Kemp's Point

A newsletter of the Kemp Natural Resources Station
Volume 8, Number 2 - Fall 2007

Kemp Research Report: Bat Tracking

A bat monitoring station was installed at Kemp Station earlier this summer by Wisconsin DNR Bat Ecologist, David Redell. I visited with Dave about this research tool, the project it's linked to and his interest in bats.

What does the bat monitoring station at Kemp do?
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.).

Dave Redell checks the data logger at the Kemp bat monitoring station.

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. The bat monitoring station detects and records these acoustic signals as the bats fly by and records the date and time of each bat pass.

What do you do with the data? And how will the data be applied to the "real world?"
The data is stored digitally on a compact flash card and is downloaded once a month. Using software specifically designed for viewing the data, we can separate out the noise (insects, high levels of wind and rain) from the bat's calls. Once the files are cleaned to contain only bat calls, we 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. 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 (capture and identify the bat in hand then release and record 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 we hope to answer. With each bat passing the detector we get the date and time of the encounter. Thus, we can begin describing seasonal and nightly timing of activity, phenology, migration, species occurrences, and the relationship of bat activity with weather patterns.

Are there other bat monitoring stations in Wisconsin?
Yes, there are four other bat monitoring stations besides the one at Kemp. They are at the UW Green Bay Cofrin Arboretum; the Urban Ecology Center in Milwaukee; the UW Stevens Point Schmeekle Reserve; and the UW Madison Arboretum.

Why did you decide to put one at Kemp? And why in the particular spot it is located?
We had the funds available to

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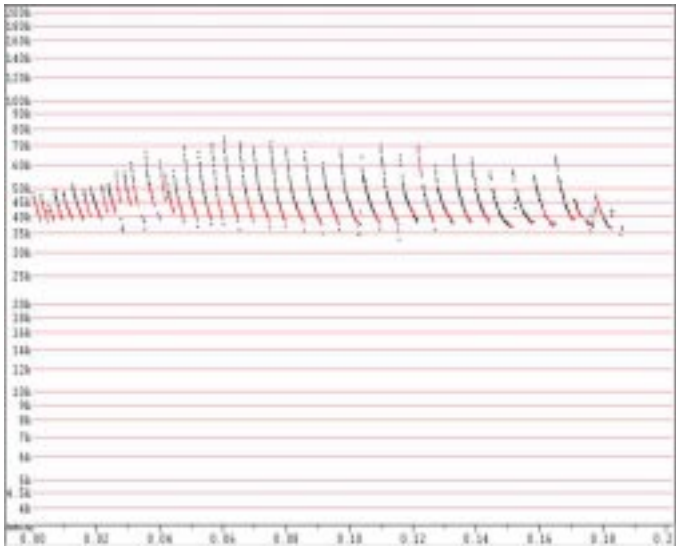
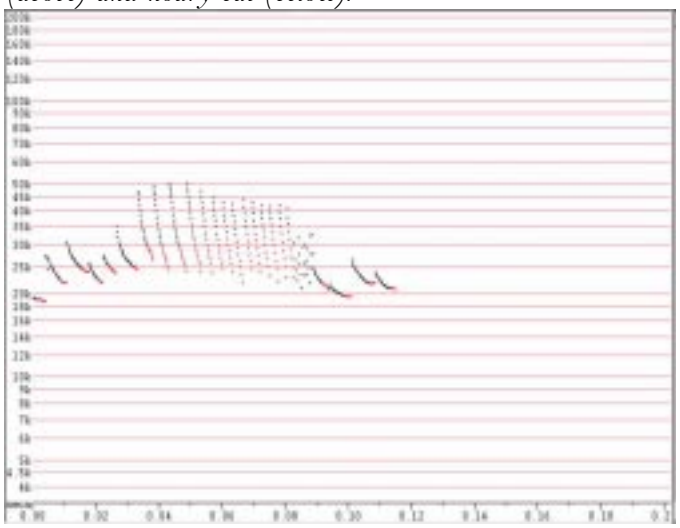
deploy 5 long-term stations and wanted to get good site representation throughout the state. We were also looking for areas that had individuals on-site that could download and transfer the data, and areas that were not subject to shifting land-use. Kemp provides a great study location in the Northern Highlands.

