

**THE USE OF ACOUSTIC
TRANSECTS TO
DOCUMENT CHANGES IN
BAT DISTRIBUTION AND
ABUNDANCE**

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Stressors to Bat Populations

- **White-nose Syndrome**
- **Wind energy development**



Monitoring of Bat Populations

Hibernation Surveys

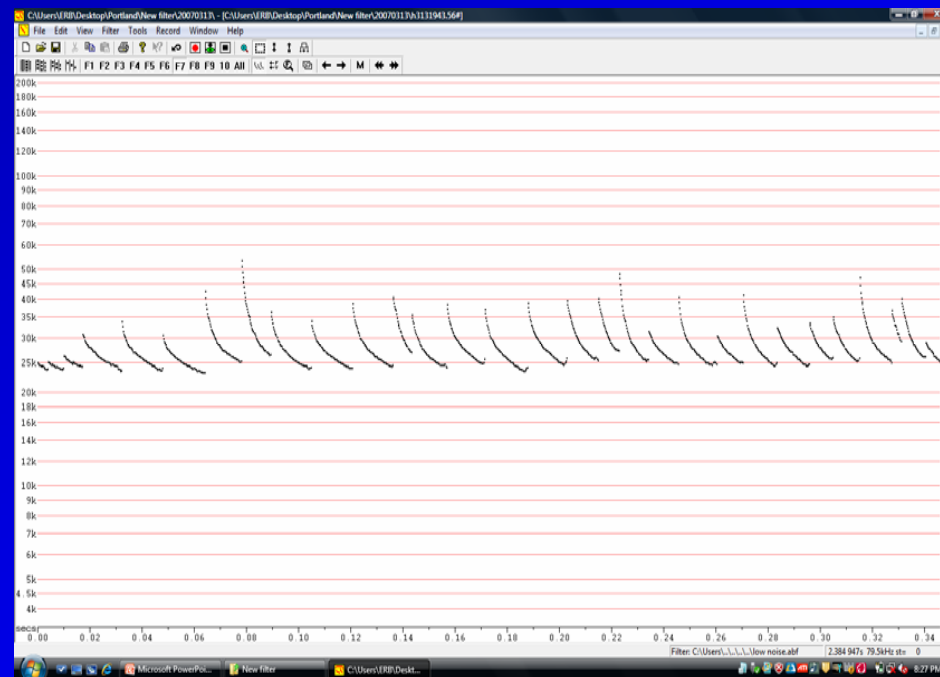
- Some species can be counted in hibernacula
- Percentage of hibernacula that are counted is unknown
- Counts assume that the observed trends are representative of the population



Monitoring of Bat Populations

Acoustic Surveys

- Able to monitor multiple species simultaneously
- Requires little training to collect data



