *reduce* the risk of spread of spores, but cannot guarantee it. Cavers must evaluate the level of risk they could transport of spores; the WNS Risk Assessment Tool (page 2) is intended to assist in cavers' choice of equipment and actions.

Because cavers respect their environment and value conservation, compliance with these protocols is expected.



Map by: Lindsey Heffernan, PA Game Commission

Report It

If you see or hear evidence of bats please report your findings. Winter sightings are particularly important to understanding the over-wintering behaviours of western bat species.

Report your bat sightings to: Wildlife Conservation Society Canada: clausen@wcs.org
BC Bat Action Team: bcbats@gmail.com
Alberta Speleological Society: info@caving.ab.ca

Report any significant number of dead bats and/or signs of WNS (e.g., white muzzle) in western Canada to:

In Alberta: Margo Pybus, Provincial Wildlife Disease Specialist
Email: margo.pybus@gov.ab.ca Phone: 1-877-944-0313 or 780-427-3462

In British Columbia:

Dr. Helen Schwantje, Ministry of Forest, Lands and Natural Resources

Email: Helen.schwantje@gov.bc.ca Phone: 250-953-4285

Dr Purnima Govindarajulu, Ministry of Environment:

Email: Purnima.Govindarajulu@gov.bc.ca Phone: 250 387 9755



Healthy little brown bats

Clean It

Equipment used in caves with a **low risk** of having WNS should be cleaned to reduce the introduction of foreign matter to other caves. Dirt and debris should be cleaned with water. The use of scrubbing tools and pressurized water aid in a more thorough cleaning. Rope should be cleaned with a rope brush to better clean off grit. Pressure washers at car washes are not recommended because of the potential contact of petrochemical products with nylon caving equipment.

Decontaminate It

Equipment used in caves with a **moderate risk** of containing WNS should be decontaminated to eliminate spores that could be on caving equipment.

Reducing spore load can be done in two ways: 1. Removing spores, 2. Inactivating spores (can no longer cause infection). Spores can be removed from surfaces by thorough washing, however, because not all spores can be removed this way, especially from porous substrates such as rope, webbing, and clothing. Potential spores need to be killed/ inactivated. There are two options of decontamination to inactivates spores: **A) Submersion in hot water** and **B) Chemical disinfectant**

A) Submersion in Hot Water

The most universally available and preferred option for decontamination of gear is:

Step 1) Clean It following the instructions above. A gentle dish detergent such as Dawn or Camp Soap is encouraged and proven to be more effective in decontamination, but is not required.

Step 2) Submerge gear in water $\geq 50^{\circ}\text{C}$ (122°F) for 20 minutes. Because fungal spores are resistant, it is crucial the **50 for 20** guideline be met. Cooler water or shorter time will compromise the effectiveness of this method. Soaking can be done in a standard washing machine, but may require adjustments to the hot water heater or additional hot water.

Testing the effective temperature is required to determine viability.

B) Chemical Disinfectant

This option is intended for equipment that cannot be submersed in hot water.

Step 1) Clean dirt and debris off gear using water. The use of scrubbing tools, pressurized water and dish detergent such as Dawn or Camp Soap is encouraged and proven to be more effective in decontamination, but is not required.

Step 2) Disinfect in accordance with label of the chosen product

Disinfectant products must be used in accordance with the label and material safety data sheets (MSDS). Disinfectant products and the contaminated rinse water must be managed and disposed of as per product directions to avoid contamination of groundwater, drinking water, surface water, or any other form of water.

Two chemical treatments are available options include:

1. Household chlorine bleach solution (e.g. Javex) diluted to 10% by volume (1 part bottled bleach solution, 9 parts water).
2. Quaternary ammonium products containing 0.3% ammonium quaternary compounds (quatts). These quaternary ammonium products must be used at the label dilution for best fungicidal activity.

