

HURON MOUNTAIN WILDLIFE FOUNDATION



Winter 2020/2021
Newsletter

The Weather Report: Climate Study in the Huron Mountains

By Jill Riddell



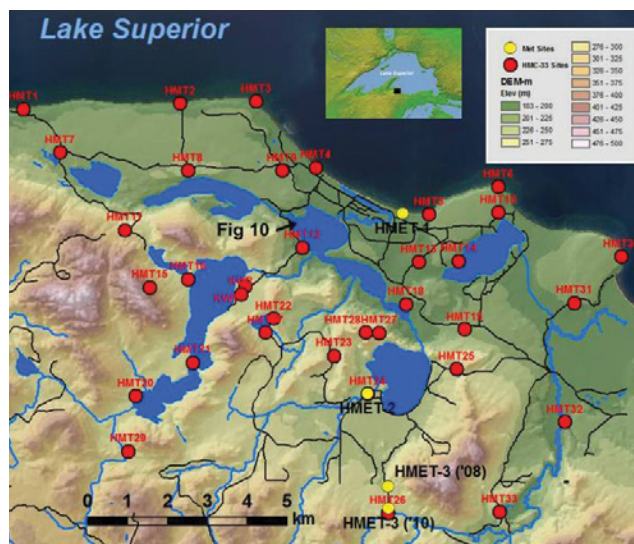
Fritz Nelson and Ken Hinkel are professionals whose work crosses disciplines. At the Huron Mountains, their work falls mainly into the category of climatology, yet Hinkel has degrees in geography and geology, and Nelson in geography. Their work soars among and connects various fields of study. When asked how they should be described professionally for this article, they settled on a label broad enough to cover everything: “earth scientists.”

Fifteen years ago, the earth scientists Frederick “Fritz” Nelson at the University of Delaware (now at Northern Michigan University and Michigan State University) and Kenneth Hinkel at the University of Cincinnati (now at Michigan Tech), began conducting a climate observation study in the Huron Mountains. Since then, with the Huron Mountain Wildlife Foundation’s support, they’ve been maintaining and collecting data from a network of climate-observation stations installed throughout the Huron Mountains.

“We wanted to do this because this scale of observation—detailed information about a local region of the approximate size of the Huron Mountain Club property—was relatively rare,” says Nelson. “A report issued by the National Oceanic and Atmospheric Administration pointed out how critical it is to collect information at the mesoscale.” That report is encapsulated in the book, *Observing Weather and Climate from the Ground Up: A Nationwide Network of Networks* published by the National Academies Press. Its authors stated, specifically, that “the status of U.S. surface meteorological observation capabilities is energetic and chaotic, driven mainly by local needs without adequate coordination” and said that serious, long-term studies at the mesoscale were the sort of information most sorely missing. (*Meso* means middle or intermediate scale as opposed to *micro*—very small—or *macro*—very large.)

Hinkel and Nelson designed the Huron Mountain Climate Observation Network to provide synchronous observations over the extent of the Huron Mountain Club’s property. The network provides climate data from a variety of microenvironments and supports integration of these measurements to show how temperature varies over the entire study area with respect to the shape of the landscape. This mesoscale network can potentially be integrated into the national network proposed in the National Academies Press book.

In addition to the intrinsic value as a source for information about local climate, the network yields data useful to ecologists and other scientists working in the Huron Mountains. Information from the network can be helpful in managing the property, in



Left: Short for “meteorological station,” a met station is the standard weather station setup. It collects hourly measurements of air temperature, relative humidity, solar radiation, precipitation, barometric pressure, wind and gust speed, and wind direction, and also records the temperature of the soil.

Right: Distributed at even intervals throughout the property, at different altitudes and in different cover types, are 39 monitoring stations. Thirty-five of these log only temperatures, while four are full-blown weather stations. (“Everything you’d get in a news report,” says Hinkel.)