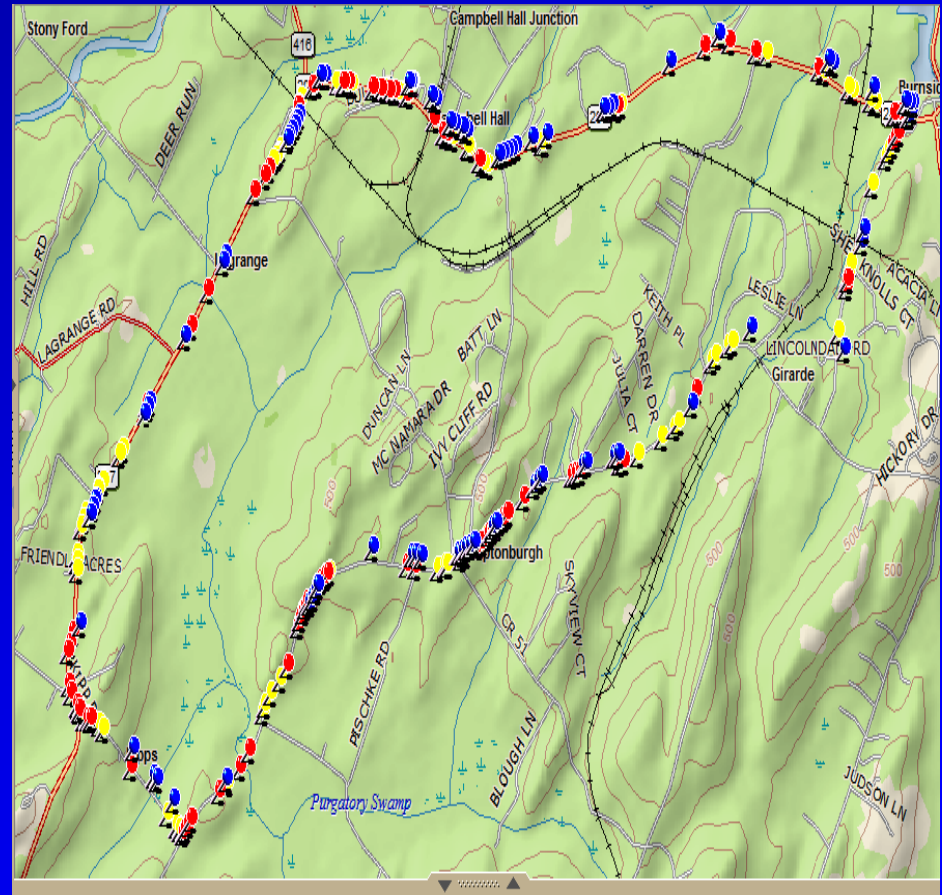
Acoustic Surveys

Two Basic Methods

- Fixed Site
 - Limited to occupancy-based analysis
- Mobile Transects
 - Inherently quantitative
 - Used in Europe

History of Acoustic Transect Sampling in New York

- Initial tests started in 2006 – sampling was not designed to establish baseline species presence or activity levels
- Project put on back burner in 2007 due to WNS
- Sampling in 2008 rekindled interest



Transect Methodology

- Drive route at ~ 20 mph
 - Done to reduce the chance of bats being detected multiple times
 - Maximizes the data gained
 - # of call sequences more accurately tracks abundance
- Drive for ~ 30 miles
 - Done so that sampling is conducted within 1 ½ hours after sunset, so activity is high throughout the sampling period

Methodology, cont'd

- Point detector straight up from roof
 - Initial testing compared different orientations but no real differences
 - Pointing straight up is easiest and maximizes vertical sampling
- Sample under appropriate weather conditions
 - Minimum temperature
 - Low wind
 - No rain



Type of Ultrasonic Detector

- Need to use ultrasonic detectors that sample signals in real time (i.e., no time expansion recording)
 - Anabat
 - Binary Acoustics Technology

