



QUARTERLY

THREE LAKES ASSOCIATION

SERVING LAKE BELLAIRE, CLAM LAKE AND TORCH LAKE IN NORTHWEST MICHIGAN

FALL 2022

Science Grants Go to Three Area Elementary Schools

By Steve Laurenz
Education Committee Chair

We are excited to announce the recipients of this year's Science Education and Outreach Program (SEOP) grants! Our youth will be the vital environmental stewards to help protect our precious lakes, rivers, and streams, and TLA supports and encourages their development through this granting process. All the funded projects are excellent examples of hands-on science and environmental education. Here is a short description of each winning grant.

Elementary Teacher Michelle Zamaites from Rapid City Elementary will be funded for three submitted activities:

- Going to Grass River Natural Area to hike to Grass River, study the stream, find tracks, scat and other animal signs, and learn about reptiles, amphibians, fossils, rocks, minerals, seeds, plants, and trees.
- Touring the Traverse City Fish Hatchery to learn about salmon eggs used for fish reproduction, and to see the salmon climb the ladder at the weir.
- Visiting the Sleeping Bear Dunes, an opportunity to explore and see incredible sites that most of Michelle's students might not otherwise have.

Michelle says, "We are very excited at Rapid City Elementary to give our students the opportunity to visit nature in our surrounding area, which they might not be able to visit without your help."

Elementary teacher Greg Beach from Birch Street Elementary will be taking his students on a field trip to AuSable Institute of Environmental Studies. The students will learn about animal habitats, the water cycle, and human effects upon natural systems as part of the state standards. Greg says, "The visit to the AuSable Institute supports students' learning and greater understanding of the wetlands in our area and the animals that live there."

Elementary teacher April Davidson from John R. Rodger Elementary will also be funded for three submitted activities, which are all field trips to the Great Lakes Children's Museum for kindergarten, first and second grade. "Exhibits there will enhance the learning of our state science standards and give our students a chance for hands-on activities," says April. "Thank you again for this opportunity for our students!"

Our youth are our **Environmental Stewards of the Future** and these



Rapid City students at Sleeping Bear Dunes in 2022.

programs help ensure this future is supported! If you'd like to donate directly to support the SEOP grant program in 2023, please visit member.3lakes.com, and indicate your donation amount under Education or type in SEOP after you sign in. Thank you!

Sneak peek

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Birch Street Elementary students at AuSable Institute in 2022.



THREE LAKES ASSOCIATION

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- D. Central Lake Township: Todd Collins, Steve Laurenz
- E. Forest Home Township: Fred Sittel, Open
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Jeanie Williams

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TLA Welcomes New Board Members at Annual Meeting

The Three Lakes Association Annual Meeting is held on the first Thursday in August of every year. This year the membership approved some much needed bylaws updates and voted in a slate of exceptional candidates to the TLA Board. We also heard from Meteorologist Greg Bac, from the National Weather Service office in Gaylord, about current weather trends and emergency alert systems. It was very interesting, and well received by the 50 TLA members who attended the annual meeting.

Fred Sittel was elected to his first full term as President, however he comes with plenty of experience because he has held the role since January 2021 due to the early departure of our previous president. Greg Fredericksen is now the Secretary. So far he is impressing us all.

Mike Novak and Norton Bretz renewed their terms as At-Large Directors. Cheryl-Lynn Fields, Rick Doornbos, and Todd Collins renewed their terms as Zone Directors for Clearwater, Milton, and Central Lake Townships, respectively. It is so valuable to have our experienced board members renew their terms year after year.

We also welcomed two new board members. Chris Herb volunteered to serve as the Zone Director for Kearney Township and Sheri Greenhoe volunteered to serve as the Zone Director for Custer Township.

Chris Herb has been coming to the Bellaire area for 45 years with his wife Laurie of almost 40 years. They have two sons and three granddaughters. They have recently moved to Bellaire after living in the Chicagoland area for more than 32 years, and now live in Forest Home Township.

Chris joined the board to help protect the beautiful waters in Northern Michigan. As a board member, he'd like



Chris Herb

to be a part of all areas of TLA with an emphasis on publicity and fundraising to help create stronger brand awareness for our association. To this end, Chris has agreed to chair the

Publicity Committee, which will benefit greatly from his leadership and enthusiasm. In the business world he was skilled at motivating and managing a team and will bring these skills to bear in his service to TLA.

Chris enjoys traveling, all sports and cooking. He also loves the beauty and tranquility of the water and enjoys boating and looking at all of our lakes and streams. He will be a great asset to TLA for years to come.

