# THE CURIOUS CASES OF DEEPWATER SCULPIN *MYOXOCEPHALUS THOMPSONII* AND LAKE WHITEFISH *COREGONUS CLUPEAFORMIS* IN LAKE ST. CROIX OF MINNESOTA AND WISCONSIN

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The deep, dark (tannin-stained) waters of Lake St. Croix near Hudson, WI, is a natural lake of the St. Croix River formed by the delta of the Kinnickinnic River entering from Pierce County, WI. The lake is 18 miles long and in places over a mile wide with some deep holes ranging from 60 to almost 100 feet (Figure 1).

The St. Croix River was designated a National Scenic Riverway in 1968 for the river's outstanding aesthetic value and undeveloped floodplain and bluffs. The river is one of the cleanest in the state, supporting an incredible species diversity including a treasure trove of Minnesota and Wisconsin endangered, threatened, and special concern fish and mussel species.

In 2001, I was volunteering in the James Ford Bell Museum of Natural History (JFBM) fish collection. I was going through several collections from statewide surveys done in the 1970s and 1980s that had never been cataloged when I found a one half-gallon Kerr canning jar with the tag: "Lake St. Croix, Howard Krosch, Trawl, Summer 1969." I thought what a coincidence that I worked in the same Minnesota Department of Natural Resources (MDNR) office as Howard. I was well aware of his fish investigations of Lake St. Croix. I cracked the seal, which I could tell had never been opened. I poured the contents into a rinsing pan and noticed the specimens were heavily stained from age, but then I focused on one specimen at the pinnacle of the heap. I looked again at the tag on the jar and back at the specimen. My mind was reeling in disbelief, but without a doubt this was a Deepwater Sculpin *Myoxocephalus thompsonii* (Figure 2). The specimen was cataloged into the collection under the label's Lake St. Croix locality (JFBM 38097).

In Minnesota, Deepwater Sculpins are a glacial relict restricted to Lake Superior in the Gulf of Saint Lawrence drainage and five large, deep Rainy River headwaters lakes in the Hudson Bay drainage (Schmidt 2018). Lake St. Croix drains into the Mississippi River and is about 125 air miles from the nearest population in Lake Superior. I started sorting the rest of the fish and found three more head scratchers: (1) Banded Killifish *Fundulus diaphanus*, which has never been reported downstream of St. Croix Falls, WI, (2) American Brook Lamprey *Lethenteron appendix*, which occurs in only two Lake St. Croix coldwater tributaries (i.e., Valley Branch – Washington County, MN, and Kinnickinnic River – Pierce County, WI) (Figure 1), and (3) Slimy Sculpin *Cottus cognatus* likewise, known from the same two streams and also many miles north in the headwaters of the St. Croix River.

Jumping into detective mode, I pulled Howard's report of Lake St. Croix from the MDNR library and found the final species list. The Deepwater Sculpin was not listed. Then I checked the other

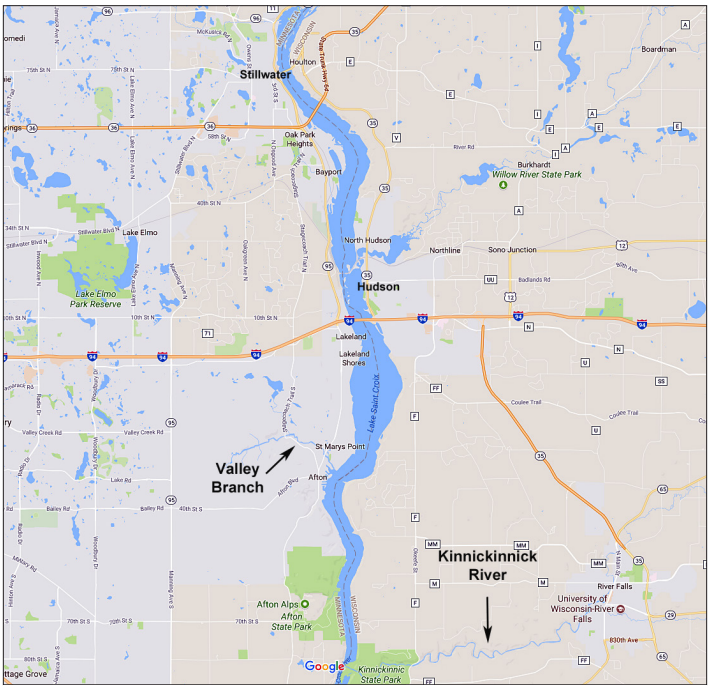


**Figure 1. Lake St. Croix (Minnesota and Wisconsin).**

Photos by the author unless otherwise indicated.

