

ECHOLOCATOR

Volume 7, Issue 1

WISCONSIN
BAT PROGRAM

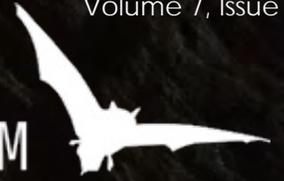


Table of Contents

WISCONSIN BAT PROGRAM

- 3 Reflections on 2017
- 5 WNS Spreads
- 6 Acoustic Update
- 8 Cave and Mine Update
- 9 Roost Monitoring
- 11 Tracking a Rare Bat
- 12 Habitat Conservation Plan
- 13 Outreach Lights the Night

Cover Photo: DNR conservation biologist Heather Kaarakka photographs bats during winter surveys.

PARTNER RESEARCH AND NEWS

- 14 Studying WNS Survivors
- 15 Vaccine Tests Continue
- 17 Bat Guano May Hold Key to Early Detection of WNS
- 18 Mycobiome and WNS
- 19 Bat Diet Analysis Enters Final Field Season
- 20 UV Treatment of Bats
- 21 Bats of the Forest
- 22 Midwestern Collaboration to Save Bats Grows
- 23 Bat Habitat Protected in Wisconsin's Kickapoo Caverns
- 24 Record-Breaking Festival Highlights Bat-Plant Connections

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Echolocator is an annual publication of the Wisconsin Bat Program, part of the Wisconsin Department of Natural Resources Natural Heritage Conservation Program. DNR conservation biologists statewide monitor, research and inventory Wisconsin's eight bat species in collaboration with other state and federal agencies, universities, conservation groups, other non-governmental groups, and hundreds of volunteers. *Echolocator* presents bat conservation work and research relevant to Wisconsin and welcomes ideas for future articles and featured groups. Please contact Jennifer. Redell@Wisconsin.gov to share your suggestions.

Editor, Jennifer Redell
Graphic Design, Rebecca Witt

State of Wisconsin
Department of
Natural Resources
Box 7921
Madison, WI
53707



CONTRIBUTORS

Dr. Anne Ballmann is a wildlife disease specialist at the USGS-National Wildlife Health Center and has been actively involved in studying various aspects of white-nose syndrome since 2008.

Sarah Bratnober is Development Associate at Mississippi Valley Conservancy where she works to build awareness and relationships for the land trust. She brings depth of experience from her years developing strategic communications for organizations in sustainable food production and in soil and water conservation.

Kyle George has a master of science degree in biology from Eastern Michigan University with a focus on the ecology and microbiome of bats. He has been conducting field research with bats for over five years and has been a technician at the USGS-National Wildlife Health Center working on the white-nose syndrome national surveillance project since 2016.

Brian Heeringa is a wildlife biologist for the U.S. Forest Service, Chequamegon-Nicolet National Forest and Northern Research Station Institute for Applied Ecosystem Studies. He started the Chequamegon-Nicolet's bat program in 2005 and is currently working on several projects focused on habitat use and roost tree selection by northern long-eared bats and a study looking into the secondary effects of white-nose syndrome in bats of the Upper Midwest.

Dr. Kate Langwig is an assistant professor in the Department of Biological Sciences at Virginia Tech. Her research is broadly focused on ecology and evolution of infectious diseases. She addresses questions on pathogen transmission and dynamics, heterogeneity in host susceptibility and infectiousness, the impacts of pathogens on ecological communities, and the conservation and policy implications of infectious disease.

Dr. Jonathan Palmer is a research biologist at the Center for Forest Mycology Research-USDA Forest Service. He is a fungal geneticist that has worked on white-nose syndrome for the last five years. His research includes the use of classical genetics and comparative genomics to identify genes in *P. destructans* that contribute to pathogenicity.

Karen Vanderwolf arrived in Wisconsin two years ago and is a PhD student at the University of Wisconsin-Madison. She is originally from Canada and has been studying white-nose syndrome since 2009 as a research associate at the New Brunswick Museum.

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 to determine the diets of insectivorous bats in Wisconsin.

REFLECTIONS FROM

DNR Bat Program Staff

We welcome a diverse network of readers -- volunteers and scientists, state/federal/tribal/university partners, educators and coordinators. We have information FOR everyone, collected BY everyone. Since entering Wisconsin in 2014, white-nose syndrome (WNS) has spread quickly and been extremely deadly for bats in its path. As we try to keep pace with a disease that leaves but a few survivors, we continue to focus on the mission laid out by the founder of the Wisconsin Bat Program, Dave Redell.

Our main goal is to prevent extinction, monitor bat health, status, and trends, while implementing adaptive management actions to sustain or recover one of Wisconsin's greatest natural resources for the benefit of future generations.

Though white-nose syndrome can ruin even the best of days, we are still proud to share the bat research and monitoring projects in Wisconsin that continue to advance our knowledge of this wonderful group of animals while connecting with great people like you. – *J. Paul White, DNR Bat Program Lead*

We Can All Help Bats in Ways Big and Small

Right now, with bat populations severely reduced in most of our 60 surveyed hibernation sites, individual bats are important in a way they were not before—their tiny lives carry more weight on the scale of species survival. Similarly, we are each individually responsible for making choices about how we can help bats and other wildlife. We can all help in ways big and small.

- Set aside a Saturday morning before May to build or buy a bat house and put it up on your house or property.
- Reach out to get your name on our volunteer list so you can receive action alerts like the Great Wisconsin Bat Count, our call for acoustic volunteers, etc.
- Suggest and work with your local parks committee or school



Wisconsin Bat Program staff get ready to survey for bats in February 2018. Left to right: Andrew Badje, J. Paul White, Jennifer Redell and Heather Kaarakka.

shop class to build and place bat houses in your community.

- Buy an Endangered Resources license plate, which adds a \$25 annual donation to your registration fee for rare and endangered wildlife and plants, or donate directly to one of the bat funds.
- Even learning just one amazing bat fact and then sharing what we know can make a difference. Our personal infectious enthusiasm for conservation of bats will make the strongest impact.

– *Jennifer Redell, DNR Cave and Mine Specialist*

Thankful for Volunteers on the Long Road Ahead

I am constantly amazed by and thankful for the effort put forth by everyone who volunteers for the bat program, whether it be counting a roost or conducting an acoustic survey. It is truly magical to witness the excitement people have about bats and science, and I count myself very lucky to be a part of it. There is a long, hard road ahead with white-nose syndrome in the state, but thanks to your efforts, we have made great strides in preparing for the disease. Thank you. We cannot continue the program without your help and support.

– *Heather Kaarakka, DNR Roost Monitoring Coordinator*

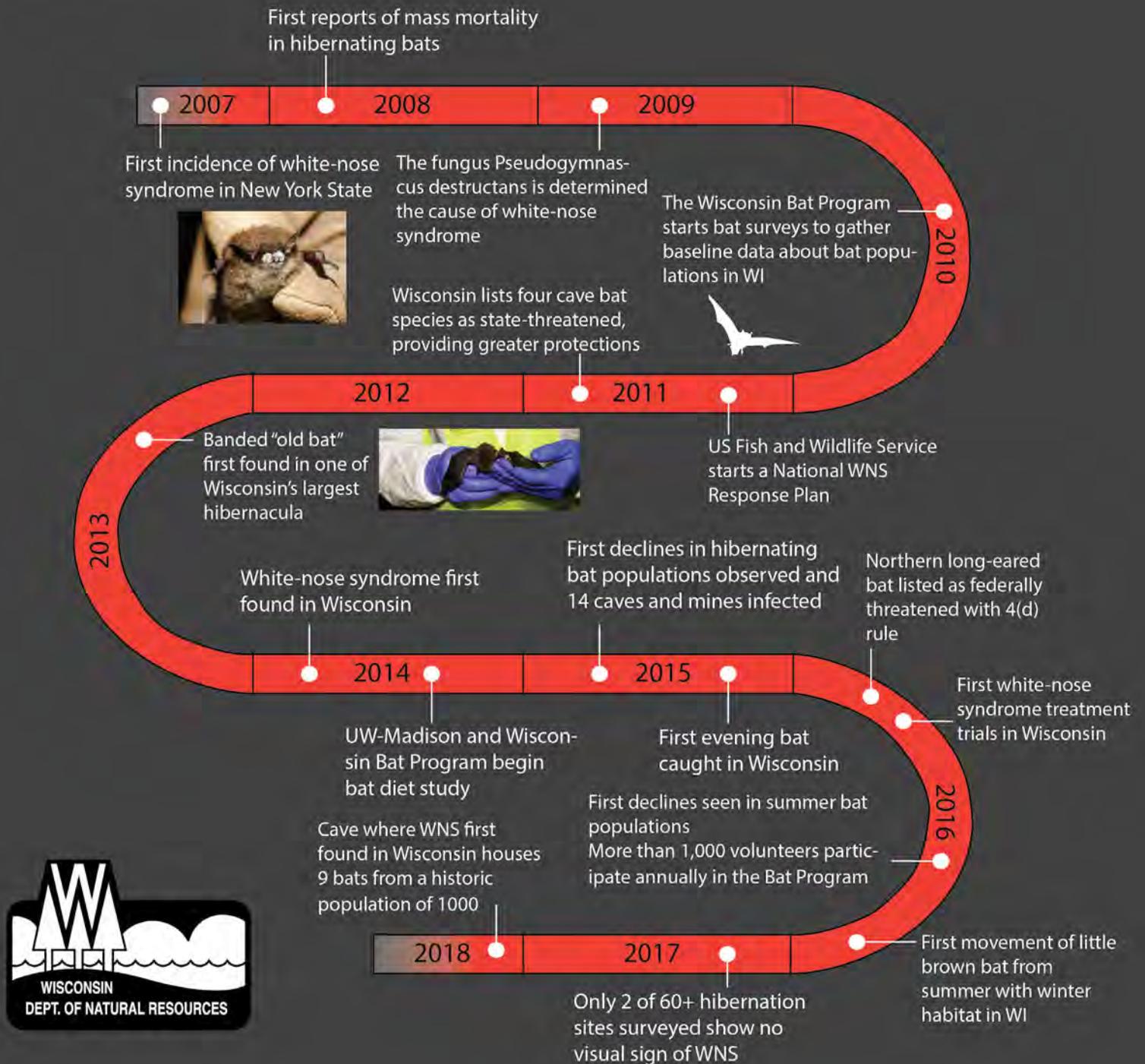
Finding Inspiration for the Future of Bats

I have seen and experienced firsthand how addicting counting bats in roosts and via acoustic devices can be -- whether it's the first survey or the 100th. Like many of you, I've saved each and every one of my 168 (and counting) acoustic maps for sentimental reasons. I get the pleasure of seeing your reactions to the 400 maps we send out each year. Some of you express your joy at recording the ever elusive northern long-eared bat, some are still committed to documenting the first Indiana Bat in Wisconsin since 1961, while others have expressed your sadness while helping us document the precipitous drop of post-WNS bat populations.

