KLSA

Kawartha Lake Stewards Association

2024 Annual Lake Water Quality Report

Kawartha Lands and Waters - Naturally Connected

MAY 2025

KAWARTHA LANDS AND WATERS - NATURALLY CONNECTED

The Kawartha Lake Stewards Association (KLSA) is a volunteer-driven, non-profit organization of seasonal and year-round residents in the Kawartha Lakes region. The Association's programs include the testing of lake water for phosphorus, clarity, calcium and E. coli bacteria, and research and public education about water quality issues. KLSA has partnered with universities, colleges and governmental agencies to conduct research studies and produce publications. KLSA is led by an up to twelve member Board of Directors. A list of the members of the Board is provided in Appendix A.

Please Note:
To obtain copies of our report or to find out more about KLSA, please contact:

Kawartha Lake Stewards Association
264 Bass Lake Road, Trent Lakes ON K0M 1A0
Email: **klsa@klsa.info**

You can view Adobe pdf versions of KLSA reports on the new KLSA website: **www.klsa.ca**

Cover photo: Rainbow Over Big Cedar Lake
Photo credit: Mike and Glenda Hooper

Graphic Design by Danielle Shaw (Gull's Graphic Design)

Mission Statement

The Kawartha Lake Stewards Association was founded to carry out a coordinated, consistent water quality testing program (including bacteria and phosphorus) in lake water in the Kawartha Lakes. KLSA ensures that water quality test results, prepared according to professionally validated protocols with summary analysis, are made available to interested parties. KLSA has expanded into research activities that help to better understand lake water quality and may expand its program into other related issues in the future.

Editorial Committee:

Chair: Sheila Gordon-Dillane
Members: Carol Cole, Tom McAllister, Jacqui Milne and Kimberly Ong

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KLSA

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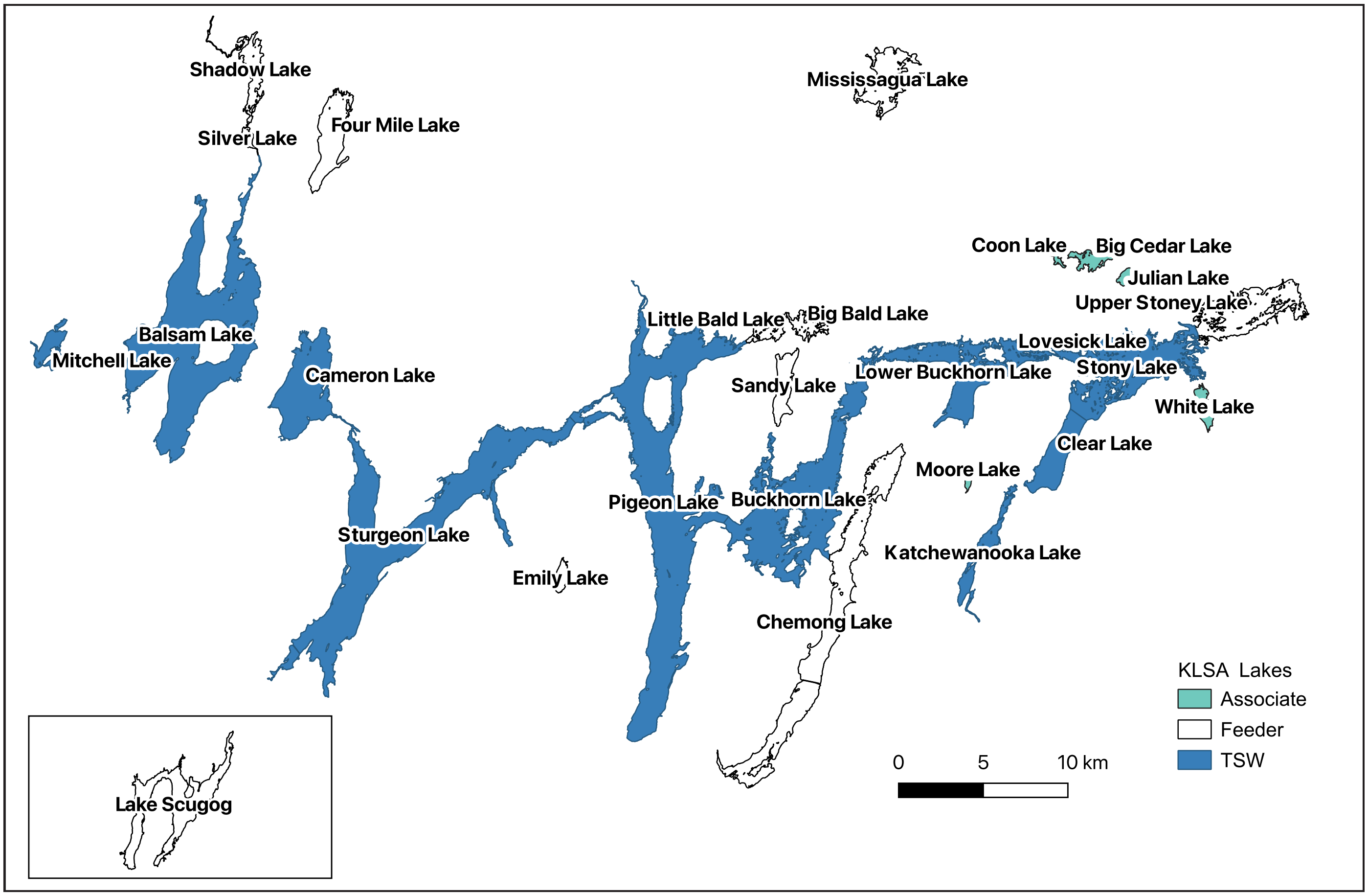


Land Acknowledgement

We acknowledge that the Greater Peterborough Area is in Michi Saagiig Nishinaabeg territory, in the context of the Rice Lake, Treaty 20 and Williams Treaties.

We wish to recognize First Nations rights in these Treaty areas.

In keeping with KLSA's mission, we wish to emphasize the past and current efforts of First Nations peoples as nibi-apisidoon (water protectors).

There is much we can learn from First Nations' knowledge of the land and what is needed for a more sustainable and regenerative future.

Chair's Message

Ed Leerdam, Chair
Kawartha Lake Stewards Association

It's mid-February as we prepare this Lake Water Quality Report, and as I write this message I am looking out my window at the snow falling from the sky onto an already high pile. It settles onto the branches of the tall trees and the fully frozen Nogies Creek. What a difference compared to last year's winter!

We have previously had articles written and speakers talk at our meetings about winter, ice cover, ice-on and ice-off dates, frozen lakes and how important this season is for our ecosystem and lake health. It's also a season for fun winter activities: skiing, tobogganing, snowshoeing, ice skating, ice-fishing, and community celebrations of winter. While I no longer hit the slopes or have skates, for me winter is a quiet and peaceful time, a time to immerse myself in the season and enjoy frequent cold and snowy walks with my buddy Niko. It is enjoyable to watch as he comes across tracks deer and other wildlife leave behind or sounds the alarm when a brave squirrel scampers amongst the snowy branches or a big noisy black bird flies overhead. We are sometimes lucky enough to spot a deer or two or three. When it's not a snowy day, the squirrels dart around in the warm sunshine (even though the air temp is minus 15-20C), and visible are the many tracks left behind by the wild animals as they navigate this cold and snowy winter. But today, the squirrels are taking refuge in their nests and the tracks are being covered. I can't help but think how lucky I am to live in this part of the world.

A wintery walk. *Photo by Ed Leerdam*

The past year and into January has been both remarkable and unsettling. We saw a spectacular and lengthy show of the aurora borealis this past summer, and occurring as I write this is the alignment of seven of the eight planets in our solar system. March will bring us another lunar eclipse and a partial solar eclipse along with other celestial events in March and April. A dark sky is so important to be able to enjoy these sights, and living here in the Kawarthas you don't have to go far to get out of artificially lighted areas to be able to view these wondrous sights. I have to point out we are having a more 'normal' Canadian winter this season, with close-to-average snowfalls and temperatures. I put all these things in the 'good' category. However, the intense snow squalls we've experienced at times are the result of the Great Lakes still being mostly open water, which historically is not normal, but certainly trending over the past few decades, and is likely a consequence of climate change. Note that 'we' also sent a good amount of snow and frigid temperatures as far south as Louisiana, Georgia, Alabama, Florida and Mississippi. This is something they are not used to and for which they are ill-prepared. In 2024, the southeastern US seaboard got hammered with 18 named storms, 11 hurricanes, and five major hurricanes; it was also the first season since 2019 to feature multiple Category 5 hurricanes. Tragically, 401 people lost their lives and there was $129 billion USD worth of destruction. The Los Angeles wildfires aided by the Santa Ana winds killed at least 29 people, forced more than 200,000 to evacuate, and destroyed or damaged more than 18,000 structures. All this to say again I feel so very fortunate to live in the Kawarthas. But I don't fool myself- the negative consequences of climate change affects us in the Kawarthas as well, just not to the same extent - at least not yet.

Signs of the wild on the frozen Nogies Creek. *Photo by Ed Leerdam*

Of particular note and relevance to our efforts here at KLSA, I want to speak about the Olympics this past summer in Paris, France. Overshadowing the pomp and circumstance surrounding the event was the concern for the swimmers competing in the Seine River. Scenes of daily testing of the Seine for bacteria and especially *E. coli* is what stands out in my memory, not how many medals Canada won, or the spectacle itself. It's been illegal to swim in the Seine for more than a century because of the pollution. In the few years leading up to the Olympics, Paris invested 1.4 billion euros in infrastructure to catch more stormwater

An illustration of the February planetary alignment as seen from the Northern Hemisphere. *Star Walk*

runoff, preventing sewage and other waste from contaminating the river.

The standards are far less stringent in Paris (France) than in Ontario. Under the European Environment Agency's Bathing Water Directive — used by World Triathlon to determine if water quality is fit for competition — anything below 1,000 *E. coli* colony-forming units (cfu) per 100 ml of water is considered safe for swimming. As it was, day-to-day testing of the Seine River was being done to determine whether or not it was 'safe' to swim in, and some days the *E. coli* count was over the 1000 cfus/100ml. Here in Ontario, Provincial guidelines suggest the average presence of *E. coli* should be **less than 200** cfus/100ml of water. **The Kawartha Lake Stewards' threshold is 50** cfus/100ml of water, at which point we do re-tests to see if it repeats and requires our attention.

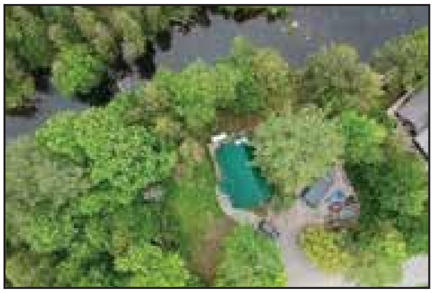
With increased development pressures in cottage country, especially along the waterfront, it becomes increasingly important to protect our lakes, streams and wetlands, as well as our lands and forests. Municipalities are struggling with competing pressures – more development and tax revenue versus protecting our lakes and forests. Some are looking at new building bylaws incorporating some elements of environment protections. In January, 2024 the Municipality of Trent Lakes established an Environmental Advisory Committee, on which I have the pleasure to serve. You'll read about this committee later in this Report. A work product coming out of this committee is the creation of a waterfront property owners information flyer. This is an information brochure about the importance of a natural shoreline. The flyer was included in the interim tax bill in February and went to all property owners in the municipality. It is reproduced as an article later in this Report.

Our work at KLSA remains constant with our water quality monitoring programs (*E. coli*, participation in the Lake Partner Program, water temperature and dissolved oxygen), our Natural Edge program, and our outreach and education programs including producing this annual Lake Water Quality Report. When we could take on additional projects: with our Environmental Climate and Change Canada (ECCC) grant (August 2023 – March 2025) we were able to naturalize additional shoreline properties in 2024 and conduct a Love Your Lake survey of Clear Lake. With funding, we hope to continue to offer this program. In 2024 we supported and partnered with Kawartha Conservation on their nearshore sampling program on four lakes in the Kawarthas (see article in this Report). We anticipate continuing this collaboration in 2025. We have worked long and hard to update our website to a hosting platform which does not have all those annoying pop-up ads. Please check it out at www.klsa.ca. With continuing support through donations, grants and advertising revenue, we were able to do a reprint of our popular 2nd edition (2023) of our Aquatic Plants Guide and continue to offer it to all free of charge.

Last year we had to address changing our governing documents (i.e., bylaw or constitution) to conform to the Ontario Not-for-profit Corporations Act (ONCA). The deadline was October 18, 2024, and we presented our proposed revised bylaw at our AGM on September 28, 2024. After questions and discussion, our new bylaw was approved by our members. Our new bylaw in its entirety was sent to our entire email distribution list. A notice with a link has been posted on our social media, and can be found on our website www.klsa.ca.

KLSA enjoys a wonderful reputation as a community science organization and as stewards of our lakes and streams in the lower Kawarthas. However, we are facing a looming crisis. We have several vacancies on our Board, and that makes it a real challenge to keep the organization and our programs going, including the production

Wintertime at Nogies Creek. *Photo by Ed Leerdam* of this annual report. We need your help. We need people who are willing and able to take on any one of a number of roles. Much of the work can be done on a computer - writing letters, looking for grants and completing grant submissions, number-crunching, book-keeping, research, communications, recruiting and managing volunteers, attending and representing KLSA at events, taking meeting minutes, running our programs, and other administrative work. If you have any interest in this kind of volunteering, I urge you to send us an email at klsa@klsa.info.



Summertime at Nogies Creek.. *Photo by Ed Leerdam*

We are always very thankful to those people who choose to volunteer their time and talents on our Board of Directors. Last year we bade a fond farewell to Carol Cole, who served from October 2020 to September 2024. Carol joined the KLSA Board after discovering starry stonewort in her lake, and was looking for support in learning and dealing with this highly aggressive invasive aquatic plant. In addition, Carol enthusiastically took on many roles in her time on the Board: as our Secretary, Communications person, including managing our emails and supporting all the behind the scenes things with our (then) new email system, as our Privacy Officer, as a member of our Editorial Committee, and initiating and working on replacing and updating our old website this past year. Carol remains our Communications person while we seek her replacement. We also bade farewell to Darryl Kotton, who joined our Board in October 2022. During his short two years on the Board Darryl headed the Aquatic Plant ID contest in 2023, was KLSA's person on the joint nearshore sampling program with Kawartha Conservation, and led our bylaw changes to conform to ONCA.

Joining our Board in September 2024 was Kaleigh Mooney, who has a passion for aquatic ecosystems and lake health. Kaleigh loves being in the field (that means in the water and muck up to her knees) and has worked with local aquatic researchers such as Dr. Eric Sager. She contracted with FOCA to produce their own Aquatic Plants Guide, and has presented at numerous events and Association annual meetings. As we prepare this Report Kaleigh is completing her undergraduate studies at Trent University, and will be moving to Whitehorse, Yukon to continue with her research there.

We are especially grateful to our other volunteers 'in the field' who are doing the water-sampling on our lakes, shrub plantings in our Natural Edge program, water temperature monitoring and dissolved oxygen sampling, and other programs we run or partner on from time to time. Without these volunteers, we would have no data and no association. Again, please contact us at klsa@klsa.info if you would like to volunteer in any of these programs – they take little time and effort.

We could not do anything without our supporters – lake/cottage associations, businesses, individuals, and local municipal governments who give us donations and grants, and our advertisers who support us by buying ad spots at the back of our report. Please support these local businesses whenever possible.

Lastly, thank you to everyone who submitted photos in our contest for the front cover of this report. All the beautiful photos show how much we all love this area. All the submitted photos are spread throughout this Report. Enjoy!

Please plan to attend our annual Spring Public Meeting, this year being held on Saturday May 24, from 9:30am–12:30pm, at the Buckhorn Community Centre on Lakehurst Road. We are working on plans now but we will have the same format as last spring. There will be interactive exhibits and displays from seven or eight organizations with tables set up in the hall. We learned from last year not to cram too much into the meeting, so we will have just one main speaker (TBD), thereby allowing more time for them and more time for you to interact with exhibitors and each other. Stay tuned for our announcements via email, on our website and Facebook page.

To contact me directly, please send an email to Ed.Leerdam@klsa.info. For general inquiries, please send an email to klsa@klsa.info.

Have a wonderful summer!

Ed Leerdam

Observing the 'Wings' of Change: Bird Populations in the Kawarthas

Warren I. Dunlop, President
North Pigeon Lake Association

Part of the joy of returning to the lake each spring is anticipating seeing the birds that call the Kawartha Lakes home. I'm sure we all have a favourite memory of one of the familiar summer visitors to our lakes: Great Blue Herons wading in wetlands or along the shore; Ospreys fishing over the lakes and carrying their catch back to their young; the haunting cry of the Common Loon.

Even relative "newcomers" like Double-crested Cormorants can be a welcome sight. While some consider them a nuisance due to their current large numbers, their presence reminds us that their recovery from the brink of extirpation in Ontario is a conservation victory. The ban on pesticides like DDT facilitated their population recovery, and also benefited many of our birds of prey, including the aforementioned Osprey.

Figure 1. Four species that are ubiquitous across the Kawartha Lakes: a) Common Loon b) Osprey c) Great Blue Heron d) Double-crested Cormorant. *Photo Credits: W.I. Dunlop (a, b, c); D.A. Sutherland (d)*

As a seasonal resident of the Kawartha Lakes area and permanent resident just south of the lakes, I have sometimes returned to the lake and thought, "Hmm, I don't remember seeing that bird here before - is that new?" Or, perhaps while enjoying a morning coffee, I've wondered, "Why haven't I seen bird such-and-such around here for a while?"

As with many things in nature, it's not always easy to answer those questions. It can be hard to know if one's individual observation represents real change. And, if it does, is it just what's going on locally, or is it representative of population change across broader landscapes?

Changes in bird population numbers and distributions can be due to many factors, and can occur across many time scales and geographies. Let's take a look at what's happening with a few species that are common in the Kawartha Lakes area.

Long-Term Trends

A partnership between Birds Canada and Environment and Climate Change Canada has recently produced The State of Canada's Birds Report. This great resource brings together data from various sources and uses expert analysis to provide overviews of population trends for all our birds.

The report provides an overview of long-term trends, using a baseline of 1970 as an index. That's when many standardized monitoring programs were established. Trends are shown for major groups of birds over the half- century period since then.

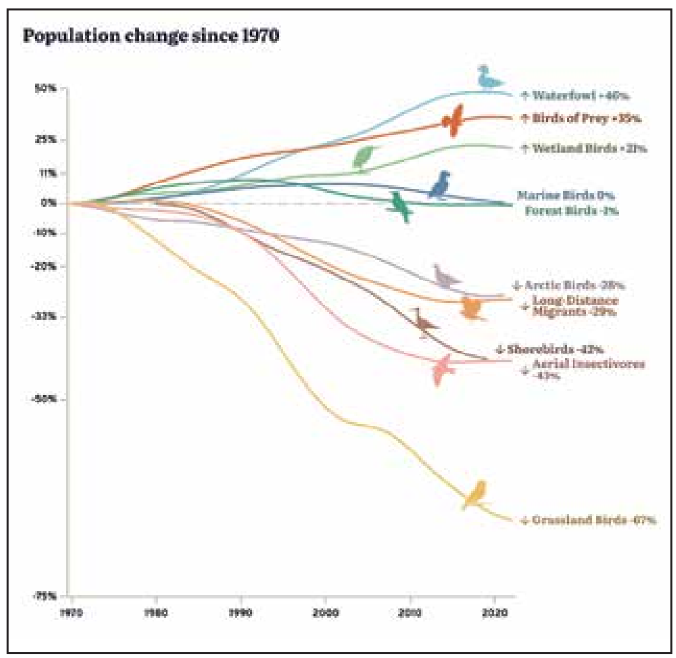


Figure 2. Population trends of major bird groups from 1970 to present. *Credit: BC & ECCC 2024.*

The trend lines should be considered averages for the groups, as individual species' trends may vary within the groups. The report is available online and organized in a manner that allows you to take a deeper dive into the data to look at sub-groups or individual species if you are interested.

From the graph, you can see that waterfowl, birds of prey, and wetland birds have generally upward trends; forest birds, as a group, have been fairly stable; while shorebirds, aerial insectivores, and grassland birds have shown sharp declines.

The report uses data from a number of community science projects like Breeding Bird Surveys, Christmas Bird Counts, and other specialized surveys. The trends represent how these groups are doing across their ranges. We can take a look to see if some of our local bird populations either conform to, or diverge from those trends. To do that, I've looked at another source of community science data, eBird, for some clues about how some populations in the Kawartha Lakes area are doing.

While we can't look at every species or group, I've concentrated on a few of the more distinctive birds that you are likely to notice while at the lake.

It's important to remember that populations of some species may seem fairly stable during the last 20 –30 years and you may not have noticed any changes. However, many of the sharp declines occurred from the early 70s to the 90s (or before), so current population levels may be stable but are far below historical levels and below target goals for recovery. This phenomenon of unnoticed gradual change is known as "shifting baseline" and emphasizes the need for long-term monitoring programs.

Waterfowl Group

Within the waterfowl group, the largest increases across Canada have been for geese and swans.

Due to overhunting and habitat loss, Trumpeter Swans were extirpated from Ontario in the 1880s. A recovery program was established in the mid-1980s, and the species was successfully reintroduced at the Wye Marsh Wildlife Centre near Midland. The population has expanded since and the first observations in the Kawartha Lakes area were recorded in the late 1990s. Data recorded in eBird reveal that observations of our local Trumpeter Swan population have increased dramatically in the last 25 years, and you've likely noticed them more frequently (Figure 3).

Populations of our native Tundra Swan and the introduced Mute Swan have also greatly increased across their ranges and eBird data confirms that they are also more frequently observed in the Kawarthas (Figure 4).

You can now usually see Trumpeter Swans year-round in the Kawarthas, while Tundra Swans are seen more frequently during spring and fall migration. During winters of greater ice cover on the Great Lakes, Mute Swans will move inland in greater numbers looking for areas of open water on rivers (like the Otonabee) and inland lakes.

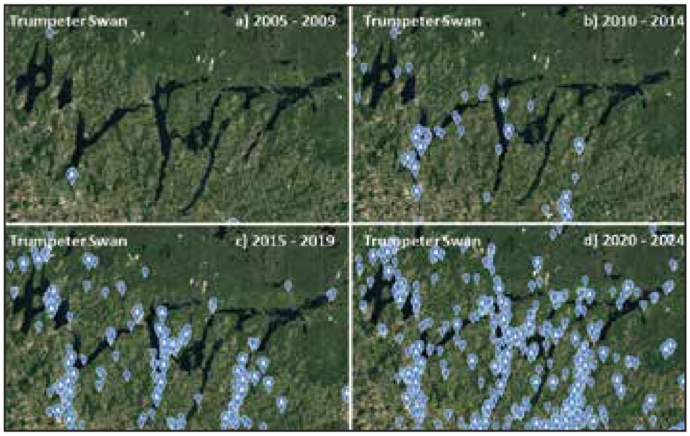


Figure 3. **eBird data illustrate a dramatic increase in Trumpeter Swan observations across the Kawartha Lakes over the four 5-year periods between 2005 and 2024. Each blue marker represents an observation of at least one individual bird and often more** ***Data Source: eBird 2021.***

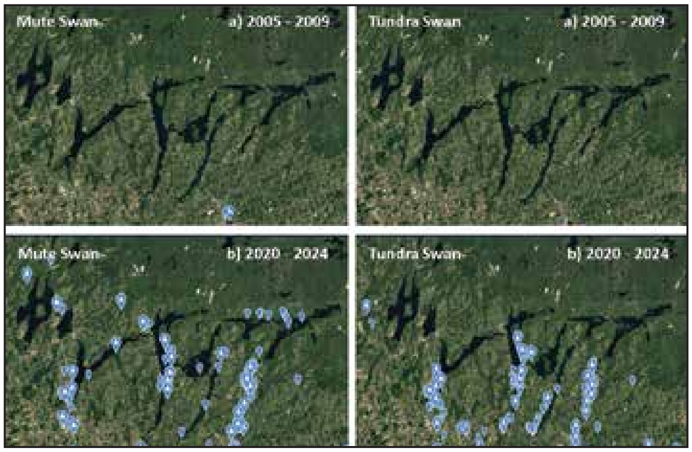


Figure 4. **eBird data illustrate dramatic increases in Mute and Tundra Swan observations across the Kawartha Lakes between 2005 and 2024. Each blue marker represents an observation of at least one individual bird and often more.** ***Data Source: eBird 2021.***

Other large waterfowl that have increased across their entire range are Canada Goose, and the closely related Cackling Goose (once considered a Canada Goose subspecies). While some Canada Geese are resident and breed here, huge numbers migrate through the area in spring and fall. A few Cackling

Geese and Snow Geese can sometimes be observed migrating with the Canadas.

Figure 5. Swans and geese that have exhibited large population growth across their Canadian ranges: a) Trumpeter Swan b) Tundra Swan c) Mute Swan d) Cackling Goose (left) and Canada Goose (right). *Photo credits: W.I. Dunlop*

Forest Birds and Birds of Prey Groups

While the general trend for the Forest Bird group is relatively stable, there is a great deal of variability for species within the group.

Most of the owls that are resident or that occasionally visit the Kawartha Lakes area have either increased since 1970 or have fairly stable population trends. The exception is the Great Horned Owl, which has, for some reason, declined across its range and is observed less often in the Kawartha Lakes area. Barred Owls, on the other hand, have become much more common in the last 15-20 years. If seen during the day, they are most likely hunting for food, so it's worth keeping an eye out along roadsides for these handsome owls.

Common Raven, Osprey, Bald Eagle, Peregrine Falcon, and Merlin have all shown greatly increased populations in our area as well. For example, data from eBird illustrates how Barred Owl and Merlin have spread across the Kawarthas (Figure 6).

Red-bellied Woodpecker, which was historically primarily a southern species, has moved north to our area in large numbers. Similarly, Red-Headed Wood-pecker, which had once essentially disappeared from the Kawarthas, is now often seen (Figure 7).

