



WISCONSIN  
BAT PROGRAM



# ECHOLOCATOR

Volume 6, Issue 1 Echolocator

January 2017

## JOIN US IN 2017!

**WHEN:** Friday, June 2 &  
Friday, July 14

**WHAT:** Natural Resources  
Foundation of WI Field  
Trips— “Avon Bottoms Bat  
Survey”

**SIGN UP:**  
[www.wisconservation.org](http://www.wisconservation.org)

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## The Search for a Vaccine to Prevent White-Nose Syndrome

Tonie Rocke, USGS National Wildlife Health Center, Madison

Scientists from the University of Wisconsin-Madison, the USGS National Wildlife Health Center, and the Wisconsin Department of Natural Resources have teamed up to develop and test potential vaccines to prevent white-nose syndrome (WNS), the fungal disease that is devastating bat populations in Wisconsin and elsewhere. Just like our annual flu shot, a vaccine against WNS would pre-arm the bat's immune system, so it can respond quickly and more vigorously to the fungus when it attacks.



Doctors Elizabeth Falendysz and Ben Stading collecting samples from an experimental bat.

Developing a vaccine for bats is a challenging prospect on several fronts. First, few vaccines have been developed for fungal diseases, even for humans or domestic animals. Second, wildlife vaccines require novel “self vaccination” delivery mechanisms. Oral vaccines for wildlife, delivered via baits, have been developed and used to curtail rabies in carnivores, and more recently, plague

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## Bat Diet Analysis Project Update

Amy K. Wray, UW– Madison

All eight of Wisconsin's bat species consume insects, but their favorite foods and seasonal appetite changes are largely unknown. Do certain bats mostly munch on moths, or do some prefer a buffet of beetles?

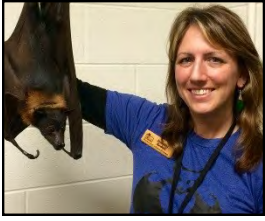
In collaboration with the Wisconsin Department of Natural Resources, the U.S. Forest Service Center for Forest Mycology Research, and a network of citizen scientists, our UW-Madison team has been working to understand the diets of little brown and big brown bats and possible impacts of their foraging on insect populations.

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Luna moth (*Actias luna*) captured by blacklight trapping. These moths use their elaborate wing tails to evade bats and other predators.





## Cave and Mine Catalogue Update

Jennifer Redell

White-nose syndrome (WNS) was widespread across Wisconsin last winter when we began receiving reports of day-flying bats in mid-January. Reports came in from all corners of the state but, as expected, reporting was particularly high near some of our largest hibernation sites. We also received several reports from underground sites that had been inaccessible to humans (either because the entrances were too small or because the sites themselves were unsafe). While we will not know what the final 2016 decline is until this winter's upcoming surveys are complete it is likely that we lost about half of Wisconsin's hibernating bat population last winter due to WNS.

As we prepare for our upcoming hibernation survey and WNS surveillance season (January- March) we anticipate adding 10 more counties to Wisconsin's WNS positive map—the counties with caves and mines that were not visited last winter. We can also anticipate a noticeable absence of bats on the summer landscape in the summer of

2017 when bats that die of WNS this winter fail to return to their summer roosts.

### **Bat Friendly Gates Installed at Four Sites**

Preventing human disturbance at hibernation sites continues to be an important conservation goal, particularly last winter and this winter, as bats who are sick with WNS are particularly susceptible to the unnecessary energy consumption caused by such disturbance. Our program assisted with four bat-friendly gate placements and related hibernation site improvements, including the modification of two existing underground structures to allow bats access to these areas and to stabilize temperatures inside the sites to allow for hibernation. One project was at the former Badger Army Ammunition Plant near Sauk City and is detailed on Page 9 in this newsletter. Another gate project involved an underground walkway used to connect the historic nurses' dormitory to the historic sanatorium (now the Dane County Health & Human Services) building at Lake View Hill Park on Madison's

*Continued on page 14*



Photo: Michael Kientz

## Roost Project Update

Heather Kaarakka

Many volunteers counted many thousands of bats at their summer roost sites this season and for their herculean efforts, we are continually thankful!

This summer was especially exciting because volunteers were able to monitor roosts of all four species of cave bats in the state! Not only did monitors count little brown and big brown bats emerging from their roosts, but one landowner watched a single northern long-eared bat in her shed over the summer, and another monitored a small maternity colony of eastern pipistrelles under their eaves! Northern long-eared bats and eastern pipistrelles are not commonly found in buildings and usually form small, not-obvious colonies, which makes them hard to find and watch. The efforts of these and all summer roost volunteers has helped further our understanding bat roosting habitat and behavior around the state.

### **Great Wisconsin Bat Count and Yellowstone Bat Blitz**

We continued the **Great Wisconsin Bat Count** for a second year and volunteers counted more bats at a larger number of sites than in 2015! The Great Wisconsin Bat

Count is a statewide count conducted in early June and late July to cover pre-volancy and post-volancy. In June this year, 616 big brown bats were counted at 16 sites and 9,742 little brown bats were counted at 35 sites. In late July, volunteers counted **1,596 big brown bats** at 16 sites, 25 eastern pipistrelles at one site, one northern long-eared bat and a whopping **15,174 little brown bats** at 41 sites!

This year's **Bat Blitz at Yellowstone Lake State Park** counted in 1,785 bats in June and 2,120 bats in late July. This is a drop of about 40% from other high counts in July, but cool, drizzly weather during the survey may have discouraged bats from leaving.

Unfortunately, summer roost sites that saw declines in 2015 had even fewer bats this year due to white-nose syndrome. Populations at some sites in Door County have dropped by almost 90%. Other sites in northern Wisconsin that historically have had several hundred bats now see few or no bats. It is sad to see these declines, but the information volunteers and landowners are able to gather is helping biologists better understand the full impacts of white-nose syndrome.

*Continued on page 15*

## Vaccine (continued from page 1)



*Immunized bats released in the mine for hibernation.*

in wild rodents, but vaccinating free-living bats has not been tried before. Finally, WNS occurs only in bats during hibernation and the fungus grows very slowly so traditional methods of vaccine development and testing in laboratory animal models such as mice aren't particularly useful.

### **Developing the vaccine and its delivery mechanism**

The most critical and difficult challenge is to find vaccine antigens, proteins that induce an immune response, that protect bats from WNS. Dr. Bruce Klein, a fungal disease expert from the UW School of Medicine, has identified a protein that is common among ascomycete fungi (including the fungus that causes WNS) and has shown that it is protective against fungal diseases in mice. The team is testing this protein, as well as several other candidate antigens and combinations, for their ability to induce an immune response to WNS in bats. It is hoped that one or more of these candidate vaccines will, at minimum, slow the growth of the fungus on hibernating bats.

Since wild animals are not likely to queue up for a shot, the best method for mass vaccination involves placing the vaccine into something that can be ingested (i.e. an oral delivery mechanism). Most protein vaccines can't survive digestion, so a different approach is required. Dr. Jorge Osorio, a vaccinology expert from the UW School of Veterinary Medicine, has constructed several previous vaccines (e.g. for plague, influenza, and rabies) using a harmless poxvirus as a

“viral vaccine vector” that infects the soft tissue of the mouth. These “virally-vectored” vaccines are genetically engineered to express the disease antigens of interest as they replicate in the animal's mouth, vaccinating them against the disease of interest at the same time. This approach is now being applied to WNS. Preliminary experiments have shown that poxvirus vectors replicate very well in bats' mouths.

### **Capitalizing on grooming behaviors**

Another component required for an effective WNS vaccine is a method for applying it to large numbers of bats easily and inexpensively. Bats are not likely to be attracted to bait, but they frequently groom themselves and each other. Thus topical application is a possibility and has been used elsewhere for delivering poison to bat colonies to control population. While vaccine development is progressing, the team is testing applying vaccines via gels or pastes that can be sprayed on the bats in common roost sites. Staff from the wildlife health center and DNR tested this approach in little brown bats last summer using a gel containing a biomarker that becomes visible in hair and whiskers after ingestion. By plucking a few hairs and examining them under a microscope, it is possible to determine if treated bats have eaten the gel or if it was transferred and consumed by other bats. Additional trials testing other materials and application methods are set for summer 2017.

