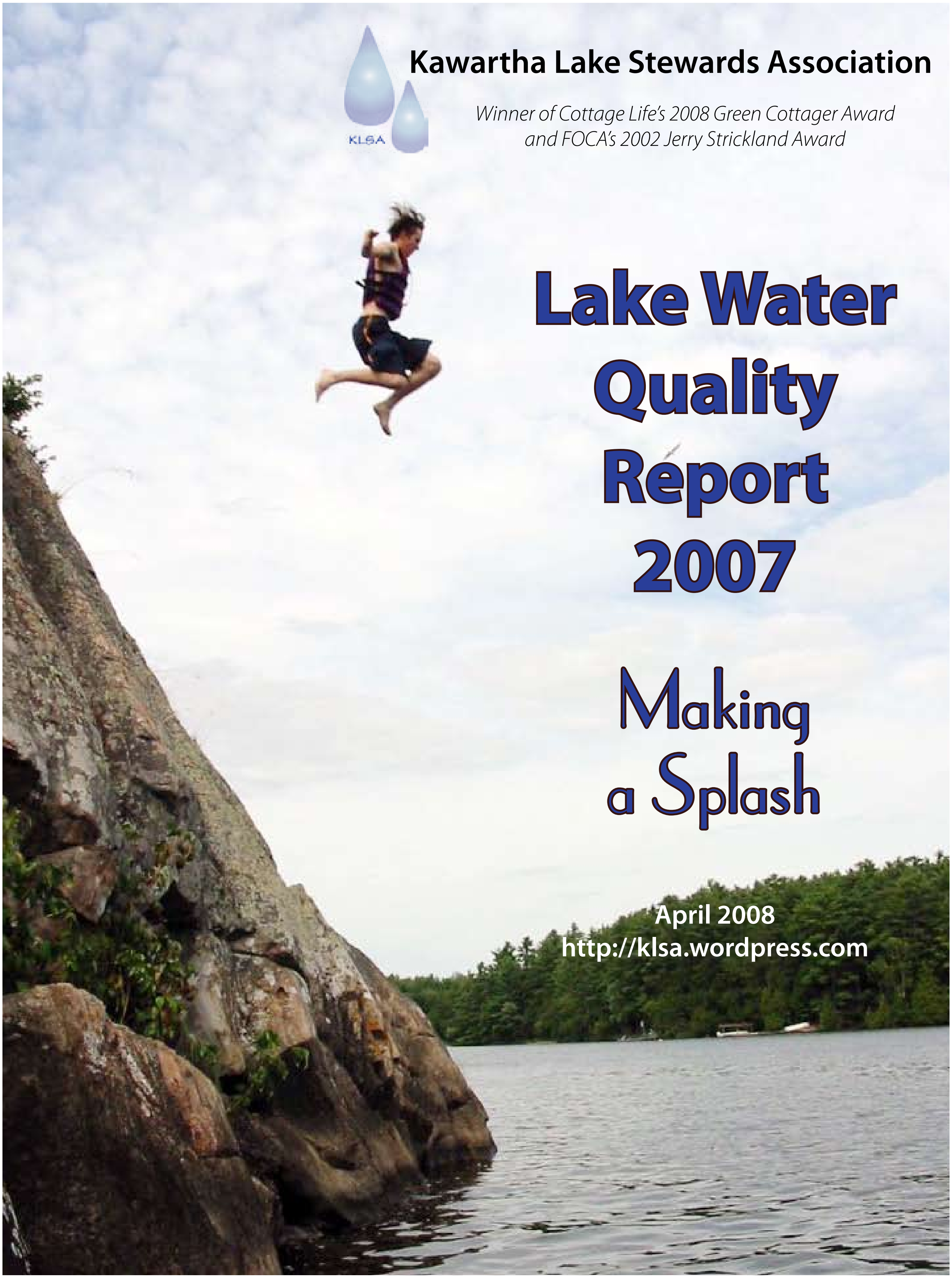


Kawartha Lake Stewards Association

Winner of Cottage Life's 2008 Green Cottager Award
and FOCA's 2002 Jerry Strickland Award

Lake Water Quality Report 2007

Making a Splash

April 2008
http://klsa.wordpress.com

Kawartha Lake Stewards Association

Lake Water Quality Report - 2007

This report was prepared exclusively for the information of and for use by the members of the KLSA, its funders, interested academics and researchers, and other non-profit associations and individuals engaged in similar water quality testing in Ontario. The accuracy of the information and the conclusions in this report are subject to risks and uncertainties including but not limited to errors in sampling methodology, testing error, reporting error and statistical error. KLSA does not guarantee the reliability or completeness of the data published in this report. Nothing in this report should be taken as an assurance that any part of any particular body of water has any particular water quality characteristics, or is (or is not) safe to swim in or to drink from. There can be no assurance that conditions that prevailed at the time and place that any given testing result was obtained will continue into the future, or that trends suggested in this report will continue. The use of this report for commercial, promotional or transactional purposes of any kind whatsoever, including but not limited to the valuation, leasing or sale of real estate, is inappropriate and is expressly prohibited. This report may be reproduced in whole or in part by members of KLSA or KSLA's funders or research partners, for their own internal purposes. Others require the prior permission of KLSA.

