



**Title:** National White-Nose Syndrome Decontamination

**SOP Number:** SOP065

**Purpose:** The purpose of this SOP is to provide the best available scientific information known to effectively decontaminate clothing, footwear, and equipment that may have been exposed to *Pseudogymnoascus destructans* (*Pd*). Local, state, federal, or other management agencies may have additional requirements or clarifications for equipment used on lands under their jurisdictions<sup>1</sup> or work involving public trust resources. Always follow all state and/or federal permit conditions. Contact the respective agency representatives for supplemental documents or additional information.

---

Modified from National White-Nose Syndrome Decontamination Protocol – Version 10.14.2020  
White-nose Syndrome Disease Management Working Group. 2020. National White-Nose Syndrome  
Decontamination Protocol – October 2020. [www.WhiteNoseSyndrome.org](http://www.WhiteNoseSyndrome.org)

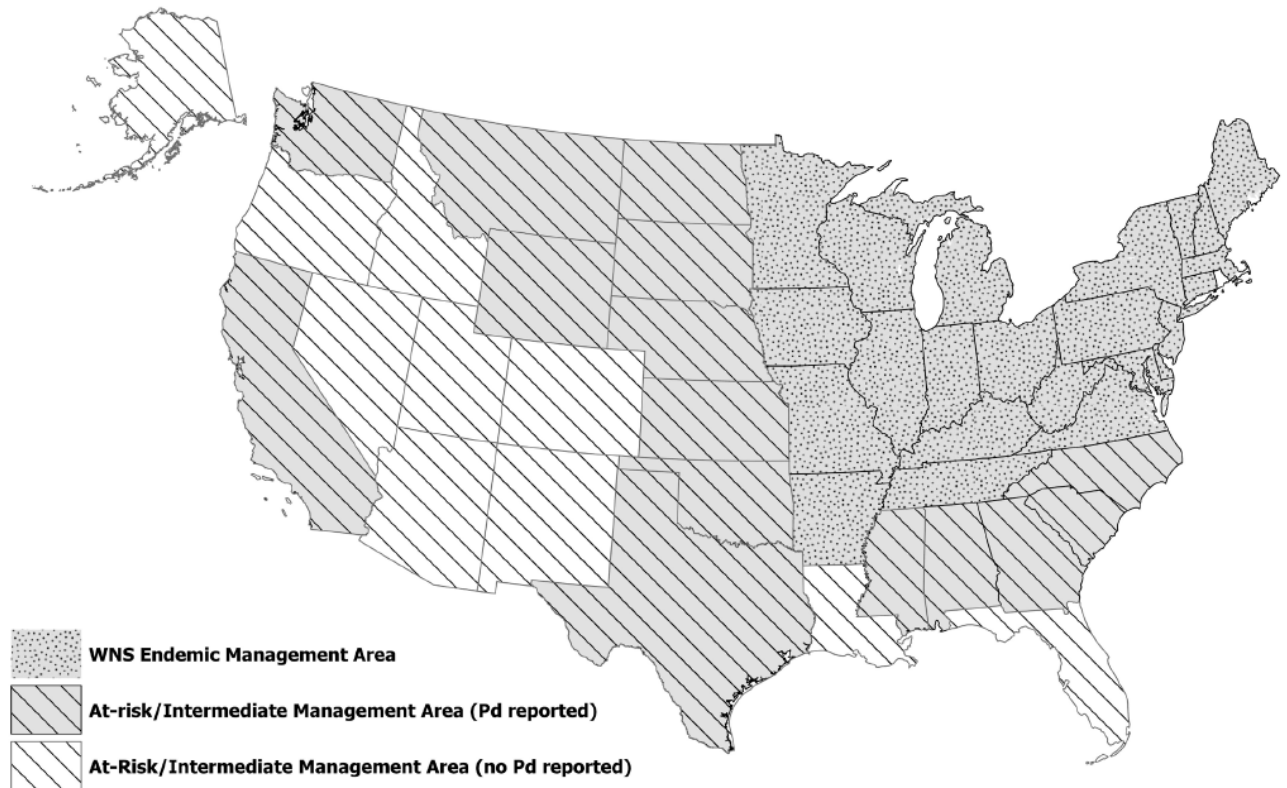
<https://www.whitenosesyndrome.org/mmedia-education/national-wns-decontamination-protocol-u-s>

