HURON MOUNTAIN WILDLIFE
FOUNDATION

Summer 2017
Newsletter

Looking for Lepidoptera: Butterflies & Moths of the Huron Mountains

By Jill Riddell

Thomas Werner studies butterflies, moths, and fruit flies of the Huron Mountains. Here, he applies bait to a tree trunk to attract moths. ***Photo by Jill Riddell.***

Baltimore checkerspot butterflies are a species of concern to conservationists who believe its numbers have declined. They're found at Ives Lake near the research station.

At the Ives Lake Science Field Station, darkness is falling. A whip-or-will calls out as a lone biologist gets busy with a paintbrush. Thomas Werner, Assistant Professor at Michigan Tech, dips the paintbrush in a shallow bucket that contains a viscous, fermented substance made from brewer's yeast, fruit juice, beer, and brown sugar—and four overripe bananas donated by Wal-Mart in Houghton.

"This bait attracts the moths." Werner says, as he slathers the mixture onto the trunk of a maple. "But sometimes it also brings in flying squirrels."

Werner is one of two Foundation researchers who simultaneously are studying butterflies and moths *(Lepidoptera)* of the Huron Mountains. Working under separate grants, Werner and Jim Bess, an independent restoration ecologist, had never met before they coincidentally applied to the Foundation in the same year. (In both proposals, butterflies and moths were one part of larger insect surveys each wished to conduct.) When Kerry Woods, the Foundation director, brought the coincidence to their attention, the two men conferred and collaborated with one another, and their two studies have dramatically increased the total number of butterflies and moths known at the Huron Mountains from 34 species to 584 species in just three years.

Werner smoothes the gooey bait onto the bark of ten trees north of the Stone House and then ten more south of it. He heads for the barn, where he stows the bucket in his van. He then proceeds to set up something else moths can't resist: bright light. He places two white sheets over a card table, and lays two tubular black lights on the ground so they shine upon the sheets. The whole white surface is now brilliantly illuminated to lure in moths. On top of the table he sets down a lamp with two compact fluorescent bulbs and collecting jars.

Earlier, Werner dropped off a moth bucket—another type of trap that catches moths—in a pine barrens between the Huron Mountain cabins and Pine Lake. This collection system consists of a battery-driven black light (UV-A) tube suspended over a 5-gallon bucket with a funnel on top. Moths are attracted to the light and dive at it, falling into the funnel and bucket, where they are quickly euthanized with ethyl acetate. "That area is a moonscape for butterflies, but there are many moths I've captured there that I've seen nowhere else," Werner says.

Moths fly mostly at night, while butterflies are active during the day. Since the times when we humans are usually outdoors are daylight hours, we tend to know butterflies much better than moths. Yet moths way outnumber butterflies; worldwide, the ratio is ten types of moth for every one type of butterfly; at the Huron Mountains, the disparity is even greater, with a ratio of seventeen moth species for every one butterfly species. Werner identified 39 butterfly species and 379 moth species; Bess, whose study didn't focus on butterflies, identified 445 moth species; and since there was overlap between what the two found, this yielded a total of 545 moth species.

continued on page 2

Researcher and restoration ecologist Jim Bess discovered the Huron Mountain pine barrens are particularly rich in moth diversity. Moths caught by Jim Bess in 2016. After the moths are captured by a researcher, they must be sorted, identified, recorded and stored. For every one species of butterfly found in the Huron Mountains, there are 17 species of moth.

Jim Bess's Methods

Jim Bess has owned topographic maps of the Huron Mountains since he was nineteen years old. A biologist told him about the place, and as soon as he heard about it, he wanted to go. "It's huge and has the largest tract of hemlock forest anywhere," Bess says. "The mountains there have really cool flora, so I knew it would be interesting to find out what insects lived there." Bess grew up in southern Michigan and has been studying Lepidoptera for over 45 years. His studies have taken him throughout North America and he has spent the past 33 years working in insect conservation.

His collecting techniques differ from Werner's. He uses 3-4 bait traps, and instead of a single black light station, he depends on a dozen moth bucket traps. (They're identical to Werner's; in fact, the one Werner uses was given to him by Bess.) "I put out eight to twelve bucket traps a night, all in different habitats. I've placed them on parts of Huron Mountain and on Mount Homer, where the balds have some neat stuff. I've also put them in the jack pines and in the wetlands around the lakes," Bess says. "When you collect from so many different places at once, it's like doing twelve nights of work in one single night."

One surprise was finding that certain moths don't move around as much as others. "Some stay close to their colonies and their food plants," Bess says. "I could have traps within 50 feet of each other and get widely different compositions."