Within the Kemp property we investigated a variety of possible locations to place the monitoring station, considering habitat context, site access, and sun exposure for the solar panel. We eventually settled on the area known as the blow-down where high winds created a large, natural opening in the hemlock dominated forest in 2000. As bats often fly along edge habitat and forest openings and are associated with water resources, the location selected had the best context and possibility of detecting all species present at the site.



The individual echolocation calls of the little brown bat (above) and hoary bat (below).



How long will this project run?
We hope to have operational equipment for a minimum of 10 to 15 years.

Alternative energy sources are all the rage, with wind energy at the forefront. Are bats affected by the wind turbines used to generate this energy?
Unfortunately bats do fatally collide with wind turbines. In past years when folks were conducting post-construction mortality studies to look at the effects of turbines on birds, to their surprise they usually encountered more dead bats than birds during the searches. It was completely unexpected. That is, with bats highly developed sense of echolocation and ability to avoid clutter objects (tree branches) in their path in complete darkness while capturing tiny insects in flight—detecting and avoiding something as large as a 400' wind turbine seemed a "no-brainer." There are a variety of hypotheses as to why bats are impacted by this new obstacle and some of these hypotheses are currently being tested as the issue moves to the forefront of many agencies and private organizations involved in wind energy development. For some background information and current research you can link to the Bat and Wind Energy Cooperative (BWEC) at Bat Conservation International's website (www.batcon.org). With the number of wind turbines on the landscape expected to increase in coming years, the impact to bat populations throughout Wisconsin, the U.S. and other countries could be serious if nothing is done to mitigate sites experiencing high rates of fatal bat collisions.

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This newsletter is also available as a PDF at the Kemp website, www.kemp.wisc.edu.

Wild Wonders

Voles, Moles, Shrews & Mice

Have you ever been cleaning the garage and discover a stash of seeds tucked away in a corner or inside something? Or have you ever noticed tunnel-like paths in the grass after the snow melts in the spring? These are signs that small mammals have been about. We may not give our discoveries a second thought. But what if we paused to wonder about these signs – what animal is responsible for it? What else does that animal do in its daily living? The answers just might surprise you.

There are a number of small mammal species in Wisconsin. I selected four to look at in more detail because they tend to be ones we don't see much, but find their signs. These are also animals that can be confused with one another. I think you'll find that each has unique characters and habits.

Each spring after the snow melts, I'm intrigued by the tunnel-like pathways in the grass. I've always wondered what little animal is responsible for these architectural wonders. Turns out these are constructed by the meadow vole (*Microtus pennsylvanicus*). The vole makes these tunnels by parting the grass, pushing it aside, and trampling down the pathway.

Running is a vole's main mode of moving about and in their runways they can max out at 5-6 miles per hour! Voles will mark their routes with feces and food waste. Nests are often built above ground along the paths in a grass tussock. Meadow voles are also good swimmers and will even dive into water.

Meadow Vole

Also known as a meadow mouse, this little critter is about 5-7 inches long, with a relatively short tail, measuring about 1.5 to 2.5 inches. It looks a bit like a short sausage covered in fur as its ears are hidden by fur, and its wide neck makes it seem without one.

Meadow voles aren't known to stash away lots of food for later, so, instead, they eat a lot every day — 60% of their own weight daily. In general, meadow voles eat fresh grass, sedges, and other herbage, and also grains and seeds. Choice foods vary by the season. Green and succulent vegetation are choice foods from May to August with grains, seeds, bark and roots eaten in winter.

The meadow vole is found throughout Wisconsin. It is extremely abundant so is an important food for many predators, including hawks, owls, weasels, fox, coyote, snakes, and even some fish. Voles are active year round, but tend to be more nocturnal, active from dusk until dawn, in the summer; and more diurnal, active during the day, in the winter or on cloudy days. Maybe on a cloudy day this winter you'll think about voles racing about in their pathways beneath the snow.

Eastern Mole

Before doing research for this article, what I knew about moles came from my grandma. Gramma was always at war with the moles. In the summer she'd stomp down the ridges of dirt in the lawn that resulted when moles built underground tunnels. I can still see Gramma relocating her mole traps, in hopes of stopping the beast from tunneling further!

There are two species of mole in Wisconsin, the eastern mole (*Scalopus aquaticus*), and the star-nosed mole (*Condylura cristata*). The mole responsible for my grandma's ire was the eastern mole, which is found mostly in the southwestern part of Wisconsin. The star-nosed mole lives throughout the state, except for the southwest corner. Most of the differences between the two species are related to their preferred habitats. The star-nosed mole lives in damp, swampy environments while the eastern mole prefers habitat where the soil is moist loam, or sandy loam.

