



# CRYSTAL WHITECAPS

*The Newsletter of the Crystal Lake & Watershed Association*

*Protecting Crystal Lake Now for Generations to Come.*

Vol. 15, No. 2

Fall 2019

## COLD CREEK: CRYSTAL LAKE'S ACHILLES HEEL

*Fifty years ago a University of Michigan study of Crystal Lake's water quality noted problems emanating from Cold Creek at the east end. It reported, "significant contributions of nutrients and bacteria (coliform) organisms are made by Cold Creek discharges to Crystal Lake. Also it is apparent that phosphates are being contributed by several business establishments and houses along the north branch."*

*The following articles by Ed Hoogterp and John Ransom describe the state of Cold Creek today and the measures being taken to remediate the continuing problems.*

### The Background

On a dry, October day, Cold Creek is a lovely, but undistinguished, waterway as it flows through the Village of Beulah, running between grassy banks near the library and flowing beneath a footbridge before entering the lake at the public beach. It plays an important part of the effort to revitalize and beautify the Village of Beulah.

Beneath this image, however, lie the specific geography and history of Cold Creek which bring serious threats to the water quality of Crystal Lake.

Crystal Lake is closely bounded on its north, south and west sides by bluffs and dunes that limit the extent of its watershed. But on the east end, near the village of Beulah, a flat expanse of wetland extends eastward for about half a mile, and from that wet area, the three fingers of Cold Creek stretch

out along ravines and up hillsides. The branches come together in the village then flow into Crystal Lake.

The North Branch begins above the northeast corner of the lake on Eden Hill, then flows under US-31 where it merges with other small tributaries and meanders behind highway businesses such as the Cherry Hut. The Middle Branch flows for more than a mile along the north side of Narrow Gauge Road, also picking up water from the agricultural ditches in the Trapp Farm. The North and Middle branches meet just east of US-31.

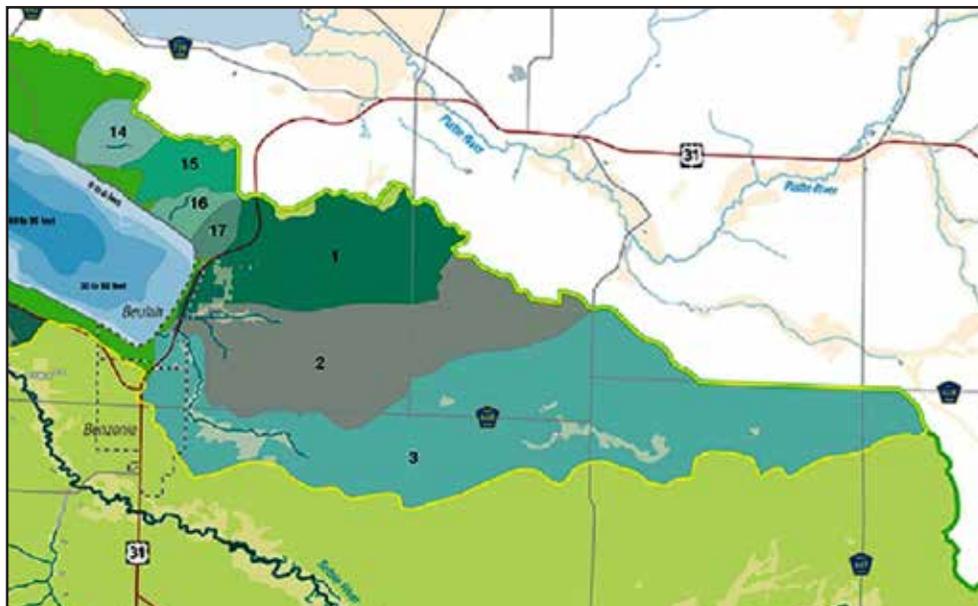
Though these branches of Cold Creek often look more like drainage ditches than natural waterways, they are classified by the state of Michigan as trout streams. Indeed, the Michigan Department of Natural Resources has found brook trout, rainbow trout and juvenile Coho salmon here.

The South Branch is larger than the combined North and Middle branches and appears more like a traditional trout stream – with clear, cold water rippling over sand and gravel. It begins in the area south of Benzie Central High School and flows near Case Road and the Betsie Valley Trail before passing under US-31 just north of the Beulah Viaduct.

This picturesque little stream has played an outsize role in the history of Benzie County.

