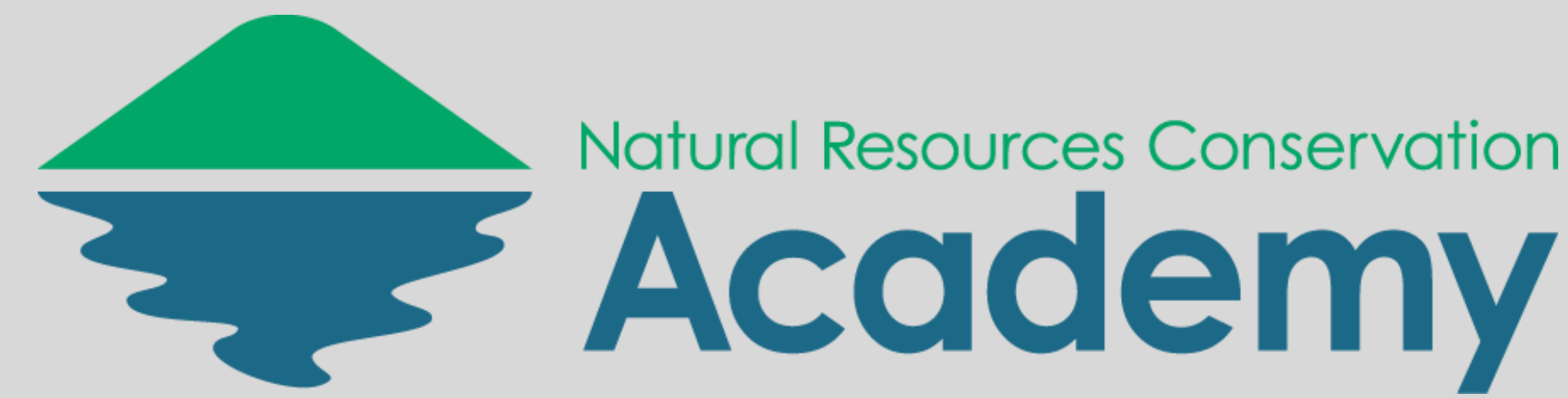


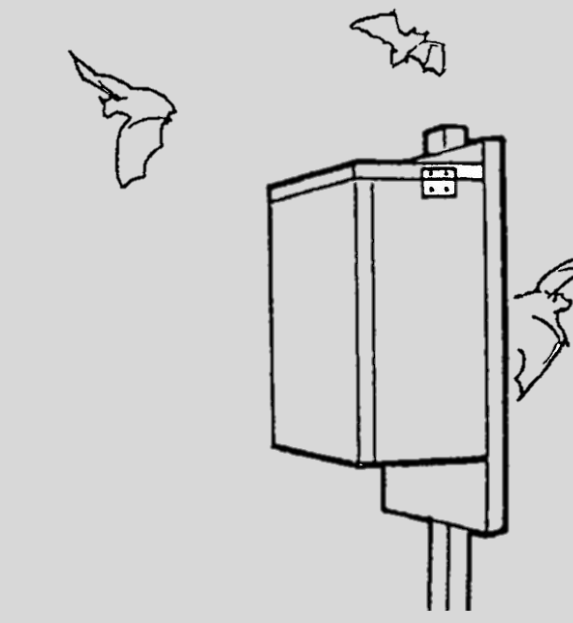
Developing Tech Materials & Approach for Citizen Science Bat House Monitoring Program



