



CRYSTAL WHITECAPS

The Newsletter of the Crystal Lake & Watershed Association

Protecting Crystal Lake Now for Generations to Come.

Vol. 19, No. 1

Spring 2024

WHAT'S LURKING AT THE WATER'S EDGE

In 2023 we completed an algae survey of the entire Crystal Lake shoreline, approximately 21 miles. With help from the Benzie Conservation District's AmeriCorps Vista members and a summer intern, it took us most of the summer. Depending on the section (and how many riparians stopped to say hello!) each mile of shoreline took from 1 to 3 hours to complete. Wearing waders, we walked the shallows looking for algae that grow on hard surfaces at the water line. We specifically looked for a common native alga called *Cladophora* which is a good

indicator of where excess nutrients are entering the lake.

Cladophora is at home in our cool freshwater lakes and does not pose a threat to the lake itself. Its appearance tells us where nutrients are coming into the lake. Too many nutrients can impact the water quality of the lake by causing algal blooms, excess plant growth, and oxygen depletion. This type of impact on a water body is commonly referred to as "non-point source pollution" and can be remediated by land management

practices that stop erosion, fertilizer and other pollution from reaching the surface water.

The survey also gives us a better understanding of what is happening in the lake's littoral (shallow) zone, since most of the water quality data we collect is from the deepest part of the lake. The results of this survey can also be paired with the 2019 drone survey to analyze the condition of the shoreline which has a direct impact on the water quality, fisheries, and overall health of the lake.

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Author John Ransom became the CLWA Lake Biologist in 2023. A unique partnership between the Crystal Lake Watershed Association (CLWA) and the Benzie Conservation District created this position. He leads the water monitoring projects on Crystal Lake and is available to answer questions about the lake.



Cladophora algae (foreground) growing at the waterline on rocks ("riprap") along the Crystal Lake shoreline. Possible sources for nutrients could be fertilizers and runoff from the lawn (top).



PRESIDENT'S MESSAGE

Once again our love of Crystal Lake brings us together, whether emerging from our homes in Benzie County or returning from near and far. The summer of 2024 has brought warming temperatures and a return of old routines like weeding the garden, maintaining docks and cottages, and finding time to catch up with old friends. Meanwhile the Crystal Lake Watershed Association is continuing its year-round mission of protecting Crystal Lake for generations to come.

Our dedicated and hard-working volunteer Board of Directors approved an ambitious budget for 2024 (see p. 8), designed to strengthen and expand our core programs of water quality monitoring and data interpretation, invasive species control, lake friendly shoreline management, and attention to development in the watershed. We are all rejoicing at the resumption of our successful pioneering swimmer's itch control program, which also brings substantial added costs with it. While we don't expect to see immediate results this year, we are confident that this program is a sound investment in future enjoyment of the lake for all our generations.

With your generous support, the Crystal Lake Watershed Association is having another year ensuring a healthy lake for the benefit of the entire watershed community.

I want to call particular attention to one major project that has

been a long-time goal. After extensive evaluation and testing, a new association management system with a proven record among non-profits is now in place for communications and record keeping. Implementing this new system has been a steep learning curve, but we expect it to facilitate our work and better serve the membership. Added efficiency will free up funds that can go toward our lake-centered programs.

Many of you have already encountered this new system when you received a personalized reminder to renew your membership. Timely news updates about the CLWA and Crystal Lake are coming to your inbox if we have your email address. You had the option of voting on-line for this year's CLWA board election (the cost of a postage stamp went up again in July!)

You will find additional benefits when you explore the system further:



Karen Dennis, CLWA Office Administrator, who is earning our immense gratitude and admiration for learning our new AMS system!

specifying lake topics to receive communications about areas of your interest, confidentially checking your record of donations and dues payments, accessing a secure directory of members. Memberships now last for 12 months, no matter when you renew, ending much confusion from the past!

So please make sure that CLWA has your email address in our files! Log in to your Member Portal so that CLWA may serve you better. (We will continue to provide "snail mail" for members who prefer.)

To our CLWA family, we're very grateful for your support. On your behalf, the CLWA is committed to being an excellent steward of this beautiful natural resource that we share.

Sue Brown, President
Crystal Lake Watershed Association



CLWA President Sue Brown

YOU CAN ASSIST THE CLWA'S SWIMMER'S ITCH RESEARCH AND CONTROL PROGRAM BY REPORTING CASES OF SWIMMER'S ITCH. YOU WILL FIND THE LINK ON CLWA'S HOME PAGE, WWW.CRYSTALLAKEWATERSHED.ORG.