In 1863, the Case Dam on the creek's South Branch created a millpond north of what is now Homestead Road. The dam provided power for a sawmill and other industries – and also for the area's first electric lights. A quarter century later, the Ann Arbor and Toledo Railroad served the mill area on its way to Frankfort.

*Continued on pages 4 and 5*



*The Cold Creek sub-watersheds of Crystal Lake: (1) North Branch; (2) Middle Branch; (3) South Branch*



# PRESIDENT'S MESSAGE

Your Association had a very active and productive summer. In addition to the projects reported elsewhere in this issue, the CLWA:

- ✔ Washed 694 boats at the Mollineaux Road DNR boat launch
- ✔ Reached out to educate the public at several art fairs, the Beulah Sidewalk Sale and the EGLE/DNR Landing Blitz boat wash event
- ✔ Published an updated edition of the swimmer's itch brochure and distributed it throughout the area
- ✔ In conjunction with the Benzie Conservation District conducted regular water quality testing in Crystal Lake
- ✔ Carried out a thorough review of the Crystal Lake Overlay District to identify areas in

need of strengthening to protect lake water quality

Perhaps most exciting to everyone involved was the continued dramatic reduction in the incidence and severity of swimmer's itch. The effort and expense incurred over the last 3 years appear to have been very successful.

As the boats are going into storage and docks are being pulled out of the Lake, the work on several major initiatives will continue and intensify through the winter:

- ✔ Planning and permit process in preparation for treatment of the aquatic invasive Eurasian watermilfoil in summer 2020
- ✔ Meetings with stakeholders to discuss and evaluate

improvements to the Crystal Lake Watershed Overlay that will better protect the lake

- ✔ Analysis of the aerial shoreline survey data
- ✔ Planning for the next Annual Walkabout, which will occur on June 4, 2020
- ✔ Continued presence and involvement with local zoning administrators to support and encourage enforcement of existing ordinances that protect water quality

Everything we do is for "Protecting Crystal Lake Now for Generations to Come". It can only be done with your dues and a dedicated cadre of volunteers.

**Dave Wynne, CLWA President**

## AERIAL SURVEY DOCUMENTS THE CRYSTAL LAKE SHORELINE

Zero Gravity Aerial, headed by Dennis Wiand, carried out a complete photographic survey of Crystal Lake's shoreline this summer. The purpose of the CLWA project is to produce a visual record of current conditions so that future changes can be identified. The survey also helps spot existing problem areas around the lake (see *Crystal Whitecaps* 15:1, p. 7).

The survey method consisted of a high altitude drone flyover followed by low altitude (ca. 30 feet) detail photography from which still images can be extracted.

Over the winter, Wiand and Jim Hamp, CLWA board member, will review and categorize the aerial data to identify features such as significant erosion, evidence of excess nutrients, location of all inlets and pipes emptying into the Lake, and plant growth. For example, cladophora, a nuisance algae connected to avian botulism outbreaks, appeared in numerous areas near the east end. Analysis will also recognize examples of good shoreline stewardship.

For more on healthy waterfronts, see *Crystal Whitecaps* 15:1, p. 1.



*Cladophora, a nuisance algae common in Crystal Lake*



*Aerial shoreline survey 2019 detail*



*Large green lawn close to shoreline, a "goose magnet" and potential source of E. coli*

*Protecting Crystal Lake Now for Generations to Come.*



# SWIMMER'S ITCH 2019

Crystal Lake's years of struggle against swimmer's itch once again showed the successful results seen in 2018. Numbers of cases continued to decline and the cases that occurred were milder. The waterfront director at the Congregational Summer Assembly (CSA) reported that the number of children participating in swimming lessons doubled this year. We attribute this progress to the merganser trap and relocation program that began in 2017.

*A visitor from Ohio who had contacted the CLWA with concerns about swimmer's itch sent the following email after their stay in July: "My family (all 19 of us) just finished a great week long vacation at Crystal. We had [two houses] on the South Shore....We were in the water a lot, every day, and not one problem. Keep up the great work as I want to bring them all back next year as everyone loved the lake and the area!"*

With help from continued State support for SI control, CLWA's team captured and relocated all merganser

broods that appeared on the lake: 10 broods (one without the hen) and a total of 68 ducklings, 77 birds in all. This compares to 16 broods and a total of 143 birds captured in 2018. The broods were relocated to several different Michigan Department of Natural Resources approved sites in northern Michigan. The team also took two sets of water samples that will be analyzed for the presence of the swimmer's itch parasite.