### **Testing in the lab and in the field**

The final hurdle is testing the WNS vaccine candidates in bats to assess their effectiveness. In a preliminary trial last winter, captive bats were immunized with vaccine candidates, treated with fungal spores, and placed in an environmental chamber that is intended to mimic hibernation conditions. The results of this pilot study are very promising but maintaining bats in captivity under artificial conditions is not ideal.

This winter, with the help of DNR, the team used an abandoned mine contaminated with the fungus that causes WNS and that previously housed hibernating bats. A group of little brown bats were immunized with the most promising vaccine candidates and placed in the mine to hibernate. The mine was sealed to prevent the bats from exiting (and other animals from entering), and the team is checking on the bats periodically through the winter. If the immunized bats survive hibernation with little or no effects, prospects for a WNS vaccine are very good, and the next phase of development will proceed as quickly as possible. Finding a treatment for WNS is a race against time as the disease is moving rapidly across the US. Whether or not the team's search is successful, methods developed in this study are being applied to other bat diseases where vaccines could be useful, such as controlling rabies in vampire bats.

## Images from the Field



Unusual ice formations build up as water drips from a state trail tunnel ceiling, indicating the freezing temperature created as air is drawn through the open ends of the tunnel in winter.



A near-albino little brown bat found by DNR bat biologists in 2016 during cave and mine surveys for white-nose syndrome.



WBP staff, partners, and volunteers gathered in spring to study the migratory movement of Eastern pipistrelles. (Left to right top: Heather Kaarakka, Brian Heeringa, Brenna Hyzy, Leakena Au, Emma Meyer Paul White, Jennifer Sommers. Bottom: Jennifer Redell, Amy Wray, Katie Luukkonen, Samantha Scully-Jordt.)



The 2016 annual meeting of the Midwest Bat Working Group in Ohio.

**Learn & connect**



**JOIN US IN MADISON AS WE DISCUSS THE LATEST BAT RESEARCH AND BAT-RELATED ISSUES IN THE MIDWEST**

WHERE: PYLE CENTER 702 LANGDON ST, MADISON, WI 53706

A BLOCK OF 45 ROOMS WILL BE RESERVED AT THE **LOWELL CENTER**, 610 LANGDON STREET, WHICH IS CONVENIENTLY LOCATED ONE BLOCK FROM THE PYLE CENTER.

Visit: <http://www.mwbwg.org/2016-meeting>

# Wisconsin '16 WNS Update

J. Paul White, DNR Bat Program

The Wisconsin Department of Natural Resources (DNR) Bat Program has been and will continue to be involved in multi-agency collaborative white-nose syndrome research. Our management goal has been to slow the spread of WNS into and through Wisconsin and minimize its impact where it does occur.

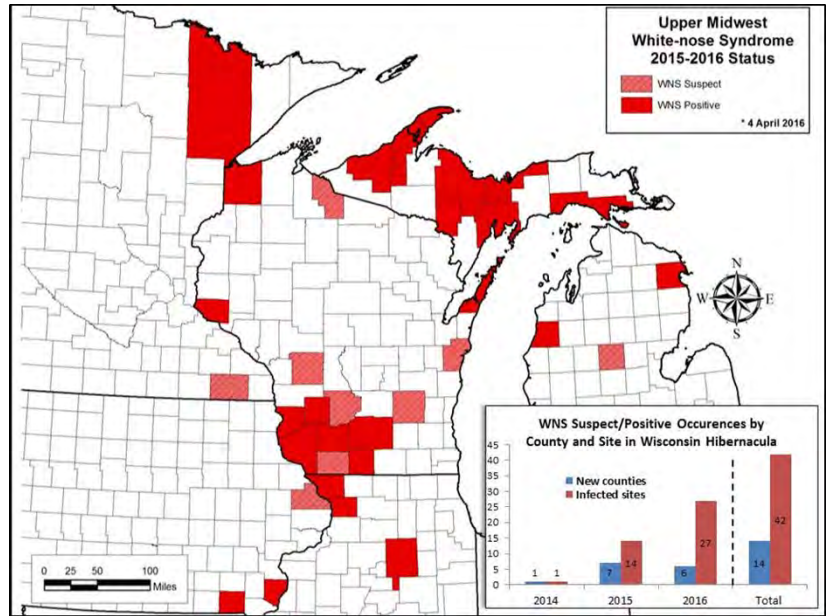
Because the natural movement of bats cannot be controlled, the current focus of the Wisconsin DNR strategy is to limit the anthropogenic spread of WNS through education/outreach, ensuring proper decontamination of clothes/gear used underground as well as researching disease management options.

To that end, the Wisconsin Bat Program has been involved in a variety of research aimed at minimizing the effects of WNS, knowing full-well that it will likely take a multitude of management options instead of one silver bullet.

### ***Disease spreads; impact on bat population mirrors other states' patterns***

During the 2015-2016 hibernation season, Wisconsin Bat Program staff visited 74 sites for WNS surveillance and research and together with partners including the U.S. Geological Survey-National Wildlife Health Center and University of California-Santa Cruz collected more than 1,000 samples. Since the disease was first detected in Wisconsin in 2014, 42 sites in 14 counties have been confirmed as WNS positive or WNS suspect. Wisconsin sites in the first year of fungal infection have experienced an average of 39.6% increase in population when compared to baseline, followed by an average 47.5% decline in population in year two, and a 93.6 % reduction in year three (one location).

Through the federal WNS Grant Program, the Wisconsin DNR recently received funding for work to be completed in the 2016-2017 winter season. Funds will be used for closely monitoring WNS-affected and susceptible bat populations in order to better understand the spread and effects of the disease, as well as assisting researchers in field-testing treatments that have shown promise in the lab.



*Left: A little brown bat sick with WNS clings to a tree in early February after emerging from a nearby mine.*

*Right: Little brown bat carcasses collected by neighboring land owners of an infected mine. These bats left hibernation early and died on nearby homes and yards.*



## Bat Diet (continued from page 1)

“...both bat species consume a variety of aquatic flies such as mosquitoes and midges, perhaps in a much greater quantity than previously thought.”

The insects that bats consume are digested and excreted but their DNA remains in the bat guano. Bat guano also contains a large amount of other materials, including dead and live bacteria from the digestive tract, cells from the bats themselves, and other materials like fibers, fats, and proteins. Separating insect DNA from all these other materials requires an intricate process in which DNA is extracted from the guano. Next, certain insect gene regions of interest are targeted and amplified into many copies through the process of polymerase chain reaction, or PCR. Once this insect genetic material has been extracted and amplified, it can be sequenced in order to determine the precise order of nucleotides — the building blocks of DNA — and can be compared to sequences from known insect species.

### **Preliminary results: different species, different snacks**

So far we have developed and optimized methods for these processes, and samples taken by citizen scientists and Wisconsin DNR personnel in 2014 are currently being analyzed. Preliminary results indicate that little brown and big brown bats do, in fact, feed on very different insects, with big browns preferring beetles and little browns preferring a variety of moths and flies. Some exciting results also suggest that during certain times of the year both bat species consume a variety of aquatic flies such as mosquitoes and midges, perhaps in much greater quantities than previously thought. Bat diets also appear to change depending on landscape composition, and further investigations will seek to tease apart the effects of agricultural, forest, and other habitat types on bats' diet preferences. Guano samples from 2015 and 2016 have been collected, and with the development of these new analytic methods we will soon gain an even better understanding of Wisconsin bats and their favorite snacks.