Your dedication and passion further fuels my motivation to work harder for our bats. The Wisconsin Bat Program is more than a handful of biologists betting on citizen scientists to help in our mission... It's a community of selfless and diverse "batters," all with a common goal of trying to conserve Wisconsin's bats in perpetuity. Remember that the battle to conserve our bats in Wisconsin is just beginning, and we are all needed. Keep up the inspiring work!"

– *Andrew Badje, DNR Mapping Specialist*

A Brief History of White-nose Syndrome and Bats in Wisconsin



WNS Spreads, Decimates Bats

Gear Decontamination Rules Remain In Place

By J. Paul White
DNR Bat Program Lead

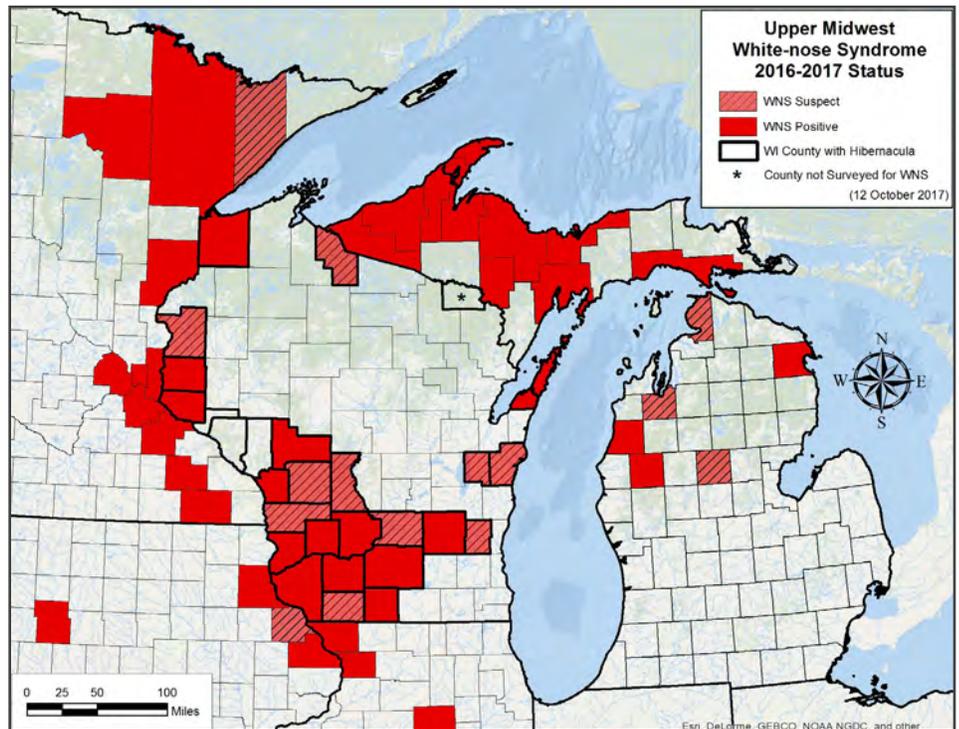
It's a hard realization to come to grips with, but white-nose syndrome is everywhere in Wisconsin. Our 2017 winter surveillance of hibernacula revealed that WNS has negatively affected most, if not all bat hibernacula in the state.

Wisconsin, now in its fifth year of infection, has seen severe declines in cave bat species with population losses ranging from 70 to 100 percent. At Wisconsin's original infection point in Grant County, the disease has decreased a once thriving hibernating bat population by 98.4 percent overall compared to the pre-WNS average population.

Hibernacula now in year 3 of infection have not fared much better, with an overall decline of 80 percent compared to the pre-WNS average. The declines reported in Wisconsin are similar to what have been reported in the disease-endemic eastern United States, with little brown bats, northern long-eared bats and eastern pipistrelles especially hard hit.

What does this mean for the future of cave bats in Wisconsin? The answer remains to be seen, but the Wisconsin Bat Program will continue to conduct WNS surveillance to assess changes resulting from the disease. Information from these efforts will prioritize research aimed to identify and protect surviving populations. We will remain vigilant in implementing biosecurity practices to minimize the human-assisted movement of the deadly bat fungus, specifically as it relates to cleaning and decontaminating exposed bat monitoring gear and equipment.

The Wisconsin Bat Program has always had an obligation to think beyond our state's borders, which was in part, why rules were put in place in 2010 to limit the movement of cave gear from one hibernaculum to



another.

Why are biosecurity measures important when WNS is widespread in Wisconsin?

1. There are other states and countries that still hold vulnerable (uninfected) hibernating bat populations which could be negatively impacted with the movement of the fungus.
2. The best available information suggests that the deadly fungus is not reproducing sexually in North America, only through clonal reproduction. However, genetically diverse populations of the fungus have been found in other locations (e.g. Europe and Asia), and if other strains of fungus were introduced into Wisconsin, the result could prove deadly to surviving populations of cave-hibernating bats.

Report Sick or Dead Bats

Wisconsin Bat Program staff would like to recognize those citizens who have reported sick or dead bat observations. Such observations are important as we monitor bat populations around the state. Public reporting of sick and/or dead bats throughout Wisconsin in 2017 confirmed the losses seen



An eastern pipistrelle infected with deadly fungus in a cave in southwest Wisconsin.

underground. We continue to encourage citizens who observe winter bat activity to report those observations to us. We are especially interested in finding banded bats which have been marked because of various research projects and could help us gain insight into the movement of these individuals and the efficacy of the research.

Please report your sick or dead bat observations here: <http://wiatri.net/Inventory/Bats/Report/>.

Acoustic Volunteers Active But Find Few Bats in 2017

By J. Paul White
DNR Bat Program Lead

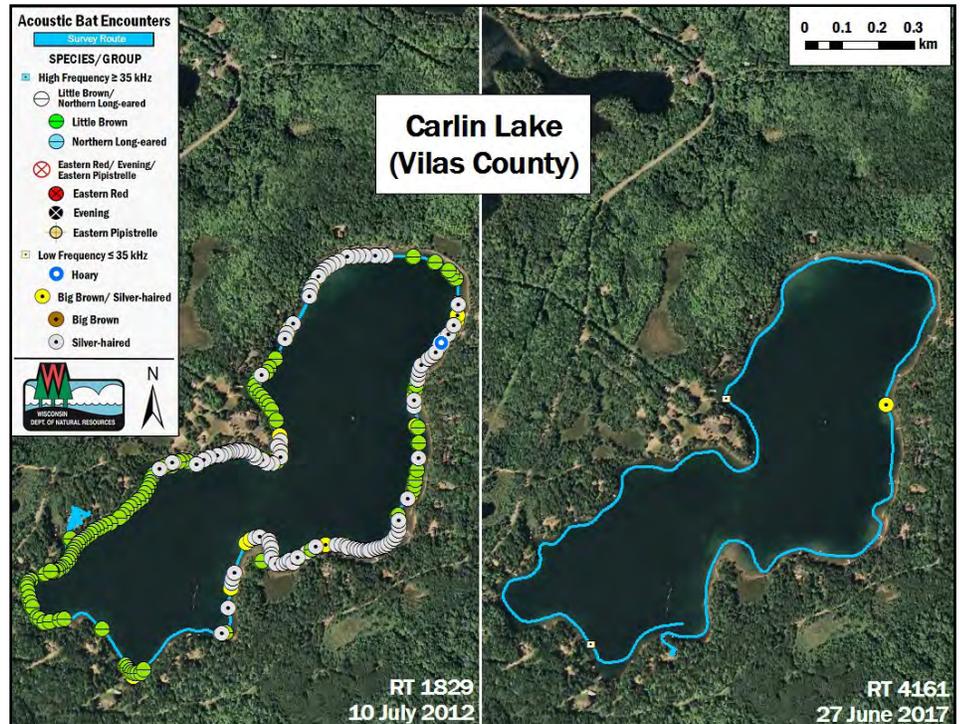
Despite the amazing effort put forth by acoustic bat monitoring volunteer in 2017, cave bat detections are down across Wisconsin due to the losses from white-nose syndrome. Many of our regional coordinators and volunteers reported noticeable declines in bat activity for routes that are regularly monitored.