Bess's report highlights 94 species of moths that are relatively rare and live only in high quality natural areas. Several were "firsts" for this region and for Michigan and some are considered to be "of conservation concern," meaning it's likely they're in danger of extinction.

Butterflies

While Bess surveyed intensively for butterflies in his first year at HMC and found 28 species, Werner continued surveying each year for butterflies. Earlier that day, Werner searched in the flowery patches along the road around Ives Lake. Canadian tiger swallowtails were out; these bright yellow butterflies live all across Canada but are only in the farthest northern borders of the U.S. Northern crescents, hobomok skippers, and mourning cloaks made appearances, and Werner made his field notes by speaking in German into a handheld digital recorder.

Werner grew up in East Germany, where he developed a strong interest in butterflies at an early age. He says it wasn't an unusual hobby for a child to have in the late 1980s. "There was nothing to buy in East Germany, nothing colorful. If you wanted some color, you'd collect butterflies," he says. "That was the only beauty to be had."

Though he went into the field of biology with an intense desire to study butterflies, opportunities tugged him in a different

ADDITIONAL RESOURCES

Best weather, time and place to see butterflies in the Huron Mountains: Around the Fourth of July, on a sunny day. Try the sunny flower patches and puddles on the road around Ives Lake.

Best weather and place to see moths in the Huron Mountains: Warm, overcast night with high humidity, anytime late June through August. Try a porch light or look in the pine barrens.

One of Jim Bess's bait traps. Inside the cylinder, bait is set upon a platform. Bess places the traps in different locations each evening and collects the buckets and specimens the following morning.

direction. The Berlin Wall fell when he was in his last year of high school; he went to college in Germany, and then later, found his way to Sweden for his PhD. "I studied Swedish and learned to speak and read it before I went, only to discover that all science was conducted in English." In Sweden, he began researching fruit flies. After that, he moved to take a job in Madison, Wisconsin, where the fruit fly work continued. It remains part of his research today at Michigan Tech. Recently, he and a colleague published the first field guide to fruit flies in the Midwest.

"Fruit flies were also part of what I studied in my work for the Huron Mountain Wildlife Foundation," Werner says. He hopes to continue with a new project next field season that will continue the work on fruit flies, butterflies and moths. Jim Bess's additional work in the original grant, aside from the *Lepidoptera,* was on leafhoppers, planthoppers, spittlebugs and their relatives; groups about which nothing was known from HMC prior to 2014. His 2017 study includes spiders.

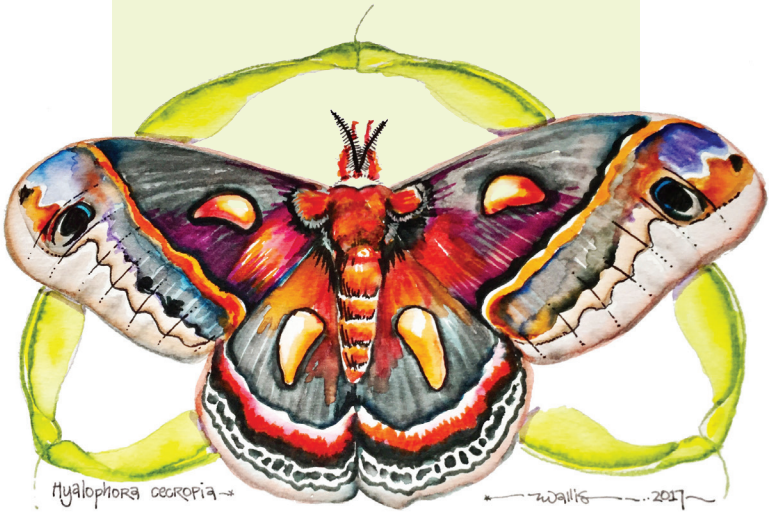
"Jim is excellent on identification," Werner says. "At the end of the year I'd take my stuff to him, the things in question, and sometimes all I have is a very worn specimen, yet Jim can still make an identification."

Bess is similarly impressed with Werner's results. "Thomas has found some incredible stuff with the black light by Ives Lake, moths I haven't found." Taken together, the two studies greatly increased the collective knowledge of what lives in the Huron Mountains.

"The number of new butterflies we find may be tapering off, but moths not at all," says Werner. "Right now, there's no end in sight to the number of species."