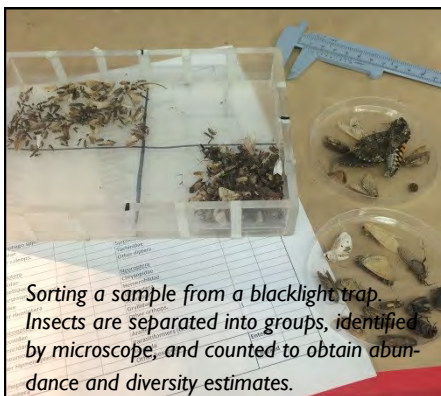
### **Research methods**

To compare bat dietary preferences with the insect communities in their habitat, we deploy blacklight traps to capture night-flying insects. This allows us to estimate the underlying insect diversity and abundances where bats are foraging. With the help of UW undergraduates, especially lab and field technician Jade Kochanski, we identified and counted 448,406 (nearly half a million!) insect specimens in 2015. We also expect to complete identification of 2016 samples in the next few months. As WNS spreads, our team will continue to investigate the effects of disease-related bat declines on insects and other arthropods — and particularly, agricultural and forest pests — so we can better understand and appreciate bats' role in the ecosystem.

This project would not be possible without citizen scientists collecting guano all over the state, as well as landowners who allow our research team to collect guano and insect samples on their properties. I am constantly amazed at Wisconsinites' enthusiasm and passion for bats and am very much looking forward to the next field season. Data generated by this project provides invaluable natural history information about bats while also helping quantify the great things these amazing animals do for us in Wisconsin and beyond.



Amy Wray collects guano under a roost at Governor Dodge State Park.



Sorting a sample from a blacklight trap. Insects are separated into groups, identified by microscope, and counted to obtain abundance and diversity estimates.



Laboratory samples from 2015, amplified and ready for sequencing.

Amy Wray is a PhD student at UW-Madison who is broadly interested in understanding the connections between predator-prey interactions, agroecology, and conservation medicine. Her research uses next-generation sequencing (NGS) to determine the diets of insectivorous bats in Wisconsin.

## Acoustic Update (continued from page 2)

### Acoustic Survey Report

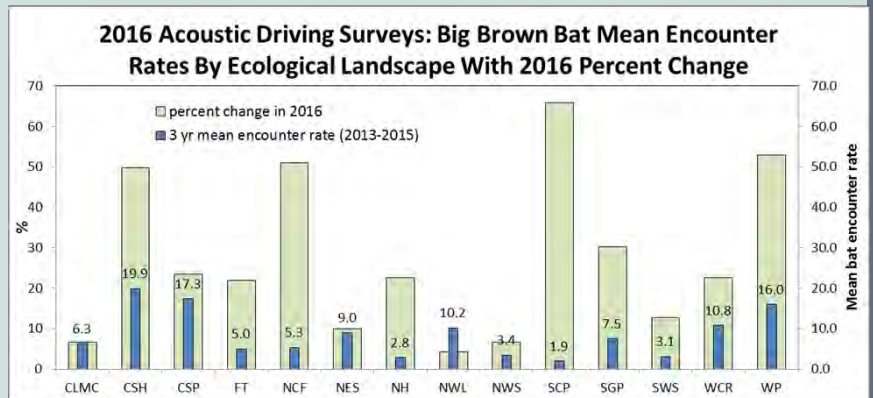
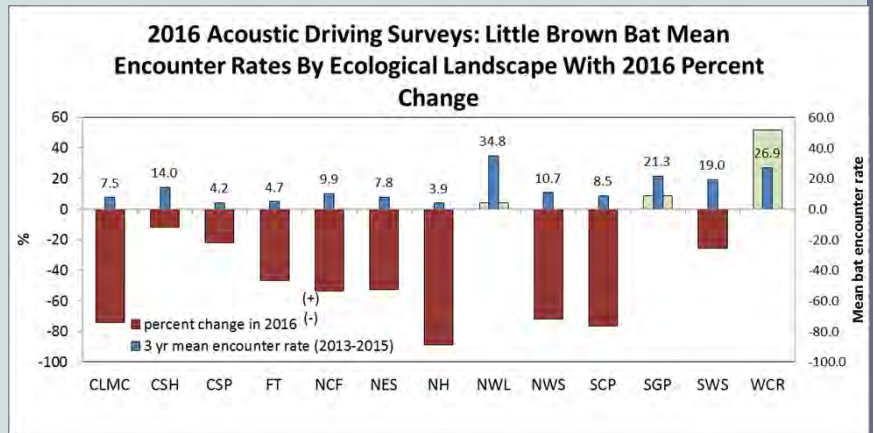
Acoustic survey techniques, like surveying on land by walking and on water by paddling, are increasingly important because of their ability to detect species like the northern long-eared bat and eastern pipistrelle, which prefer forests and water. The 2016 effort was a great success due to the many volunteers and coordinators that collect and manage the data throughout Wisconsin. We cannot thank you enough for time and energy you've spent on this important project. THANK YOU!

In 2016, the acoustic bat monitoring project reported 361 surveys uploaded to our database, of which 328 (90.9%) returned complete acoustic results, with 33 surveys not included due to technical difficulties. Of the 72 counties in Wisconsin, 52 (72.2%) had at least one acoustic bat survey completed in 2016, with the highest number of surveys coming from Racine County at 52, followed by Vilas (49) and Dane (31) counties. 267 individual surveyors took part in at least one acoustic bat survey, with the average survey per volunteer at 2.4. Assuming a 50 foot field of detection, 18,381.8 acres were surveyed when combining all three methods of acoustically monitoring bats in Wisconsin (driving, paddling and walking).

On the whole, completed surveys were marginally down compared to the previous four years which could account for some declines in bat species relative abundance. That said, anecdotal reports from both acoustic and bat roost surveyors from the northern third of the state suggest that the relative abundance of bats, specifically little brown bats, have dropped from 2015 to 2016. Unfortunately this decline can likely be attributed to white-nose syndrome, which was confirmed in hibernating bat populations in the Upper Peninsula of Michigan and Wisconsin in the winter of 2014, but adverse effects on bat populations in this region would not likely be observed until the second year of infection (winter of 2015).

To look closer into possible declines in little brown bats detected in northern Wisconsin, we examined acoustic data from two northern counties. Both Iron and Vilas counties had consistent surveyor effort and areas monitored with 64 surveys in 2015 and 59 surveys in 2016, with each season averaging just over 1.3 detector hours per survey. In 2015 the average bat detections per hour was 49.6 (standard error [S.E.] of 5.6) for both counties, while 2016 had 18.6 (S.E. 2.5) average bat detections per hour, which is a -62.5% decline from year to year. Looking at little brown bat (LBB) detections per hour, in 2015 the average LBB per hour was 23.9 (S.E. 3.3) compared to 2016, where average LBB per hour was 7.9 (1.6), a -66.9% decrease from year to year.

The declines in bat species detections are unfortunately a very sobering trend, one that would have largely gone undetected on a summer landscape without the use of acoustic data collected by this project. The anecdotal reports of "my bats are gone" or "I don't see as many as I used to" now have numbers to legitimize these observations. The need to collect this information is still the same, perhaps even heightened: *Collect acoustic bat information to improve our understanding of species distribution and summer habitat use.* These data has been and will continue to be used in management planning efforts such as informing the Wisconsin Wildlife Action Plan and other conversation strategies. Thanks again!





## Ho-Chunk Improve Bat Access at Former Badger Ammo Site

Randy Poelma, Ho-Chunk Division of Environmental Health & Jennifer Redell



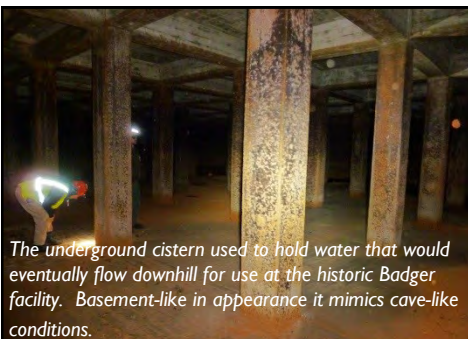
A wooden cupola and brushy invasives including buckthorn cover the location of an underground cistern.



Karen Sexton (left) prepares a warm-air trapping baffle that Randy Poelma (middle) and Paul White (right) will lower into the cistern opening.



One of two new bat-friendly cupola gates now cover the cistern now cleared of brushy invasives.



The underground cistern used to hold water that would eventually flow downhill for use at the historic Badger facility. Basement-like in appearance it mimics cave-like conditions.