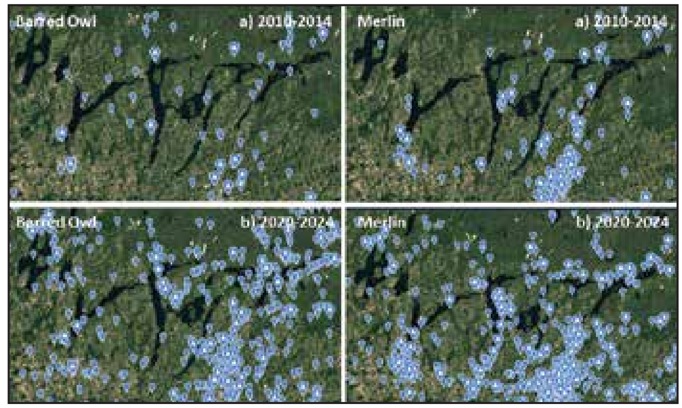


Figure 6. eBird data illustrate increases in Barred Owl and Merlin observations across the Kawartha Lakes between 2010-14 and 2020-24. Each blue marker represents an observation of at least one individual bird. *Data Source: eBird 2021*

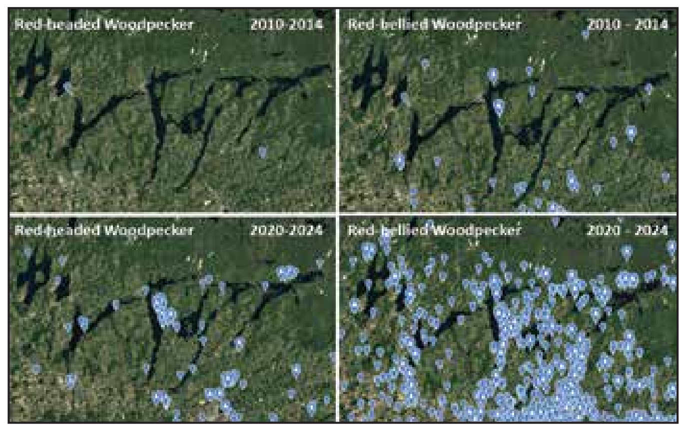


Figure 7. eBird data illustrate increases in Red-headed Woodpecker and Red-bellied Woodpecker observations across the Kawartha Lakes between 2010-14 and 2020-24. Each blue marker represents an observation of at least one individual bird. *Data Source: eBird 2021*

Wild Turkeys were extirpated from Ontario in the early 1900s and reintroduced into southwestern Ontario in 1984. The population has increased greatly and spread well beyond its historic range. By the mid-1990s, the first occurrences in the Kawartha Lakes area were recorded. Today, Wild Turkeys are readily observed foraging in the fields and forests around the Kawartha Lakes.

Some other species in this group are in decline. Although never very abundant in the Kawartha Lakes area, the Canada Jay (formerly Gray Jay) is now rarely seen. Surveys indicate that the overall population may be fairly stable or slightly declining, but the range of the species is moving north with climate change. The Canada Jay caches food for use in late

Figure 8. Four species that have exhibited large population growth across the Kawartha Lakes: a) Barred Owl b) Two male Wild Turkey (Toms) display for a female c) Merlin d) Common Raven. *Photo credits: W.I. Dunlop (a, b, c); D.A. Sutherland (d)*

winter to feed their young (which hatch in winter); warmer winters are increasing the amount of cached food that is spoiling, forcing them northward.

Northern Shrike are another northern species that is showing moderate declines across its range. These birds, which breed in the high Arctic, are winter visitors to the Kawarthas. Keep an eye out for these small birds perched high in trees, surveying for potential prey.

Across their range, surveys indicate that Ruffed Grouse populations are relatively stable with some annual fluctuations. In our area, data from Christmas Bird Counts indicate that they have been reported less frequently the last few years, possibly due to decreased food availability or increased predators. If you are lucky, you'll hear them 'drumming' during breeding season.

Evening Grosbeak populations have seen such large declines across their range that they have been designated a species of Special Concern under the federal Species at Risk Act. These beautiful birds are rarely seen in the Kawartha Lakes area anymore, but because they wander in winter looking for food, they may show up at your feeder from time to time.

Aerial Insectivores Group

As a group, aerial insectivores (birds that feed on insects while flying) have seen a large decline in populations across most of their range since the

Figure 9. Four species that have seen local declines in recent years: a) Canada Jay b) Evening Grosbeaks at a feeder c) a male Ruffed Grouse displaying d) Northern Shrike. *Photo Credits: W.I. Dunlop*

early 1970s. The Kawartha Lakes area is no different. Barn, Bank and Cliff Swallows; Eastern Phoebe; and Eastern Wood-Pewee have all shown large decreases. Least, Willow, Alder, and Great Crested Flycatchers, as well as Tree and Northern Rough-wing Swallows, have all shown moderate declines. Declines are likely a result of the combined impacts of habitat loss or degradation, increased pesticide use, and climate change. Reversing the trends, therefore, will be a challenge.

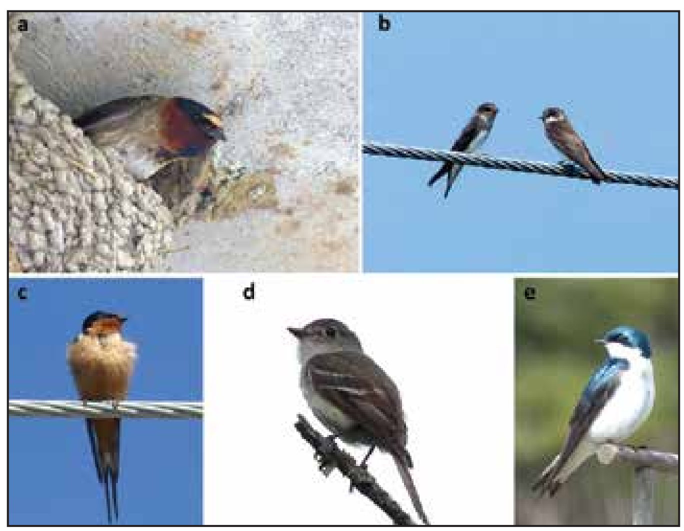


Figure 10. Some of the aerial insectivores that are in long-term decline: a) Cliff Swallow in mud nest on Nogies Creek bridge b) Bank Swallows c) Barn Swallow d) Least Flycatcher e) Tree Swallow. *Photo credits: W.I. Dunlop*

I've observed the bird populations at the Nogies Creek Bridge at the north end of Pigeon Lake for a number of years. The bridge used to support a large colony of both Barn and Cliff Swallows (as well as Rock Pigeons), which could be seen foraging over the water in summer with their young. In recent years the Barn Swallow colony has been much reduced and the Cliff Swallows seem to have disappeared completely. I'll continue to monitor this location and hope I'll see a rebound of these colonies in the future.

Seasonal Variation

Birds move seasonally, or migrate, to escape harsh weather and to find abundant food and nesting habitat. While some spring migrants will stay in the area and nest here, others just stop for a while and carry on to breed farther north. These migrants can include warblers, sparrows, waterfowl, gulls, and shorebirds.

There are a number of shorebirds that stop in the Kawartha area during spring and fall migration to refuel on their way to boreal and arctic breeding grounds and returning to their southern wintering areas. They are not here for long, so opportunities to observe them are fleeting. Because they are only here for a short time each year, it's difficult for us to recognize if their populations are rising or falling, so long-term monitoring programs are important to give us insight.

These shorebirds are primarily long-distance migrants, so population levels can fluctuate depending on habitat conditions or food availability on their wintering grounds, breeding grounds, or along their migration routes. Two of the birds that pass through here, Dunlin and Lesser Yellowlegs, have shown large declines. Least Sandpipers have fairly stable population levels, while Solitary Sandpipers and Greater Yellowlegs have had moderate and large increases respectively. If you check out shorelines, wetlands, flooded fields, or sewage lagoons in spring or fall, you may be lucky enough to see many of these birds.

If you've come up to the lake earlier in the spring than usual, you may be surprised to see large rafts of ducks with which you aren't familiar or a warbler flitting about that you haven't noticed during the summer. These could be early migrants that may be gone before you normally arrive at the lake.

If your movement patterns haven't changed, perhaps

Figure 11. **Some of the shorebirds that refuel in the Kawarthas during their migration to and from their northern breeding grounds: a) Least Sandpiper b) Solitary Sandpiper c) Greater Yellowlegs d) Dunlin.** ***Photo Credits: W.I. Dunlop.***

it's the birds. Evidence suggests that in response to warmer springs due to climate change, some bird species are arriving earlier in the spring than they did traditionally.

Annual Variation

While remaining relatively stable over long time periods, bird populations can appear to vary in local areas due to changes in the overall distribution of the species. Distribution can vary dramatically from year to year, such that you might surmise that a particular species has disappeared from your local area completely or that the population has suddenly exploded.

These changes in distribution are usually in response to food availability and are most obvious in a group of birds known as 'winter finches'. Some of these birds don't always migrate from our province in winter but will move around in response to the availability of their preferred foods. The 'winter finches' include: Pine Siskin, Redpoll, Purple Finch, Red Crossbill, White-winged Crossbill, Pine Grosbeak, and Evening Grosbeak. They can be common in the coniferous forests just north of the Kawarthas.

During a poor cone or seed crop year or a year with a drop in abundance of some insects such as Spruce Budworm, the finches will move around looking for food. If they've moved south, you may be more likely to see them visiting your winter bird feeders or foraging on locally abundant food. Because various

Observing the 'Wings' of Change ... cont'd.

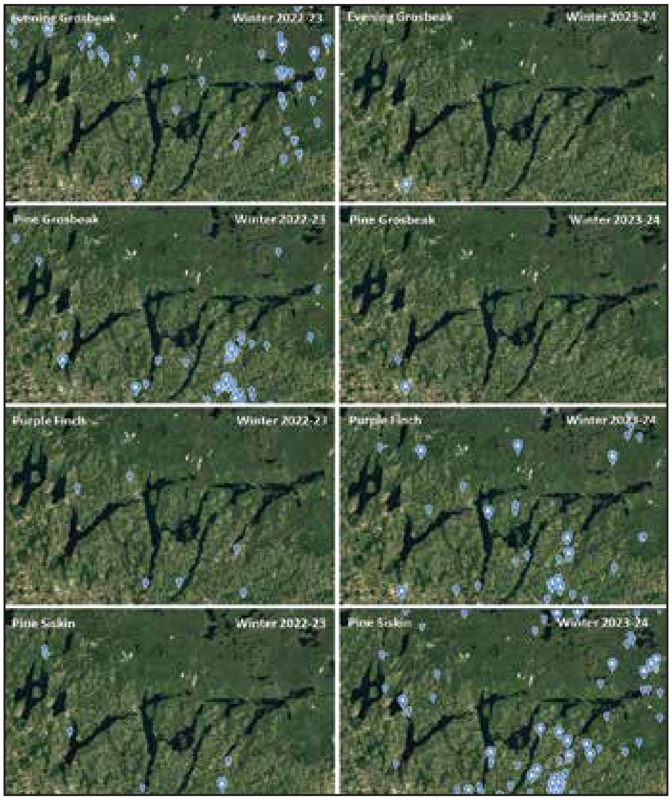


Figure 12. **Comparison of relative distributions of four "winter finches" during Dec-Feb 2022-23 (left column) and Dec-Feb 2023-24 (right column).** ***Data Source: eBird 2021***

species prefer different crops, a big flight year for one species doesn't necessarily translate into big flight years for all.

Figure 12 uses eBird data to illustrate a recent example of this phenomenon. Evening Grosbeaks and Pine Grosbeaks were both observed fairly frequently during the winter (Dec-Feb) of 2022-23, albeit with different distributions. Both species were essentially non-existent in the area during the following winter (Dec-Feb 2023-24). On the other hand, Purple Finches and Pine Siskins were seen infrequently during winter 2022-23 and much more often in winter 2023-24.

Keep an eye out for these species because their distribution and abundance will likely change from year to year.

Do You Want To Get Involved In Bird Conservation?

If you're already a birdwatcher, you can help track populations by recording your observations in eBird, which makes them available for analysis. Much of the bird population trend monitoring data comes from volunteer scientists like you.

And, you don't need to be an expert! I hope that I've highlighted a few species here that are fairly easy to recognize with a little practice. For example, if you see the distinctive Red-headed Woodpecker or Red-bellied Woodpecker, you can help track these species by reporting your sighting to eBird or iNaturalist.

You can also help our birds by preserving or improving habitats in your own yard. Maintain native plants that provide food and shelter; naturalize (part of) your shoreline; reduce pesticide use; and avoid creating boat wash near wetland areas where birds may be nesting. Tree Swallows and other cavity nesters can benefit from the provision of nest boxes, and building them can be a fun family activity.

Many of our bird populations are doing better than they were 50 years ago, but some are still in trouble. All of us can help get them on the right trajectory.

Figure 13. **Two striking forest birds that have exhibited huge population growth across the Kawartha Lakes region in recent decades: a) Red-headed Woodpecker and b) Red-bellied Woodpecker.** ***Photo credits: D.A. Sutherland (a) and W.I. Dunlop (b).***

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Lake Water Temperature Monitoring: 2024 Summary and Seasonal Patterns

Brett Tregunno, Director
Kawartha Lake Stewards Association

In 2024, we added 100,000 new water temperature data points (an increase of 60%) to our 'Kawartha Lakes water temperature almanac' thanks to our partnerships with 29 waterfront volunteers and Kawartha Conservation.

Our database on lake surface waters now includes temperatures at 37 locations (32 'nearshore' summer dock sites, and 5 'offshore' year-round buoy sites) across 15 waterbodies recorded between 2020 to 2024 (Figure 1 and Figure 2).

One benefit of having a comprehensive database is the ability to examine general patterns in water temperature across seasons, and even on a monthly basis. It is important to understand how our lakes change throughout these periods so we can better understand (and detect) impacts associated with climate change.

Our almanac dataset shows seasonal and monthly water temperatures fluctuate on average by 11.4°C and 4.2°C, respectively, throughout the year (Figure 3). Spring and fall exhibit the greatest difference in temperature ranges. From March to May, average temperatures change by as much as 18.1°C, and from September to November by as much as 20°C. During these periods our lake changes dramatically: fish and birds are migrating, plants are growing or dying,

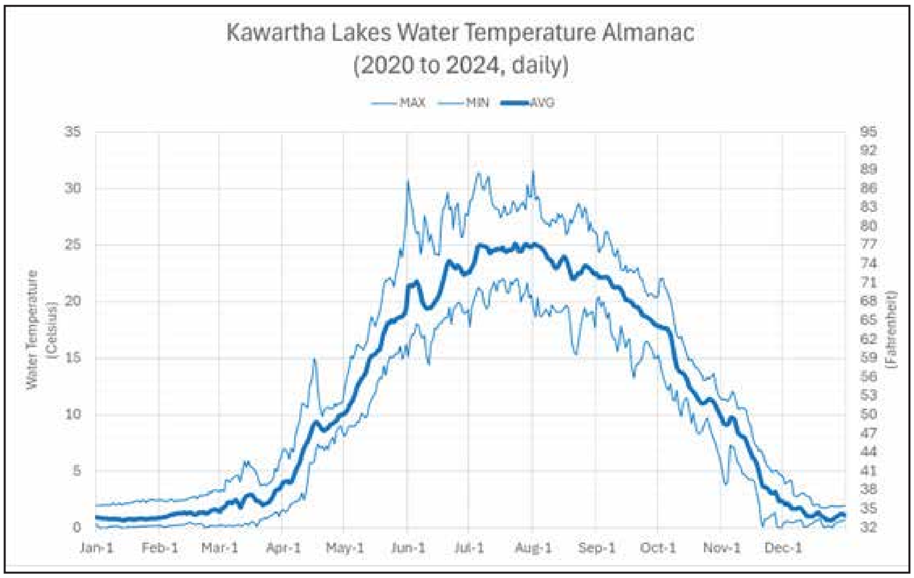

Figure 1. **Kawartha Lakes water temperature 'almanac' graph, updated with 2024 data.**

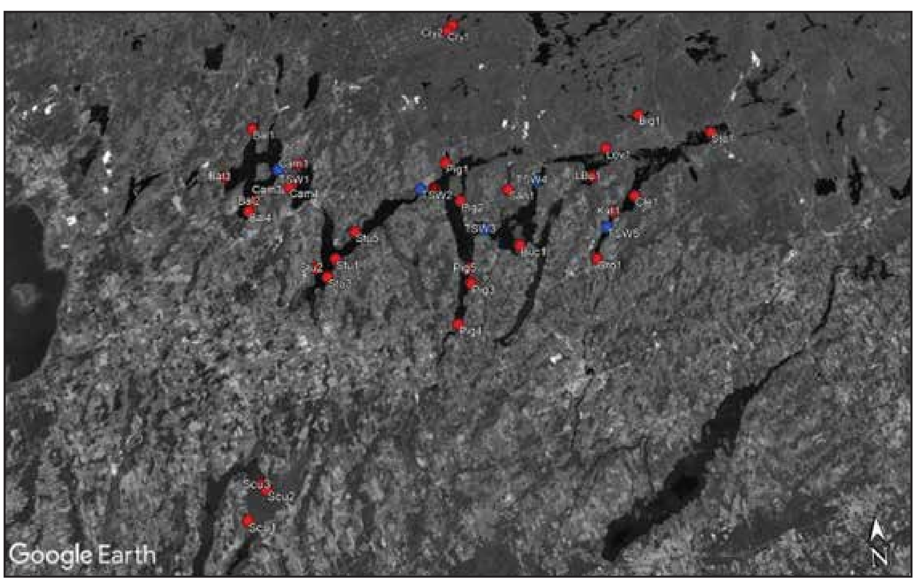

Figure 2. **Map of water temperature sampling locations. Red dots are nearshore (summer) sites, blue dots are offshore (year-round) sites.**

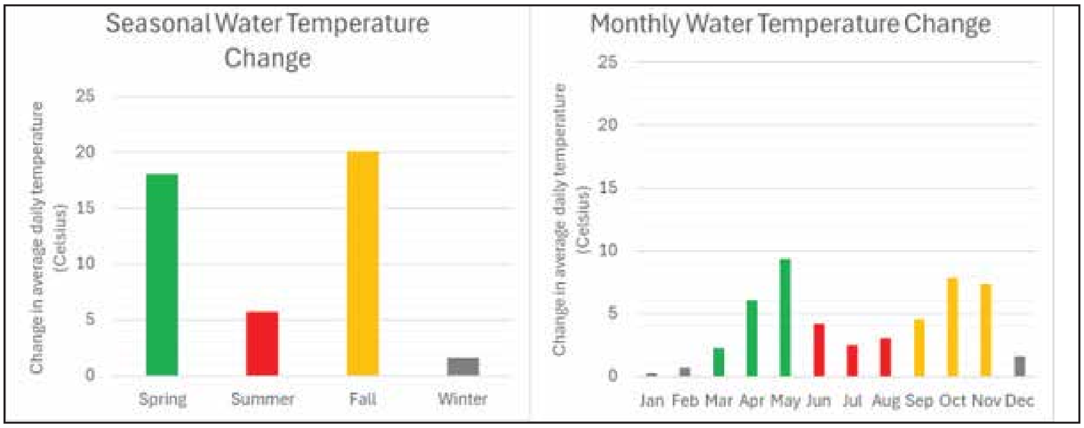

Figure 3. **Changes in average daily temperatures over a seasonal and monthly period.**

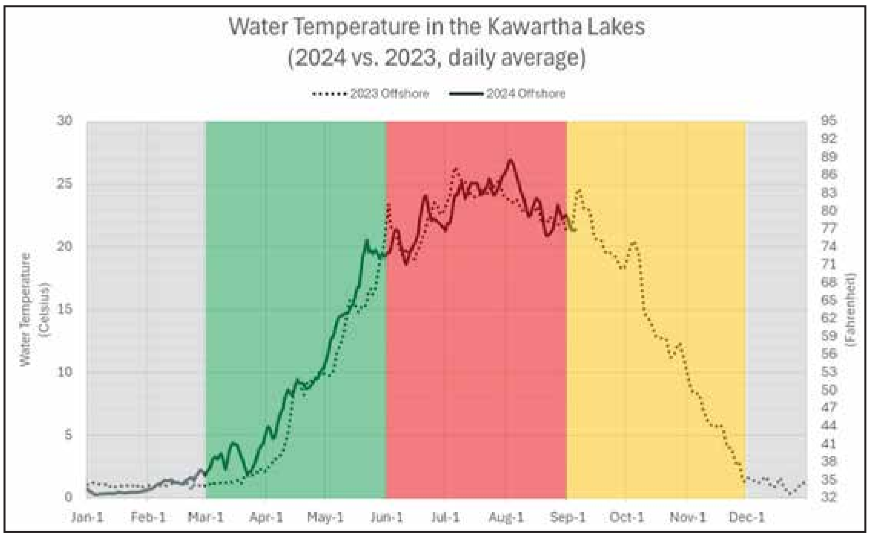

Figure 4. **Daily average water temperatures for 2024 (solid line) and 2023 (dotted line) from five offshore sites. Colours represent seasons.**

and cottagers are coming or going. Summer and especially winter are relatively stable periods, with average temperatures fluctuating by only 5.7ºC, and 1.6ºC, respectively.

Spring 2024 (i.e., March, April, May) water temperatures were consistently higher than in 2023, as indicated by average water temperatures from our five year-round offshore sites (Figure 4). By mid-March and up until mid-May, water temperatures were up to 3 to 5ºC higher than the previous year. The lack of significant ice cover on the lakes in winter 2024 (specifically February and March) likely played a role here. Lake ice and snow cover insulates lake water from the sun, and combined with a prolonged period of ice 'break-up' helps keep the waters cool typically until April.

Summer 2024 (i.e., June, July, August) water temperatures were generally the same or slightly cooler than in 2023. When comparing data between fifteen sampling sites that had complete summer datasets, there were 0.4 fewer days with temperatures greater than 25ºC, maximum temperatures were 0.3ºC lower, and no difference in average temperatures. 2024 summer water temperature results are shown in Appendix G.

There are no data available yet for Fall 2024 or late-winter 2024, because we retrieve our offshore dataloggers in September every year.

We look forward to sharing late 2024 and 2025 water temperature results in next year's KLSA Annual Lake Water Quality Report.

2024 Kawartha Lakes Dissolved Oxygen Monitoring Results

Abdulhaq Olaniyan, BSA Student
Trent University

The Kawartha Lake Stewards Association (KLSA) has continued its work to bring light to the impacts of global warming and how it can affect our lakes. With the help of some dedicated volunteers from the community, they continue to track water temperatures and dissolved oxygen concentrations across our lakes. This is especially important work as lakes in the Great Lakes region are warming substantially faster than the global average[1].

Climate change could have profound and broad effects on lake water quality as the result of increased air temperature. As air temperatures rise globally, so will lake surface temperatures. Water temperature controls several factors that can influence dissolved oxygen. Warmer waters have relatively lower oxygen solubility than cold waters, which can reduce the total amount of oxygen. Warm water is also less dense than cold water. Typically, this results in the layering (or 'thermal stratification') of the water column such that cold water lies closer to the lakebed and warm water remains close to the surface.

Stratification prevents nutrients from the lakebed from reaching the surface and oxygen from the surface from reaching deep waters; long periods of stratification can worsen internal nutrient loading and lead to deep water oxygen depletion.

In 2024, volunteers collected water temperature and dissolved oxygen data at the deepest sections of 13 lakes, every one meter from top to bottom, between August 13th and September 4th. The lakes are sampled once each, in late summer, with a water quality probe (Figure 1). This is considered an appropriate time to capture a reasonable 'snapshot' of lake stratification and low oxygen conditions.

Figure 1. **KLSA's water quality probe used to record water temperature and dissolved oxygen.**

Since KLSA started sampling in 2020 the lakes follow a general pattern: in most years the majority of lakes with deep basins tend to be stratified around this late summer period, and they have low oxygen levels near the bottom. But last year was different (Figure 2): most lakes we sampled were well-mixed by late summer. Water temperatures were not much different between surface and bottom (except for Big Cedar, Clear, and Upper Stony), and dissolved oxygen was generally acceptable (with the same exceptions of Big Cedar, Clear, Upper Stony, but also Balsam, and Lower Stony).

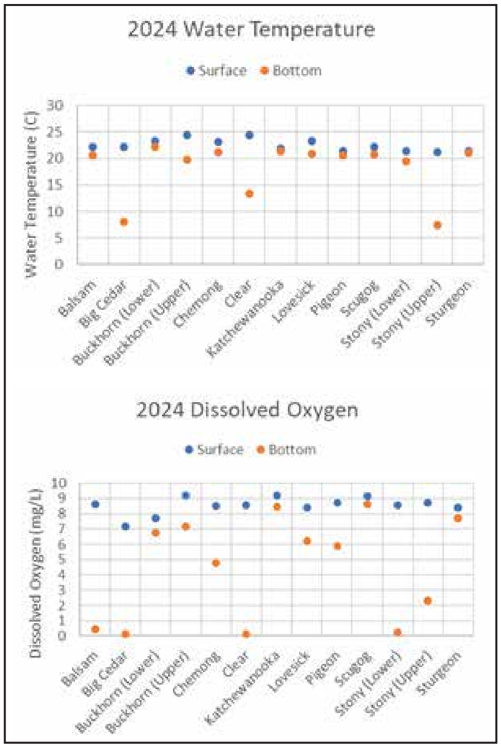

Figure 2. **2024 water temperature and dissolved oxygen values, recorded during late summer, at the surface and bottom waters in the deepest basin of each lake.**

Some working hypotheses regarding why, include:

- The time of year sampled: it is probable that most lakes did in fact experience stratification, but it happened earlier in the season (e.g., in June and July), and became mixed by the time

[1] Numerous scientific papers speak to this, but here is a favourite: Rapid and highly variable warming of lake surface waters around the globe (O'Reilly et al., 2015).

they were sampled in mid-August.

• Higher than normal summer rainfall amounts: last year received record rainfall, which led to higher-than-normal water flows and therefore elevated water mixing potential, especially for lakes that are on the 'main flow path' of the Trent-Severn Waterway.

• Each lake's natural susceptibility to mixing: small volume or shallow lakes on the main flow path such as Sturgeon and Buckhorn may naturally be 'weakly' stratified, meaning they are less stable and it doesn't take much external influence (e.g., increased flows, wind, temperature change, etc.) to cause them to mix. In contrast, the deeper lakes off the main flow path, for example Big Cedar and Upper Stony are naturally 'strongly' stratified, more stable, and therefore more resistant to mixing. Groundwater inputs may also play an important role.

It is not well understood why conditions were different last year than in previous years. But for whatever reason, most of the Kawartha Lakes in 2024 weren't stratified for as long as have been observed in recent years. Ultimately, this meant that oxygen conditions for most lakes were not depleted as in previous years during the late summer period.

Given the variability in conditions from year to year, and that dissolved oxygen and water temperatures are important indicators of climate change, KLSA volunteers should continue to track conditions and help fill knowledge gaps wherever possible.

Thank you to Brigitte Simmatis, Ministry of Environment, Conservation and Parks, and Brett Tregunno, KLSA Director, for providing advice on this article.

Community Science in the Kawartha Lakes - 2024 Results

Nathan Rajevski, Assistant Watershed Resource Technician, *Kawartha Conservation*

Introduction

Since the creation of our first nearshore monitoring program in 2019, Kawartha Conservation has been actively assessing lake health in the shallow areas near shore to help identify potential environmental issues caused by human activity. In 2024, the program was expanded and rebranded as the *Community Science Program*.

The program strives to enhance residents' understanding of their lakes and the essential role everyone plays in safeguarding their waters by involving them in meaningful, science-based activities. In 2024, the targeted lakes were Balsam Lake, Cameron Lake, Sturgeon Lake, and Pigeon Lake. Figure 1 illustrates the study area for the program and the locations where samples were taken by volunteers.

Volunteers were tasked with collecting monthly water samples from May to September at designated nearshore locations. Samples were stored in a cooler and sent to an accredited lab for detailed water quality testing, analysing phosphorus, nitrates, chloride and *Escherichia coli* (*E. coli*). Volunteers also recorded water temperature and conductivity measurements with a water quality probe.

