

Starting Our 15th Year of the HEE!



Hardwood Ecosystem Experiment

THE HEE UPDATE

<http://HEEForestStudy.org>

Charlotte Owings, Project Coordinator | 765-494-1472 | freemac@purdue.edu

The 2020 field season marks the 15th year of data collection for the Hardwood Ecosystem Experiment!

Reflecting upon reaching 15 years of the project, there have been a number of exciting accomplishments!

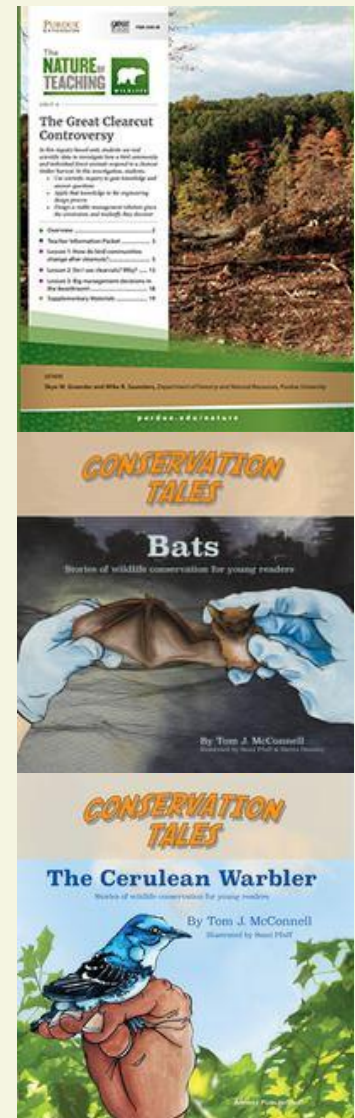
Below are just a few highlights, of many, from the first 15 years:

• **People:**

- Over **250** field technicians have worked on the HEE.
- Over **35** graduate students have done research on the HEE.
- **22** different primary investigators have done a project on the HEE from **8** different universities.

• **Sharing the Data:**

- **2** children’s books by Dr. Tom McConnell from Ball State University have been published featuring HEE graduate students and their research on Cerulean Warblers and bats <https://conservationtales.org/> .
- A free Middle School Lesson Plan utilizing HEE data was developed and is available for free through Purdue Extension <https://www.extension.purdue.edu/extmedia/FNR/FNR-549-w.pdf> .
- 5 peer-reviewed Extension publications featuring HEE Data were published <https://heeforeststudy.org/publications/> .
- 4 peer-reviewed Extension videos featuring HEE Researchers are available online <https://heeforeststudy.org/videos/> .



Images of the covers for *The Great Clearcut Controversy* lesson plan (top) and the *Bats* (middle) and *Cerulean Warbler* (bottom) children’s books written by Dr. Tom McConnell.

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• Examples of some Interesting Research Findings

- *Cerulean Warblers* - Novel vocalizations by a female Cerulean Warbler were recorded (<https://www.audubon.org/news/female-cerulean-warblers-chirp-away-birdsong-stereotypes>) by graduate students from Ball State University working with Dr. Kamal Islam. Among some of the other novel findings from this lab group has been the first documented “double-decker” Cerulean Warbler nest.¹
- *Spiders* - Several new spider distribution records for Indiana were updated using data collected on the HEE by Dr. Marc Milne from the University of Indianapolis.²
- *Small Mammals and Oak Regeneration* - Dr. Rob Swihart and his lab group at Purdue University determined that acorns buried and forgotten by small mammals are one of the most, if not the most, important factors for germination success and survival of acorns.³ Small mammals are the “true architects” of our oak forests.

- *Bats* - The depressing effects of white-nose syndrome on bat species in Indiana can be seen from data collected on the HEE (below):