Sheri Greenhoe and her husband Jim spend several months each year in Custer



Sheri Greenhoe

Township, at their summer home at Summit Village-Shanty Creek. They spend late fall through spring in Florida, at their condo in the Tampa Bay area. They have two grown sons who have wonderful

memories of boating, swimming and fishing in our lakes, and two young grandsons who are making more great memories when they visit.

Bellaire has been Sheri's family's summer destination for more than 40 years. They've been members of Three Lakes Association for a long time, and have followed and very much appreciated our work and goals. Sheri says, "It felt like a good time to join the board and help out. I hope to play a small part in preserving the beauty and health of these lakes for my family and for future generations."

Boating through the chain of lakes has always been a favorite way for Sheri's family to spend beautiful summer days. Now they are paddlers primarily, and enjoy canoeing in Lake Bellaire, and in both the Intermediate and Grass Rivers. Her husband also loves to fish, either from his fishing boat or from the shore.

Before she retired, Sheri's career was in marketing and PR in the nonprofit sector, primarily as a director with a statewide professional association. She also was PR director for a hospital system, did development communications for MSU, and was communications director for an economic development organization.

Sheri will be assisting with newsletter and membership efforts, and also says, "I'm game to be a 'citizen scientist' and get my hands dirty!"

Summer Experiments Evaluate Nutrient Related GBA Hypotheses

By Jan Stevenson
Michigan State University

This is the fourth article in a series about our study of golden brown algae (GBA) on the bottom of Torch Lake, Lake Bellaire, and other lakes in northern Michigan. Previous articles have reviewed the hypotheses for GBA's sudden appearance and described a strategic approach to determine the causes of GBA. This article describes the experiments we performed this summer to test one of our hypotheses.

Experiments are an important research tool

Evidence from our research indicates that changes in phosphorus availability could be the cause of GBA. On the one hand, groundwater contamination by riparian septic tanks, runoff from regional fertilizer uses for lawns and agriculture, and zebra and quagga mussel invasion could have increased phosphorus availability on the bottoms of lakes. Alternatively, phosphorus availability could be decreasing in many Michigan lakes, as evidenced by trends in measured phosphorus. Phosphorus decreases could trigger the development of algal mats like GBA by increasing calcium deposition which can provide a stable foundation for algal accumulation.

To address whether increases or decreases in phosphorus cause GBA, we designed and deployed experiments in Torch Lake during summer 2022. Experiments are a tool in the strategic approach for identifying causes of environmental problems, and a complement



Art and Fred ready to deploy a nutrient delivery frame.

to the survey approach, which has been the primary tool thus far.

For many years, we have surveyed GBA attributes and environmental factors from multiple locations and times to develop relationships and test hypotheses. Often multiple environmental factors can be related statistically to a problem. To tease out which environmental factor or factors actually cause the problem, versus which are just correlated with the problem, experiments are used. Experiments enable strategic manipulation of one or more environmental factors to see if problems can be reproduced with those environmental manipulations. For example, when we see changes in algae that look more or less like attributes of GBA when we experimentally manipulate environmental factors, we have an important line of evidence for how changes in the environment cause GBA.

This summer TLA volunteers and I ran two experiments to evaluate how changes in phosphorus affect GBA. Both experiments were conducted at the same time in August, which is when GBA development is usually extensive. I will describe one of the two experiments in this newsletter.

Nutrient delivery frames in a low GBA location

The first experiment was designed to determine if phosphorus or nitrogen enrichment could cause development of benthic algae in an area of Torch Lake where GBA does not occur. Several areas in Torch Lake have relatively low amounts of algae on the lake bottom, which we assume resemble bottom conditions before GBA developed

extensively around Torch Lake. These low GBA areas provide an opportunity to see if nutrient enrichment can produce thick GBA mats with the same species, abundance, and chemistry as the GBA commonly found around Torch Lake.

To manipulate nutrient concentrations at the sand-water interface, I designed and tested a new variation of an existing method that has been used for nutrient enrichment experiments with benthic algae. This method does not physically disturb naturally growing benthic algae, unlike other methods.

A nutrient delivery device was built by making a square from one-inch diameter PVC pipe that could lay flat on the lake bottom. Extensions of the four sides were filled with concrete to reduce chances that the nutrient delivery (ND) frames would move with wave disturbance (see photos). Agar (a gel-like substance) infused with or without nutrient amendments was added to all four pipes in the square to manipulate conditions on the lake bottom inside the square. Holes in the PVC pipe arranged in rows around the inside of the square frame allowed diffusion of phosphorus and nitrogen out of the agar and into water inside the square.