The CSA beach has been producing the most complete and accurate data on the occurrence of swimmer's itch since 2013. The incidence rate there ranged from 2.9% (that is, 2.9 cases for every 100 swimmers) to a high of 5.3% in 2015. Noteworthy is the dramatically decreased incidence in 2018 and 2019, at 1.7% and 0.6% respectively. The number of swimmers has also increased steadily.

Al Flory's report on the 2019 season CSA data emphasizes another important conclusion: incidence of swimmer's itch is higher when there are onshore winds and during the morning hours. (Flory's full analysis and summary is

available on the CLWA website, [CrystalLakeWatershed.org](http://CrystalLakeWatershed.org))

Although less scientific than the CSA data, the public also reported swimmer's itch cases on the CLWA website (see map below). The 32 reports from 19 lake sites in 2019 were down significantly from 36 locations in 2018 and 34 locations in 2017. This also appears to reflect a lower SI incidence this year, consistent with the CSA waterfront results.

Much of the success of this program is thanks to the active involvement of the Crystal Lake community, who reported merganser brood sightings and cases of SI. The CLWA is grateful for your participation and asks for your continuing support, so that the progress being made against swimmer's itch can be maintained into the future.

CLWA continues to work with the Michigan Swimmer's Itch Partnership to persuade the State to renew appropriations for swimmer's itch control after 2020. Our program will need to continue on an annual basis in order to prevent a return of severe infection.



CSA beach on Sunday in early August 2019



Map: cases of swimmer's itch reported to CLWA website



# COLD CREEK: CRYSTAL LAKE'S ACHILLES HEEL

Continued from page 1



*Cold Creek emptying into Crystal Lake (looking west)*

Beginning in the 1920s, swampy muck lands east of Beulah were ditched and drained for an agricultural operation that thrived for nearly 50 years. The ditches had the unintended effect of allowing organic muck particles to flow out of the farmland into a branch of Cold Creek and, ultimately, into Crystal Lake. Farming there ended in the 1970s and the land was donated to the Grand Traverse Regional Land Conservancy, which manages the site as the Trapp Farm Nature Preserve.

In the mid 20th century, the creek mouth in Beulah was the epicenter of Michigan's smelt-dipping craze, as thousands of people gathered on spring evenings to net the tiny, toothsome fish.

The Case Dam failed in the 1970s, sending tons of sawdust and sediment downstream through the merged

branches of Cold Creek. A man-made pond in the village was redesigned after that disaster, in hopes of catching more of the sediment before it entered the lake. The "sediment basin" must be cleaned out every three to eight years and the sediment trucked away, costing the village and Benzonia Township about \$30,000 each time.

Today, the stream runs clear in dry periods. But rainstorms wash organic sediments – along with bacteria and nutrients – off the old mucklands and into the creek. The sediment basin in the village collects about 1,000 cubic yards of that sediment each year, but an undetermined amount still flows into Crystal Lake, contributing to weed growth and to high *E. coli* counts that result in summer beach advisories.

CLWA is working with the village of Beulah, the Benzie County Drain Commissioner, the Benzie Conservation District, surrounding townships and other partners on a grant application to address the *E. coli* issue. If the grant is received, it will be combined with a long-term maintenance plan to reduce sediments from the creek.

**Ed Hoogterp**, *Benzie County Drain Commissioner*

## Current Monitoring

In 2017 the Benzie Conservation District (BCD) partnered with the CLWA to start a water monitoring program within the Cold Creek Watershed. The objective was to quantify how much phosphorus, *E. coli* and suspended solids were flowing into Crystal Lake and to pinpoint where these pollutants originated within the sub-watershed. This monitoring built on a 2016 stream flow monitoring program that the BCD conducted to quantify baseline (periods without significant rain or snow melt) flow conditions within the Cold Creek Watershed.

The monitoring program was also designed to locate sites and areas that would be the focus of potential grant funded restoration projects, as specified in the Betsie River/Crystal Lake Management Plan.

Six sites were originally chosen to cover the Main, South, Middle, and North Branch of Cold Creek with some sites being added or moved based on early sampling results. Sampling started in June of 2017 and has continued once a month during the summer for the last three years.



