

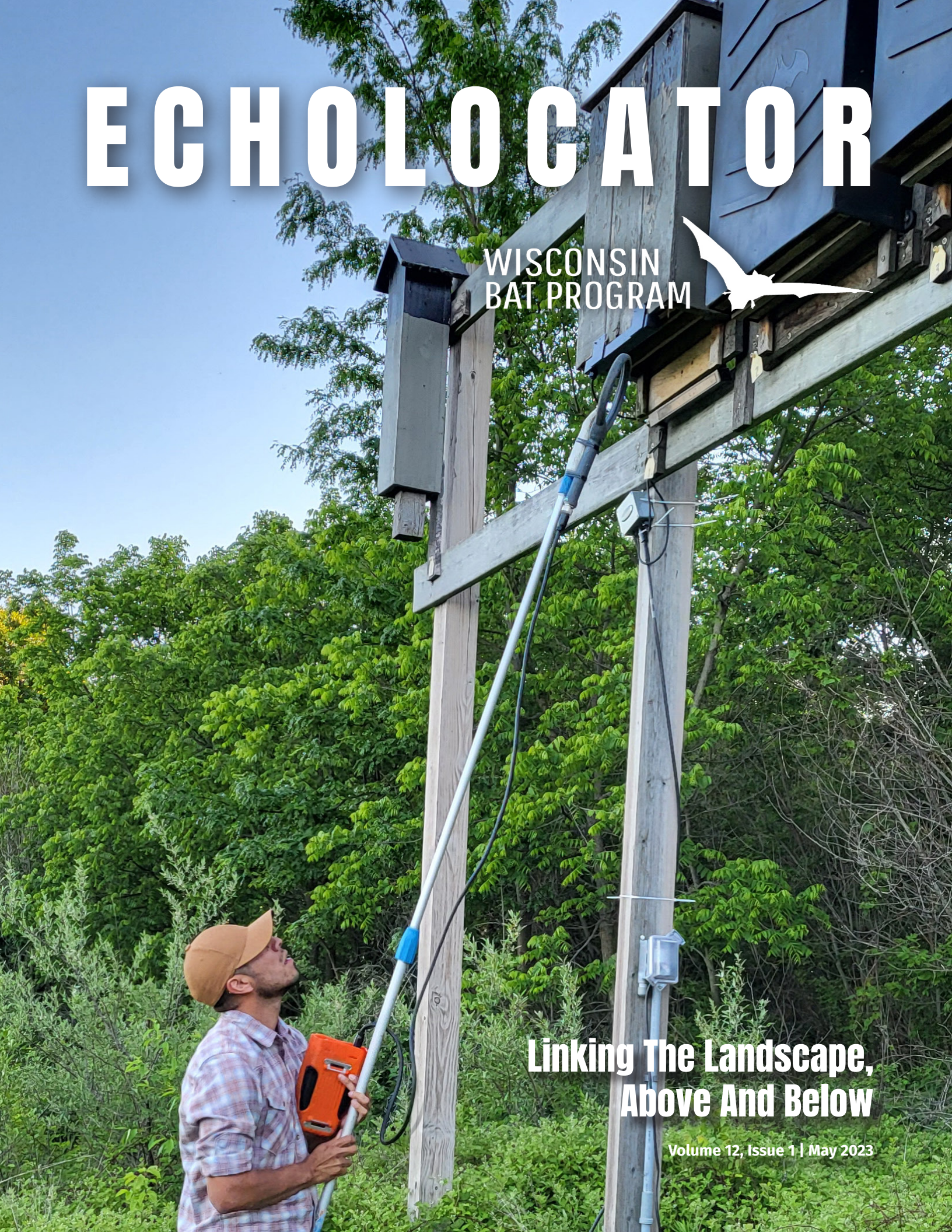
ECHOLOGATOR

WISCONSIN
BAT PROGRAM



Linking The Landscape,
Above And Below

Volume 12, Issue 1 | May 2023



Greetings To Our Partners In Bat Conservation!

We are incredibly grateful to all our conservation and outreach partners across Wisconsin for your hard work to protect Wisconsin's eight bat species, their habitats, and to connect others to bats!