NATIONAL MOTH WEEK

July 22-30, 2017
nationalmothweek.org



The largest moth in all of North America, the cecropia moth is one of the many interesting moths found in the Huron Mountains. *Illustration by Lynda Wallis.*

2016 Research Program

By Kerry Woods, Director

Each year's crop of proposals affords a glimpse of emerging and changing patterns and emphases in natural science research, and watching the overall shape of the Huron Mountain Wildlife Foundation's research program evolve is one the most interesting aspects of my work. Although some of this "evolution" is idiosyncratic, depending on which researchers happen to discover the potential of the Huron Mountains or have time to prepare proposals, some patterns reflect larger trends. For example, more and more ecological research is making use of modern tools of genetic analysis. Biological diversity and interactions among organisms that previously were impossible to detect are now made possible by bulk analysis of DNA taken from soil or water. This year, several HMWF projects rely heavily on these tools.

Ecological and environmental science research is also expanding into more and more "massively integrative" studies, relying on sophisticated statistical and modeling to integrate diverse data-sets from many projects and sites. This capability tends to enhance the appeal of the "reference ecosystem" quality of the Huron Mountains, where our largely pristine ecosystems are the conceptual equivalent of "experimental controls" in studies where experimental manipulation is not feasible for reasons of temporal or spatial scale. We see increasing numbers of projects that collect very large data-sets in the Huron Mountain study area and integrate them with other data-sets. These extensive studies are increasingly making use of interested amateur naturalists by crowd-sourcing basic data collection, and major funding agencies strongly encourage this approach. (This is what is part of what is meant by "citizen science.") At least two of our 2017 projects have citizen science components, and this trend will likely continue.

Another trend, also emerging from a broad interest in increasing general and popular exposure and access to scientific research, is an integration of field-based science and art. Several field stations (and national parks) have developed "artist-in-residence" programs; interestingly, these sometimes result from scientists who are active in the art world, and sometimes from the initiative of artists interested in natural history. This new facet of field science hasn't yet become manifest at Ives Lake, but in recent years several conversations have touched on such possibilities. We recently received an inquiry from a "science plus art" initiative originating at the University of Wisconsin.

Among this year's projects several reflect these trends. Others may be anticipating patterns that will strengthen over the next few years. In any case, here is the list:

Predators and their prey: Predators are highly charismatic, but hard to study. They are scarce relative to their prey, cryptic, and often nocturnal. **Nyeema Harris** (University of Michigan) is attempting to overcome these challenges in the second year of her ongoing project, by using scat surveys and an extensive network of trail cameras to establish abundances and distributions of "mesopredator" species (mesopredators are anything smaller than wolves and mountain lions and larger than shrews and weasels; minks, skunks, otters, bobcats, raccoons, coyotes, fishers, etc.). This mesopredator study focuses on comparing three study regions from southern to northern Michigan (and from highly human-modified to largely pristine). Later stages of the study may implement more intensive techniques like trapping and radio-tracking. **David Flagel** (University of Notre Dame), in a new project for 2017, focuses on understanding prey interactions with predator population; he is also using trail cameras to monitor behavior of white-tailed deer in response to experimental cues of predator presence (for example, wolf scent and urine and recorded wolf sounds).

Effects of whitetail deer on their "prey" (plants) are the focus of two other projects, both ongoing. **The Donald Waller lab** (University of Wisconsin – Madison) is in the sixth year of their long-term monitoring of a large "deer-exclosure" area near Fisher Creek; the researchers' objective is to examine multi-layered effects of deer browse on tree regeneration, forest understory communities, bird populations, etc. by comparing the deer-excluded area to surrounding forests, and using another long-term study by Dennis Riege to provide baseline data. Approaching similar questions from a different angle, **Walter Carson** (University of Pittsburgh) and **Rose-Marie Muzika** (University of Missouri), previously established that tops of large boulders and ledges that can't be reached by deer provide "refugia" for wildflower species that are particularly vulnerable to deer. They are in the second year of a planned ten-year study to see if wildflowers can recolonize the forest floor from these refugia, thus helping to maintain diversity in the forest understory community.

We continue to attract researchers interested in ***documenting biodiversity.*** After three years surveying moths and leafhoppers (and adding several hundred species, including some rarities, to the Huron Mountain All-Taxa Biodiversity Inventory), **James Bess** (Houghton, MI) is expanding his scope to include spiders (probably the most poorly documented major animal group at the Hurons). In an additional, new project, **Robert Wolff** (South University) will also be inventorying spiders as well as the microbial diversity of sandy soils of the Huron Mountain area. **Patrick Gorring** (Harvard University), while in transition at the completion of his Ph.D. work, is hoping to continue his surveys of beetle diversity with a focus on weevils.