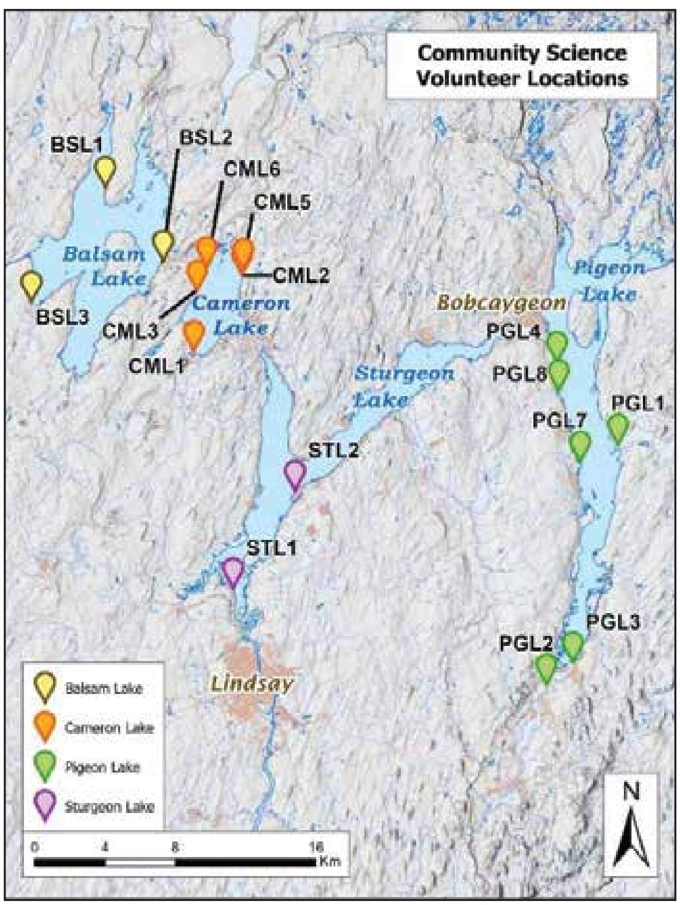

Figure 1. Study area and sample locations

2024 Data results

Our results were based on 66 nearshore water quality samples collected by volunteers across the four different lakes. The lab analysis of these water quality samples were compared to Provincial Water Quality Objectives (PWQO) and Canadian Water Quality Guidelines for Aquatic Life to better understand the health of nearshore water quality. This data can help address emerging issues affecting water quality and provides background on how to manage these issues through conservation efforts.

Monitoring phosphorus in the nearshore areas of lakes is important as these regions are highly sensitive to large nutrient inputs. Figure 2 provides an outline of the average levels of phosphorus for Cameron Lake and Balsam Lake, indicating average phosphorus levels were slightly above the Provincial Water Quality Objectives of 0.01 mg/L.

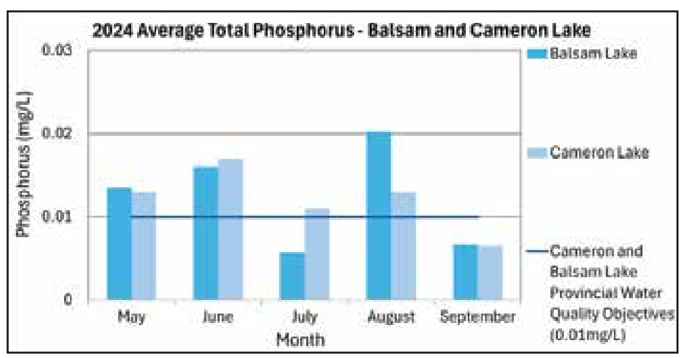

Figure 2. Average Total Phosphorus for Balsam Lake and Cameron Lake, 2024

Figure 3 outlines Sturgeon Lake and Pigeon Lake's phosphorus levels and indicates sample averages from Sturgeon Lake were above the Provincial Water Quality Objectives of 0.02 mg/L. These values are not overly high; however, they do indicate that phosphorus input could be a contributor to increased aquatic plant growth within these lakes.

Assessing nitrate levels is vital, as higher levels of nitrates can impact aquatic life within nearshore areas. Figure 4 showcases the average nitrate levels in all four lakes. Nitrate levels were consistently below the long-term exposure limit of 3.0 mg/L outlined in the Canadian Water Quality Guidelines for Aquatic Life, indicating nearshore areas aren't over-exposed during summer months.

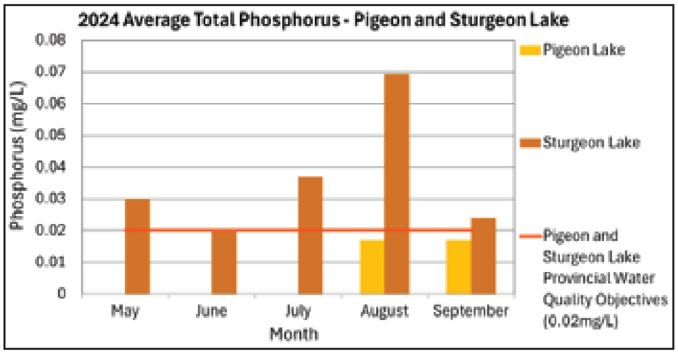

Figure 3. Average Total Phosphorus Pigeon Lake and Sturgeon Lake, 2024

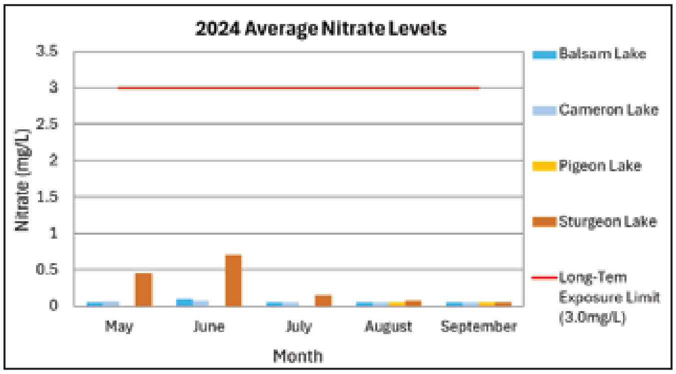

Figure 4. Average Nitrate Levels, 2024

Evaluating chloride concentrations is critical to understanding how dissolved salts can impact water quality within our lakes. Elevated chloride levels can disrupt aquatic species such as fish, amphibians and aquatic insects. Figure 5 outlines average chloride levels, indicating all four lakes were below the long-term exposure limit of 120 mg/l specified in the Canadian Water Quality Guidelines for Aquatic Life. Sturgeon Lake and Pigeon Lake results did show slightly higher chloride levels, likely due to the larger amount of runoff entering the lake from urban (including road salt) and agricultural sources in winter.

Monitoring *Escherichia coli* (*E. coli*) levels provides valuable insight into the potential contamination of the nearshore environment. Figure 6 illustrates the average *E. coli* levels present in all four lakes. None

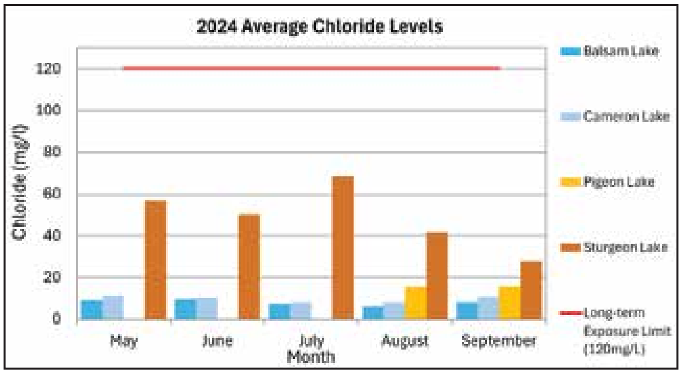

Figure 5. Average Chloride Levels, 2024

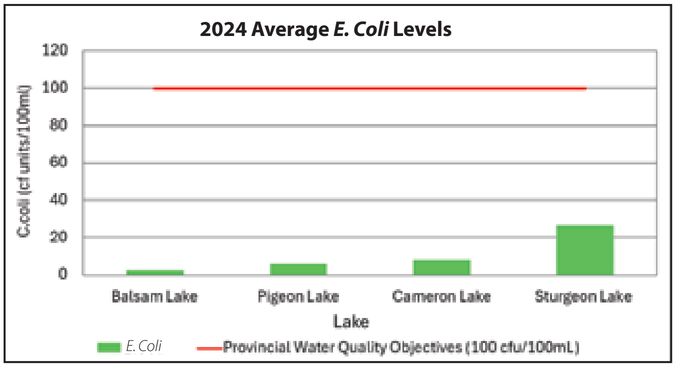

Figure 6. Average *E. Coli* Levels, 2024

of the samples exceeded the Provincial Water Quality Objectives of 100 CFU/100 ml, indicating no significant inputs of *E. coli* were detected in the nearshore areas of these lakes.

The results from this year's sampling provide a similar insight to the nearshore study outlined in the 2022 KLSA Lake Water Quality Report article, "Shoreline Studies: What is driving nearshore aquatic communities in the Kawartha Lakes?" by Erin Smith, a PhD from Ontario Tech University, which highlighted similar results for nutrient inputs into our lakes. Balsam and Cameron Lake showed to have a lower nutrient input, whereas Sturgeon and Pigeon Lake indicated slightly higher amounts of nutrients and higher conductivity measurements, likely due to the surrounding land uses. This trend has stayed consistent and showcases the differences in these groups of lakes. Table 1 highlights some of the conductivity and water temperature data recorded by volunteers throughout the summer months.

What can we do?

Reducing phosphorus and nitrate runoff into lakes

Community Science in the Kawartha Lakes ... cont'd.

can be achieved by limiting fertilizer use on waterfront lawns and properties. Minimizing road salt on sidewalks and driveways helps lower chloride levels in our lakes. Regular inspection, maintenance, and upgrades of failing septic systems near shorelines prevent *E. coli* from leaching into the water. Planting native species along shorelines is also highly effective at reducing nutrient inputs into our lakes, as they act as natural buffers, absorbing these chemicals before they reach the water.

Future of Community Science

The Community Science program achieved great success in 2024. As the program continues to evolve, we aim to continue monitoring at the sites we have established while also expanding our coverage of these lakes to work with other members of our community.

We would like to thank all our program volunteers for contributing in 2024, along with our partners who helped fund this program. Without their help, this would not be possible. If you are interested in participating in the Community Science Program, please contact Kawartha Conservation for more information.

Lake	Average Conductivity	Average Water Temperature	Max Water Temperature	Total Number of Samples
Balsam Lake	160 µs/cm	21.9°C	26.2°C	18
Cameron Lake	150 µs/cm	21.2°C	23.4°C	17
Sturgeon Lake	600 µs/cm	21°C	22.1°C	11
Pigeon Lake	400 µs/cm	21.5°C	24°C	20

Table 1. **Conductivity and Water Temperature.**

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Aerial view of Crystal Lake. *Photo Credit: Mike Long, Crystal Lake*

Boy examining fish. *Photo Credit: Ken Simpkins, Sturgeon Lake*

Protecting Ontario's Waterways from Aquatic Invasive Species

Robert McGowan, Project Specialist, Invading Species Awareness Program (ISAP),
Ontario Federation of Anglers and Hunters (OFAH)

As recreationalists, it's essential to recognize the negative impacts of Aquatic Invasive Species (AIS) on Ontario's fisheries, ecosystems, and recreational opportunities. Species like spiny waterfleas can drastically alter available plankton that supports juvenile fish species, while the invasive aquatic plant, Eurasian water-milfoil, can create large floating mats that impede boating and paddling. Zebra mussels, on the other hand, severely impact walleye populations as they remove beneficial particles and plankton from the water column, negatively affecting spawning and feeding opportunities for this popular light-sensitive game fish. To combat this issue, the Ontario government has implemented legislation requiring boaters to take precautions to prevent the spread of AIS.

As anglers and boaters, we need to be aware that AIS, some of which can be microscopic, discrete and hitch rides on boats, trailers, kayaks, or other watercraft equipment, making the boater pathway the number one vector of spread for AIS. Even during seasons with cool water, such as fall, winter, and spring, there is still a high risk of transmission of aquatic invasive species like zebra mussels or spiny waterfleas, as they can still hitch a ride or even find themselves in your bait buckets.

That is why in January of 2022, legislation was passed by the Ontario government that requires anyone moving watercraft or watercraft equipment overland to take reasonable precautions to ensure that they are free of all aquatic plants, animals, and algae before they exit or enter a new waterbody. These amendments to the Invasive Species Act, 2015, make it a legal requirement for boaters to perform the first two steps of "Clean, Drain, Dry."

It's the Law to:

- ✓ **CLEAN** any plants, animals, or algae from your watercraft, trailer, and equipment.
- ✓ **DRAIN** by removing drain plugs (e.g. transom, bilge, motor, live-well, ballast) to allow water to drain from the watercraft.

Go above and beyond:

- ✓ **DRY** the watercraft and gear completely between trips and allow wet areas to air dry.
- ✓ Consider **CLEANING** with hot and/or pressurized water.

Clean, Drain, Dry does not take long and can be as simple as a quick walk around inspection of your watercraft while securing it for transport. By ensuring that the watercraft is free of AIS, we can ensure healthy aquatic ecosystems for all to enjoy.

In 2022, the Ontario government also enacted Bait Management Zones (BMZs) to help prevent the spread of aquatic invasive species and diseases like Viral Hemorrhagic Septicemia (VHS). Be sure to refer to Ontario's Fishing Regulations so that you understand which BMZ you will be fishing in and the rules that apply to it. Generally, a good rule of thumb is that you should never transport live baitfish into a different BMZ from where it was purchased and always keep your receipt from the retailer that you purchased the bait from.

For example, if you are a resident of Peterborough, which is in Fisheries Management zone (FMZ)17 and part of the Southern BMZ, and planning a trip to Sudbury, which is in FMZ 10 and part of the Northeastern BMZ, you must purchase your live bait somewhere in the Northeastern BMZ and retain your receipt. Alternatively, if you are fishing within your home BMZ, in this example, the Southern BMZ in FMZ 17, you would be permitted to capture and use your own baitfish, thus not needing a receipt to accompany your bait.

Remember to never dump your bait, no matter the time of year. It is also illegal to dump your bait onto the ice or within 30 m of a water body. When you are finished with your live bait, properly dispose of it at least 30 m away from shore.

How you can help:

Help us install signage in your area! If you'd like to receive a Clean, Drain, Dry sign from us FREE of charge, contact robert_mcgowan@ofah.org.

Think you've seen an invasive species? Snap a photo, note your location, and report it to the Invading Species Hotline at 1-800-563-7711 or report online at www.EDDMapS.org.

To learn more about Ontario's boater pathway regulations and other changes to the Invasive Species Act, 2015, visit https://www.ontario.ca/page/invasive-species-ontario

Together, we can protect Ontario's waterways and preserve the province's natural beauty for future generations.

Dock and chairs at sunset. *Photo Credit: Mike and Glenda Hooper, Big Cedar Lake*

Trent-Severn Aquatic Plant Experimental Removal (TAPER) Project: Investigating the Impacts of Aquatic Thrusters, Lake Rakes and Weedsickles on Aquatic Vegetation

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Alana Tyner, Ph.D. candidate,
Ontario Tech University, Oshawa

The shorelines of the Kawartha Lakes are home to thousands of properties, offering residents direct access to the water. However, some of these lakes experience excessive macrophyte (aquatic plant and macroalgae) growth. This growth can hinder residents' ability to fully enjoy their shorelines, interfering with activities such as boating, swimming, and fishing. As a result, some residents wish to control the growth by removing some or all of the macrophytes.

Currently there is limited research on the effects macrophyte removal has on the health of the lake and the effectiveness of different macrophyte removal methods. To address this gap, the Kirkwood Lab at Ontario Tech University conducted the TAPER project (Trent-Severn Aquatic Plant Experimental Removal) during the summer of 2023. This project which was done in collaboration with Toronto Metropolitan University, Carleton University, University of Ottawa, the Kawartha Lake Stewards Association, Kawartha Conservation, and Parks Canada, aimed to investigate the effects of macrophyte removal.

This experiment took place across Lake Scugog and Canal Lake, selected for their abundant near-shore macrophyte growth. Twelve study sites were established on each lake (Figure 1). A Before-After Control-Impact (BACI) study design was used to assess the sites before and after plant removal, to evaluate the impacts on macrophyte growth (Figure 2). The treatment methods investigated included the aquatic thruster, lake rake, and weedsickle. Aquatic thrusters use a powerful motor to create a current that blows the plants out of the area. Lake rakes work by dragging a heavy, metal rake through the sediment to remove plants, similar to raking leaves. Weedsickles function by slicing the plants near where they grow from the sediment, similar to mowing grass. All treatments were applied in early August. At the reference sites, macrophyte cover in Lake Scugog showed minimal change before and after the treatment date, while Canal Lake exhibited an increase in macrophyte cover. These trends confirm that the treatments were conducted during the peak period of macrophyte growth.

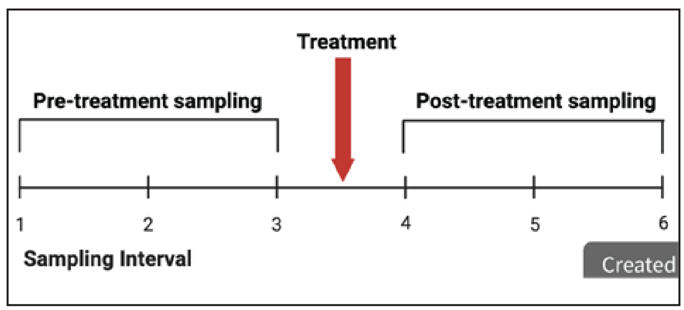


Figure 2. Before-After Control-Impact study design, showing multiple sampling sessions both before and after treatment.

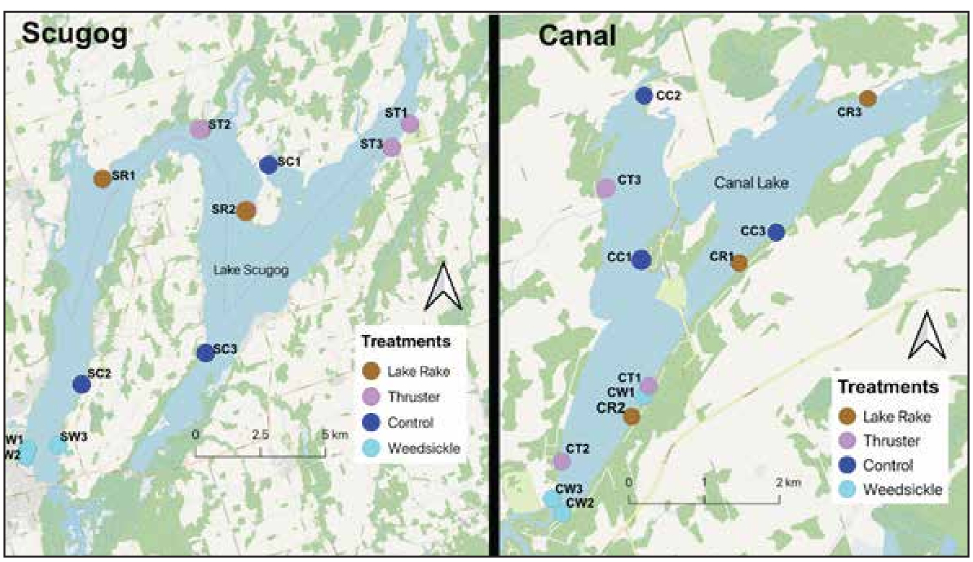
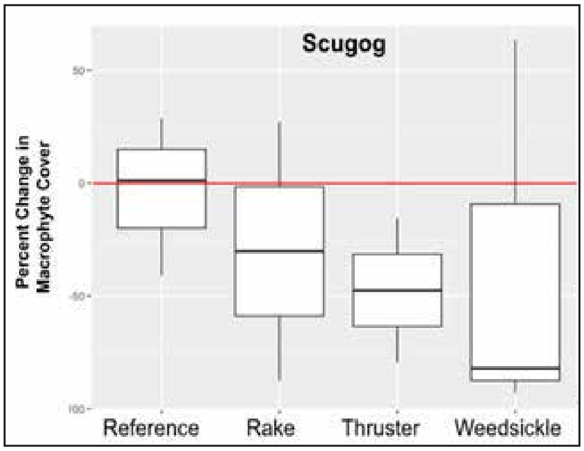


Figure 1. Maps of 2023 sampling sites at Lake Scugog (left) and Canal Lake (right).

In Canal Lake, macrophyte cover at rake treatment sites significantly declined (Figure 3), although species richness (the number of species) remained stable. In contrast, no significant changes were detected in macrophyte cover or species richness in Lake Scugog after raking. While a reduction in macrophyte cover was observed, the cover was low at the time of treatment which may explain why no significant changes were detected. In Canal Lake, rake sites were initially dominated by *Chara* spp. (muskgrass), a rootless macroalgae. After treatment, rooted macrophytes, like *Vallisneria americana* (eelgrass), became more prevalent, suggesting that rooted macrophytes may be more resistant to the rake treatment. This reasoning may also explain why no significant changes were detected in cover in Lake Scugog, as one of the two rake sites in Lake Scugog (SR2) was dominated by rooted macrophytes, such as *Myriophyllum spicatum* (Eurasian watermilfoil) and eelgrass at the time of treatment.

In Canal Lake, plant cover recovered rapidly following weedsickle treatment, with overall percent change stabilizing near zero (Figure 3). Species richness showed no significant changes. In contrast, while no significant changes in cover were observed in Lake Scugog, species richness was significantly reduced and remained low throughout the study. At the time of treatment, the weedsickle sites in both lakes were dominated by Eurasian watermilfoil, a fast growing invasive aquatic plant. However, at the end of the study in September, native macrophytes were dominant. Eurasian watermilfoil generally peaks earlier in the season, with a second peak in August. It may have already subsided by September when macrophytes were physically removed and assessed in the laboratory. Greater proportions of rootless macrophytes like muskgrass and *Ceratophyllum demersum* (coontail) were present in Canal Lake at the end of the study. It is possible that rootless macrophytes can more readily populate an area after a disturbance when compared to rooted macrophytes. This finding is noteworthy, as waterfront property owners often use weedsickles to reduce vegetation cover. However, this method may inadvertently decrease species richness without substantially reducing overall plant cover. High macrophyte species richness is crucial for enhancing habitat complexity which can sustain a wide array of organisms, providing resistance against invasive species, and improving ecosystem functioning.

At the thruster treatment sites in Canal Lake, which were initially dominated by rootless muskgrass, macrophyte cover significantly declined (Figure 3), accompanied by a notable decrease in species richness. By the end of the sampling period, mostly rooted macrophytes such as *eelsgrass* and *Heteranthera dubia* (water star-grass) remained. Thruster sites in Lake Scugog showed no significant decreases in macrophyte cover (Figure 3). One site (ST3) had no macrophytes before treatment, while another (ST2) was dominated by *Nymphaea odorata* (fragrant white waterlily). Fragrant white waterlily is known to slow water currents in rivers, which may make it more resistant to strong currents compared to other macrophytes, such as muskgrass.



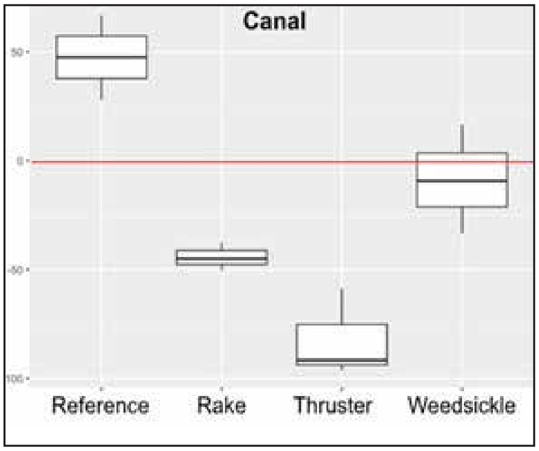


Figure 3. Overall percent change in macrophyte cover for each treatment group. Lake Scugog is above and Canal Lake is below. The red line denotes 0% change. Overall percent change was calculated for each treatment group by subtracting the average cover of the before group from the after group, dividing by the average cover of the before group, and multiplying by 100.

Another key finding with aquatic thrusters was their ability to reshape the lake's benthic region (the bottom of the lake). In Canal Lake, thrusters were able to remove sediment almost completely from their surrounding area resulting in deeper water near the shoreline (Figure 4). As noted earlier, the thrusters were more effective in Canal Lake by significantly reducing macrophyte cover and richness. This

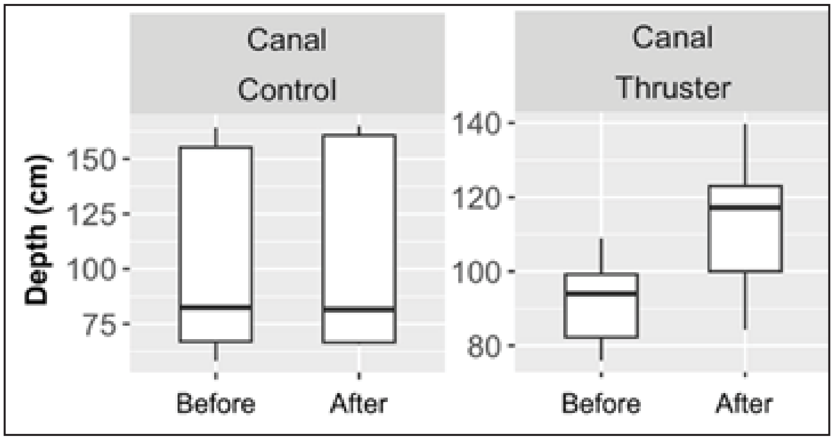


Figure 4 **a. (above) Depth before and after the treatment day for the control and thruster sites in Canal Lake. The depth increased at the thruster sites but remained the same at the reference sites. During each sampling interval, depth was measured four times at each site: at 0 m, 2m, 4 m and 6 m from the end of the dock (thruster) or alongside the dock (control). *4 b. (right)* Berm which developed due to displaced sediment induced by the thruster.**

displaced sediment formed an underwater berm in a semi circle shape around the edges of the excavated area (Figure 4). Altering the benthic region can be detrimental to benthic communities, including invertebrates, insects, and fish species. When the aquatic thruster displaces sediment, this can lead to increased turbidity from sediment resuspension and the release of nutrients and chemicals trapped in the sediment, which can exacerbate water quality issues. Additionally, altering the benthic region can disrupt the habitat of these organisms, potentially causing physical harm and displacing them. This is a significant drawback of using the aquatic thruster.

In summary, no significant reductions in macrophyte cover were observed in Lake Scugog after treatment using any removal method. However, a significant decrease in species richness was observed following the weedsickle treatment. In Canal Lake, significant decreases in macrophyte cover were observed for the thruster and rake groups, but not for the weedsickle group. Only the thruster treatment resulted in significantly lower species richness. Of the three treatments, the rake was the least impactful on species richness but still effective at reducing macrophyte cover, the weedsickle was least effective at removing macrophytes, and the thruster was the most disruptive to the benthic zone.