Resource managers from the Ho-Chunk Nation (Nation) completed a bat hibernaculum improvement project this fall on tribal lands at the former Badger Army Ammunition Plant parcel near Baraboo, Wis. The Ho-Chunk project focused on a three-acre area surrounding an underground concrete water reservoir, a cave-like cistern, and included the removal of invasive shrubs and the building and installation of bat-friendly gates.

The first step in encouraging bats to use the underground cistern was to make it accessible for them to initially locate and investigate. Invasive shrubs were removed by the Nation and a contractor as part of the Nation's land management plan for the property and to improve access for bats to this potential winter hibernation site. Invasive shrub removal at the cistern is part of a much larger invasive management program at Badger. The Nation completed forestry mowing of invasive brush on 230 acres this summer and plans to treat 570 more acres this winter in preparation for prescribed burns planned this spring.

Rotting wooden cupolas atop openings to the reservoir were carefully removed and then replaced with engineered metal bat-friendly cupola-style bat gates. The gates allow bats to freely access the site while limiting access and safety concerns presented by tribal members visiting the property. Foam-board baffles were added to the ceiling inside the cistern to provide "traps" for rising warm air, thus creating a range of temperatures for bats to select from by mimicking the variability in ceiling height in natural caves.

### ***If we build it, will they come?***

The Wisconsin DNR Bat Program, in coordination with the Ho-Chunk Nation, USDA-Dairy Forage Research Center, and Town of Sumpter has been monitoring bats at the Badger facility for several years and the cistern is an experiment to see if the bats will use artificial hibernation habitats. While bats in Wisconsin have an abundance of insect prey, water sources, and foraging areas available to them, we want to make sure they have a good number and distribution of the summer roosting and winter hibernation habitats they may need. Thus partners are trying at the Badger site, and elsewhere, to create artificial winter hibernation sites given the success of artificial summer roosts.

There are many unknowns about why bats select certain hibernation sites and not others. Information is lacking about the effects of air-flow, disturbance, and distance to summer roosts or navigational beacons on landscapes, and similar criteria on the selection of hibernacula by bats. Our work to turn the cistern into an artificial hibernation habitat is based on what is known at this time, and we surmise that bats may take up residence in newly accessible artificial hibernation sites provided the environmental conditions (temperature, humidity, air-

flow) are suitable for hibernation. We know that bats are already using a range of "artificial" hibernation sites in Wisconsin that include mines, tunnels, beer caves, basements, sewers, and root cellars. We do not know how long it takes for bats to locate, investigate, select, and begin using artificial hibernation sites. There are no known recorded observations of when bats began using mines after mining operations began. The Nation and WDNR Bat Program will continue monitoring the cistern for the first evidence of resident bats and we are hopeful bats will find a winter home there.

## Better Understanding Bats of the Forest

Brian Heeringa, Wildlife Biologist, Chequamegon-Nicolet National Forest, USFS

“...the collected genetic samples are being used to identify potential immunity (or adaptation) to WNS...”

The Chequamegon-Nicolet National Forest and the Forest Service Northern Research Station have been busy continuing some exciting collaborative research focusing on the secondary effects of white-nose syndrome (WNS) in bats of the Upper Midwest.

White-nose syndrome, as many of us are more than aware of at this point, has decimated bat populations across the eastern United States and Canada.

Progressing steadily west, Wisconsin documented its first cases in winter 2014, and in 2016 the deadly fungus was found to have made a huge westward jump to Washington state.

Since the initial discovery in 2006, the fungus that causes white-nose syndrome has become one of the biggest threats to North American bats but has also sparked an unprecedented coordinated effort to find a solution. Partnerships have developed between agencies of all jurisdictions, many non-governmental organizations, universities, and even concerned citizens. The efforts to investigate the fungus and the disease it causes are expansive and urgent. Work is currently being done not only in the United States and Canada, but in Europe and China where the same fungus has been discovered and bats are doing just fine!

How is that possible? What clues to this apparent immunity can be discovered? Is there time for our bats to adapt and become immune to the fungus? Is there a cure or an effective way to stop or slow the spread? White-nose syndrome affects hibernating bats during the winter, but what can we do to improve the survival chances of those bats that make it through hibernation? For these survivors, what habitat do they need to heal and hopefully raise young? The questions are many, and for every answer uncovered it seems two more questions take its place! However, the good news is that those many partners are up to this challenge and won't stop working until this puzzle is solved.

During the last couple years, I have had the privilege to work with a great group of folks at the Forest Service Northern Research Station – Institute for Applied Ecosystem Studies in

Rhineland, Wis. Using a multi-part approach we are attempting to answer some of those questions mentioned previously. In 2014, scientists and land managers came together to help develop the tools needed to recover and conserve bat populations. By exploring the interactions between bats and their environment, habitat use, and investigating regional and seasonal movements, we are hoping to shed light on how bats use different parts of their environment. Improving our understanding of these relationships allows us to restore and improve habitat areas. It also can guide current and future management planning and implementation by ensuring adequate protections and mitigations are in place for habitat features favored by bats.

### **Migration and adaptation to WNS**

The first part of this project is looking into how bats move across the landscape between summer and winter sites and how they may be adapting to WNS. Genetic samples have been collected from bats across Wisconsin, Minnesota, and Upper Michigan.



Continued on page 17

## Information Explosion on Eastern Pipistrelle Day Roosts in Wisconsin

Heather Kaarakka

Until last year, when three Eastern pipistrelles (aka tri-colored bat) were reported roosting under a porch in May, nothing was known about summer roost habitat of this species in Wisconsin. Eastern pipistrelles do not form large colonies and are not commonly observed roosting on or in buildings in Wisconsin, so this cryptic species has gone largely undetected since the roost monitoring project began.

This year however, we had a pleasant surprise when a photo of an eastern pipistrelle colony was sent to us in July. This particular colony roosts under the eaves of a cabin in Richland County. Over the summer, the bats moved around the cabin, sometimes roosting on the south side, and sometimes on the north side. When pups were too large to move, the small colony of 7-9 adults and 9-11 juveniles remained in one location offering the opportunity to place a trail camera and record their behavior. In late July, the pups began to fly on their own and the colony slowly dispersed.


Maternity colonies of eastern pipistrelles in buildings are not uncommon elsewhere in the country. In a study in Indiana, six colonies of eastern pipistrelles roosting in buildings were monitored by landowners (Whitaker 1998). The monitors in this study provided valuable information about timing of arrival, birth, flight of juveniles, and departure, as well as movement of the colonies among different roosts. Because Eastern pipistrelles appear to prefer to roost in open but sheltered areas, observations can be easily made about their behavior. Little brown bats and big brown bats tend to roost in tight places where observing them is more difficult.

This summer, the Wisconsin Bat Program was able to radio-tag and track three female Eastern pipistrelles caught in mist-nets in southern Wisconsin. All three bats roosted in foliage of trees and moved between tree roosts almost every day. One bat was mostly solitary, but the other bats moved among trees in colonies of 7-16 individuals. Unlike northern long-eared bats we have tracked, the eastern pipistrelles roosted high in the canopy and were never visible from the ground which made pinpointing the roost nearly impossible until we could watch the bats emerge.

There's a bit of a thrill to be able to watch these small bats flutter out of the leaves and know you followed your tag to the correct tree.

The two bats caught along the Wisconsin River roosted mostly in live foliage of oak and hickory trees; however, the bat captured and tracked at Yellowstone Lake State Park roosted in the branches of Norway Spruce, which to our knowledge, is some of the first evidence of this species' use of live coniferous foliage as day roosts.

So in one summer, we've gone from virtually no information on summer day roosts of Eastern pipistrelles in Wisconsin to having several records across the state including a roost on a building! We look forward to hearing about the return of the pipistrelles to the eaves in the spring.



*Female and pup eastern pipistrelles roost under eaves of a cabin in Richland County.*

# 2016 WISCONSIN Bat Festival

A soaring success!

