



# CRYSTAL WHITECAPS

The Newsletter of the Crystal Lake & Watershed Association

Protecting Crystal Lake Now for Generations to Come.

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Fall 2023

## A NEW THREAT TO CRYSTAL LAKE

Most of us are aware of tiny shellfish attached to rocks in Crystal Lake's shoreline waters that may cut our feet when we swim. Transoceanic cargo ships brought these invasive zebra mussels to the Great Lakes in the mid-1980s, where they spread rapidly. They likely arrived at Crystal in the early 1990s by hitchhiking on recreational craft.

By 2010, the zebra's more dangerous cousin, the quagga mussel (*Dreissena rostriformis bugensis*) had totally replaced the zebra in Lake Michigan, thickly covering the lakebed from shore to shore. It marched southwest from other northern Michigan inland lakes -- found in Mullett Lake by 2012, Crooked Lake near Lake Charlevoix by 2015, Torch Lake by 2018, and was found in Elk Lake last year (2022). Additional sampling in Torch Lake in 2022 found that the density of the quagga colony had already increased substantially.

Despite vigilance and boat washing campaigns, it seemed inevitable that this invasive mussel species would eventually reach Crystal. (See [Crystal Whitecaps 11:2](#), Fall 2015, p. 7; [8:1, Winter 2012](#), p. 2-3.) Sadly, testing in the summer of 2022 showed that this invasion has occurred.

As part of its ongoing efforts to monitor and control aquatic invasive species in Crystal Lake, the CLWA contracted Swimmer's Itch Solutions (SIS) to collect water samples, isolate eDNA, and use qPCR to test for the presence of quagga mussels. Environmental DNA (eDNA) is genetic material shed by living organisms, which can be free-floating in water. It is filtered from the water and then analyzed via quantitative polymerase chain reaction (qPCR) which can identify the specific source of the DNA.

SIS collected three water samples at each of ten locations in September

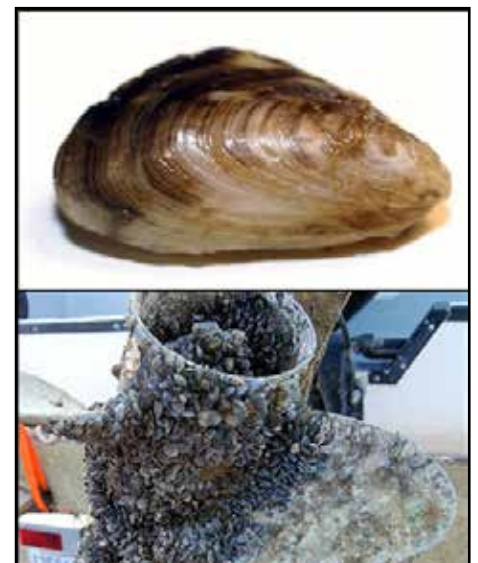
2022. After analysis, they reported that 28 of the 30 samples showed the presence of quagga eDNA. This high frequency strongly suggests that Crystal Lake has an established population of quagga mussels, even though no actual mussels have yet been found. (Full report posted on the CLWA website.)

Zebra mussels and quagga mussels are related (genus *Dreissena*), originate in similar eastern European regions, and were likely introduced to the Great Lakes in similar manner. Both colonize rapidly and aggressively filter phytoplankton from the water, thus reducing an essential component at the bottom of the aquatic food web. Filtering also increases water's transparency, leading to increased light penetration. More light in deeper water can change the existing species balance, leading to disruption of the entire ecosystem. (For a graph showing the increase in Crystal's

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*Quagga mussels covering bottom of Lake Michigan*





## PRESIDENT'S MESSAGE

Fall is here, and we had some very rare nice weather in September. It was short-lived, but enough to remind me of childhood days, walking to school, kicking leaves, looking for woolly-bears (caterpillars, I mean...). As the lake quiets down and the weather begins to chill, the CLWA gets into "off-season" mode: analyzing data collected by our Water Quality committee, keeping an eye on construction developments, making plans and preparing budgets for next year.

We have made great strides on the invasive species front – our original 7 acre patch of Eurasian watermilfoil is now down to under 3 acres, thanks to your support for our treatment plan. This issue won't ever go away, but smaller patches mean fewer treatments, which is a win-win for the lake. On the other hand, it is a disappointment to discover the presence of quagga mussels in Crystal Lake, despite the concerted efforts of our fantastic boat wash to keep new

invasive species out of the lake. Sadly, there are several popular launches that do not have boat cleaning facilities.