As we begin 2023, we wanted to reflect on what we accomplished together during the previous year:

- In 2022, the Wisconsin Bat Program partnered with more than 35 organizations across

the state, working to collect thousands of points of data, publish findings, and reach thousands of people as part of bat conservation, research, and education projects.

- We made meaningful progress towards our bat conservation goals, from supporting the efforts of partner organizations to protecting bat habitat and teaching the public, to completion of a the Lake States

Forest Management Bat Habitat Conservation Plan that will help ensure bats continue to have the forest resources they rely on.

Whether you paddled an acoustic route, reported a bat roost, or were simply a positive voice that spoke up for bats, thank you for all that you do for Wisconsin bats, and we look forward to partnering with you in 2023!

Roost Monitoring Update

The Summer Bat Roost Monitoring Project had a successful 12th season in 2022! Our 235 volunteer roost monitors set eyes on and recorded more than 19,000 bats emerging from 173 roost locations across the state during 600 emergence surveys! If that weren't enough, 21 new roosts were reported in 2022! Check out the annual [Roost Monitoring Report](#) for all the details.


Cover Photo: Summer Conservation Intern Edgar Flores Gomez scans for tagged bats at a bat house using a handheld reader (orange) with an antenna at the end of a pole. This bat house also has a stationary reader which records tagged bats that fly over the antenna (black bar on bottom of box). Read about the exciting preliminary results of this project in this issue's featured story. Photo by Heather Kaarakka

621 surveys
were completed in 2022, counting
19,821 bats

Wisconsin Bat Program | Wisconsin Department of Natural Resources

Roost Monitoring Report

2022

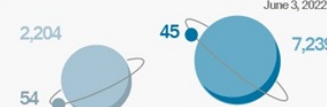


Great Wisconsin Bat Count

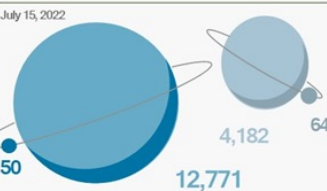
The goal was to count as many roosts as possible in a single weekend, now in its 8th year.

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

June 3, 2022

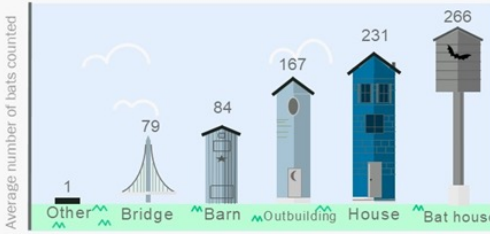


July 15, 2022



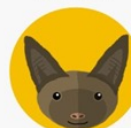
Bat houses, houses draw bat crowds

In 2022, bat houses and houses housed the largest numbers of little brown bats.



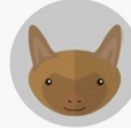
Meet a couple of our bat species

Two bats that sometimes use artificial roosts in Wisconsin are the northern long-eared bat and tricolored bat



Northern long-eared bat
Myotis septentrionalis

This rare bat usually roosts in dead trees in summer but is sometimes found in buildings. In winter they hibernate in caves and mines and are heavily impacted by white-nose syndrome

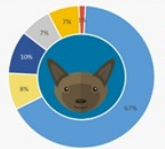


Tricolored bat
Perimyotis subflavus


This little bat likes to eat caddisflies and beetles, and roosts in leaf clusters or open areas of buildings. In winter, tricolored bats hibernate in caves and mines

Where do bats live?

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



Little Brown
72 roosts



Big Brown
86 roosts

235 volunteers reached for their clicker-counters to help count bats this 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, called pups.

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.

Help survey bats!

