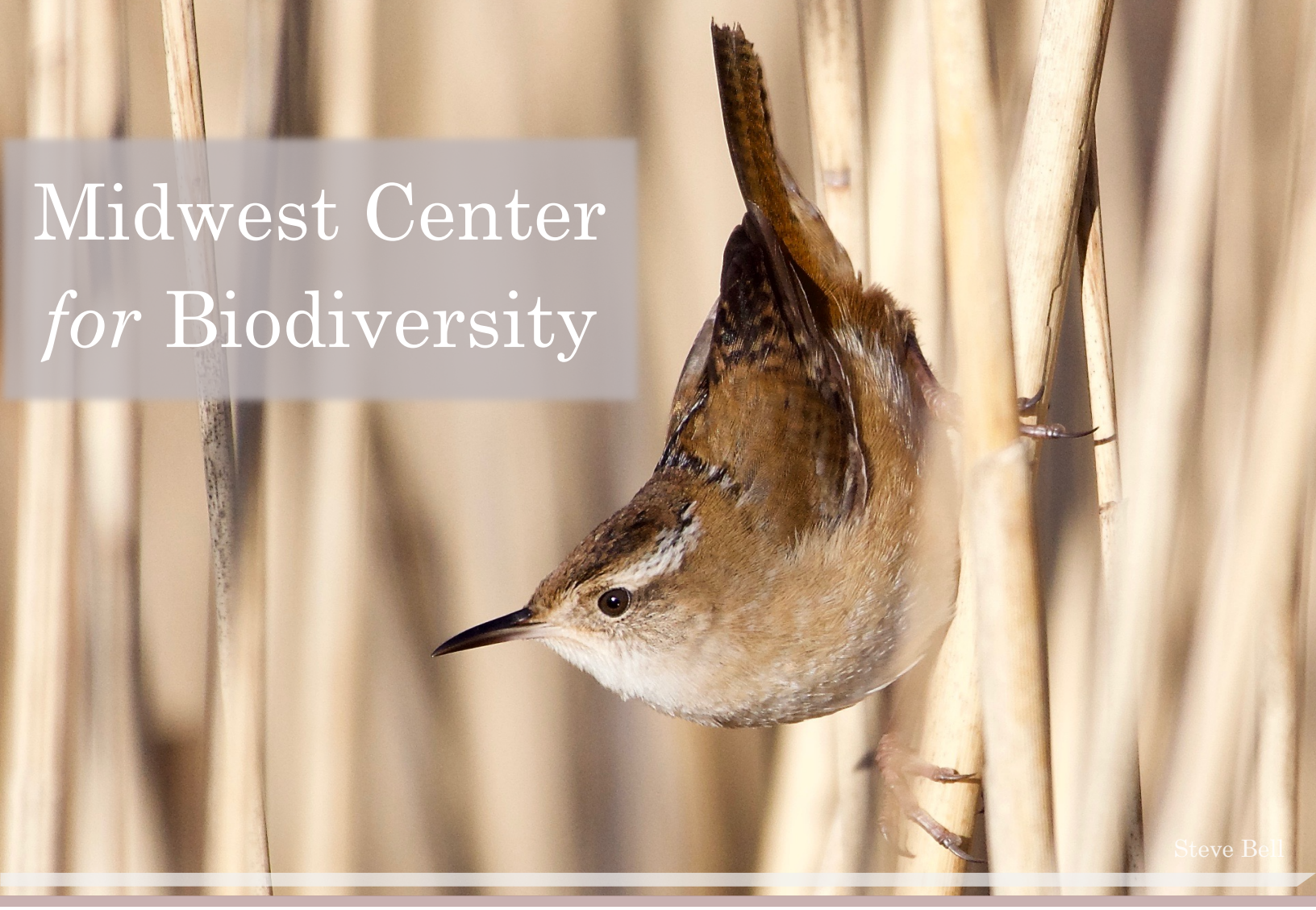
Midwest Center *for* Biodiversity



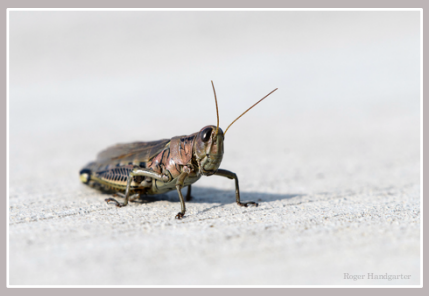
Steve Bell

Inaugural Newsletter

Volume 1 | Dec 2023 | Editor: Sarah Wanamaker

Announcement

We are proud to announce the launch of our Midwest Center for Biodiversity (MCB), a collaborative effort dedicated to promoting the region's biodiversity.