The fungus *Pseudogymnoascus destructans* (*Pd*) is the cause of white-nose syndrome (WNS), a disease that has resulted in unprecedented mortality of hibernating bats throughout eastern North America. Since first documented in New York in 2006, WNS continues to threaten hibernating populations of bats across the continent, having spread rapidly through the Northeast, mid-Atlantic, Midwest, and Southeast states, as well as eastern Canada. Because of the devastating effects of WNS in North America, and with the risk of human-assisted transmission, all persons who come into contact with bats, their environments, and/or associated materials for any reason (*e.g.*, research, recreation, etc.) are advised to take precautions to avoid additional, inadvertent transport of *Pd* to uncontaminated bats or habitats.

**TRIP PLANNING/ORGANIZATION:**

Researchers must consider the order of sites that they visit and what region(s) of the country they will be visiting and the presence of the disease to guard against vectoring the disease to uncontaminated areas.

1.) Identify the appropriate WNS Management Area (Figure 1)



**Figure 1.** WNS Management Areas for decontamination. Endemic: Endemic states are those where *Pd* is determined or assumed present in most hibernacula. This area comprises states where WNS has been widespread for multiple years. At-risk/Intermediate: Intermediate states are those where *Pd* is detected or assumed present in some but not all hibernacula in the state. States adjacent to states with confirmed WNS are also included in the Intermediate category. At-risk states are those that have at least one state between them and the nearest confirmed case of WNS. Shaded areas are where *Pd* has been reported as of May 2020.

2.) Once the appropriate Management Areas have been determined, use Figure 2 to determine appropriate uses for A. Subterranean Equipment or B. Terrestrial Equipment.

**All equipment must be decontaminated prior to any approved movement or transfer between locations.**

The following symbols indicate that equipment transfer/movement is:



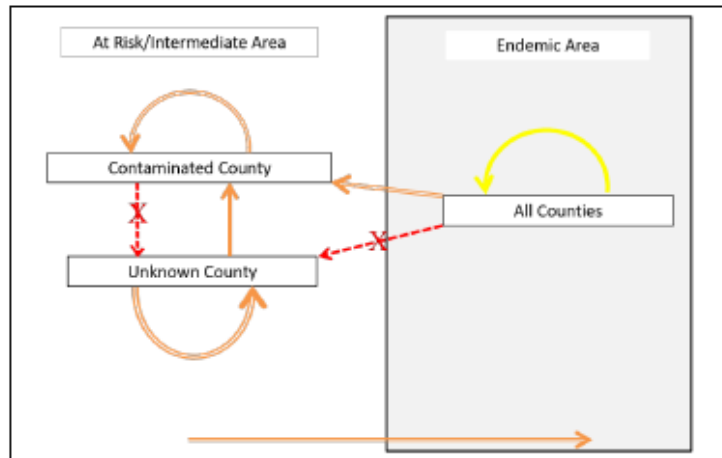
High risk – Do not transfer or use equipment from contaminated counties or states

Moderate risk – Equipment should not be transferred for use between management areas without authorization to do so in specified situations by the local land management agency.

Low risk – Equipment, once decontaminated, may be transferred or used in specified situation.

