



The Beetle and the Pine

By Jill Riddell

The beetles of the Huron Mountains have had a great deal of attention lavished upon them over the years, especially when compared with other types of insects. Records for beetles date back to 1929, when an associate at the University of Michigan's Zoology Museum, A.W. Andrews, conducted and published an initial baseline survey. In the 1980s, more work was done with beetles by Huron Mountain Wildlife Foundation supported researchers. In the 1990s, surveys of aquatic insects added still more beetle species. Altogether, over 400 species of beetles have been found in the Huron Mountains.

interview to the BBC. "They have divided the world up into very small pieces to specialize in their different jobs, managing to co-exist without competing with each other."

Since 2012, Patrick Gorring, a PhD candidate from Harvard University, has been adding to Huron Mountain's list of species and deepening the understanding of scientists about our what certain types of beetles are up to. A native of Wayne, Michigan, Gorring first learned about beetles and the work of the Foundation from visiting the natural history museum on the campus of the University of Michigan.

Beetles are one of the most abundant and diverse groups both in the Huron Mountains and in the bigger world beyond the Upper Peninsula.

"In my first year of surveying, I focused exclusively on the long-horned beetles. They're the best wood decomposers," says Gorring. "They bore into the heartwood of trees and do a really good job of decomposing wood recently fallen on the forest floor. If you see circular holes in the wood of a fallen limb, that's the job of the long-horned beetles."

Gorring specializes in the pine sawyers, a type of beetle that chews a little egg niche inside a pocket in the pine bark. There it lays an egg or two, and tucks it between the bark and the wood underneath. After the egg hatches out, the larva bores under the bark and feeds, and as the larva develops and grows a bit larger, it becomes capable of drilling into the hardest part of the tree.

"This is important work, because if you didn't have insects breaking down the wood, it wouldn't happen," says Gorring. "The wood would just lay there piling up. Another main decomposer of wood is fungi—but many times, the fungi is either brought to the wood by beetles or it only finds a niche to grow in because of the holes created by insects."

Part of Gorring's research involves understanding how the pine sawyers make sense of their world. How do they find their



Patrick Gorring studies beetles, and specializes in the types of beetles that bore into conifers. He's added fifty new species to the list of beetles found in the Huron Mountains; eleven of these are longhorned beetles.

Photo by Adam Gorring

Beetles are one of the most abundant and diverse groups both in the Huron Mountains and in the bigger world beyond the Upper Peninsula. "Beetles are the most dominant, species-rich group of organisms in terrestrial eco-systems," the beetle collection manager at the Natural History Museum in London, Max Barclay, said in



Of all life on earth, one out of every five species is a beetle. As animals, beetles are highly successful because they manage to find ecological niches no other insect is controlling or fully exploiting. Here is a spotted jack pine beetle collected at the Huron Mountains; it lives almost exclusively on jack pines and is restricted to the region around Lake Superior. Photo by Patrick Gorring



Beetle traps hang high in the trees. If you encounter one, it's best to leave it alone so the beetles don't spill out. "That's one of the great things about working in the Hurons instead of a national forest or state park," says Gorring. "No one messes with your traps." Photo by Patrick Gorring

way through the forest, locate mates, and pick appropriate trees, especially when they're so selective about what species the tree has to be? By baiting collecting traps with different pheromones and plant chemicals, Gorring has found the answers. "It turns out that pine sawyers favor scent over vision. When one dead tree has been exhausted it puts off different chemicals. The pine sawyers locate the next tree not by looking around for one, but by detecting the scent of a fresh dying tree. In lieu of using eyes—which they do have—they use their long antennae and the sense organs on the antennae."

Of the four species of pine sawyers that Gorring studies at the Huron Mountains, three of them prefer the same type of tree, yet these three species manage to avoid possible conflicts with one another by working on the same tree trunk at different times of day. One species is most active at dawn and at dusk; another favors the middle part of the day; and one species works solely at night. In this manner, the three different species can co-exist in peace, and each can consume its portion of pine pie.

"If you partition your environment in a way that you can consume the same resources at different times, you can live in harmony, in a sense," says Gorring. "There are so many cool stories like that about beetles. Their amazing diversity—their amazing ecological relationships—beetles can be a tool to study almost any questions I would want to ask. Evolutionary questions, ecological questions—there's likely a beetle that can help me answer those questions."

Notes: The beetle surveys of the 1980s were conducted by David Gosling, a previous research director for the Huron Mountain Wildlife Foundation. These concentrated on long-horned beetles. The surveys of aquatic insects—which weren't restricted to beetles but did identify them along with other invertebrates—were carried out by Steve Yanoviak in 1996.



