

REDUCTION OF *MYOTIS* ACTIVITY RELATIVE TO TOTAL BAT ACTIVITY IN LONG-TERM ACOUSTIC BAT SURVEYS PRE- AND POST-EXPOSURE TO WHITE NOSE SYNDROME

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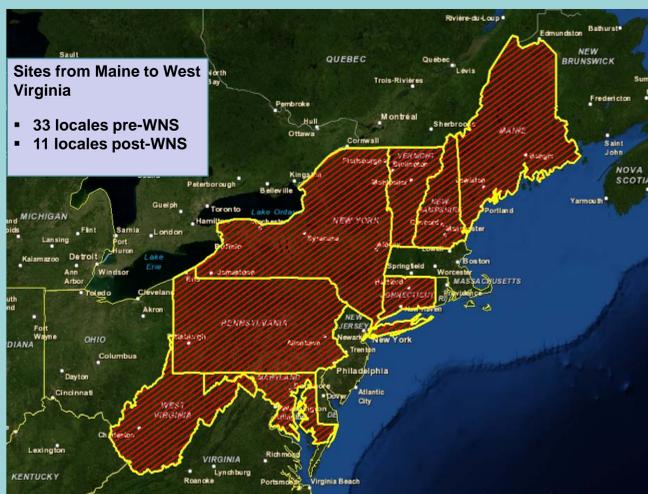
Summary

- Since 2006 white-nose syndrome (WNS) has led to unprecedented declines in populations of cave-roosting bats throughout the eastern United States, documented first through winter cave surveys, and more recently through substantial reductions in mist-netting capture results for affected species.
- Stantec has conducted long-term passive acoustic bat monitoring throughout the northeast beginning in 2005 and continuing through the present, providing a unique opportunity to assess the degree to which acoustic activity patterns and species composition have changed after the appearance of WNS in various states.
- Previous work conducted from 2007 to 2011 at the Grandpa's Knob site in Vermont (Watrous, et al. in prep) recorded a significant decline in *Myotis* species acoustic activity levels following the spread of WNS within the region.
- Based on this finding we hypothesized that *Myotis* species acoustic activity, as a percentage of total high frequency bat activity, would decline on a regional level after WNS has become established.

Data Sources

- Regional study area included 44 sites extending from Maine to West Virginia (n=246 total detector locales).
- Data collection years: 2005 – 2012, April to early November
 - Spring – April 1 to May 31
 - Summer – June 1 to July 31
 - Fall - August 1 to mid-November
- 98% of data was collected between 2006 – 2011.
- 32,436 total detector-nights.
- Qualitative Analysis – 838,517 calls to species/guild identified.

Study Area



Methods

Acoustic Detector Deployment

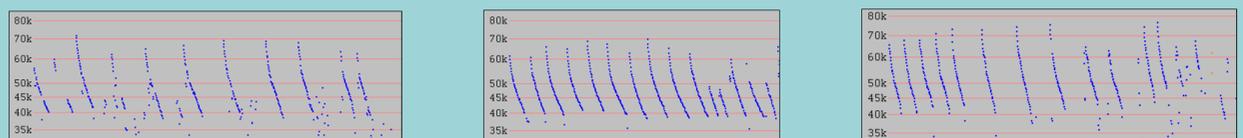
Acoustic surveys were conducted at 44 survey sites, totaling 246 detector locales from West Virginia to northern Maine. Anabat SD1, SD2 or Anabat II detectors paired with storage ZCAIMs (Titely Electronics, Australia) detectors were placed in weatherproof housing, suspended up to 90m high in meteorological towers, or at ground level in trees, passively recorded data each night of the survey period from 7:00pm to 7:00am.

Call Identification

Anabat files were visually inspected in AnabookW software (Corben 2006) to separate bat call sequences from other files. For the purposes of this analysis, we defined a “bat call” as any Anabat file containing five or more echolocation pulses (Arnett et al. 2006a, b; Baerwald and Barclay 2009; Thomas 1988). Calls were identified by qualitative comparison to reference libraries of known calls.

Species with high frequency calls have a minimum frequency above 30 to 35 kHz. High frequency species potentially occurring in this region include several species of *Myotis* (MYSP), eastern red bat (*Lasiurus borealis*), and tri-colored bat (*Perimyotis subflavus*). While there are some general characteristics believed to be distinctive for several of the species of the *Myotis* genus, these characteristics are not sufficiently consistent to be relied upon for species identification at all times when using Anabat recordings. Therefore calls identified as *Myotis* were placed into a single guild, and were not identified to species level.

