



A Huronicus Among Us: Discovering the Trout of the Hurons

By Jill Riddell

A team of researchers has determined that two distinct forms of lake trout thrive in Rush Lake, a small but deep lake in the Huron Mountains. The first type is called the “laker” and it spends its days near the banks. Commonly found throughout the lake trout’s range, the laker is a lean form that prefers shallow to deep water. It has short fins, a long back end and tail, low body fat, and relatively small eyes situated in the middle of its head. It’s evolved for fast swimming, horizontal movement, and feeding on fish that patrol the shores.



On a cold spring day, researcher Charles Krueger measures fish in Rush Lake. Scientists have determined there’s a type of trout in Rush Lake that lives nowhere else. Photo by Andrew Muir

The other form, named “huronicus” in honor of the Huron Mountains, differs in appearance, behavior and appetite. It’s likely that Rush Lake is the only place this variety is found. “Huronicus is very dark in color—walnut-colored, almost black,” says Andrew Muir, a scientist from the Great Lakes Fisheries Commission who’s been conducting the latest round of research. “And it’s small. The adult size is only about fifteen or sixteen inches.”

Huronicus spends most of its time in Rush Lake’s deepest water. “We find the shape of huronicus quite different from the lean form,” says Muir. “These fish are well-designed for living in deep

water. The huronicus has a fatter belly, and the lipids help it move vertically. It has slightly longer fins. Its eyes are up higher on the head, which makes it appear to be constantly looking up.”

Based on what scientists have learned from deepwater forms found in larger lakes, during the day, the huronicus lake trout spends the sunny hours resting in deep pools. When night falls, it rouses into action. It rises up from the bottom to feed on fallen insects, zooplankton, and freshwater shrimp. It finds food visually, and by using its lateral line system to sense vibration and movement, and by using its keen sense of smell.

Huronicus was spotted for the first time eighty-four years ago. In 1929, two prominent ichthyologists, Carl Hubbs and Walter Koelz were studying the fishes of the Huron Mountain Club. Hubbs had a remarkable career, working first at the Field Museum of Natural History in Chicago, then as fish curator at the museum of the University of Michigan, and later as a professor at Scripps Institution of Oceanography in San Diego. He published over 900 papers and was such a luminary in the field of aquatics that twenty-two different species of fish have been named in his honor (including a distinctive cisco resident only in Ives Lakes that’s sometimes recognized as a distinct species, *Coregonus hubbsi*). Walter Koelz eventually switched from working on fish to working on birds, and he became well-known as an explorer and adventurer who traveled the world collecting specimens for museums.

“Carl Hubbs recognized that this was a different form of trout,” says Muir. “He is the one who gave it the name *Salvelinus namaycush huronicus*. But the information from his 1929 study lacked detail.”

Though it was well-documented that different forms of lake trout co-exist with lakera in large bodies of water like Lake Superior, it’s a puzzle how a distinct form of trout could evolve in a lake as small as Rush. Before the recent spate of work sponsored by the Foundation, there was some doubt that it even existed. Without a thorough study that applied modern scientific methods, there was no way to know whether what Hubbs called “huronicus” was a morphologically and genetically distinct form or merely a variation in coloring from the more common laker.

In 2006 and 2007, researchers Mara Zimmerman from Michigan State University, Charles Krueger from Great Lakes

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The first team of Foundation scientists to investigate Rush Lake trout worked in the summers of 2006 and 2007. Here, Trevor Middel from the Ontario Ministry of Natural Resources navigates a rowboat packed with gear, including hydroacoustic equipment. Photo by Charles Kreuger

Muir, Zimmerman, and Krueger analyzed the morphological and ecological differences while Shauna Baillie and Paul Bentzen from Dalhousie University, in Halifax, Nova Scotia analyzed genetic differences between lakers and huronicus. Curiously, the researchers found that analyses of DNA did not, so far, show clear genetic divergence.

“This far north, glaciers receded only 9 or 10,000 years ago,” Muir says, “And these fish live up to 30 years, which means there haven’t been a ton of generations. It takes a long time to evolve distinct genetic variation. But so far, we’ve examined only a small portion of the

Fisheries Commission, and Trevor Middel from Ontario Ministry of Natural Resources investigated Rush Lake’s huronicus. With Foundation support, the researchers had no difficulty catching and identifying it. They confirmed that huronicus existed and that its population in Rush Lake remained robust. Zimmerman’s team compared its features with lakers found in Rush Lake and with various forms documented from elsewhere.

In 2011, Muir and Krueger received Foundation support to do additional work to settle the question of whether the laker and huronicus forms are genetically distinct or whether they’re variations within a single population or gene pool. This work targeted collecting more samples for genetic analysis.

“It was spring of 2011 when I went to Rush Lake with Chuck Krueger,” Muir recalls. “It was April, with a bit of snow and a blustery wind blowing.”

The researchers didn’t want to take any more fish than absolutely necessary, so they did their sampling non-lethally, catching the trout with rods and reels from a rowboat.

“I rowed that boat around the lake about fifteen times in three days. We’ve got tons of sampling equipment out there, and the boat has a cage on the side to keep the fish alive,” Muir says. “Sometimes the logistics got challenging, handling that boat in choppy water with one and a half-foot waves”

Given its relatively small surface area, Rush Lake is exceptionally deep. A fair portion of the lake goes down to 90 meters, or 300 feet. To put this into perspective, 90 meters is the approximate height of a 30-story skyscraper. Compared with any other lake in the Huron Mountains, Rush Lake is more than twice as deep.