**Figure 2. Deepwater Sculpin from Lake Superior near the Apostle Islands, Wisconsin.**

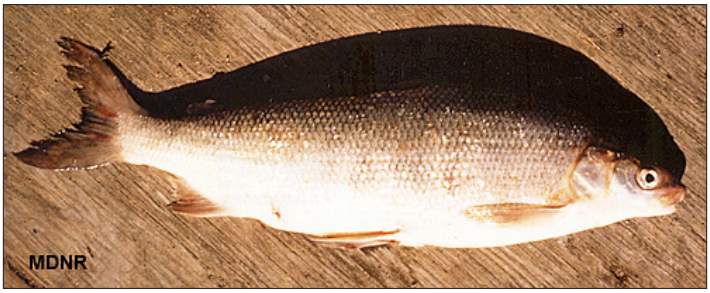


**Figure 3. Lake Whitefish from a 1967 commercial catch in Lake St. Croix. (Photo by Howard Krosch)**

species, and a red flag jumped off the print: Lake Whitefish *Coregonus clupeaformis*. This was another species never reported from the St. Croix River drainage. Next step was "go to the source." I asked Howard about the sculpin. This was news to him, but he added that Dr. James Underhill, JFBM Curator Emeritus, did occasionally accompany him to collect specimens from one trawling station, which he showed me on a map. Then I brought up the Lake Whitefish, and he again said he never collected any in his surveys but did check the catches of a commercial fisherman and observed the species multiple times. I asked the next question hoping there may be specimens on a dusty shelf: "Did you keep any specimens?" He piqued my anxiety by replying, "Yes" then after a pregnant pause added, "They were delicious!" The next day he stopped me in the hall to say he did check his freezer at home, but there were no long-lost Lake Whitefish. He then added, "But I have something else which may help." He showed me two photographs, both yellow and grainy. The first was of a woman holding the fish. The styles of the bygone era were frozen in time with her classic beehive hairdo and thick horn-rimmed glasses. The second was a close-up of the fish on a dock (Figure 3). Despite the poor quality, the diagnostic subterminal mouth and adipose fin were visible. The date on the photos was October 10, 1967.

The nearest known population of Lake Whitefish is, again, Lake Superior. However, there are two closer but unverifiable records. One is from 1975 of larval specimens found in the cooling water intake at the Excel Energy Prairie Island nuclear plant on the Mississippi River (Goodhue County, MN). This locality is about 25 air miles south of Hudson, WI. The other is a 1978 MDNR lake survey in the headwaters of the Mississippi at Charlotte Lake (Todd County), which is about 120 miles northwest of Lake St. Croix. Although the origin of Lake Whitefish in Lake St. Croix will forever remain a mystery, I am convinced the occurrence is valid.

On the other front, the trail of the Deepwater Sculpin specimen was literally ice cold. I could no longer go to the source since Jim Underhill had passed away the year before. He had been my all-knowing prophet of clarity on countless rare and unusual occurrences, which I found in the Bell Museum database, collection tally sheets, and his pre-computer but very user-friendly, card files. His collections were all pre-GIS. Locality data were anything but pinpoint accuracy providing only township, range, and section number, which covers one square mile. Sometimes I got lucky when a road crossing was listed. Jim remembered them all down to minute details and often had a great story to tell about each collection. I had been keeping Jay Hatch, NANFA member and one of Jim's students, in the loop about the specimen. He found it very odd that Jim had not left any record about the Lake St. Croix collection. We both agreed, until further evidence could be found, to flag the record with the following comment:

