



# CRYSTAL WHITECAPS

*The Newsletter of the Crystal Lake & Watershed Association*

*Protecting Crystal Lake Now for Generations to Come.*

Vol. 20, No. 1

Spring 2025

## CRYSTAL LAKE'S UPS AND DOWNS

The Crystal Lake community couldn't help but wonder what was happening last summer as the lake level began falling and kept going lower right through autumn. By late October, the surface was nearly a foot below the court ordered level. Water was so shallow that riparians had difficulty bringing boats to their docks or getting vessels off their lifts.

The underlying cause was a severe drought that gripped all of Northwest Michigan, reducing stream flows into the lake and increasing surface evaporation. In nature's long battle with Crystal Lake's water-control infrastructure, nature was winning.

The lake level is controlled (to the extent possible) by the Crystal Lake Outlet Dam, a steel-and-concrete structure across the Outlet stream near Molineaux Road on the South Shore. A set

of five boards or "stop-logs" in the dam can be raised to let water flow out of the lake, or lowered to block the flow. This dam was built in 1977, replacing a badly deteriorated structure that had been in place since 1911.

Under Michigan law, the Circuit Court can set legal lake water levels. With this new dam in operation, property owners petitioned the Circuit Court to establish legal summer and winter lake levels. After a study and several public hearings, they asked that control of the new dam strive for a difference of six inches between summer and winter levels. The previous practice had been to try to maintain a single level throughout the year, and that had proven to be impossible.

In December of 1980, Judge Charles Wickens signed an order specifying that the boards should be managed to "attempt"

to keep the lake level at 599.75 feet above sea level in winter (November 1 to April 30) and six inches higher – 600.25 feet – in the summer (May 1 to October 31). The tight 6-inch limit sought to minimize both "too-high" and "too-low" issues.

Even the Judge seemed cautious in his expectations, adding to his order "...the Road Commission shall have no obligation to attempt to control the level of the lake other than through changing the elevation of the dam, and shall not be responsible for damages caused to surrounding property owners as a result of carrying out the order of the Court." [The full order can be found on the CLWA website.]

Initially the Benzie County Road Commission managed the dam. In the 1990s, Benzie passed a population threshold requiring election of a Drain Commissioner who then took responsibility.

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*Outlet dam 1930s (Benzie Area Historical Society)*





## PRESIDENT'S MESSAGE

Here at the lake spring has reluctantly arrived, but something that isn't reluctant to arrive is the yearly onslaught of the Common Merganser. As the birds fly over my house in search of a place to nest (I've taken down two nesting sites already), we need to brace ourselves for a "touchy" summer.

The State of Michigan has denied all trap-and-relocate permits this year as the avian flu continues to attack bird populations. This means that our swimmer's itch control program is suspended yet again. Our best defense this year is to adjust when and where we swim and to apply whatever protections you have found to work (see our website for the most current advice).

And please continue to report brood sightings and swimmer's itch cases for our database.

Someone mentioned the other day that five bald eagles had to be euthanized because they became infected, likely from eating an infected bird. This indicates that the natural food chain is becoming increasingly affected, and puts our discomfort into perspective.

I wish I had better news about this. However, as you'll read in this newsletter, we have many other issues and projects showing positive impacts on our watershed. Thank you for your support!

**Sue Brown, CLWA President**



## SWIMMER'S ITCH RESEARCH CONTINUES

Despite this summer's setback to the merganser relocation program, the CLWA is continuing its dedication to swimmer's itch (SI) research. These initiatives have led to better understanding of the causes and biology of SI, helping to develop new methods to combat its effects on humans.

A central focus of our work is the years-long database that records details about SI cases around the lake. It consists of on-line reporting to a Crystal Lake website and also the staff-maintained reports gathered at the Congregational Summer Assembly waterfront. Researchers have used this invaluable information to reveal the times and conditions when the itch-causing parasites are most active, and thus provide guidance on how swimmers can avoid it.

**We urge CLWA members and the public to continue to report their cases of SI this summer. We also ask you to report sightings of merganser broods, even though we are not permitted to capture them.**

You may also have an opportunity to observe merganser nesting behavior late in the spring. This would consist of female birds flying back and forth to their nesting spot, a hollow tree cavity. The nest may be very high up in the tree, and can be a considerable distance from the water. Birds cannot be disturbed while nesting, but if the location is identified it may be possible to block the nest later so that it cannot be used again. Let the CLWA know!

