

WINTER  
2014



Vol. 49 No. 1

# THE MICHIGAN RIPARIAN

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THE MICHIGAN RIPARIAN (ISSN 0279-2524) is published quarterly for \$3.50 per issue by the Michigan Lakes and Streams Foundation, a Michigan non-profit corporation. Periodical postage is paid at Lansing, Michigan and additional mailing offices.

**POSTMASTER:**

Send address changes to:  
The Michigan Riparian  
300 N. State St., Suite A, Stanton, MI 48888

THE MICHIGAN RIPARIAN is the only magazine devoted exclusively to the protection, preservation and improvement of Michigan waters and to the rights of riparian owners to enjoy their water-front property.

THE MICHIGAN RIPARIAN magazine is published quarterly and is mailed to subscribers in the Winter, Spring, Summer, and Fall each year.

**The Michigan Riparian**

**PUBLISHING OFFICE**

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Stanton, MI 48888

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**SUBSCRIPTION RATES (4 issues/year)**

Individual annual subscription: \$14

Lake association quantity subscriptions: \$12

**ADVERTISING RATES**

Advertising rates sent upon request or available on website.

**DEADLINES:** August 15 for Autumn issue

December 15 for Winter issue

March 15 for Spring issue

May 15 for Summer issue

*Printed by Spartan Printing, Lansing, Michigan*

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# FROM THE PUBLISHER

## REFLECTIONS & RESOLUTIONS



One of the top priorities for The Michigan Riparian magazine is to get each issue into the hands of our subscribers. I want to take a little time here to let you know that, even with all of our best efforts, sometimes that simple task can still be a challenge. We are pleased with the improvements we have recently put in place to reach our goals; however, we still need your help.

Due to the large number of subscriptions and our non-profit status, our magazine is sent as bulk mail instead of first class. This enables us to keep the costs down and the magazine more affordable for you. Over the last few years, the NCOA (the section of the post office that processes the mailing list we give them) has implemented stricter guidelines and policies regarding the validation of addresses. Simply put, the addresses for bulk mail need to be 100% accurate (i.e. no transposed numbers, no missing parts of an address such as Lane, Drive or Court, no misspelling of streets, names or cities, etc.). So, if any part of the address is incomplete or inaccurate, the magazine is not delivered. It is more important than ever that we receive the mailing lists and addresses with 100% accuracy.

Determined to resolve the mailing conundrum, a database was recently developed by us to accommodate thousands of subscriber addresses and provide a much more functional system for tracking expiration dates, address changes, second address information and more. The new system was launched in December, 2012. While it has provided us with a more efficient tool, we still need you to provide us with information that is complete and accurate. To further our efforts to acquire accurate mailing lists, we have communicated with our subscribers via articles in the magazine, and through letters, emails and phone calls.

We rely on the lake association representatives for information regarding their lake's subscribers, and the time and effort of these dedicated volunteers to provide accurate lists are appreciated. Please check with them to assure that they have the right information. If you have a different residence during the winter, please let us know where to send your issues and for which months. Email us with any changes to: info@mi-riparian.org or call (989)831-5100.

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This issue of The Michigan Riparian includes details of the upcoming Michigan Inland Lakes Convention set for early May, along with a variety of articles that will inform, educate and entertain you. Please keep sending us your stories, questions and suggestions. We love hearing from you. And thanks for helping to assure that every issue of The Michigan Riparian gets delivered.

From everyone at The Michigan Riparian, we wish you a happy and healthy 2014.

-publisher, Sharon Wagner

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# FASCINATING FRESHWATER PHENOMENA:

## JELLYFISH AND BRYOZOANS

By: Jennifer Jermalowicz-Jones, PhD Candidate and Nicholas Gressick, MS, Restorative Lake Sciences

### Freshwater Bryozoans: Origins and Composition

Freshwater bryozoans are an excellent example of an aquatic entity that consists of multiple individual animals that comprise a colony and together they perform life functions for the benefit of the entire colony. While the majority of bryozoans are considered marine, there are a few freshwater forms. *Pectinatella magnifica* (Figure 1) is a member of the animal phylum Ectoprocta (also known as moss animals), a group with a fossil record extending back to the upper Cambrian period (500,000,000 years ago). The class Phylactolaemata is found exclusively in fresh water (Wood 1989) and some species even pre-date the dinosaurs. The majority of the colony is water, but Morse (1930) determined that *Pectinatella* sp., was comprised also of protein amino acids such as tyrosin, tryptohane, and cystin, as well as sodium chloride (salt), glucosamine chitin, and large quantities of calcium.

Freshwater bryozoans are far less diverse than their marine cousins, with only about 50 species worldwide, but what they lack in numbers they make up for in size. Some colonies grow to be 4-foot “blobs” such as the colony found floating in Newport News, VA. When the individual animals extend their tentacles to feed, the colony takes on a fuzzy appearance, hence the bryozoans’ common name of moss animal (Science

Daily 2010). Colonies of *Pectinatella magnifica* feature a surface layer of adjoining rosettes each with 12-18 animals or zooids around a central jelly-like mass that is 99% water. The colonies can be free-floating or attached to a piling or other submerged object such as woody debris. In the winter, the bryozoans form statoblasts which offer protection against harsh elements and allow for spring colony formation. One study even showed that young colonies of *P. magnifica* can actually move on their own by coordinated pulsing of the individual animals (Science Daily 2010).

Each bryozoan has an outer layer that protects a digestive tract. Bryozoans are filter feeders that feed on algae and organic matter and may substantially reduce algal abundance in some lakes, thereby resulting in clearer water. The zooids feed by using ciliated (hairy) lophophores (tentacles) to direct food to them via self-created water currents. These bryozoans, despite their appearance in nature, are not a sign of bad water quality and they are not harmful to fish or other vertebrates. They may be however, indicative of nutrient-rich waters (Dendy, 1963). The bryozoans are usually found in slow-moving waters since currents tend to break up the colony.

### Freshwater Bryozoans: The Need for More Information

Other common freshwater species include *Plumatella emarginata*, *P. repens*, *P. longigemmis*, *Stolella indica*, *Fredericella sultana*, and *Gelatinella toanensis*. Dispersal has been shown to be initiated by waterfowl across continents, but human activities may also be a factor. Much is still not known about freshwater bryozoans (Wood 2001). Protection against known species may be needed since little is known about their total distribution. The presence of the zebra mussel (*Dreissena polymorpha*) in the Great Lakes has focused new attention on the sessile benthic communities, as significant changes in benthic (bottom) community structure are expected with the introduction



Figure 2. A freshwater jellyfish in medusa form found in Dewey Lake, Cass County, Michigan (Photo courtesy of Doug Pearson, Dewey Lake).

of this exotic species. Without knowing the historical and current distribution of native invertebrates, such as the bryozoans, it is not possible to identify changes in community composition over time (Barnes 2003). Natural predators of the bryozoans include fish and wildlife such as raccoons.

### Freshwater Jellyfish: Origin, Distribution, and Morphology

The Freshwater jellyfish (*Craspedacusta sowerbyi*; Figure 2) was first noted in England in 1880 by Lankester and originated from the Yangtze River system (Parent, 1981). Although the majority of the phylum Cnidaria (taxonomic rank) is found in marine or salt water habitats, a few species are also present in freshwaters. Freshwater jellyfish have been found in Asia, Europe, North and South America, and Australia. They can be found in lakes, reservoirs, man-made impoundments, rivers, and water-filled gravel pits or quarries. In the United States, they have been seen in large river systems such as the Allegheny River, the Ohio River, and the Tennessee River and thus are able to tolerate moving waters although they prefer slower moving waters. In the Great

Continued on page 6

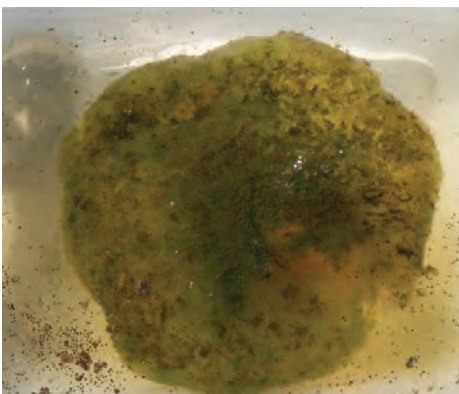


Figure 1. A photo of a bryozoan found in Magician Lake, Van Buren County, MI (Restorative Lake Sciences, 2013).