This particular lake trout is the type that’s endemic to Rush Lake. Smaller and darker than the average lake trout, it spends much of its time in the deepest water. Photo by Andrew Muir

LAKE TROUT, *SALVELINUS NAMAYCUSH* WHAT IT EATS & HOW IT LIVES

The lake trout is native to only one place: northern lakes of North America. These handsome fish can live for three decades. They grow relatively slowly, and take years to mature to the point where they can reproduce.

Because we fish for lake trout, we tend to regard it primarily as our prey. Yet for smaller creatures, the lake trout is a fearsome predator. “A relentless hunter, the lake trout seems to have a peculiar penchant for cisco.” according to the Michigan Department of Natural Resources website. “It also concentrates on alewives, smelt or sculpin (dead or alive), and sometimes takes crustaceans, insects, other fish, and even small mammals.” This wide-ranging diet is corroborated by Minnesota DNR: “Other things that have turned up in lake trout stomachs are freshwater sponges, terrestrial insects, shrews, and even yellowwarblers.”

trout genome. As we develop technologies to look at more, we're likely to find where the two have diverged or are diverging."

Also, Muir points out, because Rush Lake is small, it's hard to have absolute reproductive separation between the two. Any time the odd stray huronicus spawns with a laker, that creates a breakdown of the genetic separation. "Even if the genetic distinctions aren't yet apparent, you clearly have two forms with different sets of behavior and morphology," Muir says.

"Rush Lake is unique. There are hundreds of thousands of small lakes scattered over the Ontario Shield, and plenty of them are nearly identical in terms of habitat," says Muir. "But Rush Lake is the only small lake we know that has its own different, distinct form of lake trout."

The Great Lakes Fisheries Commission helps restore native deep water fish in the Great Lakes for the benefit of Canadians and Americans. It's the binational commission that was formed in 1954 to deal with the lamprey issue and to help restore lake trout, one of the species severely impacted by lamprey.

Dr. Mara Zimmerman was part of the original research team that examined the Rush Lake trout. Formerly at Michigan State University, she's now at Department of Fish and Wildlife for the State of Washington. Photo by Charles Krueger



PUBLICATIONS AND CONFERENCES

Investigators publish and present results of the work conducted during their time at the Huron Mountains in a wide range of forums. Here is a collection of recent publications from Foundation scientists that we've learned about since the last issue.

RECENT PAPERS BY FOUNDATION RESEARCHERS THAT HAVE APPEARED IN PEER-REVIEWED PUBLICATIONS:

- Gailing, O. 2013. Differences in growth, survival and phenology in *Quercus rubra* and *Q. ellipsoidalis* seedlings. *Dendrobiology* 70:73–81.
- Lind, J. F., and O. Gailing. 2013. Genetic structure of *Quercus rubra* L. and *Quercus ellipsoidalis* E. J. Hill populations at gene-based EST-SSR and nuclear SSR markers. *Tree Genetics & Genomes* 9:707–722.
- Major, K., D. J. Soucek, R. Giordano, M. J. Wetzel, and F. Soto-Adames. 2013. The common ecotoxicology laboratory strain of *Hyalella azteca* is genetically distinct from most wild strains sampled in Eastern North America. *Environmental Toxicology and Chemistry* 32:2637–2647.

CONFERENCE PRESENTATIONS

- Jol, Harry M. "GPR imaging of coastal sedimentary deposits along the Lake Superior shoreline of the Huron Mountains, Michigan, USA." Annual Meeting, Geological Society of America, Denver CO, 27-30 Oct 2013.
- Loope, H.M., Liesch, M.E., Loope, W.L., Jol, H.M., Goble, R.J., Arnevik, A.L. and Legg, R.J. Early Holocene eolian activity, Huron Mountains, Upper Michigan. 47th Annual Meeting (2-3 May 2013) North-central Section Geological Society of America.

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Annual Meeting: A Great Success

By Kerry Woods, Research Director

Following the annual meeting in August, around twenty Foundation members and supporters went on an excursion to visit the site of the 5-acre deer enclosure constructed and maintained since 2011 by Dr. Donald Waller's lab. Since Dr. Waller wasn't able to make the meeting, I led the group to the enclosure located near Fisher Creek.

The plan is for researchers plan to measure sample plots within and outside the enclosure annually for at least five years, assessing differences in understory plant communities as well as nesting bird populations and other ecosystem features. For example, the 2013 sampling revealed, for example a number of blooming pink lady-slipper orchids within the enclosure while none were recorded in adjacent forests.

MANIERRE AWARD

At the annual meeting, the annual Manierre Research Award went to Dr. Robert Fahey of the Morton Arboretum in Lisle, Illinois for a paper he co-authored with Dr. Craig Lorimer, of the University of Wisconsin, "Persistence of pine species in late-successional forests: evidence from habitat-related variation in stand age structure," which was published in *The Journal of Vegetation Science*. Some readers will remember Fahey's presentation at the Foundation's annual meeting and the field trip that he led afterwards in 2011. His paper addresses a long-standing question: how does white pine, while not itself tolerant of shade, maintain a significant presence in old-growth forests otherwise dominated by 'shade-tolerant' species like sugar maple and hemlock?

The Manierre Award recognizes a peer-reviewed publication of particularly ground-breaking research sponsored by the Huron Mountain Wildlife Foundation. The Award is supported by an endowment honoring the late Dr. William and Anne Manierre, long-time supporters of the Foundation and distinguished naturalists themselves. We have seen, in recent years, a gratifying increase in the rates of publication of Huron Mountain research (ten papers have been published so far in 2013), so there is no shortage of strong candidates for the Award and the choice has become increasingly difficult.



Each August, Foundation staff, board, supporters, and researcher convene to discuss the year's progress and to present the Manierre Award. This year's winner was Robert Fahey (left). Photos by Meg Townsend



In summer, native wildflowers line the rock walls outside the Stone House at Ives Lake.

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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