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

Contact Heather at heather.kaarakka@wisconsin.gov or visit wisnr.net/inventory/bats

Infographic by Heather Kaarakka

Number of roosts counted in 2022

Little Brown Bat **72**

Big Brown Bat **86**

Linking The Landscape, Above And Below - The Passive Integrated Transponder (PIT) Tag Project

Tracking bats across time and space is difficult, but important because it helps us better understand aspects of their biology such as when they are using critical habitats and the connections between summer and winter habitat. For example, where are bats that are persisting in summer colonies hibernating and surviving white-nose syndrome infection? One way to mark bats to track individuals involves attaching a passive integrated transponder (PIT) tag to them, similar to microchips used to identify pets. Specialized PIT tag readers can scan bats for tags and record the date and time those tags are encountered. We use both hand-held readers that we can take to different sites to record tags, as well as stationary readers which continuously scan for tagged bats as they fly through the entrance to a bat house or an underground hibernation site.

Recently the WI Bat Program has collaborated with USGS National Wildlife Health Center and Virginia Tech University to install stationary PIT tag readers at five little brown bat summer roost sites and three important hibernacula. Each stationary reader records thousands of tag encounters over the year as bats fly over and through the antennas. And from these encounters we've recorded amazing behaviors including the first movements of little brown bats from summer to winter habitat (and back!) in Wisconsin, and never-before observed repeated movements by female bats between the two habitats in late summer!

Thanks to this network of PIT tagged bats and PIT readers we've recorded seven little brown bats moving from summer to winter habitat, flying anywhere from 30 to 160 miles! We've also recorded three tagged little brown bats moving among summer



*Setting up a PIT tag scanning antenna at a bat maternity roost in early spring before bats arrive for the summer.
Photo by J. Paul White*

roost sites, usually in spring and fall as they migrate. These summer roosts are sometimes many miles apart (40 miles in one case) suggesting that little brown bats are aware of many suitable summer roosts in their region.

With continued tagging and scanning, we stand to learn much more about little brown bat movements and survival in Wisconsin!

Underground Update

Thankfully, despite the arrival of the ninth winter of white-nose syndrome (WNS), we tallied up thousands of hibernating bats during 54 site visits by staff, university, and federal agency partners as part of the 2021-2022 hibernation season. Although two of Wisconsin's largest surveyed sites remain reduced 74% and 70% from their pre-WNS mean both population censuses represent the highest counts since 2018! The 2022 survey season marked the seventh year of infection for each site. We continue to focus on understanding survivorship, immigration/emigration and site fidelity. To this end, and in cooperation with our partners at Virginia Tech University, we banded and PIT-tagged over 1,000 bats in 2022 funding cycle.

Plans Advance for the Stewart Tunnel

The Stewart Tunnel on the Badger State Trail is an important bat hibernaculum long visited and valued for its historic importance and ambience by trail users and local communities. The tunnel was closed in 2019 when loose and falling rocks from the ceiling and side walls inside the tunnel became a safety concern. There was a need to see if the site could be stabilized in a way that would allow it to remain open to both people and bats, so after consultation with our program and with various trail user groups, a draft [Stewart Tunnel](#)

[Alternatives Analysis](#) was developed to lay out possible solutions. After a public input period, Alternative 4 – Corrugated Metal Pipe Lining was recommended because it would provide a long-term solution for ensuring safe, year-round access to the tunnel for recreational purposes while also preserving a separate upper tunnel space for bats to hibernate. This type of tunnel re-line has been used successfully for the same purpose at the [Poe Paddy Tunnel](#) in Pennsylvania, where trail users may access the tunnel year-round and where hibernating bat numbers and species diversity increased after the project was completed.

Horseshoe Bay Cave Project

Caves are mysterious to many, but Door County Parks offers a way for the public to experience a wild cave and bat hibernaculum in its most natural state. Horseshoe Bay Cave (HSB Cave) at Murphy County Park is one of the longest caves in the state and is the largest known natural cave bat hibernaculum in Wisconsin. Home to all four species of cave bats is one of a small group of sites statewide that are showing signs of population growth after heavy losses from WNS.

We helped with a variety of County-initiated projects at HSB Cave in 2022. Retrieval of water level loggers placed in the cave in 2021 as part of a larger zone of contribution study around the cave were removed in the fall of 2022. In partnership with Door County we completed both Chapter 7 (Cave Safety Strategy)

In September the first official Horseshoe Bay Cave Trustee Training class "graduated" after a day spent learning about caves and karst, and experiencing the cave firsthand.