# FASCINATING FRESHWATER PHENOMENA:

## JELLYFISH AND BRYOZOANS *Continued from page 5*

Lakes Region, freshwater jellyfish were first discovered in the Huron River near Ann Arbor, MI, in 1933, and in Lake Erie shortly thereafter (Mills et al. 1993). It has since been recorded in Lake Huron and Lake St. Clair, as well as dozens of inland lakes and streams throughout the region, in the states of IL, IN, MI, MN, NY, OH, PA, and WI (McKercher et al. 2013). The appearance of the jellyfish is described as sporadic and unpredictable. Often, jellyfish will appear in a body of water in large numbers even though they were never reported there before. The following year they may be absent and may not reappear until several years later (Ameling 2012). It is also possible for the jellyfish to appear once and never appear in that body of water again (Peard 2005). Jellyfish have been found in nearly 203 lakes in Michigan and that number may increase with time.

The jellyfish are all “polymorphic” which means that there are multiple forms for the same entity within a population. Most of the adult freshwater jellyfish range from the size of a penny up to the size of a silver dollar. During the winter, the polyps contract and become “resting bodies” that are capable of surviving the cold temperatures. Some scientists believe that the resting bodies, called podocysts, are one way in which the jellyfish are transported from lake to lake. It is believed that the podocysts may be transported on aquatic plants, by aquatic animals, or perhaps on the feet of birds. When conditions become favorable, the podocysts develop into polyps and the life cycle is continued (Peard 2005). The polyp form may be a “resting body” that is persistent in cold waters or when starvation is evident. Additionally, the polyp form persists annually while other life cycle stages (medusa, frustule, and resting bodies) occur when certain environmental conditions are present. However, polyps are usually not found in areas where sedimentation or dense algae is present because the polyp needs to find suitable substrates to conduct feeding in the water. Suitable substrates include rock, aged wood, and aquatic vegetation. Thus, polyps tend to be more plentiful in oligotrophic (nutrient-poor) water bodies than in eutrophic (nutrient-rich) waters (Acker and Muscat, 1976). Polyps may be translocated among lakes accidentally

with stocked fish and aquatic plants or by waterfowl (McKercher et al. 2013). This may explain the increase in sightings over the years in inland lakes and water bodies.

The presence of the various life cycle forms varies with water temperature and thus season. In the winter, the resting body is the most prevalent form and all do not survive extreme winter conditions. Polyps are most abundant in the spring and propagate through asexual reproduction. During late spring and early summer, the frustule becomes abundant and by late summer and early fall, the medusa (large umbrella-shaped form) is common. Medusa formation is most prevalent in water temperatures between a minimum of 59°F and a maximum of 86°F (Milne, 1938).

### Freshwater Jellyfish: Feeding Patterns and Predation

Freshwater jellyfish migrate to the deeper waters of a lake during the daytime and then to shallower depths at night to feed on migrating zooplankton that also follow this trend. The impact of this widespread jellyfish on surrounding ecosystems is unclear and is currently being studied. It is well known that the jellyfish feed on zooplankton in the water column, especially genera such as *Bosmina* sp., *Cyclops* sp., *Ceratium* sp., and *Nauplius* sp. (Lytle, 1959). Figure 3 shows a copepod known as *Cyclops* sp. that is a preferred food source found in many healthy lakes. Dodson and Cooper (1983) proposed *C. sowerbyi*'s preference for predatory zooplankton, such as the rotifer *Asplanchna*, could influence relative zooplankton species structure. *C. sowerbyi* medusae prefer larger

zooplankton (0.4–1.4 mm) and vigorous prey such as copepods (Spadinger and Maier (1999). They analyzed the stomach contents of various medusae and found that the larger zooplankton was dominant. This could be due to the morphological characteristics of tentacle spacing or that some prey cannot activate the stinging nematocysts used by the jellyfish to capture food. In fact, when the copepods and larger zooplankton feel threatened, they may increase the length of their antennule and make other bodily modifications to defend themselves against the jellyfish (Jankowski, 2004). Predation of the zooplankton by *C. sowerbyi* result in increased algal (phytoplankton) populations (Jankowski and Ratte, 2001). It is unlikely that the medusa could consume zooplankton quickly enough to compete with the fish for food (Dodson and Cooper, 1983) and do not pose an immediate threat to fishery structure. It was further noted that freshwater jellyfish are generally not considered an important predator of eggs or small fish but larger fish will feed on them if other food sources are not abundant (Davis, 1955). Crayfish are considered the only important predator of the medusa phase (McKercher et al. 2013).

It is unknown whether freshwater jellyfish can harm humans. Like marine jellyfish, they do have stinging cells (cnidocytes). This mechanism is designed for feeding, as the cnidocytes are utilized to paralyze macroinvertebrates and even small fish. However, we have no “hard” evidence that these organisms can penetrate human skin (though some have claimed otherwise).

*Continued on page 7*



Figure 3. The copepod, *Cyclops* sp. (photo courtesy of the USGS, 2012).



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# The 2014 Michigan Inland Lakes Convention: Partnering to Protect Michigan's Inland Lakes

by Paige Filice  
Michigan State University

In today's world of flourishing aquatic invasive species, the continuous loss of natural shorelines and pressing urban development on our inland lakes, it can seem impossible to keep up with the latest information. Look no further than the 2014 Michigan Inland Lakes Convention May 1st through 3rd, 2014 at Boyne Mountain Resort in Boyne Falls, Michigan to learn how to protect your lake through knowledge and partnerships.

The Convention will educate, engage, and empower the individuals who work, live and play on Michigan inland lakes including lake enthusiasts, lake professionals, researchers and local government officials. At the Convention you will have the opportunity to experience three days of educational presentations and discussions, in-depth workshops and tours focused exclusively on Michigan's 11,000 inland lakes. There will be dozens of non-profit and business exhibitors showcasing their projects, resources and services.

The inaugural Michigan Inland Lakes Convention is a cooperative effort between major lake organizations including the Michigan Lake and Stream Associations and the Michigan Chapter, North American Lake Management Society, both of which are forgoing their annual conferences in 2014 to coordinate on this unique and significant event.

The Convention kicks off Thursday, May 1st with a variety of hands-on workshops focused on natural shorelines, youth stewardship development, and aquatic invasive species management. There will also be a guided tour of the Oden Fish Hatchery led by a Department of Natural Resources fisheries biologist. The MiCorps Cooperative Lakes Monitoring Program volunteer training will take place all day Thursday and Friday afternoon.

On Friday there will be presentations and discussions on an array of inland lake management topics and plentiful networking time



Photo by Jo Latimore, Crystal Lake, Michigan. Learn how to protect inland lakes at the Michigan Inland Lakes Convention May 1-3 at Boyne Mountain.

during breaks, happy hour, and the Convention banquet. Friday's breakout session topics will include current lake research from academia and state agencies, a review of Michigan's Aquatic Invasive Species State Management Plan, causes and solutions of harmful algal blooms, communicating effectively with state representatives regarding inland lake issues, and much more. On Saturday the Convention will host a Certified Natural Shoreline Professional workshop and presentations on aquatic invasive species including an in-depth look at starry stonewort and its lasting impacts on Michigan inland lakes, how to improve lake water quality, current tribal lake management efforts, and riparian rights.

Early bird registration for this important event ends March 1st! Additional details regarding registration, sessions and workshops can be found on the Michigan Inland Lakes Convention website at <http://michiganlakes.msue.msu.edu/convention>. Stay up-to-date on the latest Convention developments by visiting our Facebook Page [www.facebook.com/michiganinlandlakesconvention](http://www.facebook.com/michiganinlandlakesconvention).

This landmark event is being brought to you by the Michigan Inland Lakes Partnership, launched in 2008 to promote collaboration to advance stewardship of Michigan's inland lakes. The Convention is a cooperative effort between the many public and private organizations that make up the Michigan Inland Lakes Partnership, including: the Michigan Chapter of the North American Lake Management Society, Michigan Lake and Stream Associations, Inc., Michigan State University Extension, Michigan Natural Shoreline Partnership, Michigan Department of Natural Resources, Michigan Department of Environmental Quality, and the Michigan State University Institute of Water Research. ●●●



Photo by Jane Herbert, learn about natural shoreline benefits at the homeowner workshop at the Michigan Inland Lakes Convention.



