Connecticut Bat House Citizen Science Monitoring Program

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ABSTRACT

- Bats provide important pest control but are declining in CT due to a fungal disease known as White-Nose Syndrome (WNS).[2]
- Monitoring bats and bat houses is particularly important in the face of WNS to record bat numbers and species types in CT.
- First part of the study included a CT bat house monitoring program:
  - ❖ Visited and studied 46 houses throughout CT.
  - ❖ Those with bats (all Big Brown) had common features (all dark in color, all near known water source, etc. – see *Results* for details).
- Findings from above study and from scientific literature helped to create guide on proper bat house installation.
- Monitoring program and guide assisted in the creation of bat house monitoring citizen science app.
- This study aimed to answer the following questions:
  - ❖ What characteristics make CT bat houses most successful?
  - ❖ What species use bat houses the most in CT?
  - ❖ How can the public become more involved in CT bat conservation?

INTRODUCTION

- Bats are vitally important to pest control in North America, saving the corn-growing industry alone more than 1 billion dollars annually.[1]
- Yet, CT hibernating bat populations (see species below) have significantly declined due to WNS, with some populations <10% pre-WNS size.[2]
- Because of WNS, it is particularly important to monitor bat populations.
- Citizen science has contributed to monitoring efforts of many taxa (e.g. birds)[3], but few exist for bats. Given public interest in helping bats but their uncertainty as to how to do so, an easy and accessible bat citizen science program is vital.
- Bat houses contribute to conservation and monitoring efforts by:
  - ❖ Providing safe spaces for mothers to raise their young during summer months; and
  - ❖ Providing an easy way to monitor bat populations.
- The objectives of this study are to:
  - ❖ Develop a citizen science bat house monitoring program;
  - ❖ Use information from the program to create a guide instructing on proper bat house construction and installation; and
  - ❖ Use information from the program and the guide to help create a citizen science monitoring app.

CT BAT SPECIES

**Hibernating, cave roosting*
***Migrating, tree roosting*

Big Brown Bat*
(*Eptesicus fuscus*)

Little Brown Bat*
(*Myotis lucifugus*)

Northern Long-Eared Bat*
(*Myotis septentrionalis*)

Indiana Bat*
(*Myotis sodalis*)

Silver-Haired Bat**
(*Lasionycteris noctivagans*)

Hoary Bat**
(*Lasiurus cinereus*)

Eastern Red Bat**
(*Lasiurus borealis*)

Tri-Colored Bat*
(*Perimyotis subflavus*)

DEVELOPING MONITORING PROGRAM

Steps Taken

- Developed bat house network throughout CT by creating and distributing flyer describing citizen science project.
- Surveyed network of bat houses from August 13 to September 20, 2016.
- Recorded environmental, structural, and bat data for each house (Fig. 1).
- Began monitoring houses with bats 30 minutes before sunset to:
  - ❖ Count number of bats living in house as they exited; and
  - ❖ Acoustically monitor using *Wildlife Acoustics* Echo Meter Touch and iPad to determine species (Fig. 2).

Results

- 46 bat houses in original network (Figs. 3 & 4).
- 4 houses were occupied by bats (Fig. 3)—all Big Browns (*Eptesicus fuscus*).
- Colony sizes ranged from 12 to 47 individuals.
- Common characteristics among houses with bats:
  - ❖ Habitat: all were in developed areas, with clear evidence of humans;
  - ❖ All were mounted on buildings;
  - ❖ Height: all were located at least 12 feet above the ground;
  - ❖ All had known water sources nearby (within ¼ mile); and
  - ❖ Color: all were painted a dark color.
- Characteristics that did not affect bat inhabitants:
  - ❖ Noise pollution: varied based on location;
  - ❖ Size: houses with bats ranged from small to large; and
  - ❖ Number of chambers: ranged from 1 to 4.
- Presence/absence of bats potentially influenced by survey dates.

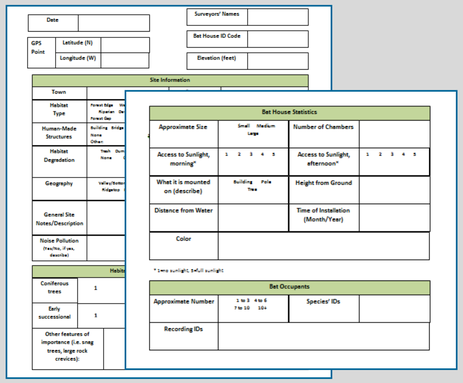


Fig 1. Example of the two pages of the survey form used to record data on bat houses throughout CT.