There is no better example than a side-by-side comparison of survey results for Carlin Lake in Oneida County before white-nose syndrome and after. Carlin Lake used to be one of the best regions to find little brown bats due to the abundance of lakes, which little browns are closely tied-to for feeding opportunities.

In 2012, pre-WNS, there were 290 bat encounters, 48.6 percent of which were classified as little brown bats, and the relative abundance index was 200 bats per detector hour. In the same route in 2017, during the height of the summer when bat activity is usually the highest, only three bat encounters were detected (4.6 bats per detector hour), none of which were classified as little brown bats.

An important disclaimer is that bat activity can vary nightly and seasonally based on climate, reproductive condition, insect availability, moon phase and the detector used, among many other factors. However, the loss of bats as it relates to little brown activity can be attributed to WNS based on the winter losses observed in both Wisconsin and Michigan.

Surprisingly, acoustic monitoring detected little activity by other bat species, like the hoary or silver-haired bat. We have much to learn about how tree bats (eastern red bat, silver-haired bat and hoary bat) respond to the loss of cave bats. For example: Will tree bats assume a niche that was once occupied by a



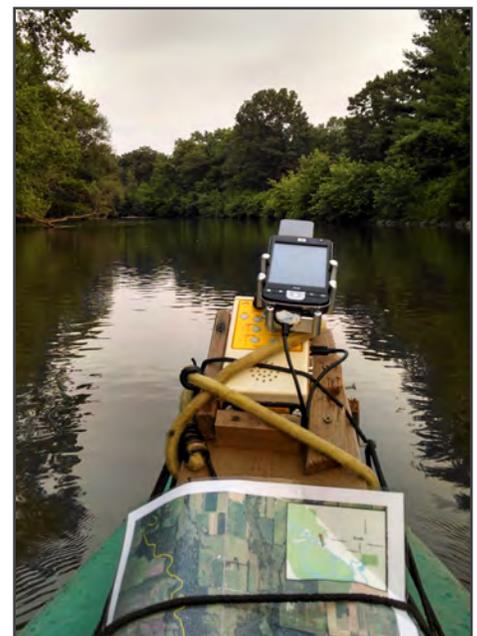
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There is no better example than a side-by-side comparison of survey results for Carlin Lake in Oneida County before white-nose syndrome and after.
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cave bat? Possibly, but there are likely morphological limitations such as body and wing size that may inhibit a larger bat species from targeting smaller insects that are now readily available. Much more to learn on that front.

One thing is for certain, it will be important to continue acoustic bat monitoring into the future to help us understand the statewide impacts of white-nose syndrome and determine the efficacy of management actions taken to conserve bat populations.

Above: Side-by-side comparison of bat survey results on the same northern Wisconsin lake before and after white-nose syndrome.

Below: An acoustic detector and map on a kayak ready for surveys on the Sugar River in Green County.

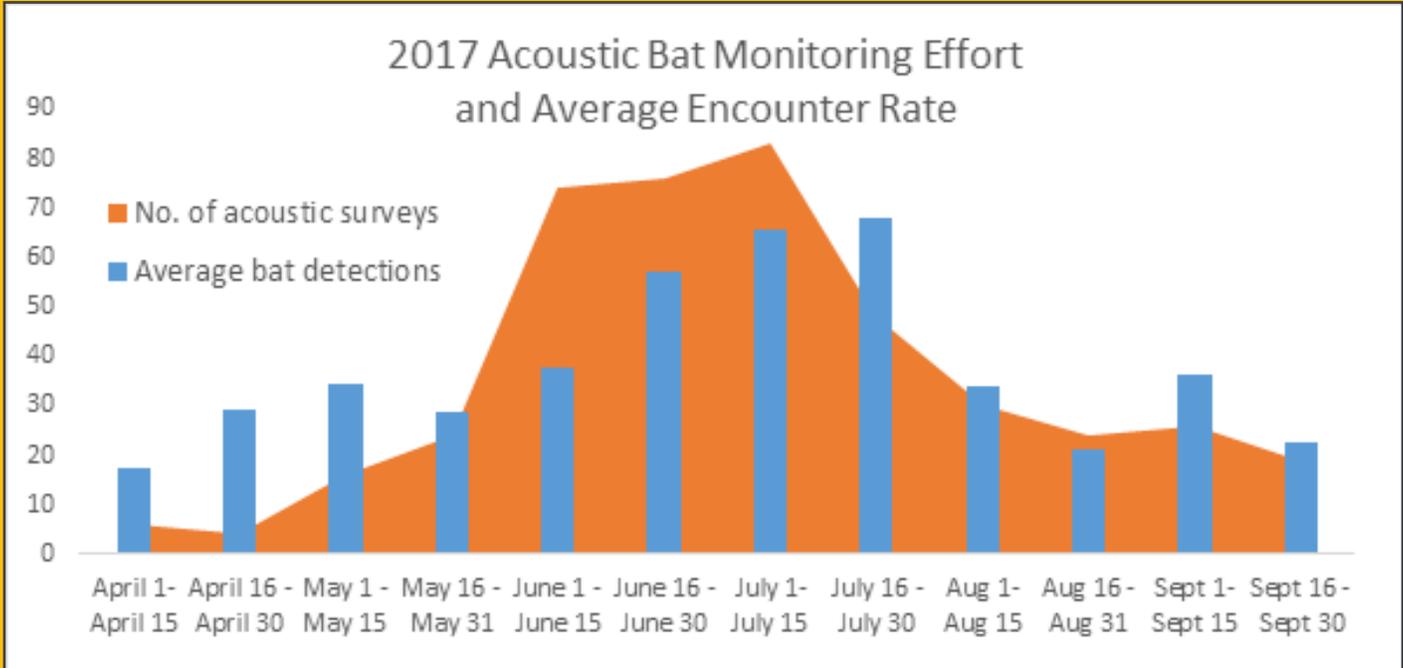
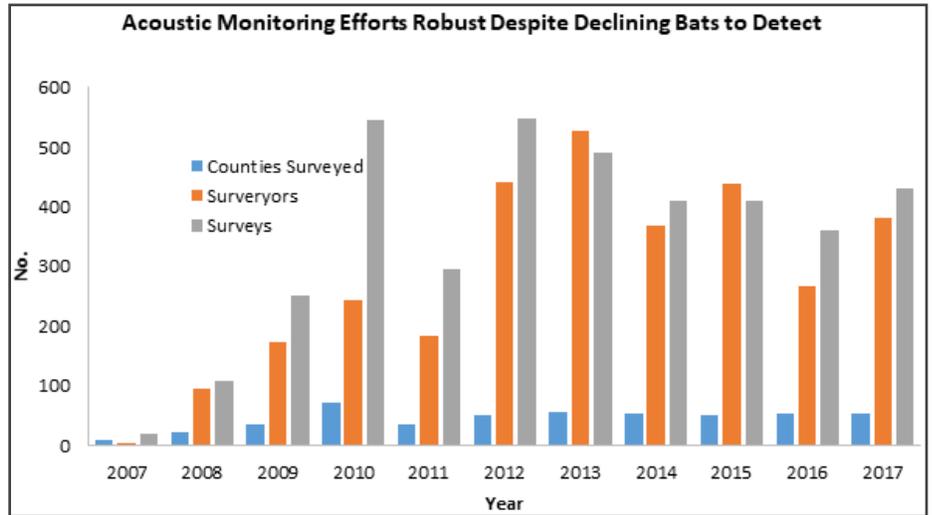


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Eastern states, like Vermont, where WNS has been present for more than a decade, have seen a consolidation of little brown bats on the summer landscape in the Champlain Valley, which has allowed Vermont Fish and Wildlife Department to target protective management and appropriately allocate resources reserved for recovery efforts.

We hope that data collected by this acoustic monitoring project will also identify surviving populations of cave bats, which will help the Wisconsin Bat Program further target bat conservation efforts.



**By The Numbers:
Bat Acoustic Monitoring**

The Wisconsin Bat Program has an amazing core of citizen scientists who take time out of their busy lives to paddle, drive or walk along set routes to search for bats. The number of volunteers and the hours they spent in the field in 2017 using acoustic detectors to record bat calls

is jaw-dropping and critical to efforts to conserve Wisconsin bats.

- 52 of 72 (72.2 percent) counties surveyed
- 430 complete acoustic surveys
- 36,949 minutes spent surveying
- 98,097 files recorded
- Most surveyed counties: Vilas (57), Racine (44) Dane (37)
- 11,449 of files identified as to a

bat species

- 39.6 percent big brown bats
- 24.8 percent little brown bats
- 16.9 percent Eastern red bats
- 15.2 percent hoary bats
- 2.3 percent silver-haired bats
- 1 percent Eastern pipistrelle bats
- 0.1 percent northern long-eared bats
- 0.1 percent evening bats



WISCONSIN *Bat Festival*

Calling All Volunteers!

We need your help to make the Wisconsin Bat Festival on Aug. 25 in Ashland a soaring success! Educators especially needed. Mark your calendars and contact Jennifer to learn more.

✉ Jennifer.Redell@Wisconsin.gov

Cave and Mine Catalogue Update

*By Jennifer Redell
Cave and Mine Specialist*

Over the past eight years Wisconsin Bat Program staff have engaged in intensive efforts to identify, monitor, research, and manage bat hibernacula—the critical winter habitat of hibernating bats.

Since the arrival in 2014 of white-nose syndrome, we've been documenting the important and tragic changes occurring beneath the surface in Wisconsin caves and mines. Wisconsin's infection status is now officially classified as within the WNS-endemic area by the U.S. Geological Survey National Wildlife Health Center. Severe declines in three species have occurred (little brown, eastern pipistrelle, northern long-eared) regionally across the eastern U.S., statewide across Wisconsin's hibernation sites and summer landscape, and within unique sites in Wisconsin.