RESUMING THE FIGHT AGAINST SWIMMER'S ITCH

The Crystal Lake community celebrated in early 2024 when the Michigan Department of Natural Resources (MDNR) sent word that CLWA could resume its swimmer's itch (SI) control program. As most CLWA members know, this program consists of the trapping and relocation of merganser ducks, a procedure that is regulated by permits from the MDNR.

Begun in 2017, the program had reduced the incidence of SI to a minor nuisance on Crystal Lake. But in 2022 the MDNR suspended permits out of concern for the spread of avian influenza in Michigan. The result was an explosive increase in SI cases on Crystal Lake in the summer of 2023.

The dedicated lobbying efforts of Dave Wynne, past CLWA president and member of the Water Quality committee, and the impact of years of research sponsored by the CLWA finally convinced the MDNR that mergansers play no role in avian influenza and that SI poses a serious threat to human health and the local

Benzie county economy. (For this background, see [Crystal Whitecaps 18:2](#), Fall 2023, p. 7.)

A crucial factor in the State's change of heart was an important research paper by Curtis Blankespoor, Harvey Blankespoor, and Randall DeJong, "[Swimmer's itch control: Timely waterfowl brood relocation significantly reduces an avian schistosome population and human cases on recreational lakes.](#)" published in *Plos One* in February 2024. (Also available on the CLWA website.) Based on the authors' studies of snail infection rates on Crystal and Higgins lakes, this paper demonstrated that breaking the cycle between infected snails and their avian host (the common merganser) dramatically decreased the incidence of swimmer's itch [see chart]. This scientific evidence corresponded with our real-life experience on Crystal.

The CLWA mobilized rapidly to be ready to trap the first merganser broods as soon as they began to appear in the spring. It is essential to

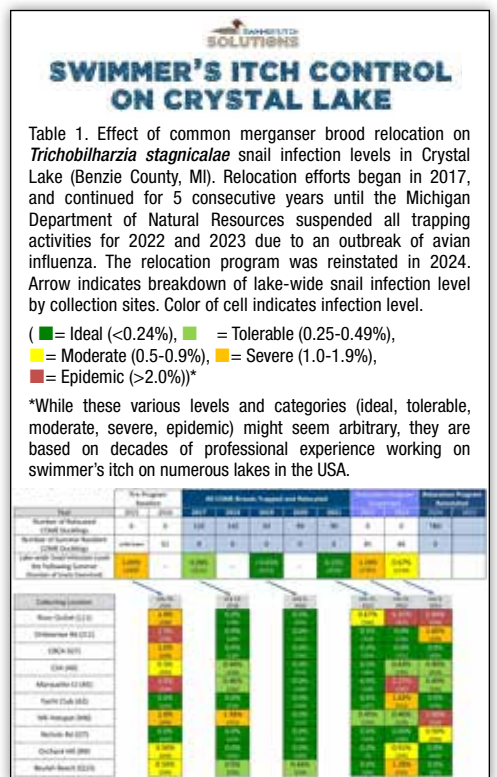
capture the broods (with their mother) as soon as they appear on the lake – once the chicks are able to fly, it is virtually impossible to capture them.

Fortunately our veteran local trapping team of Tim Reznich and Tom Thorr (trained by C. Blankespoor) were available to resume their work. The CLWA activated the Crystal Lake page on the Swimmer's Itch Solutions website where the public could report sightings of broods. Announcements went out by email and in the *Record Patriot* that trapping was resuming. The CLWA also updated its [SI information brochure](#) and distributed free copies around the area.

Due to the two-year life cycle of the SI parasite, swimmers can expect little or no impact on infections this summer. But thanks to the vigilant public who reliably report their brood sightings, and to CLWA members for their financial support for this program, we can hope to look forward to more enjoyable swims in 2025.



Merganser trapping team Tom Thorr and Tim Reznich



Effect of merganser relocation on snail infection rate



WHAT'S LURKING AT THE WATER'S EDGE

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What did we find?

During the 2023 shoreline survey we found 189 individual algae sites around Crystal Lake (Figure 1). Algae sites were spread out along the entirety of the shoreline, with slightly denser clumps of sites along the southwest and northeast sections, a stretch just west of Beulah along the south shore, and west of the Crystal Lake Outlet. To quantify the algae growth and potential nutrient inputs, we measured the width and the depth of the patch and an average length of the strands of algae at each of the sites. We also estimated the percentage of the area that was covered in algae. These measurements gave us a rough estimate of the total volume of algae in each patch, enabling us to quantify individual sites and identify hotspots of nutrients. In addition we will be able to compare the total volume of algae in future years to see if there are more or fewer nutrient inputs into the lake.