Photo by Jennifer Redell



of the HSB Cave Management Plan and finalized development of the HSB Cave Trustee Training Program, necessary for public cave access and bat outreach and WNS biosecurity. With our assistance, through the County's public cave tours and school trips, WI Natural Resources Foundation field trip program, and the efforts and talents of volunteers

and County staff, more than 160 adults and students experienced the wild cave bat habitat in the summer of 2022. We are grateful to be able to support this important work with our partners. Learn more about how you can visit Horseshoe Bay Cave by visiting the [Door County Parks website](#).

Acoustic Bat Monitoring Update

Our citizen-based Acoustic Monitoring Project spent over 500 hours collecting 16,397 bat calls from 360 surveys using the efforts of 210 volunteers and staff! Surveyors drove over 2,700 miles, paddled over 300 miles, and walked 125 miles --in the dark!

Unfortunately we still see the effects of White-nose syndrome (WNS) declines - tricolored (Eastern pipistrelle) bats were only found on three surveys, while the northern long-eared bat was found on just one survey. Little brown bats were detected on 60% of all surveys and nearly all the water routes (87%) detected little brown bats, which speaks to the importance of conducting water surveys to record this species.

Wisconsin's three primary tree/migratory bat species (hoary, eastern red and silver-haired) remain unaffected by WNS – but detections



Although normally solitary hibernators, the extremely cold temperatures at this human-made hibernaculum forced a group of tricolored bats (aka eastern pipistrelles) to cluster together for warmth. Photo by Jennifer Redell

of them per hour surveyed have more than doubled in recent years. In 2015 this metric was on-average 6.2, while in recent years rates rose above 13.

It's possible [tree bats are filling-in some of the niches](#) lost by WNS-affected bats, but we still have more data to analyze to fully understand these possible shifts over time.

Change is coming - in response to changing priorities, the acoustic bat monitoring project is looking to redefine project objectives to meet the needs of the department and that of the [NABat monitoring program](#). Acoustic data remain the only true source of data for tree or migratory bat species and acoustic surveys continue to be one of the best methods describe species diversity, relative abundance, occupancy, and phenology. Surveys that focus on summer and fall trends will be prioritized as these describe the most important times of year when bats are raising young or are most vulnerable during migration to winter hibernacula or out of the state entirely.

The Latest Wisconsin-Based Bat Research

Studies with research partners using data collected in Wisconsin, combined with DNR staff support, culminated in several new publications in 2022. These results are informing how we might support bat populations moving forward. Read the reports:

[Shifting effects of host physiological condition following pathogen establishment.](#)

- Being a fatter bat may have initially benefited bats as WNS invaded Wisconsin, but that effect disappeared after a few years, likely because bats evolved other mechanisms enabling their survival to WNS

[Reducing environmentally mediated transmission to moderate impacts of an emerging wildlife.](#)

- We used a chemical disinfectant to reduce the fungus that causes white-nose syndrome in bat hibernation sites.
- The use of this chemical in high concentrations reduced transmission of *P. destructans* and increased bat survival overwinter.

[Host abundance and heterogeneity in infectiousness determine extent of the environmental reservoir.](#)

- We sampled bats and the hibernaculum substrates where they roost as WNS invaded and established in Wisconsin.
- We found that different species of bats shed different amount of the pathogen into the environment, however, highly shedding species (northern long-eared bats) also suffered large declines, which reduced their importance to environmental contamination as the fungus that causes WNS established.
- Overall, contamination of the environment was determined by both bat abundance, species composition, and variability in species infection levels.



Tiny bat toes are specially designed to grip narrow edges. Here a bat is weighed while it hangs on the edge of a paper cup as part of a WNS study in a Wisconsin mine. Photo by Jennifer Redell

[Sex-biased infections scale to population impacts for an emerging wildlife disease.](#)

- Female bats suffer from more severe infections than males.
- Correspondingly, female bats have lower survival during winter than males.
- In the first several years of WNS, female bats declined more than males at winter hibernation sites.