*Cold Creek pours a torrent of silt-laden water into Crystal Lake after a July rainstorm*



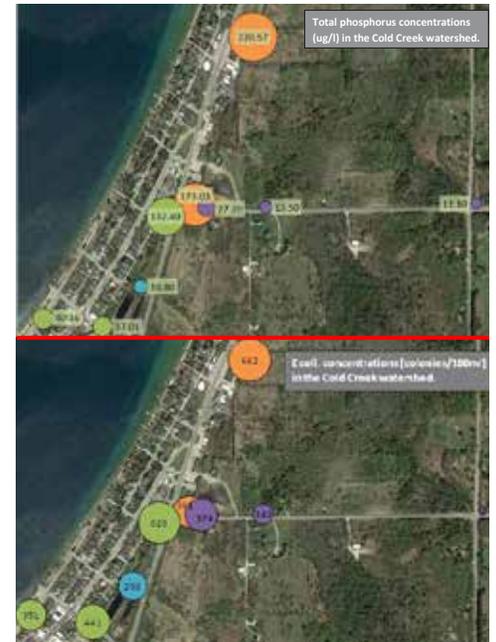
*Ed Hoogterp and John Ransom measuring flow on the Middle Branch of Cold Creek*



# COLD CREEK: CRYSTAL LAKE'S ACHILLES HEEL



Water Monitoring locations 2017-present in the Cold Creek Watershed



Bubble plots of Total Phosphorus and *E. coli* concentrations at sampling sites. Bubble size is proportionate with concentration. Main Branch, North, Middle, and South Branches are represented by green, orange, purple and blue respectively

## Results

Cold Creek contributes approximately 43,483 lbs total phosphorus (TP) per year to Crystal Lake. Phosphorus is a nutrient common in agricultural fertilizers, manure and organic wastes in sewage and industrial effluent. When overabundant in a water body, it can feed excessive growth of algae, bacteria, and other tiny organisms, resulting in such adverse effects as toxic algal blooms.

The average concentration of (TP) entering Crystal Lake from Cold Creek is 40.36 ug/l, compared to the baseline concentration of Crystal Lake of around 5.0 ug/l, about 8 times as much. Peak phosphorus concentrations (167.7ug/l) were measured in the North Branch at site CC\_06 and CC\_09. Proportionally, it is estimated that 47.3% of the phosphorus entering the lake originates in the North Branch followed by the South Branch (29.7%)

the Main Branch downstream of the sediment basin (19%) and the Middle Branch (4%). Although these are rough estimates based on the 2016 stream flow study and the current monitoring, they give us an idea of the problem areas within the watershed.

*E. coli* bacteria are naturally found in human or animal intestines, but can cause illness when they contaminate water or food. The public beach in Beulah is regularly monitored for *E. coli*, and has frequently been closed to swimming (see *Crystal Whitecaps* 14:2, Fall 2018, p. 6).

*E. coli* levels were found to be high throughout the Cold Creek watershed. The highest measured values occurred during or just after a rain event. However, on average *E. coli* levels were above the State-designated level for partial body contact (300 colonies/100ml) at 6 of the 9 sites tested. In 2018 the Michigan Department of Environmental Quality

(now EGLE) tested sites on the North, Middle, and South branches of Cold Creek and found no evidence that the *E. coli* was from human or livestock. Although the specific source of the *E. coli* is still unknown, it is likely from wildlife or pet waste within the watershed and/or discharges from leaking septic systems.

Cold Creek adds an estimated 7.40 lbs of total suspended solids (TSS) into Crystal Lake per day and about 3,300 lbs annually including high rain events. Our sampling shows that the sediment basin does reduce the amount of TSS from the North and Main branches. Even during a high flow event (157% of average flow) the TSS downstream of the sediment basin (66.8 mg/L) was 34% of the total in the South (62.8 mg/L) Middle (13.7 mg/L) and North Branches combined (117.9 mg/L).

**John Ransom, Benzie Conservation District**



# CONTROLLING EURASIAN WATERMILFOIL IN CRYSTAL LAKE



*CLWA aquatic plant survey 2016: S. Brown, J. Hamp, J. Ransom, D. Wynne*



*E. watermilfoil infestation at Beulah public pier July 2018 (Zero Gravity Aerial)*



*Eurasian Watermilfoil (Myriophyllum spicatum)*

In 2018 the CLWA completed its three-year survey of the aquatic plants in Crystal Lake. After analyzing the results, the CLWA is ready to propose the next steps to best protect the lake for the enjoyment of future generations.

