

Monitoring a maternity colony of Rafinesque's big-eared bats (*Corynorhinus rafinesquii*)

Introduction

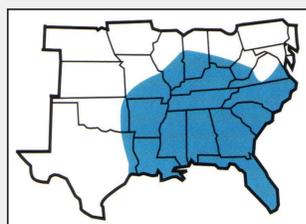
Rafinesque's big-eared bats can be found across much of the southeast, but are not very common anywhere in their range. They are also one of the least studied bat species in the eastern U.S. Researchers affectionately refer to them as "Rafs."

Approximately 1,500 Rafinesque's big-eared bats are known to live within the boundaries of Mammoth Cave National Park. They hibernate in caves during the winter; during the summer they can be found in caves, abandoned buildings, and hollow trees. Rafinesque's big-eared bats eat moths and other insects. They are very agile fliers and can even pick insects off the leaves of trees.

During the summer, female Rafinesque's big-eared bats will group together in maternity colonies. Females give birth to a single baby bat called a pup in early June. During the day the mother will nurse its baby, and then leave it at night to go feed. The young bats will begin flying in the roost when they are about 3 weeks old, but won't go out to feed at night until they are about 6 weeks old. Adult males are solitary during the summer.



Rafinesque's big-eared bat roosting in a cave.



Areas where Rafinesque's big-eared bats can be found.

Research and monitoring activities

Several years ago, a maternity colony of Rafinesque's big-eared bats was discovered in an abandoned building in the Wondering Woods area of the park. This was (and still is) the largest known Rafinesque's big-eared bat maternity colony in the park. Approximately 100 females take refuge in this building each summer.

The building needed to be either rehabbed or torn down due to safety concerns. Park management decided that since the Rafinesque's big-eared bats are a species of special concern and were already inhabiting the building, that they would turn the building into a state-of-the-art bat house.

Bat gates were installed to prevent people from entering the roost and disturbing the bats. A beam break system was attached to the gates. The beam break system shoots a pair of infrared beams between two sensors. Every time a bat flies through the gate it breaks the beams, and thus allows



Building at Wondering Woods before rehab.



Building after being converted into bat house.

the number of bats entering or exiting the bat house to be counted.

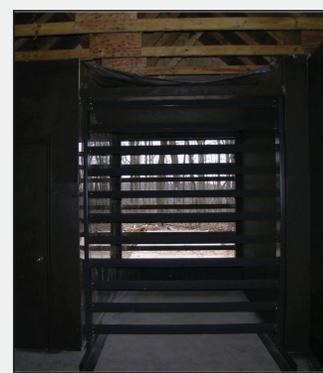
Passive Integrated Transponder (PIT) tag readers were also installed in the building. PIT tags are similar to the microchips that can be implanted in pets to allow them to be identified if they are lost and taken to a vet or shelter.

In the spring and fall of 2011, Rafinesque's big-eared bats were caught as they left the bat house and implanted with small PIT tags. The PIT tag reader then records every time that individual bat enters or exits the bat house the same as a keycard records every time you enter your hotel room.

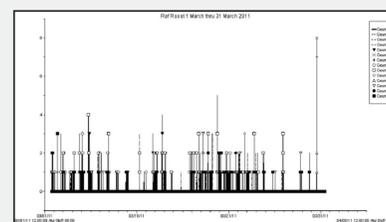
Since this spring, 128 Rafinesque's big-eared bats have been implanted with uniquely coded PIT tags. The 65 bats tagged in the spring were recorded by the reader over half a million times between May and August.



Researchers wait to quickly remove captured bats at the bat house.



Inner and outer bat gates looking from inside the bat house towards the outside. The beam break system is attached to the inner gate.



Example of beam break data from March 2011.



PIT tag reader located inside the bat house.

What's next?

A pair of video cameras are located in the bat house. The video cameras allow us to remotely view the bats' behaviors inside the building. We are developing a website that will provide live, streaming video of the maternity colony. The website will also be incorporated into the new Visitor Center exhibits. We plan to continue passively collecting the beam break and PIT tag data. In upcoming years, we will continue to capture and implant PIT tags in new Rafinesque's big-eared bats found using the bat house. The data collected will be available for scientists to use and study.



Researchers examine bats that were captured at the bat house and record each bat's health, age, sex, and reproductive condition before the bat is implanted with a PIT tag.

Why is this research important?

Bats play an important role in the ecosystem as nocturnal insect predators, pollinators, and nutrient providers for many cave organisms. However, relatively little is known about their social behaviors. In the summer maternity roosts, do certain bats hang out together? Do the mothers help each other care for their young? What percentage of time in the daytime roost is spent sleeping, grooming, interacting with their young, interacting with other bats in the colony? Do the babies interact with each other? How?

Scientists don't know the answers to these and many other questions about bats and their behaviors. One of the main reasons is that even a single person sitting quietly in the roost would disturb the bats. Only recently has technology advanced to the point that video cameras with night vision capabilities can be used to remotely view roosting bats.

Not only are bat behaviors interesting from a purely scientific standpoint, but understanding them has taken on a new importance. New research suggests that bat social behaviors are potentially one of the major ways White-Nose Syndrome (WNS) is spread. While WNS only affects hibernating bats, scientists don't know if summer social behaviors can spread the fungal spores that cause WNS. Scientists are increasingly calling for more research on summer bat populations and behaviors to help us gain a better understanding of the impacts of WNS.

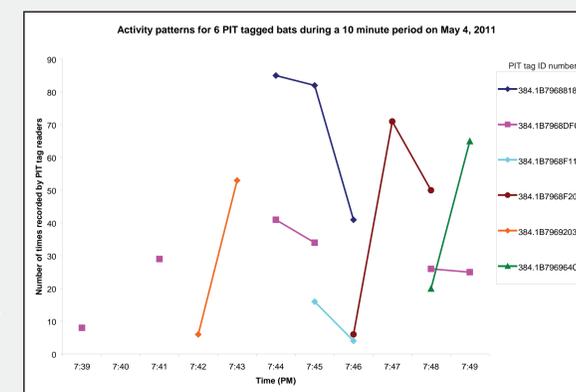
Rafinesque's big-eared bats are one of the least studied bats in the eastern U.S. This project will provide a massive database of behavioral information that scientists can use to learn more about this interesting, but not well understood, species of bat.

Acknowledgements

Many thanks to everyone who has worked so hard to make this project a success. Partners in this project include NPS staff; researchers from Western Kentucky University, University of Kentucky, Ball State University, and Indiana State University; interns from the Student Conservation Association; and the Kentucky Department of Fish and Wildlife Resources.



Researchers carefully implant a PIT tag into a Rafinesque's big-eared bat.



Representation of 10 minutes of data recorded by PIT tag readers on May 4, 2011. Each PIT tag identification number represents a single bat.



Group of female Rafinesque's big-eared bats in the bat house's maternity colony.