And research is showing that bats may be changing their behavior in hibernacula due to white-nose syndrome. Collaborating researchers have documented that the optimal temperature and humidity of bats' preferred hibernating areas within a given site may differ from before the onset of white-nose syndrome. Bats may become more aggregated at fewer sites, which may lead new sites to become exceptionally important.

With these changes to the hibernating bat population, Wisconsin Bat Program staff will also change our WNS surveillance priorities. We will now focus on surveying those hibernation sites where the largest and most diverse populations survive. These sites may ultimately prove to have environmental conditions allowing for greater survival, and/or the bats found inside may have special characteristics enabling them to survive at higher rates.

Previously, we prioritized surveying hibernation sites closest to contaminated sites and those with a higher level of visitation by people including mine workers and

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We will now focus on surveying those hibernation sites where the largest and most diverse populations survive.
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recreational cavers. So this winter we will be surveying 40 to 50 sites, largely following the strategy Pennsylvania has taken, since WNS reached statewide prevalence there.

Sites were prioritized by population size, species richness, sites with historic data (for baseline comparison) and sites where there is a high likelihood we may encounter marked individuals through research projects

that were conducted directly at the site or in the vicinity (within 10 miles). Hibernation surveys began mid-January. This winter we will begin to learn about what our “new normal” will look like underground in our post-WNS world.

In order to learn more about WNS survivors we will begin to apply lightweight aluminum wing bands to accessible bats in hibernation sites where WNS has been documented for at least three years. A 2012 mid-winter banding study indicated that the presence of a band is unlikely to affect bat survival but re-sighting banded survivors in the future may help us understand why and how these individuals remain alive. Such information may help inform future conservation efforts. If you find a dead bat please check it for bands and report banded bats to our program.

DNR Bat Program staff designed and installed a bat friendly gate at a DNR-owned hibernation site in Sauk County.



More Roost Monitors Count Fewer Bats After WNS

By Heather Kaarakka
DNR Roost Monitoring Coordinator

Many volunteers counted many thousands of bats at their summer roost sites this season and for their herculean efforts, we are continually thankful. It was yet another special summer in the bat roost monitoring

By The Numbers:

Average decline in summer roost populations is around 80 percent in different areas of Wisconsin.

world! Not only did monitors count little brown bats and big brown bats emerging from their roosts, two landowners watched small

colonies of eastern pipistrelles over the summer. Eastern pipistrelles in Wisconsin 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 of bat roosting habitat and behavior around the state.

We continued the **Great Wisconsin Bat Count** for a third year and volunteers counted bats at a larger number of sites than previous years. This statewide count conducted in early June before pups are able to fly and late July after pups are flying on their own. In June this year, 1,140 big brown bats were counted at 24 sites, 5,181 little brown bats were counted at 45 sites and nine pipistrelles at one site. In late July, volunteers counted 2,905 big brown bats at 33 sites, 26 eastern pipistrelles at two sites, and 7,909 little brown bats at 41 sites! Unfortunately, counts at little brown bat sites are down about 50 percent from last year even though more sites were monitored.

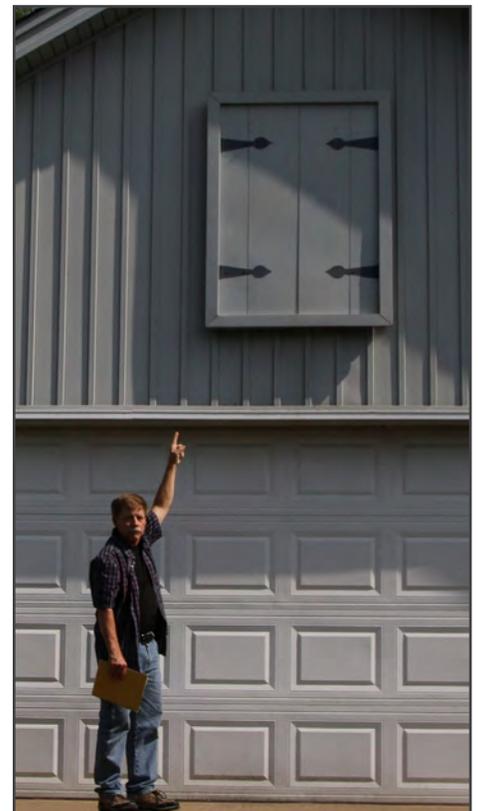
In sad news, this year's **Bat Blitz** at Yellowstone Lake State Park resulted in 392 bats in June and 661 bats in late July. This is a drop of about 80 percent from high counts in July in past years.



Volunteer reporting is helping DNR learn more about the different kinds of roosts eastern pipistrelles use, like this underside of a bridge. Volunteer Jim Edlhuber built and monitors this bat house on his Waukesha garage.

Unfortunately, summer roost sites across Wisconsin saw declines likely from white-nose syndrome. Populations at some sites in Door County have dropped almost 90 percent. Other sites in northern Wisconsin that historically have had several hundred bats now see few or no bats. And sites in southern Wisconsin saw dramatic drops of up to 85 percent. It is disheartening 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.

Read the full 2017 Roost Monitoring Report and please feel free to offer feedback. If you wish to participate in the roost project in any capacity, please contact me at Heather. Kaarakka@Wisconsin.gov. A very big thank you to everyone who reported or monitored a roost this summer!



WANTED

Help us find
**HIBERNATING
BIG BROWN
BATS**

on your land.
Check: root cellars, cold storage, basements with external access, cisterns, wells and other cave-like sites.



SEND INFORMATION TO:

Jennifer Redell

Jennifer.Redell@Wisconsin.gov

Tracking a Rare Bat During Spring Migration

*By Heather Kaarakka
DNR Roost Monitoring Coordinator*

One of the big remaining questions about bat ecology for most species in North America is the connection between their winter and summer habitat. We are one step closer to answering that question thanks to a tiny bat that led us on a 35-mile, 4-hour chase.

Four of Wisconsin's species migrate for the winter and may go as far as the southern United States and even into Central America. Traditional methods for assessing long-distance movement aren't useful for investigating shorter movements of the other four species of hibernating bats from caves and mines to summer areas. As a result, researchers rely on radio telemetry and banding for following cave bats between seasonal habitats.

In 2016, as part of the Habitat Conservation Plan being developed

for hibernating bats in forests, we set out to better understand the distances and directions eastern pipistrelles may migrate as they emerge in spring from their hibernation sites. In mid-April 2016, we attached radio transmitters to several female eastern pipistrelles at a cave in northeast Wisconsin. Unfortunately, these bats did not emerge while they were tagged so we were unable to investigate where they went.

That effort did tell us about the timing of emergence and early spring behavior of this species, however, and we used that information to guide our efforts in 2017. In May, we successfully tagged two female pipistrelles flying out of a cave in Pierce County. To track the bats as they flew, we deployed six vehicles each with a driver and a biologist using a telemetry receiver to determine the direction the bats were headed. After the tagged bats were released, they headed directly west from the cave.

The vehicles followed as best we could given we had to stay on roads while the bats could fly directly across the landscape. After about 40 minutes, we lost contact with both bats. We knew the direction they were flying so we continued westward and eventually picked up the signal again from one of the bats about 3 hours later as she flew along the St. Croix River. We followed this bat as she headed north along the river and eventually settled in a birch tree. In total, this bat flew about 25 miles directly west from the cave, and an additional 10 miles north to her roost near Hudson, Wis. It took her 3.3 hours to fly 35 miles, a speed of about 10.6 miles per hour. Pretty incredible for a bat weighing about as much as a nickel!

This small case study marks the first time this species has been tracked from winter to presumed summer habitat in North America. It would be inappropriate to make assumptions about the behavior of species from information gleaned about one individual, but the bat we tracked has helped shine a tiny light into the secretive lives of these animals. We learned a lot from bats in both 2016 and 2017 about what to expect when conducting a study like this, and we finally made one connection between where a female eastern pipistrelle spends her winter and her summer habitat. Good luck little pip; we hope to see you again this winter.



Above: Eastern pipistrelle fitted with a radio transmitter, the antenna extending from its back.



Right: Katie Luukkonen uses a hand-held antenna to get a bearing on the migrating bat.

Lake States Forest Management Bat Habitat Conservation Plan

By Sarah Herrick
DNR Conservation Biologist

Cave-hibernating bat populations in Wisconsin are in precipitous decline due to the fungal disease white-nose syndrome.

Populations are expected to continue to decline over the next several years and one or more species may be listed as federally endangered by the U.S. Fish & Wildlife Service. In anticipation of these listings, Wisconsin, Michigan, and Minnesota are developing the Lake States Forest Management Bat Habitat Conservation Plan (Lake States HCP), designed to protect federally listed bat species and ensure that forest management activities across all three states remain in compliance with the federal Endangered Species Act.

Without a habitat conservation plan, impacts to individual bats that might occur during forest management activities would be prohibited when a bat species is listed as endangered. At completion, the plan and resulting incidental take permit will ensure that forest management and related activities, such as road and trail maintenance and prescribed fire, will not jeopardize populations of northern long-eared bat (*Myotis septentrionalis*), little brown bat (*Myotis lucifugus*), and tricolored bat (*Perimyotis subflavus*), also known as the eastern pipistrelle.