This year's SI research once again includes an annual study of the snail

infection rate (see chart in [Crystal Whitecaps 18.1](#), Spring 2023, p. 3), and a lakewide complete bird survey – counting and recording the locations of all waterfowl on the lake, which are mostly mergansers, mallards and Canada geese. Additional funds have been budgeted to support new studies that our research partners, [Swimmer's Itch Solutions](#), may recommend.



*Location of merganser nest reported in 2024 on north shore. The nest is approximately 40 feet from the ground and 100 yards from the lake shore.*

**YOU CAN ASSIST THE CLWA'S SWIMMER'S ITCH RESEARCH PROGRAM BY REPORTING SIGHTINGS OF MERGANSER BROODS AND CASES OF SWIMMER'S ITCH. YOU WILL FIND THE LINK ON CLWA'S HOME PAGE, [WWW.CRYSTALLAKEWATERSHED.ORG](http://WWW.CRYSTALLAKEWATERSHED.ORG)**





# CRYSTAL LAKE'S UPS AND DOWNS

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Outlet dam March 2017 (boards raised)



Outlet dam control mechanism

Crystal is a huge, windswept body of water with a very deep center and broad shallow areas around the perimeter. When water is high, storms can cause significant erosion, especially on the North Shore. When it's low, docks may become inaccessible in some shallow segments.

Typically, the boards are raised to let water flow out without restriction from November 1 to April 30. The dam is then closed off beginning May 1, and adjusted through the summer as the water level changes. Rains usually keep the lake at or above the target level in May and June. By mid-July, the level often begins falling naturally, even if the dam is closed off.

This was never totally successful. Over the years, heavy rains or snowmelt sometimes pushed the spring level above the target, while dry summers resulted in low water. In 2009, the autumn level sank to 599.25 – a full 12 inches below the target. Both 2013 and 2014 briefly saw water levels 6-12 inches too high.

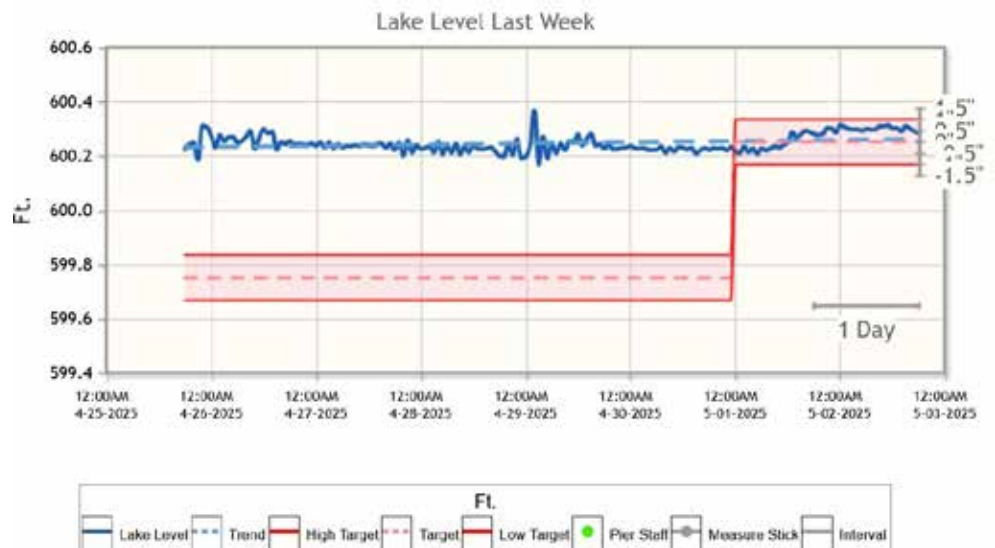
In order to provide better oversight of lake level fluctuation and enable

more timely action to control extreme changes, CLWA installed an automated lake level monitoring station at the Outlet in 2014. (The public can view the real-time readings on the CLWA website: <https://crystallakewatershed.org/lake-level-monitoring/>)

In a typical year, management of the dam helps keep the water at levels that satisfy most lake users. Last year, unfortunately, was not typical. Rain and snowmelt kept the lake above

the prescribed level through June, even with the Outlet flowing freely. On June 27, 2024, the surface elevation was measured at 600.50 feet – three inches above the prescribed level.

And then the rains stopped. All the boards were closed off in July, with the lake an inch above the target. By October, Northwest Michigan was in severe drought conditions. Weeks of sunny weather increased evaporation, and the lake level dropped to 599.34 – 11 inches below the target!