With this method we could enrich the bottom of the lake to see if a change in nutrients would stimulate GBA growth. I expected diffusion of nutrients from the frame to continue for at least 4 weeks, because other nutrient-diffusing devices using agar released nutrients over similarly

Interested in joining the TLA Board?

The TLA Board meets on the fourth Tuesday of every month. We have openings for Zone Directors in Torch Lake, Forest Home, and Helena Townships. Please contact TLA at 231-412-7551 if you'd like to learn more about joining us.

To read our updated bylaws, visit 3lakes.com/about. To read the Annual Summary and other Annual Meeting documents, visit 3lakes.com/annual-meeting-document-archive/



Volunteer Sue Sittel with collected nutrient delivery frames.

long periods. Additionally, four weeks should be a sufficiently long time to change algal abundance and species composition on the lake bottom. A prototype was tested in Lake Michigan and performed as expected.

TLA volunteers, Fred Sittel, Art Hoadley, Greg Fredericksen, and Becky Norris assembled 16 ND frames to create four treatments: no nutrients added to agar; phosphorus only added; nitrogen only added; and both phosphorus and nitrogen added. A corner of each frame was color-

coded to indicate the treatment. We used 4 replicates of each treatment to reduce the chance that we would observe a change by chance and wrongly attribute it to a treatment effect. We deployed the frames on August 2, 2022 at a low GBA site by lowering each frame onto the lake bottom in water that was 6 to 8 feet deep. Fred monitored the frames to make sure they were not disturbed and to make periodic observations of algal growth.

Fred, Susan Sittel, Becky and I returned

on August 27 to collect an algal sample from inside each frame. We also collected an algal sample from outside each frame to improve our characterization of treatment effects. Fred and I dove underwater using snorkels to collect samples in a Petri dish. Susan put each sample into a separate Ziploc bag with its location and treatment marked, and passed them to Becky who stored the samples in coolers and also made sure we got out of the water after 45 minutes to warm up! Cool weather and waves made the hours of sampling a bit challenging.

All of the samples were either chemically preserved or frozen for laboratory analyses. Over the next six months I will analyze the samples to determine the abundance and species of algae in the samples. In addition, we will have the samples analyzed to determine phosphorus, nitrogen, and calcium concentrations.

The results will inform our next steps

It is notoriously challenging to calibrate treatment levels and manipulations in ways that faithfully reproduce what has happened to cause a problem. If all goes well, comparisons of algal species, abundance, and mat chemistry in different nutrient treatments should help us determine whether increasing or decreasing phosphorus concentrations have caused GBA.

On the other hand, we may learn that we need to tweak the conditions and run the experiments again with slightly different parameters that better reproduce the changes that likely occurred over the time GBA developed. Doing experiments requires experimentation! We are hopeful our experience will pay off and we can get it right the first time. Stay tuned next year to hear about our results.

If you would like to support our GBA research, please login to the Membership Portal at member.3lakes.com and enter an amount next to Water Quality General. We will be doing a lot more study with Jan Stevenson in 2023 and could really use your support.

Are you interested in becoming more involved with Three Lakes Association?

VOLUNTEER

Do you have a few hours a month to volunteer your time for our organization? Would you like to help us protect the quality of our lakes and streams?

TLA takes dozens of water samples each year from our lakes and streams to monitor water quality and to detect potential issues that may be harmful to our environment. We rely on volunteers to do this work for us to keep our costs low and maintain in-house capabilities. In 2023, we have a need for several new volunteers who would be willing to help take water samples from our lakes and

streams periodically during the year. No previous experience or technical knowledge is necessary and schedules are flexible. Current volunteers will train you in the proper technique and show you exactly what to do.

If this is something you would be willing to consider, please contact us at 231-412-7551 or send an email to info.3lakes@gmail.com. You can also contact Rick Doornbos, Water Quality Chair, at 989-600-9907 if you have questions or would like to learn more about this opportunity.

Interns Find Large Numbers of Quagga Mussels on Torch Lake

You couldn't find brighter, more curious, or more delightful teenagers if you tried. Six ambitious high school students from four area high schools took part in the Three Lakes Association High School Internship program in 2022 to study how the species on the bottom of Torch Lake and Lake Bellaire have changed since TLA interns last examined this lake zone in 2007.

There were three questions: 1) Has the number of *Diporeia* changed? 2) Has the number of zebra mussels changed? and 3) Have quagga mussels arrived in Torch Lake or Lake Bellaire?

Diporeia are tiny shrimp-like creatures that live in deep water and are an important food source for many fish, but have declined in lakes where zebra and quagga mussels have become abundant.

