

TLA QUARTERLY
March 2006

President's Letter

Here's an early spring snapshot of life in northern Michigan:

- An eleven-pound, 31-inch walleye was caught on Clam Lake last week; the ice fisherman was fishing for perch.
- The weather has been teasing us; 54 degrees over the weekend; 25 degrees and snow today.
- Shanty Creek has been sold to Trinidad Resorts, Inc. and 600 Antrim County jobs have been saved.
- Loons have been sighted on Lake Michigan, and the robins are back.
- March Madness is upon us and Three Lakes Association is alive and well.

Here's the big picture at TLA:

We are pleased to see that membership numbers and financial commitment has continued to increase compared to last year. Our goal of 500 members will soon be reached. Your continued support is appreciated and critical to the mission of TLA. An exciting and productive summer season awaits us.

Please keep Saturday, **June 11th** open for the 3rd annual Grass River/ Three Lakes golf outing at Hawk's Eye Golf Club. A day of golf will be followed by a fine meal along with prizes and a raffle. Last year was great fun so make a foursome and send in the enclosed reservation form by **June 1**.

The TLA, GRNA & TLPA Joint Education Committee has two great events planned for the summer. Mark your calendars for **June 14th** at the Alden Depot and **August 23rd** at DeWitts Marine, both 4-6 p.m. The June event is titled "Summer Serenity" and will feature having fun with respect for man and beast. Come learn how to 'keep your summers hot and your neighbors cool'. The August event will be titled "In the Drink-III" and will feature water quality reports and a pontoon cruise on Clam Lake.

While you're at it, be sure to save **July 19th** for our annual meeting at Hannert's Farm. The pig roast is back by popular demand. Make sure you bring a group of friends.

Hardy members of the TLA water quality team have braved the elements throughout the winter months to continue work on Lake Bellaire and Clam Lake for Phase II of the Water Quality Model. Applications have been submitted for additional grants to keep this very important project going. These guys are looking forward to spring!

Dick Garcia's persistence has paid off. After three years of negotiating between Shanty creek, the Antrim Conservation District, and the DEQ, the sediment ponds at Shanty Creek have finally been dredged. This should partially solve the erosion problem from

Maury Creek into Lake Bellaire. Thanks are due to Heidi Lang of the Conservation District, Brent Nelson of Shanty Creek, and Dick Garcia, TLA Board member.

We are still looking for more volunteers. When you send in your 2006 membership, let us know of any volunteer activity that would be of interest to you.

As spring approaches, it will be nice to see the Snowbirds return!

Best regards,

Bob Bagley



Annual Meeting and Pig Roast: Wednesday, July 19th, 5:00 pm

This year's annual meeting should be good old fashion fun. We're planning the second annual pig roast at Hannert's farm on Stover Road, just east of Bellaire. There will be a short business meeting at 5:00 preceding the dinner, and after dinner, a genuine barn dance. A caller will be on hand to teach us how to square and line dance. The menu is slow-roasted pork, baked beans, tossed salad, homemade applesauce, dessert and your choice of 2 beverages. We'll have beer, wine, ice tea and soda on hand. All this for only \$25 per person, and you'll have the time of your life!!

The tables are set for eight so plan to get a group of friends together and join us for the fun.

See the reservation form in this newsletter. We need paid reservations by July 5th

Predictive Water Quality Model Project: Clam Lake and Lake Bellaire:

TLA has begun construction of the predictive water quality model for Clam Lake and Lake Bellaire. Co-leaders for the water-quality modeling project, Bob Kollin and Ray Ludwa, have been measuring dissolved oxygen concentrations in the deep basins each month over the winter. An important accomplishment has been properly calibrating TLA's Hydrolab instrument and downloading the data from the instrument to a personal

computer. A special THANK YOU to Cory Arsnoe, a project co-leader until mid-April. His skill in safely lowering the Hydrolab's sensors through the ice on the lakes and for transferring his project knowledge to his replacement, Ray Ludwa has been most valuable. Cory is moving to Alaska in April.

Ultimately the concentrations of dissolved oxygen near the deeper regions of these lakes will be graphed to show seasonal variations. The patterns in the seasonal variations of dissolved oxygen combined with phosphorus loads are good indicators of future water quality. They are an important part of the overall process of building a predictive water quality model.