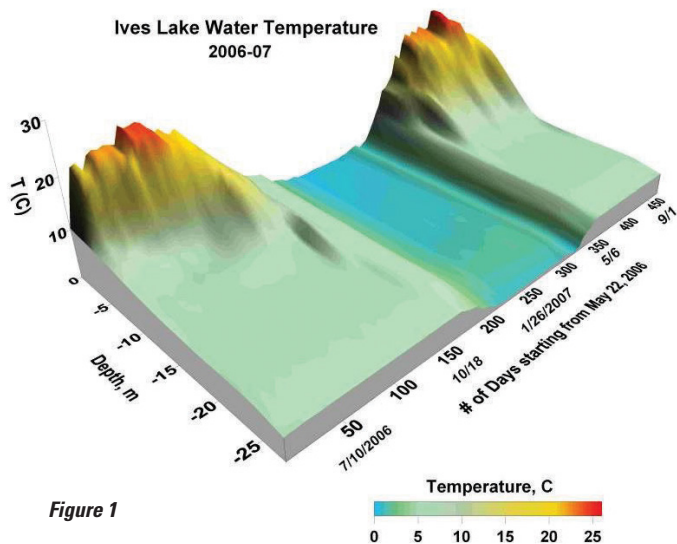


Figure 1

analyzing regional climate, and for specific projects like evaluating whether the nearby sulfide mine is affecting the Huron Mountains. Nelson's and Hinkel's findings have been useful for HMWF researchers like Alex Dye and Steve Voelker, who study the relationship between climate and tree growth rates; Louise Chavarie's and Mary Zimmerman's work on Rush Lake's lake trout; and Betsy Swanner's and Chad Wittkop's work researching chemistry and history of Canyon Lake. Also, such "mesonets" are crucial elements in short-term weather forecasting and regional climate monitoring.

"It's a great location for the study because we can compare the measurements taken in the pre-Columbian, old growth forest to those of nearby meadows," says Hinkel. "Plus, with the security we can install expensive instruments and trust they'll be safe." At least they're safe from human interference, though animals are a different story. Early on, the wires in twenty percent of the met stations were gnawed by porcupines and squirrels, and bears have sometimes torn them apart. One particular installation near a road in the property's West End was ruined by bears three years in a row. Even after Nelson and Hinkel relocated it into the branches of a tree, the bear climbed the tree to get it.

Hinkel's and Nelson's program maps temperature at hourly, daily, weekly, monthly, and annual temporal scales. The network is made up of 35 stations measuring air and near-surface temperature and four weather stations recording observations of other additional meteorological variables. The network will ultimately achieve its maximum utility by continuing over a multi-decade period. Its usefulness increases the longer it operates. The two collaborators hope the study will be able to continue over many decades.

To learn more: Hinkel, K.M. and F.E. Nelson. 2012. Spatial and temporal aspects of the lake effect on the southern shore of Lake Superior. *Theoretical and Applied Climatology*. DOI 10.1007/s00704-012-0585-2.

Figure 1

Lake temperatures are measured as part of this survey. Sensors were attached to a nylon rope with a concrete block anchor, and are lowered into the deepest part of Ives Lake (100 ft). An inflatable float is attached to the top of the rope to keep it from sinking. The twelve sensors make hourly measurements and are equally spaced at depths of 0, 0.7, 3.7, 6.7, 9.7, 12.7, 15.7, 18.7, 21.7, 24.7, 27.7, and 30.7 m. Temperature changes are more pronounced at the surface. The coldest temperatures are 32 degrees Fahrenheit, and the warmest during the measurement period shown in the figure are in the low 70s. Temperatures remain cool at depth. Below ten feet under the surface, the temperatures don't change much during the year.

FUN FACTS ABOUT LOCAL WEATHER: *Findings from the Climate Monitoring Network*

IN SUMMER

The temperature on land right along the Superior shoreline is consistently cooler than places a little further inland. The typical difference in temperature between the southern border of the Huron Mountain Club property and the Club property directly on the shore is one and a half degrees Fahrenheit. Inland temperatures fluctuate up and down more dramatically than temperatures do next to Lake Superior.

IN WINTER

Near the shore, the snow cover is thin because winds off of the lake prevent it from accumulating. As you'd expect, the soil freezes in winter. But away from the lakefront, especially in years when there's a blanket of snow early in the season and the snow remains, the soil typically doesn't freeze during winter. The heat stored in the ground is slow to dissipate, and snow is a good insulator that inhibits the flow of heat from the warm ground to the cold air above the snow.