Monitoring Program

NRCA Student: Carissa Horton¹

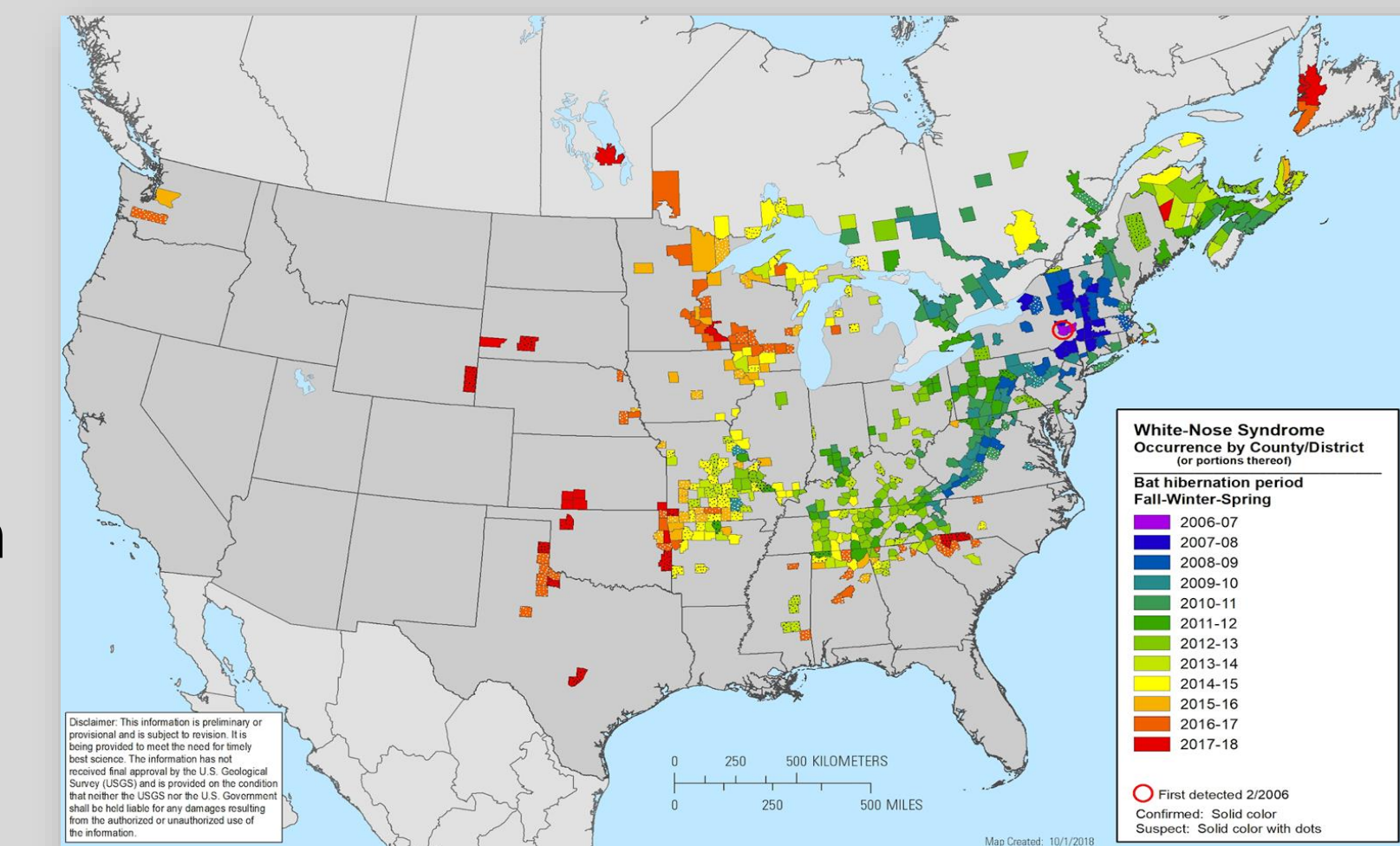
Community Partner: Dr. Laura Cisneros²



¹Rockville High School; ²UConn Dept. of Natural Resources & the Environment

INTRODUCTION

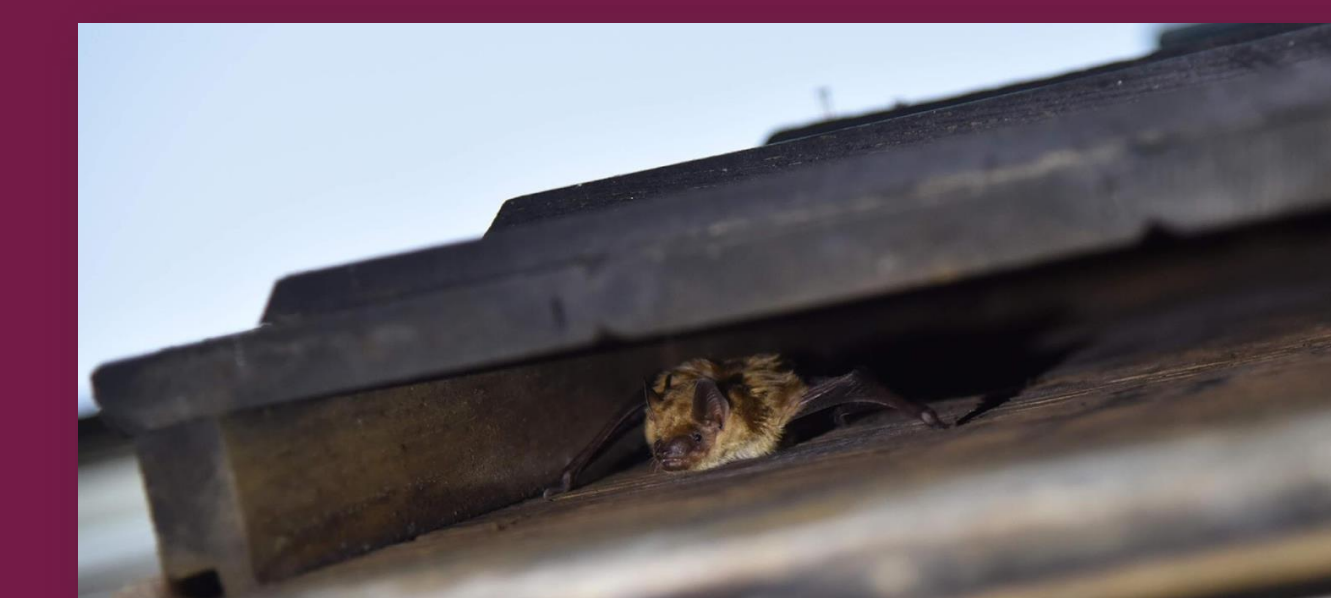
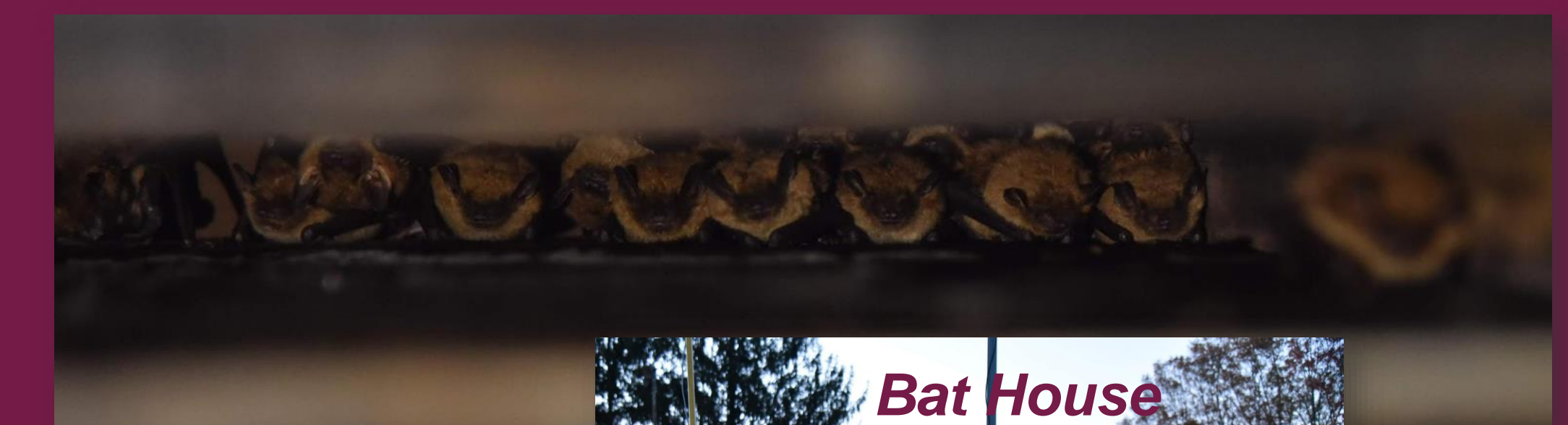
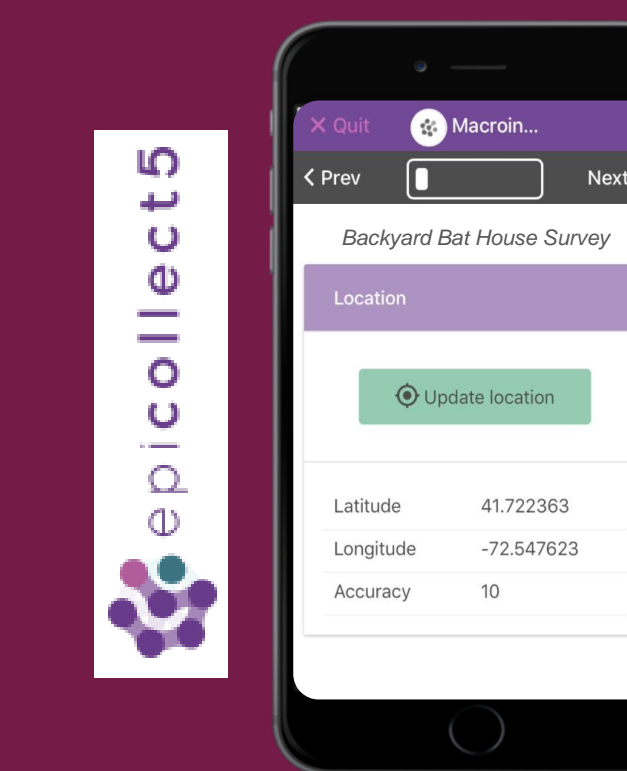
- White Nose Syndrome (WNS)—a disease caused by a cold-loving fungus—affects hibernating bats all over North America (see map right), with over 6 million bat deaths since it was discovered in 2006.¹
- In Connecticut, all 6 hibernating, cave-roosting bat species are affected by WNS, and all, except the big brown bat (*Eptesicus fuscus*), are listed as endangered under the Connecticut Endangered Species Act.³
- This disease disrupts the hibernation of bats, causing them to become active and wasting energy they need to survive the winter.
- As the public becomes more aware of the threats facing North American bats, there is great interest in contributing to local bat conservation efforts by putting up bat houses, which can provide important summer roosting locations to maternity colonies.
- To help the public contribute to bat conservation and monitoring efforts, we developed two components of a citizen science bat house monitoring program:
 - An online data collection form for bat house monitoring that is accessible to citizen scientists via a smartphone device.
 - An acoustic monitoring approach that relies on user-friendly equipment that produces quality acoustic calls recordings.