During the survey we also looked for a potential cause for algae growth at each site and categorized them into 4 major causes. Although most of the causes of algae growth were unknown (99 sites), green lawns to the shoreline were the most common source (45 sites), followed by an outlet or

drainage pipe (37 sites), and potential failing septic systems (4 sites).

In 2019 the CLWA funded a drone survey of the shoreline that was carried out by Dennis Wiand of ZeroGravity Aerial, LLC (see [Crystal Whitecaps 15:2, Fall 2019](#)). Freshwater Solutions analyzed the drone footage, examining it for baseline shoreline features that are either beneficial to the lake (for example, natural shorelines, greenbelt and lake water irrigation) or harmful, such as no greenbelt, sea wall, riprap, inlet, drainpipe, beach sanding, detectable algal growth, terrestrial invasives and erosion. This comprehensive analysis provided an overall sense of how well riparians are protecting Crystal Lake through their shoreline practices.

Of the 1,090 parcels around the lake, 93% lacked a greenbelt (natural vegetation buffer of at least 25 ft), nearly 78% of parcels had hardened shorelines with either a sea wall or riprap, and 64% maintained beach sand along the shoreline (Figure 2 and Table 1). The drone also captured 102 algae sites around the lake. This was fewer than the 2023 survey – however the difference is likely because it is harder for a drone to detect small

algae patches or algae sites that are shaded by trees.

When compared to nine other regional lakes, Crystal Lake had the most beach sanding and parcels without greenbelts, and second most percentage of sea walls and riprap (Table 2). These practices are considered harmful to the lake and may increase runoff and non-point source pollution. They also negatively impact the shoreline wildlife habitat. Additionally, Crystal Lake has only 6.9% of parcels with greenbelts or natural shorelines and 9.4% had lake water irrigation systems, which are considered best practices for shoreline conservation. Crystal Lake had only one erosion site, and no terrestrial invasive plants were detected. Out of the ten lakes surveyed Crystal Lake had the *lowest* shoreline “best management practices” (BMP) score (Table 2), 25 points below the next lowest scoring lake.

What does this mean?

These shoreline surveys give us high quality baseline data on the condition of the Crystal Lake shoreline. Looking at both potential inputs of nutrients and shoreline practices around the lake we now have a better understanding of areas of concern and can take next

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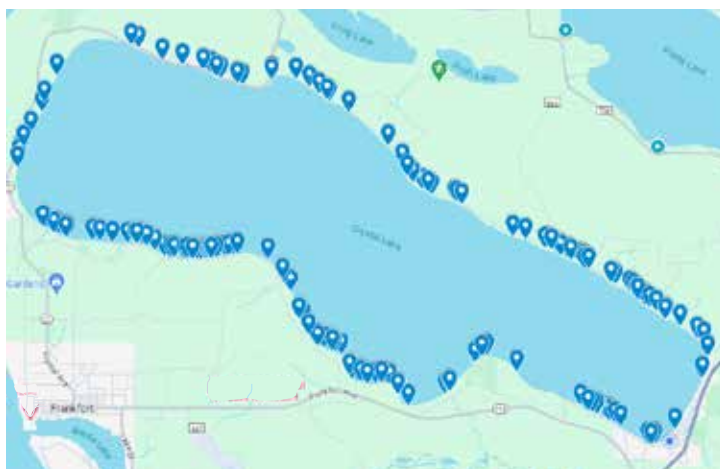


Figure 1. Shoreline algae sites from the 2023 survey. These sites show likely nutrient inputs from sources around the lake.



Figure 2. Results from the 2019 drone survey with markers showing parcels with poor shoreline practices. Each marker represents either beach sanding, riprap or a sea wall.



WHAT'S LURKING AT THE WATER'S EDGE

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steps to protect Crystal Lake. For example, beach sanding negatively impacts the BMP score since typically beach sanding occurs when sand is brought in to a shoreline that lacks sand. In the drone survey report beach sanding was marked when the *naturally* sandy beach typical of Crystal was kept clear of vegetation. Thus, allowing some natural vegetation to grow in sandy areas of the shoreline can easily improve this BMP score. Best practice recommends only clearing 25% of your shoreline to allow access to the lake. Additionally, a naturally sandy beach has a gentle slope which is better for preventing erosion than a sea wall or other hardened structures.