# CRYSTAL LAKE'S UPS AND DOWNS

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At nearly 10,000 acres, Crystal is too large to react quickly to changes in the dam, which has a maximum spillway width of 50 feet. Fully open, the dam is believed to reduce the lake level by about an inch a week. Natural conditions such as rainfall, snowmelt and evaporation often have a much larger impact. While those natural forces pose the largest challenges in lake-level management, other factors also have some impact.

The build-up of sandbars above and below the dam may reduce flow through the structure and also limit its effectiveness as a barrier to sea lampreys. In addition, culverts carrying the Outlet below Mollineaux Road and M-115 are undersized and restrict the downstream flow.

The design of the dam – and the area's popularity as a picnic spot – have left it susceptible to vandalism when individuals attempt to pry up the boards to let water through, often so that they or their children can play in the flow. This is dangerous in addition to being illegal, but it has been a long-standing issue.



*Outlet dam with low Lake level September 20, 2020*

In Michigan qualified engineers must inspect water-control structures every third year. The 2024 inspection confirmed that the Outlet Dam is showing its age, though the main structure remains sound. It will likely need updates or repairs within the next several years. Some of the access and sand-build up issues may be addressed at that time. But Mother Nature will likely remain the one who ultimately controls the water levels of Crystal Lake.

**Ed Hoogterp**

Ed Hoogterp served as the Benzie County Drain Commissioner from 2016 to 2024

## WHAT'S NEXT FOR THE OUTLET?

As mentioned in the preceding article, the Outlet has long been a spot for informal recreation. Never designated as an official “park,” its location adjacent to the Betsie Valley Trail and the Railroad Point Natural Area puts it in the middle of some of Benzie County's prime attractions.

Now after decades of discussion among the Michigan Department of Natural Resources, the Grand Traverse Regional Land Conservancy, the Michigan Department of Environment, Great Lake and Energy, and Benzie County, the area is slated for development as a public ADA-compliant launch site for unmotorized watercraft (especially kayaks).

Funds are in hand and working plans are in development. Construction should start in spring 2026, aiming for completion in late summer 2026. A meeting for public comment on the plans will be scheduled this coming summer. **Watch for further details and plan to express your views!**

The CLWA is committed to the right of public access to Crystal Lake. We intend to work closely with the County planners to insure that the new facility will conform to practices that protect the water quality of

Crystal Lake. Specific concerns include minimization of impervious surfaces, maintenance of vegetative cover, and provisions for craft cleaning to prevent the introduction of aquatic invasive species.



*Crystal Lake Outlet Access Site (original concept plan)*





# A CLOSER LOOK AT THE CRYSTAL LAKE SHORELINE

## Diving deeper...

As we enter the third year of our expanded water quality monitoring program, I want to dive into some of the water quality parameters that we have been tracking throughout the watershed. What does the data say about the status and the future of Crystal Lake?

Last spring I wrote about the shoreline survey we conducted in 2023 looking for nutrient inputs that have caused algae growth along the shore. [See [Crystal Whitecaps 19:1](#), Spring 2024] In the summer of 2024, we went back to some of the most impacted sites to collect nutrient and *E. coli* samples to see if we could find the cause of the algae growth.

Collecting this information not only gives us insight into what is happening at these specific sites around the lake, but also helps us understand the dynamics of the watershed so we can stay ahead of potential issues in the future.

Why are we monitoring nutrients – specifically phosphorus and nitrogen – in Crystal Lake? Nitrogen

and phosphorus play a significant role in water quality and ecosystem health. Both nutrients are essential for plant and algae growth. But when present in excess, they can lead to unsightly algae blooms which can deplete oxygen levels in the water, threatening the cold-water ecosystem and fishery of Crystal Lake.

Crystal Lake is listed as an “impaired water body” by the State due to high *E. coli* levels causing beach closures on Beulah and Bellows beaches. One source of excess nutrients can be aging septic systems around the lake. Thus we monitored *E. coli* levels at algae sites to give us an additional clue to the source of the nutrient inputs at that site. Understanding sources and levels of *E. coli* in Crystal Lake continues to be a priority for the CLWA.

## Searching for clarity...

In 2024 we went back to the “top eight” algae sites from the 2023 shoreline survey, based on the algae volume by weight. The total phosphorus, which is considered the most important element for

stimulating algae growth, was 3-5 times higher at the shoreline sites than in the deep basin of the lake during 2024 (Figure 1). We expected to find elevated phosphorus levels at these sites with dense algae growth. However, we did not see a strong relationship between phosphorus concentrations and the amount of algal growth across sites.