The Cooperative Lakes Monitoring Program training will take place in conjunction with the Michigan Inland Lakes Convention.

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# Tip of the Mitt Watershed Council Awarded Grants for Two Demonstration Greenbelts

written by Jennifer Gelb  
Restoration Ecologist  
Tip of the Mitt Watershed Council

Northern Michigan has at least two more great greenbelts thanks to a grant from the Midwest Glacial Lakes Partnership. Tip of the Mitt Watershed Council was awarded \$17,200 to install two demonstration greenbelts as part of two hands-on greenbelt workshops. The first workshop was held July 13, 2013 in Aloha, MI, on Mullett Lake, Cheboygan County, in partnership with Mullett Area Preservation Society (MAPS). Prior to the workshop, MAPS coordinated an application process for lakefront property owners with interest in receiving a greenbelt through the grant program. Approximately 14 applicants expressed interest. Tip of the Mitt Watershed Council evaluated each of the sites and chose the site in Aloha based on need, visibility, site conditions, and cost. The second workshop, coordinated with Three Lakes Association (TLA), was held October 5, in Kearney Township on Lake Bellaire, Antrim County, at the Summit Village Beach Club. The Watershed Council worked with TLA to find a site where a greenbelt would both stabilize the shoreline and serve as an educational greenbelt for lake residents.

Both workshops consisted of a short presentation on the importance of greenbelts, distribution of a booklet created for each workshop, and installation of the greenbelts. Both sites were prepped in the days prior to the workshops, which included applying herbicide to the turf grass, edging the outermost boundary of the greenbelts for a clean, crisp edge, and planting of the larger shrubs and many of the herbaceous plants. When participants arrived at the workshops, they were introduced to the partially finished projects and then, after some instruction and guidance, were digging, mulching, planting, and watering like professionals until the greenbelts were completed. In both cases, the reaction and remarks of the participants were strikingly similar: WOW! Overall, the attendees were pleased with the orderliness of the plantings, and excited about some of the native plants they were introduced to.

In both cases, the property owners wanted to keep their views of the lake so shrubs were strategically placed where they would not block views. Accent boulder clusters were also incorporated to add visual interest and opportunities for special planting pockets. The outlines of the greenbelts were clearly defined by cutting in a deep edge between the greenbelt and adjoining turf. The Mullett Lake greenbelt included over 400 herbaceous and woody Michigan native plants, including butterfly weed, prairie dock, little bluestem, beardtongue, western sunflower, false sunflower, red-osier dogwood, bush honeysuckle, and over a dozen more species! The Lake Bellaire greenbelt, with slightly different conditions, includes more shade-tolerant species, including ferns, sedges, foamflower, and low shrubs.

At the end of both workshops, participants were rewarded for their hard work with their own native plant kit. Each kit contained multiples of five or six different species, for an average total of about 30 plants per kit. Armed with their new skills and native plant kits, attendees couldn't wait to return to their lakefront homes to start or add to their greenbelts.

The Watershed Council extends our sincere thanks to the Midwest Glacial Lakes Partnership, MAPS, and TLA for their support of these two successful workshops. ●●●





# ASK THE EXPERTS

*If you have a question about water related issues, riparian rights, and/or lakes and streams, etc., let us know by email or snail mail.*

Email: [info@mi-riparian.org](mailto:info@mi-riparian.org)  
Mail: The Michigan Riparian  
300 N. State St., Suite A,  
Stanton, MI 48888

**Question:** I keep hearing about this new Michigan Inland Lakes Convention that will happen on Thursday, Friday and Saturday, May 1st, 2nd and 3rd, 2014 at Boyne Mountain Resort in Boyne Falls, but what about this year's Michigan Lake & Stream Associations annual conference. Has it been cancelled for 2014?

**Answer:** The short answer is no-the Michigan Lake and Stream Associations annual conference has not been cancelled for 2014, and we would strongly encourage all those who have participated in our annual conferences in past years to attend the Michigan Inland Lakes Convention!

All of the events traditionally associated with the ML&SA annual conference, including the awards ceremonies that are part of our annual banquet, MiCorps Cooperative Lakes Monitoring Program (CLMP) volunteer training, the silent auction, our annual review of Michigan riparian rights and water law conducted by Attorney Cliff Bloom, the 50-50 raffle as well as your opportunity to meet representatives from the many outstanding commercial and non-profit exhibitors that participate in our annual conference each year, will all take place as usual within the 2 ½ day Michigan Inland Lakes Convention.

The Michigan Inland Lakes Convention will provide an outstanding opportunity for you to meet representatives from the various public and private partners with whom we have been long affiliated, including the Michigan Department of Environmental Quality, the Michigan Department of Natural Resources, the Michigan Natural Shoreline Partnership, Michigan State University Extension, and the Michigan Chapter, North American Lake Management Society (McNALMS), that have come together under the organizational banner of the Michigan Inland Lakes Partnership. The Partnership was created in 2008 to promote collaboration to advance the stewardship of Michigan's inland lakes. One of the early goals of the Partnership was to organize and conduct a Michigan Inland Lakes Convention. The achievement of this goal will come to fruition on May 1st, 2nd, and 3rd, 2014 at the Boyne Mountain Resort in beautiful Boyne Falls.

To register for the Michigan Inland Lakes Convention or to find out more about this unique opportunity to gain additional information about our magnificent inland lakes, point your internet browser toward

<http://michiganlakes.msue.msu.edu/convention>

Thanks,  
Scott Brown  
ML&SA  
Executive Director

\*\*\*\*\*

Our experts include our riparian attorney, a biologist, a limnologist, an engineer, a college professor and a state agency official. They look forward to responding to your question.

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# Aquatic Special Assessment Districts — Mass Confusion?

By: Clifford H. Bloom, Esq.  
Bloom Sluggett Morgan, PC  
Grand Rapids, Michigan  
[www.bsmlawpc.com](http://www.bsmlawpc.com)



The proliferation of exotic and invasive aquatic weed species in Michigan inland lakes is becoming an increasingly significant problem. In general, there are two ways of funding aquatic weed eradication or control efforts – voluntary funding by riparians or lake associations or mandatory special assessments by a local governmental unit. Naturally, the problem with the voluntary program is that many property owners on or adjacent to an inland lake benefit from aquatic weed control programs but refuse to contribute monies. A mandatory special assessment district solves that problem but also comes with its own set of headaches.

What is a special assessment district? Special assessments in Michigan are authorized only by specific statutes. In the absence of statutory authority, municipalities may not impose special assessments. Various statutes authorize municipalities and local government agencies (including cities, villages, townships, drain commissioners, and statutory lake improvement boards) to create a special assessments district, i.e., a geographic district within which the properties are subject to an annual special assessment or “quasi-tax” which can only be used for certain improvements within that district. When a special assessment district is created, the special assessments are placed on the landowners’ annual property tax bills. (Even though special assessments are placed on property tax bills, they are technically not taxes and not typically deductible from the landowner’s income taxes).

Special assessment districts are normally created only for a specific number of years. Some of the improvements that can be funded by a special assessment district include not only aquatic weed control but also paving and maintenance of public or private roads, watershed management, improvements for sidewalks and public trails, street lighting, the installation, maintenance and repair of dams or other impoundment structures, lake dredging,

the installation of municipal water and sewage systems, and the creation and maintenance of public parks.

The most common statute used by townships in Michigan to fund special assessments regarding inland lakes is Public Act No. 188 of 1954 as amended, being MCL 41.721 et seq. (the “Act”). Unfortunately, setting up a special assessment district tends to be a somewhat complicated and paper intensive process. It is surprising that the Michigan Legislature has not seen fit to streamline and simplify the process. Furthermore, the requirements of the statute must be followed precisely, or the special assessment district could be challenged after it is set up. Accordingly, the municipality involved

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should utilize legal counsel (either the municipality’s regular attorney if he or she is well-versed in special assessments or by hiring special outside legal counsel) for the special assessment district creation process.