Cindy Sandeno, Region 3 Program Leader, Threatened, Endangered and Sensitive Species, USFS

The 2016 Wisconsin Bat Festival officially kicked off on Sept. 30, 2016, with a special, "Superheroes of the Night DEMO" at the Urban Ecology Center - Menomonee Valley Branch. This evening event allowed the community to see how local bat experts use technology to study bats. The demonstration offered a peek into a world of mystery that few get to see – the splendor and variety of bats that live throughout the world – from bats found in Wisconsin backyards to those that live in Africa. Participants were able to see a presentation about the bats of Wisconsin, meet live bats, learn about bat detectors and how they are used by scientists, and participate in a few hands-on activities.

The main event was held Oct. 1 at the Milwaukee Public Museum and marked the first time the festival was held at this location, and the first time the museum partnered with an outside organization to allow educational programming. This exciting day celebrated the unique role that bats play in our world and explored why bats are so important to Wisconsin. Right now is a critical time for bats. Because of the loss of so many bat to white-nose syndrome (WNS), every bat in Wisconsin is important.

The goals of the festival are to increase awareness that bats are amazing animals critical to our food, environment and economy; build support to protect these species and the places they live; explore the threat of WNS to bats and the environment; and inspire people to get involved in bat conservation and the fight against WNS. These goals are accomplished through live bat programs, hands-on activities, and interaction with scientists, agency representatives, and other bat educators.

This free festival featured bat-themed crafts and games for kids, a 70-foot inflatable cave that kids could crawl through, bat house building, educational exhibits, and live bat exhibits. Guests could observe bats interact with each other, play with their toys, and watch them eat - a truly unique experience.



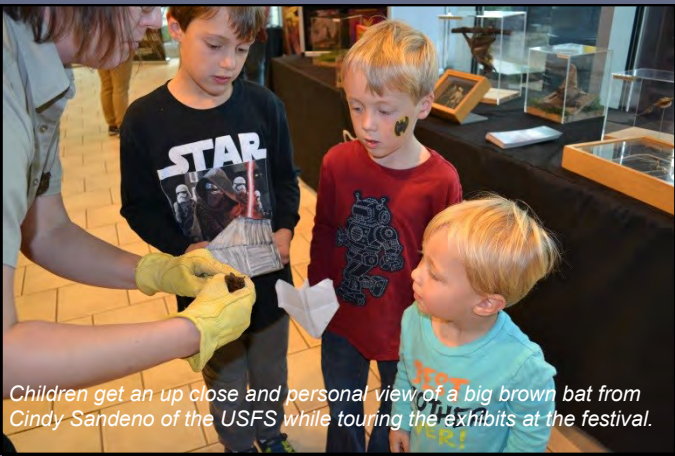
Rafiki, a straw-colored fruit bat, helped represent the Wisconsin Bat Program



Code Orange is a team of kids working to inspire others to help bats.



Rob Mies, from the Organization for Bat Conservation, demonstrates echolocation with the help of Batman.



Children get an up close and personal view of a big brown bat from Cindy Sandeno of the USFS while touring the exhibits at the festival.



Brian Heeringa of the USFS demonstrates a bat detector for attendees.



Inter-agency and inter-galactic partners in bat conservation: (left to right: Gail Moede Rogall— USGS, Rich Geboy— USFWS, Batman—superhero, Jennifer Redell— WI DNR, Brian Heeringa, USFS



After finishing an activity with Montez Langford Ashley, USFS, these kids are showing off their bat rings! All photos : USFS, Eastern Region

Collaboration was key to the festival’s success, building upon strong partnerships and strategically leveraged resources and networks to reach a large and diverse audience with key bat conservation messages. Exhibitors included the U.S. Forest Service, Organization for Bat Conservation, Wisconsin DNR Bat Program, U.S. Fish and Wildlife Service, U.S. Geological Survey, Wehr Nature Center, Urban Ecology Center, Milwaukee Public Museum, University of Wisconsin–Platteville, University of Wisconsin–Stevens Point, Milwaukee County Parks & Recreation, Carthage College, and Lawrence University. Together, we were able to host over 25 hands-on activities, nine live bat talks, 12 science talks, and build 30 bat houses that will be put up on national forests across the United States in 2017.

More than 1,500 people attended the festival from Wisconsin and Illinois. A survey of participants revealed that 89% of those surveyed were first-time attendees. In addition, 87% were “Very Satisfied” with the festival and 13% were “Satisfied.”

Attendees learned about the festival in a variety of ways including websites, word of mouth, rack cards, information posted in the museum, and of course social media. Facebook posts about the event on DNR’s Facebook page and other partner sites reached more than 65,000 people.

One very inspiring group of students attending the event were the First Lego League Team, “CODE Orange.” This group had traveled from Oshkosh to learn more about bats and identify a way to help bats in the real-world. After talking with several of our experts, the team wrote a children’s book called, “Backyard Bat: How Buddy Bat Became Our Backyard Friend!” which teaches about building and installing bat houses.

This event would not have been possible without the assistance of all of our exhibitors, symposium speakers, DNR and Forest Service staff, and volunteers. More than 450 hours of volunteer assistance was necessary to put on this successful event.

**Special thanks to our sponsors:**



**ORGANIZATION FOR BAT CONSERVATION**  
#SAVETHEBATS



## Cave & Mine Catalogue (continued from page 3)



A cupola-style bat-friendly gate was constructed over the entrance to an underground walkway at Lake View Hill Park in Madison in an effort to make the site accessible to bats for hibernation.

north side. As part of a larger demolition project the tunnel was saved, sealed at one end, and a bat-friendly cupola gate placed over an opening at the other end. Summer resident bats in the Madison area would normally migrate at least 20 miles to find the nearest hibernation site so the tunnel provides a new option and could potentially be easily accessed or decontaminated in the future.

### **Long-Distance Traveller**

While almost nothing is known about the connection between summer and winter habitat in Wisconsin we did locate a single banded bat in a cave early in this hibernation period (November, 2016) that had been banded over the summer. This re-sighting represents the second recorded movement between a summer roost site and a cave for Wisconsin. The banded little brown bat migrated from its Madison summer roost to a cave 45 miles away. The first such record for summer to winter movement in Wisconsin was a little brown bat that migrated from its barn roost to a mine two miles away.

### **Cave Rescue Lessons Get Real-Life Test**

In June, the Door County Parks Department hosted an Orientation to Cave Rescue seminar for local emergency response staff and agency partners. The seminar is taught by volunteers from the National Cave Rescue Commission. Staff from the Door County Horseshoe Bay Cave management team, Soil & Water Conservation office, Door County Emergency Services Department, Sturgeon Bay Police Department, USGS- National Wildlife Health Center, and Wisconsin DNR attended. The two-day course consists of classroom and fieldwork in all

phases of cave rescue including underground environment, vertical operations, extrication techniques, medical management, communications systems, and the organization and management of cave rescue operations. High water in Horseshoe Bay Cave that weekend made the mock-rescue portion of the seminar particularly challenging while offering a realistic (and cold!) scenario for rescuers.

*Emergency response professionals and scientists participated in cave rescue training in Door County last summer.*



In an ironic turn of events, less than two weeks after the cave-rescue seminar I found myself called up to aid a real search and rescue at a mine after three teenage boys went missing. Their last known cell phone signals, and their bikes, were near the mine. My familiarity with the mine comes from the various bat surveys and related work we have conducted there. I was able to assist in locating the boys underground and escorting them to the surface. The uninjured boys waited in the mine for nearly 24 hours after getting lost and having the batteries of their phones die, their only light sources. Everyone involved was grateful for successfully reuniting the boys with their families.

### **Other news**

We continued to locate and assess a few small unknown potential hibernation sites, updated and created WNS prevention and education materials at commercial caves and continued participation in the continent-wide WNS sampling study being conducted by the University of California-Santa-Cruz. We tracked spring migration of the Eastern pipistrelle, learned about their summer roosting habitats, and again with UC-Santa Cruz, initiated a study to learn about torpor bouts of this species during hibernation.

# Roost Project (continued from page 3)

Find the full 2016 roost report and the infographic below on the Wisconsin Bat Program website's roost monitoring page. Enjoy and please know that I am always looking for feedback on how to improve the report and project. If you wish to participate in the roost project in any capacity, please contact me via email at Heather.Kaarakka@Wisconsin.gov.