Sea walls or riprap can be difficult or impractical to remove, but allowing

a buffer strip of deep-rooted native vegetation to grow along these structures will still help stop runoff and nutrients from reaching the lake. Non-point source pollution is death by a thousand cuts: each individual site may not be having a big effect on the lake, but when taken as a whole our shoreline practices have an immense impact.

Of the 189 algae sites, 90 of the sites extended 50 feet or less along the shoreline, while only 19 sites extended for over 100 feet of the shoreline. This means that a majority of algae sites were small impact sites that likely could be improved by the owner implementing some BMPs. We now know where the higher impact sites are and are following up this summer with additional testing

and investigation into where the excess nutrients are coming from. Conducting surveys with this level of detail will help us focus our efforts for future monitoring and restoration.

As the CLWA lake biologist, I am working with the CLWA Water Quality Committee to identify sources of nutrients from the largest algae patches. We want to work with riparians to address these hot spots. During 2024 we are continuing our water quality monitoring on Crystal Lake and its tributaries to add to the new Crystal Lake Watershed database.

If you have questions, concerns, ideas -- or if you would like to learn about best management practices -- feel free to reach out to me through the CLWA (info@crystallakewatershed.org).

Crystal Lake 2019		
Category	Sites	Percentage of properties
Natural Shoreline (NS)	51	4.7%
Greenbelt (GB)	24	2.2%
No Greenbelt (NGB)	1015	93.1%
Sea Wall (SW)	112	10.3%
Beach Sanding (BS)	697	63.9%
Rip Rap (RR)	738	67.7%
Drain Pipe (DP)	43	3.9%
Lake Water Irrigation (LWI)	102	9.4%
Detectable Algal Growth (DAG)	102	9.4%
Erosion Evidence (EE)	1	0.1%
Inlet (IN)	8	0.7%
Tenestral Invasives (TI)	0	0.0%
Culverts (CUL)	7	0.6%
Total Parcels	1090	
Total Placemarks	2900	

Table 1. Drone survey shoreline practice categories: site totals and percentages of parcels



Figure 3. Hardened shoreline: sea wall and riprap



Figure 4. Green lawn to shoreline (no vegetative greenbelt), drainage pipe

Whole Lake BMP Score									
Lake	NS	GB	LWI	SW	NGB	BS	RR	DP	Score
Fisher	0.000	0.800	0.000	0.020	0.200	0.190	0.140	0.000	104.00
Glen	0.145	0.585	0.094	0.020	0.270	0.158	0.130	0.046	103.17
Lower Herring	0.440	0.034	0.069	0.078	0.526	0.190	0.129	0.000	90.58
NL Leelanau	0.339	0.153	0.260	0.059	0.507	0.147	0.507	0.090	89.35
Little Traverse Lake	0.206	0.226	0.082	0.075	0.562	0.103	0.596	0.021	83.43
Elk	0.222	0.146	0.289	0.060	0.631	0.164	0.635	0.018	81.33
Lime	0.058	0.292	0.017	0.058	0.608	0.125	0.408	0.050	80.11
Skegemog	0.238	0.065	0.232	0.032	0.697	0.195	0.714	0.016	77.37
SL Leelanau	0.220	0.077	0.193	0.108	0.703	0.119	0.516	0.087	76.25
Crystal	0.047	0.022	0.094	0.103	0.931	0.639	0.677	0.039	50.80

Table 2. Shoreline best management practices (BMP) scores for 10 regional lakes. Scores were calculated based on the number of best shoreline practices (e.g., Natural Shoreline - NS, Greenbelt - GB, Lake Water Irrigation - LWI) versus the number of harmful shoreline practices (e.g., No Greenbelt - NGB, Sea Wall - SW, Riprap - RR, Drainpipe - DP, and Beach Sanding - BS). The score helps compare shoreline health across regional lakes.



CRYSTAL LAKE AND ITS YEAR-ROUND RESIDENTS

The glaciers provided northwest Michigan with an abundance of deep lakes and pristine river systems. Among these, most of us consider Crystal Lake special, “home” no matter what our mailing address. We treasure its deep, clear water – features that scientists classify as “oligotrophic.”