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Why the MCB?

MCB is the first university-based conservation organization with a regional emphasis on the Midwest and its unique set of challenges related to our intense agriculture and expanding urban centers.

Director's Message:

On the need for a center to address unprecedented losses of biodiversity.

We live in an unprecedented era, witnessing the greatest loss in global biodiversity in recorded history. This irrecuperable loss of natural variety, from genes to ecosystems, is resulting in the loss of ecosystem services including pollination and pest control, while increasing the risk of zoonotic diseases crossing from wildlife to humans. Such complex, multi-faceted issues require informed, science-driven solutions at both local and global scales.

To meet the challenge of declining biodiversity, a group of scientists and scholars at Indiana University have established the *Midwest Center for Biodiversity (MCB)*, whose mission is to understand the causes of biodiversity loss and to formulate feasible solutions.

Similar centers exist on other university campuses, some on the East Coast (e.g., at Yale University, Temple University), the West Coast (UC-Santa Barbara), and the southern US (University of Florida, University of Texas), but to date there has been no university-based center in the Midwest that is specifically addressing loss of midwestern biodiversity. By basing our center at a large university, we can draw on experts in a wide variety of disciplines, from the social, life and health sciences, to engineering and the arts, all to address the challenge of preserving biodiversity.

Because all life is interconnected, the center will also address other regions. Birds, bats, and butterflies that breed in Canada and winter in Mexico need safe transit that we will strive to ensure. Biodiversity loss is a global as well as a local challenge.

MCB will promote:

1. Impactful **world-class research** to offer practical solutions to biodiversity loss.

2. **Engagement** with local communities, public agencies, and private industry by harnessing the ubiquity and charisma of birds to call attention to the issues.

3. Development of **research synergies** across disciplines in the life sciences, social sciences, humanities, media, law and engineering at IU, and collaborations with other universities.

4. **Connection with students** to train the next generation of conservationists, who as professionals will be focused on understanding how to best conserve our natural resources.

For those who grew up in Indiana, we know how much change has occurred over the last few decades in our state and across the Midwest. MCB will give us the opportunity to work together to put the power of science to the task of stemming the unraveling of our ecosystems. We look forward to working with you! Please know that the most powerful thing you can do is talk with your neighbors. People respond to those they know and trust. If you can contribute financially to this effort, we will be able to do more. And of course, feel free to contact us, we'd love to hear from you!

Sincerely yours,

Ellen Ketterson and Alex Jahn

Why the Midwest?

- Biota of the Midwest have received less attention than life on the coasts.
- The Midwest supports the world's largest freshwater ecosystem, the Great Lakes.
- Midwestern flyways connect Indiana to the rest of the New World and are used by many migratory species.

Featured Article:

Plants on the move.

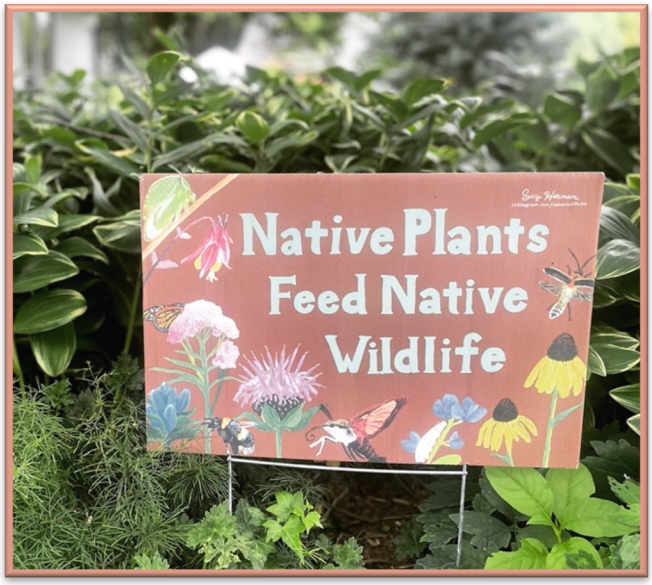
by Jennifer Lau

Plant biodiversity is declining across Indiana. As of 2020, 44 Indiana native plant species are no longer found in the state, an additional 246 are endangered (at risk of extinction) and 192 are threatened (on the brink of becoming endangered) at the state level. Much of this species loss is due to habitat destruction, but climate change and invasive species also threaten native plants.