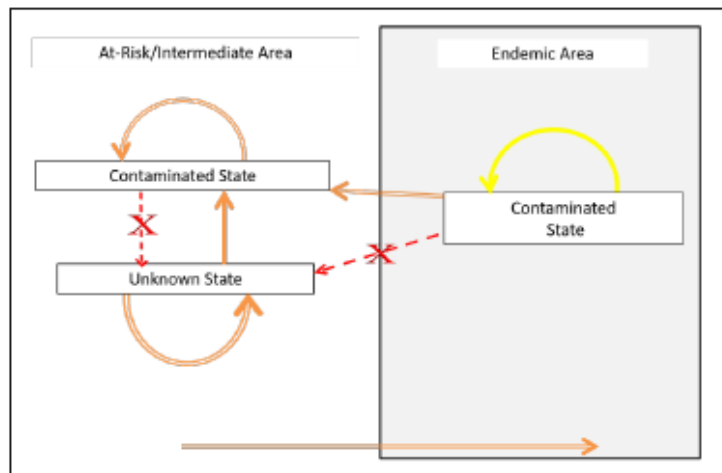
**A. Strategies for movement of Subterranean/ High-risk Terrestrial Equipment evaluated at the county scale**

“Subterranean/High-risk Terrestrial equipment” includes any equipment that is used in a cave/mine environment as well as other underground bat roosts, and certain other situations of potential exposure to seasonally abundant *Pd* fungus regardless of location.



**B. Strategies for movement of Lower-risk Terrestrial Equipment evaluated at the state scale**

“Lower-risk Terrestrial equipment” includes any equipment that has not previously been exposed to a cave/mine or other environments with potential exposure to seasonally abundant *Pd* fungus.



**Figure 2. Movement recommendations for decontaminated (A) Subterranean/High-risk Terrestrial equipment and (B) Lower-risk Terrestrial equipment.**

3.) Choose equipment that can be most effectively decontaminated. Equipment should always be inspected for defects prior to use.

4.) Confirmed *Pd* contaminated sites or those with a high index of suspicion for contamination should be visited **only after** those sites of unknown *Pd*/WNS status<sup>2</sup> have been visited.

#### **PROCEDURES FOR DECONTAMINATION:**

##### 1.) On site:

- a.) Before leaving a site, thoroughly inspect all gear for 'stowaway' bats.
- b.) Thoroughly remove sediment/dirt from equipment immediately.
- c.) Contain all exposed and potentially contaminated equipment in sealed bags/containers for treatment away from the location. Decontaminate the outside hard, non-porous surfaces of containers and bags using one of the treatments indicated in Table 1 prior to moving them to a secondary location (*e.g.*, vehicles, labs, or storage). Store all exposed and decontaminated equipment separately from unexposed equipment.
- d.) Clean hands, forearms, and exposed skin using hand/body soaps/shampoos. When feasible, change into clean clothing and footwear prior to entering vehicles and contain all potentially contaminated equipment as per c above.

##### 2.) Off site:

- a.) *REMOVE* dirt and debris from the outside of vehicles (especially wheels/undercarriage) prior to additional site visits.
- b.) *CLEAN* submersible and non-submersible equipment according to manufacturer's specifications. The use of conventional cleansers like Woolite® detergent or Dawn® dish soap aid in the removal of sediments and debris prior to treatment. Clean the inside of field vehicles, especially floor mats and seats. If the vehicle has become dirty from approaching or being inside a roost, wash the wheels and undercarriage before using at additional sites.
- c.) *TREAT* submersible and/or non-submersible equipment as legally allowable according to the instructions provided on the product label using an application and/or product found in Table 1. The use of any product or application should also consider all pertinent equipment manufacturer's recommendations for cleaning and/or decontamination. For equipment that cannot safely be treated using an application in Table 1, dedicate to individual sites as determined appropriate in Section IV and clean according to the equipment manufacturer's instructions.

i. Submersible Equipment (*i.e.*, equipment that can safely withstand submersion in water or other specified product for the recommended amount of time without compromising the integrity of the item): Recognition that not all products found in Table 1 are suitable for submerging equipment is a fundamental part of choosing the most appropriate application and/or product. The safety and integrity of equipment, therefore risk of personal injury or irreversible equipment damage, requires the user to carefully consider each application and/or product. Always remember to wear personal protective gear suitable for the application and/or product selected in Table 1.