Great Blue Heron. *Photo Credit: Isabel Brockley, Lower Buckhorn*

Ongoing KLSA Initiatives to Restore Our Shorelines: The Natural Edge Program and the Love Your Lake Program

Kimberly Ong, Director
Kawartha Lake Stewards Association

The Importance of Healthy Shorelines

Shorelines are the critical link between land and water, playing an essential role in maintaining the health of our lakes, ecosystems, and communities. Healthy, natural shorelines help prevent erosion, filter pollutants, provide habitat for wildlife, and contribute to the scenic beauty of our waterways. They also help deter geese from settling on properties, and significantly reduce the need for lawn maintenance! However, many shorelines have been degraded due to human activity, leading to increased erosion, water pollution, and habitat loss.

Recognizing the importance of shoreline conservation, the Kawartha Lake Stewards Association (KLSA) is actively involved in two key programs aimed at protecting and restoring our shorelines: The Natural Edge Program and the Love Your Lake Program. These initiatives offer practical, science-based solutions to help property owners contribute to a healthier, more sustainable future for our lakes.

The Love Your Lake Program - Evaluating and Protecting Our Shorelines

The Love Your Lake program, a partnership between Watersheds Canada and the Canadian Wildlife Federation, is a shoreline evaluation program designed to help lakefront property owners take proactive steps toward improving the health of their lakes. By creating and maintaining healthier shorelines, property owners play a key role in preserving water quality, supporting local wildlife, and ensuring the long-term sustainability of our lakes.

This innovative program provides personalized assessments of the health of shorelines, along with science-based recommendations to enhance natural shoreline features, reduce environmental impact, and keep lakes clean for generations to come—all for free!

In 2024, KLSA launched the Love Your Lake program on Clear Lake as a pilot initiative, made possible by two dedicated interns, Noelle Deane and Angelina Gordon. In the summer of 2024, they ventured out onto the water—sometimes by canoe and other times with the support of generous volunteers who provided boat transportation—to conduct 256 shoreline assessments. Their dedication and hard work laid the foundation for this valuable program, helping property owners better understand the health of their shorelines and how to improve them.

Given the success of this pilot year, KLSA aims to bring back the program on another Kawartha Lake in 2027 to assess more lakes in the region and continue supporting shoreline conservation.

Angelina and Noelle spent much of their summer surveying the Clear Lake shoreline by canoe. *Photo credit: Jeffrey Chalmers*

Training was provided by the Canadian Wildlife Federation and Watersheds Canada

How the Love Your Lake Program Works

1. Receive Program Information: Property owners on Clear Lake received details about the program and were asked to complete a Values Survey to share their shoreline goals and priorities.

2. Shoreline Assessment: Trained KLSA interns, Noelle and Angelina, conducted shoreline assessments by boat, evaluating key factors such as:

   • Vegetation Health: The presence and condition of natural plant life.

   • Erosion Risk: Areas vulnerable to soil loss and shoreline instability.

• Water Quality: Signs of pollutants or runoff affecting the lake.

• Habitat Conditions: The suitability of the shoreline for local wildlife.

3. Personalized Recommendations: In April 2025, Clear Lake property owners will receive a unique survey code to access their personalized shoreline report online. They can choose:

• A free electronic PDF report

• A printed hardcopy for $20.00 (including taxes and shipping)

The report will include tailored recommendations such as:

• Planting native vegetation to stabilize the shoreline and prevent erosion.

• Implementing erosion control measures to protect against soil loss.

• Enhancing wildlife habitats to support biodiversity.

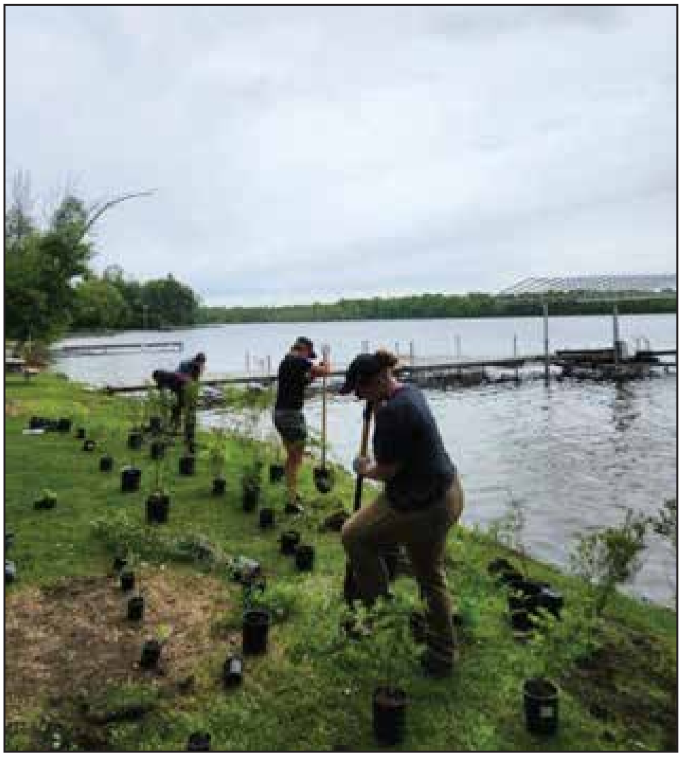
• Reducing runoff to help maintain water quality.

Clear Lake Landowners: Your shoreline property reports will be ready in April 2025. You will receive a survey code via mail to your permanent address. You can access your report at myreport.loveyourlake.ca or request your code by contacting info@loveyourlake.ca.

The Love Your Lake program is only possible with boating volunteers like Patty Macdonald! *Photo Credit: Patty Macdonald*

The Natural Edge Program - Re-Naturalizing Shorelines

The Natural Edge program had another successful year in 2024, continuing its mission to restore and protect shorelines in the Kawartha Lakes region. With the help of dedicated volunteers and generous funding, the program restored eight additional shorelines in the Kawartha Lakes area, bringing the total to 37 sites covering 5230 m^2 of shoreline, and 2800 native shrubs, trees, and flowers planted!



Planting a buffer at the edge of your shoreline can help prevent erosion

How the Natural Edge Program Works

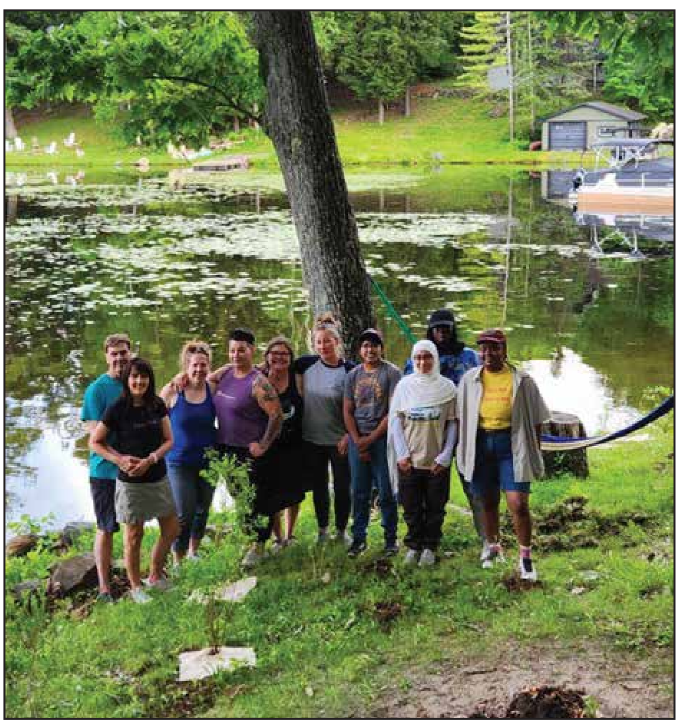
The Natural Edge program is open to all waterfront property owners in the Kawartha Lakes region. The process is simple and effective:

1. Site Visit & Consultation: An expert visits the property to assess shoreline conditions and discuss restoration goals.

2. Customized Planting Plan: Using Watershed Canada's specially developed app, a detailed restoration plan is created, including photos, plant species, and descriptions of the land characteristics.

Ongoing KLSA Initiatives to Restore ... cont'd.

The KLSA Natural Edge program covers all the Kawartha Lakes!



Need volunteers to help you plant? We have the best volunteers who are eager to come help!

3. Plant & Material Ordering: The program provides all necessary materials, including native plants, soil, mulch, planting mats, and tree guards.
4. Plant Delivery & Installation Support: Volunteers help deliver plants to the property, and assistance with planting is available upon request.

Need to add some plant diversity to your shoreline? We can help plant some native wildflowers to add some colour!

The typical cost to property owners is $250, which helps offset the expense of the plants and materials. It generally takes about three years for the plants to fully establish and for the shoreline to transform into a thriving, self-sustaining ecosystem.

Get Involved in the Love Your Lake or Natural Edge programs

Interested in bringing Love Your Lake to your community? Partner with KLSA today!

If you're a waterfront property owner interested in restoring your shoreline as part of the Natural Edge program, or if you'd like to volunteer to help with planting, we'd love to hear from you!

For more information, contact: klsa@klsa.info.

Looking Forward: Continuing the Programs

With growing interest in shoreline restoration, KLSA continues to seek funding to progress the programs in the coming years. The 2024 season was possible thanks to the ongoing support of Watersheds Canada and contributions from the Daniel and Susan Gottlieb Foundation, the RBC Foundation's 'RBC Tech for Nature Fund,' and the Environment Council. The success of the program is also driven by the hard work of community volunteers and students, who have all played an essential role in making shoreline restoration a reality. Support from EcoAction (Environment and Climate Change Canada) contributed to advancing environmental initiatives, ensuring the longevity of shoreline restoration efforts and the continuation of both The Natural Edge and Love Your Lake. Without these sponsors and funders, these shoreline programs would not be able to deliver their impactful conservation work.

Together, we can create healthier shorelines, cleaner waters, and a more sustainable environment for future generations.

Second year shore naturalization. *Photo Credit: Pam Dickey, Big Bald Lake*

Paddling to Protect Nature: How a Community-supported Campaign Protected Vital Natural Shoreline on Ston(e)y Lake

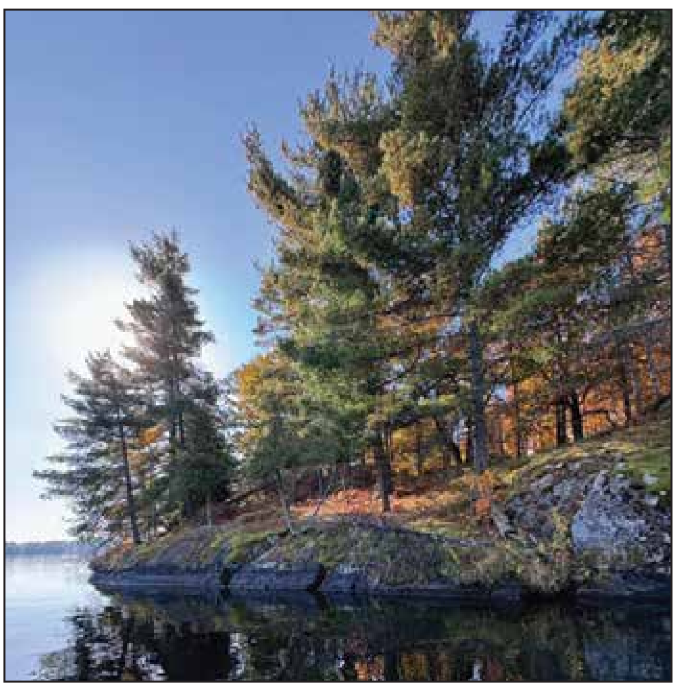
Dani Couture, Communications Manager
Kawartha Land Trust (KLT)

A volunteer-led and community-supported effort to protect an extension to KLT's Jeffrey-Cowan Forest Preserve on Ston(e)y Lake turned into an end-of-summer success.

The care of Kawartha Land Trust's (KLT) protected lands takes a great deal of planning, time, care, and consideration. During the long winter months when much of the natural world in the Kawarthas is blanketed in snow and ice and in a state of hibernation or brumation, the work continues in our office — at computers and through a multitude of data, reports and maps.

During the coldest months of the year, KLT's Land Stewardship Manager, Hayden Wilson, works on stewardship plans for each protected property, plans special projects, and places orders to support the flurry of fieldwork in the spring, summer, and early fall.

The protection of new lands can take even more time, sometimes years — with each potential new nature reserve having its own unique set of opportunities and challenges. Protecting the natural and working lands of the Kawarthas for future generations is a long-game effort. It takes patience, diligence, and often bold leaps of faith supported by our volunteers, donors, and funders.



Eastern White Pine trees on Kawartha Land Trust's Jeffrey-Cowan Forest Preserve Extension reflecting in the calm waters of Ston(e)y Lake. *Photo Credit: Tina Warren*

Every once in a while, an opportunity to protect nature requires immediate action. A property is put up on the market. A 'for sale' sign goes up along the roadside. The property has beautiful forests, is rich with wildlife, and has a natural feature that is becoming increasingly rare in our region — natural shoreline.

This exact scenario happened in 2024 when a group of concerned citizens on Ston(e)y Lake approached KLT about a conservation project to protect 10.5 acres of forest and 200 metres of natural shoreline on their beloved lake — a property contiguous with KLT's Jeffrey-Cowan Forest Preserve (est. 2018).

Over the span of several short months, these concerned citizens, turned into an impressive volunteer fundraising team (and donors themselves) paddling Ston(e)y's waters to spread the word about the project and secure pledges to protect the property, which would come to be known as KLT's Jeffrey-Cowan Forest Preserve Extension.

Over 300 individuals and families contributed to this conservation project. The volunteers and donors succeeded in protecting connected forest habitat and natural shoreline that contributes to the health of the lake and also benefits local wildlife.

Natural shoreline is one of the most characteristic and at-risk features in our area, and this particular shoreline was identified as a top priority for conservation through research jointly conducted by KLT and the Environment Council for Clear, Stony and White Lakes, with the support of The Stony Lake Heritage Foundation, in 2021.

At the end of last year's successful campaign, KLT's Executive Director John Kintare noted the dedication and persistence of the volunteer fundraising team and their passion for nature made this conservation concern a conservation success.

"We offer our sincere thanks to the volunteer fundraising team — John Huycke, Wendy Pitblado, Carrie Scace, Lois Wallace and Tina Warren — and to all who pledged to protect the Jeffrey-Cowan Forest Preserve Extension. Without them, this land could have been lost."

Paddling to Protect Nature ... cont'd.

Instead, that one summer in 2024 will always be remembered as a time when the community came together to protect the nature of the lake that they cherish. It was exciting — thrilling even — and showed the possibility of community action to care for our lands and waters.

"I felt very strongly about protecting this treasure of land on Ston(e)y Lake. And now, being able to share with my wonderful children that the entire lake community came together to protect nature — a forest that is filled with amazing wildlife, as well as an astonishing piece of shoreline — is a powerful message", said Wendy Pitblado, one of the volunteer fundraisers and a donor to the project.

"It was incredibly important to me personally that we came together to protect this jewel on Ston(e)y Lake for all time, and I hope it will inspire others to protect nature."

Over the last 19 years, Kawartha Land Trust, with the support of the KLT community has protected six lakeside properties along Ston(e)y and Clear Lakes: Jeffrey-Cowan Forest Preserve (est. 2018), Jeffrey-Cowan Forest Preserve Extension (est. 2024), Christie Bentham Wetland (est. 2020 — another property protected through community action), Elliott Conservation Easement Agreement (CEA) (est. 2009), East Syndicate Island (est. 2006, first through CEA and later donated in 2018), and the Zeidler Property, which was generously donated to KLT in 2024 by Jane Zeidler.

The Zeidler Property is a small but mighty nature reserve where wildlife continues to thrive and another 125m of natural shoreline on Ston(e)y Lake has been protected. Donations of ecologically significant lands like this one are core to KLT's ability to conserve nature in the Kawarthas. Jane Zeidler's generous donation coupled with donations we receive from the community and funders allow us to care for the lands in perpetuity.

Once a property is protected, the work does not stop. KLT's stewardship team works together with dedicated volunteers on projects to make our protected lands even more resilient, including tree planting, invasive plant species removal, wildlife surveys, and much more. Caring for our lands happens over many years and with the help of many hands and hearts.

In 2026, Kawartha Land Trust will celebrate our 25th

KLT staff members and the volunteer fundraising team having a celebratory moment after the protection of the Jeffrey-Cowan Forest Preserve Extension. *Photo Credit: Dani Couture/KLT*

anniversary. The spirit that drove the founders of Kawartha Heritage Conservancy (KHC), which would become Kawartha Land Trust (KLT), still drives us today: the passionate belief that each one of us has a role in making a difference for the health of our forests, wetlands, grasslands, fields, and waters.

To learn how you can contribute to future conservation opportunities, upcoming volunteer opportunities, outdoor events, conservation successes, and much more, you can subscribe to KLT's e-newsletter at **kawarthalandtrust.org/subscribe**.

Fighting Light Pollution Helps - Indinawemaagani (All My Relatives)

Karen Shearer, Buckhorn
Eric Knott, Curve Lake First Nation
Municipality of Trent Lakes Environmental Advisory Committee, DarkSky Subcommittee

I vividly remember coming home from school like it was yesterday to see my parents packing food for the next morning, hoping my dad would invite me to join him on his trap lines. The anticipation of being out on the land with my dad was something I always enjoyed. It took me away to a place where I was comfortable and at ease, and knew I would be learning something completely different from the repetitious lessons I was being taught in a confined classroom.

As we paddled silently along the shore, our synchronized strokes were only interrupted by the distant call of a loon (maang). We discussed the environment and relationships we observed. My dad told stories of our ancestors setting up camps along the lake's shoreline every spring and fall, each with an Anishinaabeg name, giving it spiritual significance and forming a connection to the land and with those who had passed on into the spirit world.

My dad explained that the camping spots along the shoreline were sacred places where families had gathered for generations to access food and medicines in rhythm with nature. This practice kept our traditional ways and spiritual beliefs intact and fostered a deep respect for the environment. He believed the land is a living entity filled with spirits and that every organism, no matter how small, plays a role in the web of life. To my dad, water was sacred and healing, and we have a responsibility to care for it properly.

By recognizing the interconnectedness and sacredness of all elements in nature, we can change how we care for the earth. As teachers and good stewards of the land and water, it should be part of our identity to protect the earth. Our health depends on maintaining harmonious relationships with our environment, and by honoring this relationship through our clan system, we ensure the safety and protection of all spirits we consider our brothers and sisters. We must also look ahead and ensure the continuation of our species by planning for seven generations into the future. In our Anishinaabemowin language, my dad called it "mino-bimaadiziwin", "the good life."

My dad stressed that ceremonies and rituals were crucial for respecting sacred shoreline sites. With many of these places now developed, he feared restless spirits. Today, spirits still dwell along the shoreline, even in areas with homes.

This spiritual relationship links the human spirit with nature's interdependence. In the Anishinaabe worldview, the earth is a living entity connected to people. We are all relations both animal and human and we have a responsibility to help each other in this web of life.

I remember when harvesting red willow for medicine along the lakeshore and cutting my hand with a pocketknife. Once my dad and I stopped the bleeding, we went looking on the shoreline for a rock below the surface of the water on which a bacterium was growing. We found the rocks and scraped the bacteria from the surface of the rock and applied it to the cut. It started to sting, but within a few minutes of applying the salve, it began to cool the wound. Having taken some of the salve home and applying it over the next few days, the wound completely healed.

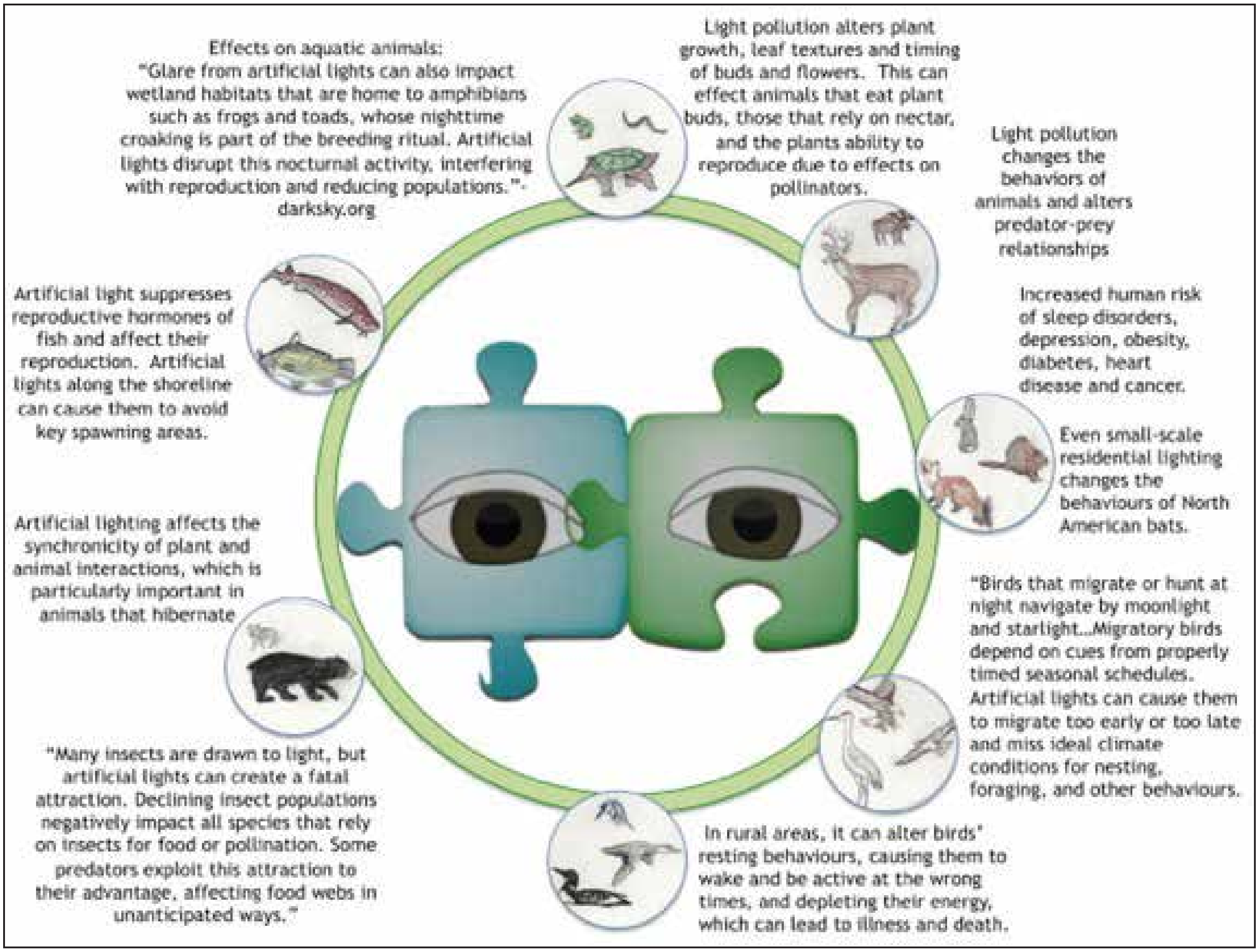
I asked my dad where these bacteria come from and how they got there!

"On a moonless spring night, thousands of minnows rub against the shore rocks, leaving bacteria behind. This event supports the entire ecological chain." Predator-prey relationships are maintained through this cyclical event. It is beneficial to us!"

My experiences on the land with my dad profoundly influenced my relationship with nature, instilling respect for its delicate balance. Each ceremony and act of reverence honored our connection to Earth and its inhabitants, fostering a deeper understanding of our role in preserving the environment. My dad taught me to perceive the interconnectedness of all things through ancient knowledge and values passed down generations. These teachings emphasized harmony and respect for all living spirits.

As I've grown older, I've come to understand the wisdom behind my father's words and actions, and how our ancestors knew the importance of preserving the natural balance for our survival. Now, I share these stories and practices with my friends to ensure that future generations continue to honor and protect the earth, just as my father taught me.

The landscape where my father once took me has changed significantly over the years. As



The ways light pollution negatively impacts wildlife depicted in the Anishinabe Doodemag (Clans) diagram. Information synthesized from various publications.

development around the shorelines increases, we strive to find new ways to connect with nature and preserve the sanctity of the land, even amid urbanization. I tell my friends and family about our ceremonies and the importance of respecting the natural world, hoping to inspire a sense of stewardship and respect. By combining traditional knowledge with modern scientific practices, we can honor the wisdom of our ancestors while adapting to the changing landscape, ensuring that the spirit of the shoreline and its lessons are preserved for future generations.

Before my father passed away, I had the opportunity to visit the places where we created many memories together. The lighting from homes and shoreline docks now illuminates the lakes in a way that contrasts greatly with the darkness of the moonless nights we once enjoyed. Despite these changes, the memories and lessons from my father remain significant to me. I often reflect on those moments, using them to navigate the present. These visits highlight the enduring connection we have with the land. As modern development encroaches upon natural spaces, I am committed to upholding environmental stewardship and preserving our stories and practices. Through storytelling, community engagement, and sustainable practices, I aim to honor the legacy of our ancestors and promote harmony and respect for nature.

Communities along the lakeshore deserve thought-

Fighting Light Pollution ... cont'd.

ful consideration about artificial lighting. It impacts both humans and wildlife, affecting the ecosystem's balance. We must understand and mitigate the unintended consequences, especially those affecting natural processes.

Darksky.org defines light pollution as the human-made alteration of outdoor light levels from those occurring naturally. It occurs as **Glare** — excessive brightness that causes visual discomfort, **Sky glow** — brightening of the night sky over inhabited areas, **Light trespass** — light falling where it is not intended or needed, and **Clutter** — bright, confusing, and excessive groupings of light sources.

Artificial lighting disrupts the circadian rhythms of wildlife, altering behaviors, life cycles, predator-prey dynamics, breeding patterns, and foraging. To minimize light pollution, we should use shielded fixtures and reduce unnecessary lighting. Embracing sustainable practices will help restore the natural balance and protect the lakeshore environment.

Artificial lighting also affects Indigenous traditional teachings of the night sky, and thus the stories central to our creation, and relationships with all our relations on the landscape. This impacts the spiritual and physical well-being of our knowledge keepers and intergenerational learning opportunities that are integral to maintaining the mindfulness of all our relations.

Preserving the Kawartha Lakes lakeshores and reducing light pollution is vital for future generations. We must respect all life forms and view the land as a living entity. By integrating Indigenous knowledge with western knowledge, we can collaborate effectively for the benefit of all and advance knowledge sharing and research.

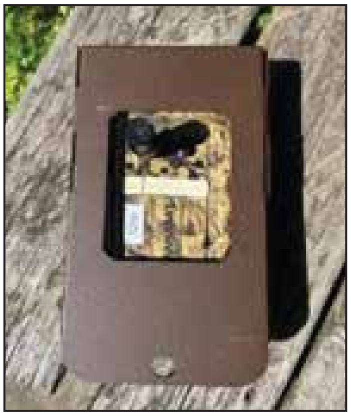
In Mi'kmaw culture, this concept of integrating Indigenous and western knowledge is called "Etuaptmumk" or Two Eye Seeing. The Anishinaabe describe it with two related words: "Gikinoo amaadiiwigamig" (the environment as a "place to learn" a "place of learning) and "Nibwaakaawin" (the wisdom obtained by observing the environment in its natural form).

Recommendations from Darksky.org

The Kawarthas are Batty!