The Michigan Department of Environment, Great Lakes, and Energy (EGLE) presented a list of outstanding issues that the condo development off Mollineaux Road must resolve before its private road will receive a permit. CLWA is continuing to monitor that situation. We urge you too to keep informed about what is happening in your



*Sue and her husband Dave setting up "Keep Crystal Clear" fundraiser*

local township and to be vocal about issues of concern. The CLWA tries to keep you informed, but it cannot have eyes everywhere and the voice of citizens is powerful.

A healthy watershed requires a balance between nature and responsible development. As the CLWA, we all have a responsibility to protect Crystal Lake "for generations to come."

Thanks to all of you who joined us at the 3<sup>rd</sup> Keep Crystal Clear fundraiser at Stormcloud Taproom in July. CLWA board members enjoyed meeting you and hearing first-hand your thoughts and concerns.

I want to thank everyone in the CLWA for their membership, their concern for the lake, and their willingness to step up and help. Our love of this lake requires that we remain watchful and active in its defense.

**Sue Brown, CLWA President**

## CLWA HONORS DAVE WYNNE

The CLWA paid tribute to Dave Wynne at the 2023 Annual Meeting by presenting him with the Crystal Circle Award. This award honors those who have made exceptional contributions to the Crystal Lake & Watershed Association: those whose energy, intellect, experience, and dedication have helped the organization advance its mission in significant ways.

As President Sue Brown noted in making the presentation, "What is remarkable about him is his continuous effort to go beyond his role and get engaged in the nuts and

bolts of detailed activities and projects initiated by CLWA. He has done this for many years while balancing the CLWA with other voluntary commitments throughout the community."

Despite retiring from CLWA's presidency last year, Dave agreed to be elected a board member-at-large, showing his deep commitment to the CLWA, its Board and its vision. The CLWA and its members are very fortunate to have his continued experience and enthusiasm. We are a stronger and more successful organization because of his ongoing contributions.



*Jan and Dave Wynne*



# KIDS KEEP ON WALKING THE CRYSTAL LAKE WATERSHED

This year's CLWA Walkabout bolstered the decision to move the event to the spring – weather is so much better in May than October! For this, the 28<sup>th</sup> Annual Walkabout, approximately 110 sixth grade students from Benzie Central and Frankfort moved between the DNR Boat Launch/ Boat Wash and Bellows Beach learning about the beauty and fragility of Crystal Lake's watershed through hands-on science. The team of wonderful volunteer experts/presenters emphasized

that these young people are the future stewards of the lake.

For the second year, Debbie Smith coordinated much of the organization. For the first time, she also arranged a post-Walkabout visit to each of the classrooms that had participated in the event, helping the students recall and record their experiences. Debbie remarked, "It was exciting to see the time the teachers devoted to preparing kids with their presentations on invasive species." CLWA thanks these dedicated teachers for

providing an additional opportunity to heighten their students' awareness of the extraordinary recreational and environmental resource that Crystal Lake represents for their community.

We are fortunate to have supportive local volunteers and experts who dedicate their time to make every Walkabout a success.

New volunteers are always welcome! If you're interested in volunteering for the 2024 Walkabout, contact the CLWA at [info@crystallakewatershed.org](mailto:info@crystallakewatershed.org).



*John Ransom, CLWA Lake Biologist, demonstrating oxygen and temperature testing to measure the water quality of the lake.*



*Bruce Gerhart, CLWA Water Quality committee, explaining water clarity and non-point source pollution from runoff.*

## A NEW THREAT TO CRYSTAL LAKE

*Continued from page 1*

clarity since the arrival of zebra mussels, see [Crystal Whitecaps 14:2](#), Fall 2018, p. 5.)

The prolific reproduction of these mussels can clog underwater mechanisms such as pipes, screens and valves. They impact recreation by encasing docks, buoys, boats, propellers, and beaches.

Quagga mussels pose a greater threat to fresh water bodies than do zebra mussels for several reasons. They

can colonize both hard and soft surfaces, so can spread throughout the lake bottom, not just on rocks – as they now cover the entire bottom of Lake Michigan. They also can live at greater depths than zebras, up to 130 meters, thus further expanding their territory. Unlike zebra mussels, they do not hibernate in winter, so continue eating and multiplying year-round. (Females can produce more than a million eggs a year.) Their highly proficient filtration causes a

number of chemical changes to the water (such as increasing acidity and toxicity) which are not fully understood at this time.

All this combines to make quagga mussels a serious threat to lakes and their entire ecosystems. The CLWA Water Quality committee is now planning further studies in Crystal's deep waters to locate the actual mussels and gather data on their population and locations.