The fish spider is known to be in the Huron Mountains, but spiders in general haven't been intensely studied yet. ***Photo by Kerry Woods.***

Microbial ecology and evolution appear to be gaining a prominent place in our research program. **Betsy Swanner** (Iowa State University), **Chad Wittkop** (Univ. of Minnesota – Mankato), and their team will continue work to understand the microbial communities and ecosystem properties of the deep waters of Canyon Lake, with a particular focus on poorly understood microbial roles in methane and iron cycles. This work was featured in a newsletter last year and at the Foundation's annual meeting, and it has recently gained recognition in the form of grant support from the National Science Foundation – an indicator of its broad importance. **Stephen Techtmann** (Michigan Technological University) is in the second year of a study of soil microbes, making use of the pristine "reference ecosystem" quality of the Huron Mountains to assess whether microbes that have evolved biocide resistance – common in more human-influenced systems – have established in more remote, pristine environments.

Studies of microbial ecology have been greatly advanced by the tools of modern genetics, allowing researchers to assess diversity and detect presence of particular taxa without having to culture organisms for identification. Indeed, "bulk processing" of genetic material for soil and water samples has led to discovery of vast numbers of previously undescribed species. Related tools are facilitating much more sophisticated ***population genetics studies of more familiar organisms*** as well. **Oliver Gailing's**

lab (Michigan Technological University) is continuing the most recent of several studies of oak populations, attempting to better document and assess significance of genetic differences between the relatively uncommon northern pin oak *(Quercus ellipsoidalis),* and the abundant, wide-spread red oak *(Q. rubra).* (Gailing has taken a new position as chair of the Forestry Program at the University of Göttingen, so this is likely the last field season for his very productive series of studies of oak genetics at the Hurons.) **Cody Thompson** (University of Michigan) will be in the second year of his study of potential hybridization of rare northern flying squirrels and increasingly abundant southern flying squirrels (using genetic analysis of tail hairs from live-trapped squirrels).

Many of these studies rely on the "reference ecosystem" qualities – relative long-term freedom from direct human management – of the Huron Mountain Club's "Preserved Area." These are particularly critical for ***comparative studies of ecosystem function and dynamics.*** **David Costello** (Bowling Green State Univ.) will continue studies of primary production (photosynthetic productivity) of algae and bacteria in Huron Mountain streams, focusing on effects and dynamics of trace metals and related spatial variation. **Donna Kashian** and **Corey Krabbenhoft** (Wayne State Univ.) will maintain their long-term, comparative monitoring of a number of stream ecosystems in northern Marquette County, focusing on physical stream properties and invertebrate communities. **Scott Tiegs** (Oakland University), in a parallel study across regional streams, continues his innovative approach to study of ecosystem function through assessment of decomposition rates.

More traditional sorts of ecological studies, focusing on ***population and community dynamics*** of plants and animals have long constituted the core of the HMWF program, and these remain strong in both aquatic and terrestrial systems. In a new study, from a new institutional linkage, **Karen Murchie** (Shedd Aquarium) and colleagues have brought the Huron Mountains into a region-wide network of observers monitoring spawning of suckers. This project is a citizen-science initiative, relying on local observers to build the large, regional data-base researchers require to understand the cues and timing of fish migrations; in this case, HMC staff conducted brief, daily observations at the Pine and Salmon Trout Rivers. Long-time HMWF researcher **Casey Huckins** (Michigan Technological University) and grad student **Brad Wells** will be conducting behavioral studies of salmonids (the group of fish that includes salmon, trout, chars, freshwater whitefishes, and graylings) in the Salmon Trout River, focusing on observations of foraging behavior and competitive interactions among species and relationships of these behaviors to sediment conditions.

Studies of plant populations and communities include **Evelyn Williams'** (Chicago Botanic Garden) ongoing monitoring of *Botrychium* fern populations (now in its 10th year), **Jalene LaMontagne's** (DuPaul Univ.) continuing study of seed production patterns in white spruce. **Dennis Riege's** (University of Maryland – University College) fifth year of assessing the effects of beaver activity in old-growth forests near Fisher Creek, and his ninth year of studying white pine and hemlock seedling establishment, growth, and survival in the same area. (His study plots serve as "controls" for the Waller project's study of deer browse.)