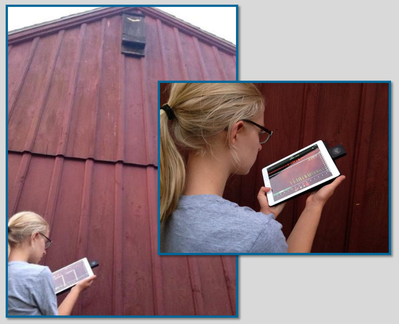


Fig 2. The above photos show the process of acoustically monitoring an inhabited bat house.

Fig 3. Locations of the 46 bat houses throughout CT that were included in this study. Blue dots indicate uninhabited houses; red dots indicate inhabited houses where additional monitoring took place. Pictures of each inhabited bat house are shown.

CREATING HOW-TO GUIDE

- Surveys showed that a large percentage of houses were constructed or installed incorrectly (installed on trees, painted light color; see Fig. 4).
- Most people do not know that there is a right or wrong way to install houses.
- Created guide detailing how to properly construct and install a bat house in CT (Fig. 5) that includes the following information:
  - ❖ Descriptions of CT bat species;
  - ❖ List of threats to bats, with special focus on WNS;
  - ❖ Materials and procedure for constructing a three-chamber 'nursery' bat house; and
  - ❖ Steps describing how to properly install a bat house.
- Created bat house based on instructions in guide to provide instructional photos.

NEXT STEPS

- Creation of citizen science app to continue monitoring bat houses, using monitoring procedure from this project and the how-to guide.
- Continuation of monitoring program with the help of newly-created app (Fig. 6).
- Installation of bat house I created in an East Windsor, CT location.

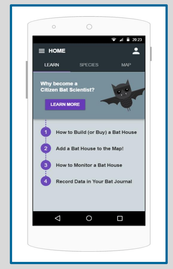


Fig 6. Mock-up of the citizen science app.

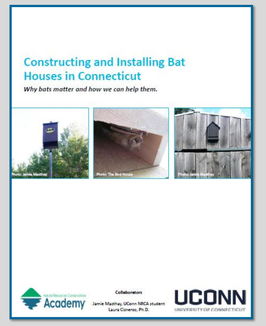
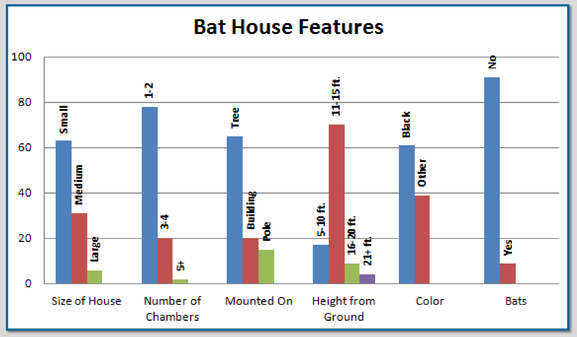


Fig 5. The front cover of the bat house how-to guide. Contact Dr. Laura Cisneros for a full copy (laura.cisneros@uconn.edu).

IMPLICATIONS

- Given the short distribution time of the flyer, many people responded, indicating that a large number of people are interested in helping bats.
- Though it is difficult to monitor bats, this program will make it easier for a larger number of people to help with bat monitoring and conservation via an easy-to-use app, informational guide, and portable acoustic monitoring technology.
- How-to guide will assist with conservation by:
  - ❖ Instructing how to create houses that bats are more likely to inhabit; and
  - ❖ Informing the public on CT bats, how they are helpful, and why conservation is necessary.



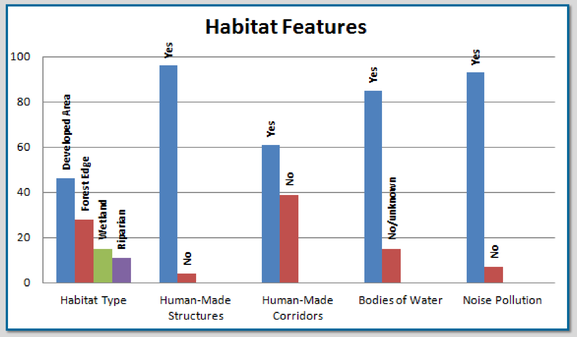


Fig 4. The above graphs show the percentage of the 46 bat houses with particular structural and habitat features.

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