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

Kawartha Lake Stewards Association
858 Birchview Rd., RR #4, Lakefield, ON K0L2H0
Email: kawarthalakestewards@yahoo.ca

You can view Adobe pdf versions of KLSA reports on the web at the KLSA website http://klsa.wordpress.com and at the Trent University Oliver Ecological Centre www.trentu.ca/olivercentre.

KLSA has been 'Making a Splash' with the recent Cottage Life magazine Green Cottager Award and the Ontario Trillium Foundation's grant, which will support our exciting new research and public education project on aquatic weeds management.

Cover photo of Graham Mackenzie by Ian Mackenzie, taken on Stony Lake.

Table of Contents

Graham Mackenzie

2007 KLSA report committee at work: Sheila Gordon-Dillane, Simon Conolly, Pat Moffat, Kathleen Mackenzie. (Behind-the-scenes: Janet Duval and Kevin Walters).

Chair's Message

KLSA enters its eighth year of volunteer water quality testing programs in the Kawarthas with renewed enthusiasm. We recently learned that our application for a $50,000 Ontario Trillium Foundation grant to study, evaluate, and publicize the various methods of controlling aquatic weeds in swimming and docking areas has been approved! In partnership with Trent University, we will soon be hiring five students to carry out the research part of the work this summer. Thank you, Trillium! Thank you to the associations, businesses and private individuals in the area who have also contributed funds for this study. (For a list of donors to date, see Appendix I.)

More good news! On March 29 Cottage Life magazine announced its second annual Green Cottager Awards for outstanding environmental achievement, and KLSA was the winner in the group category. Kathleen Mackenzie and Pat Moffat accepted the attractive plaque, certificate and $2,500 on behalf of KLSA. The award money will go towards our weeds study. Thank you, Cottage Life!

KLSA is an all-volunteer environmental organization focused on testing lake water for *E.coli* bacteria and phosphorus in the lakes of the Trent-Severn Waterway from the height of land at Balsam Lake down to Katchewanooka and White Lakes, where the waters of our connected lakes become the Otonabee and Indian Rivers. In 2007, KLSA represented 19 local cottagers' and residents' associations on 15 lakes in this watershed; we took water samples from 92 sites for bacteria and 39 sites for phosphorus. During the past several years, we have expanded our focus to include the recent phenomenon of aquatic weed proliferation. Under the guidance of Dr. Eric Sager of Trent University and his colleagues and students, we have been learning more about possible causes for the prolific growth of macrophytes, or water weeds, in our area. It was this work – and the outcries from our members and other shoreline residents and businesses in the Kawarthas, wanting to know what to do about the weeds – that led us to conceive our new project and apply for the Trillium grant.

Presentation of Cottage Life's 2008 Green Cottager Award on March 29 at the Cottage Life Show: Penny Caldwell, CL editor; Pat Moffat, KLSA Chair; Kathleen Mackenzie, KLSA Vice-Chair; Al Zikovitz, CL publisher.

Pat Moffat

2007 report

We hope you will enjoy this year's varied selection of topics in our annual report. Last year's big news was the carp die-off in the Kawarthas, and we are grateful to Dan Taillon of the Ministry of Natural Resources (MNR) for writing a wrap-up of that problem and the lessons learned. Beth Cockburn of the Trent-Severn Waterway (TSW) has contributed an article summarizing the Waterway's work in protecting vulnerable and endangered flora and fauna in our area, and suggesting how we can get involved. Kathleen Mackenzie, our KLSA Board member in charge of the water testing programs, has as usual wrapped her mind around the wealth of data our volunteers collect, and come up with thoughtful interpretations concerning the varying phosphorus levels and the overall low levels of bacteria in our lakes. As in last year's report, we are publishing part of an essay on a physical overview of the Kawarthas written by KLSA Board member Kevin Walters. Reading Kevin's description of the geology, geography, and history of the upper lakes is like walking along their shores with him. In "Sustainable Lakeshore Living & Naturalizing Your Shoreline," Kevin also shares some ideas on this important topic, which may be new to you as they were to me. Finally, "Aquatic Weeds Management Study" explains exactly what we will be doing this year and next in our new research and public education project, supported by Trillium and other donors.

Networking

During the process of applying for the Trillium grant, we were encouraged to forge alliances with several other volunteer organizations as well as government agencies that could act as partners with us in different phases of our project. Now we have partners to help in preparing the public manual for weed management, which will come out of this year's research phase, and in distributing it. We look forward to working with the following non-governmental groups more closely through this project: Lakeland Alliance, the Federation of Ontario Cottagers Associations (FOCA), Gamiing Centre for Sustainable Lakeshore Living, Kawartha Protect Our Water (KPOW), and the Ontario Federation of Anglers and Hunters (OFAH). And we look forward to closer ties with government agencies such as Kawartha Conservation and Otonabee Region Conservation Authority, the Ministry of Natural Resources, Ministry of the Environment, the Trent-Severn Waterway, and the Department of Fisheries and Oceans as the project moves along.

Thank-you

Many thanks to all of our financial partners who help keep us in the black each year, with a special thanks going to the TSW, which provides our baseline funding. For a complete list of financial partners, see Appendix B. Thanks to George Gillespie of McColl Turner Chartered Accountants in Peterborough for reviewing our financial records, to the Buckhorn Community Centre for meeting space, to SGS Lakefield Research and MOE's Lake Partner Program for laboratory analysis and guidance.