The preferred treatment for all submersible equipment is submersion in hot water that maintains a temperature of at least 55°C (131°F) for a minimum of 20 minutes. Ensure that all equipment surfaces remain in direct contact for the duration of the treatment period. The use of applications and products in Table 1 should be done with extreme caution and proper personal protective equipment (PPE) due to the risk of personal injury. Many commercial and home washing machines with sanitize (or allergen) cycles may be capable of submerging gear in the recommended hot water application for the required time, but each machine should be tested to ensure it reaches and sustains the needed temperatures throughout the process. Remember, if heat may affect the safety and/or integrity of the otherwise

- submersible piece of equipment, consider equipment dedication or the remaining products listed in Table 1.
- ii. Non-submersible Equipment (*i.e.*, equipment that may be damaged by liquid submersion): Treat all non-submersible equipment using the application or product in Table 1 that complies with the manufacturer's recommendations and product label instructions. The listed applications or products may not be appropriate or safe for non-submersible equipment. Dedication of equipment should always be considered the preferred application in these circumstances.
- d.) RINSE equipment, as appropriate, thoroughly in clean water. Allow all equipment to completely dry prior to the next use.
- e.) DECONTAMINATE the equipment bins, sinks, countertops and other laboratory, office, or home areas with products in Table 1.

**Table 1.** Applications and products with demonstrated efficacy against *Pd* 3, 4, 5, 6, & 7. Remember to consult equipment labels, registered product labels, and the appropriate SDS for regulations on safe and acceptable use.

	Tested Applications & Products <sup>3, 4, 5, 6, &amp; 7</sup>	Federal Reg No.:	Laboratory Results
Preferred Applications	Equipment Dedication	N/A	Clean according to manufacturer standards and dedicated to a site.
	Submersion in Hot Water <sup>4, 6, &amp; 7</sup>	N/A	Effectiveness demonstrated when submerged for 5 continuous minutes in water $\geq 55^{\circ}\text{C}$ (131 $^{\circ}\text{F}$ ).
Other Products	Ethanol (60% or greater) <sup>4, 6, &amp; 7</sup>	CAS - 64-17-5	Effectiveness demonstrated upon exposure in solution for at least 1 minute.
	Isopropanol (60% or greater) <sup>4, 6, &amp; 7</sup>	CAS - 67-63-0	
	Isopropyl Alcohol Wipes (70%) <sup>4, 6, &amp; 7</sup>	CAS - 67-63-0	Effectiveness demonstrated immediately following contact and associated drying time.
	Hydrogen Peroxide Wipes (3%) <sup>4, 6, &amp; 7</sup>	CAS - 7722-84-1	
	Accel <sup>4, 5, 6, &amp; 7</sup>	EPA - <a href="#">74559-4</a>	Effectiveness demonstrated when used in accordance with product label.
	Clorox <sup>®</sup> Bleach <sup>3, 4, 5, 6, &amp; 7</sup>	EPA - <a href="#">5813-100</a>	
	Clorox <sup>®</sup> Clean-Up Cleaner + Bleach <sup>4, 5, 6, &amp; 7</sup>	EPA - <a href="#">5813-21</a>	
	Clorox <sup>®</sup> Disinfecting Wipes <sup>4, 5, 6, &amp; 7</sup>	EPA - <a href="#">5813-79</a>	
	Clorox Healthcare Hydrogen Peroxide Disinfectant Cleaner <sup>4, 5, 6, &amp; 7</sup>	EPA - <a href="#">67619-24</a>	
	Formula 409 <sup>®</sup> Antibacterial Kitchen All-Purpose Cleaner <sup>3, 4, 5, 6, &amp; 7</sup>	EPA - <a href="#">5813-73</a>	
	Hibiclens <sup>4, 5, 6, &amp; 7</sup>	NDA - <a href="#">017768</a>	
	Lysol All Purpose Cleaner Lemon Breeze <sup>4, 5, 6, &amp; 7</sup>	EPA - <a href="#">777- 66</a>	
	Lysol Disinfecting Wipes <sup>4, 5, 6, &amp; 7</sup>	EPA - <a href="#">777- 114</a>	
	Lysol <sup>®</sup> IC Quaternary Disinfectant Cleaner <sup>3, 4, 5, 6, &amp; 7</sup>	EPA - <a href="#">47371-129</a>	
	Rescue Hydrogen Peroxide Personal Wipes <sup>4, 5, 6, &amp; 7</sup>	EPA - 74559-4	
	Sani Cloth Germicidal Disposable Wipes <sup>4, 5, 6, &amp; 7</sup>	EPA - <a href="#">9480-4</a>	
Up and Up Disinfecting Wipes <sup>4, 5, 6, &amp; 7</sup>	EPA - <a href="#">6836-336-56952</a>		
Virkon S	EPA - <a href="#">39967-137</a>		