Quagga mussels are cousins of zebra mussels. Both are less than 2 inches long, live on the bottom of the lake, are highly efficient in filtering algae from water, and are considered invasive species because of the disruption they can cause to ecological process and human activity.

Quagga mussels can live in deeper water and are more effective at filtering water than zebra mussels, so are sometimes considered more troublesome. Quagga mussels were not present in either lake in 2007. The first record of their presence in Torch Lake happened in 2015, in a DNR invasive species survey. Zebra mussels have been in Torch Lake since at least 2005, and we don't know when they arrived in Lake Bellaire, but none were found in 2007. Exact dates of these introductions are unknown because regular surveys are not performed on either lake. This study is one of the few investigations that surveys the bottoms of our lakes.

Interns lowered a device called a PONAR grab to the bottom of the lake, which has a

claw-like mechanism that can scoop up a chunk of soft bottom sediment and bring it to the surface. The students washed away the sand and silt through mesh screens and were left with a plethora of mussels, snails and tiny wiggling creatures that they collected and stored in alcohol for later counting and identification.

According to their study, the number of *Diporeia* has increased in Torch Lake since 2007, and not changed in Lake Bellaire. Both results suggest great news for the fish and other creatures that feed on *Diporeia*, since *Diporeia* remain present in both lakes. However due to the very small number of samples in both studies, more sampling is needed to verify this trend.

Zebra mussels were not found in Lake Bellaire in 2007, but they were found this year, in 30% of the samples collected. On Torch Lake, about 45% of the samples contained zebra mussels this year, as compared to 20% of the samples in 2007. We can definitively say that zebra mussels are present on both lakes, but even though the data suggests an increase, due to the small number of samples in both studies, it's not clear if the overall abundance has changed in either lake.

The most notable and clearest result was the new and sizeable presence of quagga mussels on Torch Lake. The interns made their first positive identification on June 29, 2022. On that



TLA volunteers Fred Sittel and Norton Bretz with TLA Interns, Freddie, Morgan, and Maddie and their first discovery of quagga mussels in Torch Lake.

day, the interns collected 34 quagga mussels in two samples near the outlet of the Clam River, and many more in a third sample. In fact they found quagga mussels in every single sample collected this summer, except one, which was over 90% of the time. They found an average of 29 quagga mussels per sample (a 6"x6" area), which is almost one mussel per square inch. Some samples had as many as three mussels per square inch. This is a vast and troublesome increase since the first quagga mussels were found in 2015 by the DNR.

You can see color-coded maps of the sampling done by the interns, the Michigan DNR, and Tip of the Mitt Watershed Council in the full internship report posted on our website: 3lakes.com/projects/summer-intern-reports/

The TLA internship program is supported in part by the Gerrit Lee Wierda Memorial Internship Fund. If you would like to donate to the TLA high school internship program in 2023, please select Wierda Internship Fund after you login to the TLA Member portal at member.3lakes.com.



2022 High School Interns: Nevaeh Wise, Nils Stoldt, Maddie Birgy, Morgan Standfest, Aaron Brown, and Freddie Shannon on Lake Bellaire.

New Members

Three Lakes Association Welcomes You!

Linda Dean
Bradley Lawton
Richard & Sandra Leweke

Mark Stone, Antrim County Operator of Dams talks with members of the community at Central Lake H.S. about the hydrological model of the chain of lakes which was recently completed by the Detroit office of the U.S. Army Corps of Engineers.



Water Levels Event Showcases Results and Future of Three-Year Effort

By Leslie Meyers, TLA Volunteer and Fred Sittel, TLA President

On July 12, 2022, TLA sponsored an educational event at Central Lake High School attended by over 100 people eager to learn more about the recently completed hydrological model of the Elk River Chain of Lakes (ERCOL). Lake Levels Committee co-chair, Dave Christian, Antrim County Operator of Dams, Mark Stone, and TLA President, Fred Sittel, talked about the project.

Mark Stone described how citizens concerned about flooding and lake level control from the Bellaire Dam led to formation of a Lake Levels Committee and ultimately to an offer of assistance from the Detroit office of the U.S. Army Corps of Engineers (USACE). Antrim County's Board of Commissioners agreed to fund a portion of the work while primary funding and model development was provided by USACE. According to Stone, "The riparian community now has control of their own fate and now that the model and study are in the public domain, there are no constraints." He was quite confident that the riparian owners will answer the clarion call for action also stating that they shouldn't count on government to solve this problem.

