

Research at the UW-Madison Arboretum

Bat monitoring station helps reveal the unknown habits of bats

A bat monitoring station was installed near Margaret's Council Ring on the edge of Curtis Prairie earlier this summer by Wisconsin DNR Bat Ecologist, David Redell. The station detects and records acoustic signals as bats fly by and records the date and time of each bat pass.

"All bats in Wisconsin utilize echolocation to orient and navigate the dark night sky as well as detect, pursue, and capture insect prey as they fly through varying levels of clutter (tree limbs, etc.)," Redell explains.

"Because these bats echolocate in the ultrasound range (sound above the range of human hearing), we use an acoustic recording system capable of detecting these calls as the bats fly through the area."

With this system, information is stored digitally on a compact flash card and downloaded once a month. Using software specifically designed for viewing the data, Redell can separate out the noise (insects, high levels of wind and rain) from the bats' calls.

Once the files are cleaned to contain only bat calls, his team can begin analyzing the data for bat activity patterns. Each species of bat utilizes different frequency ranges of sound for their echolocation.

"By looking at these frequencies and shapes of the calls (viewing the sonograms), we can start separating out each species based on these sound characteristics," says Redell.

"While there is occasionally some overlap in characteristics between some of the species, making visual identification difficult, we are currently working on building a reference library of echolocation calls (by capturing and identifying the bat in hand then releasing and recording

the calls of each species) to create a statistically based identification model to further separate out the difficult groups."

Very little information exists for bats in Wisconsin: Where are the different bat species in the state? Are they resident or migrating through the area? When are they active? Those are a few of the questions Redell hopes to answer.

"With each bat passing the detector we get the date and time of the encounter," says Redell. "Thus, we can begin describing seasonal and nightly timing of activity, phenology, migration, species occurrences and the relationship of bat activity with weather patterns."

There are four other bat monitoring stations in addition to the one at the Arboretum. They are at the UW-Green Bay Cofrin Arboretum, the Urban Ecology Center in Milwaukee, the UW-Stevens Point Schmeckle Reserve and the UW-Madison's Kemp Natural Resources Station in Woodruff.

"We had the funds available to deploy five long-term stations and wanted to get good site representation throughout the state," says Redell. "We were also looking for areas that had individuals on-site who could download and transfer the data, and areas that were not subject to shifting land-use."

According to Redell, the Arboretum provides a great study location in the southeast glacial plains. Redell's team investigated a variety of possible locations at the Arboretum for placement of the monitoring station, considering habitat context, site access, prairie burn schedules and sun exposure for the solar panel.



Bat Ecologist David Redell inspects the solar panel on the bat tracking station. This panel collects electrical energy from the sun during the day, which is used to power the audio gathering system when it automatically switches on in the evening. Photo by Bill Arthur



This bat (L borealis) is a valuable, although reluctant, participant in bat research undertaken by the Wisconsin DNR.

Bats often fly along edge habitat and forest openings and are associated with water resources. The area near Margaret’s Council Ring had the best context and possibility of detecting all species present at the site. Redell hopes to have operational equipment there for a minimum of 10 to 15 years.

Redell’s fascination with bats began in a terrestrial vertebrates class in his undergraduate days at UW-Madison’s Department of Wildlife Ecology. His professor, Scott Craven, somehow planted the seed and watered it over the course of a couple of weeks.

“That’s all it took for me to get hooked,” says Redell. “Here was a group of mammals that was understudied, had amazing sensory capabilities and natural history characteristics to maintain a lifetime of interest, and they became active at

the same time as me – after dark. The more I learn about bats, the more interesting and amazing they become.”

Not everyone likes bats, Redell acknowledges. He points out that bats in Wisconsin are insectivorous in their foraging appetite. As primary predators of night flying insects, bats consume a large number of insects, including forest and agricultural pests, as well as mosquitoes which carry and spread the West Nile Virus.

“Healthy populations of bats can reduce our reliance on pesticides and they provide these insect-eating services for free as long as they have adequate roosting areas, travel routes to foraging areas, and access to clean water,” Redell points out.

Redell is putting together a citizen-based bat monitoring program using equipment similar to that used at the Arboretum. However, instead of sampling a single location, citi-

zens will be able to use hand-held bat detectors coupled with a GPS unit for conducting mobile surveys in their area. The system will automatically record the route traveled along with the position and time of each bat encountered.

From these data they will map distribution of species throughout the state and determine routes that may be used for monitoring on a yearly basis. Citizens interested in getting involved and wanting to learn more about training or updates can contact Redell at David.Redell@wisconsin.gov

Editor’s note: Parts of this article were adapted from a story that appeared in Kemp’s Point, the newsletter of the Kemp Natural Resources Station.

Bat facts

* All bats in Wisconsin are insectivorous in their foraging appetite. As primary predators of night flying insects, bats consume a large number of insects, including forest and agricultural pests, as well as mosquitoes which carry and spread the West Nile Virus.

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* In other parts of the world, nectar and fruit eating bats often serve as critical links to pollination and seed dispersal services for regeneration of more than 300 plant species and 450 known economically important products such as bananas, breadfruit, mangoes, cashews, dates and figs, to name a few.

* One example for those who enjoy tequila – few probably realize that without bats pollinating the agave plants, seed regeneration drops to 1/3000th the normal level with bats. So, kick back some night while enjoying a margarita and remember to thank the bats.