While native plant species have been declining, many non-native plants (plants that were not historically found in Indiana but arrived from elsewhere) have colonized the Hoosier state. Many of these species do not cause economic or ecological problems, but many others do by outcompeting Indiana's native plants and transforming our forests and prairies. For example, garlic mustard invades forests where it uses chemical warfare to attack the fungal mutualists (mycorrhizae) that funnel nutrients to many of our charismatic spring ephemeral native plant species. As a result, in forests invaded by garlic mustard, native plant diversity is quite low, and many native species may take years to recover even after garlic mustard removal because of long-lasting effects on the mycorrhizae.

When the threat of climate change is added to the mix of habitat loss and invasive species, natives appear to be facing an uphill battle. One way that plants respond to climate change is by advancing their phenologies, or timing of life history events, to germinate or begin to grow earlier in the spring and flower earlier.

Ultimately, whether a plant wins or loses in the face of climate change may be determined by its ability to shift its flowering times to match warmer conditions. We know from long-term surveys that plant species that manage to flower earlier in warmer years survive or even increase in abundance; species that cannot have declined over the past century.



Unfortunately, recent work suggests that native prairie species like those found in Northern Indiana are not very good at advancing their phenologies. Instead, problematic invaders are the ones capable of substantially advancing their flowering times in response to warming. Thus, climate change may hinder native species both because they are less capable of responding to climate change and because one of their other major threats, invasive species, are good at responding to climate change.

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Given the myriad threats facing Indiana native plant species, how can we shift the balance back to native species? One answer is restoration. For example, prairie habitat has been decimated across the United States, so that prairie habitats are now considered North America's most endangered ecosystem. However, a number of successful restorations in the northern part of the state are taking land that was previously used for agriculture and restoring this habitat that is home to charismatic native species like the 6–12- foot-tall Compass Plant and the Wild Blue Lupine, the only known host to the endangered Kerner blue butterfly. Similar restorations on a small scale can be seen across the state from city parks to backyard monarch way stations.

One challenge that these restorations face, however, is how to restore these native species in the face of current and future climate change. For restorations, local seed is typically preferred. In the past, this certainly made sense given that seed collected from nearby habitats should be more likely to be adapted to local climate conditions and potentially even to local soil types. One big question is whether this still makes sense. Given that climate is changing so rapidly, do we need to change our restoration strategies to either include more southern populations or genetically diverse mixes that can facilitate adaptation to the novel environments our restored plant communities will face? Biologists at the Midwest Center for Biodiversity are investigating this question.

Research Spotlight:

Making IU-Bloomington a bird-friendly campus.

by Sarah Wanamaker

We now know that North America is home to 3 billion fewer birds than it was 50 years ago. Collisions with buildings are one of the primary causes of bird mortality, second only to domestic cats. Window strikes kill millions of birds every year in the U.S. and can occur during the day (because birds cannot see glass) and at night (because birds are attracted to the relative brightness of lighted buildings) and pose a disproportionate risk to migrating birds. Window strikes are particularly detrimental to avian populations because they are non-discriminatory and can kill otherwise healthy birds.

Like cityscapes, college campuses pose a greater risk for window strikes because they are home to clusters of tall buildings and many large windows. Furthermore, the interior lights of campus buildings are often left on continuously.

The combination of factors creates a particularly dangerous obstacle for birds and needs to be addressed.