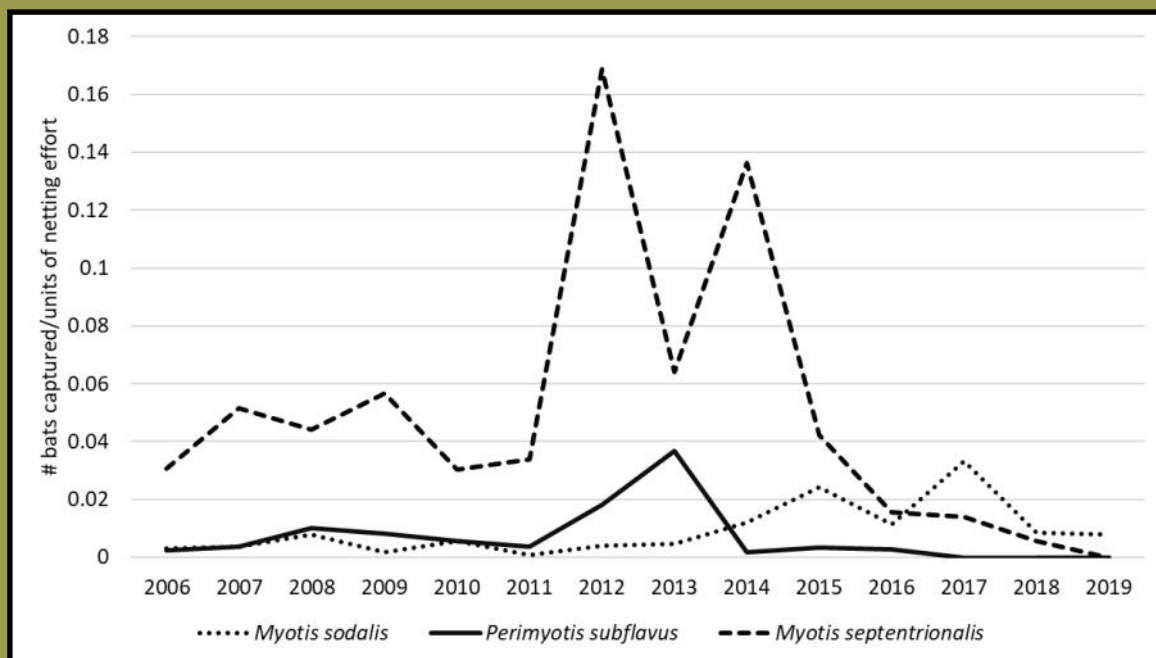
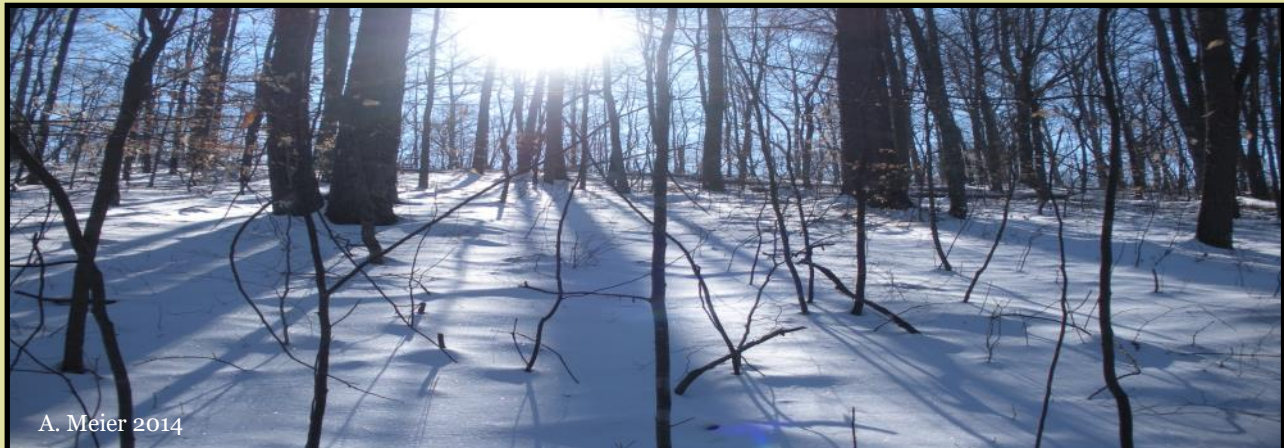


Figure 1. Captures of three bat species affected by white-nose syndrome (WNS), 2006–2019, on the HEE Project. White-nose syndrome was first detected in Indiana in February 2011. Prior to this, it was relatively rare to capture the federally endangered Indiana bat (*Myotis sodalis*) or the tri-colored bat (*Perimyotis subflavus*), but the northern long-eared bat (*M. septentrionalis*) was one of the most commonly captured bat species. In 2012, just after WNS arrived, HEE researchers switched to netting over ponds more often and saw a spike in all bat captures. However, in 2014–2015, as WNS took its toll on these cave-dwelling bats, they saw a dramatic decline in capture rates for tri-colored bats and northern long-eared bats. By 2019, they were not capturing either species, whereas Indiana bats still made up at least a small proportion of their captures. *Figure developed by Dr. Joy O’Keefe and graduate student Elizabeth Beilke from Indiana State University.*

Starting Our 15th Year of the HEE cont.

• Interesting Research Findings cont.

- *Longhorn Beetles* - A paper published in *Ecosphere* (Hanna et al., 2019) by Dr. Jeff Holland and his lab at Purdue University shows that the longicorn beetle communities of the HEE project are showing resilience to the harvest treatments. While the communities change substantially one and two years post-harvest, by six years after harvest the beetle communities come to resemble the pre-harvest communities. The most interesting finding has been that although the communities change in different ways under different management types, they return to pre-harvest communities at the same rate.⁴
- *Moths* - Dr. Keith Summerville from Drake University found that moth communities in shelterwood harvest treatments and controls were more resilient to changes in moth diversity than in areas of greater disturbance.⁵
- *Breeding Birds* - The first confirmation of successful chestnut-sided warbler breeding in southern-central Indiana in over 20 years was observed by a graduate student from Purdue University working with Dr. Barny Dunning.⁶ They also investigated the use of young forest habitat by Worm-eating Warblers which had been previously thought to be a mature forest-only species.⁷