The states have received federal grants to fund development of the habitat conservation plan from the U.S. Fish & Wildlife Service, and work will continue over the next two to three years. The HCP development effort is led by a steering team made up of one representative for endangered species and one for forestry from each of the three state DNRs as well



Photo Credit: Michael Kienitz
DNR conservation biologists Heather Kaarakka, left, and Katie Luukkonen, right, track radio-tagged bats during a study to understand tree bats' summer habitats.

“ **Without a habitat conservation plan, impacts to individual bats that might occur during forest management activities would be prohibited when a bat species is listed as endangered.** ”

as a representative from the federal agency. A consultant with extensive experience in this area has been contracted to develop the plan. Preliminary internal review of the early chapters has been completed and internal review of the conservation

strategy will begin in early 2018. Once each plan chapter has been reviewed internally and revised, the steering committee will seek input on the draft chapters from interested stakeholders. In addition, the U.S. Fish & Wildlife Service will put the completed draft of the entire plan out for public comment sometime in 2019.

Join the Effort

For more information, visit the Wisconsin Bat HCP Website
<http://dnr.wi.gov/topic/ForestPlanning/hcp/bats.html>

Sign up for electronic updates by contacting Wisconsin steering committee representatives:

- Sarah Herrick, DNR Natural Heritage Conservation, Sarah.Herrick@Wisconsin.gov 608-267-7689
- Mark Heyde, DNR Forestry Mark.Heyde@wisconsin.gov 608-267-0565

Outreach to Dispel the Darkness Around Bats

By Jennifer Redell
DNR Cave and Mine Specialist

Outreach and education are necessary to achieve our mission of conserving Wisconsin bats and their important role in nature and our economy. If we want to encourage public support of bat conservation, we need to help raise awareness of bats and dispel the misconceptions that often shape how many people react when they encounter a bat, whether it's in their attic, in a park or a zoo.

A telling encounter with a family at a nature center this year drove home the point. An adorable three-year-old was having her very first experience with a live bat and likely hearing the word "bat" for the first time. As I held the tiny, motionless big brown bat up, her eyes widened and her face softened and she sweetly sighed "aww!" at the same time her grandmother behind her, said "eww!"

Positive attitudes are created with positive experiences and will help prevent direct killing of threatened bats due to fear or misunderstanding. A recent study of visitors at Great Smokey Mountains National Park to bats in buildings showed that visitors were more likely to support bat conservation actions in buildings if they had a positive perception of bats. We strive to show people bats in a way that is more likely to affect a positive emotional reaction. Here are some of the measurable ways we promoted public knowledge, appreciation and stewardship of bats in 2017:

- More than 3,500 adults and students attended formal bat presentations in 15 counties.
- Bat program staff interacted with more than 5,000 individuals at outreach booths at four events, providing information and guidance about bats and bat related issues.
- Three live bat ambassadors travel with three program biologists to



Photo Credit: Drake Hokanson
Jennifer Redell teaches students from the public about bats.

“ **If we want to encourage public support of bat conservation, we need to help raise awareness of bats and dispel the misconceptions...** ”

formal presentations across the state.

- A record 2,200 adults and children attended the 2017 Wisconsin Bat Festival held August 26 at the Mitchell Park Conservancy "Domes" and 100 volunteers helped make the Festival a success.
- Thousands of people were reached through the WBP newsletter, *Echolocator*.
- \$3,400 was generated for bat funding from speaker honorariums, t-shirt sales, field trip

fees, and cash donations at bat programs. Nearly a quarter of our NHC budget comes from grants and donations like these, which the state then matches dollar for dollar.

- WBP staff worked with 20 groups including conservation clubs, scouts, and local government to place dozens of bat houses around Wisconsin and in other states.
- Tens of thousands of people across Wisconsin, neighboring states, and nationally were reached via numerous interviews with mainstream media: Wisconsin DNR press releases, radio, television, and newspaper interviews and specials featuring the WBP.
- Thousands of people visited the Wisconsin DNR bat webpages and Wisconsin Citizen-Based Monitoring bat website.
- Partners including nature centers, state parks, commercial caves, bat trunk loaner programs, etc.) provided bat education to thousands of individuals statewide.

Researchers Find Bat Species Extirpated At Several Sites, Focus on Understanding Survivors



By Kate Langwig
Virginia Tech

Research at 16 hibernation sites in Wisconsin has revealed the devastating impacts of white-nose syndrome – population decreases in most sites of 90 percent or more -- and also shed light on timing of disease impacts, differences in transmission among species, and the importance of environmental contamination of the fungus that causes white-nose syndrome.

By The Numbers:

Most white-nose bat population hibernation sites have decreased by 90 percent or more.

University of California Santa Cruz researchers Dr. Joseph Hoyt and Dr.

Kate Langwig, now both at Virginia Tech, and Dr. Marm Kilpatrick have been conducting a multi-year study on the arrival of white-nose syndrome and the impact of the disease on bat populations. Their work suggests that the fungus that causes white-nose syndrome (*Pseudogymnoascus destructans*), or Pd, is 50 percent more likely to arrive at hibernacula in midwinter than in either the fall or spring and that the fungus increases on bats and in the environment over the winter.

In the first year of white-nose syndrome detection, there is often low mortality in bat populations. However, by the second year of white-nose syndrome, the environment in hibernacula becomes very contaminated and there is high mortality in most bat species -- the little brown bat, the Eastern pipistrelle

“ In the first year of white-nose syndrome detection, there is often low mortality in bat populations. However, by the second year of white-nose syndrome, the environment in hibernacula becomes very contaminated and there is high mortality in most bat species... ”

or tri-colored bat, and the Northern long-eared bat. Unfortunately, the research has also revealed extremely severe declines at most sites. The majority of the sites have declined by at least 90 percent in tri-colored bats, Northern long-eared bats, and little brown bats. Several of the sites have experienced complete extinction of several species, and northern long-eared bats are now absent from most sites.

These researchers will continue their work in Wisconsin investigating factors that might contribute to species or population persistence. They are currently testing hypotheses about the importance of temperature, species composition, and population size in determining which individuals, species, and populations survive WNS.

Testing Vaccine Application Methods Continued in 2017



Researchers prepare to test methods for applying vaccines to bats.

Targeting Bat House, Not Bats, Shows Promise

By Heather Kaarakka
DNR Roost Monitoring Coordinator

Researchers at U.S. Geological Survey and the University of Wisconsin-Madison continue to investigate possible vaccinations for bats to prevent white-nose syndrome infections.

Part of vaccination includes determining the best methods for administering vaccines to individual bats and work in 2017 applied lessons learned the previous summer when DNR conservation biologists applied a biomarker directly to bats as they emerged from a roost.

In 2016, we captured a portion of each colony at two little brown bat roosts in Dane County and applied the topical

“ **The assumption was that the biomarker would show up in the hair follicles of the bats that ingested the biomarker, and would show up as well in bats rubbing up against or grooming the treated bats.** ”

biomarker to their fur. The assumption was that the biomarker would show up in the hair follicles of the bats that ingested the biomarker, and would show up as well in bats rubbing up against or grooming the treated bats.

We returned to the sites a week later to take hair samples from all individual bats we caught. All treated individuals had hair positive for the biomarker, but only one untreated bat was positive, indicating that little brown bats may not participate in mutual grooming as previously thought.

We also hypothesized that this method did not work well because bats were treated as they left for the evening and may have groomed the biomarker off before returning to rub it off on colony mates. This year instead of applying the biomarker as the bats left, we treated the bat house with strips of biomarker gel in the early morning before the bats returned.

At one site, about 60 percent of the bats captured had ingested the biomarker, indicating that this might be a way to vaccinate bats against WNS in summer.

Bats of Wisconsin

All of Wisconsin's bats are insectivores, using echolocation to capture as many as 1,200 insects every hour! Installing bat houses can encourage these skilled hunters to live nearby.

CAVE BATS can be considered year-round residents of Wisconsin. During warm months they may roost in trees or other outside structures, but in winter they hibernate in caves or mines (hibernacula) around Wisconsin or adjacent states, usually in large groups.

Little Brown Bats prefer to live in large colonies, where many individuals crowd together in bat houses, barns or in tree crevices. In the spring, large numbers of females will gather in maternity colonies to rear their pups.

State Threatened

Big Brown Bats are commonly seen throughout the state, especially around urban buildings, barns, and bar houses. This is a very hardy species, able to tolerate colder temperatures in a variety of roost sites.

State Threatened

Northern Long-eared Bats are named for their very long ears, which feature a pointed, symmetrical tragus (the distinctive bump or spur in the front of a bat's ear). This trait helps to distinguish them from Little Browns, which have a shorter asymmetrical tragus.

However, these bats may form small colonies and roost in hollow trees.

Tricolored Bats are Wisconsin's most common species. The long guard hairs on their wings are shaded with three distinct colors: black, brown, and white.

State Threatened

Wisconsin's Silver-haired Bats are named for the silver ticking on their dark fur. During the summer they commonly roost in tree hollows and under bark.

Silver-haired Bats are named for the silver ticking on their dark fur. During the summer they commonly roost in tree hollows and under bark.

Eastern Red Bats have bright red fur with silver ticking that contrasts with their black wings. They have very short, round ears, and appear to be fairly solitary. Males have a brighter, more burnished coat than females. These bats look for solitary summer roosts in the branches of deciduous trees such as elms, oaks, or maples.

Special Concern

Hoary Bats are the largest bats in Wisconsin, with a wingspan of up to 35 inches (90 cm). Their white-tipped fur extends down over their tail membrane and across part of the underside of the wing. These bats prefer to roost solitary in the south-facing branches of deciduous and coniferous trees in summer.