We are very fortunate this year in having two new volunteers, who are not sitting on the Board of Directors but are providing invaluable assistance. Simon Conolly, publisher of the Lakefield Herald, is doing all of our desk-top publishing – from our new brochure to this annual report to, eventually, the weeds management manual at the end of our big project. Simon took over from Jeff Chalmers, our overworked treasurer, who was doing all the financial work for the organization as well as report production. Thanks to Jeff and Simon!

Pat Moffat

Have you checked out KLSA's new website? http://klsa.wordpress.com was set up by another new volunteer, Ann Jaeger. Ann is an artist and website designer who lives in Buckhorn. Our new Board member, Janet Duval, has been working hard on the new website, posting lots of information about KLSA. Thanks to Ann and Janet!

Many thanks also to the rest of the KLSA Board of Directors, who work so hard to make this all-volunteer organization a success, to Dr. Eric Sager, our scientific advisor, whose energy, knowledge and enthusiasm inspire all of us, and to all out volunteer water testers and weed watchers.

Thanks again to the Ontario Trillium Foundation, to Cottage Life magazine, and to all the businesses and individual donors to our weeds management project. Special thanks to KLSA Past Chair Jim Keyser for organizing the fund raising appeal to local businesses.

Spring meeting

We hope to see you at KLSA's May 10th meeting! It's at 10:00 a.m. at the Buckhorn Community Centre. We will be discussing the weeds management project and meeting the graduate student hired to supervise the project. We will briefly review this annual report and answer any questions about it, and we will gear up for this year's water testing programs. We will also have a featured speaker.

by Pat Moffat
KLSA Chair

Pat Moffat

Kawartha Lake Stewards Association - Executive Summary - 2007 Report

The Kawartha Lake Stewards Association (KLSA) is a volunteer-driven, non-profit organization representing cottage associations and year-round residents in the Kawartha Lakes. Established to provide a coordinated approach to lake water monitoring, the Association tests lake water for phosphorus, water clarity and *E.coli* bacteria during the spring, summer and early fall. In recent years, KLSA has expanded its activities significantly, primarily into the area of research into various factors that affect water quality such as sources of phosphorus and aquatic plants. In 2008, further research into methods of aquatic weed control will be conducted with funding from the Ontario Trillium Foundation.

Introduction to the Watershed: The Upper Lakes of the Kawarthas

The Kawartha Lakes are a unique chain of lakes occupying a broad, shallow valley running across the central part of Southern Ontario (Trent Valley). In our 2006 report, KLSA published an overview of the lakes, written by Board member Kevin Walters. In this report, Kevin discusses the history, geography and geology of the upper lakes of the Kawarthas, those located north of Fenelon Falls – Silver and Shadow Lakes (also known as the Mud Turtle Lakes), Balsam, Mitchell and Cameron and the rivers and creeks that flow into them. The upper lakes have a combined surface area of about 28 square miles (Balsam is by far the largest) and they are much deeper than most of the Kawartha Lakes, reaching depths of 50' in Balsam, 60' in Cameron and 75' in Shadow Lake. Interesting geological features include marble bedrock in the Silver Lake area, a limestone bedrock escarpment around Balsam Lake and a mix of Shield rock and limestone in parts of Cameron Lake. Remnants of an original wooden lock and dam can be found in a sandy delta area at Goose Lake, a small lake that was previously part of Cameron Lake. Varied water colours, affected by the geology and vegetation in the area are also described.

A Carp Corpse Conundrum – The 2007 Carp Die-Off

For cottagers and permanent residents of many Kawartha Lakes, the summer of 2007 was most notable for the carp die-off that occurred between June and August. Dan Taillon, a biologist at the Ontario Ministry of Natural Resources has described the occurrence and efforts that were made to identify its cause. Sick and dead carp were first found in Lake Scugog, followed by Sturgeon, Pigeon, Buckhorn, Chemong, Little, Big and Little Bald, Cameron, Sandy and Balsam Lakes, lasting about 2-3 weeks in each lake. In total, it is estimated that up to 24,000 carp were taken to municipal landfill sites during the summer. Both large and small fish were affected. Extensive laboratory studies were undertaken to look for viruses, bacteria and parasites that might be causing the die-off. The bacterium Flavobacterium columnare was the only confirmed pathogen found in the fish. Columnaris is commonly found in water and mud and has been associated with large-scale fish die-offs in the past. Environmental conditions in 2007 were conducive to the growth of F. columnare and because it resides in the substrates, the feeding behaviour of carp may make them susceptible. Additional water testing by the Ministry of the Environment in several lakes did not identify any water quality-related causes for or negative effects of the die-off. Although a large number of carp were killed during the summer of 2007, surveys showed that healthy carp were still present in the lakes after the die-off and, because carp reproduce prolifically and grow fast, the species should recover quickly. The article contains a number of best practice recommendations to avoid the introduction or spread of exotic fish diseases. The MNR is continuing to work with other agencies to develop a coordinated approach to future events of this nature.