- Female infections may be higher because they use hibernation more in the fall; when bats lower their body temperature it allows the fungus to grow.

[Environmental transmission of Pseudogymnoascus destructans to hibernating little brown bats.](#)

[Environmental control reduces WNS infection in hibernating bats.](#)

- The application of Polyethylene Glycol 8000 to mine roost substrates in summer is an effective environmental control of *Pd* and reduces WNS disease effects in bats within contaminated hibernacula.
- Carefully designed environmental control strategies such as this have potential for managing environmentally persistent pathogens.

[Influence of underground mining with explosives on a hibernating bat population.](#)

- Environmental and acoustic data were collected over two

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State Of Wisconsin Student Diversity Internship



Edgar Flores Gomez was the Wisconsin Bat Program's (WBP) summer intern. Photo by J. Paul White

The DNR had numerous interns in 2022 with the goal of introducing new people, especially those early in their careers, into the department by having them assist with high-priority work. Edgar Flores Gomez was the Wisconsin Bat Program's (WBP) summer intern. He is a first-generation college student and a recent graduate of UW Stevens Point with a degree in biology. Looking for experience in the field of conservation biology, Edgar helped the WBP lead field trips, conducted various types of bat surveys, and [wrote an article](#) about bats for a local non-profit newsletter. Internship highlights for Edgar included conducting acoustic bat surveys and bat emergence counts and camping for the first time.

Continued from page 5

hibernation seasons from an active sand mine where regular blasting, portions of the inactive areas serve as a hibernaculum for 52,000 hibernating bats of 4 species.

- Total bat activity was assessed for 7 hours before and 7 hours after blasting.
- Temperature, barometric pressure, and season were all significant factors, however blasting did not influence bat activity significantly at this mine.

[Disease-related population declines in bats demonstrate non-exchangeability in generalist predators.](#)

- We tested whether bat species that display a lower mortality from WNS can partially fill the functional role of other bat

species experiencing population declines.

- Interspecific dietary overlap did not change between little brown and big brown bats before versus after populations declines related to WNS.
- The incidence and taxonomic richness of agricultural pest taxa detected in diet samples decreased following bat population declines.
- Results suggest that persisting generalist predators do not necessarily expand their dietary niches following population declines in other predators, providing further evidence that the functional roles of different generalist predators are ecologically distinct.

[Comparing little brown and big brown bat isotopic niches over the past century in an agriculturally dominated landscape.](#)

- Little brown and big brown bat museum specimens and carcasses collected in the Upper Midwestern region of the United States from 1898 to 2019 were compared to assess how they may have shifted their diets in response to land-use changes.
- Results indicate that the isotopic niches of little brown bats have been largely conserved, whereas the isotopic niches of big brown bats are more flexible and became more similar to little brown bats over time.
- Findings suggest that the foraging patterns of some aerial arthropodivores have shifted in response to the loss of habitat diversity and corresponding changes in prey resources.

Coming Up In 2023!!

Requests for bat talks and similar outreach keep coming in so we're coordinating the first Wisconsin bat speaker's bureau, the Bat Ambassadors. Wisconsin Master Naturalists can volunteer for this group by attending the new Advanced Training for bat outreach! This year we will offer a choice of two course dates/locations: Door County in July

and Southwest Wisconsin in August. Each two-day training will include classroom and field experiences with live bats, as well as visits to caves. WI Master Naturalists and other interested volunteers should can stay tuned for training announcements through the [WI Master Naturalist Program](#).

Bat Swarm at Neda Mine is back! We are hosting only this one bat field trip this year through the [Natural Resources Foundation of Wisconsin](#). Although bat numbers are greatly reduced at this site there are still thousands of bats flying during fall swarm.

Conservation works better together.

Donate to the [Endangered Resources Fund](#). Your gift will be matched, doubling your impact for Wisconsin's rare species.



The Wisconsin Bat Program, part of the Bureau of Natural Heritage Conservation, relies heavily on citizen scientists to help collect data and offers resources such as how to build bat houses.

To donate to the program or learn more about bats, check wiatri.net/inventory/bats.

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