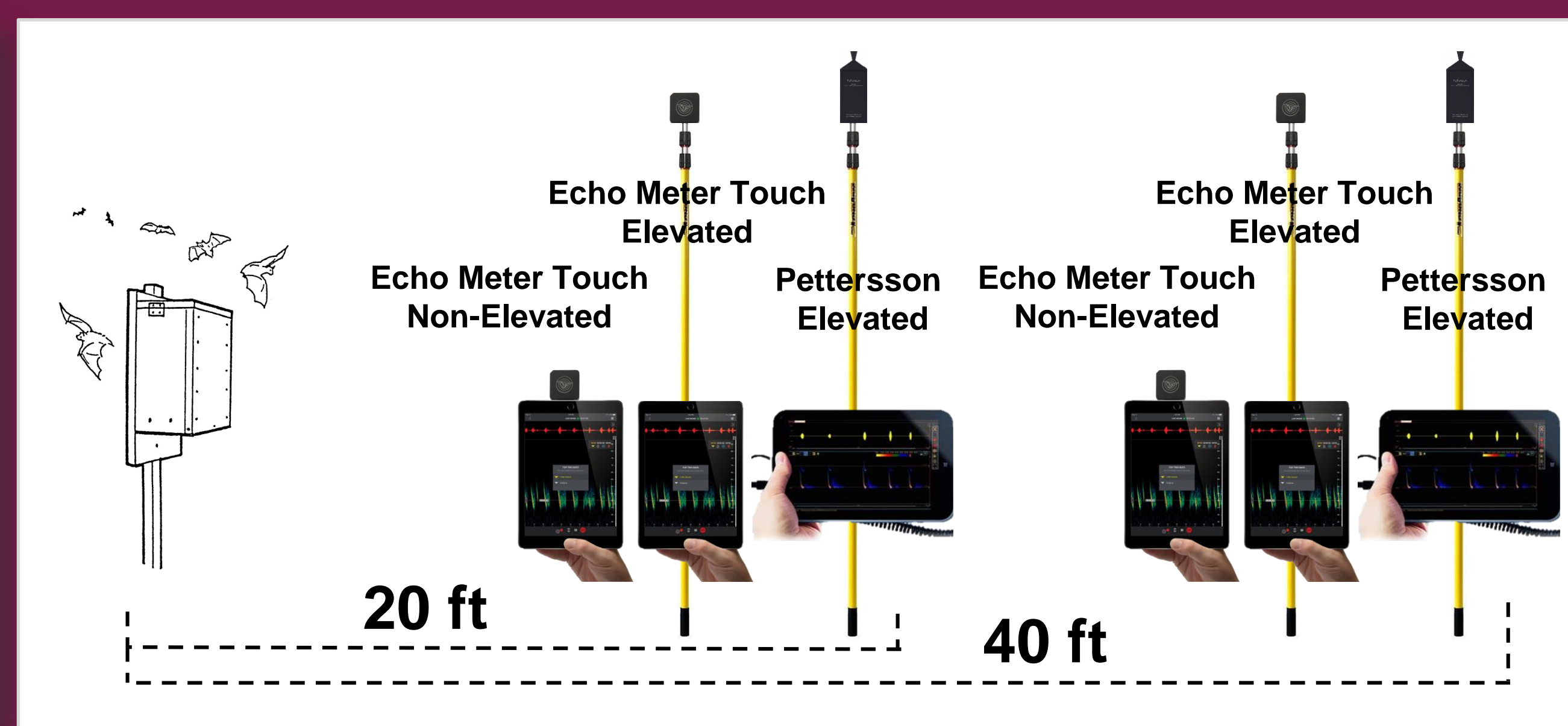
The most recent (10/2018) United States distribution map of White-nose Syndrome.²