For a lake of its size Crystal has a tiny watershed, with Cold Creek and a handful of brooks the only in-flow, and the Outlet at Mollineaux Road the only outflow. It bottoms out at 165 feet, and its sharp contours provide an overall average depth of 70 feet. The ninth largest lake in Michigan, it resembled a fjord after glaciation, surrounded by steep wooded bluffs which plunged into its cold crystalline waters.

Crystal Lake provides an ideal habitat for fish with many different requirements for survival and thriving. The larger predators – northern pike, lake trout, rainbow trout and coho salmon – have an immense buffet table spread for them. Whitefish, ciscoes, white suckers and smelt are all prime prey.

Oligotrophic water bodies are not particularly rich in nutrients, which makes them relatively weed-free. That smorgasbord of prey at the bottom of the food chain feasts on algae, aquatic insects, and other microscopic life. But if too many nutrients, such as phosphorus runoff, enter a lake it leads to excessive plant growth that can deplete the oxygen that fish depend on.

An early effort to improve the fisheries of Crystal Lake was the planting of rainbow smelt in 1912. Ostensibly to bolster the forage base for the native lake trout, smelt established a viable population and began running up Cold Creek to spawn. Dip-netting smelt in April became a social event, and thousands of these small, silvery fish were beheaded, gutted and tossed into hot oil for a feast. They made their way through the Outlet and were the progenitors of millions of smelt throughout the Great Lakes. Over the years, continued tinkering with the fisheries dramatically reduced their numbers and today the populations are more of a see-saw ride than a predictable calendar event.

Rainbow trout and steelhead (a genetic strain of rainbow trout) are foreigners, introduced to “improve” the fishery potential of the lake. Brown trout, originally from Europe, were planted as a hedge against potentially warming waters. The coho salmon, a pioneer species of Pacific salmon, has created a reproducing population in Crystal Lake. These species provide fishing opportunities for anglers year around.

All native species – lake trout, lake whitefish, lake cisco and burbot – are found in the colder depths as summer comes on. Ice anglers often take burbot, the only freshwater member of the cod family (“poor man’s lobster”). Local menus often showcase lake trout and whitefish, but none of those fish served at table are from Crystal Lake.

Classified as cool-water species (able to thrive in water of widely varying temperatures), northern pike, yellow perch, rock bass and smallmouth bass abound in Crystal Lake. All four species have shown marked fluctuations in numbers over the past 70 years. While our parents caught

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Ken Marble with a Crystal Lake pike, caught through the ice.



Grampa Lovett with pike, August 1912 (Benzie Area Historical Society)



Early morning at Bellows Beach, August 2018



Crystal Lake yellow perch catch ca 1900 (Benzie Area Historical Society)



EURASIAN WATERMILFOIL – SLOW BUT STEADY PROGRESS

The CLWA first identified and mapped Eurasian watermilfoil (EWM) during its full-lake aquatic plant survey 2016-2018. If left alone, this aggressive invasive plant can soon take over an entire lake and make it unfit for recreation. After a careful and complex planning process, the CLWA began to treat the affected areas in 2021. (See [Crystal Whitecaps 16:1](#), Spring 2020.)

Three years of chemical treatments have reduced the EWM infestation from more than seven acres to about two and a half and also thinned the biomass and density of the beds. Central to the CLWA’s approach is thorough survey and precise application of the product in order to minimize the amount introduced into the lake. To achieve this, we have used the assistance of drone-based guidance provided by ZeroGravity Aerial.

Summer of 2024 began with an assessment of the plant’s regrowth in June. (For last year’s activity, see [Crystal Whitecaps 18:2](#), Fall 2023, p. 6.) For the first time the CLWA team used a boat equipped with a GoPro

underwater camera. Compared to the hand-held viewer used in previous years, the GoPro greatly improved visibility and the ability to accurately identify the plants. The team concluded that last year’s treatment had reduced the EWM infestation by 70%-80%, to less than three acres. Of particular interest was the area of our small test in 2023 of the relatively new aquatic herbicide ProcellaCOR.

In July the team used aerial drone surveillance of the shallow water shoreline (“littoral zone”) to locate all remaining patches and any new areas that should receive treatment. They identified about 22 small new areas of growth: the owners of those properties are being contacted and asked to provide permission to treat. (Permissions given in past years are still valid if those areas need additional treatment.) ProcellaCOR had performed well in the shallow test areas.

Planning is under way for treating the remaining EWM in August. A professional pest management contractor, licensed by the Michigan Department of Agriculture and Rural

Development will apply the product, guided by aerial drone imaging.