Products currently available in Canada:

Clorox Disinfecting Wipes (.29 quatts*)

Lysol Disinfecting wipes (.26 quatts*)

ASEPTOL 2000 S.E.C. Repro Inc. http://www.secrepro.com/en/sanitary/aseptol_2000.php

Alcohol based disinfectants, such as wipes and hand wash, **are not** effective for destroying *P.d.* spores as determined by US FWS.

Note: Some products listed by the U.S. Fish and Wildlife Service (US FWS) decontamination protocol are not available in Canada.

* 0.26 quatt wipes were proven effective in testing by US FWS

Alcohol based disinfectants, such as wipes and hand wash, are not effective for destroying P.d. spores

Planning for Decontamination:

If you are going to a **moderate risk** cave you will have to decontaminate your gear before and after the trip:

Choose gear that can be most effectively decontaminated. Rubber boots will be less affected by multiple hot water submersions or chemical treatments than leather boots; and because rubber is not porous, spores will wash away more easily.

Prepare a strategy for cleaning and treatment of equipment. How and where will all equipment and waste materials be contained, stored, treated or discarded after your trip?

Bring bags - Gear should be isolated (quarantined) at the cave/mine entrance, in sealed plastic bags or containers. Be mindful of cross-contamination during quarantine, put your cave suit, boots and equipment into a garbage bag as soon as possible once you exit the cave or return to your vehicle.

Be aware of cross contamination. If equipment is not quarantined it can pass spores to camp gear, backpacks, and vehicles. Be prepared to clean and disinfect the outside surfaces of containers and bags prior to putting them in vehicles or storage areas. Do not wear your caving boots in your vehicle.

Mud on personal clothing, hair, and skin can also contaminate. On a best effort basis, wash and dry your person and clothing

Removing mud and sediment before decontamination makes the process more effective (Shelley et al. 2013); efforts should be made to limit muck once you've emerged from the cave, and before equipment is sealed for transport.

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Gear – Ropes and tackle can be dedicated to a cave, so they do not require frequent decontamination. If this method is chosen, be conscientious of cross contamination during storage. Most ropes and nylon products have not been tested for impact of chemicals; Sterling brand ropes may be soaked in a quaternary ammonium solution for 15 min and rinsed with water. The **50 for 20** method is generally preferable due to lack of knowledge of the impact of chemicals on equipment.

Refer to provincial/federal regulatory or land management agencies to determine additional requirements for site visits.

The process of decontamination is about reducing the risk of transferring spores. Anything that is muddy or porous, such as helmet straps, needs to be decontaminated because they could be carrying spores.

Swap It

Under no circumstances should equipment or clothing used in a WNS affected area be used in Western Canada because there is a **high risk** of spore build-up on equipment/clothing in WNS positive caves. The implications of transferring spores are too great and the decontamination is not guaranteed effective.

Cavers who cave outside of western North America can choose from the following options 1) borrow gear while in a WNS area, 2) use old gear and not bring it back or 3) have a set of gear dedicated to use outside of western North America which must be isolated from other gear while in storage to avoid cross contamination.

By swapping gear, cavers greatly reduce the risk of being the vector that causes the giant leap of the P.d. fungus to western North America. When WNS arrives to western Canada the restrictions to cavers will increase and protocols will become more onerous.

It is in the cavers best interest to be diligent in handling and choosing equipment and they must be cognisant of the threat of WNS.

Stay Informed

This is a living document; it will be revised as new research and developments come available. It is recommended you refer to documents online to ensure you are reviewing the most up to date version.



Below are some links for further information on White Nose Syndrome:

White Nose Syndrome.org <https://www.whitenosesyndrome.org/>

White Nose Syndrome Map of North America and each province: http://www.ccwhc.ca/wns_maps.php

BC Bat Conservation fact sheet: http://www.env.gov.bc.ca/wld/documents/wldhealth/WNS_fact_sheet_BC_General_Public_Jan_2014.pdf

Decontamination procedures from US Fish and Wildlife https://www.whitenosesyndrome.org/.../national_wns_revise_final_6.25