Special Concern

Evening Bats are small colonial bats and can be confused with Little Browns. However, the Evening Bat can be identified by its velvety coat and blunt tragus. Reputably its orange fur smells like burnt oranges. As eastern and southern/midwestern species, Evening Bats are rare in the northern part of their range.

New to Wisconsin 2016

White-Nose Syndrome

Pseudogymnospora destructans is a cold-loving fungus that causes a devastating bat disease called white-nose syndrome. The fungus typically grows on the bats' wings and faces during winter hibernation, giving the disease its name. The exact mechanism of mortality remains unknown, but aberrant behavior such as mid-winter flights or movement toward hibernacula entrances can contribute to the loss of precious fat reserves, causing starvation. Infected bats may also leave the hibernacula midwinter and die of exposure. Some colonies have suffered up to 100% fatality. All of Wisconsin's cave bats are susceptible to white-nose syndrome.

The disease was first observed in a New York cave in 2005. Researchers are racing to find a solution as the fungus continues to spread and threaten bat species across North America.

LITTLE BROWN BAT
Myotis lucifugus



BIG BROWN BAT
Eptesicus fuscus



NORTHERN LONG-EARED BAT
Myotis septentrionalis



TRICOLORED (EASTERN POSTER)
Perimyotis



SILVER-HAIRED BAT
Lasiurus noctivagans



EASTERN RED BAT
Lasiurus borealis



HOARY BAT
Lasiurus cinereus



EVENING BAT
Nycticeius humeralis



Bats are shown average adult life size

Created by Jacki Whisenant and Kandis Elliot © 2015 University of Wisconsin Zoological Museum

Bats drawn from specimens from the UW-Zoological Museum
DNR Bat Consultants: J. Paul White and Heather Kaarakka
See the [Wisconsin Bat Program](http://WisconsinBatProgram.org) website for more information about these bats,
and how you can help monitor Wisconsin bat populations:
wbatr.net/inventory/bats/

Artwork created by experienced biological illustrators Jacki Whisenant and Kandis Elliot and annotated by J. Paul White and Heather Kaarakka of DNR's Bat Program. Printed with archival inks on Premium Luster 260 Photo paper. 43 x 24 inches. \$30. All proceeds help purchase supplies and equipment for Museum projects and students.

ORDER ONLINE
charge.wisc.edu/zoology/items.aspx

Wisconsin's newest bat species – the evening bat, first documented in Wisconsin in 2015 – has been added to the UW Zoological Museum's archival quality poster.

Bat Guano May Hold Key to Early Detection of WNS

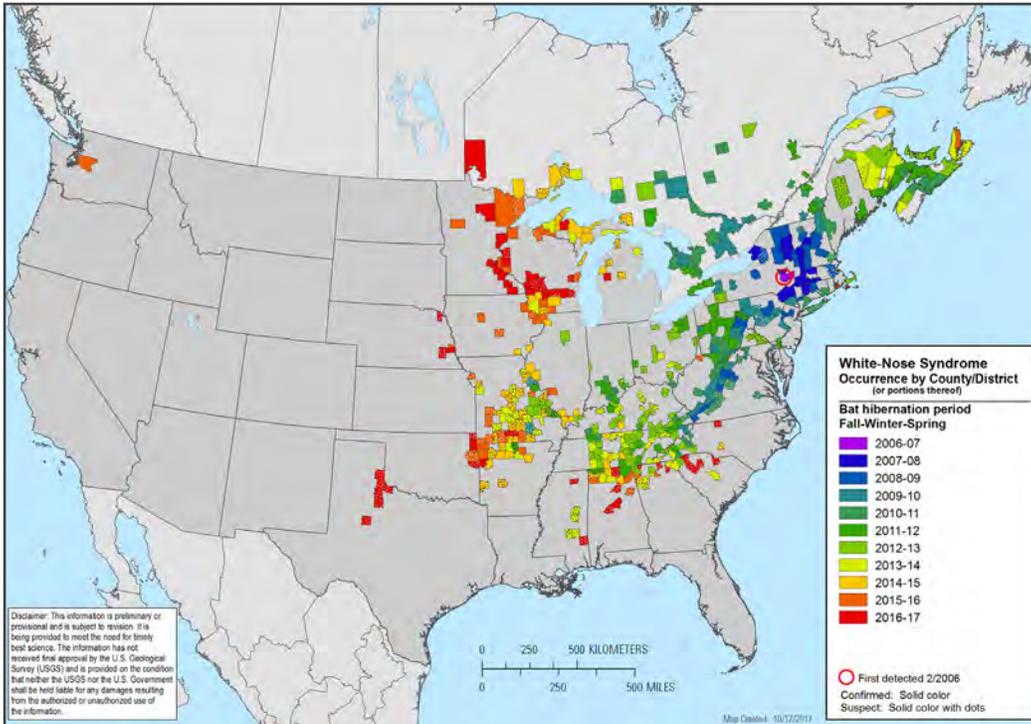


Photo Credit: USGS-NWHC
 Guano traps were deployed beneath bat boxes used by little brown bat maternity colonies.

By Kyle George and Anne Ballman
 U.S.G.S. National Wildlife
 Health Center

Since the winter of 2013-14, the U.S.G.S National Wildlife Health Center in Madison has coordinated a national surveillance project that aims to track *Pseudogymnoascus destructans* (Pd), the fungus that causes white-nose syndrome, as it continues to spread across the country and infect more bat species. To date, the fungus has been discovered in 33 states and five Canadian provinces. The first detection in the West occurred in April 2016 in Washington state, more than 750 miles from the nearest known infected site at the time in eastern Nebraska.

Surveillance strategies for the detection of Pd consist primarily of collecting swab samples from bat skin during hibernation or from their hibernation sites when bats are not available. However, hibernacula are not always accessible, and locations

where susceptible species overwinter are not always known. Alternative strategies for early detection of Pd are warranted when primary strategies are not possible.

Scientists at the National Wildlife Health Center, in coordination with DNR and the University of Wisconsin, explored using guano as a sampling strategy for Pd surveillance. This past summer, guano traps were deployed beneath bat boxes in Dane, Lafayette, and Iowa counties where three colonies of little brown bats (*Myotis lucifugus*) were known to spend their summers. Pooled guano samples from these traps were collected at weekly and monthly intervals between May and August. Additionally, mist-nets were set up outside each bat box three times throughout the summer to sample individual bats directly with the goal of determining how long after emergence from winter hibernacula the fungus could be detected in the bat population by the different sampling methods.

Molecular analyses detected the presence of Pd DNA in skin swabs and guano from individual bats captured at each of the three roost sites as long as 15 weeks post-hibernation. Genetic material from Pd also was detected from pooled guano collected from each roost and at almost every time point through the summer. One source of continued Pd exposure for bats in the summer appeared to be the bat boxes themselves. However, this finding does not necessarily equate to the presence of living fungus.

Cultures of pooled guano and environmental swabs from bat boxes are being monitored for growth of Pd, which will inform researchers as to whether viable spores or conidia were present at these sites during the summer. Further analysis of the data is ongoing and guidance for biologists on how to utilize pooled guano as a sampling strategy is still being developed.

Research Probes Why Some Bats Survive WNS Better Than Others



By Karen Vanderwolf
University of Wisconsin-Madison

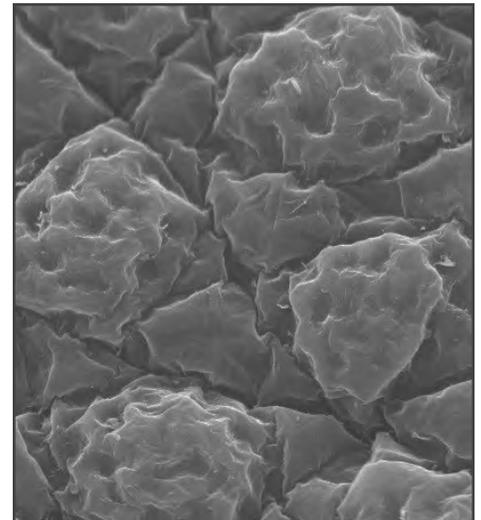
Why some bat species, such as big brown bats, experience lower mortality rates due to white-nose syndrome compared to other bat species, such as little brown bats and tricolored bats, is still an unanswered question. Researchers are exploring multiple hypotheses to explain this pattern, such as differences in the immune systems or physiologies of different bat species.

My project is focusing on the fungi found on the wing surface of bats and whether this mycobiome is associated with resistance to white-nose syndrome. One method for documenting the mycobiome is to use scanning electron microscopy to take close-up pictures of bats wings. We took small samples of bat wings last spring from three different species and found that big brown bats have yeast on their wings while little brown

bats and tricolored bats have none. If the presence of yeast on bat wings really does confer resistance to white-nose syndrome, this may lead to a treatment for the disease to lower the mortality of bats in the wild.