Representative *Myotis* Species Call Sequences



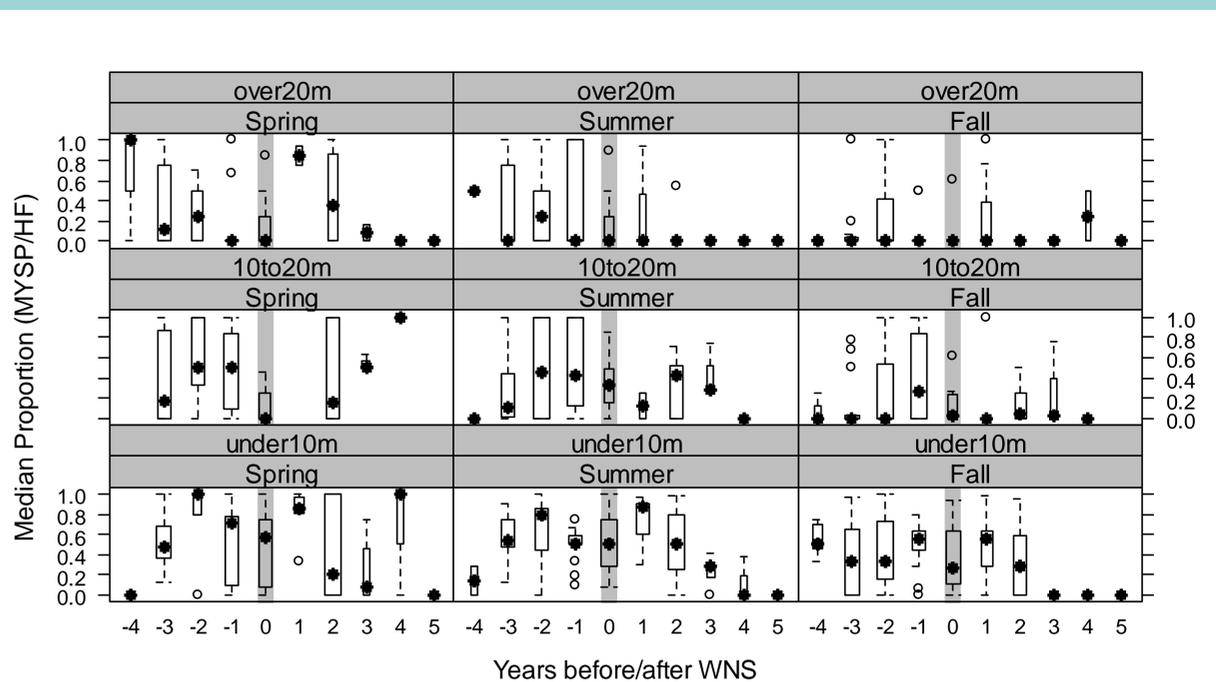
Analysis

The year of WNS infection was designated by the USFWS WNS county record data. Locales were assigned a WNS year based on the county in which the acoustic survey was first documented: within, or adjacent to, an affected county. Study areas not adjacent to affected WNS counties not included in this analysis.

WNS year assigned

- “Pre” = before WNS detected;
- Zero = year of WNS detection (included in “Pre” data);
- “Post” = after WNS detected;
- Negative numbers denote years “Pre” (-4 through -1);
- Positive numbers denote years “Post” (1 = the spring/summer/fall after WNS first detected, 2 = the second annual cycle after WNS was detected, 3, 4, and 5 followed suit).

Overall Results - Median Proportion of MYSP to High Frequency Calls at Varying Heights



Conclusions

- Low elevation (<10 m) summer data may present the clearest indication of a pre and post-WNS infection decline in *Myotis* activity.
- The data is heavily weighted with pre-WNS acoustic data. Seventy-five percent of locales were surveyed during pre-WNS conditions. Regional acoustic surveys are ongoing throughout the northeast. Additional post-WNS acoustic data will likely provide a clearer picture of reduced *Myotis* activity rates.
- We will explore the use of a different model, which may prove more valuable for this non-parametric data (negative binomial distribution).

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