It should always be kept in mind that special assessments and special assessment districts are a government function. Although individuals, lake associations and other groups can have input into the process, ultimately, a special assessment district must be approved and administered by a local governmental unit. However, all costs associated with creating and administering a special assessment district (including the municipality’s attorney fees, public hearing

notice costs, contractor costs, annual billings, etc) can be “rolled into” the district and charged to the individual property owners as part of the special assessment.

Typically, special assessments are initiated by property owner petition. Under the Act, a municipality can proceed without property owner petitions but if petitions are filed opposing the special assessment district by the owners of twenty percent or more of the area of the lands involved, then a “pro” petition representing the owners of more than fifty percent of the area of the lands involved must be filed before a municipality can proceed. Accordingly, some municipalities, in an attempt to avoid dueling petitions, require a “fifty percent plus” petition to initiate the process. Before any petitions are circulated, however, the wording and form should be approved by the municipality involved (including the municipality’s attorney). Many groups have spent countless hours circulating self-drafted petitions, only to have them be rejected later by the municipality when the completed petitions are turned in.

In general, it requires three separate meetings of the municipality involved to approve a special assessment district, including two public hearings and two notices of public hearings (with newspaper and mailed notices). At the first meeting, the legislative body of the municipality determines whether or not to tentatively proceed with the special assessment district. The second meeting involves a public hearing to determine whether to formally approve the special assessment district. The third and final meeting (i.e., the second public hearing) actually confirms the geographical limits of the special assessment district itself and the assessments.

In most cases, a special assessment involving inland lakes is imposed by either

*Continued on page 14*

# Aquatic Special Assessment Districts — Mass Confusion?

*Continued from page 13*

a municipality (typically, a township) as a “standard” special assessment district or, where one exists, by a statutory lake improvement board created pursuant to MCL 324.30901 et seq.

The “pros” and “cons” of utilizing a standard special assessment district by the local municipality versus the creation and implementation of a statutory lake improvement board (with special assessment powers) is beyond the scope of this article. For those issues, please see the article entitled “Weed Whacker” in the winter 2009 issue of the Michigan Riparian Magazine. As a generalization, if a special assessment district is to be created for simple aquatic weed control purposes and the lake is located entirely within one municipality, a special assessment district imposed by the local municipality is typically the most cost effective, simple and straightforward fashion in which to proceed. However, if a lake straddles two or more municipalities, the problem involves more than simple aquatic weed issues, or a “whole watershed” approach is needed, a statutory lake improvement board is often preferable. The drawback of a statutory lake improvement board is that its special assessments tend to be higher and there is generally a loss of local control.

Contrary to popular myth, special assessment districts cannot be renewed or extended in a summary fashion once the end of the initial term of the special assessment district is reached. Rather, the process must start all over again. Hence, if a proposed special assessment district has widespread support, it is better to approve it for a longer period of time (for example, seven to ten years or even longer) than a shorter period of time (under seven years). Most special assessment districts can be approved for up to twenty years.

Once a district is created, all functions of the special assessment district must be administered by the municipality involved. A municipality must send out any public hearing notices, take bids for aquatic weed treatment purposes (and sign a contract with the successful bidder), collect the

special assessments annually via property tax bills and generally administer the district. Lake associations or individuals cannot perform these functions. However, most municipalities are fairly deferential to lake associations or similar groups regarding their desires and some townships have even appointed advisory committees comprised of riparian owners and lake association representatives to advise the legislative body of the municipality regarding matters pertaining to a special assessment district.

Even though there are dozens (if not hundreds) of special assessment districts currently in effect throughout Michigan in townships relating to inland lakes, township officials in parts of the state where special assessment districts have not been utilized are often reluctant to create a special assessment district. Why? There are typically many different reasons. First, local government officials who have not been involved in special assessment districts in the past sometimes need to be educated since they often do not understand the function or process of a special assessment district. Second, some local government officials do not want to take on the extra work associated with a special assessment district, even though all costs associated therewith can be rolled into the special assessment district. Third, local government officials are sometimes susceptible to pressure from groups who oppose chemical treatment of aquatic weeds. The response to local municipal officials should be that the special assessment process has been recognized and endorsed not only by state statute but also by many municipalities (including numerous townships) throughout Michigan. It is a government function and a service to a majority of the property owners where the support for the creation of a special assessment district exceeds fifty percent. It is not some exotic or rare process. Furthermore, it does not cost the general fund or the taxpayers of the municipality at large one dime because all costs associated with the special assessment district can be charged to that district.

If the legislative body of a municipality determines to proceed with a special

assessment for a lake, the assessment can be levied in one of five different ways – on a per lot, taxable parcel, lake front footage, lot or parcel size, or taxable value per parcel basis. It is most common to assess on a per taxable parcel basis (using the permanent parcel number assigned for property tax purposes). Should off-lake or back lot properties with easement, park or other lake access privileges be included? They can be, but often, it is more trouble than it is worth and can sometimes effectively “kill” a special assessment district (due to controversy, protest petitions, etc.). It is also frequently difficult to determine how an off-lake parcel should be assessed (should off-lake properties be assessed at one hundred percent, two-thirds, fifty percent, one-third, etc. of a lakefront parcel?), as well as which off-lake parcels should be included in the district.

Another advantage of a special assessment district is that with certain chemicals for aquatic weed treatment, the Michigan Department of Environmental Quality will allow their use only if one hundred percent of the property owners on a lake agree or a special assessment district has been set up for the entire lake.

In summary, special assessment districts are often the most equitable and effective way of treating or controlling invasive aquatic weed species in Michigan inland lakes. Such districts are commonly used by many townships throughout Michigan. In general, they do not cost taxpayers anything because all the costs and expenses of a special assessment district are charged only to the property owners directly benefitted. Finally, given that setting up a special assessment district can be a somewhat complicated and exacting process, governmental units should utilize a municipal attorney who is well-versed in this area. ■■■



# MiCorps Cooperative Lakes Monitoring Program Annual Free Parameter Drawing Results

By Jean Roth,  
ML&SA CLMP Administrator

Since 2008 the MiCorps Cooperative Lakes Monitoring Program (CLMP) has held an annual drawing for lake water quality monitoring volunteers who directly enter their respective lake data into the on-line MiCorps Data Exchange, and each year one lake is randomly selected from each monitoring parameter to receive a waiver for FREE enrollment in that parameter for the following year.

We are pleased to announce that for the monitoring season that begins in the spring of 2014, the following lakes have won free enrollment in a monitoring parameter:

- ▶ **Browns Lake in Jackson County** (volunteer Libby Greanya) has won free enrollment in the Secchi Disk Transparency Parameter for 2014;
- ▶ **Christiana Lake in Cass County** (volunteer Doug Hansen) has won free enrollment in the Spring Phosphorus parameter for 2014;
- ▶ **Glen Lake in Leelanau County** (volunteer Andy DuPont) has won free enrollment in the Summer Total Phosphorus parameter for 2014;
- ▶ **Beaver Lake in Alpena County** (volunteer Gary Wolter) has won free enrollment in the Chlorophyll-a parameter for 2014;
- ▶ **Lake Angelus in Oakland County** (volunteer Carol LaGrasso) has won free enrollment in the Dissolved Oxygen / Temperature parameter for 2014.

The annual drawing for free parameter enrollment is our way of saying “Thank you” for being the volunteer for your lake and for entering your own data into the MiCorps Data Exchange. Michigan Lakes, Ours to Protect! Thank you to everyone for entering your lakes’ data in to the MDE for 2013! Also, a reminder to all lakes, if you haven’t signed up yet for 2014, please be aware that there are specific cut off dates for specific parameter enrollment.

- ▶ **March 1st is the enrollment deadline for Spring Phosphorus enrollment**
- ▶ **March 15th is the enrollment deadline for Dissolved Oxygen and Temperature**
- ▶ **April 1st is the enrollment deadline for Chlorophyll, Exotic Aquatic and Aquatic Plant Mapping**

Enroll now to ensure your participation in all the parameters you want for 2014!

Please contact Ms. Jean Roth, ML&SA CLMP Administrator, at 989.257.3715; or e-mail [jroth@mlswa.org](mailto:jroth@mlswa.org) if you should have questions regarding your participation in the CLMP program for 2014.