The comprehensive survey consisted of a combination of the surface-based point-intercept method and drone-based aerial photography (see *Crystal Whitecaps* Fall 2016, Fall 2017, Fall 2018). The results showed an overall healthy lake, with only one invasive aquatic plant species, Eurasian Watermilfoil (EWM). It clusters at the east end of the lake, most likely introduced at least 25 years ago by transient boating traffic.

Left unchecked, EWM can out-compete native, beneficial plants, and overwhelm all other lake biology including fish and amphibians. It can grow so thickly that it requires mechanical harvesters to clear the top few feet of water for a short period of time before it grows back, making recreational boating, swimming and fishing difficult if not impossible.

EWM is widespread in Michigan and Crystal's situation is much better than many lakes in the state. The invasive here is limited in extent – just 6.05 acres of Crystal Lake's total area of about 10,000 acres – and it has not yet begun to interfere with surface activities. DNA analysis shows that Crystal's milfoil has not

yet hybridized into variant species that are more difficult to treat.

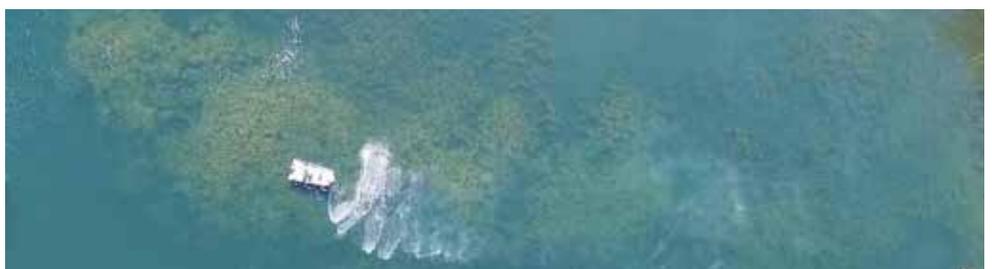
While total eradication of EWM is likely impossible, CLWA's aim now is to control it and keep it from becoming worse. Various control methods have been tried on other lakes, most of them complex and expensive and with ambiguous results. Following expert consultations and studying experience on other lakes, the CLWA has concluded that the only practical and effective way to control EWM on Crystal is by the use of specialized herbicides while it is still at a manageable stage. These chemicals only affect this type of aquatic plant and not the native, beneficial plants in our water, and they dissipate in 4 to 6 hours. This treatment method has been extensively tested by the Environmental Protection Agency and has decades of use in the United States.

Since the CLWA's fundamental purpose is to protect the water quality of Crystal Lake, we feel confident that no harmful effects will result from the EWM treatment. To increase safety, we

propose to use a professional drone to direct the application of the chemicals, a method that insures accurate targeting of the product and prevents excess usage.

The use of herbicide in inland lakes requires permits from the Department of Environment, Great Lakes and Energy (EGLE), a licensed professional applicator, and the permission of involved landowners. Usual protocol calls for two treatments the first year and possibly yearly after that. The CLWA will soon be approaching affected riparians to explain the proposal and answer any questions.

We will also keep the Crystal Lake community fully informed and ask everyone's support to control this infestation before it becomes an irreversible threat to our precious lake. Preventing the introduction of invasive plants into the lake in the first place is extremely critical, for example, by careful boat washing. Reducing the nutrients entering the lake – such as runoff or failing septic systems – will also help prevent the rapid growth of undesirable aquatic plants.



*Drone-guided herbicide treatment (Zero Gravity Aerial)*

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# WOULD YOU LIKE TO LEARN MORE ABOUT YOUR LAKE?

While Crystal Lake hibernates over the winter, the CLWA would like to suggest two opportunities for you to learn more

about why Crystal Lake is so special – and how you can help protect it now for future generations. Many of

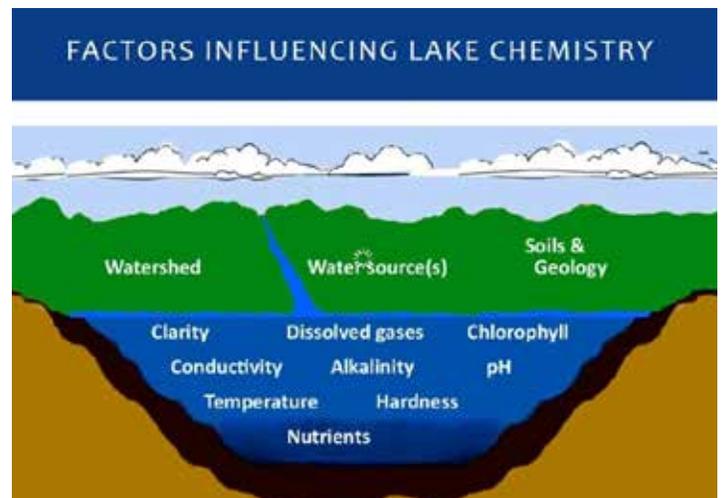
your CLWA board members have participated in these annual activities, and recommend them highly.