Winter temperatures share the same characteristic variation as summer ones, only in reverse: the shoreline records consistently warmer temperatures than the weather stations located on inland property, and inland temperatures consistently fluctuate more dramatically than temperatures do next to the lake. In winter at shoreline sites the mean of daily average temperature is 24°F, and at inland sites the mean of daily average temperature is 22°F.

HISTORY

Before this survey began recording data from the Huron Mountains, most research conducted by scientists on the Huron Mountains cited weather information that came from Marquette. "I can't stress this enough: very few weather observations were made by scientists who measured directly within the Huron Mountains," says Fritz. "They'd look up data from Marquette, which was as close as they could find. But not only was that information coming from thirty miles away, the particular weather station it originated from happened to be located on the roof of a building in the middle of Marquette's heat island." (The National Weather Service's station was on the roof of the Federal Building (the post office) from 1885 to 1900, and again from 1937 to 1979. In intervening years it operated from the top of a downtown bank.)

IS OUR LOCAL CLIMATE WARMING?

The Huron Mountains will be affected by global climate change. No part of Earth is immune. However, this particular span of data—over the past fifteen years—show no warming trend. "The data collected during the run of this survey so far are quite variable from year to year," says Nelson.

Manierre Award Given for Tree Ring Analysis

By Kerry Woods

The Manierre Award was created twenty years ago to honor the contributions of Dr. William and Anne Manierre to the work of the Foundation. The Award recognizes recent publication in the peer-reviewed scientific literature of research sponsored by the Huron Mt. Wildlife Foundation. Sixteen researchers have received the award since its first presentation in 2000. All winners and the publications recognized are listed at <http://www.hmwf.org/news/manierre-award/>.

Presentation of the Award is traditionally a feature of the Foundation's summer annual meeting. Sadly, the meeting was cancelled this year, a victim (along with so many other things) of the COVID-19 pandemic. However, given the rich crop of publications from HMWF-sponsored research projects over the last couple of years, the Foundation Board decided to proceed with a 2020 Award.

The 2020 Manierre Award has been bestowed upon Dr. Steve Voelker for his 2019 paper, with six co-authors, "Tree-ring isotopes adjacent to Lake Superior reveal cold winter anomalies for the Great Lakes region of North America," in the online journal *Scientific Reports*. *Scientific Reports* is part of the British *Nature* publishing group; it is open-access, so the full text of the paper is available to all at <https://www.nature.com/articles/s41598-019-40907-w>.



Dr. Steve Voelker, winner of the 2020 Manierre Award.

For some decades, ecologists and climatologists have used the analysis of tree-rings – 'dendrochronology' – to reconstruct various aspects of environmental history. Ring-widths are records of tree growth rates and variation in growth rate can be used to help reconstruct climate over past decades and centuries, extending our understanding of climate variation well beyond the short history of meteorological instrumentation. Dendrochronology research has shown that ring widths in various species can be used, statistically, as 'proxies' for different aspects of climate; some species respond strongly to moisture, some to temperature, some to summer weather, some to winter, etc. More recently, analysis of specific chemical isotopes in growth rings (requiring sophisticated analysis of the tiny amounts of wood in a single ring from a core only a few mm in diameter) has permitted ever more detailed understanding of past climates. These approaches to the study of past climates have become a critical contribution in our predictions of likely future climate change.

Voelker and colleagues report an 'isotopic signature' in the rings of white pine that provides a unique indicator of specific winter conditions experienced by the tree. Applying this tool to cores from trees along the shore of Lake Superior, they were able to reconstruct winter minimum temperatures and Lake Superior ice cover. The method promises a much more detailed understanding of historical climatic fluctuations for the Lake Superior region and the potential for generalizing this tool to other regions.

Dr. Voelker is currently an Adjunct Assistant Professor at the SUNY College of Environmental Science and Forestry in Syracuse, NY. The research was conducted while he was at Utah State University. Dr. Voelker has also collaborated with past Manierre Award winner, Dr. Louise Chavarie (2017), to explore whether tree rings and bone growth patterns in lake trout are responding similarly to local climatic patterns. We hope Dr. Voelker will be able to join us for the 2021 Foundation meeting to be recognized in person, along with the winner of next year's Manierre Award.