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**Enrollment for the 2014 monitoring season began  
October 1, 2013**

**Program Administrator, Jean Roth at 989-257-3715 or  
e-mail [jroth@mlswa.org](mailto:jroth@mlswa.org)**

**To enroll on-line visit [www.micorps.net](http://www.micorps.net)**

# MICHIGAN LAKE & STREAM ASSOCIATIONS, INC.

## ML&SA NEWSLETTER



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## Save the Dates!

Be a Part of Michigan History!  
Plan on Attending the First-Ever Michigan Inland Lakes Convention  
by Scott Brown, ML&SA Executive Director

Michigan Lake and Stream Associations is proud of the fact that we have conducted 52 consecutive annual conferences. However, in order to promote and support the broad interests of our various collaborative partners, the previously scheduled venue and dates for our 2014 annual conference have been integrated within the overall concept of a first-ever Michigan Inland Lakes Convention.

**Michigan Inland Lakes Convention**  
**Thursday, Friday and Saturday, May 1 - 3, 2014**  
**Boyne Mountain Resort in Boyne Falls, Michigan**

Conducted under the auspices of the Michigan Inland Lakes Partnership, an initiative created in 2008 to promote collaboration to advance stewardship of Michigan's inland lakes, several public and private agencies and organizations, including the Michigan Chapter of the North American Lake Management Society, the Michigan Department of Environmental Quality, the Michigan Department of Natural Resources, Michigan State University Extension, the Michigan Natural Shoreline Partnership and Michigan Lake and Stream Associations, will join forces to offer two and one half days of inland-lakes-focused open sessions, workshops and a wide array of topic specific breakout sessions designed to appeal to a wide range of personal and professional interests.

Activities traditionally associated with the Michigan Lake and Stream Associations annual conference such as our annual banquet, the annual review of riparian rights and water law, our awards ceremony, silent auction and the 50-50 raffle will be conducted as usual within the larger context of the overall convention.

Please also note that MiCorps Cooperative Lakes Monitoring Program volunteer monitor training will be held on Thursday, May 1st, 2014 from 9:00 AM to 4:30 PM and on Friday, May 2nd, 2014 from 1:00 to 4:00 PM. Cooperative Lakes Monitoring Program volunteer water quality monitors with questions regarding the 2014 training sessions should contact Ms. Jean Roth, ML&SA CLMP Administrator, at 989.257.3715 or via e-mail at [jroth@mlswa.org](mailto:jroth@mlswa.org).

The inaugural Michigan Inland Lakes Convention promises to be an outstanding opportunity for members of Michigan Lake and Stream Associations and/ or readers of The Michigan Riparian to learn more about the science and management of their favorite inland lake and to directly participate in open discussions focused on a number of important inland lake related topics including aquatic invasive species management, riparian rights and water law, preserving or restoring their natural shorelines and working effectively with their local government officials.

For more information regarding the 2014 Michigan Inland Lakes Convention, please read the detailed article which appears in this issue of The Michigan Riparian.

To register for the Michigan Inland Lakes Convention, point your browser toward the Michigan Inland Lakes Partnership website at <http://michiganlakes.msue.msu.edu>.





# MICHIGAN LAKE & STREAM ASSOCIATIONS, INC.

## ML&SA NEWSLETTER



### The Starry stonewort Invasion: An Unprecedented Threat to Michigan's Inland Lakes

Story and Photos by Scott Brown,  
ML&SA Executive Director

Starry stonewort (Scientific Name: *Nitellopsis obtusa*), a member of the Characeae family, and considered a beneficial, though increasingly rare species within its native range of northern Europe and Asia, was first observed as an invasive species within the North American waters of the St. Lawrence Seaway in 1978, and was later detected in the St. Clair-Detroit River system by the



summer of 1983. Discovered in Michigan inland lakes in February of 2006, successful colonization of over 125 of the state's inland lakes had been confirmed by the Michigan Department of Environmental Quality by the spring of 2012. Due to the repeatedly observed ability of invasive starry stonewort to degrade ecologically sensitive areas of shallow water habitat within colonized inland lakes, federal and state government agencies, including the United States Aquatic Nuisance Species Task Force and the Michigan Department of Environmental Quality, have classified starry stonewort as a highly invasive aquatic species. Michigan limnologists Pullman and Crawford (2010) have suggested that rapidly proliferating starry stonewort "may be one of greatest challenges ever faced by management professionals and lake user groups in Michigan."

Starry stonewort frequently produces dense monotypic meadows that have been commonly observed in Michigan inland

lakes extending from near shore areas in depths of less than one meter to the outermost edges of the littoral zone in depths of up to nine meters, completely engulfing the most sensitive and productive of areas within colonized inland lakes. Aquatic meadows of invasive starry stonewort form dense benthic barriers of up to two meters thick that effectively prevent the growth of an important array of native submerged aquatic plants that rely upon access to bottom sediments for vertical stability and for the uptake of nutrients. In colonized inland lakes, it is not uncommon to observe littoral areas that once supported diverse plant communities now entirely dominated by vast starry stonewort meadows and completely devoid of native submerged aquatic plants. Dense monotypic aquatic meadows possess the ability to significantly alter and/or destroy submerged native macrophyte communities. Native submerged macrophytes play a vital role in inland lake ecosystems by reinforcing and exerting influence on several vital physical, biological and chemical mechanisms that contribute to sediment stability, water transparency, moderate biological productivity levels and the promotion and sustainability of plant and animal biodiversity. Severe degradation and/or loss of native submerged macrophyte communities represent a significant threat to the immense ecological, recreational and economic value of Michigan's inland lakes.

The evidence that starry stonewort has now successfully colonized several hundred Michigan inland lakes continues to mount.



It is extremely important that lakefront property owners, recreational boaters, the fishing community and inland lake users in general learn to identify starry stonewort. Early detection and management of the rapidly growing species is critical to sparing your inland lake or favorite fishing spot from the ecological ravages of this unprecedented biological invasion.

To learn more about invasive starry stonewort and its impact on Michigan's inland lakes, please plan on attending the **2014 Michigan Inland Lakes Convention** which will be held on **May 1st, 2nd and 3rd** at the **Boyne Mountain Resort** in Boyne Falls, Michigan. To find out more about the first ever lakes convention, visit <http://michiganlakes.msue.msu.edu/convention>.

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## LAKE HAPPENINGS

### SINKHOLE LAKES

Huron Pines Newsletter  
August 2013

Natural Sinkholes Offer a Unique Recreation and Conservation Opportunity in the Pigeon River Country State Forest

When most people hear the word “sinkhole,” images of disappearing houses and gaping holes in the earth leap to the forefront of their mind. However, not all sinkholes are a cause for concern. In fact, these natural geologic features can be found in many counties in Northeast Michigan, and some even fill in with groundwater to form spring-fed sinkhole lakes. A series of seven sinkhole lakes exist within the Pigeon River Country State Forest, and they are the focus of an important conservation project spearheaded by Huron Pines.

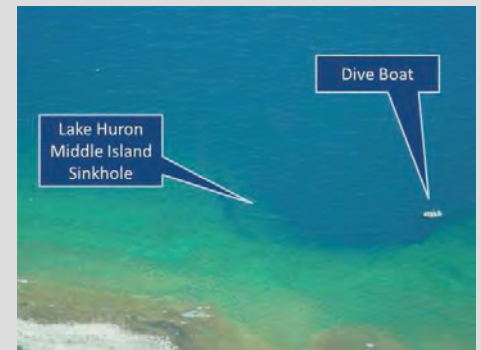
Given the limestone bottom of the lakes, the color of the water within the sinkholes is a tropical blue-green color. Each lake has a similar bowl shape with steep banks. The combination of beautiful lakes, steep banks and their location

on public property encourages overuse and leads to erosion at concentrated access points.

Many of these lakes were closed to public fishing for more than 40 years because they were used by the Department of Natural Resources (DNR) for fisheries research. Recently, these lakes were opened to public fishing to provide a unique angling opportunity for coldwater species. This expanded the angling opportunities in a State Forest that is already a fabulous fishing destination with the Sturgeon, Pigeon and Black rivers. With increased angling and continued presence of other users, bank erosion would only continue to increase and negatively impact the fishing and aesthetic quality at each lake. This is why Huron Pines, the DNR and the Headwaters Chapter of Trout Unlimited implemented a plan to protect these unique resources.