Ed Leerdam, Chair and Treasurer
Kawartha Lake Stewards Association

This past summer an invitation came my way to participate in a Backyard Bat Acoustics Monitoring project, being run by the Toronto Zoo Native Bat Conservation Program in partnership with our friends at The Land Between. From mid-May to late September, each week a different volunteer installed an ultrasonic recorder 2.5 - 3 metres high on a tree, post or structure at a strategic location on their property. The monitor was retrieved at the end of each week, memory cards and batteries swapped out and in, then passed along to the next volunteer, for a total of 20 weeks. The monitor was programmed to begin monitoring 30 minutes prior to sunset, and cease 30 minutes after sunrise. During this period, the device monitored ultrasonic frequencies for bat vocalisations, and recorded them for later analyses. These data were processed by the Toronto Zoo Native Bat Conservation Program to identify the species recorded. After initial organisation and labeling the files were scrubbed to remove 'noise' files without any potential bat signals. The remaining files were then assigned species identifications using an automated classifier. This classifier is effective, but not perfect, and manual verification is required before these results are considered final.



I and four other current and past KLSA Board Directors participated in this project. I learned that eight species of bats call Ontario home, and that my yard is very busy at night! There was a total of 936 acoustic observations, with all eight species of bats identified during my week (four nights) in mid-July! Below are the number of acoustic observations by species during the four nights of monitoring in my yard. Contrary to myth and legend, bats do not suck your blood, nor do they want to get entangled in your hair. In reality, one of their favourite snacks is mosquitos, which they eat voraciously. This is great mosquito control given that there are plenty of mosquitos in my area.

a) Big brown bat: Most commonly observed bat in Southern Ontario and well adapted to urban environments. Bodies are covered in light brown fur. Females are typically larger than males. Weigh approximately as much as 3–5 toonies (11–25 g).

b) Silver-haired bat: This bat gets its name from the striking black fur with frosted silver tips on its back. They are one of Ontario's migratory bat species. They roost primarily in trees, but have been found roosting in firewood piles. This bat weighs about 1–2 toonies (8–11 g).

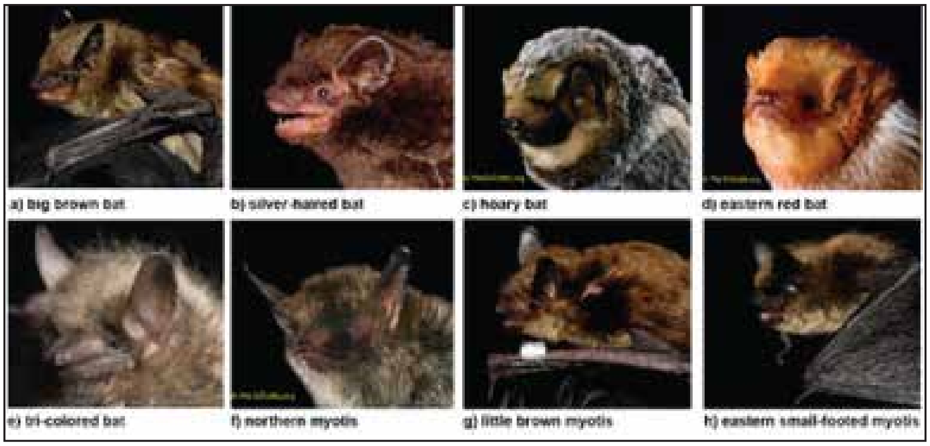
c) Hoary bat: The Hoary bat is Ontario's largest bat species, weighing 3–5 toonies (18–39 g). The stunning fur colouration and wing patterns help it camouflage amongst tree leaves. It has a furry tail membrane which it uses to keep itself warm. The is one of Ontario's migratory bat species and is most affected by wind farms. They are capable of long-distance flights and occasionally, turn up in Iceland.

d) Eastern red bat: Typically, most bats only bear one pup a year. Red bats are capable of birthing 3–5 young at a time with each weighing about 20–30% of the mother's body weight. This species is also migratory, but will hibernate in mild temperatures underneath the leaf litter. It weighs about 1-2 toonies (7–13 g).

e) Tri-colored bat: This bat gets its name from its distinctly banded fur which is yellow, black and brown. The forearms on this species are orange-red in colour in comparison with other species. Not much information is available for this species in Ontario. This bat weighs as much as a toonie (7 g).

f) Northern myotis: This bat is now considered one of North America's most endangered bat species. Populations have plummeted, with some being extirpated from certain regions due to white-nose syndrome. This bat is a gleaning insectivore, that means it picks insects off of vegetation rather than catching them in the air. Their large ears help them hear their prey. They weigh about 1–2 toonies (6–9 g).

The Kawarthas are Batty! ... cont'd.

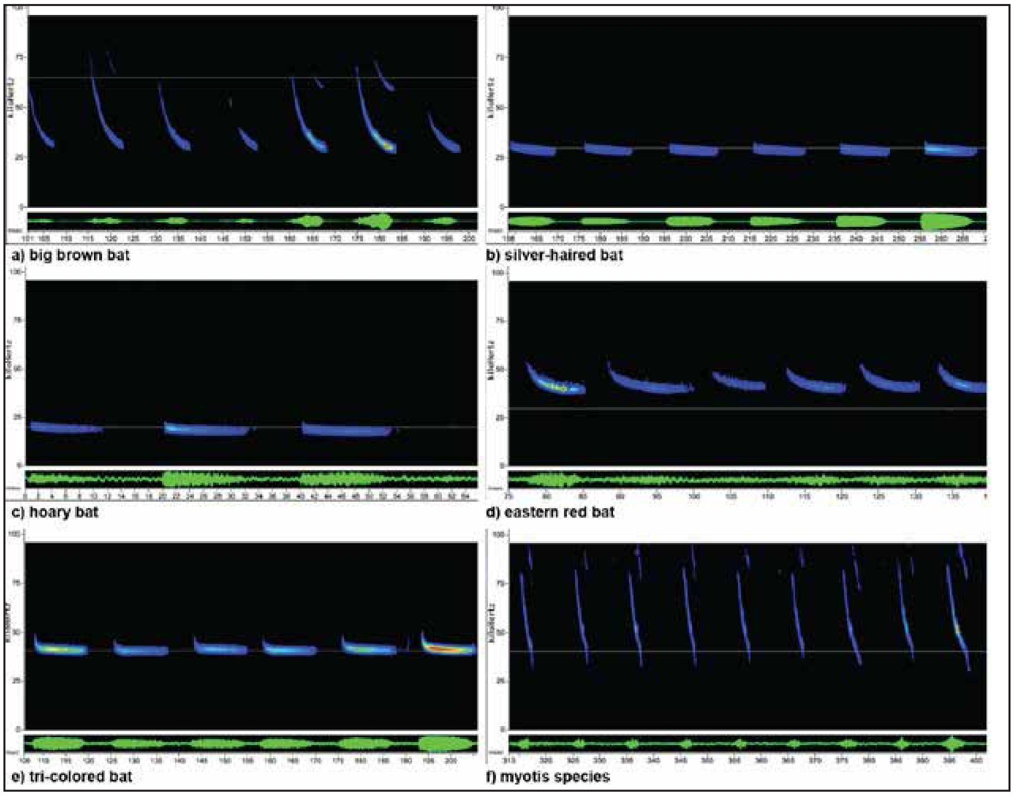


Species	Total
Big Brown Bat	592
Eastern Red Bat	33
Hoary Bat	31
Silver-haired Bat	188
Eastern Small-footed Myotis	3
Little Brown Myotis	35
Northern Myotis	3
Tri-colored Bat	51

g) Little brown myotis: This bat was once Canada's most common bat species, but populations were decimated by a disease called white-nose syndrome which only affects hibernating bats. The impact of the disease has decreased since its discovery, but since bats are slow to reproduce, population levels will not re-establish to pre white-nose syndrome levels in our lifetime. Little brown myotis are capable of living up to 40 years and weigh about 1–2 toonies (4–11 g).

h) Eastern small-footed myotis: One of Ontario's smallest bats, it differs from the other Myotis by the striking black face mask and wing membrane in contrast to its fur. They roost in rock crevices and can even be found under rocks on talus slopes. They are more prevalent around the Niagara Escarpment. They weigh about as much as a nickel (4–5 g).

As each bat species has a unique echolocation call, species can be distinguished through acoustic monitoring. However, the calls of individuals within a species are difficult to distinguish from one another, so an accurate abundance of a species cannot be obtained. For example, if there are 10 observations of Big Brown Bats on a single night, we cannot tell if that was 10 individual big brown bats flying by the monitor once, or a single big brown bat flying by the monitor 10 times. Generally, however, the number of observations can tell us about the activity at a study location and that may help to indicate good habitat.

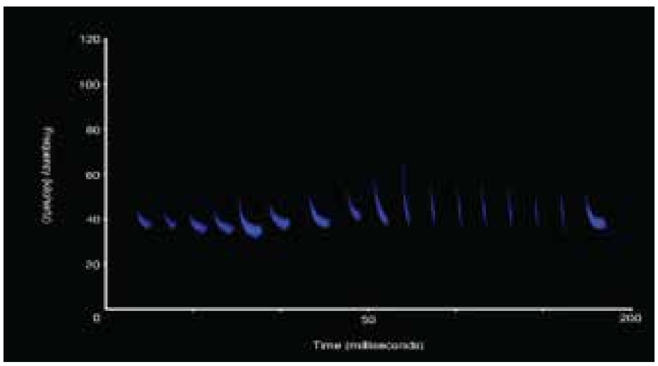


Though counterintuitive, bat species are identified by looking at the graph produced by the recorded sound rather than listening to the calls (see figure left). Some of the features looked at include: the shape of the ticks or pulses, how close together they occur, what frequency they start and end at, and how long the pulses last. We also need to be able to distinguish what isn't a bat call and differentiate it from noise, artifact or echoes. The Image on page 36 Illustrates typical search phase calls for Ontario bats.

Identifying a bat from a spectrogram can be very challenging as bats change the shape of their call based on the type of environment they are currently in (for example when a bat is flying in an open space, compared to flying in a forest). There are many instances where we cannot associate a recording with a particular species. However, we can tell whether a bat is navigating, feeding, or partaking in a social behaviour at the time of recording. See below for an example.

While some bats hibernate, others migrate. During the winter season you might find bats resting in caves, mines, rock formations, tree hollows, warehouses, barns, attics, and basements. While hibernation spots will vary by bat species, most will seek out a predator-free area that has lots of food.

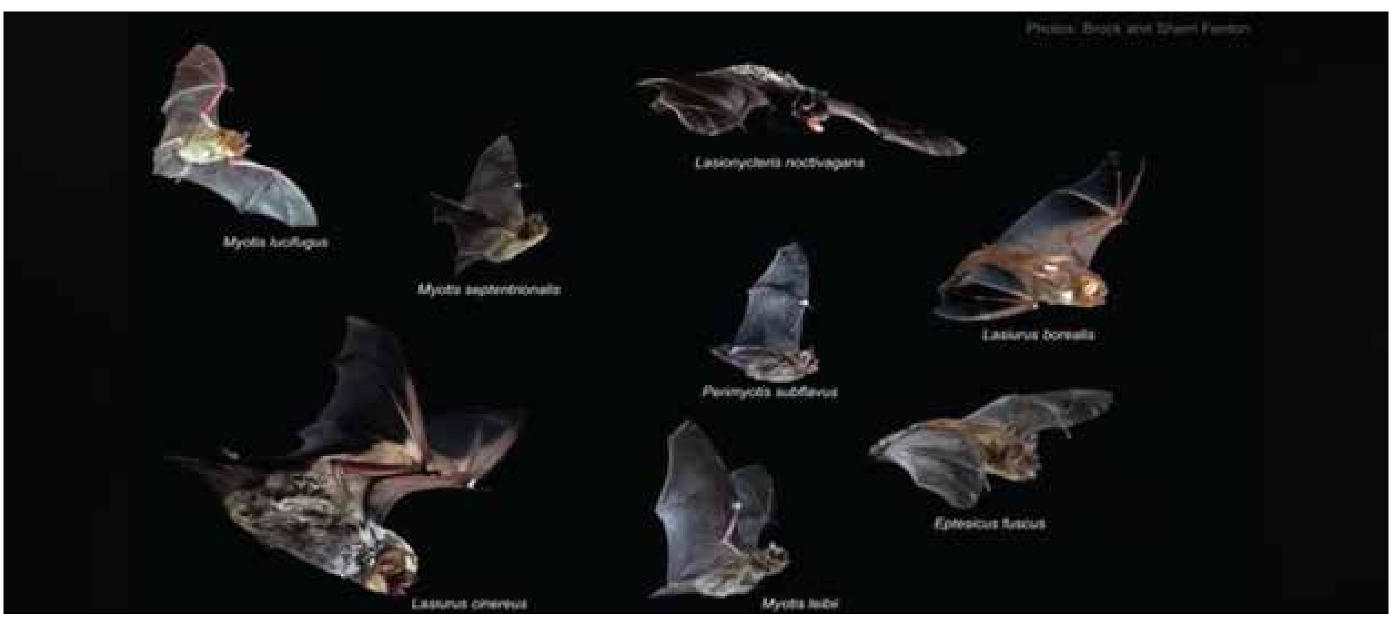
Bats are very shy and are active at night. It's important to ensure a friendly environment is available to them. During their active nights, as well as during their winter hibernation, a dark sky (i.e. no artificial lighting) is important for these creatures (and many others), so please keep your exterior lights off when you don't need them. You'll reduce your electricity bill as well.



Typical call made during feeding called a 'feeding buzz'. Notice how the calls progressively become steeper and are produced more closely together.

HIBERNATING BATS	MIGRATING BATS
Big Brown Bat	Silver Haired Bat
Tri-Coloured Bat	Hoary Bat
Northern Long-Eared Bat (myotis)	Eastern Red Bat
Eastern Small-Footed Bat (myotis)	

Little Brown Bat (myotis) Hibernates & Migrates!



2023 Kawarthas Sewage Treatment Plants Report

Mike Dolbey Ph.D., P.Eng., Volunteer
Kawartha Lake Stewards Association

Each year, KLSA monitors the performance of Sewage Treatment Plants (STPs) that discharge effluent either directly into the Kawartha Lakes or their watershed, or into waterbodies that flow into the Kawartha Lakes. The purpose of STPs is to protect public health by minimizing the discharge of pathogens and to protect the environment by minimizing the discharge of phosphorus (P) into our lakes. Of primary interest to KLSA is the quantity of phosphorus that is discharged by these plants into our lakes because phosphorus is known to be the most likely nutrient to cause increases in the growth of aquatic plants and algae.

Lake management studies have shown that the amount of phosphorus now discharged from STPs is only a small percentage of the phosphorus entering our lakes from all sources. This was not always the case. Prior to the 1970s, STPs discharged between 50 and 100 times more phosphorus than modern STPs. However, unlike most other phosphorus sources that are widely distributed, STPs are localized sources that can be controlled, and considerable public dollars are spent to build and operate these plants to protect our health and the environment. Municipalities fund STPs by charging the users of the systems an annual levy and they also receive grants from the federal and provincial governments, i.e., all taxpayers, that partly offset the cost of capital projects to repair, upgrade and increase the capacity of STPs.

KLSA monitors the performance of STPs to determine if they are being operated to their fullest potential. Ideally, KLSA would like all STPs that discharge directly into our lakes to achieve a 99% phosphorus removal rate. This means that only one part in 100 of the phosphorus entering the plant leaves in the effluent. A drop of removal rate to 95% means five parts in 100 leave the plant, which is five times more phosphorus released compared to 99% removal rate. What might seem like a small change in removal rate can have a very large consequence!

As we have indicated in past years, our STP data is always one year behind, because the reports for the previous year are not available to us before going to press. This year all the reports except for Minden were available online on the websites of their respective municipalities. Minden's report was provided on request.

Again this year we have included three STPs, Minden, Nonquon (Port Perry) and King's Bay, which do not discharge directly into the Kawartha Lakes. These plants are upstream of our Kawartha Lakes and have at least one body of water in between to attenuate the effects of their effluent discharge.

Minden

Minden's STP discharges into the Gull River just above Gull Lake, which is two lakes away from our most upstream Kawartha lake, Shadow Lake. The average annual removal rate in 2023 was 96.4% without accounting for bypasses. Three bypasses of the tertiary sand filters occurred due to weather events in March, April and May. An estimated 27004 m^3 of partially treated sewage entered the river. Based on samples taken during these events it is estimated that the additional P load into the river was 5.17 kg. This increased the total annual P load to **37.7 kg**, higher than last year's 32.6 kg. The Minden STP's effective removal rate was **95.9%** compared to 95.2% last year. No other spills, bypasses or overflows were reported, and no complaints related to the plant's operation were received during the year.

Average *E. coli* discharges were generally low during the year. The geometric mean of samples during the year ranged from 1.7 to 8.9 cfu/100 mL with an average value of 2.8 cfu/100mL, well within the plant's Certificate of Approval level of 200 cfu/100mL.

Coboconk

This lagoon system continued to function well in 2023, with planned discharges to the Gull River just above town occurring in March, April, May and November. The average phosphorus content of all effluent discharges was less than 0.05 mg/L. With lagoon systems such as Coboconk's, the volume of effluent released from the lagoons each year may be considerably more or less than the volume of raw input to the lagoons during the year. This may be due to operational considerations and variable amounts of precipitation and evaporation. Hence, determining the phosphorus removal rate is problematic. Considering all inputs and outputs over the past twelve years, the overall phosphorus removal rate was **greater than 96.8%** during that period and the 2023 total annual discharge of phosphorus was estimated to be **6.1 kg**.

The maximum geometric mean of *E. coli* in the four discharges during 2023 were 316, 10.6, 6.9 and

4.8 cfu/100mL respectively. One small spill of about $1m^3$ occurred in a manhole but there was no release into the Gull River. No bypasses occurred during 2023. Three complaints about odour were received during the year.

Fenelon Falls

In 2023 the performance of the Fenelon Falls Waste Water Treatment Plant (WWTP) was slightly better than in 2022 but still well below its historical performance. On two occasions high flow caused by weather events resulted in a partial bypass of the treatment plant's tertiary sand filters. During one of these events in April there was also a raw sewage overflow at the Colborne St. Sewage Pumping Station (SPS). The two bypass events, in January and April, resulted in approximately 0.5 kg of phosphorus entering the lakes. The raw sewage overflow in April resulted in an additional 1.9 kg of phosphorus entering the lakes. The annual average removal rate of the plant was 93.5%, slightly better than last year's 92.3% and the overflow and bypasses reduced the overall removal efficiency to **93.2%**. This resulted in a P discharge into Sturgeon Lake of **48.8 kg** for the year compared to 84.4 kg last year.

In 2023 *E. coli* levels in the effluent from the Fenelon Falls WWTP were generally low with an annual average geometric mean of 2.3 and a maximum of 4 cfu/100mL. No complaints about plant operations were received in 2023.

Lindsay

The Lindsay WWTP is the largest on the lakes. The City of Kawartha Lakes (CKL) owns the Lindsay plant and operated it until the end of July 2015 when its operation was contracted to the Ontario Clean Water Agency (OCWA) which operates all the other sewage treatment plants owned by CKL. As reported in previous years, the Lindsay plant measures influent and effluent volumes separately with surprisingly different results in past years. In 2023 a new influent measurement system was used which resulted in monthly influent and effluent volumes agreeing within 2.5% throughout the year.

The upgrades to construct a new aeration basin and blower building for the Lindsay WWTP that were in progress throughout 2022 were substantially complete by the beginning of 2023. With completion of these upgrades, more stringent limits for Total Suspended Solids (TSS) were implemented. On four occasions during the year TSS slightly exceeded the tighter limits. Operating procedures were adjusted to address this concern. However, these problems did not affect the removal of Total Phosphorus (TP). No bypasses or abnormal discharges from the plant were reported. It is estimated that the 2023 annual average phosphorus removal rate was **96.9%**, similar to last year's 97.1%. This resulted in a P discharge into Sturgeon Lake of **346.6 kg**, slightly higher than last year's 318.6 kg.

The annual average geometric mean of *E. coli* in the discharge was 3.9 cfu/100mL with a maximum of 17 cfu/100mL in January. In 2023, there were no complaints about operation of the STP. However, there were three complaints about odour from a vent for the sewer forcemain on Angeline St. N.

Bobcaygeon

Inflow and infiltration (I&I) in Bobcaygeon's sewage collection system has been shown to have a significant impact on influent volumes. After CCTV assessment of the whole system in 2022, repairs were begun in 2023 and are continuing in 2024. In 2023 the Bobcaygeon WWTP appeared to operate well with no reported bypasses, overflows, spills or abnormal events. The average phosphorus removal rate was calculated to be **97.0%**, down slightly from last year's 97.2%. The reported annual phosphorus load into the lake was **77.5 kg,** compared to last year's 61.3 kg. As discussed previously, only one influent sample is tested for Total Phosphorus each month and monthly results vary considerably. Hence calculated removal rates are influenced by this variability.

The annual average geometric mean density of *E. coli* in the discharge was 9.7 cfu/100mL with a maximum of 41.9 cfu/100mL in August. No complaints were received about the operation of the Bobcaygeon WWTP in 2023.

Omemee

This facility consists of two large settling lagoons. Until 2014 all the effluent was spray-irrigated onto nearby fields during the summer months. A subsurface effluent disposal system was commissioned at the site in March, 2014 with the intention that it would dispose of all the effluent. However, there were problems with the capacity of the subsurface system that required both the spray irrigation and subsurface disposal systems be used for a few years. After a study of the problem, changes were implemented in 2022. During 2023, the subsurface disposal system was used throughout the year handling 77% of the annual effluent. It was supplemented by the spray irrigation system during the months of April, May, June, August and September to dispose of 33% of the annual effluent.

The average effluent phosphorus concentration in 2023 was 0.24 mg/L, lower than last year's 0.40 mg/L and well below the allowable 1.0 mg/L. Lagoon systems can have considerable volume buffering capacity with the volume of raw influent and treated effluent varying considerably from year to year. In 2023 the effluent discharged was about 145% of the influent volume. Based on the numbers provided, phosphorus removal was estimated to be **~84%** with ~76.0 kg being distributed to the disposal systems. However, because the effluent is disposed of far from Pigeon Lake, removal is probably **100%** with respect to our lakes. This is confirmed by measurements in 17 downstream monitoring wells that are sampled four times a year. All wells have very low TP levels and there has been no significant change since 2019 when the subsurface disposal system was commissioned.

The annual average geometric mean density of *E. coli* in the effluent was a rather high 1070 cfu/100mL this year. This lagoon facility did not require any emergency discharges into the Pigeon River in 2023 and there were no bypasses, overflows or abnormal discharge events reported. One small spill of <0.04 m^3 occurred in 2023 in a chamber near the lagoons, but it was too small to affect TP removal performance. One complaint was received about odour near the Sturgeon Street SPS. Air filters were changed and conditions monitored.

King's Bay

The King's Bay STP serves a golf course community situated on a peninsula between Lake Scugog and the Nonquon River. Houses down the centre of the peninsula are surrounded by the golf course. Treated effluent from the STP at the apex of the peninsula is discharged into two large disposal beds under the golf course on each side of the peninsula. One up-gradient and three down-gradient wells are located around each disposal bed to monitor groundwater for phosphorus migration.

The King's Bay STP treats sewage using two Rotating Biological Contactor (RBC) units. Both RBCs worked well in 2023. Effluent TP concentration of discharge to the underground disposal beds averaged 0.26 mg/L, similar to the 0.25 mg/L in 2022, out of an allowable 1.0 mg/L. The annual daily loading for 2023 was 0.010 kg per day, about 6% of the allowable discharge of 0.17 kg per day. The annual average phosphorus removal rate within the plant was 99.4% this year. No spills, bypasses or abnormal discharges occurred in 2023. There were no community complaints in 2023.

Monitoring wells located both up and down-gradient of the disposal sites have had sporadic high TP readings in past years. In 2016 the TP measurement procedure was changed to collecting a field filtered grab sample from each well twice a year. TP levels in the two up-gradient wells have remained low over the past four years. However, a number of down-gradient wells have had variably high readings for a few years but with no consistent pattern to the high readings. In 2023, one well in the east down-gradient rank had an intermittent high reading. The purpose of the monitoring wells is to detect phosphorus migration towards the lake or the Nonquon River. Since these wells are on average 100 m from the lake or the Nonquon River, it is probable that, at least for the time being, there is still effectively **100%** removal with respect to the lake.

Port Perry

Port Perry is served by the Nonquon Waste Pollution Control Plant (WPCP) which discharges treated effluent into the Nonquon River northwest of Port Perry, which, in turn, empties into Lake Scugog at Seagrave, where the King's Bay facility is located. A new modern plant designed to treat wastewater at an average daily flow rate of 5900 m^3/d was commissioned in 2017. In 2023 the system worked fairly well but problems with plugging of the tertiary sand filters with algae, grease, and solids resulted in higher than normal total phosphorus and total suspended solids at times.

In 2023, phosphorus was reduced to an annual average of 0.061 mg/L for a total loading of **72.3 kg**, somewhat higher than last year's 56.2 kg. This reflects a removal rate of **98.1%**, slightly lower than last year's 98.6%. Monthly *E. coli* levels this year were between 1 and 50 cfu/100mL. There were no reported bypasses, spills or abnormal discharges, and no complaints were received during 2023.

Summary

The total weight of phosphorus discharged to the mainstream Kawartha Lakes from the Lindsay, Fenelon Falls and Bobcaygeon WWTPs in 2023 was 470 kg, similar to last year's 464 kg. If we include all the plants that we now monitor, we had total phosphorus loading into the lakes of 587 kg in 2023 compared to 556 kg in 2022. If all plants had achieved the 99% removal rate that we would like, the total phosphorus discharge for the year would have been about 191 kg, or about 33% of the 2023 total.