Trent-Severn Waterway: Good News for Species at Risk

The Trent-Severn Waterway (TSW) has been participating in the federal Species-at-Risk (SAR) program since 2006. Through the Waterway Wildlife In Action for Habitat Health program, TSW has been working to increase public awareness of the 40 flora and fauna species designated "at risk" by a federal committee and has sponsored research aimed at protecting these species. Beth Cockburn, the SAR Program Manager at the TSW, describes the efforts of three regional teams (one covers the Kawartha Lakes) that have undertaken community initiatives and demonstration projects in their areas. Research initiatives have included a three year inventory of turtles along the TSW, a reptile inventory in the Severn River region and a marsh bird monitoring program. Habitat assessment and vegetation inventory studies have also been undertaken and the MNR is creating a predictive mapping tool for species and habitat distribution throughout Southern Ontario. Further information can be found at www.waterwaywildlife.com or by calling 705-750-4900.

Phosphorus Testing

In 2007, as part of the Ministry of the Environment's Lake Partner Program, KLSA volunteers collected water samples 6 times per year (May to October) at 39 sites in 15 lakes for phosphorus testing. Samples were analyzed by the Ministry lab. Volunteers also measured water clarity, using a Secchi disk. The Ministry's Provincial Water Quality Objectives consider average phosphorus levels exceeding 20 parts per billion to be of concern since at that point algal growth becomes more noticeable, adversely affecting enjoyment of the lakes.

Three "phosphorus personalities" have been identified in the Kawartha Lakes:

- **low-phosphorus lakes** (below 10 ppb) receive water only from the northern Canadian Shield regions and then flow *into* the Trent-Severn Waterway,

- **high-phosphorus lakes** (less than 15 ppb in spring, rising to 17-25 ppb in mid-summer and then declining) receive much of their water from the main Waterway flow and also from inflows from the south, and

- **marl lakes**, which have a specific chemistry that keeps phosphorus levels near 5 ppb from spring to fall.

Most of the Kawartha Lakes (10 of those where testing occurred) are high-phosphorus lakes.

"The spring flush effect": As in previous years, phosphorus levels on most of the KLSA lakes were low in the spring, rising to their maximum by early August. This lower spring phosphorus can be attributed to the large spring flush that brings low-phosphorus water from the north into the Trent-Severn Waterway. It was interesting that the very low spring and summer flows of this very dry year did **not** result in higher phosphorus levels; instead, phosphorus levels were generally slightly lower than usual. Obviously, factors other than northern inflow affect phosphorus levels.

"Changing as we flow": As in the past, phosphorus levels rose somewhat as water flowed downstream from Balsam to Stony. They fell somewhat in Stony Lake due to dilution by low-phosphorus water from Upper Stoney Lake, then rose slightly in Clear Lake and Katchewanooka Lake.

E.coli Bacteria Testing

In 2007, KLSA volunteers tested 92 sites in 12 lakes. Each site was tested up to 6 times during the summer for *E.coli* bacteria. Samples were analyzed by SGS Lakefield Research. Public beaches are posted as unsafe for swimming when levels reach 100/*E.coli*/100 mL of water. The KLSA believes that counts in the Kawartha Lakes should not exceed 50/*E.coli*/100 mL. In general, *E.coli* levels were low throughout the summer, consistent with other years. Of the 84 sites tested 4 or more times during the summer, 66 were "very clean" (no readings above 20 ppb), 13 were "clean" (occasional high readings), 1 was "slightly elevated" (3 readings between 20-100 ppb) and 4 had 4-6 high readings, "needing observation".

It is commonly assumed that high levels of rainfall will result in higher *E.coli* counts. 2007 was a dry year. There was only one weekend of heavy rain preceding a testing date and it did not result in high *E.coli* levels. The carp die-off also had no effect on bacteria counts.

The KLSA is grateful to the many volunteers who participate in our monitoring programs.

Sustainable Lakeshore Living

Sustainable lakeshore living involves minimizing one's impact on the environment, working with nature and not against it. In an article on what you can do to protect your waterfront, Kevin Walters discusses issues facing property owners along the lakeshore and good stewardship practices. Suggestions include minimizing lawn space and avoiding fertilizers, minimizing runoff to the lake by changing the grading and use of depressions and undulations, mulching and composting leaves, grass clippings and other yard waste instead of raking and removing them, keeping septic systems as far from the lake as possible with a wooded area between the tile bed and the lake and avoiding shorewalls, maintaining a natural shoreline to minimize erosion.

An Exciting New KLSA Initiative – An Aquatic Weeds Management Study

For the past several years, Dr. Eric Sager and his colleagues and students at Trent University have worked with KLSA to try to understand the increased weed growth that has occurred in the Kawartha Lakes in recent years. No conclusive answers have been found and in 2007, frustrations grew among shoreline residents about massive weed beds composed of both native and invasive species. In response, the KLSA Board of Directors submitted an application for funding to the Ontario Trillium Foundation (OTF) to study methods currently being used to control aquatic plants and the effectiveness and safety of various control methods. We are excited to report that our application was approved. The funds will be used to hire a Trent University graduate student and several undergraduate students to conduct field studies of current methods of weed control and a survey of shoreline residents. The graduate student will also undertake a literature search. Cottage associations and individuals will be asked to assist by responding to the survey and identifying potential study sites. In year two of the study, a Weed Control Manual will be prepared and distributed with the assistance of cottage associations and collaborating organizations. The Manual will outline best practices for weed control and prevention. Congratulations and much appreciation go to Pat Moffat, Dr. Eric Sager and Mike Stedman for their outstanding work in preparing the OTF application.