The Research Station on Ives Lake, as viewed from the top of Ives Hill. One asset of the Foundation's location is the continuous flow of habitat uninterrupted by paved roads and power lines. *Photo by Kerry Woods*

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The Huron Mountain Wildlife Foundation gratefully acknowledges its many donors and devoted supporters. Without your generosity, there would be no Foundation, and no new discoveries. Thank you!

You'll notice in this year's list that in addition to memorial gifts—which commemorate departed loved ones and sometimes pets—we received a gift in honor of a birthday. Let this be a new tradition: commemorate the next happy occasion with a gift to the Foundation that studies life and living.

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Notes From the Director of Research

By Kerry Woods

As I began writing this, I realized that several Huron Mountain-related events of this summer fell into a network of historical interconnections. I suppose the likelihood of experiencing this sort of connectivity increases as one gets older; in any case, these linkages make a context for these notes.

I was first made aware of the forests of the Huron Mountains through the landmark book, *The Deciduous Forests of Eastern North America*, published in 1950 by Dr. E. Lucy Braun, one of the founders of American vegetation science. Braun taught at the University of Cincinnati from the 1920s to 1948; she was the second woman to earn a Ph.D. from that university (her sister, an entomologist, was the first), and was the first woman president of the Ecological Society of America. The book, her *magnum opus*, was based on extensive travel and sampling at hundreds of sites from the Gulf Coast to southern Canada. Braun gives the lands of the Huron Mountain Club particularly extensive treatment as representative of the natural forests of the upper Great Lakes, and it was that work that led to my first visit to Ives Lake in 1978. (I have yet to discover Braun's original notebooks and data from her work in the Huron Mountains, but hope to track them down.)

In August, the Ecological Society of America held its 100th annual meeting in Baltimore. This is the largest ecological conference in the world; this centennial meeting had over 5,000 participants (about 50 times the size of meetings in Braun's day). One of the special sessions was dedicated to the work of E. Lucy Braun. It seemed to me to

be particularly fitting that *three* of the participants in this session were Huron Mountain Wildlife Foundation researchers. Walter Carson (University of Pittsburgh) talked about the role of large herbivores in forest dynamics, Rose-Marie Muzika (University of Missouri) reviewed her studies of fire history, and I was invited to talk about how the long-term studies that brought me to the Hurons in the first place have influenced our concepts of old-growth forests.

MANIERRE AWARD

Following that session at the ESA meeting, I officially presented Dr. Rose-Marie Muzika with the 2015 HMWF Manierre Award. The award was announced at HMWF's August annual meeting, but Dr. Muzika was unable to attend to receive the award at that time. The award is given annually to recognize notable publications springing from HMWF-supported work. Many Foundation supporters will recall Dr. Muzika's presentation of her research on fire history in the pine forests of the Huron Mountains at the annual meeting several years ago. This research saw publication in 2015 in the *Journal of Sustainable Forestry* under the title, "Fire, Drought, and Humans in a Heterogeneous Lake Superior Landscape" (co-authored with R.P. Guyette, M.C. Stambaugh, and J.M. Marschall, all of the University of Missouri).

Using tree-ring analysis and fire scars on charred logs and stumps of red pine, Dr. Muzika was able to reconstruct fire history for more than 500 years (the earliest fire identified was in 1439). She finds that, prior to 1750, pine forests of the area experienced fire, on average, every 50 years; fires



Rose-Marie Muzika won an award this year from the Foundation in honor of her published research on the fire history of pine forests.

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Each newsletter, we report on the “yield” of HMWF-supported research as it becomes available to the larger scientific community, through peer-reviewed publication, completed theses, or presentations at major conferences. Our researchers have established a strong presence for the Foundation and the Ives Lake Field Station in the research community. We have accomplished this in a remarkably cost-efficient way.

PUBLICATIONS

- Marcarelli, A.M., C.J. Huckins, S.L. Eggert. 2015. Sand aggradation alters biofilm standing crop and metabolism in a low-gradient Lake Superior tributary. *Journal of Great Lakes Research* 09/2015 (online – in press); DOI:10.1016/j.jglr.2015.09.004.
- Yanoviak, S. P., E. M. Gora, J. Fredley, P. M. Bitzer, R.-M. Muzika, and W. P. Carson. 2015. Direct effects of lightning in temperate forests: a review and preliminary survey in a hemlock-hardwood forest of the northern United States. *Canadian Journal of Forest Research* 45: 1258-1268. doi: 10.1139/cjfr-2015-0081.
- Zhang, R., A.L. Hipp, O. Gailing. 2015. Sharing of chloroplast haplotypes among red oak species suggests interspecific gene flow between neighboring populations. *Botany* 93:691-700.