The budget for this project totals \$130,000, based on MDEQ's \$80,000 grant and TLA's \$50,000 in required matching funds. The majority of the TLA matching funds are in-kind volunteer hours.

If you would like to help with the Clam Lake, Lake Bellaire Project please contact Bob Kollin (231) 377-7735 or Ray Ludwa (231) 377-7034 or Tim Hannert (231) 533-6550.

Volunteer Orientation:

A project orientation lunch for TLA volunteers is scheduled for **Saturday, April 22nd** (Earth Day). Bob Kollin and Ray Ludwa will host the orientation at the Dockside Restaurant. The informal agenda for this orientation will include an overview of the project by Doug Endicott, environmental engineer from Great Lakes Environmental Center in Traverse City, a brief description of weekly field work sessions (drilling groundwater wells, measuring tributary flows, collecting water samples, measuring dissolved oxygen with the Hydrolab instrument, and mentoring summer interns. Details of the luncheon will be emailed to all of last year's volunteers plus anyone else who might be interested. Call the TLA office at (231) 533-4852 for information.

Michigan Lake and Stream Association's 45th Annual Conference:

The 2006 Michigan Lakes and Streams Association (MLSA) Annual Meeting will be held April 28, 29, and 30 at the Holiday Inn in Big Rapids and will feature two presentations on Torch Lake. On Saturday, April 29 Dean Branson and Norton Bretz will give two talks: *Predictive Water Quality Model for Torch Lake*, and *Groundwater Phosphorus Influx to Torch Lake*. Dean will present the overall conclusions of our modeling on Torch Lake and Norton will talk about the groundwater measurements and their significance for the model. This will be the first time that Three Lakes Association has had a significant presence at this meeting and one of a very few times that a nutrient-based water quality model has been developed for a lake in Michigan. Three Lakes will be not only advertising its skills but also inviting constructive criticism from various experts on Michigan lakes who attend this conference. Many of these attendees will be members of lake organizations such as ours, but many are university professionals and government scientists. In fact, we have a lot of questions for them that have been raised

by our research, and we will be spending some time cornering the experts in order to get advice on how to interpret our findings.

The February issue of *The Michigan Riparian* has a photo of Torch Lake on the cover, an announcement for the meeting, and a synopsis of the predictive water quality model that was presented to the community at our gathering at Hayo-Went-Ha Nov. 11. After the workshop presentation Doug Endicott and the Three Lakes team finished the final report on the Torch Lake project (see below). We are going to begin presenting the results of our efforts to a wider group of lake organizations and researchers.

The registration fee for one day is \$35 and lunch is \$16 payable to the MLSA Conference, P.O. Box 303, Long Lake, MI 48743. More information is available by phoning (989) 257-3583 or emailing Pearl Bonnell at pbonnell@mlsa.org A complete conference agenda is available at the MLSA website www.mlswa.org

High School Intern Presentations

Photo ID (l to r): Dean Branson, Emily Lowery, Norton Bretz

Our Bellaire High School intern, Emily Lowery, recently presented her project report *Estimates of Groundwater Entering Torch Lake plus Cedar River Watershed and Land-Use* on to the Bellaire School Board. Her co-author, Central Lake High School student Jessica Arnold, made her presentation to the Central Lake School Board in February. Our three Elk Rapids High School students, Derek Walton, Lauren Elbert and Samantha Fox made their presentations to the Elk Rapids School Board in December. The titles of their reports are respectively; *Total Phosphorus Input and Output of Torch Lake plus the Watershed Boundary of Shanty Creek* and, *Seasonal Variations of Temperature, Dissolved Oxygen, pH, and Specific Conductivity in Torch Lake plus Finch Creek Watershed Maps*. All of these students made ten-minute PowerPoint presentations and answered questions from their school boards. They each received a \$200 check from Three Lakes to put toward their college book fund and a Certificate of Achievement for their work on Torch Lake and their excellent reports. These reports are now in the Three Lakes archive. All of these reports showed a high level of understanding and analysis and would be very credible university level papers. All of these students are going to colleges and universities next year except for Emily, who will be a senior. We hope that their internships helped them achieve their goals. Finally, we had a university student intern as well, Mike Nelson, of Notre Dame University. He wrote a paper entitled *Piezometric Determination of Groundwater Flux and Phosphorus Loading of Torch Lake* for which he received university credit.