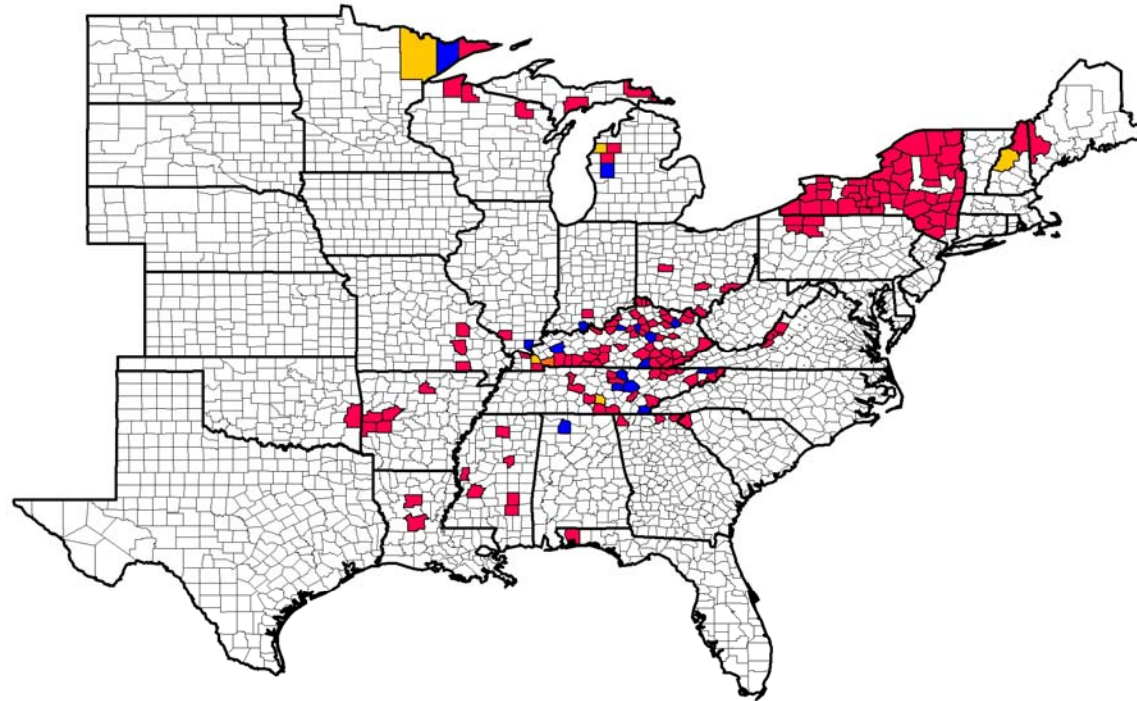
Sampling effort

- Monitor 1 – 3+ times a season
 - Effort has focused on sampling when bats are residents on their maternity range (June – mid July)
 - Can extend sampling in other periods to maximize information gained
 - Particularly important in southern sites that might be winter sites for bats that migrated from northern areas

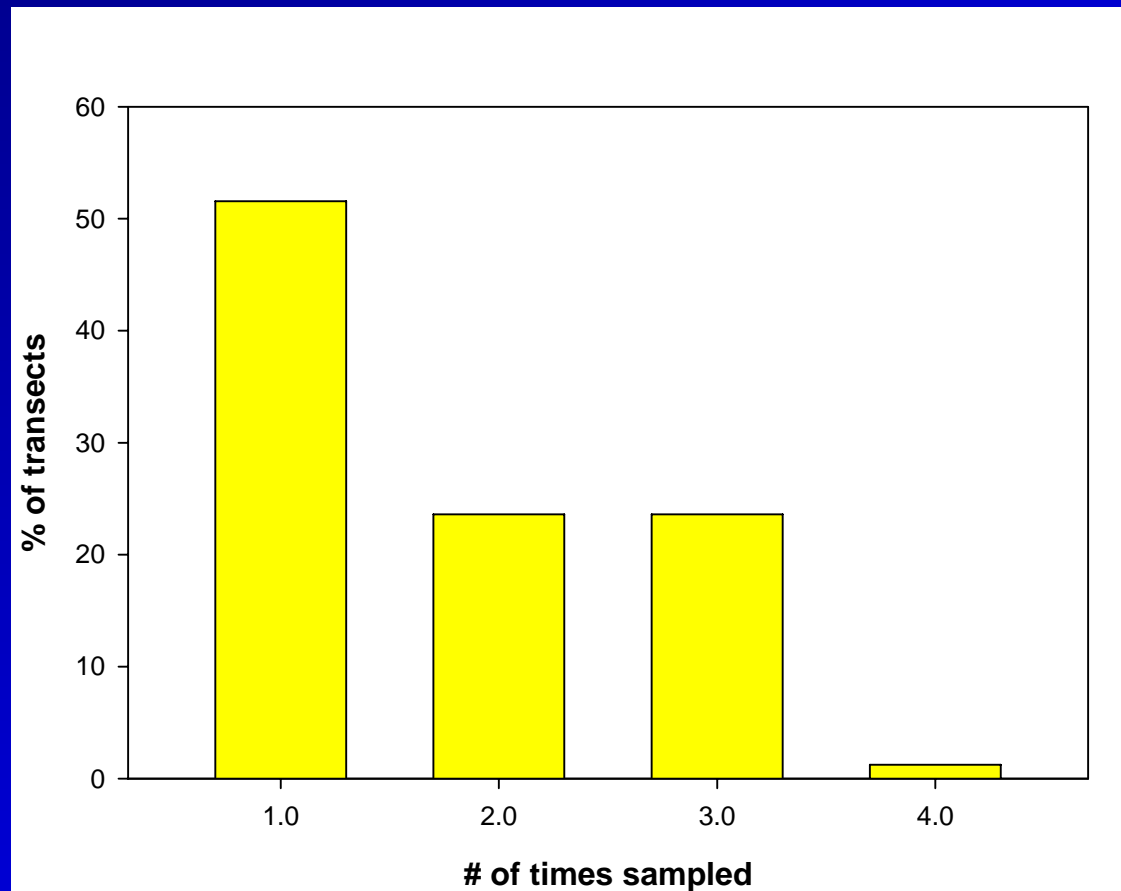
Overall Sampling Scheme

- Purposely avoided tightly specifying sampling design details – density and layout of transects – to allow for varying objectives
 - Since comparisons are made on the same transect among years, the transects can vary from the generalized description
 - For example if you have a smaller tract that is of interest you can run a transect that is 20 miles long