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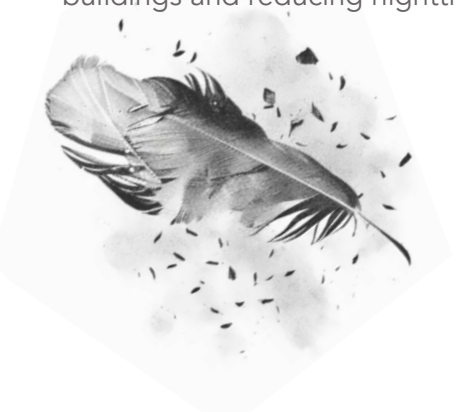
Fig. 1. Some of the fatalities found on IU's campus, demonstrating the unfortunate diversity of species that fall victim to window strikes.

For the last three years, I have been conducting a survey of fatal bird-building collisions on Indiana University's Bloomington campus. Many of the recorded fatalities were migratory species killed during their fall migration (Figure 1).

We will use data from this project to raise awareness on this conservation issue, and to advocate for the implementation of bird-friendly solutions on the highest-risk buildings. Retrofitting windows with visible patterns will allow birds to see glass, thereby creating a bird-safe campus.

Working with our partners, our mission is to prevent bird deaths and save energy by promoting bird-safe buildings and reducing nighttime lighting.



"Biological diversity must be treated more seriously as a global resource, to be indexed…and above all, preserved."

E.O. Wilson, 1988

To Contribute

If you find a dead bird near a building at IUB, please:

1) Take 1–2 photos for species ID.
2) Record the date, time, and building.
3) Email to: strikes@indiana.edu.

If you are interested in joining the research team, email sarawana@iu.edu.

MCB Outreach

MCB collaborated with the School of Education in September 2023 to host an "Educating for Environmental Change" workshop. This one-day workshop was geared towards educating high-school teachers about issues related to climate change and biodiversity.

How You Can Support Biodiversity

- Leave your leaves this Fall.
- Protect nocturnal migrants by turning your Lights Out.
- Plant Natives with Sycamore Land Trust.
- Donate to MCB!

Research Spotlight:

Impact of Wildfire Smoke on Birds

By Alex Jahn

This past summer, I traveled to Oregon to begin a field research collaboration with Dr. Jamie Cornelius, an ecologist based at Oregon State University. Together, we're studying the effects of wildfire smoke on birds, addressing how birds respond in real time to fires of different severities. Scientists still understand little about the behavioral and physiological responses of birds to wildfires. Under what smoke conditions do birds decide to leave their territory? If they stay, what behavioral modifications help them to cope with smoke? If they leave, where do they seek shelter? Are there flyways or habitats that offer refuge during smoke events?

Addressing these questions requires understanding of how fire and smoke impact bird survival, and how various behavioral responses to fire, such as the timing of spring and fall migration, mitigate their risk to wildfires. And by addressing these questions, we hope not only to better understand how birds are impacted by smoke, we hope also to work with fire scientists and resource managers. Doing so will help us identify feasible management strategies to reduce the negative impacts of smoky conditions on birds and other wildlife. For example, we may be able to evaluate whether specific habitats or flyways are used during smoke events that could be protected or managed to benefit birds and other wildlife trying to escape large wildfires.

Wildfire smoke has not only impacted western North America recently, but we've also seen its presence right here in the Midwest over the past summer, highlighting how widespread its effects could be. By first learning about how birds cope with smoky conditions in Oregon, we can apply such lessons back in Midwest, to provide the information needed to help birds in Indiana and neighboring states cope with this emerging health threat.

Who is MCB?

MCB members are researchers, educators, students, and community members all working towards a unified goal: to preserve biodiversity.

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Acknowledgments

Special thanks to…

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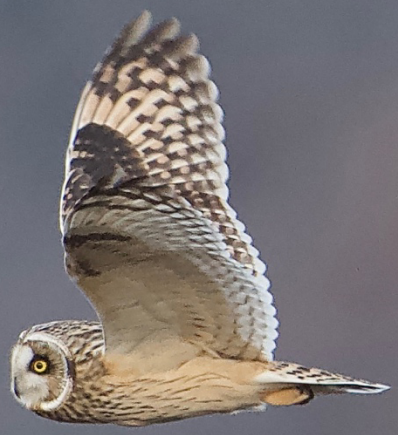

Thank You

for your interest and commitment to maintaining biodiversity.