> *"SUSPECT OCCURRENCE. NOT MAPPED. Underhill did not list the species in his collection notebook, but the specimen was subsequently found in the sample jar. It is unlikely to have been overlooked by Underhill, and therefore, its inclusion in the sample is suspect."*

I did make three efforts to find the Deepwater Sculpin in Lake St. Croix even though I was never optimistic of success. I still don't have a clue why minnow traps work on species living out their entire lives in total darkness. Nevertheless, when "baited" with glow sticks, minnow traps are very effective on both Deepwater and Slimy sculpins in some deep northern Minnesota lakes (Schmidt 2013). During the summer, Lake St. Croix is bank-to-bank with houseboats and cabin cruisers. Minnow traps with fluorescent orange buoys wouldn't last five minutes unattended. We waited until a cold windy day in October 2005, and dropped the traps in the deepest holes shown on the lake map (Figure 4). Even then, heading back to the landing, we came across two anglers ignoring the buoy's MN DNR decals reeling in the minnow trap into their boat. With a little edge in my voice I asked politely to not disturb our survey markers. The one caught red-handed sheepishly replied, "We thought it fell off somebody's boat." The next day, we got an early start in an attempt to prevent others from trying to "rescue" our traps, but we found half were missing. We did catch a River Darter *Percina shumardi* at 55 feet and a Silver Lamprey *Ichthyomyzon unicuspis* at 80. The next day I had a message on my voice mail. The caller asked if I wanted the buoy and minnow trap he pulled from the river, but he forgot to leave his name or number and our office phones did not yet have have Caller ID. I wish he had mentioned if he found any fish in it.

The second attempt was a sweltering summer day using a Missouri benthic trawl, which was effective on both sculpin species in northeastern Minnesota lakes. We hit some of the same deep holes that were minnow trapped in 2005, but not a single fish. We assumed Lake St. Croix at these depths is a dead zone void of dissolved oxygen (DO) during the summer months. A recent water quality study confirmed that Lake St. Croix, like most lakes with deep basins, does typically stratify from June to September and

**Figure 4. Jake Lehner (MDNR) setting a minnow trap in Lake St. Croix.**

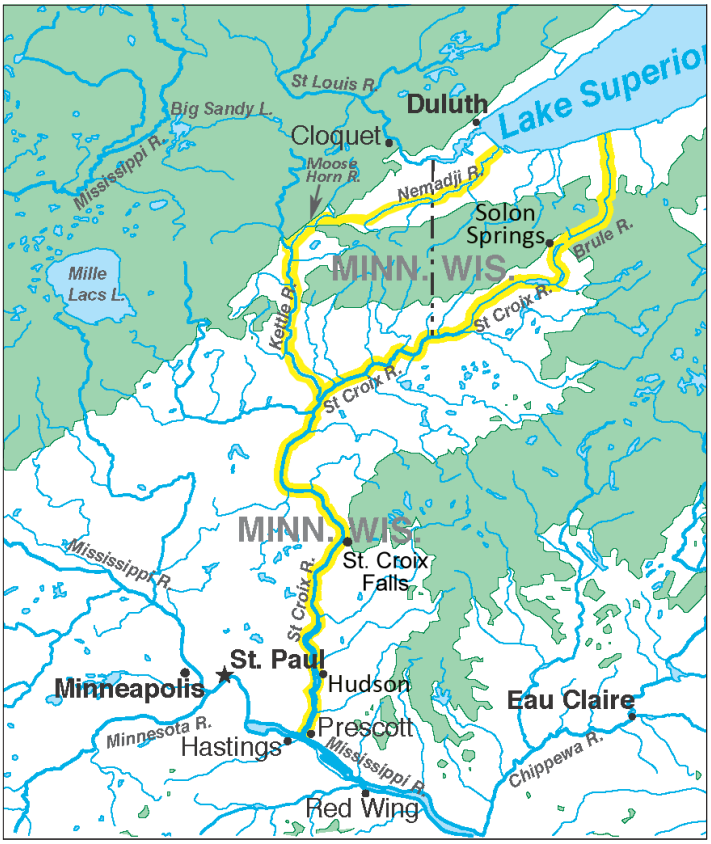


**Figure 5. Two waning Ice Age pathways between Glacial Lake Duluth (i.e., present day Lake Superior) and the St. Croix River via the Brule and Nemadji river outlets. Higher elevations are shaded in green. Map modified from McGuiness 2010.**