This could simply be because a water sample is a snapshot of the current conditions at that site, while the algae is continually responding to the nutrient inputs at that location. In other words, the algae keep a record of nutrient inputs throughout the growing season.

Nitrogen is typically considered the second most important nutrient (after phosphorus) for algae and plant growth in lakes. Recent data from Crystal Lake suggest that nitrogen may become the limiting nutrient for growth in late summer as the nitrogen in the lake gets “used up” by growing plants, release into the atmosphere, and absorption by bacteria in the lake bottom. This means that nitrogen

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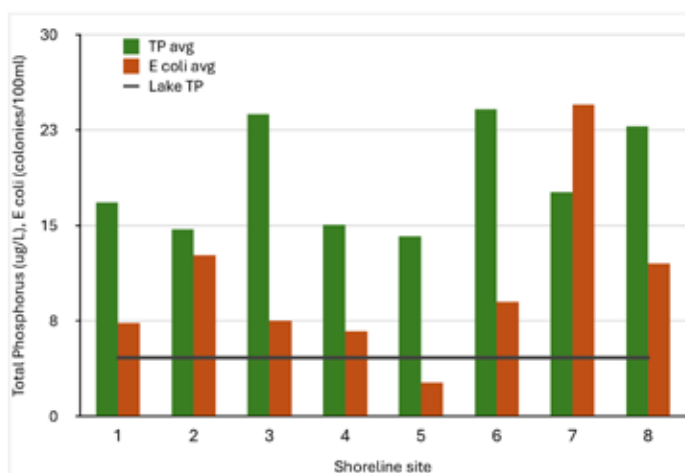


Figure 1. Total phosphorus (TP) and *E. coli* levels at the top eight algae sites from the 2023 shoreline survey. The sites are organized left to right by the amount of algae growth in pounds most algae to least.

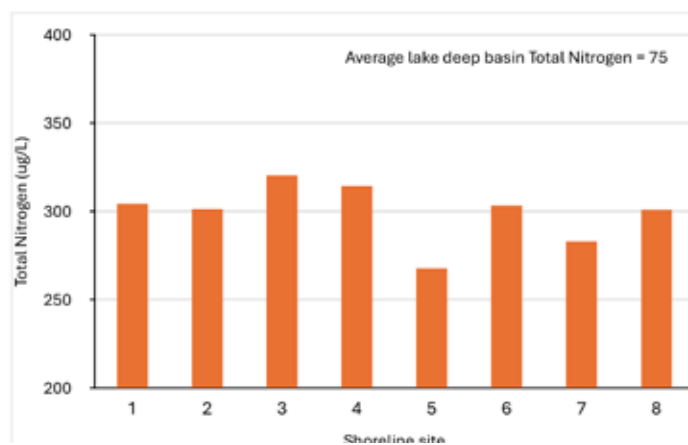


Figure 2. Nitrogen concentration at the top eight algae sites from the 2023 shoreline survey. The sites are organized left to right by the amount of algae growth in pounds, most algae to least.



# A CLOSER LOOK AT THE CRYSTAL LAKE SHORELINE

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may be just as impactful on algae production as phosphorus. We found that nitrogen levels at our top algae sites average around 300 micrograms per liter (ug/L) which was 4 times higher than the nitrogen concentration in the deep basin of the lake (Figure 2). The top four algae sites tended to have slightly higher nitrogen levels than the other sites although the relationship was not significant.

We did not find spikes in *E. coli* at any of the shoreline sites. The highest recorded value across sites was 37 colonies/100ml which is far below the trigger value for a beach closure at 300 colonies/100ml. This result does not specifically rule out septic systems as a source of nutrients, but it is not a “smoking gun” either.

## Coming back to shore...

What does all this mean for you and how you can protect



*Cladophora green algae*

Crystal Lake? The shoreline sites that we monitored in 2024 were just 8 of the 189 such sites recorded in our 2023 shoreline survey. Similar dynamics are playing out all around Crystal Lake: nutrients are entering the lake at the shoreline, causing small algae blooms. The algae is a record of the influx of

the elements that over time can change the dynamics of Crystal Lake's ecosystem.

Last summer a CLWA member contacted me about an algal bloom on their shoreline. When this site was surveyed in 2023, no algae was detected, but in 2024 rocks along the shoreline were covered in bright green Cladophora algae. We determined that the sudden appearance of algae was caused by phosphorus-free ‘lake safe’ fertilizer that had been applied to help nurture some ailing cedar trees near the lake shore.

This example shows us just how quickly the algae react to excess nutrients, how easy it is to see the warning signs (when you know what you're looking for), and how simple it is to correct the issue. Should the cedars have been neglected? Absolutely not! They provide long-term benefits to the lake and the property owners.