DEVELOPING SMARTPHONE DATA FORM

- In order for citizen scientists to contribute bat house monitoring data, they need an easy way to submit data electronically.
- The bat house monitoring survey is set-up on EpiCollect5 (<https://five.epicollect.net/>), an online and mobile app that allows you to create tailored data collection forms for your project:
 - Allows multiple citizen scientists to download form to smartphone device and contribute text, numerical and photo data out in the field. Data are geotagged so that they are associated with a specific bat house.
 - Provides easy-to-follow instructions on how to collect and submit data from mobile device, helping to promote systematic data collection.
- The *Backyard Bat House Monitoring Survey* walks the citizen scientist through the following data collection sections:
 - Register and assign a unique code to their bat house: involves reporting location, geography and property type.
 - Annual environmental and anthropogenic disturbance assessment: involves reporting natural vegetation features, water sources, land use/human development features, and noise & light pollution.
 - Annual bat house assessment: involves reporting on the physical structure of the bat house (e.g. size, chambers, color, height, what it's mounted on and when it was installed).
 - Monthly bat occupancy assessment (April-October): involves reporting presence/absence of bat occupants and returning at sunset to count the number of bats in the house. If bats are present, the house will be “flagged” to be acoustically monitored to determine species.



(Upper left) Example mobile device with EpiCollect bat house survey. (Lower right) Counting bats occupying a bat house at sunset as they exit. (Upper right & lower left) About 45 big brown bats (*Eptesicus fuscus*) occupied the test bat house.



We tested 3 equipment set-ups (from left to right in all figures: non-elevated EchoMeter Touch, elevated EchoMeter Touch & elevated Pettersson M500 at 2 distances (20ft & 40ft) from bat house.