Other effective treatments with similar water-based applications or chemical formulas (e.g., a minimum of 0.3% quaternary ammonium compound) may exist but remain untested at this time. Find more information on the USEPA or FDA registered product labels by accessing the individual hyperlink or searching USEPA or FDA Registration Numbers at: <http://iaspub.epa.gov/apex/pesticides/f?p=PPLS:1> or <http://www.accessdata.fda.gov/scripts/cder/drugsatfda/index.cfm>.

Products with USEPA registration numbers mitigate persistence of living organisms on surfaces and are regulated by the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA, 7 USC 136, et seq.). FIFRA provides for federal regulation of pesticide distribution, sale, and use. Within FIFRA, pesticides are defined as any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest. FIFRA further defines pests as any insect, rodent, nematode, fungus, weed, or any other form of terrestrial or aquatic plant or animal life or virus, bacteria, or other micro-organism (except viruses, bacteria, or other micro-organisms on or in living man or other living animals) which the Administrator declares to be a pest under section 25(c)(1). Find more information on FIFRA at: <http://www.epa.gov/oecaagct/lfra.html>.

## EQUIPMENT AND ACTIVITY SPECIFIC RECOMMENDATIONS:

### **A. Clothing & Footwear:**

**IMPORTANT: All clothing (*i.e.*, inner and outer layers) and footwear should be decontaminated after every site visit or otherwise cleaned and dedicated for use at individual sites or areas as determined appropriate in Section IV.**

Use of a disposable suit (*e.g.*, Tyvek® or ProShield®) or site-dedicated, reusable suit (*i.e.*, coveralls) is an appropriate strategy to minimize sediment/soil accumulation on clothing during a cave/mine or bat research activity. All clothing layers should still be decontaminated or otherwise cleaned and dedicated after every use.

Disposable items, regardless of condition, should not be reused. Contain all used equipment in plastic bags upon final exit from a site, separating disposable materials from reusable equipment. Seal and store plastic bags in plastic containers until trash can be properly discarded, and/or exposed reusable equipment can be properly decontaminated off site.

### **B. Cave/Mine and other Subterranean Equipment:**

Dedicate or decontaminate all cave/mine equipment (*e.g.*, backpacks, helmets, harness, lights, ropes, etc.). Carefully adhere to manufacturer's care and use to maintain equipment functionality and safety.

### **C. Scientific Equipment:**

Consider the use of disposable scientific equipment and materials that can be refreshed between contact with individual bats, especially in the Intermediate and At-Risk management areas. All disposable scientific equipment (*e.g.*, work surfaces, containers/envelopes, exam gloves, etc.) should only be used to process one bat, then discarded after use. Similarly, reusable equipment (*e.g.*, cotton holding bags, gear bags, gloves, wing punches, banding pliers, rulers, and other field instruments) should only be used to process one bat prior to initiating procedures for decontamination. Any bag used to hold bats must be breathable and safe for the animals. Autoclaving non-submersible equipment is an acceptable sterilization measure, if feasible and permissible for the equipment, although this method has not been tested directly for *Pd*.

### **D. Mist-Nets:**

Contamination of trapping equipment is possible year-round. Dedicate or decontaminate all netting equipment. All nets must be decontaminated after each use according to the submersion in hot water application. All nets should be completely dry prior to the next use.