KLSA Annual Review of Area Sewage Treatment Plant Performance

Plant Location - Discharges to & Type	Year	Phosphorus Removal Rate % (1)	Total Annual TP Load Out kg (2)	Annual TP Load if 99% kg (3)	*E. coli* (average) (cfu/100mL)	Bypasses, Spills, Comments
Minden - Gull River	2016	89.7%	44.9	4.4	81.0	Bypass resulted in ~22 kg extra P load
Extended aeration activated sludge	2017	92.3%	32.9	5.4	297.0	Bypass resulted in ~8.7 kg extra P load
process with tertiary treatment	2018	96.2%	16.6	4.4	82	Bypass resulted in ~0.4 kg extra P load
	2019	95.3%	23.8	5.1	268	Bypass resulted in ~4.2 kg extra P load
	2020	98.1%	11.1	6.0	11.4	Bypass resulted in ~0.2 kg extra P load
	2021	97.5%	18.8	7.4	4.3	Bypass resulted in ~0.4 kg extra P load
	2022	95.2%	32.6	6.8	9.8	Bypass resulted in ~1.7 kg extra P load
	2023	95.9%	37.7	9.1	2.8	Bypass resulted in ~5.2 kg extra P load
Coboconk - Gull River Mill Pond	2016	>97.6%	4.2	1.2	3.4	None reported
Dual lagoons	2017	>97.3%	5.1	1.1	2.7	None reported
semiannual discharge to river	2018	>97.0%	4.0	1.2	1.6	Overflow of 50m³ - no P load to Gull R
	2019	>96.9%	5.0	1.1	12.2	None reported
	2020	>96.9%	2.8	1.0	1.6	None reported
	2021	>97.9%	2.7	1.1	6.7	None reported
	2022	>96.4%	2.7	1.1	6.8	None reported
	2023	>96.8%	6.1	1.2	84.6	Spill of 1m³ - no P load to Gull R
Fenelon Falls - Sturgeon Lake	2016	94.6%	38.8	7.2	3.3	Bypass resulted in ~ 10.4 kg extra P load
Extended aeration activated sludge	2017	94.6%	49.1	9.1	2.3	Bypass resulted in ~ 1.6 kg extra P load
process with tertiary treatment	2018	95.8%	34.0	8.0	2.2	Bypass resulted in ~ 1.5 kg extra P load
	2019	95.7%	33.7	7.7	9.0	None reported
	2020	93.9%	39.6	6.4	2.5	Bypass resulted in ~ 3.5 kg extra P load
	2021	97.5%	55.5	20.0	7.5	Bypass resulted in ~ 3.0 kg extra P load
	2022	92.3%	84.4	10.9	4.2	Bypass & Overflow ~2.1 kg extra P load
	2023	93.2%	48.8	7.2	2.3	Bypass & Overflow ~2.4 kg extra P load
Lindsay - Sturgeon Lake	2016	>98.6%	<176.8	134.3	3.5	None reported
Flow equalization lagoons;	2017	97.5%	311.7	125.9	11.0	Overflow resulted in ~0.5 kg extra P load
extended aeration activated sludge	2018	97.4%	301.1	115.4	14.0	Overflow resulted in ~0.1 kg extra P load
process with Actiflo tertiary treatment	2019	97.2%	364.7	132.8	11.2	None reported
	2020	97.7%	307.4	131.2	4.0	None reported
	2021	95.2%	754.7	158.4	259.2	None reported
	2022	97.1%	318.6	111.3	9.8	None reported
	2023	96.9%	346.6	110.5	3.9	None reported
Bobcaygeon - Pigeon Lake	2016	95.8%	125.6	30.0	31.0	Spill of 1 litre reported
Extended aeration activated sludge	2017	94.7%	114.7	19.7	53.7	None reported
process with tertiary treatment	2018	93.0%	171.3	24.4	98.8	None reported
	2019	96.7%	65.5	19.8	4.9	None reported
	2020	97.8%	37.9	16.9	2.8	Spill of 1 m³ reported
	2021	96.3%	64.2	17.5	6.8	None reported
	2022	97.2%	61.3	22.1	8.3	None reported
	2023	97.0%	77.5	25.5	9.7	None reported
Omemee - Fields/Underground	2016	100.0%	0	0.0	496.0	None reported
Dual lagoons with spray irrigation;	2017	100.0%	0	0.0	150	None reported
pumped into underground disposal	2018	100.0%	0	0.0	172	None reported
beds beginning 2015	2019	100.0%	0	0.0	132	None reported
	2020	100.0%	0	0.0	190	None reported
	2021	100.0%	0	0.0	3496	None reported
	2022	100.0%	0	0.0	856	None reported
	2023	100.0%	0	0.0	1070	Spill of 38 litres. No P load to Pigeon Lake
King's Bay - Underground	2016	100.0%	0	0.0	-	None reported
Pumped into underground disposal	2017	100.0%	0	0.0	-	None reported
beds.	2018	100.0%	0	0.0	-	None reported
	2019	100.0%	0	0.0	-	None reported
	2020	100.0%	0	0.0	-	None reported
	2021	100.0%	0	0.0	-	None reported
	2022	100.0%	0	0.0	-	None reported
	2023	100.0%	0	0.0	-	None reported
Port Perry - Lake Scugog	2016	97.8%	75.3	33.6		None reported
Extended aeration activated sludge	2017	98.8%	52.3	45.3	2	None reported
process with tertiary treatment;	2018	99.0%	44.5	44.4	2	None reported
effluent discharge to Nonquon River.	2019	98.7%	52.0	40.9	1	None reported
	2020	97.9%	86.3	41.0	2	None reported
	2021	98.8%	49.8	39.9	21.5	None reported
	2022	98.6%	56.2	39.1	3.3	None reported
	2023	98.1%	72.3	38.3	9.0	None reported

(1) 'Phosphorus Removal Rate %' is the percentage of the phosphorus in the plant influent that is removed before effluent is discharged.

(2) 'Total Annual TP Load Out kg' is the total weight of phosphorus, in kilograms, that is discharged from the plant during the year.

(3) 'Annual TP Load if 99% kg' is the total weight of phosphorus, in kilograms, that would be discharged from the plant during the year if the plant achieved a 99 % Phosphorus Removal Rate.

The Municipality of Trent Lakes Environmental Advisory Committee

Ted Spence, Chair
Environmental Advisory Committee, Municipality of Trent Lakes

In January of 2024 the Trent Lakes Council adopted the Terms of Reference for and appointed the members of their new Environmental Advisory Committee (EAC). The EAC mandate is:

To advise, provide guidance, and make recommendations to Council on environmental issues including protection, conservation and enhancement of natural systems and resources.

The committee has seven voting members appointed by Council including two members of Council and five citizen members. The committee also has four non-voting members, two Municipal Staff, the Deputy Clerk, and the Supervisor of Waste/Public Works Coordinator; as well as representatives from Curve Lake First Nation and from the Kawartha Region Conservation Authority.

The committee meets monthly and the meetings are open to the public and streamed live online. The Agendas and the Minutes are available on the Trent Lakes Municipal Website.

In this report we would like to update KLSA members on the work that the new committee is undertaking for the citizens of Trent Lakes.

EAC Workplan Priorities

The Committee workplan for 2024 and 2025 was passed by Council in June 2024 and has eight priorities with specific activities planned for each priority.

Priority 1: Water Management – Establish and maintain general practices for managing Trent Lakes' Water Systems.

Priority 2: Forest Protection - Preservation and Inventory – Maintain general practices for managing Trent Lakes' forests.

Priority 3: Natural Heritage Strategy

Priority 4: Dark Sky Certification

Priority 5: Emergency Management Plan

Priority 6: Review Policies, Staff Reports and Plans with an Environmental Lens

Priority 7: Engage with Experts

Priority 8: Monitor and Expedite the Implementation of the Trent Lakes Climate Action Plan and Promote Achievements

In this first year of committee operation much time was dedicated to the education of the committee on related environmental matters. We had numerous experts address our priority items. Under **Priority 7** these experts included the following:

- A representative of the *Shoreline Conservation Peterborough County* group
- A representative of the Bancroft Minden Forest Company which holds the logging license for Crown Land in our municipality
- The Chair of the *Catchacoma Forest Stewardship Committee* - a group working towards the protection of this old growth forest area north of Catchacoma Lake adjoining the Kawartha Highlands Provincial Park
- A Climate Consultant regarding heat pumps as a possible approach to energy conservation
- A representative of the *Ontario Federation of Anglers and Hunters Invasive Species Awareness Program*
- A representative of the *Kawartha Region Conservation Authority* to discuss their flood plain mapping in the Nogies Creek and Miskwaa Ziibi River Watersheds

The Committee has made significant progress on several of our priorities and in some cases the Council has already delivered results.

Priority 6: Review Policies, Staff Reports and Plans with an Environmental Lens - EAC established a subcommittee to work on this. They developed a report for Council that has resulted in a new procedure such that all policy documents, staff reports and plans presented to Council now include an assessment of environmental impacts positive or negative.

Priority 1: Water Management – EAC established a subcommittee to address this topic with an initial focus on Shoreline protection issues. The group reviewed recent work in other municipalities and met with the Director of Building and Planning and with the Municipal Planner to discuss issues and options. The municipal officials presented a report to council which resulted in direction to prepare possible legislation to regulate development within 30M of the high-water mark including regulation of tree removals in the shore zone. A further report to Council from staff is expected this spring.

Meanwhile the EAC subcommittee has prepared a pamphlet on healthy shorelines that will be distributed to all landowners with the tax bill. Copies of the pamphlet will also be available for distribution through the libraries and local cottage associations, etc.

The subcommittee has also begun an inventory of all lakes in the Municipality to monitor lake conditions, issues and trends.

Priority 4: Dark Sky Certification – EAC also established a subcommittee to look into the issue of too much nighttime outdoor lighting in many areas. They have been auditing some municipal facilities to identify how night lighting might be reduced. They have been reviewing lighting bylaws in other municipalities. They have developed an information pamphlet for all landowners which will be distributed with the tax bill and will be available in the community.

Priority 5: Emergency Management Plan – The full committee will focus on the Municipality's Emergency Management Plan at our February meeting when we will have a presentation from the local Fire Chief responsible for emergency planning and response. We will also have a presentation from the Curve Lake First Nation regarding cultural and prescribed burning activities.

Priority 8: Monitor and Expedite the Implementation of Trent Lakes Climate Action Plan and Promote Achievements - The committee has received updates from the Municipal CAO regarding the Trent Lakes Climate Action Plan and the municipal role in County level activities. EAC reviewed the CAO's July report to Council regarding the *2024 Update Energy Conservation and Demand Management* Results and Plan. The committee has also looked at heat pumps as a possible tool to decrease energy demands.

Priority 2: Forest Protection - The EAC has had important presentations from the Bancroft Minden Forest Company and from the Catchacoma Forest Stewardship Committee. We are meeting with the Fire Chief in February to review the Municipal Emergency Response Plan. We anticipate establishing a subcommittee to advance this priority in 2025.

Priority 3: Natural Heritage Strategy – this is a longer-term priority as it will draw from work on other priorities. It will also be informed by the partnership that the committee sees developing with the Curve Lake First Nation. It will be addressed later in 2025.

Overall the first year's experience with the Trent Lakes Environmental Advisory Committee has been very positive. Committee members have learned a lot and are invested in addressing the major environmental issues facing the Municipality and its residents. We have helped to advance several ongoing files especially those related to shoreline issues and lake issues. The committee looks forward to continuing and expanding our work over the remaining 18 months of our term.

Turtle. *Photo Credit: Rachelle Mack, Scugog Lake,*

Frog at Sunset. *Photo Credit: Rachelle Mack, Scugog Lake,*

Trent Lakes Property Owners Information Brochure

Waterfront Property Owners Information

Trent Lakes is gifted with abundant lakes and rivers that are enjoyed by our residents, visitors and wildlife.

You may be a Trent Lakes resident fortunate enough to have property with a lake or river in your backyard. With that comes all the special opportunities to boat, swim, paddle, fish, see wildlife and just enjoy the ever changing views. But, with that also comes a responsibility to be a good steward of the water and the lake environment to preserve it for your family and for future generations to come.

This pamphlet suggests a few of the most important things **you** can do to ensure our water bodies continue to be healthy ecosystems for people, fish, aquatic plants and other life. **THANK YOU!**

Our Vision:
Trent Lakes is proud to be a vibrant, resilient, sustainable, and environmentally friendly community.

One of our 5 strategic goals is:
To Take the Lead on Initiating Environmental Stewardship for the Community.

Natural Shorelines

The few metres below and above the shoreline are a very important **"Ribbon of Life"**. Ninety percent of all lake life is born, raised and fed in the area where the land and water meet. The shallow water and the first 10-15 metres of shoreland form a ribbon of life around lakes and streams that is essential to the survival of many species. This rich and complex habitat supports plants, micro-organisms, insects, amphibians, birds, mammals and fish.

Unaware of the importance of shoreline vegetation, many landowners clear their shorelines and transform them into urban landscapes. They destroy the cattails, bulrushes and other native species. They build retaining walls, docks and boathouses. These changes destroy the balance of the aquatic and shoreline ecosystems. They also alter wildlife habitat, natural beauty and character of our lakes and streams. And they negatively impact the health of the lake or stream.

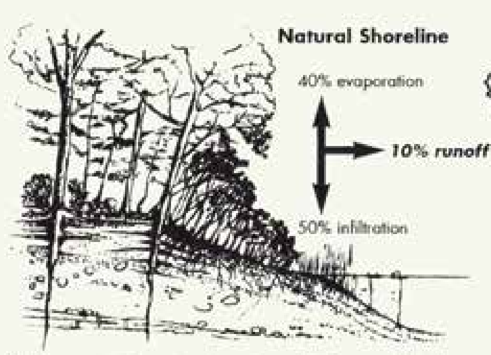
Natural shoreline vegetation plays an important role in preventing soil erosion. Plant roots anchor the soil, preventing shoreland from being washed away by currents, waves and rain. The roots of mature trees reach down to the upper levels of the water table. Dogwood and meadowsweet roots form a web that extends a half metre downward. These native species are far more effective in protecting properties from erosion than the roots of grasses, which only reach 8 cms below the surface.

By preventing erosion and runoff, natural shoreline vegetation also improves water quality. When soil and excess nutrients are washed into the water, fish spawning beds can be destroyed, dissolved oxygen is depleted, and the growth of algae and aquatic plants is encouraged. The deeper roots from native trees, shrubs and grasses intercept groundwater and runoff, and help extract harmful chemicals like phosphorus from the groundwater flow before it enters the waterbody. Shoreline vegetation also improves water quality by shading and cooling shallow water.

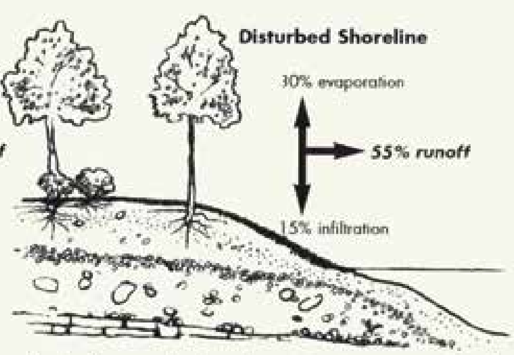
Negative changes in water quality can lead to rapid eutrophication – the aging of a lake. Eutrophication of a lake ultimately changes the kinds and numbers of species that can live there.

A shoreline buffer of native plants captures runoff and contaminants from reaching the water. Protect your shoreline with native plants, shrubs and trees that are best adapted to our region in Canada. As a bonus, tall native grasses and shrubs deter geese from coming up onto your property and leaving their droppings.

Best Practice – A healthy buffer zone, or "the ribbon of life", is potentially the most important factor in protecting the quality of water of our lakes for future generations to enjoy. As a best practice, every waterfront property owner should strive to maintain at least 75% of the buffer zone in its natural state. Programs and assistance are available through Watersheds Canada and local Lake Associations.



Native vegetation protects water quality from polluted runoff, and helps soil absorb water

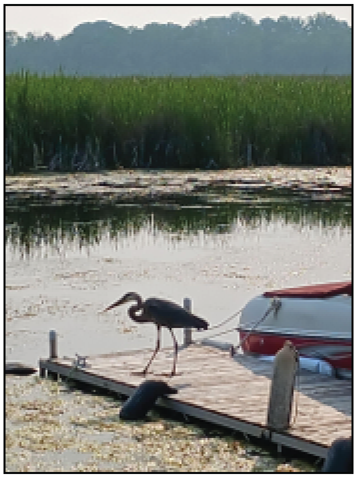


Hard surfaces and reduced vegetation increase runoff and and erosion potential, and decrease absorption by the soil.

A Quiz for Waterfront Champions

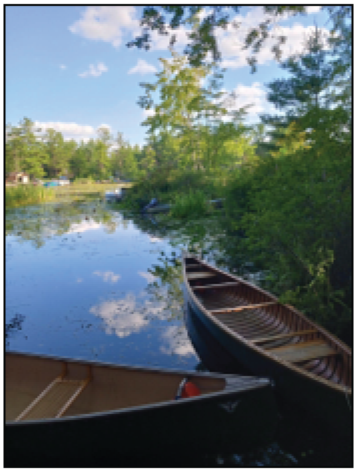
Federation of Ontario Cottagers' Associations (FOCA)

KLSA members do plenty of lake stewardship through their participation in FOCA's Lake Partner Program, but there really is so much more each of us can do to be a champion for the waterfront. In the face of increasing challenges, we can act today to make a difference for our kids and grandkids. Take our quiz: **How many of the following do you already do?** (Score one point for each action you've done or do regularly):



- Maintain a buffer of natural plants near the shoreline for erosion control and to prevent runoff from entering the lake.
- Don't bathe in the lake!
- Clean, drain, and dry the boat before moving between waterbodies to prevent spreading invasive species.
- Report finding a turtle, loon, frog, or other sign of a healthy lake in a volunteer 'count'.
- Have the septic system inspected and maintained.
- Support your local lake association (and the KLSA!).
- Avoid using harsh cleansers or other household chemicals.
- Limit light pollution by installing downward-facing light fixtures.
- Enhance biodiversity by leaving natural aquatic plants and sunken tree logs as shoreline habitat.
- Minimize speed and boat wake near shore to prevent erosion or loon nest impacts.
- Consult authorities and obtain necessary permits prior to construction or renovation projects near the waterfront.
- Avoid the use of fertilizers, pesticides or herbicides on waterfront properties.
- Read FOCA's "Shoreline Owner's Guide to Healthy Waterfronts" at foca.on.ca.
- Attend a talk or webinar about water quality or environmental impacts.
- Share tips for healthy shorelines with a neighbour.
- Stop mowing the grass down to the water's edge - instead: more hammock time!

Tally all your actions. How did you rate?



10 or more = **Stellar Steward!** You're an ambassador for healthy waters and can help by spreading the word to others.

5-9 = **Water Winner!** Keep up the good work and try "levelling up" this year by choosing two or three additional actions from the list above.

0-4 = **Potential Protector!** Pick an action from the list above and pledge to become part of the solution for Ontario's waterfronts this year.

Unsure why one of the actions above is important to the health of the waterfront? Learn more here: https://foca.on.ca/shorelines-stewardship/

I thought for a moment: "My life was over" - A True Story

Doug Wellman, President
North Kawartha Lakes Association

On Sunday, August 18th last year, I was alone in a newly acquired 14ft. aluminum boat with a 20hp. tiller motor going full speed at the north end of Anstruther Lake. A small wave jostled the boat and in a 'nano-second' the motor swung to my right and I was launched out of the boat into the middle of the lake with no lifejacket on and the boat is going full speed in circles just beyond me.

When I surfaced and saw the predicament I was in, I thought "Doug, this may be the end of your life today". Fortunately, the boat didn't track near me and stayed in its circular pattern. I started to swim a fair distance to shore calling for help. A couple I knew heard me and came out in their boat to rescue me.

Another boat, a pontoon boat, also came out and we contemplated how to get the boat stopped. Thoughts went from ramming it with the pontoon boat and jumping in, but that was too risky, to getting ropes and throwing them at the propeller to jam it and shut the motor down. That is what we ended up doing, but it took an hour.

Finally, a couple of ropes wound up in the propreller and the motor shut off.

I have been on Anstruther Lake 68 years and driving boats since I was 12. Typically, lifejackets are stored in a compartment in the boat and the kill switch cord is not attached. Not any more!

The OPP tell us that most drownings could have been prevented if lifejackets had been worn. It's not unlike wearing your seatbelt in your car. And, the inflatable lifejackets today are comfortable So, please, if nothing else, make sure your kill switch cord is attached to you so the boat will stop if you are tossed out; but better yet, also wear a lifejacket as you do your seatbelt.

Thank-you,

Doug Wellman

Loons. *Photo Credit: Rachelle Mack, Lake Scugog*

More Photos from the 2024 KLSA Photo Contest

Morning Sunrise.
Photo Credit: Pam Dickey, Big Bald Lake

Trumpeter Swan Family
Photo Credit: Isabel Brockley, Lower Buckhorn

Two Trumpeter Swans.
Photo Credit: Pam Dickey, Big Bald Lake

Loon with wings spread.
Photo Credit: Isabel Brockley, Lower Buckhorn

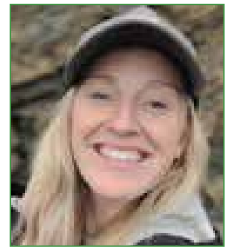
Appendix A - Board of Directors

2024 – 2025 Board of Directors

Ed Leerdam
Chair/Treasurer
Nogies Creek

Robert Bailey
Vice-Chair
Lower Buckhorn Lake

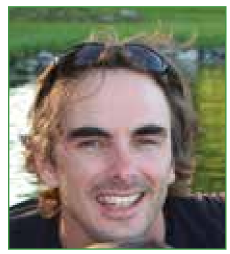
Sheila Gordon-Dillane
Secretary
Pigeon Lake



Kaleigh Mooney
Director
Peterborough

Jacqui Milne
Director
Nogies Creek

Kimberly Ong
Director
Stony Lake



Brett Tregunno
Director
Omemee

Roland Van Oostveen
Director
Selwyn

KLSA Privacy Policy

The complete KLSA Privacy Policy is on the KLSA website: www.klsa.ca.

KLSA collects information about our members and volunteers such as name, address, telephone number, email address and preferred method of communication. Information may be kept in written form or electronically. It is used to provide information about KLSA activities and related lake water issues of interest to residents of the Kawartha Lakes. Information will not be disclosed to anyone else unless required to do so by law and will be deleted when it is no longer required. Mailing lists will not be sold, transferred or traded. Information will be kept in a secure place. Further details can be obtained by contacting the KLSA Privacy Officer by email at klsa@klsa.info or by regular mail at 264 Bass Lake Road, Trent Lakes ON K0M 1A0.

Appendix B - Donors

Thank You to Our 2024 Supporters

FOUNDATIONS AND MUNICIPALITIES

Gold ($5,000+)

Silver ($1,000 - $4,999)
Township of Douro-Dummer

Bronze (less than $1,000)
Municipality of Selwyn
Municipality of Trent Lakes

ASSOCIATIONS/BUSINESSES/INDIVIDUALS

Platinum ($1000+)

S. Firoz Ahmed Professional Corporation

Gold ($200 - $999)

Ann and John Ambler
Balsam Lake Association
Birch Point Marina
Dr. Michael and Susan Dolbey
Janet and Paul Duval
Sheila Gordon-Dillane and Jim Dillane
Janet Hasslett-Theall and Larry Theall
Patricia and Robert Jamieson
Lakefield Foodland
Paris Marine
Peterborough Pollinators
Pinewood Cottages and Trailer Park
Judy Probst
Rosedale Marina
Cathy and Jeff Webb
Anonymous

Silver ($100 - $199)

Chris Appleton and Nancy Austin
Big Bald Lake Cottagers Association
Birchcliff Property Owners Association
Camp Kawartha (Jacob Rodenburg)
Peter Chappell
Jan and Ian Cowie
Egan Marine Houseboat Rentals
FR 44 Cottagers Association
Penny and Bob Little
Kathleen and Blair Mackenzie
North Kawartha Lakes Association
PROBUS (Lakefield)
Rosemary and Claudio Rosada
Scugog Lake Stewards
Edith and Joe Wood
Gill Fisher and Bob Woosnam
Anonymous

Bronze (less than $100)

Mary Auld
Dr. Robert Bailey
Bayview Resort / Ratepayer's Association
Big Cedar Lake Association
The Cottage Road Cottagers Group
Yvonne Flavelle
Anne Hurd
Darryl Kotton
Carol and David MacLellan
Stephanie Melles
Cliff Moon
Newcomb Lane Cottagers Association
Reach Harbour Marina
Sandy Lake Cottagers Association
Heather and Dr. Hans Stelzer
Westwind Inn
Karen Whalen
Anonymous

Appendix C - Treasurer's Report and Financial Statements

KLSA Treasurer's Report as of December 31, 2024

Ed Leerdam, *KLSA Treasurer*

This Treasurer's Report refers to the 2024 calendar year and the H & R Block Statement of Financial Position summarizing Revenue, Expenditures and Assets for 2023 and 2024 Fiscal Years. Our thanks to Mr. Chad Irvine of H & R Block for preparing these Financial Statements.

In 2024, KLSA was fortunate to win two grants: one from Environment & Climate Change Canada (ECCC), the other from Canadian Wildlife Federation (CWF) totalling $57,379.

Excluding the two grants from ECCC and CWF, 2024 revenue is $24,666, and increased by 19.08% over 2023's revenue of $20,713, a difference of $3,953. The increase is due to a number of line items, and evident in the Statement of Operations and Changes in Net Assets.

Contributions and Donations are up 26.26% at $1,519 year-over-year. Donations from businesses were down -$415 (-37.73%) while donations from Individuals and Associations were up significantly: $1,004 (+26.04%), and $930 (+112.05%) respectively.

Grants from Municipalities were down $263 (-11.69%) year-over-year.

Continuing sources of income were:

• Water Testing Fees	$4,050[1]
• Municipal Grants	$1,987
• Individual Donations	$4,859
• Private Business Donations	$685
• Association Donations	$1,760
• Advertising in the KLSA Annual LWQR	$6,300
• Interest from GICs (reserve funds)	$800

Excluding expenses related to the two grants from ECCC and CWF, 2024 Expenses of $24,974 decreased by 14.71% or $4,307 versus 2023 expenses[2]. While we printed another 1000 copies of our 2023 Aquatics Plant Guide, this reprint cost was $3,291 less than the 2023 cost which included producing the Guide. Other differences are noted in footnote 2, and evident in the Statement of Operations and Changes in Net Assets.

Recurring operating expenses included:

• *E. Coli* Lab Test Fees	$4,321
• Liability Insurance	$1,947
• KLSA Annual Lake Water Quality Report	$4,991
• Public Meetings	$ 545
• Office	$1,085
• Website	$ 620
• Memberships	$ 175
• Professional Fees	$ 367
• Bank Charges	$ 85

We closed 2024 with a cash position of $17,170, and $20,000 reserves in GICs.

1 $540 test fee for 2024 not received – expected in 2025.

2 The 2023 Natural Edge expenses of $6,752 include some expenses related to the ECCC grant.

Kawartha Lake Stewards Association

(unaudited- See Notice to Reader)

Financial Statements

December 31, 2024

Notice to Reader

I have compiled the Statement of Financial Position of the Kawartha Lakes Stewards Association as at Dec 31, 2024 and the Statement of Operations and Changes in Net Assets for the year then ended from information provided by management

I have not audited, reviewed or otherwise attempted to verify the accuracy or completeness of such information. Accordingly, readers are cautioned that these statements may not be appropriate for their uses

Chad R. Irvine

Haliburton, Ontario

January 16, 2025

Kawartha Lake Stewards Association
Statement of Financial Position
As At December 31, 2024

	2024	2023
Assets		
Cash	37170	20271
Prepaid Expenses		
	37170	20271
Liabilities		
Accounts Payable and Accrued	395	367
Net Assets	36775	19904
	37170	20271

Prepared Without Audit- See Notice to Reader

Kawartha Lake Stewards Association
Statement of Operations and Changes in Net Assets
Year Ended December 31, 2024

	2024	2023
Revenues		
Contributions and Donation		
Private	4859	3855
Businesses	685	1100
Associations	1760	830
Water Testing Fees	4050	4938
Advertising	6300	6050
ECCC Grant	54379	
CWF Grant	3000	
User Fees	4225	1500
Interest Earned	800	190
Municipal Grants	1987	2250
	82045	20713
Expenditures		
Annual Report Costs	4991	4862
Water Testing Fees	4321	4344
Meeting Costs	545	204
Professional Fees	367	339
Website	620	
Natural Edge- Special Project	40172	6752
Aquatic Plant Guide- Special Project	6893	10184
Grant to Kawartha Conservation- Joint Project	3945	
Memberships	175	141
Insurance	1947	1980
Office and Administration	1085	410
Bank Charges	85	65
	65146	29281
Excess of Revenues over Expenditures	16899	-8568
Net Assets, Beginning of Year	20271	28839
Net Assets, End of Year	37170	20271

Prepared Without Audit- See Notice to Reader

Appendix D - Thank You to our 2024 Volunteers

Without our volunteers, whether serving on our Board, leading a program, scooping water or aquatic plants out of our lakes, planting natural plants along shorelines or attaching a temperature monitor on their docks, KLSA would not exist, and would not be able to do the work and collect the data that is so important in knowing how good (or not) our waters are in our lakes, and what's in them. We are very grateful to all our volunteers who help us in all these ways, and more.

