# Exploring the Connection Between Arousal Patterns in Hibernating Bats and White Nose Syndrome: Immediate Funding Needs for the Northeast Region

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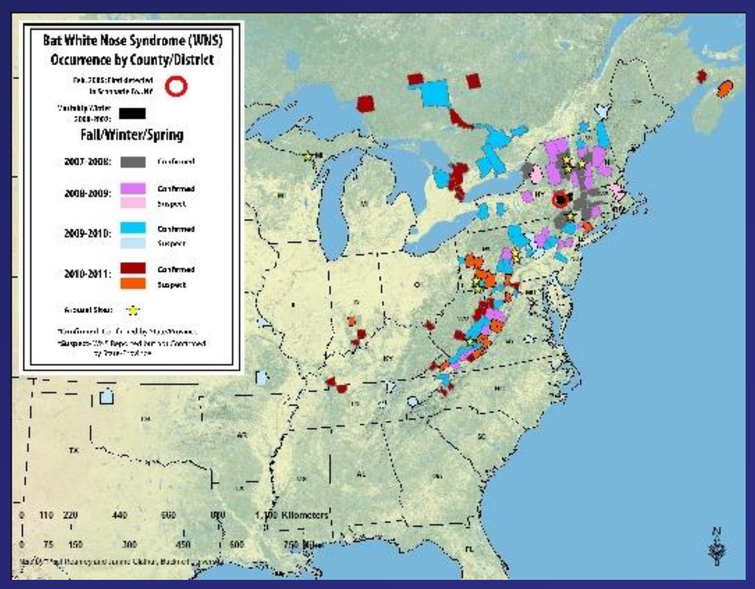



Figure illustrating spread of WNS and location of field sites

## Problem Addressed:

Bats in the Northeastern North America are dying in large numbers due to 'White-nose Syndrome'.

**Need**: to determine why bats are dying.

**Objective**: to determine if the hibernating patterns of bats affected by WNS are disrupted, leading to starvation.

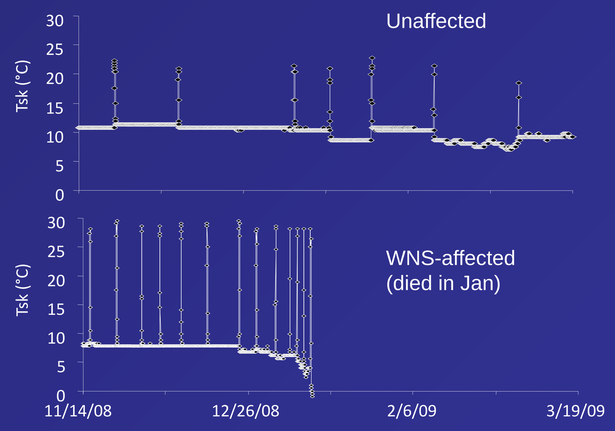
**Hypothesis**: WNS bats arouse from torpor significantly more frequently than unaffected bats.

## Methods for temperature tracking:

Temperature-sensitive dataloggers


RF transmitters

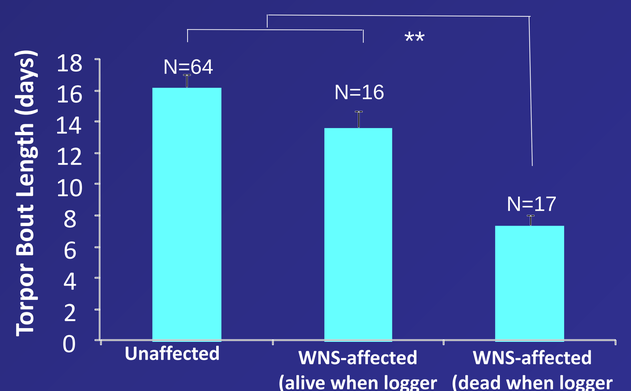
- $T_{skin} \approx T_{body}$
- Temperature-sensitive dataloggers collect data for the entire period, but the bat must be recaptured to collect the logger
- Temperature-sensitive radiofrequency transmitters provide data continuously, but only last 6 weeks (and have lots of missing data)
- Hundreds of loggers were deployed at 13 field sites in 6 states over the course of 3 years. Dataloggers provided significantly better data than RF transmitters; their results are presented here. Sample profiles from an unaffected bat and a WNS-affected bat (that died) are shown below.



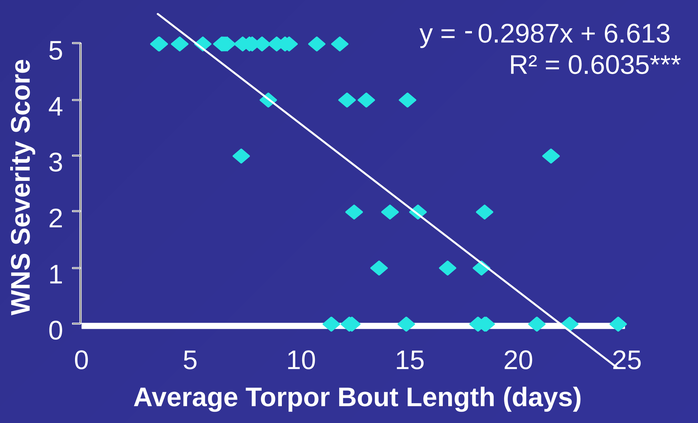

## Status/Utility:

We determined that bats severely affected by WNS arose from torpor significantly more frequently (have shorter torpor bouts) than did unaffected/less affected bats (Fig below).

- These arousal bouts are **very** energetically expensive
- Arousing too frequently leads to starvation




One criticism of our early studies what that the WNS status of individual bats was unknown, other than by documenting visible fungus (*Geomyces destructans,* the putative pathogen). In the 2010-2011 hibernation season, we worked with the National Wildlife Health Center to connect our hibernation profiles to histological analyses of bat wings. We demonstrated that this shift in torpor bout length is significantly correlated with the degree of fungal invasion ('WNS severity score'), as seen in the figure below.




This shift in hibernation patterns is now considered a prominent sign of WNS. This knowledge has significantly informed further studies of the epizootiology of WNS and will continue to move WNS research forward.