I came upon an interesting note about the eastern mole's Latin specific name *aquaticus*, which means water dwelling. The name was given by Karl Linnaeus, the man who first described this species in 1758. Linnaeus lived in Sweden and having never seen this species in the wild, thought

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the mole lived in water because of its large, webbed front feet. It is actually the star-nosed mole that is nearly aquatic, spending a good deal of time in the water. Even in winter, it will swim below the ice.

Both species are diggers and excavate underground tunnels, leaving ridges and hills above ground, though the star-nosed mole is less adept at digging. The eastern mole often takes up residence in places frowned upon by humans, like under lawns and golf courses. But in a wild meadow, or in the swampy home of the star-nosed mole, the existence of mole ridges and hills are inconsequential.

As subterranean animals moles rarely expose themselves above ground, and then perhaps only during breeding season and at night or on dark days. I saw a star-nosed mole once, not long after we moved to northern Wisconsin. While walking with our dog, she discovered the dead mole along the road. It was winter and according to the literature, it's not uncommon for them to surface in winter in search of food. And it seems exposure to the surface can be fatal.

Physical adaptations to life underground include the lack of eyes and ears as we know them. Weak optic nerves may be enough to detect light, but eastern moles have skin where eyes would be and star-nosed moles have very tiny eyes concealed by fur. Instead, their sense of touch and smell are well developed.

Moles are insectivores and locate their food by touch. The eastern mole has a nose-like snout with which to do this, eating worms, grubs, and both larval and adult stage insects like ground beetles. The star-nosed mole has a star-like appendage, fringed with 22 tentacles, at the tip of its snout. It eats primarily aquatic worms and insects, with a much smaller percentage of its food coming from land.

A final interesting difference between the two species lies in their social nature. Star-nosed moles are gregarious and often live in colonies. But the eastern mole has been called an "intolerant hermit" and will fight with animals it encounters, even its own kind.

Star-nosed Mole

Like the mole, the Northern short-tailed shrew (*Blarina brevicauda*) is an insectivore and operates primarily by tactile sense and smell. This shrew looks a bit like a mole, but is much smaller, 4.5-5.5 inches in length compared to the 7-8 inch mole. As the largest shrew, it is often referred to as a mole shrew, no doubt due to its similar appearance.

Short-tailed Shrew

Shrews dig and tunnel, but do not use large front feet like moles do. When beginning to dig, shrews will use both their fore-feet and nose, but once below ground, it mainly uses its snout and backwards movements of the feet to move soil.

If you've ever seen a shrew, you probably noticed its quick, jittery movements. The shrew is a high energy animal that is described as nervous and irritable. If startled, trapped or provoked, it will squeal or shriek, attempt to escape with quick, jerky motions, and will bite.

The salivary glands of the short-tailed shrew contain a poison that will immobilize larger prey. Shrews are known to eat other small mammals, like mice and voles, as well as snakes and salamanders, all in addition to large amounts of insects. Shrews have a high metabolic rate that requires them to consume over half their body weight each day.

Glands on their sides and belly exude a musky odor that gives the shrew a bad taste that dissuades some predators from eating them. Many shrews are killed by larger mammals, but left uneaten. When I was a kid, our dog Polly loved to hunt shrews in the backyard. Excited by the critter as it shrieked its displeasure at being harassed, Polly would toss the shrew into the air and go after it again when it landed, but she would never eat it. That's not to say there aren't animals that do eat shrews; owls, hawks, snakes and some large carnivores who don't mind the bad odor and taste.

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Bat Myths Dispelled

From Bat Conservation of Wisconsin, Inc.

Blind as a bat? Although their eyes are adapted to darkness, all bats can see, some as well as humans.

Vampire Bats? The legend of Dracula, the human vampire, arose long before real blood-drinking bats were even discovered in South America. Vampire bats (of which there are 3 species) were actually named after the legend, not the other way around.

Vampire bats suck blood? Vampire bats, found in Central and South America, usually take their blood meals–by lapping an ounce or two at a time–from nicks their sharp incisors have made in the skin of livestock

Attracted to hair? Contrary to popular conception, bats do not become entangled in human hair. Bats are not interested in your hair. If a bat can detect a mosquito in the dark it will surely not blunder into your hair.