To better understand inland lakes' complex ecosystems, learn the latest scientific information and access the best resources, consider enrolling in the **MSU Extension "Introduction to Lakes" online course**. This six-week course is specially designed for lake users, lakefront property owners, and lake

managers interested in learning about this unique resource from the comfort of home or office. The fun and easy to follow format includes closed captioned video lectures, interactive activities, additional resources, discussion forums, quizzes and live chat sessions with classmates and MSU Extension experts.

The 2020 course will begin on January 14, and end on March 13. Early registration fee is \$95 on or before December 20, 2019; \$115 after that. **REGISTRATION IS NOW OPEN AND ENDS ON JANUARY 8, 2020.**

For more information and to register, visit: [https://www.canr.msu.edu/introduction\\_to\\_lakes\\_online/](https://www.canr.msu.edu/introduction_to_lakes_online/)



Lecture slide from MSU Extension "Introduction to Lakes" course

Join lake lovers from all over Michigan at the 59<sup>th</sup> Annual Conference of the Michigan Lakes and Streams Association, which will be held at Crystal Mountain Resort in Thompsonville on May 1-2, 2020.

This two-day meeting brings experts on a wide variety of lake issues to present the latest science and strategies, and distribute informational materials that provide a permanent resource. The 2019 conference included sessions on swimmer's itch, septic care, invasive species, agricultural impact, riparian rights and water law, and lake levels.

The relaxed setting at Crystal Mountain encourages interaction among presenters and attendees, as well as facilitating contacts among like-minded members of other lake associations who share similar

problems. A large exhibit hall includes displays by commercial providers of lake-related products as well as presentations of their work by non-profit and governmental entities.

The MLSA is a non-profit organization that strives to preserve and protect the state's thousands of inland lakes and freshwater systems. It assists

lake associations as well as individual riparian property owners in water resource friendly techniques and methods of protecting their investment in waterfront property.

Conference details and registration will be available in early February 2020 on the MLSA website: <https://www.mylsa.org/>



CLWA board members at MLSA annual conference 2019: B. Leonard, B. Gerhart, E. Herscher, D. Wynne, J. Hamp, S. Brown



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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](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 looks for 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 Bruce Gerhart, at [bvgerhart@gmail.com](mailto:bvgerhart@gmail.com). For information on terms and duties, see the bylaws posted on the CLWA website: [www.crystallakewatershed.org](http://www.crystallakewatershed.org). If you are interested in a committee, contact information for the chairs is also available on the CLWA website.



CLWA booth at Beulah Sidewalk Sale

## CLWA ANNUAL MEETING 2019

The annual members meeting of the CLWA was held on Saturday, July 20, from 9:30 to 11:00 a.m. at the Congregational Summer Assembly Community Building, with over 100 members and other interested persons attending. President Dave Wynne surveyed the association's current programs and accomplishments. Treasurer Ron Ahrens reported that the CLWA received a clean audit this year; he described the allocation of its financial resources. The Crystal Circle Award was presented to Ted Fisher, retiring chair of the Swimmer's Itch committee, for his years of service and leadership. Jim Hamp, CLWA board member, reported the final results of the 3-year aquatic plant survey. Dennis Wiand, Zero Gravity Aerial, explained the methods used to conduct a shoreline survey from the air. Rob Karner, Watershed Biologist for Glen Lake, discussed how his lake association is using the information from its shoreline survey to manage and protect Glen Lake.

#### The following officers and board members were elected:

Re-elected Vice President: Susan Brown (2019-2021)

Re-elected Treasurer: Ronald Ahrens (2019-2021)

New board members: Dirk Nelson (2019-2022), Mark Walton (2019-2021), Steve Stephens (2019-2020)

Re-elected board members (2019-2022): Bruce Gerhart, James Hamp, Wanda Shreiner, Hugh Walton

Full minutes of the meeting are available on the CLWA website [CrystalLakeWatershed.org](http://CrystalLakeWatershed.org).

**CLWA thanks the Assembly for the use of its facility!**