# TRACKING POLLUTANTS IN THE COLD CREEK SYSTEM

## Introduction and Methods

Fecal contamination in Crystal Lake near the mouth of Cold Creek in Beulah has caused concern for years.\* Using a culture test for *E. coli*, the CLWA and Benzie Conservation District (BCD) have analyzed water samples from the Cold Creek system for enteric bacteria since 2013. These tests reveal the presence of live bacteria, but cannot identify the source.

A new analytical method known as qPCR can show the source of DNA in

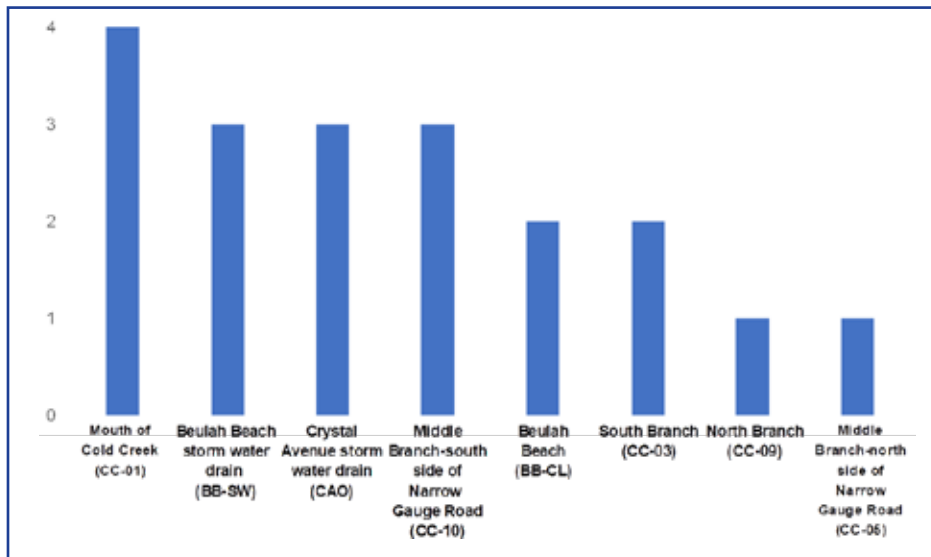
water samples, either specific animals or human. This is how CLWA recently found quagga mussels in Crystal (see p. 1) and how researchers are testing for invasive carp in Michigan rivers.

In order to better understand the sources and types of bacteria that may eventually enter Crystal Lake, the CLWA and BCD carried out research in the summers of 2021 and 2022. We took weekly water samples from eleven locations in the three tributaries of Cold Creek

watershed, two Beulah storm water drains, and four other major tributaries of Crystal Lake, a total of 220 samples. The goal was to identify areas of high fecal bacteria pollution and source track samples for the human fecal marker (HF183) and animal fecal markers.

Samples were analyzed for *enterococcus* using qPCR, followed by source tracking for human, dog, and Canada goose fecal contamination.

*Continued on page 5*



*Water samples testing positive for human fecal matter (HF183)*



# TRACKING POLLUTANTS IN THE COLD CREEK SYSTEM

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## Cold Creek Watershed Sampling Points

The aerial view of Beulah shows the sampling locations for the three branches of the Cold Creek system. The North Branch extends to the southeast and accepts drainage from an extensive watershed up to the Crystal Lake Golf Course. The Middle Branch runs along Narrow Gauge road and receives water from a steep valley topography. The South Branch extends from higher ground along the Betsie Valley Trail and passes under US-31, where it joins the other branches and enters the settling pond. Outflow from the pond goes directly to the mouth of Cold Creek into the lake.

## Results: Human, Dog, and Goose Bacteria

Examination of the results for *Enterococcus* bacteria DNA generally showed high levels. Forty-seven percent of samples reached the risk level for *Enterococcus*. Thirty-three percent were considered contaminated enough to warrant a beach closing. The contamination of most of the sites decreased considerably from 2021 to 2022: the reasons for this are still unclear.

Despite this decline, several sites remain a concern. The Middle Branch (CC-05 and CC-10) frequently showed high levels for *enterococcus* bacteria, as did the entrance to the settling pond (CC-04). The mouth of Cold Creek (CC-01) showed a decrease, but still remained high.

The samples with high risk levels of *Enterococcus* (47%) were subjected to qPCR testing to determine the source. Those outlined in red on the photo produced two or more positive tests for HF183, the marker for human fecal contamination. Highest were from the mouth of Cold Creek and the Beulah storm water drains, all of which discharge directly into the lake. Equally high was the Middle Branch along Narrow Gauge road. Any locations testing positive for HF183 are of significant health concern.