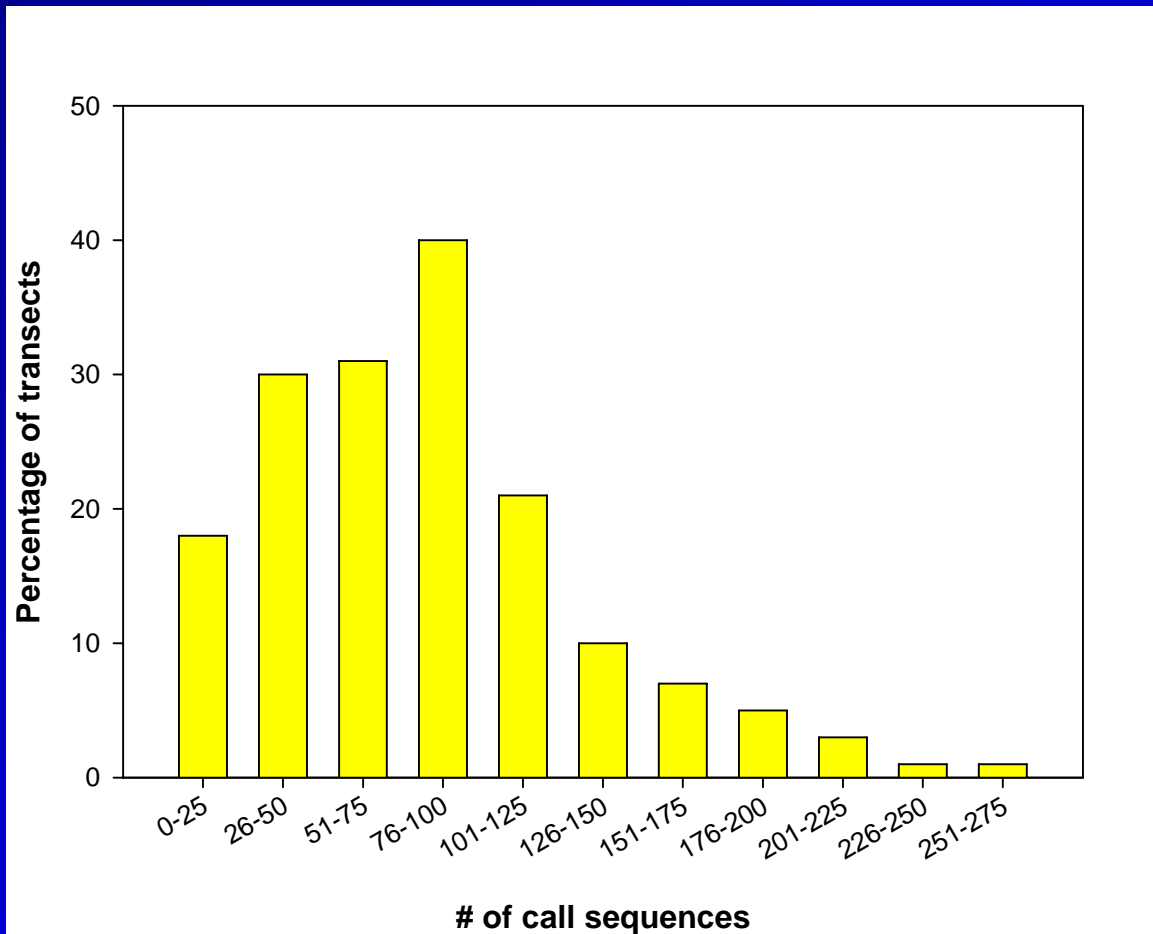
Location of Sampling Conducted During Summer 2009