With work recently completed at three lakes, Huron Pines will continue to work at two more

of the sinkhole lakes with our project partners through the remainder of 2013 and into 2014. This project has been a great opportunity to strengthen our existing partner relationships and reach out to form partnerships with new organizations. For more information on the projects, contact Sam Prentice at (989) 448-2293 ext. 17 or [samuel@huronpines.org](mailto:samuel@huronpines.org).



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(Send pictures in jpeg or 300 dpi.)

### THE PHONE BOOTH

Excerpt from *The Life and Times on Christie Lake*  
Wilma Webster, author

It is always a delight to hear those who grew up on Christie Lake tell of their experiences. The Jennings brothers, Russ, Jerry and Richard, grew up in the family cottage on Breezy Point that was built in the 1920's by their grandfather, Clarence Jennings, a druggist from Lawrence.

Russ remembers with great fondness the PHONE BOOTH that the neighborhood had built in the 1950s. Fifteen or more families shared this inconvenient convenience. He and his brothers would play near the booth as kids, and when it rang, they would answer, "Christie Lake" and then run to find the adult who was being called. Usually it was worth a 10-cent tip. Quite a business!



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# The Journey to Automation: *a Glen Lake story*

Cal Killen  
Glen Arbor, Michigan  
ckillen@tia-software.com

## Background

Glen Lake is one of Michigan's finest lakes. Actually a set of five connected lakes (Big Glen, Little Glen, Big Fisher, Little Fisher and Brooks) in northwest lower-Michigan, it covers about 6,000 acres at depths reaching 130 feet. The output of Glen Lake is the source of the Crystal River which meanders five miles before emptying into Lake Michigan, only one mile away. The flow into the Crystal River is controlled by a dam 18 feet wide with two independent swinging gates. Atypical in Michigan, this dam is not controlled by a drain commissioner, but by members of the GLA, and it has been that way since the dam was built many years ago. So the GLA formed the Water Level Committee (WLC) in 1955 to manage the Glen Lake level and Crystal River flow as much as nature would allow.

Lawsuits over the years have resulted in a court ordered set of rules for both the upper/lower bounds of Glen Lake's water level and the Crystal River's water flow minimums. This means that lake-level/river-flow management is not a hobby for the GLA; it's a legal mandate. A court appointed Technical Committee keeps close watch on the lake-level/river-flow operations and reports status to the court annually. To accommodate the legally mandated limits, the Technical Committee has approved a daily target lake level within a narrow tolerance. The days of summer have a relatively high lake level target (good for boating, enjoying the beach and supplying water to the river during drought periods) and winter days have a low lake level target (to mitigate ice damage and minimize beach erosion). The spring and fall days have targets that are a gradual transition between summer highs and winter lows. Regardless of lake level, the river flow must be kept above a certain minimum water flow so as not to adversely affect the ecology of the river.

## Determining Lake Level

The first thing required in lake-level/river flow management is to be able to determine the actual elevation of the lake level, and understand how it changes over time due to the various water inputs

and outputs. Only after having that information does one have a chance of managing the balance of lake-level and river flow through dam gate settings.

For determining lake level, a set of three staff gauges were placed at strategic positions around the lakes to determine water levels. These gauges were surveyed so the actual sea level elevation of the water can be calculated. One of the staff gauges is the standard used for determining legal lake level. Another is used as a backup. The third is used to measure the water level at a location just upstream of the dam – where the water level can vary several inches lower than that at the other gauges. Water levels are supposed to be measured and recorded at these points at least twice a week – more often when weather events dictate. It is not always possible to read the gauges, however. Sometimes windy conditions generate waves that make it impossible to take a precise reading of the staff gauge. At other times, ice and snow obscure the markings on the staff gauge, making it equally impossible to determine an exact reading. Often, the times when lake level knowledge is most important are the times when weather conditions are at their worst. Going out to read the gauges during storms (especially in winter) can be a challenging task for the WLC members.

## Automation Begins

Partly due to the fact that all the WLC members are dedicated volunteers who want precise measurements and partly because many of them are engineers and "tinkerers," it was decided in 2010 to install an automatic lake level sensor. The sensor was installed very close to the staff gauge used to determine the legal lake level elevation, and about three feet below the water's surface. Using a 100-foot underground cable, the sensor was attached to a communication station that

This is the story of how the Glen Lake Association (GLA) applied modern technology to their management of Glen Lake's water level. The results are more accurate water level control at substantially less cost, while making it safer and easier for personnel. Along the way, they learned facts about the watershed system never known before.



Staff Gauge



Crystal River Dam



Sensor Station

*Continued on page 21*



# The Journey to Automation: *a Glen Lake story*

Continued from page 20

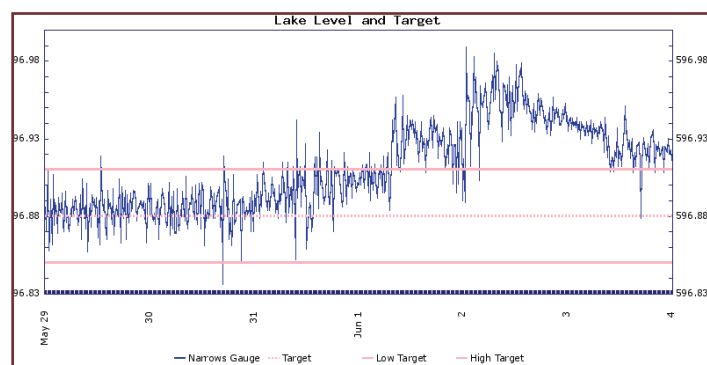
contained a data logging device, a cellular modem, a battery and a solar cell. The sensor is an accurate pressure transducer which reads water depth, not elevation. The sensor is compensated for atmospheric pressure changes. Every 15 minutes the data logger records the “depth” of water over the sensor. Every hour the modem is automatically turned on so a remotely located computer server can upload the latest depth readings. The actual elevation of the sensor has been determined through comparison with the staff gauge readings, so this elevation can be added to the depth reading to get the actual lake level.

Using automatic sensors to gather lake level data proved to be very accurate and reliable. The sensor is accurate to 1/8-inch and any fluctuations in the lake level due to wind gusts or waves are eliminated by averaging over time. The WLC realized the advantage right away; the technique gave them accurate information on an hourly basis. And with a new website, the information was available to all members without leaving the comfort of their homes.

## The Website Begins

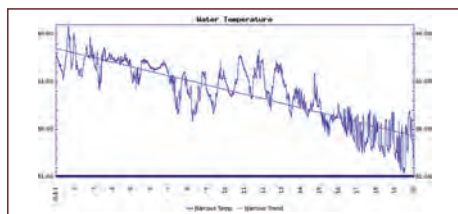
Turning “raw data” from both the automatic and manual gauges into “information” that can be used to make decisions was solved by the introduction of the WLC website. Many thousands of lines of code were written to generate graphs and tables that make it easy to know things like:

- Is the lake level on target?
- Is the lake level trending in the right direction?
- How long will it take before the lake level is in (or out) of target tolerance?
- How much did it rain last night?

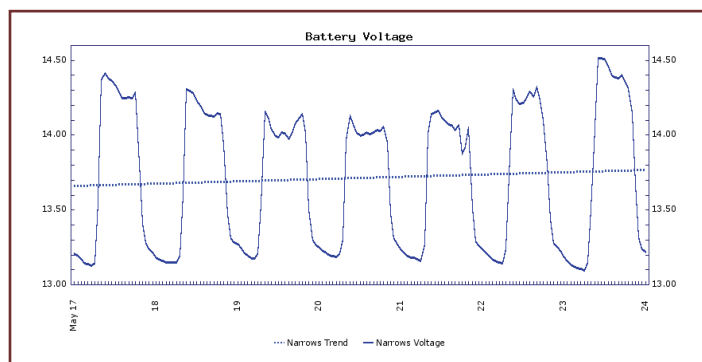


The WLC soon developed a wide set of charts and graphs on the website that answered these questions quickly and accurately. What's more, the information led to the discovery of facts about the lake never known before. For example, the WLC discovered a resonance between Big and Little Glen – water sloshes back-and-forth under the Narrows Bridge about every 40 minutes.