DONATIONS WELCOME

You can make a donation by mailing a check made out to "Huron Mountain Wildlife Foundation" to: Secretary Ted McGraw, Huron Mt. Wildlife Foundation, 71 Links Road, Hobe Sound, FL 33455

You can also pay by PayPal. Go to hmwf.org and click on the "Donate" tab.

HMWF is a 501(C)(3) organization and donations are fully deductible.



RESEARCH PRODUCTS

The emergence of research products was slowed by Covid-19 this year. Even the potentially ‘distanced’ activities of data analysis and writing have had to fight for researcher time against the increased demands of new institutional and classroom protocols. The wheels also turned more slowly at the research journals. The impact has been particularly significant with respect to conference presentations; most conferences were cancelled and submissions of papers to those that went virtual seemed to be less enticing.

Yet despite the special hurdles of 2020, a good crop of research publications did emerge over the year. There is a complete, and regularly updated list of publications and theses that have sprung from HMWF-sponsored work at our website, www.hmwf.org

PEER-REVIEWED JOURNAL PUBLICATIONS

- Dye, Alex, Kerry D. Woods. 2019. Growth and climate response of four new *Tsuga canadensis* (L.) Carrière (Eastern hemlock) tree-ring chronologies from Michigan’s Upper Peninsula. *The Great Lakes Botanist* 58:193-204. <http://hdl.handle.net/2027/spo.0497763.0058.304>
- Houghton, David C. 2020. New state records and noteworthy recaptures of Michigan (USA) Trichoptera. *The Great Lakes Entomologist*. in press.
- Houghton, David C., Ryan Lardner. 2020. Ash-free dry mass values for northcentral USA caddisflies (Insecta, Trichoptera). *ZooKeys* 951:37-46 doi: 10.3897/zookeys.951.49790
- Houghton, David C., WE DeWalt, AJ Pytel, CM Brandin, SR Rogers, PL Hudson, DE Ruiter, E Bright, BJ Armitage. 2018. Updated checklist of the Michigan caddisflies (Insecta: Trichoptera) with habitat affinities. *ZooKeys* 730: 55–72. <https://doi.org/10.3897/zookeys.730.21776>
- Leeper, Abigail C., Beth A. Lawrence, Jalene M. LaMontagne. 2020. Plant available soil nutrients have a limited influence on cone production patterns of individual white spruce trees. *Oecologia* 194:101-111. doi:10.1007/s00442-020-04759-w
- Marcarelli, Amy M., Ashley A. Coble, Karl M. Meingast, Evan S. Kane, Colin N. Brooks, Ishi Buffam, Sarah A. Green, Casey J Huckins, David Toczydlowski, Robert Stottlemeyer. 2019. Of small streams and great lakes: integrating tributaries to understand the ecology and biogeochemistry of Lake Superior. *Journal of the American Water Resources Association* 55:442-458. <https://doi.org/10.1111/1752-1688.12695>
- Muscarella, Mario E., Claudia M. Boot, Corey D. Broeckling, Jay T. Lennon. 2019. Resource heterogeneity structures aquatic bacterial communities. *The ISME Journal* 13, 2183–2195 doi:10.1038/s41396-019-0427-7
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- Priest, Ronald J., Robert R. Kula, and Michael W. Gates. 2019. Leaf mining insects and their parasitoids in the old-growth forest of the Huron Mountains. *The Great Lakes Entomologist* 52:117-159. <https://scholar.valpo.edu/tgle/vol52/iss2/9>

By Henry Dykema

Although 2020 was an exceptionally odd year for us all, the Huron Mountain Wildlife Foundation managed to carry out a productive season of important research. Because of COVID-19, Brock Francis, our facilities manager, spent extra time cleaning and disinfecting the Stone and Thorpe Houses. We imposed strict social distancing guidelines for our investigators and were able to provide a safe and productive facility.