Water samples were also tested for the qPCR markers for dog and goose fecal contamination. Six locations tested positive for dog, with the area of the Beulah shoreline (mouth of Cold Creek, the two storm water drains and Beulah Beach) being particularly high.

Goose contamination was less significant in the Beulah area, with the highest contamination found at Bellows creek on the south shore of

Crystal Lake, Harris Creek on the north shore, as well as the North Branch of Cold Creek (a location already known as a regular goose habitat).

## Conclusions:

This study increased knowledge about the effluents that enter the lake from Cold Creek. The detailed examination of bacterial contamination shed light on long-time concerns of the community. We now know that:

-  Cold Creek is a major source of bacterial contamination for the lake. It provides *enterococcus*, human and dog fecal bacteria to the lake and beach.
-  The Beulah storm water drains contain human fecal bacteria, HF183.
-  Of the four tributaries tested elsewhere on the lake, only Harris Creek showed high bacterial concentration.

**Bruce Gerhart,**  
CLWA Water Quality Committee



Sampling sites at the mouths of four tributaries outside plus the Cold Creek sub-watershed. Also shown are the inlet from Cold Creek and two major storm water inlets in Beulah.

\* A full detailed report of the data from this 2021-2022 research, "Enteric Bacteria Tracing Research in the Cold Creek Watershed Using qPCR Analytical Technology," is posted on the CLWA website, [www.crystallakewatershed.org/water-quality-monitoring/](http://www.crystallakewatershed.org/water-quality-monitoring/). For background on the Cold Creek watershed and previous studies, see *Crystal Whitecaps* 15.2, Fall 2019. Results from the study of Harris Creek tributary on the north shore of Crystal lake appeared in the Spring 2023 issue, p. 7.



# PROGRESS ON CONTROLLING INVASIVE EURASIAN WATERMILFOIL

CLWA's multi-year plan to control the harmful invasive aquatic plant, Eurasian watermilfoil (EWM), continued to show positive results in 2023.

An aerial drone survey in early summer found significant reductions in the most heavily infested areas, especially at the east end of the lake. While the survey found a few small new areas of plant growth on the south and southeast shores, the total was much less than in 2022, estimated to be down to ca 2½ acres (from the previous high of ca 7 acres) and also decreased in density. Some growth of native Northern milfoil also has been identified in the lake: this was not treated.

Treatment took place on September 11. The new growth areas required that additional permissions had to be obtained from the property owners, since explicit written authorization is required before application of an herbicide. Clear Water Lake Management used 2,4-D in most

areas, and tested the use of ProcellaCOR in a small plot at the east end of the lake around to the Crystal Lake Marina on the north shore.

If positive results are shown from the ProcellaCOR trial, CLWA may expand its use next year. This relatively new product is thoroughly tested and registered in Michigan. Its benefits include longer term control, less product use and the lowest EPA risk classification of any herbicide.

The EWM control program has shown considerable success since CLWA began treatment in 2021. (See [Crystal Whitecaps 17:2](#), Fall 2022.) After two treatments the first year, only one was needed in 2022. Ideally, the future will only require intervals of two years or longer between applications. The goal is to use the minimal amount of any chemical product to keep this nuisance aquatic invasive plant from disrupting the Crystal Lake ecosystem and recreational activities.



*Infestation of invasive Eurasian watermilfoil*

## TIME TO BE SALT SMART

Northern Michiganders are now trading in gardening tools and lawn mowers for snow blowers and shovels – and perhaps a bag of salt to sprinkle on the ice that builds up on the sidewalk or driveway. When you do, remember that salt can have a negative impact on the water quality and the ecology of Crystal Lake.

Recent studies have found that salt levels in our freshwater systems have increased over the past 25 years. Freshwater organisms, particularly zooplankton which is an important

part of the food web of Crystal Lake, are very sensitive to increased salt concentrations.

To avoid excessive salt usage and mitigate the impact of salt on Crystal Lake, here are a few tips from the Izaak Walton League of America “Salt Watch” program:

1. Use the minimum amount needed. One mugful (12 oz) is enough for a 12-foot driveway.
2. Putting *more* salt on a surface does not make snow and ice melt faster or eliminate the need for plowing or shoveling.

3. Use alternative de-icing agents, such as sand or gravel.

This fall and winter the CLWA Lake Biologist [John Ransom](#) will be collecting data on chloride levels throughout the watershed. This will give us a better understanding of the current status of salt in the lake and allow us to track any changes in the future. To learn more, see the [Izaak Walton website](#). You even can collect your own data with a free Salt Watch kit!