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*Algae growing along a shoreline the same summer as “lake safe” fertilizer was applied nearby.*





# A CLOSER LOOK AT THE CRYSTAL LAKE SHORELINE

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The algae will be gone once the fertilizing stops. However, algae growth like this that shows up year after year is a sign of a continued issue that will have larger impacts on the lake if left unaddressed.

When walking into the lake for a refreshing dip on a summer day, no one wants to be stepping over

rocks covered with strands of green algae. The good news is that if we know what to look for, we can read the warning signs that the lake is signaling to us.

We can start asking two simple questions when we notice algae growing on the shoreline. Why is algae growing in this specific spot?

Where are the nutrients feeding this alga coming from? Septic systems and fertilizer are good places to start looking. And I am always happy to help with a site visit – just contact me through the CLWA at [info@crystallakewatershed.org](mailto:info@crystallakewatershed.org).

**John Ransom,**  
*CLWA Lake Biologist*

## HIGH SCHOOL STUDENTS TEST FOR SALT

Once again the CLWA sponsored a Service Day project for the Frankfort High School Interact Club. On May 7 CLWA Lake Biologist John Ransom led seven students in testing Crystal Lake water for its salt content. Salt contamination from road treatment runoff and other human activities presents a threat to the ecosystems of lakes and streams.

The group sampled seven different locations: the Creek and the rain gardens at Bellows Park on the South Shore, and five locations around Beulah. The stormwater outlet at Beulah Beach and the outlet at Fair Park registered the highest levels of salt, both over 100 parts per million. These results are safely below the maximum Michigan standards for surface waters, but the concentrations at these two

sites probably mean that salt runoff from nearby roads is entering the lake.

The CLWA first sponsored this project in 2023 (see [Crystal Whitecaps 18.1](#), Spring 2023, p. 6). The event provides experience in scientific methods and familiarizes the students with the Crystal Lake watershed. It also aims to raise their awareness about the environmental threats that affect their community.



*Students collect water samples from rain garden at Bellows Park*



*Students recording test results at Beulah Beach*



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is published twice a year and is a benefit of membership in the Crystal Lake & Watershed Association. Back issues and membership information are available on the CLWA website:

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

## MEET THE CLWA

The CLWA will be participating in these local events during the summer of 2025. Please visit our booth and say hello! Let us know what's on your mind. Information on protecting our watershed will be available. CLWA T-shirts and hats will be for sale.

**July 23** Congregational Summer Assembly Arts and Crafts Fair

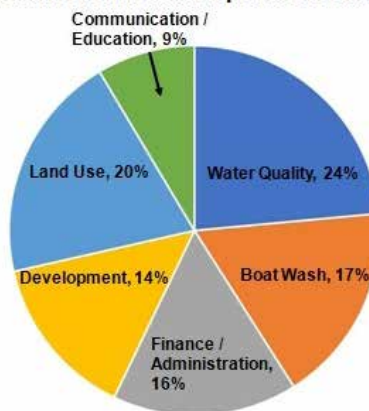
**August 8** Keep Crystal Clear Fundraiser, Stormcloud Parkview Taproom, Frankfort

**August 15-16** Frankfort Art Fair

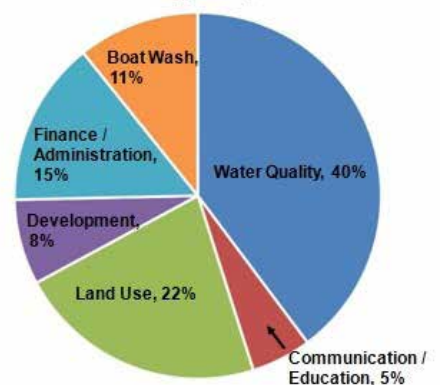
Watch the CLWA website for possible changes and cancellations.

## THANK YOU FOR YOUR SUPPORT! SEE HOW THE CLWA USES IT.

CLWA Revenue and Expenditures in 2024



2025 Budget of \$295K



## 2025 CLWA ANNUAL MEETING — ALL WELCOME!

The CLWA's 2025 Annual Members Meeting will be held on Saturday, July 19, 9:30-11:00 am at the Mills Community House, 891 Michigan Avenue, Benzonia, MI 49616. All are welcome to come and hear updates on swimmer's itch control, invasive species treatment, and other current CLWA activities.

Minutes of last year's meeting can be found at the CLWA website. They will be approved at this year's meeting.