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Working Together to Combat White-nose Syndrome: A Report of a Meeting on 9–11 June 2008, in Albany, New York

DeeAnn M. Reeder¹ and Gregory R. Turner²

¹*Department of Biology, Bucknell University, Lewisburg, PA 17837 and*

²*Pennsylvania Game Commission, 2001 Elmerton Avenue, Harrisburg, PA 17110
E-mail: dreeder@bucknell.edu*

White-nose syndrome (WNS) was first noted in 2006 in New York State. It was named for a white fungus that grows on the muzzle, ears, and other exposed surfaces of hibernating bats. It is also associated with fat reserves that are depleted by midwinter, a reduced ability to arouse from deep torpor, shifts from typical hibernating sites, daytime flight during winter, and permanent emergence from the hibernacula in midwinter. In severely affected sites, WNS is characterized by mass starvation and death and has resulted in loss of ca. 90% of the bats in certain hibernacula. WNS has been identified now at 18 sites in New York, 5 in Vermont, 3 in Massachusetts, 1 in Connecticut, and possibly 3 locations in Pennsylvania. Bats surviving the winter in Massachusetts, New York, and Vermont were experiencing mortality in their summer habitats, at least through June, and damage to wings and other anomalies (e.g., flaking skin along forearms or multiple small white spots; see Fig. 1), presumably associated with WNS, also have been documented in summer. Thus far, WNS has affected six species (big brown bat, *Eptesicus fuscus*; small-footed bat, *M. leibii*; little brown bat, *Myotis lucifugus*; northern bat, *M. septentrionalis*; Indiana bat, *M. sodalis*; and eastern pipistrelle, *Perimyotis subflavus*), all of which have been identified on state wildlife action plans as species of greatest conservation need. WNS represents a significant and unprecedented problem with likely dire consequences in the Northeast and potentially beyond.

In response to this crisis, a meeting of the primary researchers and wildlife managers dealing with WNS was held on 9–11 June in Albany, New York. The meeting was hosted by New York State Department of Environmental Conservation, and primarily was organized by the U.S. Fish and Wildlife Service and New York State Department of Environmental Conservation, with contributions from Bat Conservation International, Boston University, Cornell University, Pennsylvania Game Commission, Vermont Department of Fish and Game, and U.S. Geological Service. The meeting was supported by multiple sources, including a generous contribution from Bat Conservation International. Facilitators were provided by Bat Conservation International and the U.S. Fish and Wildlife Service, and the proceedings from the meeting are currently being produced by the New York State Department of Environmental Conservation and the U.S. Fish and Wildlife Service and will be made available on the service's webpage (see below).

The 3-day meeting was attended by 94 participants from 12 states, 8 agencies of the U.S. government, 8 universities, 4 nongovernmental organizations, and 2 Canadian agencies. In advance of the meeting, selected participants submitted papers that summarized either the state of knowledge from their particular field or the records of bats with WNS from their state or region. During the 1st day, a single session consisted of presentations on bat ecology,