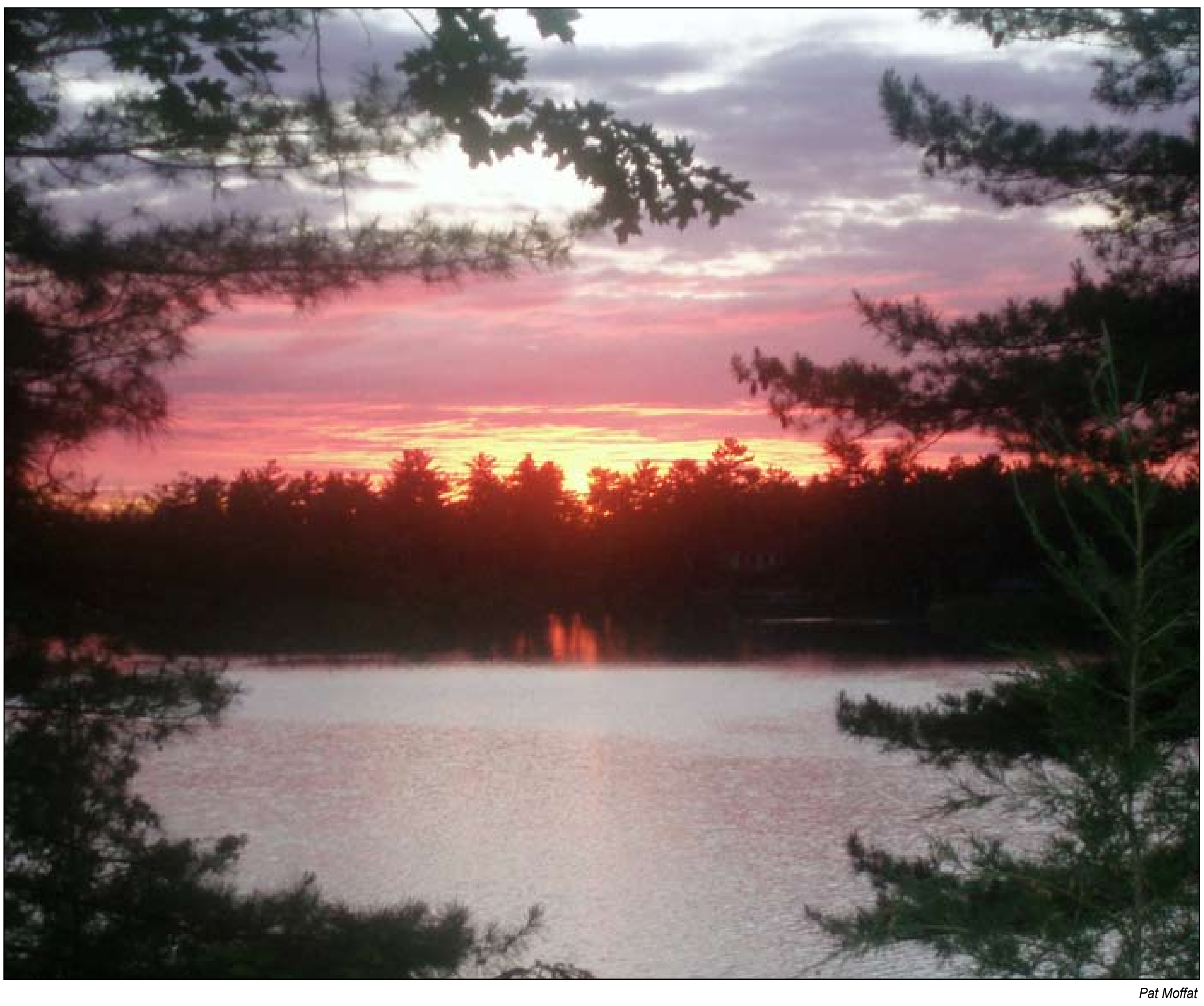
Thank you

KLSA could not achieve its goals without the extraordinary support of the many volunteers who participate in our monitoring programs and our member cottage associations and ratepayer associations, municipalities and businesses that provide financial support. We are also very grateful to our major financial partner, the Trent-Severn Waterway for its annual support. Thank you also to Dr. Eric Sager and his colleagues at Trent University for their scientific advice and ongoing support of our work, and the Ministry of the Environment Lake Partner Program.

Thanks to new volunteers: to Simon Conolly of the Lakefield Herald for preparing our publications, and to Ann Jaeger and Board Member Janet Duval for setting up our new website, klsa.wordpress.com.

Finally, special thanks to the Ontario Trillium Foundation for making our weeds management study possible, and to the businesses and private individuals who have also contributed.

Thank you, Cottage Life, for honouring us with the second annual Green Cottager Award!