(We strive to ensure no one is missed when we acknowledge our volunteers. If you see we have missed you or we've made a mistake, please let us know.)

Phaheezat Awonuga
Bob Bailey
George Brown
Jeffrey Chalmers
Carol Cole
Rich Corbin
Jim Davies
Jim Dillane
Mike Dolbey
Warren Dunlop
Mallory Farkas
Lisa Fi
Don Gillespie
Kathy Gillespie
Jessie Gordon
Sheila Gordon-Dillane
L'Anne Greene
Guy Hanchet
Ginette Hicks
Mitch Hom
Sheri Ireland
Sophia Iuliano
Patricia Jamieson
Brenda Jeffreys
Janet Klein
Darryl Kotton
Dierdre Lambert
Cindy Lee
Kari Lee
Ed Leerdam
Jessica Livingstone
Stevie Lyons
Patty MacDonald
Tony MacDonald
Tom McAllister
Emma Merritt
Dean Michael
Jacqui Milne
Kaleigh Mooney
Brian Moore
Roslyn Moore
Carmen Morris
Bill Napier
Lisa Oelke
Kimberly Ong
Lagni Patel
Mike Perry
Christine Pigeon
Line Pinard
Mark Potter
Francis Quinby
Angel Rana
Maureen Scott
Aaron Shafer
Trish Simpson
Elia Smith
Ron Smith
Abhay Sodhi
Julie Stender
Caroline Stikkelbroeck
Carolyn Sutton
Diane Trauzzi
Ralph Trauzzi
Brett Tregunno
Roland van Oostveen
Brenda Wall
Lois Wallace
Cathy Webb
Steve Wildfong
Phelisha Williams
Bob Woosnam
Wendy Zeisman

Appendix E - *E. coli* Testing 2024 Results

Bob Bailey, Vice-Chair
Kawartha Lake Stewards Association

Once again in 2024, KLSA's *E.coli* water sampling program was carried out by more than two dozen volunteer teams at 65 sites in 14 lakes up to five times each through the summer. There was a spike in *E. coli* in mid-August at several sites after an extreme rain event, but as usual about a third of the values were zero and most counts were less than 10 *E. coli* per 100mL.

Public beaches in Ontario are 'posted' when the level of *E. coli* in the water exceeds 200 *E. coli* colony forming units per 100mL. This means that the water is unsafe for recreational use. KLSA considers counts over 50 cfu/100mL as somewhat high for the Kawartha Lakes Counts of 20 and below, with an occasional reading between 20 and 50, are normal for the Kawartha Lakes. The presence of *E. coli* usually indicates fecal contamination from warm-blooded animals such as birds or mammals, including humans. Although *E. coli* can be dangerous, most strains of *E. coli* are harmless. The usual analysis done cannot distinguish the difference between the harmless and the deadly.

Results of *E.coli* analyses are expressed as *E. coli* cfu/100 mL. When sample water is plated on a growth medium in the laboratory, each live bacterium will multiply to form a visible colony which is then counted 24 hours after the start of incubation of the sample.

Note: In instances water tests on a given lake were done on slightly different dates. The symbol ~ denotes that all the tests listed in that column were taken within a couple of days of the date at the top of that column.

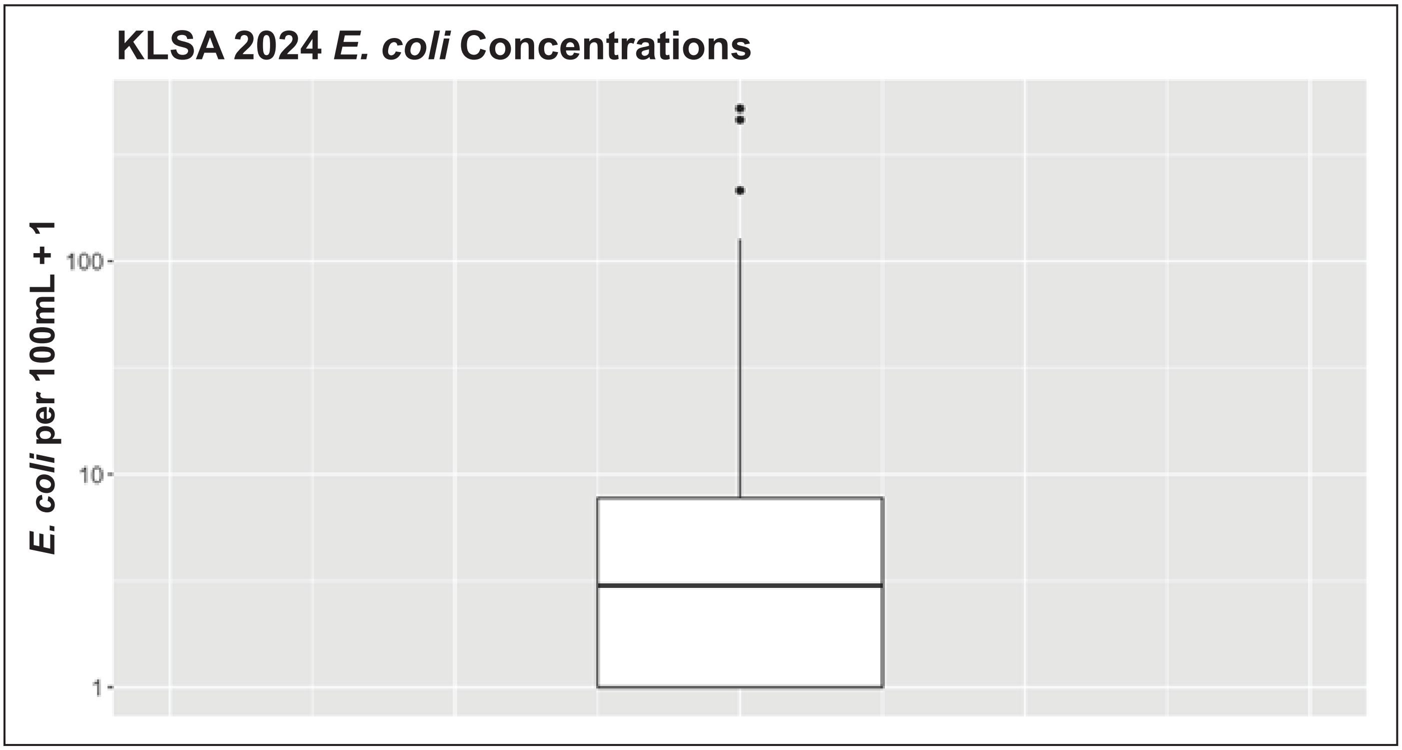


Figure 1: A boxplot of *E. coli* concentrations from the 2024 KLSA sampling program. The median value, where half the concentrations were greater and half were smaller, is the thick, horizontal line in the middle of the box. The bottom of the box is the 25th percentile, where a quarter of the concentrations were less than this value. The top of the box is the 75th percentile, where a quarter of the concentrations are greater than this value.

Balsam Lake							
Site	**15-Jul**	**~06-Aug**	**19-Aug**	**05-Sep**			
BL-00	17	10	13	3			
BL-01	2	5	0	0			
BL-02	1	3	-	1			
BL-03	11	3	12	0			
BL-03A	1	10	5	15			
BL-07	3	1	0	1			
BL-20	0	6	1	1			
BL-23	1	4	7	4			
BL-24	0	6	1	2			

Bass Lake							
Site	**05-Jul**	**15-Jul**	**06-Aug**	**20-Aug**	**03-Sep**		
Bass Lake	2	3	1	0	1		

Big Bald Lake							
Site	**02-Jul**	**15-Jul**	**06-Aug**	**19-Aug**	**03-Sep**		
1 Catalina Bay	3	12	20	12	2		
10 Saund. Bay	7	7	0	35	21		
12 Philrick Bay	1	2	0	113	1		
3 Jump Rock	2	3	3	44	1		
9 BB Narrows	2	1	2	6	0		

Big Cedar Lake							
Site	**02-Jul**	**15-Jul**	**06-Aug**	**19-Aug**	**03-Sep**		
600 C	7	11	2	1	1		
600 D	2	0	3	9	1		
610	0	2	1	0	4		
620	6	1	2	4	8		
630	1	3	0	0	0		
640	0	7	10	9	0		
650	1	11	6	12	0		

Cameron Lake							
Site	**06-Aug**	**19-Aug**	**05-Sep**				
CL1	15	55	1				
CL2	0	37	7				

Clear Lake							
Site	**~01-Jul**	**15-Jul**	**~06-Aug**	**~19-Aug**	**~04-Sep**		
4	3	0	4	1	1		
7	6	0	0	0	2		
8	0	2	1	9	0		
CL Site A	0	5	0	0	0		
CL Site B	1	0	1	0	0		
CL Site C	0	0	0	2	1		
CL Site D	1	0	0	0	1		
CL Site P	0	11	1	2	2		
CL Site W	1	0	0	0	1		

Katchewanooka Lake							
Site	**02-Jul**	**15-Jul**	**29-Jul**	**06-Aug**	**12-Aug**	**~26-Aug**	**03-Sep**
ITM-01		11	16		10	4	4
Site #2	48	3		214	95	86	53
Site 7		3		4		6	0

Lovesick Lake							
Site	**02-Jul**	**16-Jul**	**07-Aug**	**21-Aug**	**04-Sep**		
LL-16	4	1	3	2	2		
LL-20	2	2	0	2	5		
LL-21	0	2	2	4	1		

Lower Buckhorn Lake							
Site	**04-Jul**	**15-Jul**	**06-Aug**	**19-Aug**	**02-Sep**		
#02 Reach Bch.		1	4	11	13		
#05 Bay Beach		0	2	0	0		
#11 West Beach		3	4	27	0		
#13 Miller Grp.		2	3	460	4		
#20 Potter Grp.		0	1	0	2		
#30 Blk Duck By		5	0	5	3		

Pigeon Lake							
Site	**~02-Jul**	**~16-Jul**	**~05-Aug**	**~19-Aug**	**~25-Aug**	**03-Sep**	
13 Channel Mth	3	4	55	8		8	
14 Wtr Gdn Pk	0	0	4	126	0	1	
5A Pigeon Hall.	19	45	34	66	16	21	
6 Bell Haven	41	23	24	56	15	13	
8 Pigeon Lk Res.	0	3	2	0		1	
A	13	0	0	5		0	
B	2	0	1	6		2	
C	20	0	1	3		0	
Site #1	4	1	1	108	2	1	
Site #2	2	8	3	2		0	
Site #3	2	2	6	8		0	
Site #4	0	0	39	3		0	
Site #5	0	14	18	3		2	

Sandy Lake							
Site	**02-Jul**	**15-Jul**	**07-Aug**	**19-Aug**	**26-Aug**	**03-Sep**	
SL1	0	3	1	120	1	0	

Ston(e)y Lake							
Site	**02-Jul**	**15-Jul**	**06-Aug**	**18-Aug**	**03-Sep**		
BW Ston(e)y 01	0	0	0	2	0		

Sturgeon Lake							
Site	**06-Aug**	**19-Aug**	**05-Sep**				
SL1	2	520	0				
SL2	1	8	7				

Upper Buckhorn Lake							
Site	**~02-Jul**	**~16-Jul**	**~08-Aug**	**~20-Aug**	**03-Sep**		
Acorn	0	13	8	1			
Cedar	63	8	24	1			
FR	9	6	0	3	2		

Appendix F – Lake Partner Program (Phosphorus, Secchi Depth, Calcium, and Chloride) 2023 Results

Bob Bailey, Vice-Chair
Kawartha Lake Stewards Association

The Lake Partner Program (LPP) is a collaboration of the Ontario Ministry of the Environment, Conservation & Parks (MECP) with the Federation of Ontario Cottagers' Associations (FOCA). The data presented here are from Kawartha Lakes that were sampled by volunteers in our community in 2023:

Lake – name of the lake

Site ID – site code; sometimes there's more than one site sampled on a lake

Site Description – a brief description of the site

Date – date when the water sample was collected and other observations made

P (µg/L) – concentration of **Phosphorus** in the water, an important nutrient for plants and algae and sometimes too high from human activity

Ca mg/L – concentration of **Calcium** in the water, an important nutrient for all organisms, especially molluscs

Cl mg/L – concentration of **Chloride**, sometimes occurs at damaging levels due to human activity like road salting

Secchi Depth (m) – How clear the water is, measured by lowering a disk until you can't see it, so the deeper the Secchi depth, the clearer the water. Suspended material and algal blooms can reduce the clarity and thus the Secchi depth.

This dataset was downloaded from the LPP website (foca.on.ca/lake-partner-program/), where data from the past 20 years from samples of lakes across Ontario can be examined or downloaded, as well as background on all the measurements made by LPP volunteers and analyses of their water samples. If you don't see your lake below, you can contact the LPP program from their website and find out about becoming an LPP volunteer lake scientist!

Lake	Site ID	Site Description	Date	Secchi (m)	Phosphorus (ug/L)	Calcium (mg/L)	Chloride (mg/L)
BIG CEDAR LAKE	1	Mid Lake, deep spot	17-May-23		5.925	27.5	9.47
BALSAM LAKE	2	N Bay Rocky Pt.	23-May-23		5.065	21.2	7.39
BALSAM LAKE	2	N Bay Rocky Pt.	23-May-23	8.5			
BALSAM LAKE	2	N Bay Rocky Pt.	18-Jun-23		8.085	19.4	7.31
BALSAM LAKE	2	N Bay Rocky Pt.	18-Jun-23	6			
BALSAM LAKE	2	N Bay Rocky Pt.	17-Jul-23		12.3	19.2	7.3
BALSAM LAKE	2	N Bay Rocky Pt.	17-Jul-23	5.5			
BALSAM LAKE	2	N Bay Rocky Pt.	14-Aug-23		10.35	18.4	6.97
BALSAM LAKE	2	N Bay Rocky Pt.	14-Aug-23	5			
BALSAM LAKE	2	N Bay Rocky Pt.	11-Sep-23		13.1	17.3	7.03
BALSAM LAKE	2	N Bay Rocky Pt.	16-Sep-23	5			
BALSAM LAKE	2	N Bay Rocky Pt.	5-Oct-23		10.65	16.6	6.86
BALSAM LAKE	2	N Bay Rocky Pt.	5-Oct-23	5.5			
BALSAM LAKE	4	W of Grand Is.	31-Jul-23	5			
BALSAM LAKE	4	W of Grand Is.	14-Aug-23	4.1			
BALSAM LAKE	4	W of Grand Is.	14-Aug-23		10.75	18.9	7.13
BALSAM LAKE	4	W of Grand Is.	20-Sep-23		46.65	16.6	7.06
BALSAM LAKE	4	W of Grand Is.	20-Sep-23	3.85			
BALSAM LAKE	4	W of Grand Is.	12-Oct-23			15.9	6.72
BALSAM LAKE	4	W of Grand Is.	12-Oct-23	3.9			
BALSAM LAKE	5	NE end-Lightning Pt	10-Jun-23		7.88	11.9	7.04
BALSAM LAKE	5	NE end-Lightning Pt	9-Jul-23		12.25	9.11	6.61
BALSAM LAKE	5	NE end-Lightning Pt	20-Aug-23		11.18	7.61	6.21
BALSAM LAKE	5	NE end-Lightning Pt	10-Sep-23		11.65	7.35	5.71
BALSAM LAKE	5	NE end-Lightning Pt	2-Oct-23		10.6	6.83	5.12
BALSAM LAKE	7	South B-Killarney B	28-Aug-23		11.3		
BALSAM LAKE	7	South B-Killarney B	24-Sep-23		11.95		
BALSAM LAKE	8	W Bay2, deep spot	5-May-23	5.8			
BALSAM LAKE	8	W Bay2, deep spot	5-May-23	5.8			
BALSAM LAKE	8	W Bay2, deep spot	5-May-23	5.8			
BALSAM LAKE	8	W Bay2, deep spot	5-May-23	5.8			
BALSAM LAKE	8	W Bay2, deep spot	5-May-23		5.38	22.6	7.64

Lake	Site ID	Site Description	Date	Secchi (m)	Phosphorus (ug/L)	Calcium (mg/L)	Chloride (mg/L)
BALSAM LAKE	8	W Bay2, deep spot	1-Jun-23		9.005	19.5	7.38
BALSAM LAKE	8	W Bay2, deep spot	5-Jun-23	4.1			
BALSAM LAKE	8	W Bay2, deep spot	5-Jun-23	4.1			
BALSAM LAKE	8	W Bay2, deep spot	5-Jun-23	4.1			
BALSAM LAKE	8	W Bay2, deep spot	3-Jul-23		12.3	21.6	7.62
BALSAM LAKE	8	W Bay2, deep spot	3-Jul-23	3.6			
BALSAM LAKE	8	W Bay2, deep spot	3-Jul-23	3.6			
BALSAM LAKE	8	W Bay2, deep spot	3-Jul-23	3.6			
BALSAM LAKE	8	W Bay2, deep spot	10-Aug-23		12.85	18.5	7.25
BALSAM LAKE	8	W Bay2, deep spot	10-Aug-23	3.6			
BALSAM LAKE	8	W Bay2, deep spot	10-Aug-23	3.6			
BALSAM LAKE	8	W Bay2, deep spot	4-Sep-23	3.4			
BALSAM LAKE	8	W Bay2, deep spot	4-Sep-23	3.4			
BALSAM LAKE	8	W Bay2, deep spot	9-Sep-23		12.8	18	7.15
BALSAM LAKE	8	W Bay2, deep spot	2-Oct-23		10.575	16.6	6.96
BALSAM LAKE	8	W Bay2, deep spot	2-Oct-23	4.1			
BALSAM LAKE	9	E of Grand Is	21-Jun-23		10.8		
BALSAM LAKE	9	E of Grand Is	21-Jun-23	4.8			
BALSAM LAKE	9	E of Grand Is	14-Jul-23	4.8			
BALSAM LAKE	9	E of Grand Is	1-Aug-23	4.8			
BALSAM LAKE	9	E of Grand Is	22-Aug-23	5			
BALSAM LAKE	9	E of Grand Is	6-Sep-23	4.8			
BALSAM LAKE	9	E of Grand Is	4-Oct-23	4.7			
BALSAM LAKE	9	E of Grand Is	9-Oct-23	4.6			
BALSAM LAKE	9	E of Grand Is	24-Oct-23	4.8			
CAMERON LAKE	6	S end, deep spot	4-May-23		12	19.7	7.84
CAMERON LAKE	6	S end, deep spot	4-Jun-23	2.91			
CAMERON LAKE	6	S end, deep spot	14-Aug-23	3.18			
CAMERON LAKE	6	S end, deep spot	14-Aug-23		11.35	19.1	7.61
CAMERON LAKE	6	S end, deep spot	4-Sep-23	4.14			
CAMERON LAKE	6	S end, deep spot	4-Sep-23		17.7	17.7	7.46
CAMERON LAKE	6	S end, deep spot	2-Oct-23	2.4			
CAMERON LAKE	6	S end, deep spot	2-Oct-23		10.105	17.3	7.37
BIG BALD LAKE	1	Mid Lake, deep spot	26-May-23	4.1			
BIG BALD LAKE	1	Mid Lake, deep spot	26-May-23		5.105	29	19.5
BIG BALD LAKE	1	Mid Lake, deep spot	29-Jun-23		11.5	25.2	18.6
BIG BALD LAKE	1	Mid Lake, deep spot	29-Jun-23	2.7			
BIG BALD LAKE	1	Mid Lake, deep spot	25-Jul-23	3			
BIG BALD LAKE	1	Mid Lake, deep spot	25-Jul-23		12.7	24.2	18.8
BIG BALD LAKE	1	Mid Lake, deep spot	31-Aug-23	2.8			
BIG BALD LAKE	1	Mid Lake, deep spot	31-Aug-23		11.25	23.6	18.9
BIG BALD LAKE	1	Mid Lake, deep spot	27-Sep-23	2.7			
BIG BALD LAKE	1	Mid Lake, deep spot	27-Sep-23		13.05	23.4	18.7
BIG BALD LAKE	1	Mid Lake, deep spot	17-Oct-23		10.74	23.7	18.6
BIG BALD LAKE	1	Mid Lake, deep spot	17-Oct-23	3.2			
CHEMONG LAKE	9	S. of Causeway	26-May-23		13.9	50.3	29.8
CHEMONG LAKE	9	S. of Causeway	26-May-23	2.5			
CHEMONG LAKE	9	S. of Causeway	28-Jun-23	2.8			
CHEMONG LAKE	9	S. of Causeway	28-Jun-23		18.4	46.8	30.5
CHEMONG LAKE	9	S. of Causeway	25-Jul-23		14.1	40	30.5
CHEMONG LAKE	9	S. of Causeway	25-Jul-23	2.3			
CHEMONG LAKE	9	S. of Causeway	24-Aug-23	2.5			
CHEMONG LAKE	9	S. of Causeway	31-Aug-23		19.75	38.5	31.2
CHEMONG LAKE	9	S. of Causeway	22-Sep-23	3			
CHEMONG LAKE	9	S. of Causeway	22-Sep-23		16.7	39.6	32.2
CHEMONG LAKE	11	N of Big Island	1-Jun-23		9.025	54.1	25.8
CHEMONG LAKE	11	N of Big Island	1-Jul-23		10.80	50.9	25.5
CHEMONG LAKE	11	N of Big Island	1-Aug-23		12.65	44	25.9
CHEMONG LAKE	11	N of Big Island	28-Aug-23		11.3	42.1	26.3
CLEAR LAKE	2	Main Basin-deep spot	30-May-23	5.4			
CLEAR LAKE	2	Main Basin-deep spot	30-May-23	5.4			
CLEAR LAKE	2	Main Basin-deep spot	30-May-23		5.105	31.8	13.3
CLEAR LAKE	2	Main Basin-deep spot	28-Jun-23	3.95			
CLEAR LAKE	2	Main Basin-deep spot	28-Jun-23	3.95			
CLEAR LAKE	2	Main Basin-deep spot	28-Jun-23		14.80	29.6	12.2
CLEAR LAKE	2	Main Basin-deep spot	14-Aug-23	3.65			
CLEAR LAKE	2	Main Basin-deep spot	14-Aug-23		13.55	27.7	11.4
CLEAR LAKE	2	Main Basin-deep spot	4-Oct-23		15.9	26.5	11.8

Lake	Site ID	Site Description	Date	Secchi (m)	Phosphorus (ug/l)	Calcium (mg/l)	Chloride (mg/l)
CLEAR LAKE	2	Main Basin deep spot	4 Oct 23	4.86			
CLEAR LAKE	3	Fiddlers Bay	30-May-23	3.4			
CLEAR LAKE	3	Fiddlers Bay	30-May-23	4.98			
CLEAR LAKE	3	Fiddlers Bay	30 May 23	2.98			
CLEAR LAKE	3	Fiddlers Bay	30-May-23		9.04	30.5	11.8
CLEAR LAKE	3	Fiddlers Bay	28-Jun-23	5.4			
CLEAR LAKE	3	Fiddlers Bay	28 Jun 23		13.85	30.2	12.2
CLEAR LAKE	3	Fiddlers Bay	14 Aug 23		14.1	28.2	11.4
CLEAR LAKE	3	Fiddlers Bay	14-Aug-23	3.35			
CLEAR LAKE	3	Fiddlers Bay	4-Oct-23	5.1			
CLEAR LAKE	3	Fiddlers Bay	4 Oct 23		21.75	27.2	11.2
BUCKHORN LAKE (U)	9	Young's Cove, Deep Spot	17-May-23		11.75	31.5	11.3
BUCKHORN LAKE (U)	9	Young's Cove, Deep Spot	21-Jun-23		10.25	30.1	12.1
BUCKHORN LAKE (U)	9	Young's Cove, Deep Spot	26 Jul 23		19.5	29.8	12
BUCKHORN LAKE (U)	9	Young's Cove, Deep Spot	16-Aug-23		13.7	27.3	12.2
BUCKHORN LAKE (U)	9	Young's Cove, Deep Spot	20-Sep-23		10.35	27.6	13.9
BUCKHORN LAKE (U)	9	Young's Cove, Deep Spot	23 Oct 23		10.5	30.3	14.6
BUCKHORN LAKE (U)	10	NE of Fox Is	3-May-23	5.95			
BUCKHORN LAKE (U)	10	NE of Fox Is	23 May 23		17.2	31.9	12.4
BUCKHORN LAKE (U)	10	NE of Fox Is	24-Jun-23		22.6	30.9	12.2
BUCKHORN LAKE (U)	10	NE of Fox Is	29-Jun-23	5.75			
BUCKHORN LAKE (U)	10	NE of Fox Is	29 Jul 23	3.6			
BUCKHORN LAKE (U)	10	NE of Fox Is	29-Jul-23		21.5	29.6	11.9
BUCKHORN LAKE (U)	10	NE of Fox Is	27-Aug-23		18.7	28.4	12.6
BUCKHORN LAKE (U)	10	NE of Fox Is	27 Aug 23	4			
BUCKHORN LAKE (U)	10	NE of Fox Is	24-Sep-23	3.7			
BUCKHORN LAKE (U)	10	NE of Fox Is	24-Sep-23		14.25	27.4	12.9
UPPER STONEY LAKE	1	Quarry Bay	3-May-23		11.15	25.1	6.08
UPPER STONEY LAKE	1	Quarry Bay	12 May 23	4.1			
UPPER STONEY LAKE	1	Quarry Bay	1 Jun 23		8.02	26	7.14
UPPER STONEY LAKE	1	Quarry Bay	9-Jun-23	5.6			
UPPER STONEY LAKE	1	Quarry Bay	15 Jul 23	5.2			
UPPER STONEY LAKE	1	Quarry Bay	17 Jul 23		8.61	26.4	7.64
UPPER STONEY LAKE	1	Quarry Bay	27-Jul-23	5.5			
UPPER STONEY LAKE	1	Quarry Bay	11-Aug-23	5.9			
UPPER STONEY LAKE	1	Quarry Bay	14-Aug-23		8.85	25.5	7.55
UPPER STONEY LAKE	1	Quarry Bay	1 Sep 23		9.8	25.1	7.05
UPPER STONEY LAKE	1	Quarry Bay	1-Oct-23		5.75	24.4	6.91
UPPER STONEY LAKE	1	Quarry Bay	3-Oct-23	6.3			
UPPER STONEY LAKE	3	Young Bay	1 May 23		10.885	24.3	6.23
UPPER STONEY LAKE	3	Young Bay	12-May-23	4.7			
UPPER STONEY LAKE	3	Young Bay	1 Jun 23		8.72	26	7.25
UPPER STONEY LAKE	3	Young Bay	9-Jun-23	5.2			
UPPER STONEY LAKE	3	Young Bay	15 Jul 23	7.1			
UPPER STONEY LAKE	3	Young Bay	17 Jul 23	5.4			
UPPER STONEY LAKE	3	Young Bay	17-Jul-23		7.07	26.5	7.32
UPPER STONEY LAKE	3	Young Bay	11 Aug 23	6.4			
UPPER STONEY LAKE	3	Young Bay	14 Aug 23		8.33	25.9	7.65
UPPER STONEY LAKE	3	Young Bay	1-Sep-23		8.32	24.4	7.02
UPPER STONEY LAKE	3	Young Bay	1-Oct-23		7.9	24.2	6.87
UPPER STONEY LAKE	3	Young Bay	3 Oct 23	6.6			
UPPER STONEY LAKE	4	S Bay, deep spot	1 May 23		11.05	28.2	6.94
UPPER STONEY LAKE	4	S Bay, deep spot	1-Jun-23		12.65	20.9	7.45
UPPER STONEY LAKE	4	S Bay, deep spot	17-Jul-23		12.75	26.1	8.02
UPPER STONEY LAKE	4	S Bay, deep spot	14 Aug 23		11.3	25.6	7.82
UPPER STONEY LAKE	4	S Bay, deep spot	1-Sep-23		9.6	22.8	6.16
UPPER STONEY LAKE	4	S Bay, deep spot	1-Oct-23		10.38	25.6	7.7
UPPER STONEY LAKE	5	Crowes Landing	1 May 23		5.775	24.7	6.42
UPPER STONEY LAKE	5	Crowes Landing	12-May-23	4.5			
UPPER STONEY LAKE	5	Crowes Landing	1-Jun-23		17.8	26.2	7.28
UPPER STONEY LAKE	5	Crowes Landing	9-Jun-23	5			
UPPER STONEY LAKE	5	Crowes Landing	17 Jul 23		9.57	26.3	7.91
UPPER STONEY LAKE	5	Crowes Landing	17-Jul-23	6.1			
UPPER STONEY LAKE	5	Crowes Landing	11-Aug-23	5.8			
UPPER STONEY LAKE	5	Crowes Landing	14 Aug 23		7.88	25.9	7.73
UPPER STONEY LAKE	5	Crowes Landing	1 Sep 23		8.18	25	7.16
UPPER STONEY LAKE	5	Crowes Landing	15-Sep-23	6.8			
UPPER STONEY LAKE	5	Crowes Landing	1 Oct 23		7.87	25	7.13