# IT'S BAAACK: SWIMMER'S ITCH

If you were fortunate enough to spend time in Crystal Lake this year, you know that swimmer's itch (SI) is back. You or one of your family members may have experienced the discomfort inflicted by the parasite when finding a human instead of its natural host, a common merganser. The result is inflammation and development of papules which can itch intensely for up to 10 days.

Why is it back? Five years of CLWA's successful merganser trap-and-relocation had nearly eliminated the scourge. But in 2022 the Michigan Department of Natural Resources (MDNR) forced us to suspend the program. It feared that merganser relocation could spread Highly Pathogenic Avian Influenza (HPAI) or bird flu, which has been decimating flocks of domestic poultry in the Midwest.

The result was a dramatic increase of SI in 2023. Cases reported to the CLWA website increased 240%, and the number of infections reported at the CSA beach jumped from 21 to 594. Even worse, the

severity of infections increased from those experienced in past years. CLWA's ongoing research on snail infection rates supports this evidence of SI resurgence. (The full report, "The State of Swimmer's Itch on Crystal Lake – 2023," is posted on the Swimmer's Itch page of the CLWA website.)

Considering the current severity of SI in Crystal Lake, the CLWA believes that the MDNR's suspension is no longer warranted. Common mergansers do not normally associate with barnyard flocks, as they feed on live fish from clear waters. There has not been a single reported or confirmed case of a common merganser dying of HPAI in Michigan.

It is our opinion that **human health** must receive primary consideration. For that reason, the CLWA is working to convince the MDNR to reinstate the trap-and-relocate program for 2024.

CLWA is in contact with the MDNR, which will make its decision at the end of the year. In September

the Benzie County Board of Commissioners passed a [resolution](#) supporting reinstatement of the program. We are meeting with our Michigan legislators to inform them of the issue and gain their support in encouraging the MDNR to reinstate the program.

What can **you** do? If it becomes apparent that the MDNR is still reluctant to reinstate the program, we will be asking our members to contact their elected representatives, the MDNR and the Michigan Department of Agriculture to stress the vital importance of controlling SI on Crystal Lake.

Please make sure that we have your current email address on file, so that we can update you on the situation. If necessary, CLWA will advise you on whom to contact and provide ideas on what to say. And finally, if you have any personal contacts with Michigan legislators, let us know so we can brief them personally on this issue.

**Dave Wynne,**  
*CLWA Water Quality Committee*



*Bellows Beach -- Where have the swimmers gone?*



*On-line SI reporting page*

The CLWA can be contacted at [info@crystallakewatershed.org](mailto:info@crystallakewatershed.org).



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#### CRYSTAL WHITECAPS

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[crystallakewatershed.org/education/newsletter](http://crystallakewatershed.org/education/newsletter)

## CALL FOR NOMINATIONS TO THE CLWA BOARD OF DIRECTORS

The CLWA is an all-volunteer organization and welcomes new members to its board and committees. It seeks individuals from throughout the watershed area. Special skills are helpful, but most important are enthusiasm and willingness to pitch in for the many tasks that help the CLWA preserve and protect Crystal Lake.

If you would like to recommend yourself or someone you know, please contact the Nominating committee at [info@CrystalLakeWatershed.org](mailto:info@CrystalLakeWatershed.org). For information on terms and duties, see “**CLWA Board Member Responsibilities**” and the [Bylaws](#) posted on the CLWA website.

If you are interested in a committee, contact information for the chairs is also available on the website and in the annual Directory.



## CLWA ANNUAL MEETING 2023

The annual members meeting of the CLWA was held on Saturday, July 22, at the Mills Community House in Benzonia. Over 90 members and other interested persons attended, and it was live-streamed over zoom. President Sue Brown presented the Crystal Circle Award to Dave Wynne. She surveyed the Association’s current programs, accomplishments and future plans. Treasurer Bruce Gerhart reviewed the organization’s financial situation and reported that it was healthy. Draft minutes and a [recording](#) of the meeting are available on the CLWA website. **Passcode is 2Y?a750G**

### The following officers and board members were elected by mail ballot:

Re-elected Vice President (2023-2025): Mark Walton

Re-elected Treasurer (2023-2025): Bruce Gerhart

New board member (2023-2026): Greg Nowell

Re-elected board members (2023-2026): Ron Ahrens, Rick Cosaro, Tom Kucera, Steve Stephens

**CLWA thanks the Mills Community House for the use of its facility, and the Benzie Area Historical Society and Larry White for enabling the zoom presentation.**