Disease ridden? All mammals can contract rabies; however, even the less than a half of one percent of bats that do, normally bite only in self-defense and pose little threat to people who do not handle them. More people die from rabies contracted from dog bites in the U.S. than from bat bites.

Flying mouse? Many people think bats are rodents, a sort of flying mice. WRONG! Bats are more closely related to humans than to mice and belong to an entirely different group of mammals from rodents.

Evil? Bats aren't evil. Throughout history, people have chosen to label things they are ignorant about as "evil". Bats are very, very beneficial to our ecosystem.

Research... *(Continued from Page 2)*

How did you get interested in bats?
This was unexpected to me as I had no previous interest in bats. I was taking a terrestrial vertebrates course during my undergraduate days at UW Madison's Department of Wildlife Ecology when my 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. Here was a group of mammals that was understudied, had amazing sensory capabilities and natural history characteristics to maintain a lifetime of interest, and became active at the same time as me—after dark. Craven presented this amazing group of creatures and sealed the deal with his contagious enthusiasm. The more I learn about bats, the more interesting and amazing their subject becomes.

Bats aren't always appreciated or liked. Why should we care about having healthy populations of bats living among us?
As with any native wildlife species or group of species we should care about maintaining healthy populations regardless of the perceived benefit or lack thereof to humans as they are providing some service to the ecosystem in which they live. However, some of us require there be a benefit to humans before any species appreciation occurs, especially with species that are feared due to misinformation passed on to the next generation through myths and old wives tales.

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. 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. 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 over 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. *-K.O.*

Learn more about this project:
http://wiatri.net/ecoatlas/displayResult.cfm?ProjectID=1236
Learn more about bats:
www.batcow.org (Bat Conservation of Wisconsin)
www.batcon.org (Bat Conservation International)

Mice are prolific in Wisconsin and many of us will be reminded of this as some attempt to move in with us this time of year! Two common species of mice in Wisconsin are close relatives and are recognizable by their large ears and eyes, and their white feet and belly. They are the woodland deer mouse (*Peromyscus maniculatus*) and the northern white-footed mouse (*Peromyscus leucopus*).

White-footed Mouse

Historically, the white-footed mouse was found throughout Wisconsin except for the northern-most area. A range map in Jackson's Mammals of Wisconsin, published in 1961, shows no specimens of white-footed mice in Oneida County. According to Loren Ayers, a Wisconsin DNR scientist who specializes in small mammals, the white-footed mouse has extended its range farther north, resulting in some overlap. In a recent survey near Muskellunge Lake, 6 miles southeast of Lake Tomahawk, the white-footed mouse made up 91% (10/11) of Peromyscus species captured. A bit farther north, at Dry Lake, 6 miles north of Glidden, white-footed mice were represented in only 7% (3/45) of the sample. [Note: Glidden is 20 miles north and 45 miles west of Lake Tomahawk.]

One would be hard pressed to tell the difference between these two species of mice without examining the animal's tail. The white-footed mouse has a shorter tail than the deer mouse, and the line separating the upper and lower portion of the tail is not as sharply defined in the white-footed mouse as it is in the deer mouse. Easy, right?!

There are some other subtle differences between the species in their behaviors. While both are nocturnal, the deer mouse will occasionally be out during the day to search for food. The white-footed mouse is more strictly nocturnal and if disturbed during the day, will quickly retreat to a place protected from the light.

Deer Mouse

Both species can climb, but the white-footed mouse is semi-arboreal, meaning they live partly in trees. The tail of the white-footed mouse is adapted to serve as a prop and helps with balance. It will build a nest wherever it is convenient. At my grandparent's farm, these mice like to move in to the bluebird houses in fall. While cleaning out these houses, I've had up to 6 mice leaping out of the box, towards me, as I carefully pry the old nest from the box! The deer mouse chooses to nest in a natural opening in or near to the ground, in an old stump, log, or a crevice among rocks.

These mice are omnivorous, feeding on plant seeds and nuts, fungi, insects and some green herbage. It has been noted that deer mice will eat a variety of animal flesh. Both species cache food, usually near their nests in a protected spot, for later consumption, that is if they don't get consumed first. A large number of predators feed on these mice, including owls, hawks, snakes, weasels, fox, skunks, and fox.