Attendees also learned about a three-year volunteer effort to record actual rainfall and changes in lake levels, from 2019-2021. This information was ultimately used to calibrate the model to local conditions. During calibration it was found that groundwater baseflow was an important factor determining lake levels. In their modeling report USACE commented that, "The Antrim County Citizen Science group provided extremely valuable information



Intermediate Lake Association and other lake-loving groups hosted tables in nearby Thurston Park for refreshments and appetizers provided by TLA. Many gathered for this post-event reception to talk about what they heard and enjoy a nice evening along the shores of Intermediate Lake.

in terms of lake level loggers and rainfall gauge data. It is unlikely that the interaction with baseflow would have been realized without this information."

After proper calibration, USACE was able to run the model using hypothetical storm events such as a one-percent annual expected probability storm event often referred to as the "hundred-year storm." The impact of storm events on water levels in local areas of the chain was evaluated under various conditions such as replacing existing road culverts with larger ones or

increasing the channel depth of certain rivers.

The Lake Levels Committee, which has representatives from each of the ERCOL lake associations, is now soliciting requests for proposals from universities to determine next steps.

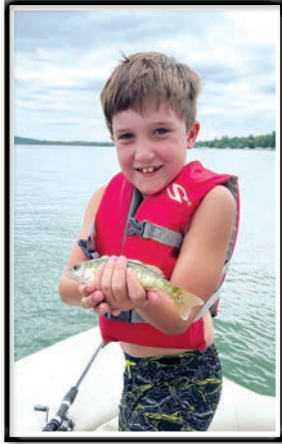
If you would like more information, you can see the entire report by searching for Hydraulic Modeling Report at www.antrimcounty.org or find basic information about the hydrology modeling software at www.HES.USACE.army.mil

GOOD CATCH!

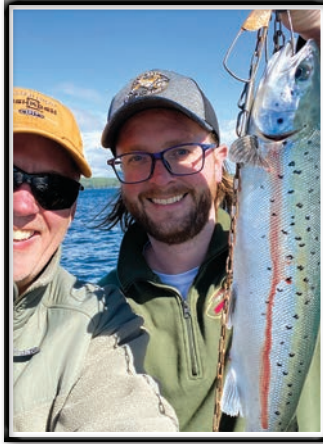
Fishing is a pastime everyone can enjoy. Here are some favorite catches submits by our board members from the summer of 2022.

Would you like to share your fishing photos with TLA? Watch for a fun way to do just that in 2023. Next year it might be your grandchild in our October newsletter!

Sheri Greenhoe's grandson Elliott caught his very first fish, a Yellow Perch, in August on Lake Bellaire.



Greg Frederickson and his son-in-law Tyler came home happy after fishing for Atlantic Salmon in 80 feet of Torch Lake water.



Fred Sittel and his wife Sue know how to catch huge Smallmouth Bass, a naturally occurring fish in area lakes (not stocked by the DNR). Here is Sue on Clam Lake in May, and Fred on Lake Bellaire in September. Both fish were released unharmed.



Gary Bart's grandkids love to fish. Here, Charlotte got lucky with her first cast of a jitterbug. Look at that Northern Pike pulled out of Lake Bellaire! Cruz and Jack will fish all day long, and they have plenty to show for it with this basket of Rock Bass.

You are Invited to a Grass River Community Conversation on December 7

In our April Newsletter we introduced you to *Grass River Connects*, a collaboration between Grass River Natural Area and Three Lakes Association to develop a long-term management plan for the Grass River. At that time we were waiting to hear about a \$20,000 grant we applied for through EGLE (Michigan Department of Environment, Great Lakes and Energy) to support this process, and now we are overjoyed to announce that we received it!

Since this good news, our two organizations have been planning the next year of activities with the end-goal of having a management plan for Grass River. We are in the middle of the community engagement phase, which brings together groups of stakeholders to inform them of the current threats to the river and to gather their input for the management plan. So far we have gathered conservation groups, met with surrounding townships, and listened to landowners who live on the Grass River and its tributaries. In 2023 we will meet with the Antrim County Commissioners and local businesses.

But before that, we will hold a **Whole Community Conversation on the Grass River** on December 7 from 5-7 PM at the Grass River Natural Area. Everyone who is interested in the Grass River is invited to attend. You can expect a 20-30 minute presentation at 5:30pm that provides a full picture of the threats to the Grass River. Then there will be opportunities to learn more about specific areas and to offer your thoughts, ideas and experiences as we work to develop community consensus on a long-term vision for Grass River. Refreshments and appetizers will be provided.

To register for this meeting, please visit 3lakes.com.



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The mission of the Association is to provide leadership to preserve, protect, and improve the environmental quality of the Elk River Chain of Lakes Watershed for all generations with emphasis on Lake Bellaire, Clam Lake, Torch Lake and their tributaries.

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- ☐ Other

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To join Three Lakes Association,

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