Nutrient-Based Water Quality Model Report for Torch Lake

The final Water Quality Model report has been completed and sent to the Michigan Department of Environmental Quality. This successfully completes the DEQ contract phase of the Torch Lake Project. Doug Endicott of the Great Lakes Environmental Center, our major subcontractor on all this work, has completed the modeling work. We

have included a slightly expanded version of one of our high school intern reports (from Lauren Elbert and Samantha Fox) documenting our profiles of dissolved oxygen, pH, temperature, and specific conductivity data. It also includes graphs for 39 profiles, a summary of our groundwater measurements, *Characterization of Groundwater Phosphorus in Torch Lake*, and a Central Michigan University analysis of the oxygen demand of the Torch sediments. All this amounts to about 150 pages of excellent work by our interns, TLA staff, volunteers, and subcontractors. We would like to thank everyone who contributed to the creation of this document and encourage you to look at the summary when we get it on our website. Hardcopies can be ordered from the TLA office for \$30.

We are continuing our water quality modeling efforts with the “Phase II” project to model Lake Bellaire, Clam Lake, and as importantly, the watersheds of these lakes. Torch Lake is big, but has a modest watershed. Lake Bellaire and Clam Lake are smaller but have huge watersheds connected to them. We plan to bring all this under our modeling umbrella next year at this same time. You’ll hear from us again on this. And then there is the rest of the Chain... but that is another newsletter too.

Predictive Water Quality Model Summary:

- The water clarity and quality of Torch Lake has not changed significantly in the last 30 years.
- The single most important nutrient to Torch Lake is phosphorus and its level, 2.6 ppb (parts per billion), has not changed significantly in the last 30 years. The phosphorus concentrations in Torch Lake are the same near the shore, north and south, and shallow and deep with no measurable differences anywhere in the lake.
- The concentration of phosphorus is similar to that found in other pristine lake systems including the north central part of Lake Michigan. Other naturally occurring components in Torch Lake water, such as calcium, are similar to those found in Grant Traverse Bay, which is also saturated with calcium and slightly alkaline (pH 8.0 to 8.5).
- The water clarity in Torch Lake is determined by a combination of two naturally occurring processes: phytoplankton growth and calcium carbonate precipitation. Seasonal variations in the water clarity can be explained by these two factors. Phytoplankton respond to sunlight, temperature, and phosphorus and calcium carbonate precipitation is regulated by pH (through phytoplankton growth) and temperature.
- Phosphorus comes into Torch in approximately equal amounts from rainwater, shallow ground water, and Clam River, the main tributary entering Torch Lake.
- Phosphorus leaves Torch Lake by two routes: primarily (90%) by settling to the bottom where it becomes entrapped in sediment and, secondarily (10%) by flowing out Torch River.

- There are no seasonal changes in the bottom layers of water in Torch where the oxygen levels remain high (>10 mg/l, milligrams per liter) and the temperatures remain low (<40 deg. F) all year.
- Tests show that the phosphorus in the sediment at the bottom of Torch Lake will remain entrapped and not re-enter the lake water as long as the bottom waters stay well oxygenated (greater than 2 ppm) and cold. These same tests also show that even if the bottom water became anoxic, the rate of phosphorus release from the sediment in Torch Lake would be very slow compared to other lakes.
- Phosphorus concentrations in Torch Lake have a calculated half-life for settling to sediment of about two years whereas the flushing time for the lake through Torch River is about 15 to 20 years. Therefore consequences of decisions about land use that could increase the phosphorus loading into Torch Lake may not be detectable for many years.
- The sources of phosphorus entering Torch Lake are both diffuse (rainwater taking phosphorus from the atmosphere), nearby (tributaries from the Chain-of-Lakes watershed), and local (shallow groundwater from fertilizers and septic systems).
- Very local sources of phosphorus from failing septic systems create onshore algae blooms of Cladophora and related algal families, but within a few feet of shore these sources are undetectable.
- It is not known how much of the phosphorus that comes from ground water is caused by septic systems and fertilizer use, but deep ground water (drinking water wells) near the lake shoreline have phosphorous levels about 5 times lower than shallow groundwater (22 ppb versus 4 ppb).
- Possible sources of airborne phosphorus in rainwater include distant contributors such as power plants, widespread sources such as dust from roads and farming, agricultural fertilizer, and local miscellaneous burning including residential heating and forest fires.
- The fraction of direct human-related phosphorus in Torch Lake tributaries is unknown. Possible sources include residential septic systems, agricultural and residential fertilizer use, storm water runoff, commercial land use (golf courses, light industry). Wetlands and greenbelts reduce the impact of the above but their total effect has not been quantified.
- According to tests by others, phosphorus in human waste is not well captured in septic systems, especially in the soil types typical of our area. This phosphorus is expected to be easily transported through the same sand and gravel that transports shallow ground water. However, up to 85% of the phosphorus in sewage can be captured by advanced sewage treatment systems with tertiary treatment such as the one in Bellaire. Phosphorus retention by advanced types of residential septic systems can be significant.