All these animals play a role in nature. While living they help consume unwanted weed seeds, disperse desired seeds, aerate the soil and help keep insect populations in check. In death, they provide food to larger birds and animals. Viewed as pests by some and overlooked by many, it's clear that these small mammals are worthy of our appreciation. *-K.O.*

Two shrews meet up. Photo from the University of Michigan Museum of Zoology's Animal Diversity Web

Note: The images used throughout the article were scanned from *A Field Guide to the Mammals*, by William H. Burt and Richard P. Grossenheider

Traveling and A Sense of Place

When a traveller returneth home, let him not leave the countries where he hath travelled altogether behind him.
-- Francis Bacon, 1597 - 1625

My family and I had the good fortune of spending this past year in Corner Brook, Newfoundland. If you aren't familiar with Newfoundland, it is the insular portion of Canada's eastern-most province, located halfway between the Northwoods and Greenland. Newfoundland is the 16th largest island in the world, the product of a tectonic kaleidoscope of slowly shifting plates. For example, western Newfoundland owes its geological heritage to the Appalachian Mountains; the eastern region originated in North Africa; and the central plain was once an ancient sea bed.

I was in Newfoundland for a year-long sabbatical, working with colleagues from the Canadian Forest Service and the Newfoundland Department of Natural Resources. Our projects focused on forest sustainability; namely, how can we manage the forest resource to achieve a balance among ecological, economic, and societal objectives. It was interesting work and a wonderful learning experience.

There are many differences between Newfoundland and the Northwoods. For example, Newfoundland has only 13 different indigenous mammals. They range in size from the small, little brown bat to the large woodland caribou. In contrast, Wisconsin has 69 different native mammal species. Heck, there are 10 different species of squirrels alone.

Interestingly, the largest Newfoundland mammal and one of its most prominent symbols – the moose – is not native. Moose were first introduced on the island in 1878 and again in 1904. Their introduction was so successful that, today, Newfoundland has one of the highest moose densities on the planet. (My girls can attest to this fact first hand. On two occasions they watched moose trot down the street in front of our house.)

Other differences between Newfoundland and the Northwoods include: climate – Maritime versus continental; forests – boreal versus northern hardwoods and pine; and topography – mountains versus the flat outwash plains, just to name a few.


T. Steele

There were some strong similarities between the two regions, too. Both places are blessed with natural beauty and both have regionally important, resource-dependent economies. Also, Newfoundland and the Northwoods each face the daunting challenge of managing their natural resources for multiple, and often competing, values.

Tour Newfoundland and you will notice that it is characterized by an incredibly strong "sense of place." Cultural geographers define sense of place as the essential character or spirit of an area. It is the intensely personal response people have to their environment. This strong sense of "Newfoundland" is deeply felt by residents and visitors alike.

So, it was while I was perched on the brink of the continent that it occurred to me: a similar sense of place pervades Kemp Station. The scientists, students, and educators who work here are passionate about their work. And, they are passionate about the Station. They describe Kemp as having its own, unique "feel," one that underpins their research, their teaching, and their learning.

Our year in Newfoundland generated a year's worth of wonderful experiences. But in addition to the memories, I came home with something else: a refined perspective of Kemp Station and its distinctive sense of place.

-Tom Steele

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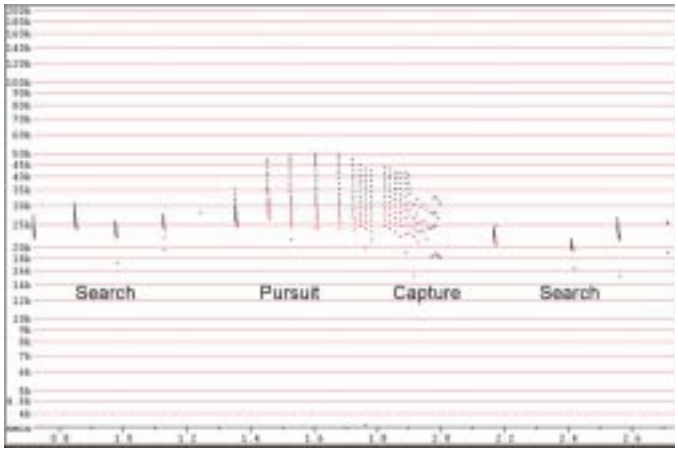
In This Issue.....



An echolocation sonogram shows a hoary bat during search, pursuit and capture of an insect. Once the insect was detected, pursuit and capture took less than one second. Notice that the number of calls per second increases during the pursuit and capture -- this illustrates the bat getting a better look at the target once detected.