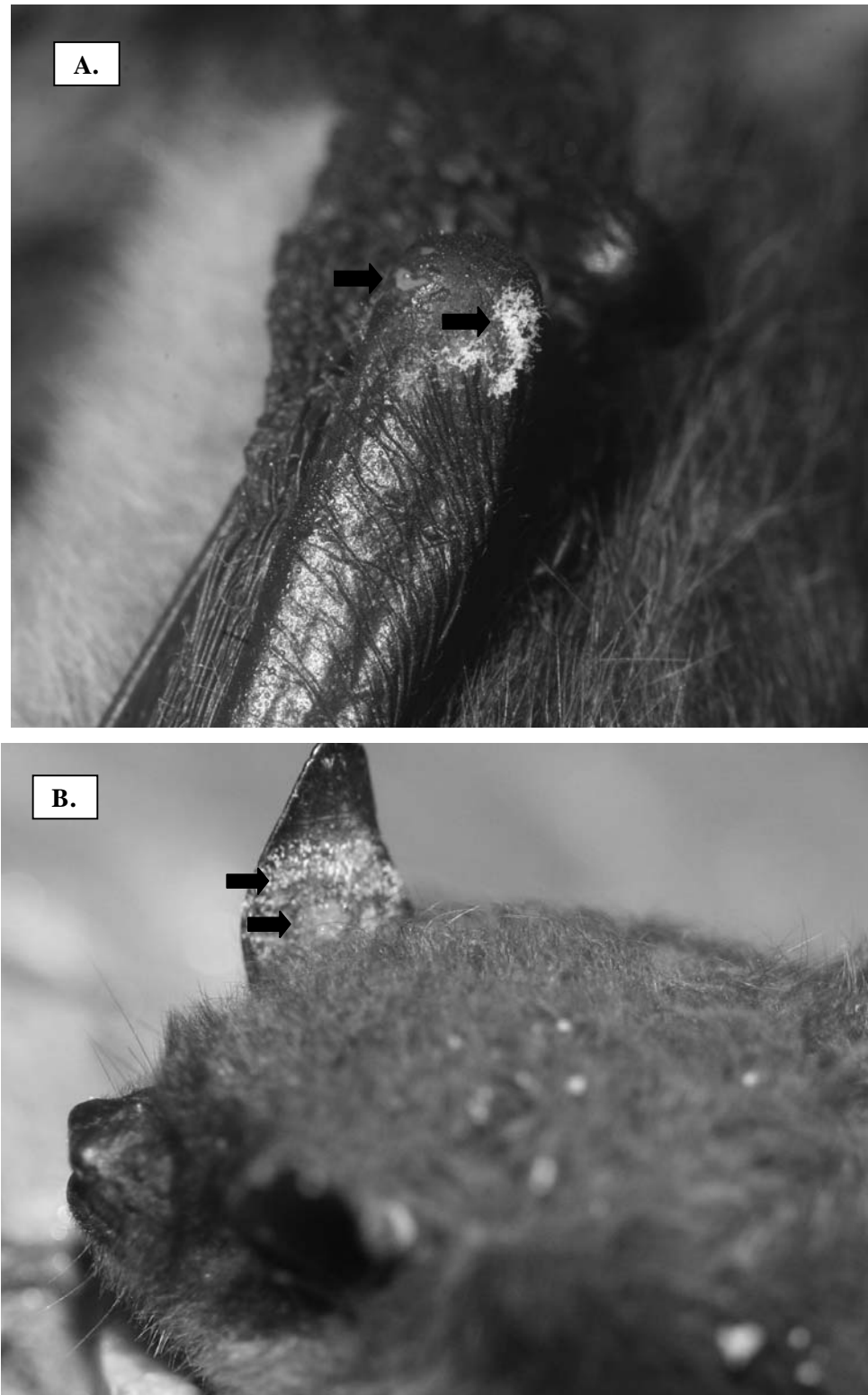


Figure 1. Photos taken of little brown bats in Pennsylvania caves in April 2008.
A) Fungus and lesion on the forearm (Photo courtesy of Charlie Eichelberger, Pennsylvania Natural Heritage). B) Fungus and lesion on the ear (Greg Turner, Pennsylvania Game Commission).

energetics, immunology, toxicology, a history and overview of WNS, perspectives on public health, and updates from pathologists on their findings concerning WNS. Two specialists on bees (J. Pettis of the U.S. Department of Agriculture and D. van Engelsdorp of Pennsylvania State University) discussed strategies for dealing with WNS in a timely fashion and shared lessons from the colony collapse disorder of honeybees.

During the 2nd day, biologists who primarily conduct research and those who primarily work for governmental agencies met separately, with the researchers focusing on developing testable hypotheses regarding the cause or causes of WNS and the managers focusing on developing a coordinated strategic response to WNS among state and federal wildlife agencies. The research group formulated four hypotheses concerning the emergence and spread of WNS.

Hypothesis 1.—Bats are starving to death due to a change in body condition caused by inadequate quantity of depot fat stored prior to hibernation, premature depletion of depot fat, or water imbalance. Implicit in this hypothesis is the assumption that the fungus is an opportunistic infection (as is typical of fungal infections) and represents a symptom, rather than a cause of WNS.

Hypothesis 2.—Mortality is directly due to a pathogen (i.e., fungus, virus, bacteria, or parasite). Although the pattern of emergence and spread of WNS is suggestive of an emergent infectious disease, there is no concrete evidence as of yet of a single causative pathogen.

Hypothesis 3.—Mortality is indirectly caused by environmental contaminants (e.g., pesticide residues or mercury), which in low levels could be altering behavior or physiology. Available evidence does not support the idea that currently present contaminants are directly lethal to bats.

Hypothesis 4.—WNS is caused by the synergistic effects of multiple causal

influences. In this scenario, factors such as contaminants, altered patterns of fat deposition or utilization, and a potential pathogen all interact to cause starvation and death. These hypotheses are currently being reworked and expanded as researchers around the country design studies to test them.

The managers' session on the 2nd day focused on strategies for determining the population effects of WNS, conducting surveillance, studying the role of contaminants, examining the role that rehabilitators can play, coordinating WNS-related activities, and coordinating public information and outreach. Primary themes that emerged from the manager's meeting included the lack of funding and time for state and federal personnel to dedicate to this issue, the necessity for continued regional coordination and collaboration among all involved agencies and organizations, the establishment of both field-oriented and coordination work groups, and the need for standardized methodology to facilitate interstate comparisons.

All participants regrouped on the 3rd day in a single session to review the work of the previous 2 days and focus on ways to move forward. A variety of committees were formally established and charged with pursuing areas of future research and management needs and for developing standardized methodology for collection of data.

Priorities established for winter 2008–2009 include, but are not limited to, heightened surveillance at both affected and non-affected sites throughout the Northeast; determining whether bats are entering hibernation with adequate energy reserves; examining arousal patterns and body temperatures during hibernation at both affected and non-affected sites; examining potential differences in metabolism of bats from affected and non-affected sites; further documentation and characterization of the

fungus; and, of critical importance, testing whether the identified fungus can cause WNS through direct inoculation experiments.

As a service to biologists, the media, and other interested parties, the U.S. Fish and Wildlife Service maintains a website for information on WNS

(http://www.fws.gov/northeast/white_nose.html). Updates on research and useful documents, such as press releases, presentations, and decontamination protocols, are located on this site. Both Bat Conservation International and the Indiana State University Center for North American Bat Research and Conservation have

established funds for research on WNS. To donate, please see their respective Web sites: (<http://www.batcon.org>), (<http://www1.indstate.edu/biology/centers/bat.htm>).

Lastly, tracking the progression of WNS across the Northeast and documenting the presence of WNS in new areas is of critical importance. Anyone who observes potential signs of WNS while caving or performing research or who observes dead or dying bats is encouraged to report such findings to the U.S. Fish and Wildlife Service (WhiteNoseBats@fws.gov) and appropriate state agencies.