Pat Moffat

Ian Mackenzie

Introduction to the Watershed

Last year, in the 2006 KLSA report, we excerpted the introductory material from Physical Overview of the Kawartha Lakes, a unique research report by KLSA board member and civil engineer Kevin Walters. Kevin has done not only geological, geographical, and historical research on the lakes of the Trent-Severn Canal watershed, but has walked much of the territory himself, taking note of the location of ruins, adjacent land use, the mixing colours of the incoming water, the vegetation and exposed geology.

As an introduction to this 2007 KLSA report, we present the part of Kevin's overview that describes the upper watershed: Shadow and Silver Lakes, Balsam, Mitchell and Cameron Lakes, as well as the rivers and creeks that flow into them.

In future annual reports, we will continue wending our way down the system of lakes, with Kevin's observations guiding us. If you missed it last year, the beginning of this overview can be found on our new website. Go to http://klsa.wordpress.com and click on 2006 Report.

The Upper Lakes of the Kawarthas

BY KEVIN WALTERS

The Upper Lakes, those lying above the falls at Fenelon, consist essentially of Shadow, Balsam and Cameron Lakes. These lakes cover a combined surface area of about 28 square miles, with Balsam comprising over two-thirds of the surface. Mean depths are relatively high in these lakes, quite distinct from the Central Lakes below them.

The Mud Turtle Lakes

Shadow Lake, while on the main stream of the Trent River – called the Gull River from Balsam Lake upstream – is not linked with the others for navigation, although there were thoughts of doing so. A drop of only 5 feet (1.5 metres) separates it from Balsam Lake. It sits on the boundary with the Canadian Shield, is mainly bedded within it, and has numerous rocky islands and points similar to those found in the Lower Lakes.

The name for this lake group has changed frequently. It was "Lac des Isles" to the early French explorers, including Champlain, "Kinaskingiquash" to the Ojibwa in the early 1800's, and later the "Mud Turtle Lakes." Today it is known as Shadow and Silver Lakes. The limestone mostly binds its south end, called Silver Lake, which is separated from a small, unnamed basin of the main lake by a short swift (fast water) on Shield rock. At the outlet of Silver Lake, the Gull River slides over limestone bedrock, and this is where the Gull River geological formation acquired its name. Notwithstanding the new individual names, we can still refer to this small scenic chain as the Mud Turtle Lakes.

At Coboconk, the waters of the Gull are harnessed by a dam, facilitating navigation upstream along the limestone bedded river, forming yet another small basin. A small side channel where a lock would have been expected allows a small flow through a culvert beneath a road crossing. Given that this drop is only about 5 feet, it is surprising, unfortunate even, that some sort of small-craft boat transfer facility between these lakes and Balsam Lake downstream does not exist.

Ian Mackenzie

Ian Mackenzie

The Gull River is a beautiful, highly regulated stream of crystal-clear and sometimes blue-green water that enters the top end of Shadow Lake at Norland, after tumbling over a dam and waterfall founded on marble bedrock. Above this are two more falls, one of which was blasted to mere rapids, while the uppermost one, Elliot Falls, produces hydroelectricity. Above this, the river continues for some distance to the first of the Haliburton Lakes. The river and its two main tributaries, the Kennisis River and the Redstone River, originate at the southern fringes of Algonquin Park, and pass through the central part of Haliburton County, leaving at the southwest extreme of the county.

Most of the Gull River watershed is a well-forested region of Precambrian Shield terrain, with much of that bedrock fairly well covered by glacial till and other deposits. As a result, the bedrock is exposed primarily along lakeshores and on hilltops, as well as in the numerous road cuts. The western fringe of the watershed, lying just to the west of the river itself upstream of Norland, is a complete contrast. Here, an uninhabited country with few roads extends west to Muskoka and is almost entirely bare bedrock, with sparse tree cover and marshy lakes. This was the result of the repeated conflagrations that laid the land waste following logging, and consequently this area was, for a time, known as "The Burnt Lands." Islands located within some of the lakes escaped the fires and still sport mature tree cover towering over the surrounding landscape, providing a glimpse of the way the land formerly appeared. Today, this bleak tundra-like area is partly contained within the limits of Queen Elizabeth II Provincial Park.

At its entry to Shadow Lake, three streams of highly stained or "tannic" water join the flow to produce a slight yellowish discoloration, typically seen throughout the Kawartha Lakes. The tannins are produced by the decay of vegetation in wetland areas.

Both Balsam Lake and Shadow Lake enjoy high water clarity. The clarity and lack of organic colour is due to a near continuous series of lakes making up this river system, with only minor wetland areas. A large portion of these upstream lakes are dammed to higher levels as reservoirs for the Trent-Severn Waterway (TSW), allowing the flow of the Gull River to be maintained remarkably close to its average annual flow rate.

Balsam Lake

The much larger Balsam Lake is entirely within the limestone bedrock, which often forms its shoreline in the form of a low escarpment. A series of islands in the northeastern part of the lake and off the tip of Indian Point are likely Shield-rock outcrops or "inliers." The large island called Grand at its centre is a mesa of limestone.