Over 35 investigators arrived this year to study a multitude of topics: how fish behaviors change due to human influences; beetle inventories; aquatic plant studies; cone production and mast seeding; and mapping where an invasive form of fruit fly lives. They found improvements in the facilities that greeted them. We upgraded the old electrical service at the Stonehouse, secured the footings for the beautiful and historic porch and rebuilt the side staircase. The Thorpe House received a new and striking paint job after years of peeling.



Before this summer, it had been a lot of years since the exterior of the newest addition to HMWF's field station had been painted, but now it has a glorious fresh coat. The Thorpe House, formerly known simply as the Red House, has been renamed in honor of Wayne Thorpe who meticulously restored the building and helped bring it online for use by researchers.

While we are glad to have been able to provide a safe and functional program this year it was an abbreviation of what we would have had without COVID-19. The HMWF Board agreed to allow HMWF-approved projects to defer a year as many institutions did not allow their faculty to travel or conduct field work. This means that next year we will not only have our new crop of projects for 2021 but also our 2020 deferred projects. This may well put a strain on the facilities and on our financial ability to support the work.

At this time of uncertainty and concern the HMWF is making every effort to keep the important and evermore meaningful scientific work going. We depend on your support to continue this work that provides critical information to the natural science community that can be instrumental in understanding the processes of our earth and how they might affect and be affected by climate change. This year we will be honoring and thanking our 2020 donors with a communication after the New Year so all who generously give will be recognized. The letter included with this newsletter gives a brief history of the Foundation and an appeal for support by all the HMWF presidents, past and present. And as always, you can go online anytime to make a donation to the Foundation. It's very easy—just go to the website at hmf.org and find the tab clearly marked “Donate.”

CONFERENCES

Grengs, A., Wittkop, C., Lambrecht, N., Fahkraee, M., Katsev, S., and Swanner, E., 2020. Constraining iron formation primary mineralogy using ferruginous lake sediments. Geological Society of America Abstracts with Programs, v. 52, doi: 10.1130/abs/2020NC-347988.

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Sterman, J., A.C. Leeper & J.M. LaMontagne. 2019. Synchrony of mast seeding patterns in a boreal forest community. Joint meeting of the Canadian Society for Ecology and Evolution. Fredericton, New Brunswick, Canada. August 2019.

Voelker, S., JI Burton, K O'Keefe, C Dangerfield, KA McCulloh. 2019. Lake-effect climate increases summer drought impacts on the growth and physiology of sugar maple and white spruce in temperate to boreal ecotone forests. Ecological Society of America Annual Meeting

OTHER RECOGNITION

Work on spawning migrations of suckers, conducted by Dr. Karen Murchie of the Shedd Aquarium, has been featured in the newsletter of the International Joint Commission (on U.S.-Canada 'boundary waters') – <https://ijc.org/en/tracking-sucker-run-how-great-lakes-fish-sustains-food-webs> – and in an educational YouTube posting by the Shedd Aquarium – https://www.youtube.com/watch?time_continue=1&v=eT9VChl4XwY&feature=emb_logo.

Dr. David Costello of Kent State University used preliminary studies supported by HMWF to support a 'career award' proposal to the National Science Foundation that has been funded at \$718,000 (<https://www.kent.edu/research/news/stream-ecologist-receives-718000-nsf-career-award-study-trace-metals-stream-algae>).



Cheers to 66 Years!

By Barbara Manierre

All good things come to those who wait, and during these months of the pandemic, everyone has been doing a lot of waiting. But next summer, on August 4th, wait no more! The Huron Mountain Wildlife Foundation will hold a better-than-ever celebration on the shores of Ives Lake to toast 66 years of groundbreaking research, the dedication of the Thorpe House, and the Foundation's spruced up facilities. All of this will be celebrated in style with local food and drink: wood fired pizzas made on-site, wine and locally brewed beers, ice cream from Donckers sweet shop in Marquette, live music and, best of all, an auction of experiential and artistic items created by Foundation supporters. To spark your interest we've included a few photos of auction items in the newsletter. Mark your calendars and get ready to head to Ives Lake on August 4, 2021 for a great time!

The auction will feature a variety of fun things to bid on: trips, experiences and useful art like the quilt above.

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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