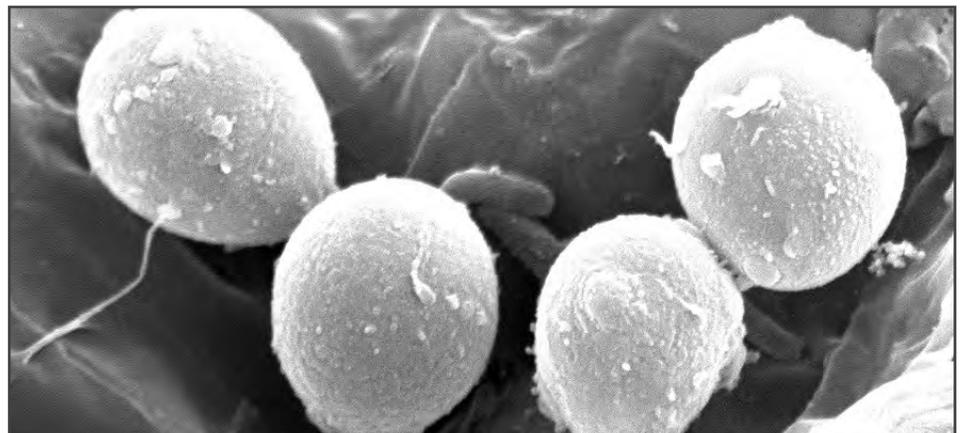
This project is funded by the U.S. Fish & Wildlife Service and in 2018 we will be using scanning electron microscopy to visualize the wings of additional bat species and expand our sample size.

“ Researchers are exploring multiple hypotheses to explain this pattern, such as differences in the immune systems or physiologies of different bat species. ”



Above: The bare surface of an eastern pipistrelle bat, also known as a tricolored bat.

Below: Yeast cells on wing surface of a big brown bat.



Bat Diet Analysis Enters Final Field Season



*Photo Credit: Amy Wray
Research assistant Jade Kochanski
collects bat guano.*

*By Amy K. Wray
University of Wisconsin-Madison*

Thinking of ecologically important predators often brings to mind classic examples such as the gray wolves in Yellowstone, orcas in the Pacific, or jaguars in Panama. However, despite their small size and mysterious habits, bats also have a profound effect on the communities of insect prey that they consume. As white-nose syndrome wreaks havoc across North American landscapes, what will happen to insect communities after bat predators are no longer around?

All eight of Wisconsin's bat species consume insects, but details about changes in their diets related to time of year, landscape conditions, and relative insect abundance remain largely unknown. Some previous studies investigated bat diets by dissecting bat guano pellets or bat stomachs and identifying insect remains. However, these studies often missed soft-bodied insects that were already too degraded by bat digestion. More recent research efforts have started searching not for insect legs, wings, and antennae left behind, but rather, the DNA sequences that even digested material leaves behind in bat guano. However, even these methods have their limitations, as DNA can



become degraded and difficult to detect.

Why is DNA sequencing still difficult for determining bat prey? Imagine you work at a copy store, and a customer brings you 30 different documents. They want 100 copies of each unique document, for a total of 3,000 copies. Maybe you are distracted (probably thinking about how cute bats are), so instead of systematically copying each unique document, you randomly choose ones out of the stack and put them right back into the same stack. You repeat the process over and over again with each round of copies, until there are 3,000 total copies. Simply by random chance, whichever documents you selected early on in this process is more likely to have more copies in the final stack. Due to probability alone, it is unlikely that you will end up with exactly 100 copies of 30 different

Do Bats Really Eat Mosquitoes?

Our research analyzing bat guano collected at sites across Wisconsin with the help of citizen scientists is confirming that yes, bats frequently eat mosquitoes and a great variety of them.

- Bats consumed 17 distinct types of mosquitoes based on DNA evidence
- 9 of the mosquito species are those known to carry West Nile virus
- Little brown bats consumed all 17 types of mosquitoes
- Big brown bats consumed 8 types of mosquitoes
- Samples from little brown bat roosts in the early summer had the highest incidence of mosquitoes in bat guano (81 percent)
- The number of samples with at least one mosquito detected and the number of mosquito types detected are higher than previously shown.

documents that were requested. Now imagine that some of the documents were easier to pick up, or a larger size, or that some were crumpled and you couldn't easily make a nice copy so you just chose another one instead. DNA amplification — the process of making DNA copies — works in a similar way. Some sequences are over-represented due to sheer luck, and others because they were just easier to copy in the first place. Because of this, and especially because the DNA in bat guano is already degraded in the first place, diet studies using DNA sequencing can be difficult because it is very hard to overcome the biases that are inherent to these molecular methods. However, this does not mean that using DNA for diet studies is not useful! Quite the opposite — these

Continued on pg. 20

Continued from pg. 6

methods have allowed us to detect and identify, even at the species level, thousands of insect (and sometimes even spider) species that bats eat. Researchers from variety of fields have also been making improvements for these methods.

Researchers at the US Forest Service Northern Research Station Center for Forest Mycology Research and UW-Madison have recently developed an improved method for using DNA sequencing to determine the diets of insectivorous animals. This research paper is currently under review for publication, and can also be found online at PeerJ Preprints (<https://peerj.com/preprints/3184/>).

But why do we need to know what the bats are eating? Well, because characterizing their diet is the first among many steps to understanding how the spread of White-nose syndrome might affect insects — and particularly, agricultural and forest pests — so that we can better understand and appreciate the role of bats in the ecosystem. To detect changes in insect communities, we have an ongoing study at 20 sites

throughout Wisconsin, including state parks, county parks, and privately-owned land. With the help of UW undergraduates and alumni, especially lab and field technician Jade Kochanski, we identified and counted 1,648,602 (yes, more than a million!) insect specimens from the 2015-2017 field seasons. Currently, ongoing analyses associating these insect data with corresponding bat diet information, bat acoustic surveys, and landscape composition at each site are being conducted in order to estimate how insect populations change over the summer and as bats decline across Wisconsin.

As we continue to analyze these huge amounts of valuable data, our team is also currently preparing for the fourth and final field season in the summer of 2018. This project relies heavily on support from citizen scientists all over the state, including those who collect guano samples, participate in bat counts, and of course the private landowners who allow me and my collaborators to set up our insect traps and collect bat guano on their land.

I am always excited to interact with the many people who are involved with this project, other research efforts



A beautiful Cecropia moth, the largest native moth in North America, was captured in one of our blacklight traps.

about bats, and everyone in general who is interested in bats, bugs, or science in any way!

The information that will ultimately result from this project will reveal so much about the natural history of bats, while also allowing us to better appreciate the economically valuable services that these amazing animals do for us in Wisconsin and beyond.

Promising UV Treatment to Kill WNS Takes the Next Step

*By Dr. Jonathan Palmer
U.S. Forest Service Forest
Products Laboratory*

This winter Wisconsin researchers and their partners take the next step in testing their promising treatment to kill the fungus causing white-nose syndrome in bats.

New research published in Nature Communications shows that the fungus causing white-nose syndrome of bats, *Pseudogymnoascus destructans* (Pd), is extremely sensitive to ultra-violet light (UV light). The fungus was shown to be

killed by treatment with UV light (254 nanometer wavelength, also referred to as UV-C light), while closely related cave fungi are able to withstand similar exposures.

The authors show that Pd is highly sensitive to UV-C light because it is missing a key enzyme in a DNA damage repair pathway, thus the fungus is unable to grow because it cannot repair the UV-damaged DNA.

This exciting discovery has potential to be used as a field-based treatment option, as the fungus is killed with only a few seconds of exposure to UV

light. This foundational research has led to a new study being conducted this hibernation season of treating white-nose infected bats with UV-C light. Since very little is known about how bats will respond to UV-C light, the current study is being conducted in the lab so that researchers can monitor the bats 24 hours a day and seven days a week and determine if UV-C light is a potential treatment option. The study is a collaborative effort between scientists at the U.S. Forest Service in Madison, Wis., the Wisconsin DNR, and Bucknell University in Pennsylvania.

Bats of the Forest

By Brian Heeringa
U.S. Forest Service

U.S. Forest Service Chequamegon-Nicolet National Forest researchers have continued to survey for bats across the national forest and assist the Forest Service Northern Research Station with research into

the secondary effects of white-nose syndrome. Collaboration with the Wisconsin Department of Natural Resources

By The Numbers:

About 80 bat houses have been installed with the help of outside organizations.

Bat Program continues with the overall goal of sharing data and better understanding what bats are doing across the state.

In 2017, national forest staff worked with partners and volunteers on projects including collecting acoustic information, collecting genetic samples, evaluating buildings for the presence of protected bat species, monitoring bat boxes and bat roosts, and providing more than 20 environmental outreach programs.

Changing Methods to Better Reveal Bat Trends

Since 2009, the Chequamegon-Nicolet National Forest has run 12 long-term mobile acoustic transects as part of a larger effort by national forests and tall grass prairie in the service's Eastern Region. These transects are vitally important for monitoring and tracking bat activity and habitat use across the landscape at a "local" level as well as at the larger state and regional level.

Results from our 12 transects have documented changes in bat activity at Chequamegon-Nicolet National Forest since white-nose syndrome was first detected in Wisconsin in 2014. We will continue to collect data from these original 12 routes through the 2020 season, but we are also transitioning to a new survey and monitoring methodology in 2018. That methodology is called the North American Bat Monitoring Program, (NABAT) and the Chequamegon

“**Results from our 12 transects have documented changes in bat activity at Chequamegon-Nicolet National Forest since white-nose syndrome was first detected in Wisconsin in 2014.**”

Nicolet National Forest and the Northern Research Station started collecting data under the NABAT program in 2015 as part of a collaborative research project.