An early map *The Coast of the United States* by the U.S. Government Survey dated 1817, with additions and revisions to 1891, indicates native as well as English names for most of the lakes of the Kawarthas. The lake appeared on this map as "Balsam Copeiba Lake," an obvious variant of Balsam Copaiba, a South American tree species producing an essential oil, probably used here in reference to either the aromatic balsam fir or balsam poplar, both of which are found in the Kawartha Lakes region. This same map also indicates a native name of "Canenandacokauk," likely an Ojibwa/Chippewa name that might have applied since that native group was by then well established on these lakes.

Ian Mackenzie

Ian Mackenzie

The abundant exposed limestone in the area led to an early cement industry, and limestone kilns for baking limestone into lime can still be seen looming above the village of Coboconk just west of Highway 35.

There are two Provincial Parks on this lake, the operating Balsam Lake Provincial Park, and the unstaffed "natural environment" Indian Point Provincial Park.

At the west side of Balsam Lake, the divide between Severn River drainage to Georgian Bay and the Trent River drainage to Lake Ontario is found only a kilometre or so away. Here, the builders of the Trent Valley Canal cut a canal across the flat plain to link with Mitchell Lake on the Severn system. Mitchell and Balsam Lakes are therefore linked and at the same elevation.

Mitchell Lake is however situated on the Talbot River system, a small tributary to the Severn River system, and has little summertime water from which to supply that portion of the canal. This small river system is located on the Carden Plain, an area of dry limestone flatland dotted with very shallow and usually small marl lakes. Marl is the product of limestone dissolved by slightly acidic rainfall and runoff, re-establishing itself as a solid once in a lake, where summer temperatures (and algal growth) force the dissolved material to precipitate out again. One of these lakes, Raven Lake, just to the west of Balsam, was used for marl extraction for early cement manufacture. Ruins of the old stone buildings sit on its east shore, and part of the bottom of this shallow lake is ringed with trenches from the extraction of the marl.

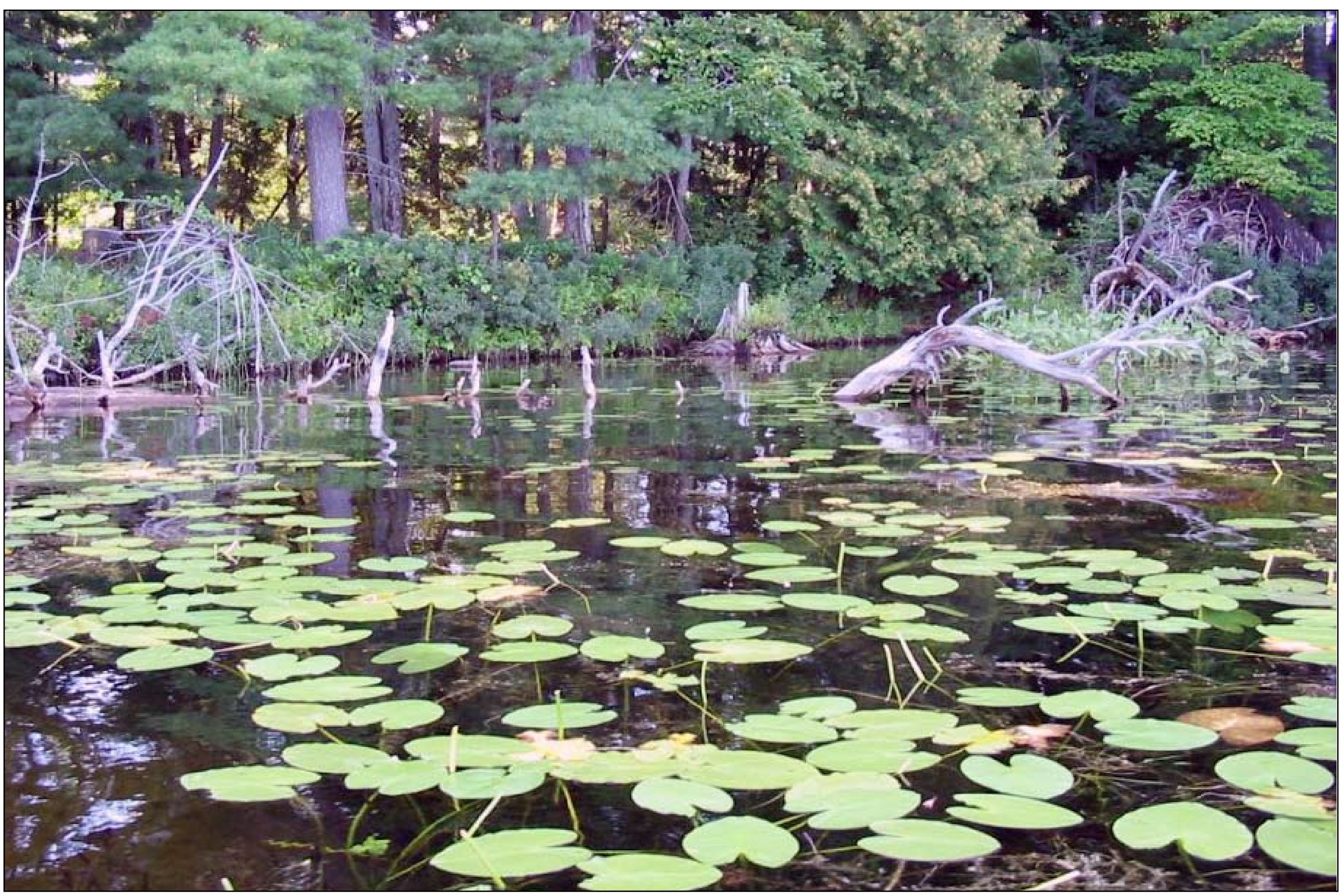
The designers of the waterway therefore installed a hydraulic lift lock at the west end of this summit level near Kirkfield, so as to minimize the need to draw water from the Gull River watershed via Mitchell Lake into the Severn watershed for its operation.