**Lake Level**  
596.70 ft.  
**Water Temp**  
43.5 °F  
Updated: Oct 29 8am



Besides water level, the sensor also records water temperature. Soon we were updating the GLA public website every hour with a posting that reflected current conditions. The sensor also records battery voltage in the station. If the voltage goes below 12v. the website automatically alerts the WLC with an email warning. Most of the time this means someone has to brush the snow off of the solar cell.



## Determining River Flow

A fourth staff gauge (called a “stream gauge”) was installed years ago in the Crystal River just downstream from the dam. This gauge was used in conjunction with a U. S. Geological Survey (USGS)-provided rating table to estimate Crystal River water flow. This is a very common method for calculating river flow; the principle being that the higher the water level in the river, the higher the water flow. One reads the stream gauge in the river and refers to the rating table, which then yields an estimated river flow. But as nature would have it, the conditions of the river are always changing, and changes degrade the accuracy of this method. Small effects can be due to natural changes in the river bed and growth of vegetation on the banks of the river. Larger effects can be due to trees and branches falling into the river (downstream or upstream), ice/snow in the river, and canoes banging in to the stream gauge. One of the most common reasons for inaccurate river flow estimations was found to occur after a large rain event or snow melt. Water flows into the river from various places below the dam which swells the river and causes this method to overestimate the flow over the dam by as much as 20%.

Because conditions continually change, regular re-calibration of the adjustment factor applied to the stream gauge readings was required. With a flow device, the USGS manually measured water flow in the river at a cross-section just below the dam, taking measurements every



Continued on page 23



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# The Journey to Automation: *a Glen Lake story*

Continued from page 21

foot at various depths. These measurements were summed to produce an accurate river flow for that point in time. Comparing that actual flow to the estimated flow from the rating table produced an adjustment or “shift” value for the WLC to use. After a calibration, the WLC members could get an accurate river flow measurement at the dam by reading the stream gauge, adding or subtracting the “shift” and then applying that value to the rating table. Since the WLC wanted to be very precise on measuring water flow – especially at low flows when we were close to the court mandated minimum – calibrations were done five times a year at a cost of \$3,000 every year to the Glen Lake Association

Unfortunately, the accuracy of the re-calibration proved to be short-lived. As soon as the re-calibration was completed, the river would change. When the WLC would get a new shift, especially one that was a significant change from the previous shift, they knew that they had been recording imprecise river flows for some unknown time and amount. Besides that, no amount of calibration could result in accurate river flow measurements after a precipitation event mentioned above. In addition, reading the stream gauge in wintertime was a chore at best and a safety hazard at worst. WLC volunteers had to walk a distance through unfavorable terrain, stand on a sometimes ice-covered bank to read the stream gauge 10-feet out in the river. The WLC started thinking about a better way to do business.

## Making Dam Gate Adjustments

The Crystal River dam was first built in the early 1900’s and was originally adjusted by adding or removing boards across the dam. The dam was remodeled in 2002 to allow for easier and finer adjustments. Two 7 ½-foot wide gates were added side by side, hinged at the bottom and adjusted by winching them up or down. The gates travel just under 24” from fully open to fully closed.

To make a dam adjustment, one WLC member cranks the winch wheel while another WLC member measures the vertical distance between the gate and a reference point on the side of the dam. A specially calibrated “yard stick”, complete with a leveling bubble, is used to make sure the measurements are accurate. Eight rotations of the winch wheel results in about one inch of vertical movement of the gates, which affects the dam flow anywhere from three to 10 cubic feet per second (CFS). After making an adjustment, the river needs some time to settle into its new level. So after waiting 20 minutes to allow for this settling, another reading is taken of the stream gauge, another calculation of the dam flow is made from the rating table, and additional adjustments are made as needed. All of these measurements and adjustments are recorded and the data kept for years.



## Automation Continues

Enthused with the results of the automatic sensor installed the year before, the WLC decided to take the much bigger step of fixing the problems related to calculating dam flow. There were four parts to this solution:

1. Install another automatic sensor 25 feet in front of the dam,
2. Develop a weir equation that calculates dam flow given the gate setting, water level and dam geometry, and
3. Regularly compare river flows (using several manual methods) to the weir equation spanning a year and over a wide range of flows to “tune” the equation, and
4. Report process and findings to the Technical Committee regularly.

Given the physical characteristics of the Crystal River dam, the standard rectangular weir equation was applied:

$$Q = CE \cdot W \cdot H^{1.5}$$

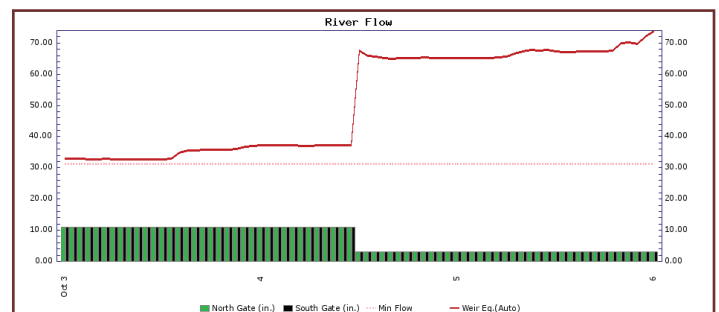
Where:

“CE” is a constant (around 3.3) which was empirically determined by comparing manually determined water flow to calculated results.

“W” is the width of the dam gate. Since the dam has two gates, the weir equation needed to be used twice, once for each gate. The values are summed for the total river flow. In this way, the gates can be set at far different elevations and the flow is calculated correctly.

“H” is the “head,” or difference in elevation between the water level above the dam and gate setting. Note that calculating the head requires a modeling of gate setting to gate elevation.

In the fall of 2011, this automatic sensor was installed and calibration of the weir equation started. Over the next year, using many manual river flow measurements from the USGS and the WLC at a broad range of flows, the weir equation was calibrated and found to be far more accurate than the stream gauge estimating method.



In the summer of 2013 the Technical Committee was convinced of the accuracy of the weir equation. With their support, the court recognized the advancement and gave the WLC permission to use the weir equation for making dam setting decisions.

(Continued on page 24)

## The Journey to Automation: *a Glen Lake story*

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*Continued from page 23*

Continued from page 23

## The Website Expands

The backbone to the WLC operations and automation is the website and the programming behind it. There are several parts to the website:

## 1. Graphs

- Lake levels, trends and targets
- River flow trends and limits
- Water temperature
- Battery voltage
- Precipitation events
- Calibration comparisons

## 2.Charts

- Raw data storage and retrieval
- Current conditions at-a-glance
- Monthly reports

### 3. Manual Input

- Staff gauge readings
- Dam settings
- Comments about current conditions

## 4. Calculators

- River flow : Lake level : Dam setting
- Dam setting recommendations

## 5. Team Membership

- a. Contact information
- b. Schedule of assignments

## 6. Photos

**Lake Level**  
596.93 ft.

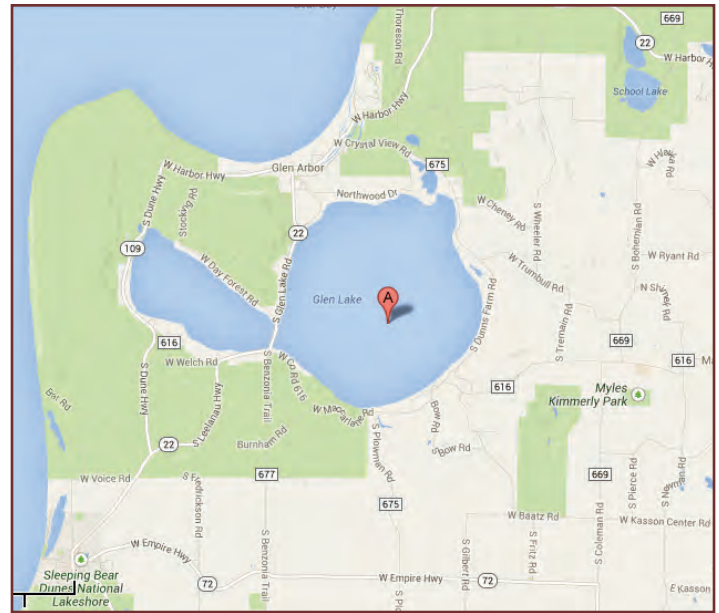
**Water Temp**  
36.1 °F

**River Flow**  
83 CFS

**Last Precip.**  
3.25" (Nov 16)

Updated: Nov 24 7pm


Besides the website, there are programs on the computer server that run automatically to update data, check for certain conditions, and send email alerts. With these advancements in the website programming, we updated the posting on the GLA public website to include river flow and precipitation events.