Finally, as always, there are studies of diverse aspects of ***landscape pattern, geology, and climate*** that can be hard to categorize but generate critically important databases and document fascinating systemic connections. **Steve Voelker** (Utah State Univ.) and **Louise Chavarie** (Michigan State University) discovered an unexpected connection between their separate prior studies on historic tree growth-rates (via tree rings) and lake trout populations in Rush Lake; growth rates in both trout and trees (specifically, sugar maples) appear to respond in parallel to multi-year temperature variation. Their work this year aims at a closer look at these patterns to verify and better document this surprising correlation. **Fritz Nelson** (Northern Michigan Univ.) and **Ken Hinkel** (Univ. of Cincinnati) continue their long-term monitoring of microclimatic patterns over the complex Huron Mt. landscape, adding further measurements of annual heat budgets of Rush and Ives Lake to better understand interactions between lakes and very local temperature variations. The data-base resulting from their work (extended to 13 years by 2017 work) has great value for other researchers as well as supporting important insights into local variation in weather in complex terrain.

Chris Anderson (Auburn University), in the second year of a geomorphological study of formation of headwater streams will be mapping more "first-order" headwater channel origins, with the goal of understanding how forest management history can affect "drainage density" (the length and number of these small, often ephemeral streams per unit area). **David Ulmann** (Northland College) is conducting initial surveys of glacial erratic boulders (boulders deposited out of place in the melting of the last ice-sheets). Chemical analyses of quartz in erratics can allow precise dating of local glacial retreat, which, in turn, can support more accurate reconstruction of the sequence of glacial melt-water drainage episodes that have shaped the landscape of the Huron Mts. Previous work by Richard Rice and Jim Bockheim has thoroughly documented the extensive impacts of glacial melt-water floods in the area, but precise dating has been elusive, and this project should add another layer of understanding.

The summary statistics are similar to the last few years. We have about 25 active projects, about a third of them new this year. An impressive strong group, both the scientists and the projects represent the range of research enabled made by possible by the existence of Huron Mountain Wildlife Foundation and the landscape upon which it is located. The world-class natural area of the Huron Mountains along with the excellent facilities of the Ives Lake Field Station are the main resources we offer. Here, I will now channel the thanks of the researchers (as well as my own) for the many supporters and gifts that enable all of this.

ALL ARE INVITED

Annual Meeting, Wednesday, August 2, 2017
4:00 p.m.
The Playhouse at the Huron Mountain Club

Keynote Address: "The Remarkable Diversity of Trout in Rush Lake"
Speaker: Louise Chavarie, Michigan State University

Other activities will take place at Rush Lake that day and the following morning. They'll be led by Dr. Chavarie and by Mara Zimmerman (State of Washington, Dept. of Fish & Wildlife). The two biologists are colleagues and co-authors on publications regarding trout in Rush Lake. The keynote address will focus on a rare variety of lake trout found in Rush Lake, and how learning more about this small piece of the puzzle helped complete a bigger picture

Wayne Thorpe Helps Ives Lake Station Run Smooth As A Top

The first time Wayne Thorpe, director of operations at the Ives Lake Science Field Station, ever came to the Huron Mountains was sixty-seven years ago. Since then, he's been in and out of those woods hundreds of times. From the time he was 14 years old, he has held various roles that included one full-time job of long duration as General Manager of the Huron Mountain Club.

Eleven years ago, Thorpe began working for the Foundation. He oversaw major improvements to the facilities, including the renovation of the Red House, a building that had been sitting unused and whose condition was deteriorating. The National Science Foundation funded the work with a $100,000 grant from the "Field Stations and Marine Labs" program. Thorpe is also in charge of the land and outbuildings around the field station. "Being outside and taking care of the grounds is my favorite part," he says. "I never tire of working to get the grounds in better shape then they were when I started."

Thorpe worked for the U.S. Navy for 35 years, on active duty for 4 years and then as a civilian working on international weather codes; he also taught computer studies at a community college for 27 years. "I grew up in Chicago, but because I spent part of every summer in the Huron Mountains, the wilderness has become my way of life," Thorpe says. "At Ives Lake, we host a lot of researchers and assistants who are city-grown and not experienced in the wilderness. My advice is 'Pay attention to where you are. Enjoy and learn from it.'"

About the Huron Mountain Wildlife Foundation:
Since 1955, the Huron Mountain Wildlife Foundation has supported original research in a wide variety of scientific fields. The research takes place in the Upper Peninsula of Michigan. More information on the Foundation can be found at: **www.hmwf.org**

We welcome comments and suggestions on this newsletter. Please send them to:

Henry Dykema
67 Vernetti Road
Red Lodge, MT 59068
hbdykema@gmail.com

Editor: Jill Riddell ***Designer:*** Amanda Micek

HURON MOUNTAIN WILDLIFE FOUNDATION
4730 South Kimbark Avenue
Chicago, Illinois 60615