Eurasian watermilfoil is a persistent plant and – now that it is established – we will likely never eradicate it completely from Crystal Lake. But the CLWA has confronted it at an early stage and has adopted a carefully constructed strategy to keep it under control so that we may all continue to enjoy this beautiful lake.



GoPro underwater camera attached to boat

Michigan law on Aquatic Nuisance Control can be found in the **[NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION ACT \(Act 451 Of 1994, Part 33\)](#)**

CRYSTAL LAKE AND ITS YEAR-ROUND RESIDENTS

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perch on cane poles in the 1940s and 1950s, rock bass and smallmouth were rarities. Northern pike, large solitary predators, were almost unheard of. Twenty years ago the rock bass population exploded, perch numbers dropped and pike became a staple for anglers targeting the toothy critters. Today, rock bass numbers have evened off, perch are making a comeback and sport fishing guides now target big pike through the ice.

Nature, like our society, is rarely predictable and never static.

Now warming weather bringing warming water threatens Crystal Lake’s fish. There is concern amongst fisheries biologists that whitefish are having a difficult time dealing with warming water. A fall-spawning species, our warmer falls and winters may impede successful spawning. Surface temperatures of 80 degrees

this summer are an anomaly, and, if those temperatures become the new normal, our cold-water species may be in danger.

Alan Marble

A lover of the lake since childhood, Alan Marble has fished here year around since 1975 and continues to fish with his son, Ken.



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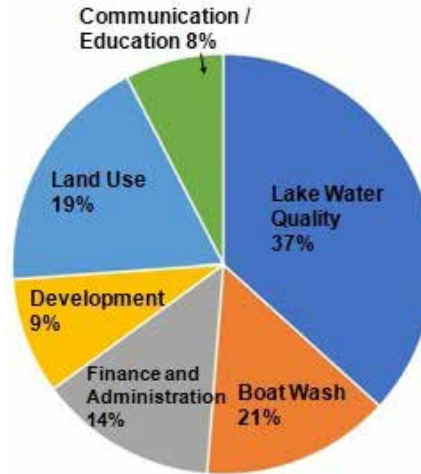
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CRYSTAL WHITECAPS

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

HOW THE CLWA SPENDS YOUR MONEY

CLWA Revenue and Expenditures in 2023



Total Revenue \$180K

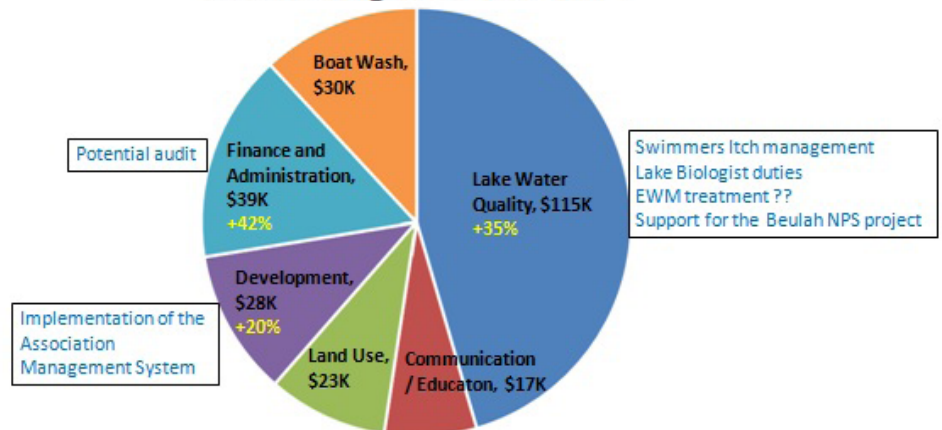
Membership \$39K
 Donations \$132K
 Interest 7K
 Merchandise 2K

Change in operating Fund +\$27K

EXPENDITURES

LAKE WATER QUALITY	\$67,979
BOAT WASH	\$26,813
FINANCE AND ADMINISTRATION	\$25,316
DEVELOPMENT	\$16,611
LAND USE	\$34,333
COMMUNICATION AND EDUCATION	\$13,969
TOTAL	\$185,021

2024 Budget of \$254,474



THANK YOU FOR YOUR SUPPORT!



For more info or to join and support CLWA's work Please visit our website: CrystalLakeWatershed.org
 Or Scan The QR Code

SAVE THE DATE

**2025 CLWA ANNUAL MEMBERS MEETING
 JULY 19, 2025**