Lake	Site ID	Site Description	Date	Secchi (m)	Phosphorus (ug/L)	Calcium (mg/L)	Chloride (mg/L)
UPPER STONEY LAKE	5	Crowes Landing	3-Oct-23	6.6			
UPPER STONEY LAKE	5	Mid Lake, deep spot	1-May-23		6.255	24.4	6.19
UPPER STONEY LAKE	5	Mid Lake, deep spot	12 May 23	4.5			
UPPER STONEY LAKE	5	Mid Lake, deep spot	1 Jun 23		8.555	26.4	7.39
UPPER STONEY LAKE	5	Mid Lake, deep spot	9-Jun-23	5.6			
UPPER STONEY LAKE	5	Mid Lake, deep spot	11-Jul-23	6.7			
UPPER STONEY LAKE	5	Mid Lake, deep spot	17-Jul-23	5.9			
UPPER STONEY LAKE	5	Mid Lake, deep spot	17-Jul-23		8.215	25.3	7.71
UPPER STONEY LAKE	5	Mid Lake, deep spot	11 Aug 23	5.8			
UPPER STONEY LAKE	5	Mid Lake, deep spot	14 Aug 23		7.915	25.8	7.56
UPPER STONEY LAKE	5	Mid Lake, deep spot	1-Sep-23		5.66	24.5	7.21
UPPER STONEY LAKE	5	Mid Lake, deep spot	3-Oct-23		7.305	24.6	6.88
UPPER STONEY LAKE	5	Mid Lake, deep spot	3-Oct-23	6.6			
PIGEON LAKE	3	Middle SandyPtBoyd I	20 May 23		12.5	30.2	11.8
PIGEON LAKE	3	Middle SandyPtBoyd I	15 Jun 23	2			
PIGEON LAKE	3	Middle-SandyPtBoyd I	1-Jul-23		20.25	27.1	11.6
PIGEON LAKE	3	Middle-SandyPtBoyd I	9-Jul-23	2			
PIGEON LAKE	3	Middle-SandyPtBoyd I	1-Aug-23		25	28.4	12.2
PIGEON LAKE	3	Middle-SandyPtBoyd I	8-Aug-23	1.5			
PIGEON LAKE	3	Middle SandyPtBoyd I	1 Sep 23		18.4	27.3	12.6
PIGEON LAKE	3	Middle SandyPtBoyd I	5 Sep 23	2.5			
PIGEON LAKE	3	Middle-SandyPtBoyd I	1-Oct-23		19.1	27.1	12.1
PIGEON LAKE	3	Middle-SandyPtBoyd I	9-Oct-23	2.5			
PIGEON LAKE	12	N-400m N of Boyd Is.	29-May-23		7.81	30.7	11.7
PIGEON LAKE	12	N 400m N of Boyd Is.	29 May 23	4.3			
PIGEON LAKE	12	N 400m N of Boyd Is.	29 Jun 23		15.25	29.3	11.1
PIGEON LAKE	12	N 400m N of Boyd Is.	29 Jun 23	4.2			
PIGEON LAKE	12	N-400m N of Boyd Is.	29-Jul-23		14.55	28.1	11.6
PIGEON LAKE	12	N-400m N of Boyd Is.	28-Jul-23	3.5			
PIGEON LAKE	12	N-400m N of Boyd Is.	28-Aug-23		20.6	27.7	12.4
PIGEON LAKE	12	N 400m N of Boyd Is.	28 Aug 23	3.7			
PIGEON LAKE	12	N 400m N of Boyd Is.	26 Sep 23		17.1	25.7	12.3
PIGEON LAKE	12	N-400m N of Boyd Is.	26-Sep-23	3.6			
PIGEON LAKE	12	N-400m N of Boyd Is.	12-Oct-23	4.1			
PIGEON LAKE	12	N 400m N of Boyd Is.	12 Oct 23		16.8	26.3	12.3
PIGEON LAKE	13	N end Adjacent Con17	20 May 23		12.3	30	11.7
PIGEON LAKE	13	N end-Adjacent Con17	16-Jun-23	2			
PIGEON LAKE	13	N end-Adjacent Con17	1-Jul-23		16.55	27.3	11.6
PIGEON LAKE	13	N end-Adjacent Con17	9-Jul-23	2			
PIGEON LAKE	13	N end Adjacent Con17	1 Aug 23		24.8	28.5	12.2
PIGEON LAKE	13	N end-Adjacent Con17	8-Aug-23	2.5			
PIGEON LAKE	13	N end Adjacent Con17	1 Sep 23		19.2	26.7	12.5
PIGEON LAKE	13	N end-Adjacent Con17	5-Sep-23	2.5			
PIGEON LAKE	13	N end-Adjacent Con17	1-Oct-23		14.5		
PIGEON LAKE	13	N end-Adjacent Con17	9-Oct-23	2.5			
PIGEON LAKE	15	C340 DeadHorseSho	22 May 23	3.05			
PIGEON LAKE	15	C340-DeadHorseSho	22-May-23		8.10	30.8	12.2
PIGEON LAKE	15	C340-DeadHorseSho	19-Jun-23		20.1	30.1	12
PIGEON LAKE	15	C340-DeadHorseSho	19-Jun-23	3.05			
PIGEON LAKE	15	C340 DeadHorseSho	19 Jul 23		21.05	27.3	12.3
PIGEON LAKE	15	C340 DeadHorseSho	19 Jul 23	3.05			
PIGEON LAKE	15	C340 DeadHorseSho	25 Aug 23	3.05			
PIGEON LAKE	15	C340-DeadHorseSho	27-Aug-23		20.45	27.7	12.6
PIGEON LAKE	15	C340-DeadHorseSho	22-Sep-23	3.05			
PIGEON LAKE	15	C340-DeadHorseSho	22-Sep-23		19.7	26.7	12.7
PIGEON LAKE	16	N300yds off Bottom I	29 May 23		8.450	31.3	11.2
PIGEON LAKE	16	N300yds off Bottom I	29 May 23	4			
PIGEON LAKE	16	N300yds off Bottom I	29-Jun-23		10.1	29.7	11.1
PIGEON LAKE	16	N300yds off Bottom I	29-Jun-23	4.1			
PIGEON LAKE	16	N300yds off Bottom I	28 Jul 23		10.85	28.3	11.8
PIGEON LAKE	16	N300yds off Bottom I	28-Jul-23	3.5			
PIGEON LAKE	16	N300yds off Bottom I	25 Aug 23	3.2			
PIGEON LAKE	16	N300yds off Bottom I	25 Aug 23		20.3	28.4	12.1
PIGEON LAKE	16	N300yds off Bottom I	21-Sep-23	3.4			
PIGEON LAKE	16	N300yds off Bottom I	25-Sep-23		17.85	26.7	12
PIGEON LAKE	16	N300yds off Bottom I	12 Oct 23	3.9			
PIGEON LAKE	16	N300yds off Bottom I	12 Oct 23		17.2	26.6	11.8
STURGEON LAKE	2	middle of lake, deep spot	5-Jul-23		20.6	29.6	13.1

Lake	Site ID	Site Description	Date	Secchi (m)	Phosphorus (ug/l)	Calcium (mg/l)	Chloride (mg/l)
STURGEON LAKE	4	Muskrat I-Buoy C388	27-May-23	3.3			
STURGEON LAKE	4	Muskrat I-Buoy C388	27-May-23		8.115	17.6	11.8
STURGEON LAKE	4	Muskrat I-Buoy C388	23-Jul-23		16.05	17.1	12.9
STURGEON LAKE	4	Muskrat I-Buoy C388	23-Jul-23	2.8			
STURGEON LAKE	4	Muskrat I-Buoy C388	1-Aug-23		18.1	2.59	12.7
STURGEON LAKE	4	Muskrat I-Buoy C388	11-Aug-23	2.6			
STURGEON LAKE	4	Muskrat I-Buoy C388	9-Sep-23	2.9			
STURGEON LAKE	4	Muskrat I-Buoy C388	9-Sep-23		[illegible]	23.8	12.4
STURGEON LAKE	4	Muskrat I-Buoy C388	19-Oct-23		[illegible]	23.3	11.6
STURGEON LAKE	4	Muskrat I-Buoy C388	19-Oct-23	3.2			
STURGEON LAKE	5	Sturgeon Point Buoy	29-Jun-23	4.2			
STURGEON LAKE	5	Sturgeon Point Buoy	29-Jun-23		16.55	24.7	11.5
STURGEON LAKE	5	Sturgeon Point Buoy	17-Jul-23	2.5			
STURGEON LAKE	5	Sturgeon Point Buoy	11-Aug-23	2.5			
STURGEON LAKE	5	Sturgeon Point Buoy	11-Aug-23		23.25	17.4	13.8
STURGEON LAKE	5	Sturgeon Point Buoy	29-Sep-23	2.6			
STURGEON LAKE	5	Sturgeon Point Buoy	29-Sep-23		16.85	21.1	10.3
STURGEON LAKE	9	Fenelon R. mouth	29-Jun-23	4.4			
STURGEON LAKE	9	Fenelon R. mouth	29-Jun-23		11.3	19.7	8.08
STURGEON LAKE	9	Fenelon R. mouth	17-Jul-23	2			
STURGEON LAKE	9	Fenelon R. mouth	11-Aug-23	1.8			
STURGEON LAKE	9	Fenelon R. mouth	11-Aug-23		18.8	19	7.78
STURGEON LAKE	9	Fenelon R. mouth	28-Sep-23	4.8			
STURGEON LAKE	9	Fenelon R. mouth	28-Sep-23		9.465	17.8	7.59
WHITE LAKE (DUMMER)	1	S end, deep spot	19-May-23	5			
WHITE LAKE (DUMMER)	1	S end, deep spot	19-May-23		8.545	[illegible]	11.7
WHITE LAKE (DUMMER)	1	S end, deep spot	19-Jun-23	5			
WHITE LAKE (DUMMER)	1	S end, deep spot	19-Jun-23		9.18	33.3	11.9
WHITE LAKE (DUMMER)	1	S end, deep spot	16-Jul-23	5			
WHITE LAKE (DUMMER)	1	S end, deep spot	16-Jul-23		[illegible]	31.1	11.7
WHITE LAKE (DUMMER)	1	S end, deep spot	15-Aug-23		10.25	30.5	11.3
WHITE LAKE (DUMMER)	1	S end, deep spot	15-Aug-23	3.9			
WHITE LAKE (DUMMER)	1	S end, deep spot	16-Sep-23	5			
WHITE LAKE (DUMMER)	1	S end, deep spot	16-Sep-23		10.28	29.1	11.1
WHITE LAKE (DUMMER)	1	S end, deep spot	12-Oct-23	5.2			
LOWER BUCKHORN LAKE	1	Heron Island	1-Jul-23		15.25	30.1	11.1
LOWER BUCKHORN LAKE	1	Heron Island	27-Jul-23		20.35	26.8	11.2
LOWER BUCKHORN LAKE	1	Heron Island	9-Aug-23		18.8	27.3	11.6
LOWER BUCKHORN LAKE	1	Heron Island	28-Aug-23		18.10	24.2	11.2
LOWER BUCKHORN LAKE	1	Heron Island	30-Sep-23		14.8	24.4	11.1
LOWER BUCKHORN LAKE	4	Deer Bay W-Buoy C267	21-May-23	5.7			
LOWER BUCKHORN LAKE	4	Deer Bay W-Buoy C267	21-May-23		12.8	32.2	11.7
LOWER BUCKHORN LAKE	4	Deer Bay W-Buoy C267	1-Jun-23	5.06			
LOWER BUCKHORN LAKE	4	Deer Bay W-Buoy C267	19-Jun-23	5.07			
LOWER BUCKHORN LAKE	4	Deer Bay W-Buoy C267	19-Jun-23		15.25	29.7	12.5
LOWER BUCKHORN LAKE	4	Deer Bay W-Buoy C267	5-Jul-23	5.03			
LOWER BUCKHORN LAKE	4	Deer Bay W-Buoy C267	25-Jul-23		20.05	27.7	11.1
LOWER BUCKHORN LAKE	4	Deer Bay W-Buoy C267	25-Jul-23	4.16			
LOWER BUCKHORN LAKE	4	Deer Bay W-Buoy C267	19-Aug-23	4.28			
LOWER BUCKHORN LAKE	4	Deer Bay W-Buoy C267	19-Aug-23		19.95	27.4	11.8
LOWER BUCKHORN LAKE	4	Deer Bay W-Buoy C267	1-Sep-23		19.1	25.2	11.3
LOWER BUCKHORN LAKE	4	Deer Bay W-Buoy C267	1-Sep-23	5.16			
LOWER BUCKHORN LAKE	4	Deer Bay W-Buoy C267	17-Oct-23	6.1			
LOWER BUCKHORN LAKE	4	Deer Bay W-Buoy C267	17-Oct-23		11.95	27.7	11.5
LOWER BUCKHORN LAKE	6	Deer Bay-centre	1-Jul-23		16.1	30.7	11.3
LOWER BUCKHORN LAKE	6	Deer Bay-centre	27-Jul-23		19.3	28.1	11.6
LOWER BUCKHORN LAKE	6	Deer Bay-centre	9-Aug-23		21.70	28.6	11.4
LOWER BUCKHORN LAKE	6	Deer Bay-centre	28-Aug-23		19.70	25.6	11.6
LOWER BUCKHORN LAKE	6	Deer Bay-centre	30-Sep-23		12.70	25.1	11.2
LOWER BUCKHORN LAKE	7	Lower Deer Bay, Mid-deep	6-May-23		8.805	22.7	8.36
LOWER BUCKHORN LAKE	7	Lower Deer Bay, Mid-deep	7-May-23	1.8			
LOWER BUCKHORN LAKE	7	Lower Deer Bay, Mid-deep	3-Jun-23	1.8			
LOWER BUCKHORN LAKE	7	Lower Deer Bay, Mid-deep	3-Jun-23		15.8	30.2	12.6
LOWER BUCKHORN LAKE	7	Lower Deer Bay, Mid-deep	3-Jul-23		17.3	25.7	10.5
LOWER BUCKHORN LAKE	7	Lower Deer Bay, Mid-deep	3-Jul-23	1.9			
LOWER BUCKHORN LAKE	7	Lower Deer Bay, Mid-deep	6-Aug-23		16.25	25.5	10.6
LOWER BUCKHORN LAKE	7	Lower Deer Bay, Mid-deep	6-Aug-23	1.7			
LOWER BUCKHORN LAKE	7	Lower Deer Bay, Mid-deep	7-Sep-23		15.65	24.1	11.4

Lake	Site ID	Site Description	Date	Secchi (m)	Phosphorus (ug/L)	Calcium (mg/L)	Chloride (mg/L)
LOWER BUCKHORN LAKE	7	Lower Deer Bay, Mid-deep	2-Sep-23	1.7			
LOWER BUCKHORN LAKE	7	Lower Deer Bay, Mid-deep	7-Oct-23		14.05	25.2	11.3
LOWER BUCKHORN LAKE	7	Lower Deer Bay, Mid-deep	7-Oct-23	1.7			
LOWER BUCKHORN LAKE	8	Main basin, deep-spot	9-May-23		8.605	25.4	9.86
LOWER BUCKHORN LAKE	8	Main basin, deep-spot	7-May-23	1.7			
LOWER BUCKHORN LAKE	8	Main basin, deep-spot	6-Jun-23	2.6			
LOWER BUCKHORN LAKE	8	Main basin, deep-spot	6-Jun-23		18.65	25.4	10.2
LOWER BUCKHORN LAKE	8	Main basin, deep-spot	7-Jul-23		19.95		
LOWER BUCKHORN LAKE	8	Main basin, deep-spot	7-Jul-23	2.7			
LOWER BUCKHORN LAKE	8	Main basin, deep-spot	1-Aug-23		13.7	24.7	9.87
LOWER BUCKHORN LAKE	8	Main basin, deep-spot	1-Aug-23	2.7			
LOWER BUCKHORN LAKE	8	Main basin, deep-spot	7-Sep-23	2.9			
LOWER BUCKHORN LAKE	8	Main basin, deep-spot	7-Sep-23		18.7	24.1	11.1
LOWER BUCKHORN LAKE	8	Main basin, deep-spot	7-Oct-23	2.8			
LOWER BUCKHORN LAKE	8	Main basin, deep-spot	7-Oct-23		14.7	23.3	11
KATCHEWANOOKA LAKE	1	S/E Douglas Island	14-May-23	5.4			
KATCHEWANOOKA LAKE	1	S/E Douglas Island	14-May-23		9.505	33.1	13.1
KATCHEWANOOKA LAKE	1	S/E Douglas Island	2 Jun 23		11.05	31.9	13.1
KATCHEWANOOKA LAKE	1	S/E Douglas Island	2 Jun 23	5.1			
KATCHEWANOOKA LAKE	1	S/E Douglas Island	2 Jul 23		17.25	28.7	11.8
KATCHEWANOOKA LAKE	1	S/E Douglas Island	4-Jul-23	5			
KATCHEWANOOKA LAKE	1	S/E Douglas Island	4-Jul-23		13.25	30	12.1
KATCHEWANOOKA LAKE	1	S/E Douglas Island	2-Aug-23	4.2			
KATCHEWANOOKA LAKE	1	S/E Douglas Island	1-Sep-23		14.05	28.1	11.4
KATCHEWANOOKA LAKE	1	S/E Douglas Island	1-Sep-23	6			
KATCHEWANOOKA LAKE	1	S/E Douglas Island	2-Oct-23		17.1	26.1	11.7
KATCHEWANOOKA LAKE	1	S/E Douglas Island	2 Oct 23	7.5			
KATCHEWANOOKA LAKE	2	Young Pt near locks	16 May 23		9.975	32.3	13.4
KATCHEWANOOKA LAKE	2	Young Pt near locks	16 May 23	5			
KATCHEWANOOKA LAKE	2	Young Pt near locks	5 Jun 23	5.8			
KATCHEWANOOKA LAKE	2	Young Pt near locks	5 Jun 23		13.3	32	13.5
KATCHEWANOOKA LAKE	2	Young Pt near locks	4 Jul 23	5.6			
KATCHEWANOOKA LAKE	2	Young Pt near locks	4 Jul 23		13.95	29.6	12.1
KATCHEWANOOKA LAKE	2	Young Pt near locks	17 Jul 23	3			
KATCHEWANOOKA LAKE	2	Young Pt near locks	1 Aug 23		17.8	28.5	11.8
KATCHEWANOOKA LAKE	2	Young Pt near locks	1 Aug 23	4			
KATCHEWANOOKA LAKE	2	Young Pt near locks	21-Aug-23	5.1			
KATCHEWANOOKA LAKE	2	Young Pt near locks	5-Sep-23	6.6			
KATCHEWANOOKA LAKE	2	Young Pt near locks	5-Sep-23		15.2	27.1	11.1
KATCHEWANOOKA LAKE	2	Young Pt near locks	20-Sep-23	7.1			
KATCHEWANOOKA LAKE	2	Young Pt near locks	2-Oct-23	6.1			
KATCHEWANOOKA LAKE	2	Young Pt near locks	2 Oct 23		10.45	27.6	11.3
KATCHEWANOOKA LAKE	2	Young Pt near locks	16 Oct 23	7.5			
KATCHEWANOOKA LAKE	2	Young Pt near locks	31 Oct 23	7.6			
LOVESICK LAKE	1	80' hole at N. end	17 Jul 23			28.4	11.7
LOVESICK LAKE	1	80' hole at N. end	1 Aug 23			26	
LOVESICK LAKE	1	80' hole at N. end	9-Aug-23			28.1	11.4
LOVESICK LAKE	1	80' hole at N. end	3-Oct-23		7.75	25.2	11.3
LOVESICK LAKE	3	McCallum Island	17-Jul-23			28.6	11.7
LOVESICK LAKE	3	McCallum Island	1-Aug-23			26.6	
LOVESICK LAKE	3	McCallum Island	9-Aug-23			28.1	11.4
LOVESICK LAKE	3	McCallum Island	3 Oct 23		31.05	25.1	11.3
STONY LAKE	4	Burleigh locks chan.	1 Jul 23		20.35	29.1	12.2
STONY LAKE	4	Burleigh locks chan.	3 Aug 23		47.35	27.8	11.4
STONY LAKE	4	Burleigh locks chan.	23 Aug 23		19.8	26.7	11.6
STONY LAKE	4	Burleigh locks chan.	11 Sep 23		19.1	25.5	11.5
STONY LAKE	7	Mouse Is.	19-May-23		8.975	32.1	12.4
STONY LAKE	7	Mouse Is.	2-Jun-23		9.445	31.7	13
STONY LAKE	7	Mouse Is.	5-Jul-23		16.8	28.7	11.6
STONY LAKE	7	Mouse Is.	4-Aug-23		15.8	28.2	10.9
STONY LAKE	7	Mouse Is.	1 Sep 23		10.25	27.1	10.9
STONY LAKE	7	Mouse Is.	20 Sep 23		15.1	25.3	10.5
STONY LAKE	8	Hamilton Bay	19 May 23		7.865	32.1	12.6
STONY LAKE	8	Hamilton Bay	2 Jun 23		10.385	32	12.7
STONY LAKE	8	Hamilton Bay	3 Jul 23		14.05	28.7	11.4
STONY LAKE	8	Hamilton Bay	4 Aug 23		17	28.4	10.9
STONY LAKE	8	Hamilton Bay	1 Sep 23		11.85	27	10.6
STONY LAKE	8	Hamilton Bay	20-Sep-23		13.8	25.2	10.5

Appendix G: 2024 Water Temperature Results (June 1 to August 31)

Site ID	Location	Waterbody Name	Days Above 25C (#)	Maximum Temp. (C)	Average Temp. (C)	Notes
2024 Bal1	Nearshore	Balsam Lake	46	28.9	23.4	
2024 Bal2	Nearshore	Balsam Lake	40	29.8	23.3	No data after August 18th
2024 Bal3	Nearshore	Balsam Lake				No data - logger malfunction
2024 Bal4	Nearshore	Balsam Lake	38	29.4	23.1	
2024 TSW1	Offshore	Balsam Lake	27	27.4	22.8	
2024 LBu1	Nearshore	Buckhorn Lake (L)	44	30.1	23.6	
2024 Buc1	Nearshore	Buckhorn Lake (U)	44	29.5	23.8	
2024 TSW4	Offshore	Buckhorn Lake (U)	33	27.6	23.4	
2024 Cam1	Nearshore	Cameron Lake	11	26.6	22.3	
2024 Cam2	Nearshore	Cameron Lake	26	27.8	22.7	
2024 Cam3	Nearshore	Cameron Lake				No data - logger malfunction
2024 Cam4	Nearshore	Cameron Lake	26	29.5	22.4	
2024 Cle1	Nearshore	Clear Lake				No data
2024 Cry1	Nearshore	Crystal Lake	34	27.3	23.1	
2024 Cry2	Nearshore	Crystal Lake	34	28.8	23.2	
2024 Kat1	Nearshore	Katchewanooka Lake	23	27.4	22.9	
2024 TSW5	Offshore	Katchewanooka Lake	19	27.0	22.9	
2024 Oto1	Nearshore	Otonabee River	30	27.7	23.4	
2024 Pig1	Nearshore	Pigeon Lake	31	28.1	23.2	
2024 Pig2	Nearshore	Pigeon Lake				No data - logger malfunction
2024 Pig3	Nearshore	Pigeon Lake	8	27.2	21.4	
2024 Pig4	Nearshore	Pigeon Lake	55	29.9	24.0	
2024 Pig5	Nearshore	Pigeon Lake	52	31.4	23.7	
2024 TSW3	Offshore	Pigeon Lake	27	27.2	22.9	
2024 San1	Creek	Sandy Creek	43	29.1	22.8	Creek site, not on a lake
2024 Scu1	Nearshore	Scugog Lake	35	28.9	22.9	
2024 Scu2	Nearshore	Scugog Lake	41	30.5	23.3	
2024 Scu3	Nearshore	Scugog Lake	53	30.0	23.5	
2024 Stu1	Nearshore	Sturgeon Lake	36	29.0	23.2	
2024 Stu2	Nearshore	Sturgeon Lake	52	30.5	23.7	
2024 Stu3	Nearshore	Sturgeon Lake	47	31.6	23.5	
2024 Stu4	Nearshore	Sturgeon Lake	50	30.1	24.0	
2024 Stu5	Nearshore	Sturgeon Lake	40	29.7	23.1	
2024 TSW2	Offshore	Sturgeon Lake	28	27.5	23.1	
*AVERAGE all			35.5	28.8	23.2	
*AVERAGE nearshore only			37.3	29.1	23.2	
*AVERAGE offshore only			26.8	27.4	23.0	

*AVERAGE does not include data shaded in grey. Note that sites Big1, Sto1, and Lov1 were not sampled in 2024.

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