## 403 surveys

*were completed in 2016, counting*

# 25,884 bats

Wisconsin Bat Program | Wisconsin Department of Natural Resources

# Roost Monitoring Report

2016

### Great Wisconsin Bat Count

*The goal was to count as many roosts as possible in a single weekend.*

- Little brown bats counted
- Little brown bat surveys
- Big brown bats counted
- Big brown bat surveys

**June 1, 2016**

**July 31, 2016**

### Building attics attract large crowds

*Building attics and bat houses produced the largest number of little brown bats.*

### Meet a couple of our bat species

*Two of Wisconsin's most common bats are the little brown bat and big brown bat.*

**Big Brown Bat**  
*Eptesicus fuscus*

*This beetle-eater uses barns and other buildings as roosts in summer. They usually overwinter in caves and mines, but occasionally hibernate in buildings.*

**Little Brown Bat**  
*Myotis lucifugus*

*This common bat species eats small aquatic insects and roosts in bat houses and buildings in the summer. In winter, they hibernate in caves and mines.*

127 volunteers reached for their clicker-counters this summer to help count bats

### Where do bats live?

*The bats we count live in a variety of man-made structures.*

Little Brown  
73 roosts

Big Brown  
30 roosts

### A bat colony's summer

**05**

**May:** the roost colony population steadily grows as bats return to their summer roost from overwintering habitat.

**06**

**June:** most of the colony is present at the roost, and female bats give birth to flightless young.

**07**

**July:** bat pups born in June begin to fly in late July and the number of bats emerging from the roost increases.

**08**

**August:** adults begin migration back to winter habitat where they will mate throughout the fall.

### Number of roosts counted in 2016

**30**

**75**

Produced by the Wisconsin Department of Natural Resources and the Bureau of Natural Heritage Conservation | 101 S Webster St, Madison, WI 53707 | DNRBureauofNaturalHeritageConservation@wisconsin.gov

### Help survey bats!

Know a place where bats roost? Want to help count bats?

Contact Heather at [heather.kaarakka@wisconsin.gov](mailto:heather.kaarakka@wisconsin.gov) or visit [wiatri.net/inventory/bats](http://wiatri.net/inventory/bats)

## Bat Week 2016— Pulling for Bats

Brian Heeringa, Wildlife Biologist, Chequamegon– Nicolet National Forest

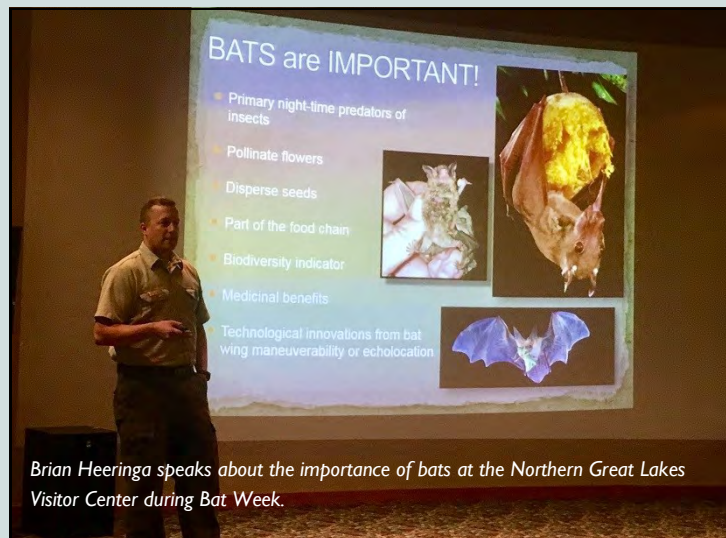
Bat Week offers a time to celebrate one of the most amazing and interesting groups of animals: bats! For some, like me, it's a time to look forward to. However, this year, if you happened to be a non-native or invasive species, you might have been trembling in your roots!

From October 24-31, 2016, Bat Week was celebrated across the U.S. to spread the word about the importance of bats and the incredible role they play in the health of our planet. This year's theme was "Pulling for Bats" and focused on improving habitat and food for bats and other wildlife by pulling and removing invasive plants.

### **Making sure bats get the food they need**

Bats need to eat a lot of insects to stay healthy. When invasive plants move into an area, they out-grow and outcompete our native plants. These native plants are necessary for supporting a variety of insects that our bats rely on — invasive plants are not. There are even invasive plants, such as common burdock and Canada thistle, that can kill bats by snagging their delicate wings with their barbs and hooks. The bats are trapped in place until they starve to death or are eaten by predators.

To celebrate Bat Week and help bats by removing invasive plants, the U.S. Forest Service Chequamegon-Nicolet National Forest, and Wisconsin DNR Bat Program hosted a "Pulling for Bats" event Oct. 29 at the Northern Great Lakes Visitor Center in Ashland, Wis. Despite cool temperatures and impending rain showers, 12 hearty souls came to remove common burdock, curly dock and Canada thistle. The event began with an indoor presentation given by Forest Service Wildlife Biologist Brian Heeringa followed by the invasive plant pull around the grounds of the Northern Great Lakes Visitor Center. As a result of everyone's hard work we filled over 20, 42-gallon trash bags, making the surrounding habitat that much healthier. Thank you to all those that came to lend a hand to help save the bats!



*Brian Heeringa speaks about the importance of bats at the Northern Great Lakes Visitor Center during Bat Week.*



*Bats can become caught on burdock and thistle, which leads to their death.*



*Staff and volunteers pull invasive species near the Northern Great Lakes Visitor Center in Ashland during Bat Week.*



## Bats of the Forest (continued from page 10)

Genetic analysis techniques are helping understand the seasonal movement patterns by associating individual bats captured from summer areas with a specific hibernation site. In addition, the collected genetic samples are being used to identify potential immunity (or adaptation) to WNS and whether the diversity of naturally occurring microbiota (think of bacteria and other organisms) on bats could slow down or resist growth of the WNS fungus. Conservation of potentially “disease-resistant” populations will be important to recovery. Obtaining the extensive samples and data needed for this study involved the participation and collaboration of biologists from the Wisconsin, Michigan, and Minnesota natural resources departments, several U.S. Forest Service units and universities.



A big brown bat is examined during summer mist-netting surveys.  
Photo: Michael Kienitz

*Sound forest management can play a key role in providing and enhancing habitats and maximizing insect availability for bats during critical times of the year...*

The second part of this project is evaluating bat activity patterns and habitat use at the landscape scale using acoustic monitoring. Numerous study grids were established on the Chequamegon-Nicolet National Forest in northern Wisconsin and the Ottawa National Forest in Michigan’s Upper Peninsula. Each individual study grid consisted of four stationary plots and one driving acoustic transect. By using stationary and mobile acoustic monitoring methods, bat activity patterns can be examined relation to the surrounding habitats.

By integrating this information with ongoing land management activities such as timber harvesting, we can gain valuable insight into how bats use and respond to changes in their environment. Sound forest management can play a key role in providing and enhancing habitats and maximizing insect availability for bats during critical times of the year such as spring and fall. The availability of these food resources in the general vicinity of a hibernation site can be critically important to bats affected by WNS as they emerge in the spring and attempt to restore body fat and repair WNS-damaged tissue.

The third, and final part of this project returns us to the genetic building blocks of life... DNA. Increasingly, genetics are being used in new and exciting ways in science. Having a resource like the full genome (genetic blueprint) of a species can prove invaluable to the larger scientific community. In support of continuing to develop this resource, project scientists are working to complete a full-genome mapping of the northern long-eared bat. Unfortunately, this information is currently not available for this species, which is why many studies often use little brown bats as an alternative or surrogate.

As you can see, this project has many moving parts, but is really only a small fraction of what is happening in the greater world of bat research and conservation. To combat WNS in the U.S. and Canada, it is taking a large collaborative effort, and this project is no exception. Because of the efforts of everyone involved, this project, the primary investigators, and 12 other collaborators (including members of the Wisconsin DNR Bat Program) were awarded with the 2016 Wings Across the Americas Research Partnership Award last March. The Wings Across the Americas program was developed to recognize partnerships working to conserve habitat and populations of birds, bats, butterflies, and dragonflies in the United States and internationally. I am proud to be a member of this incredible team and contributing a part to the fight against white-nose syndrome.