### **E. Harp Traps:**

All trapping equipment that comes in contact with one or more bats OR enters a cave/mine/bat roost must be decontaminated after each use. Explore the use of disposable trap bags or liners to reduce transmission risks. Disposable trap bags should be discarded after individual use.

### **F. Acoustic Monitor, Camera, and Related Electronic Equipment:**

Dedicate or decontaminate all acoustic monitoring, camera, and related electronic equipment. The material composition of this equipment requires careful review and adherence to the manufacturer's care and use standards to maintain their functionality and protective features. Electronic devices used as terrestrial equipment pose a limited risk of transmission. Equipment used in a cave/mine/bat roost may be placed in a sealed plastic casing, plastic bag, or plastic wrap to reduce the potential for contact/exposure with contaminated environments. Prior to opening or removing any plastic protective wrap, first clean, then remove, and discard all protective wrap.

## REFERENCES:

*These recommendations are the product of the multi-agency WNS Decontamination Team, a sub-group of the Disease Management Working Group established by the National WNS Plan (A National Plan for Assisting States, Federal Agencies, and Tribes in Managing White-Nose Syndrome in Bats, finalized May 2011). On 15 March 2012 the initial national decontamination protocol was approved and adopted by the WNS Executive Committee, a body consisting of representatives from Federal, State, and Tribal agencies which oversees the implementation of the National WNS Plan. The protocol is updated as necessary to include the most current information and guidance available.*

1 To find published addenda and/or supplemental information, visit <http://www.whitenosesyndrome.org/topics/decontamination>.

2 Visit <http://www.whitenosesyndrome.org/resources/map> for the most updated information on the status of county and state. County and state level determination is made after a laboratory examination and subsequent classification of bats according to the current WNS case definitions. Definitions for the classification can be found at [https://s3.us-west-2.amazonaws.com/prod-is-cms-assets/wns/prod/de91e7d0-9c0e-11e9-ad22-19882a049409-WNS-Case-Definitions\\_y5162019\\_FINAL-clean-logo.pdf](https://s3.us-west-2.amazonaws.com/prod-is-cms-assets/wns/prod/de91e7d0-9c0e-11e9-ad22-19882a049409-WNS-Case-Definitions_y5162019_FINAL-clean-logo.pdf) Contaminated determination includes both confirmed and suspect WNS classifications.

3 Information from : V. Shelley, S. Kaiser, E. Shelley, T. Williams, M. Kramer, K. Haman, K. Keel, and H.A. Barton – Evaluation of strategies for the decontamination of equipment for *Geomyces destructans*, the causative agent of White-Nose Syndrome (WNS) *Journal of Cave and Karst Studies*, v. 75, no. 1, p. 1–10. DOI: 10.4311/2011LSC0249

4 Information from: J.A. Glaeser and C. Kunze – Further Evaluation of Decontamination Products to Minimize Human-based Transmission of *Pseudogymnoascus destructans*. In prep. These products were tested by the Northern Research Station, under USDA Forest Service Cooperative Agreement 13-IA-11242310-036 (U.S. National Park Service and U.S. Forest Service) & 16IA11242316017 (U.S. Fish and Wildlife Service and U.S. Forest Service)

5 The use of trade, firm, or corporation names in this protocol is for the information and convenience of the reader. Such use does not constitute an official endorsement or approval by state and/or federal agencies of any product or service to the exclusion of others identified in the protocol that may also be suitable for the specified use.

6 Product guidelines should be consulted for compatibility of use with one another before using any decontamination product. Also, detergents and quaternary ammonium compounds (*i.e.*, Lysol® IC Quaternary Disinfectant Cleaner) should not be mixed directly with bleach as this will inactivate the bleach and in some cases produce a toxic chlorine gas. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

7 Final determination of suitability for any decontaminant is the sole responsibility of the user. All users should read and follow all labeled instructions for the products/applications and/or understand associated risks prior to their use. Treatments and the corresponding procedures may cause irreversible harm, injury, or death to humans, bats, equipment or the environment when used improperly. Always use personal protective equipment in well-ventilated spaces to reduce exposure to these products or applications.