Number of Times Transects Were Sampled



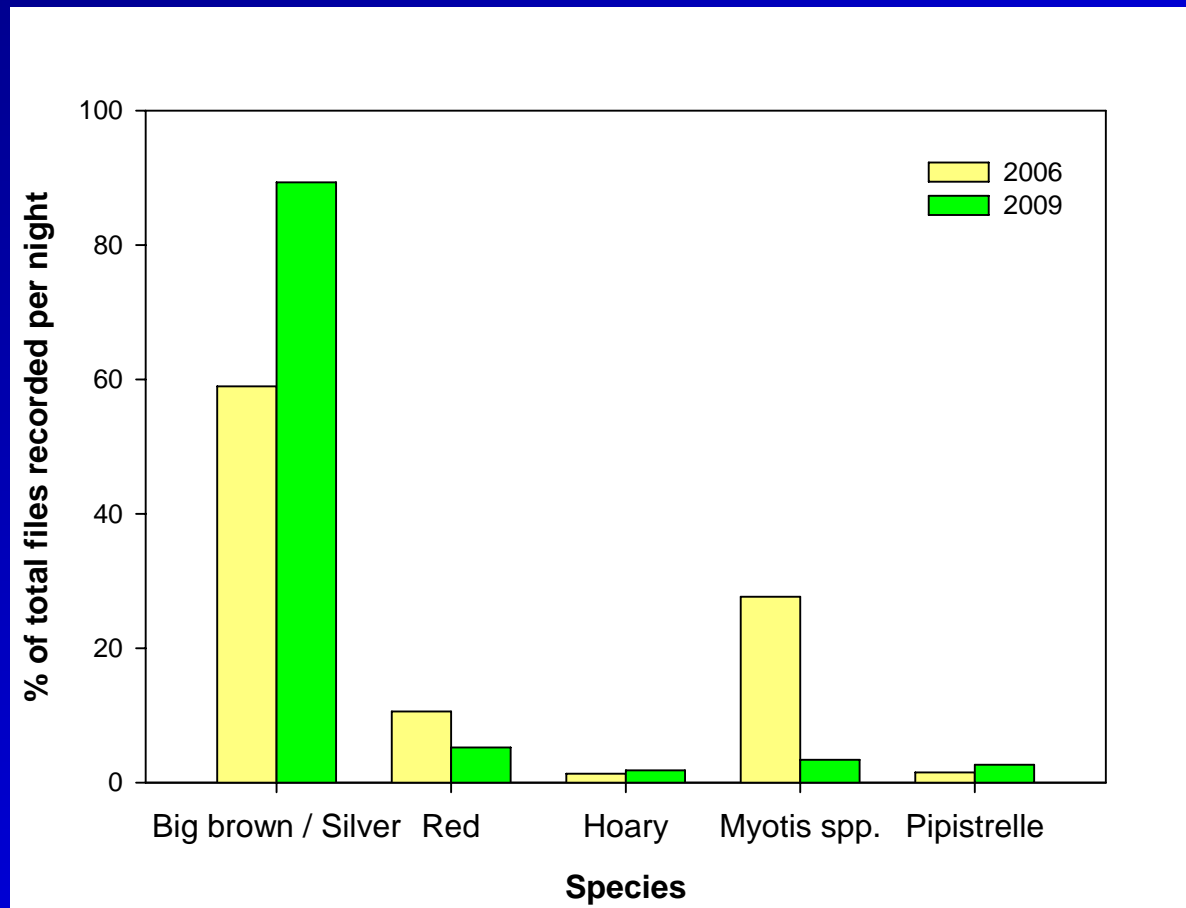
Amount of bat activity



Example results

Transect	Date	Red bat	Big brown
ONFSRD1	1 June 09	6	21
	21 June 09	9	20
ONFSRD2	15 June 09	15	6

More detailed analysis of data collected along transect in NY in 2006 and 2009



Future Plans

- Increase the areas sampled
- Increase the number of transects sampled
- Increase sampling frequency of transects
- Investigate use of targeted transects to focus on specific species

Limitations

- Not the ultimate, most comprehensive bat monitoring method
 - A useful supplement to hibernaculum surveys
- Not even the ultimate acoustic monitoring method
 - Other study designs could be more sensitive
 - Provides good results for the effort

Limitations, cont'd

- Does not work well for all species
 - Targeting other habitats (e.g., waterbodies, forest interior) with similar methodology might prove worthwhile
- Relies on well-developed road network
 - Although in remote areas alternate methods will likely also be difficult
- Some species are difficult to distinguish

Conclusions

- Data suggest that sampling transects will be a suitable method for detecting population level changes in bats populations throughout the eastern United States
 - Including information for some species not addressed well by hibernaculum surveys
 - Provides confirmatory evidence that hibernation survey results are accurate

Conclusions, cont'd

- Data collection and project administration demands are manageable
 - The hope is that additional transects will be established
- Results are similar in applicability to point counts for birds

Acknowledgements

- US Army Engineer Research and Development Center
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- US Fish and Wildlife Service
- Numerous volunteers that have sampled transects

Bat web page

<http://corpslakes.usace.army.mil/employees/bats/bats.cfm>