Have a safe and productive new year, and I hope to see you out enjoying the Chequamegon-Nicolet National Forest in 2017!

## Some Bats Develop Resistance to White-nose Syndrome

Tim Stephens, UC– Santa Cruz (originally released Dec. 6, 2016)

White-nose syndrome has decimated the little brown bat, but researchers found small populations in New York that appear to have developed resistance to the disease.

Bat populations in some places in North America appear to have developed resistance to the deadly fungal disease known as white-nose syndrome. Researchers from University of California-Santa Cruz analyzed infection data and population trends of the little brown bat in the eastern United States and found that populations in New York that had stabilized after initial declines had much lower infection levels at the end of winter than populations that were still declining.

The little brown bat was previously one of the most abundant bat species in the eastern United States, but was reduced to less than 10 percent of its former population with the arrival of white-nose syndrome. The fungus was introduced to New York State in 2006, and it continues to spread in the United States and Canada, causing declines of 90 percent or more in several species.

UC-Santa Cruz researchers led by biologists Marm Kilpatrick and Winifred Frick have been at the forefront of research on the disease, conducting field surveys to help track its spread and studying the dynamics of disease transmission and the impacts on bat populations.

In the new study, researchers sampled hibernating bats at nine sites in New York, Illinois, and Virginia, using a standardized sampling technique to detect and quantify the amount of fungus on each bat. They then used mathematical modeling techniques to examine differences in disease dynamics between persisting and declining populations. Their findings were published Dec. 5, 2016, in the journal *Philosophical Transactions of the Royal Society: Biological Sciences*.

“Populations of little brown bats have declined dramatically across their range. There have been several reports that populations in New York, where the disease was first introduced, are no longer declining, but no one understood why,” said first author Kate Langwig, who worked on the study as a graduate student at UC-Santa Cruz and is now at Harvard University. “This study is the first to indicate that little brown bats appear to have evolved resistance to the disease.”

The researchers considered several possible hypotheses for the ability of some bats to persist with the fungus: host resistance, host tolerance, and lower transmission. Their results pointed toward host resistance causing lower growth rates of the fungus during late winter. The results did not support the other hypotheses, Langwig said.

The mechanism underlying the resistance of little brown



Scientists at the forefront of WNS research including Dr. Kate Langwig have been active in Wisconsin as well. Here, Dr. Langwig records data during a WNS sampling project in a Wisconsin cave.

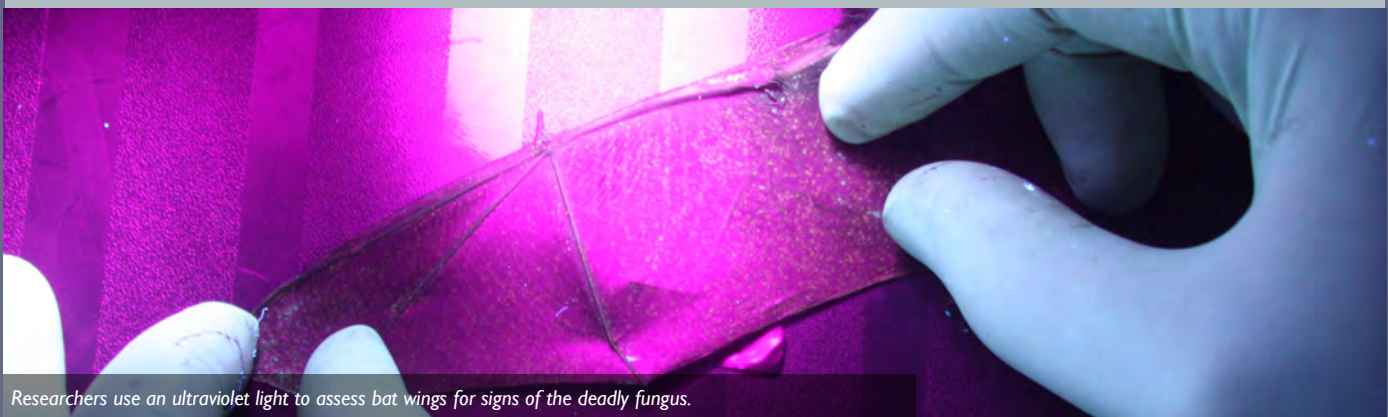


Background: In a different Wisconsin cave Joe Hoyt scans a bat to see if it is tagged with a Passive Integrated Transponder (PIT). Foreground: Dr. Marm Kilpatrick records data.

bats remains unknown. “It could be changes in arousal behavior, differences in skin microbes, or an activation of the immune response by bats after infection has reached a moderate level. Future studies are needed to uncover these details,” Langwig said.

The authors emphasized that they have only examined populations of a single bat species. “For other species, like the northern long-eared bat, we don’t have evidence to suggest populations are persisting inside hibernacula,” Langwig said. “While this study is good news for some colonies of little brown bats, other species show little sign of being able to persist with the disease.”

In addition to Langwig, the co-authors of the paper include Winifred Frick and Marm Kilpatrick, both faculty members in the Department of Ecology and Evolutionary Biology at UC-Santa Cruz; Joseph Hoyt, a graduate student at UC-Santa Cruz; and Katy Parise and Jeffrey Foster at the University of New Hampshire. This work was supported by the National Science Foundation, the Woodtiger Fund, and Bat Conservation International.



Researchers use an ultraviolet light to assess bat wings for signs of the deadly fungus.

# Bats of Wisconsin Posters Available

**\$30 each; 24 x 43 inches**

Posters are printed individually in the Museum, using archival exhibition-quality media.

Posters from the UW Zoological Museum showcase the allure of Zoological subjects and offer basic information useful for schools, conservationists, and wildlife enthusiasts of all ages. Artwork was created by experienced biological illustrators and annotated by zoologists with expert knowledge of the material. This poster was created by Jacki Whisenant, a WBP volunteer!

All proceeds help purchase supplies and equipment for Museum projects and students.

Order online at:  
<https://charge.wisc.edu/zoology/items.aspx>



If you see dead, dying, or flying bats in the winter, please call 608-266-5216

For more information, visit <http://wiatri.net/inventory/bats/>



## Wisconsin Bat Program Education and Outreach 2016

Jennifer Redell

- 50 individual presentations provided to 50 different audiences in 21 counties
- More than 3,000 adults and students attended bat presentations and field trips
- Thousands of people were reached through the Wisconsin Bat Program newsletter, *The Echolocator*
- Social media posts featuring program work reached over **234,000** people.
- Tens of thousands of people across Wisconsin, neighboring states, and nationally were reached via mainstream media: Wisconsin DNR press releases, radio, television, and newspaper interviews and specials.
- Thousands of people visited the Wisconsin DNR bat webpages and Wisconsin Citizen-Based Monitoring bat website.
- \$2,600 was generated for the Natural Resources Foundation of Wisconsin— Bat Conservation Fund and the Wisconsin DNR's—Bat Conservation (Society) gift account from speaker honorariums, t-shirt sales, field trip fees, and cash donations at bat programs.
- **1,500** adults & children attended the 2016 Wisconsin Bat Festival (Oct. 1 in Milwaukee) held at **two** venues. The Festival was free to attendees this year thanks to support from the USFS and other major sponsors.
- Wisconsin Bat Program partners (nature centers, commercial caves, etc.) provided **hundreds** of formal bat education programs to a wide variety of audiences statewide and reached **thousands** of individuals statewide.