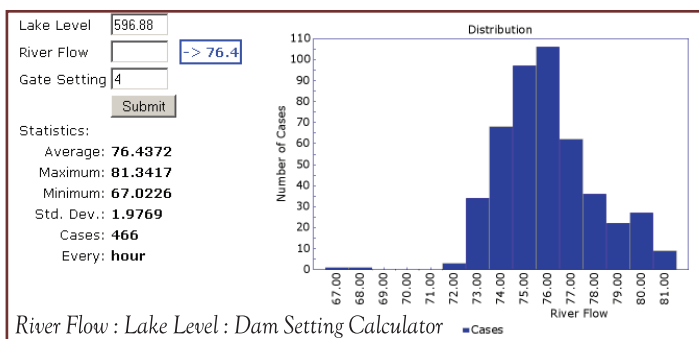


## Results

With the fine efforts of many WLC members, lake level management has been made easier, safer and more accurate. It also pays for itself. Since the flow estimating method is no longer used, there is no need for the USGS to make river flow re-calibrations. By canceling that contract, the WLC recaptured the expense of an automation station in a single year. But there is more to be learned. Now that data exists to be “mined,” the WLC can learn things like:

- amount of groundwater in and out of the lake system
- evaporation values
- daily lake level targets to maximize water level and minimize shore erosion
- methods to minimize flooding of Crystal River
- etc.

And with the capability of adding additional sensors to the system, the WLC can learn even more about water quality and the effects of different weather events. We highly recommend using these methods for other lakes. 





# YOUTH WATERSHED SUMMIT report showcases student-led water stewardship in Northeast Michigan

Youth Watershed Summit Report reflects contributions of nearly 200 students from across Northeast Michigan counties to share their watershed studies and stewardship projects.

Posted on October 3, 2013 by **Brandon Schroeder**, Michigan State University Extension; Daniel Moffatt, Northeast Michigan Great Lakes Stewardship Initiative; and Harriet Smith, NOAA Thunder Bay National Marine Sanctuary

The first annual Northeast Michigan Youth Watershed Summit, held at Alpena Community College in May 2013, welcomed nearly 200 students and teachers from around the region who participated in local watershed stewardship education projects throughout the school year. This end-of-school event gathered students together to showcase their watershed studies and science projects, now featured in the newly released proceedings and final report for the Northeast Michigan Youth Watershed Summit. This report includes an in-depth look into the Summit activities and student presentations of their watershed-related projects that emerged as part of the NOAA Great Lakes B-WET *Our Rivers, Our Future* water education effort and the Northeast Michigan Great Lakes Stewardship Initiative network partnership.

These youth gathered to celebrate water quality awareness across the region - after all, northeast Michigan is rich in water resources, from inland rivers and lakes to

coastal waters of Lake Huron - and who better to communicate the health and status of these waters than the students who spent the school year studying their local watersheds. This effort provided a fantastic platform for students to share their water science studies and stewardship projects through displays and presentations. Ranging from fourth grade to high school, students were the experts as they presented data and outcomes resulting from their projects. These presentations ranged from chemistry and biological indicators to monitor river water quality to adopting coastal Lake Huron beaches, and from studying history and human connections with area fisheries and addressing issues such as invasive species to stream bank erosion and exploring alternatives to bottled water.

Representing the growing network of watershed education efforts connected regionally through the Northeast Michigan Great Lakes Stewardship Initiative, eleven schools across seven counties contributed to the success of this first annual summit. This student leadership event was facilitated by NOAA Thunder Bay National Marine Sanctuary in collaboration with Michigan Sea Grant and Michigan State University Extension- among others- and funded by the Great Lakes Restoration Initiative through a grant secured by the Northeast Michigan Council of Governments and the Great Lakes region of NOAA Education's B-WET Program.

The regional Youth Watershed Summit experience provided a valuable, real-world learning opportunity for students. Events such as this provide incredible hands-on learning experiences for students and bring them into the community as valued partners who can address important environmental stewardship issues. Educationally, these projects reflect wonderful case studies of applied principles and best practices of place-based education - where youth, through their learning, engage in environmental stewardship leadership activities that enhance and provide community values.

Through their projects, students are promoting a better understanding on the social, economic, and environmental importance of Michigan's water resources, and realizing how these Great Lakes watersheds and people are inextricably interconnected. Throughout the day, the students were the primary audience and key contributors to the message of water stewardship. However, during the year, they had worked in important community partnerships with organizations such as NOAA Thunder Bay National Marine Sanctuary, Michigan Sea Grant, MSU Extension, 4-H Youth Programs, US Fish & Wildlife Service, Michigan's Department of Natural Resources, Huron Pines, and others partnering through the Northeast Michigan Great Lakes Stewardship Initiative network.

Visit [www.nemiglsi.org](http://www.nemiglsi.org) for more information about the Northeast Michigan Great Lakes Stewardship Initiative network, NOAA B-WET water education partnership, and place-based, community-based education programming partnerships. A copy of the Youth Watershed Summit report is available online at: [http://www.nemiglsi.org/media/partners/media/yws\\_bwet\\_report\\_final\\_v4.pdf](http://www.nemiglsi.org/media/partners/media/yws_bwet_report_final_v4.pdf)

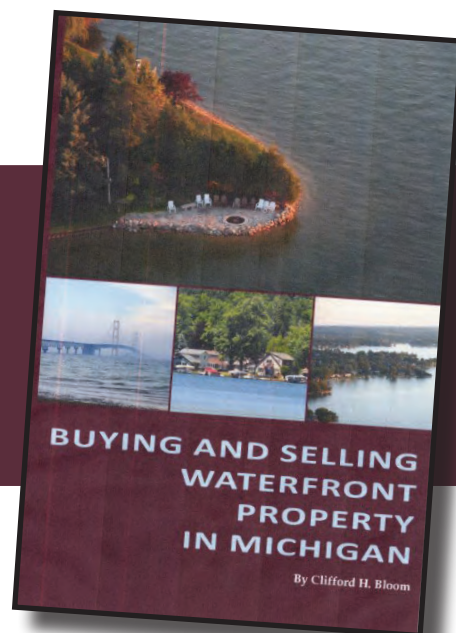
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The Michigan Lake & Stream Associations, Inc. ("ML&SA") is pleased to announce its new book entitled *Buying and Selling Waterfront Property in Michigan* by Grand Rapids Attorney Clifford H. Bloom. This is the second book from ML&SA, the first being the 2009 book called *Michigan Lake Associations—The Nuts and Bolts* (also authored by Cliff Bloom).

This new book is a "must" for anyone who is interested in waterfront property in Michigan. The list of people who should purchase the book includes not only riparians (and would be riparians) but also realtors and real estate agents, attorneys, government officials, surveyors and teachers. This book is a "how to" publication that deals with numerous real estate and waterfront issues, including:

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EnviroScience is also the exclusive provider of the Milfoil Solution® process, a natural, non-chemical alternative for controlling the growth of Eurasian watermilfoil. Using a native insect, the milfoil weevil, we are able to provide long-term control while encouraging natural lake habitat.

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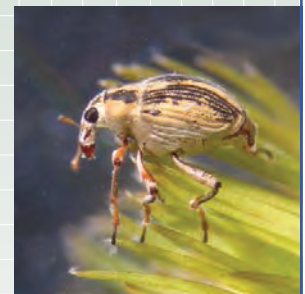
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*Collecting water samples*



*The milfoil weevil is smaller than a grain of rice*



*Measuring water quality parameters*

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