- Modeling of phosphorus levels in Torch Lake based on current conditions shows that a municipal sewage system in Alden with tertiary treatment would decrease the phosphorus level in Torch Lake by approximately 0.1 ppb (compared to its current level of 2.6 ppb) in a few years. Similarly, if the input phosphorus level increased by 10% each year (an aggressive assumption about population growth), the phosphorus level in Torch could double in about 10 years to about 5 ppb.
- The phosphorus level in Torch Lake is linked to the phosphorus levels in the upper Chain-of-Lakes watershed through Clam River and this part of the system, including the land use within the full watershed must be incorporated into the model for a full understanding of the system and to pinpoint phosphorus control measures.

Upstream and Downstream Modeling Efforts:

TLA has attended planning sessions with Elk-Skegemog and Intermediate Lake Associations to encourage and mentor them in modeling projects for their respective lakes. While neither group was able to submit a grant application to the DEQ this grant cycle, we expect both will do so next year. In the meantime TLA has been invited to present similar information to the Six-Mile Lake Association early this summer. All three groups have expressed interest in sponsoring a summer internship program from local schools. These internships could involve a total of five Antrim County high schools and as many as 20 students.

TCE Plume Update:

Based on recent test borings near Del Mason Road the DEQ reported that the TCE plume has moved westerly more than 200 feet. This means the plume has extended beyond the present limits of the municipal water supply and is continuing to approach the Cedar River Well Field. It is apparent that the first response should be providing safe drinking water to homes in the affected area. State funds have been applied for and we are awaiting the DEQ's plan for the extension of the municipal water supply.

Zone Directors Meeting

The Zone Directors of the Three Lakes Association will be meeting **Wednesday, May 10, 10 am**, at Dorothy Clore's house in Alden to discuss strategy and action plans for the purpose of increasing TLA's share of riparian landowners. Our membership comprises about 18% of the total riparian ownership on Torch Lake, Clam Lake, and Lake Bellaire. Our goal is to increase this membership to 30%.

You could help us reach this goal by encouraging neighbors who you know are not members to join with us in our important water quality work. Increased membership will allow us to improve and continue such activities as:

- Intern programs involving high school students throughout Antrim County
- Purchasing equipment to better monitor water quality in our lakes

- Boat washing at public access sites
- Summer educational outreach programs
- Staying involved with TCE Plume issues

Membership:

We have 315 regular and life memberships as of March 15, 2005. As a result, we currently reach about 1000 people with our newsletters. Our 2006 goal is a total of 500 memberships. If you can convince your friends and neighbors that TLA is serving them and they will get their money's worth with an investment of only \$50, we will reach our goal easily. Use the membership form in this newsletter to help them join in our efforts to preserve, protect, and improve the Chain-of-Lakes Watershed for all generations.

Note: Please check the mailing label to see if you are current in your dues.

Executive Director's Corner

It has been a busy winter in the basement boat shop here at Tag-A-Long Ranch. In between the writing of TLA grant proposals a sleek rowing boat with a sliding seat and room for one guest has taken shape and will soon be gliding over the quiet waters of our lakes. I look forward to continuing my early morning rows on as many lakes in our 'Chain' as possible. This activity is not only a good source of exercise, but also a great opportunity to observe the lakes up close and personal. Once you've experienced a quiet morning on the lake with a rising sun illuminating a new loon family or a doe drinking at the shore, the motivation to protect this invaluable watershed becomes self-evident.

I'm looking forward to a very busy year of water quality monitoring and predictive model construction. We should have a full compliment of students from Mancelona, Bellaire, and Central Lake working with us on these projects and could use several adults to serve as mentor/chaperones. If you'd like to help with any of our projects or events please call the TLA office at 231-533-4852.

Hope to see you soon.

Tim Hannert