References:

- ¹Nemes, C.E., K.Islam and D.M.Pirtle. 2015. First documentation of a “double-decker” Cerulean Warbler (*Setophaga cerulea*) nest. *The Wilson Journal of Ornithology*, 127(3):534-538.
- ²Milne, M.A., B. Foster, J.J. Lewis, L. Bishop, A. Hoffman, T. Ploss, and B. Deno. 2016. Spiders in Indiana: seventy-one new and updated distribution records. *Proceedings of the Indiana Academy of Science*, 125(1): 75-85.
- ³Kellner, K.F. and R.K. Swihart. 2017. Simulation of oak early life history and interactions with disturbance via an individual-based model, SOEL. *PLoS ONE* 12(6): e0179643. <https://doi.org/10.1371/journal.pone.0179643>
- ⁴Hanna, L., A. L. Kissick, E. McCroskey, and J. D. Holland. 2019. Resilience to disturbance is a cross-scale phenomenon offering a solution to the disturbance paradox. *Ecosphere* 10: e02682.
- ⁵Summerville, K.S. 2013. Forest lepidopteran communities are more resilient to shelterwood harvest compared to more intensive logging regimes. *Ecological Applications*, 23(5): 1101-1112.
- ⁶Ruhl, P.J., Jeffrey K. Riegel, and John B. Dunning. 2015. Confirmation of successful chestnut-sided warbler breeding in south-central Indiana. *Proceedings of the Indiana Academy of Science*, 124:38-42.
- ⁷Ruhl, P., Kellner, K., Pierce, J., Riegel, J., Swihart, R., Saunders, M., & Dunning, Jr, J. 2018. Characterization of Worm-eating Warbler (*Helmitheros vermivorum*) breeding habitat at the landscape level and nest scale. *Avian Conservation and Ecology*, 13(1):11.

THANK YOU JEFF!!!!



Jeff Riegel is retiring as of March 2020 after many years of service to the Hardwood Ecosystem Experiment. Jeff has been an invaluable part of the HEE as the Field Coordinator for over 14 years and will be greatly missed. To list just a few of his many, many contributions to the project; Jeff has helped with the coordination of over 28 different research projects, worked with, and mentored, over 250 field technicians and 39 graduate students, co-authored numerous scientific papers and been a part of countless outreach efforts. He has had a large impact on shaping the project and his contributions will have a lasting impression on the many people he has worked with and the entire project.

We wish him all the best in his retirement!

NEW HEE FIELD COORDINATOR

Please join me in welcoming our new Field Coordinator, Danielle Williams!

Danielle is familiar with the HEE after working for the project as a field technician in 2015. Since that time Danielle has obtained her Master's degree, worked for the IDNR, the International Crane Foundation, and as a Farm Bill Wildlife Biologist for Pheasants Forever/Quail Forever. Danielle's first day as our new Field Coordinator will be February 17th, 2020.

Welcome (back) to the Project Danielle!



HEE Outreach

Woodland Wildlife Steward Workshop to be held again in 2020

In June 2020, for the second year in a row, the Woodland Wildlife Steward Workshop for private woodland owners will be held. The workshop will focus on providing private woodland owners with information on how they can manage woodland areas for wildlife and sharing recent science on habitat needs for many wildlife species. The workshop will be held at the Morgan Monroe State Forest Training Center from June 5-7th, 2020.

You can soon find more information about the workshop by visiting the Purdue Extension website: <https://extension.purdue.edu/>

Interested in scheduling a tour of the HEE for your group? Please contact the HEE Project Coordinator at freemac@purdue.edu



C. Owings

Trevor Besosa shows a tour group a salamander found under a coverboard during Fall salamander surveys.

New HEE Publications

MacDonald, G.J. and K. Islam. 2019. Do social factors explain seasonal variation in dawn song characteristics of paired male Cerulean Warblers (*Setophaga cerulea*)? *Bioacoustics*, <https://doi.org/10.1080/09524622.2019.1682671>

Ruhl, P.J., Flaherty, E. and J.B. Dunning. 2019. Using stable isotopes of plasma, red blood cells, feces, and feathers to assess mature-forest bird diet during the postfledging period. *Canadian Journal of Zoology*, <https://doi.org/10.1139/cjz-2019-0109>.

Bergeson, S.M., Holmes, J.B. and J.M. O'Keefe. 2019. Indiana bat roosting behavior differs between urban and rural landscapes, *Urban Ecosystems*, <https://doi.org/10.1007/s11252-019-00903-4>

Delancey CD, Islam K. 2019. Post-fledging habitat use in a declining songbird. *PeerJ* 7:e7358 <https://doi.org/10.7717/peerj.7358>



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Purdue University
Department of Forestry and Natural Resources
Pfendler Hall of Agriculture
715 W. State St.
West Lafayette, IN 47907-2061
www.heeforeststudy.org