This survey protocols are being used by many state, federal, and international agencies to support local to range-wide inferences about trends in bat populations and abundances in response to stressors such as WNS and habitat loss. As well, NABAT will provide managers and policy makers with critical information needed to effectively manage bat populations, detect early warning signs of population declines, and other risks. Northern long-eared bat protections in place at Chequamegon-Nicolet Forest

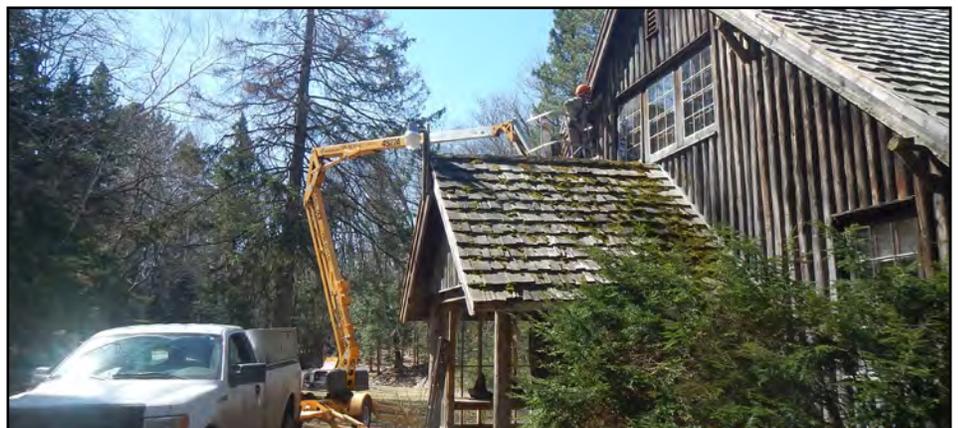
As part of the federal listing of the northern long-eared bat as a Threatened Species under the Endangered Species Act, the U.S. Forest Service Eastern Region has

several conservation measures in place to reduce potential impacts to NLEB and mitigate any adverse effects of management actions.

One measure requires our staff to inspect any buildings or structures that may provide roosting habitat for northern long-eared bat before activities that may impact the bats such as demolition, renovations, etc. If bats are determined to be using the structure(s), properly timed humane exclusion methods are used to keep the bats out and alternative roosting structures, such as bat houses, are provided.

In 2017, forest personnel inspected more than 10 structures and safely excluded bats from them. Follow up monitoring has shown success in keeping the bats out of the structures and occupancy of the installed bat houses. In addition, numerous other bat houses have been installed across the national forest and surrounding communities to provide safe roosting sites for bats and an opportunity to educate people about the importance of bats. Working with girl scout troops, 4-H organizations, tribes, local municipalities, and other groups, nearly 80 bat houses have been installed.

Looking ahead to 2018, the Chequamegon-Nicolet National Forest will continue to work with our federal, tribal and state partners to ensure we are doing everything we can to protect these amazing flying mammals. Without bats our lives would be vastly different and not nearly as interesting.



Forest service staff inspected structures and safely excluded bats from them.

Midwestern Collaboration to Save Bats Grows



The midwestern collaboration to save bats continued to grow in 2017 as the 9th Annual Midwest Bat Working Group meeting in Madison, Wis., attracted a record

number of participants dedicated to working across regional lines to conserve bats at risk from white-nose syndrome.

Organization members and other attendees at the April meeting hosted by the Wisconsin Department of Natural Resources represented various government agencies, universities, non-profit organizations, consulting firms, and others.

Members toured the U.S.G.S. National Wildlife Health Center facility in Madison, heard regional and national updates on the disease, and learned the latest research results on topics including habitat and roost use, effects of various timber harvest techniques, diet and prey selection, acoustics, and the influence of mining on bats. Participants also heard updates from state representatives attending, and the National Wildlife Health Center researchers reported more details on the sudden appearance of WNS in Washington state.

Two hundred bat enthusiasts gathered in Madison, Wis., for the Midwest Bat Working Group meeting.

Midwest Bat Working Group's Annual Meeting Notes

Scott Johnson of the Indiana Department of Natural Resources was honored for his decades of bat conservation work with the Indiana Department of Natural Resources. Johnson received the Dave Redell Lifetime Achievement Award honoring those who have demonstrated an exemplary, long-term commitment to promoting and preserving bats in the Midwest through research, conservation, and education. Johnson's achievements covered all aspects of bat conservation: science, management, protection and public education. Scott also served three years on the Midwest Bat Working Group's board of directors.

Members also elected the board of directors and other officers for the next year. They are:

- *President:* Rob Mies, Organization for Bat Conservation
- *Treasurer:* Brienne Walters, Indiana State University (ISU) Center for Bat Research, Outreach, and Conservation
- *Vice President:* Jennifer Norris, Ohio DNR



Scott Johnson, Indiana DNR, examining hibernating bats.

- *Secretary:* Marne Titchenell, the Ohio State University
- *Directors:* Tim Carter, Ball State University; Allen Kurta, Eastern Michigan University; Kari Kirschbaum, U.S. Forest Service; J. Paul White, Wisconsin DNR; Vanessa Rojas, ISU Center for Bat Research, Outreach, and Conservation; Brian Heeringa, U.S. Forest Service; Joe Kath, Illinois DNR.
- *Student Representative:* Tim Divoll, ISU Center for Bat Research, Outreach, and Conservation

Bat Habitat Protected in Wisconsin's Kickapoo Caverns



*By Sarah Bratnober
Mississippi Valley Conservancy*

Culminating a year-long fundraising campaign, Mississippi Valley Conservancy recently completed its successful acquisition of the Kickapoo Caverns near Wauzeka in Crawford County. The 83-acre property is home to one of Wisconsin's longest natural cavern systems and is now dedicated to protecting bat habitat.

Home to three bat species, the stunning limestone cavern system includes an underground river, numerous 60-foot-high cathedral-like chambers, and beautifully-colored ribbon stalactites. Surveys conducted by Wisconsin Bat Program biologists had identified the cavern as a significant hibernaculum for two state-threatened bat species, the little brown bat and the eastern pipistrelle, and one federally-listed threatened bat species, the northern long-eared

bat. The Conservancy intends to manage the property specifically for the protection of the bats, including closing the cave to tours during bat hibernation season.

The previous owners developed walking paths and electrical wiring to provide access to the cave as a tourism and education destination. These features now provide the Conservancy with an ideal opportunity for outreach, education, and a secure location for long-term research and study.

Other than the actual cavern, the property will be open to the public year-round for hiking, cross-country skiing, bird-watching, hunting and outdoor recreational activities. Guided hikes, volunteer work days, and other events will be offered to welcome all ages to experience and enjoy the site. The Mississippi Valley Conservancy is a nationally accredited regional land

trust that has permanently protected more than 18,500 acres of scenic lands in southwestern Wisconsin by working with private landowners, businesses and local communities on voluntary conservation projects.

Save the Date!

Nature lovers of all ages are invited to attend "Family Bat Fest" on July 21, 2018. Activities will highlight the history of the cave, the role of bats in nature, and the need to protect bats. The event is part of the Conservancy's "Linked to the Land" series, sponsored by Mayo Clinic Health System.

To sign up for email updates about the Conservancy and opportunities to tour Kickapoo Caverns, including Family Bat Fest, visit: mississippivalleyconservancy.org.

Record-Breaking Festival Highlights Bat-Plant Connections

By Jennifer Redell
DNR Cave and Mine Specialist

Live bats and the live plants they benefit were highlighted at the 2017 Wisconsin Bat Festival at Milwaukee's Mitchell Park Conservancy in August and helped draw a record crowd of 2,200 people.

By The Numbers:

More than 100 agency and academic staff and citizen volunteers helped host the 2017 Wisconsin Bat Festival.

The event was held for the first time at the Conservancy, better known as "The

Domes," and volunteers led bat-plant tours of the large-scale greenhouses which included tropical plants closely linked to bats.

Bats and plants go together, and one of the closest human ties to bats is through food. Worldwide, bats help pollinate, disperse, protect, and fertilize the plants harvested for food and other products. Bats benefit the commercial production of corn, bananas, peaches, durian, cloves, carob, balsa wood, and agave (tequila).

The Wisconsin Bat Festival celebrates bats' important roles in our world and highlights bat conservation efforts across Wisconsin. The day-long event features live bat programs and live bat exhibits, bat themed crafts and games for kids, a 70-foot inflatable cave kids can crawl through using headlamps to light the way, bat house building, educational exhibits, and hands-on science activities.

More than 100 dedicated and enthusiastic agency and academic staff and citizen volunteers came together to help host the more than 25 hands-on activities, eight live bat talks, guided bat-plant tours, and 12 science talks throughout the day.

An afternoon Science Symposium featured topics including volunteer



“ **The Wisconsin Bat Festival celebrates bats' important roles in our world and highlights bat conservation efforts across Wisconsin.** ”

bat monitoring, rabies, white-nose syndrome management and research, and cave research and protection. More than 100 people stayed around to watch DNR bat biologists demonstrate field techniques for studying bats at night.

The 2017 Wisconsin Bat Festival was presented by the Wisconsin Department of Natural Resources and Organization for Bat Conservation and hosted by Milwaukee County Parks. Presenters and exhibitors included the U.S. Geological Survey National Wildlife Health Center, Wisconsin Geological & Natural History Survey,



Mississippi Valley Conservancy, University of Wisconsin-Stevens Point, UW-Platteville and UW-Madison.

This event would not have been possible without the assistance of all of our exhibitors, symposium speakers, agency staff, and volunteers. Thank you! And a special thanks to our sponsors: U.S. Fish and Wildlife Service, U.S. Forest Service, Wisconsin DNR Bat Program, General Motors, Squid Communications, Wildlife Acoustics and U-Haul.



WISCONSIN *Bat Festival*

August 25, 2018 - Ashland, WI
Northern Great Lakes Visitor Center



WISCONSIN
BAT PROGRAM



**HELP BATS NOW
& IN THE FUTURE**

**DONATE TO OUR IMMEDIATE NEEDS FUND
TO HELP SURVIVORS OF WHITE NOSE SYNDROME.**