CONFERENCE PRESENTATIONS

- Carson, Walter. On the causes and consequences of region-wide changes in the browsing and disturbance regimes within the Eastern Deciduous Forest Biome. 100th Annual Meeting Ecological Society of America, Baltimore, 2015.
- Grecco, A.E., & J.M. LaMontagne. Individual variation in white spruce seed production and cone size: implications for mast seeding research. Midwest Ecology and Evolution Conference, Indiana University, Bloomington, IN, 2015.
- Nitschke, Jasmine. OSL dating of a strandplain sequence in the Pine River embayment of Lake Superior along the Upper Peninsula of Michigan. Geological Society of America Annual Meeting, 2015.
- Wetzel, Mark J., John W. Reynolds, and Margaret A. Morgan. The aquatic and semiaquatic *oligochaetes* (*Annelida*, *Clitellata*) of the Huron Mountain Club, Upper Peninsula, Michigan, USA. 13th International Symposium on Aquatic Oligochaeta (ISAQ), Brno, Czech Republic, 2015.
- Wetzel, Mark J., John W. Reynolds, and Margaret A. Morgan. The earthworms (*Annelida*, *Clitellata*) of the Huron Mountain Club, Upper Peninsula, Michigan, USA. 13th International Symposium on Aquatic Oligochaeta (ISAQ), Brno, Czech Republic, 2015.
- Wetzel, Mark J., John W. Reynolds, and Margaret A. Morgan. A checklist by counties of earthworms (*Annelida*, *oligochaetous Clitellata*: families *Acanthodrilidae*, *Lumbricidae*, *Megascolecidae*, and *Sparganophilidae*) in Michigan, USA. 13th International Symposium on Aquatic Oligochaeta (ISAQ), Brno, Czech Republic, 2015.
- Williams, E.W. and D. Farrar. Hybridization histories in the *Botrychium matricariifolium* (*Ophioglossaceae*) complex. Botanical Society of America Conference, Edmonton, Alberta, 2015.
- Woods, Kerry. New models for old growth from long-term studies in eastern deciduous forests. 100th Annual Meeting Ecological Society of America, Baltimore, 2015.

tended to be more extensive in the red and jack pine stands along Lake Superior and more localized and asynchronous in red pine stands on the dry slopes of inland mountains. From 1750 until about 1900 (when active fire suppression began), mean intervals between fires dropped sharply to about 20 years. Dr. Muzika attributes these more frequent fires primarily to increased human activity. This study is likely to prove be of very high value in understanding the dynamics of Great Lakes forests prior to European-American arrival; fire ecology has been studied intensively in many other regions, but conventional thinking about the dynamics of the cool temperate forests of the northeastern U.S. has often given little consideration to fire, in part because the potential for reconstructing fire histories was limited by the availability of unlogged reference forest systems.

ANNUAL MEETING

The 2015 HMWF annual meeting in August saw a full house at the Huron Mountain Club Playhouse. The main event – a talk by Dr. John Vucetich of Michigan Technological University – had a historical flavor. Dr. Vucetich is the lead scientist for the world-famous study of wolves and moose on Isle Royale. Uninterrupted since 1959, the Isle Royale study is, by far, the longest-term study of a large predator-prey system, and it has provided critical insights into how large mammals interact with one another and with general ecosystem function; some of those insights have challenged long-held models of predator-prey dynamics and of population regulation. Dr. Vucetich built on findings from Isle Royale to explore the role of the expanding wolf population in the upper Great Lakes region generally. More specifically, he reflected on the 1974 attempt to reintroduce wolves at the Huron Mountains. That experiment provided important insights that informed the design of later, successful introduction attempts in Yellowstone National Park and in North Carolina.



Winging It

Independent researcher Jim Bess and Thomas Werner from Michigan Tech have added over 500 species to the moths documented at the Huron Mountain Club. These include many rather nondescript (and difficult to identify) gray and brown members of groups like the *Geometridae* family (also known as inchworms). However, as the photo of mounted specimens from Jim Bess's collection shows, new discoveries also include striking and colorful members of the hawkmoth and underwing groups.

As predicted in the last previous newsletter, the results of these studies and other 2015 projects will kick the total number of species documented at the Huron Mountains well past the 5,000 mark. The All-Taxa Biodiversity Inventory, found at www.hmwf.org, will reflect this in its next update.

Photo by Jim Bess

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

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