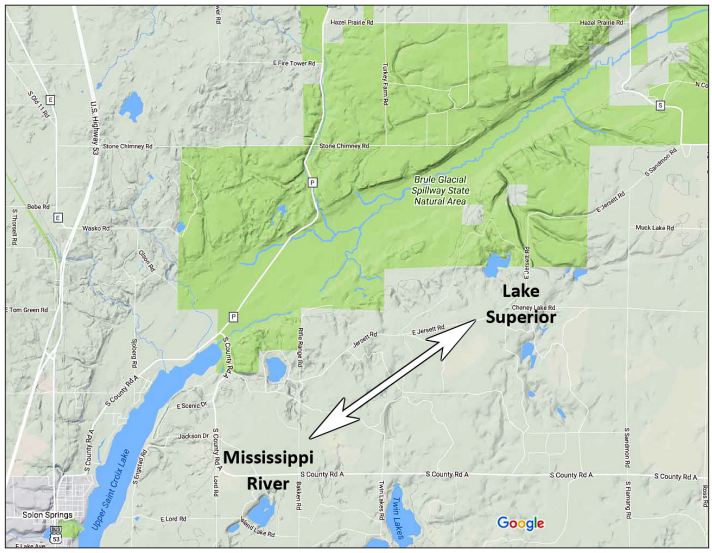


**Figure 6. Brule glacial spillway carved by meltwaters from Glacial Lake Duluth.**

thus has a cold bottom layer (i.e., hypolimnion) with DO-starved (i.e. anoxic) water (Magdalene et al. 2013). On our last trawl haul of the day, we brought up almost a gallon of a clear gelatinous mass. Looking closer, it was writhing. Initially, I thought perhaps we passed through a cloud of phantom midge larvae *Chaoborous* sp., however, even with the naked eye, this was something else. I saved a sample that was later identified as the largest water flea *Leptodora kindtii* in North America which is a predator in the plankton community feeding on copepods. My last effort was May 2017 with the assistance of Jay Hatch and another NANFA member and son, Bryan Stefansky. This time we canvassed the same area Howard Krosch had trawled with Jim Underhill, but our catch was very sparse and was comprised of one Yellow Perch *Perca flavescens* and a dozen or so variants of the Channel Shiner *Notropis* cf. *wickliffi* present in large rivers of southeastern Minnesota.

For the Deepwater Sculpin and Lake Whitefish there is one plausible but impossible-to-prove explanation of post-glacial dispersal. When large proglacial lakes formed in Minnesota and Wisconsin near the end of last Ice Age, rising meltwaters were blocked by remaining ice sheets that dammed the lowest pour points. Glacial Lake Duluth rose almost 500 feet higher than the present-day Lake Superior's level. Glacial Lake Duluth had two outlets (Figure 5): one through the (Bois) Brule River to the St. Croix river valleys and the other via the Nemadji River to the Moose Horn-Kettle-St. Croix rivers (Wikipedia contributors 2017).

The raging rivers left their mark on the landscape (Figure 6), and in the late 1800s, the US Army Corps of Engineers studied the feasibility of using the glacial river routes for a shipping canal connecting the Mississippi River to Lake Superior. The frontrunner was the Brule-St. Croix route, which had been used for thousands of years by Native Americans, European explorers, fur traders, and settlers as a portage between the two drainages (Wikipedia contributors 2016). The proposed canal would have been 210 miles long, 80 feet wide, six feet deep, and required 16 locks to lift boats almost 800 vertical feet to Lake Superior (McGuiness 2010). What a relief this folly died on the vine!

I don't believe the truth about the Deepwater Sculpin in Lake St. Croix will ever be found. Including the Lake St. Croix specimen, there are only three cataloged lots (total of 10 specimens) from 1941–1969 in the JFBM holdings. The other two lots are from Lake Superior. I suspect this is also likely the origin of this mystery sculpin that somehow lost its way via cross-contamination into the wrong jar.

**Literature Cited**

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