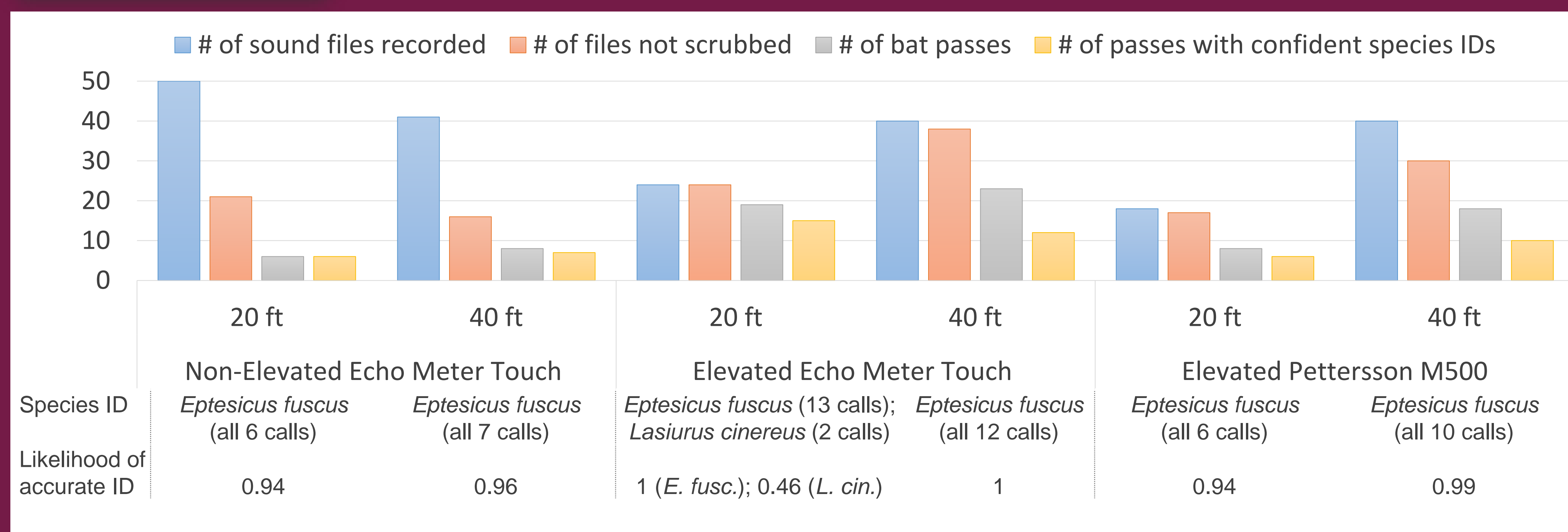
TESTING THE ACOUSTIC BAT MONITORING APPROACH

Methods

- We tested user-friendly, affordable, portable acoustic monitoring equipment to determine the best set-up that produces quality data.
- Evaluations were done on 3 different monitoring equipment set-ups: non-elevated Wildlife Acoustics EchoMeter Touch, elevated (~10ft above ground) Wildlife Acoustics EchoMeter Touch, and elevated (~10ft above ground) Pettersson M500.
- Monitored with the 3 set-ups at two different distances from the bat house: 40 feet away (19 September 2018) & 20 feet away (10 October 2018).
- Acoustic calls were recorded from sunset until all bats had exited the bat house.
- Call recordings were analyzed and assigned species IDs using SonoBat 4.3.0 and the northeastern US bat call library.
- The data calculated were:
 - # of sound files that the equipment recorded
 - # of these files that were deleted by Sonobat (scrubbed noise files)
 - # of calls that the system recognized as actual bats (total # of bat passes)
 - # of bat calls with confident species IDs
 - Species ID
 - Likelihood of accurate species ID

Results & Recommendations

- The equipment set-up(s) that resulted in fewer scrubbed noise files and a higher percentage of bat calls with confident species IDs were deemed as the best approach for producing quality data.
- We recommend using the elevated Echo Meter Touch because it resulted in greatest % of confident bat species IDs and fewest noise files (see graph to left), with an affordable price for citizen scientists.



REFERENCES

- "What is White Nose Syndrome?" *National Park Service*, 8 December 2017.
- White Nose Syndrome Website, *WhiteNoseSyndrome.org* 1 October 2018.
- "Endangered, Threatened, and Special Concern Mammals" Department of Energy and Environmental Protection, 5 August 2015.

ACKNOWLEDGEMENTS

I would like to thank my community partner Dr. Laura Cisneros for guiding me through this project. I would also like to thank local Mansfield residents for allowing us to come onto their property and acoustic monitor their bat house. Lastly, I would like to thank my parents for doing everything in their power to get me to where I needed to go for this project.