Photo: [www.laudatosiproject.com](http://www.laudatosiproject.com)



Above: Rafiki the straw-colored fruit bat visits students at Highland Elementary School. Photo: Kim Wahl

# BATS WANTED

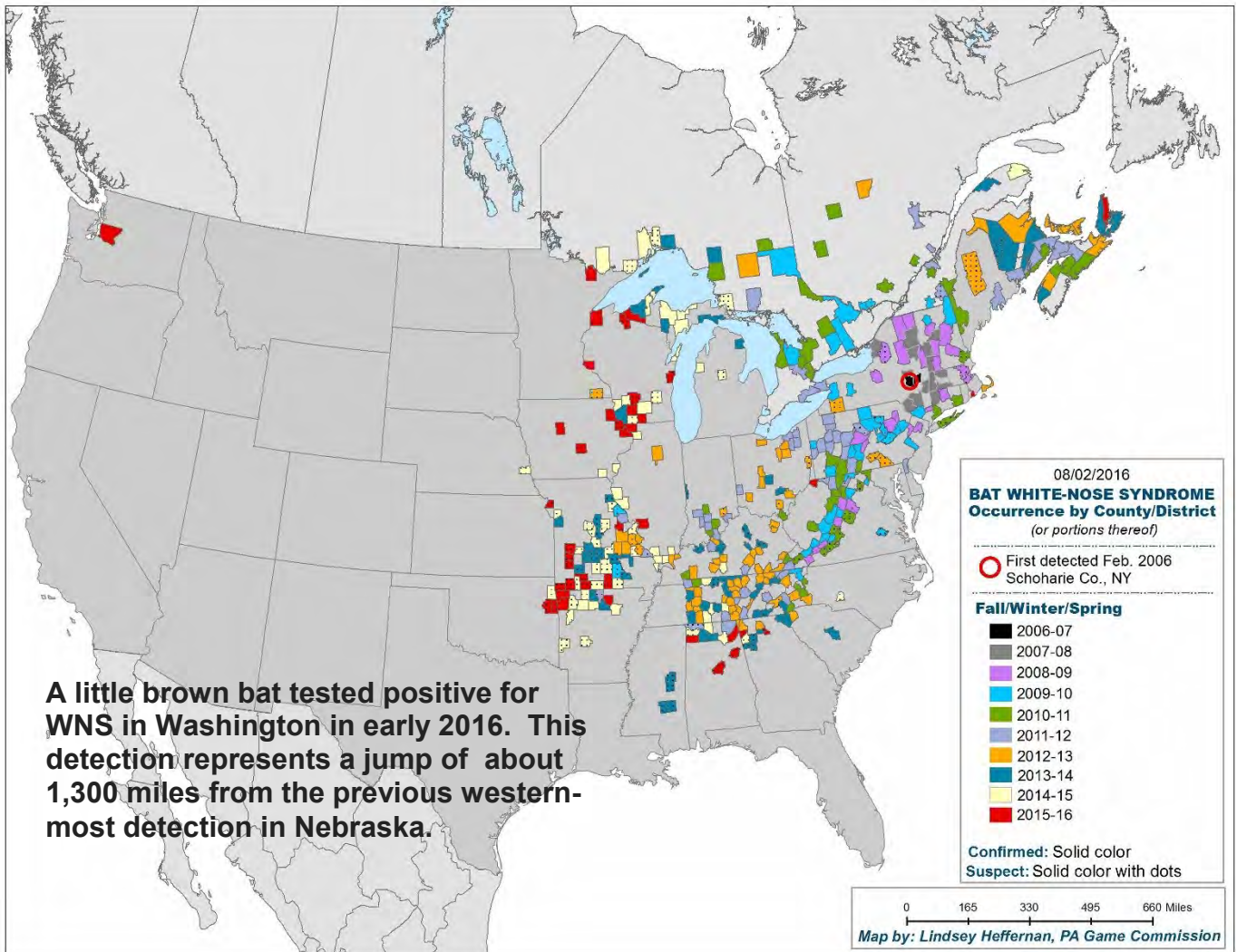
WISCONSIN  
BAT PROGRAM



**Do you have bats roosting in your bat house, barn, garage, attic or behind your shutters in summer?** The Wisconsin Bat Program is looking for summer bat roosts! With white-nose syndrome devastating bats in Wisconsin and elsewhere, remaining summer colonies will be important to monitor in the coming years because these are bats that are potentially surviving the deadly fungal disease.



Bats roosting on your property in summer? Report your roost by emailing [DNRbats@wisconsin.gov](mailto:DNRbats@wisconsin.gov) or calling 608.266.5216



**A little brown bat tested positive for WNS in Washington in early 2016. This detection represents a jump of about 1,300 miles from the previous western-most detection in Nebraska.**



WBP field technician Katie Luukkonen uses a radio receiver to locate an evening bat roost.

## Wisconsin's Newest Bat Species More Abundant than First Thought

After a decade of bad news about bats dying from white-nose syndrome, DNR bat biologists caught some good news in 2015 when they discovered a new bat species in Wisconsin. In 2016, the news got even better as the new species — a beetle-eater called an evening bat — are found to be even more abundant in Wisconsin than we first thought.

Bat biologists returned over the summer to the site where the bat species had first been discovered in 2015, Avon Bottoms Wildlife Area in Rock County. They caught one evening bat in their mist net and radio-tracked the evening bat back to her roost and found her roosting with 60 other evening bats. Returning a few weeks later to the same wildlife area, they radio-tracked two other female bats and discovered a roost with 103 individuals.

"It was pretty cool to find a maternity colony of evening bats," says Heather Kaarakka, one of the DNR bat researchers. "Now we can say the 2015 discovery of the evening bat wasn't an accidental find. We found female bats and followed them back to sizeable colonies," said Paul White, DNR conservation biologist. "It is a really big deal." The last time a new species of bat was documented in Wisconsin was in November 1954; the new species at that time, an Indiana bat, represented the one and only time an Indiana bat was documented in Wisconsin despite concerted efforts in the 1980s and 1990s to find the species again. Even more good news: this species is not vulnerable to white-nose syndrome!



State of Wisconsin  
Department of Natural Resources  
Box 7921

To subscribe or unsubscribe to the WI Bat Program mailing list, please visit the [GovDelivery site](#) or follow the mailing list link on the Bat Program website.

Unless specified all photos in this newsletter were taken by the Wisconsin Bat Program.

If you have suggestions for articles, or have a story you would like to contribute, contact:  
[Heather.Karakka@wisconsin.gov](mailto:Heather.Karakka@wisconsin.gov)  
Or  
[Jennifer.Redell@wisconsin.gov](mailto:Jennifer.Redell@wisconsin.gov)

### Did you know?

The Wisconsin Department of Natural Resources' Wisconsin Bat Program relies heavily on grants and funding support from citizens who are interested in bat conservation: donate in one of two ways below:

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Report colonies, caves, or unusual bat behavior at



Scan this barcode with your smartphone to go directly to the Wisconsin Bat Program Website!

<http://wiatri.net/inventory/bats>

The **Wisconsin Bat Conservation Society** supports WDNR bat projects that need immediate funding. Specifically, these funds will be used for WNS research, landowner support in WNS prevention and control, surveillance, inventory, monitoring, applied management, and education about the benefits of bats.

For details about how to donate head to: [www.dnr.wi.gov](http://www.dnr.wi.gov) keyword **<bats>**



## Support the Wisconsin Bat Conservation Fund

The Wisconsin Bat Conservation Fund is a permanent endowment managed by the Natural Resources Foundation of Wisconsin. Contributions to the Fund will support bat conservation needs in Wisconsin.

Yes! I would like to make a contribution to the Wisconsin Bat Conservation Fund.

### Gift Amount

\$25

\$50

\$100

\$250

\$500

\$ Other

Please send me information on how I can leave a bequest to the Fund through my estate plan.

**Name(s)** \_\_\_\_\_

**Address** \_\_\_\_\_

**Phone** (\_\_\_\_) \_\_\_\_\_ - \_\_\_\_\_

**Email** \_\_\_\_\_

Make checks payable to the Natural Resources Foundation and mail to: Natural Resources Foundation of Wisconsin, Attn: Wisconsin Bat Conservation Fund, PO Box 2317, Madison, WI 53701. The Natural Resources Foundation is a 501(C)3 tax-exempt organization. Receipt of gift will be officially recognized by the Foundation. Contributions are tax deductible to the extent allowed by law. Visit [www.wisconservation.org](http://www.wisconservation.org) to donate online.