Nonetheless, today the TSW makes little attempt to regulate the flow on Mitchell Lake. In the spring, some water from this lake flows east through the canal into Balsam, and during the summer, water is drawn from Balsam the other way to feed the locks along the Talbot River stepping their way to Lake Simcoe.

At Rosedale, the Gull River is now usually called the Rosedale River, and spills into Cameron Lake via a channel widened and deepened for navigation, and thence over a broad dam.

Cameron Lake

Cameron Lake, just a short distance downstream of Balsam Lake, and only 4 feet (1.2 metres) lower, picks up the flow from the Burnt River, the largest tributary entering the Kawartha Lakes. Here, a large delta has formed where the Burnt River meets the water from the Gull entering from Balsam Lake. The flatwater Burnt River is navigable upstream for some 24 kilometres to just beyond the village of Burnt River. This is the most northerly point of continuous navigation along the Trent Canal system within the Trent River watershed. The early U.S. Coastal map states that this river is "not navigable by canoe," which must have been an error interpreting reconnaissance, or may have referred to the jams of debris for which the river was then noted. A large island, Fork Island, sits in the delta.



Ian Mackenzie

This river originates in the east-central part of Haliburton County, and, unlike the Gull River system, has relatively few lakes long its route. Oddly, the smallest of its three main branches is the one that carries the name Burnt River, beyond the first junction just upstream of Kinmount, and yet again at the next junction at Gelert. Only the Drag River branch passing through the town of Haliburton contains lakes along its route. Accordingly, the designers of the canal system downstream were much less able to regulate the discharge of this river system through the construction of small reservoir dams like those seen along the Gull.

The larger stream branching off above Three Brothers Falls above Kinmount brings in most of the river's colour, and this river, today called the Irondale River, flows through a sandfilled valley surrounded by large barren areas of bedrock. It is therefore quite flashy (prone to rapid flow increases) following melt events or storms, and carries, as a result, large quantities of fine sand, ultimately deposited in Cameron Lake as a delta.

A small part of what was once Cameron Lake has been isolated by this river delta and is called Goose Lake. A small passage cut by lumbermen through the riverbank provides access to this small lake. An esker, being a bed of a river flowing beneath a glacier, confines the marshy delta to the northwest corner of the lake, and produces a couple of islands and shoals in the lake before disappearing altogether.

Interesting historical structures are found in this delta. Remnants of the original wooden lock and dam from 1873 can be seen in the Gull or Rosedale River, just downstream of the village of Rosedale, used until replacement between 1907 and 1914 with the current canal and lock. This modern canal bypassed much of the Gull or Rosedale River, leaving the old river route obsolete. This is the only remaining example of such an early lock, as all replacements elsewhere were located generally in the same spot, obliterating the original structures. In addition, cribs remain at the junction with the Burnt River, where early log booms containing the logs floated down the Burnt River were tethered, along with other remnant structures in the vicinity.

Ian Mackenzie

The Burnt River, as the name implies, is stained a tea colour from upstream wetlands, and this distinctly darkens the waters of Cameron Lake. The natural processes of settling, ultraviolet light breakdown and biological decay lighten the waters somewhat before they leave the lake.

Cameron Lake appears to be turned around 180 degrees. Marshlands and flatwater rivers are usually found in the south end of the Kawartha Lakes, and Shield rock in the north. In Cameron, we find it the other way round. While Cameron Lake is surrounded by the limestone bedrock, Shield rock is exposed along the south and east shore where it rises up in one of those ridges, confining the south shore, and apparently creating the foundations for Deihl and Gregory Points. It is not exposed again until well upriver along the Burnt, especially at the limit of navigation where falls block further passage. To the north, the Burnt River snakes its way through a low-lying landscape with extensive marshlands and forested swamp.

Perhaps to make up for their relatively small size, Shadow and Cameron Lakes are among the deepest lakes found in the Kawarthas, at 75 and 60 feet maximum depths respectively. Balsam is relatively shallow, not quite reaching 50 feet. Deep holes are also found in bends along the Burnt River that rival the deepest part of Cameron Lake itself.

The regulated summertime flow of the Gull River into Shadow Lake is about 600 cubic feet per second (cfs). Although a number of rivers and streams enter the Kawartha Lake system as it continues downstream, this flow rate will be essentially unchanged when it leaves the lakes, as will be described later. However, thanks to the added flow from the sizable and also fairly well regulated Burnt River, the flow at the falls at Fenelon is typically the highest on the system during dry summer weather, although most of the flow is actually routed through hydroelectric generating facilities.

Another smaller stream, called Corben Creek, wedged between the Gull and Burnt Rivers, adds unregulated flow to Balsam Lake. This stream originates on the Shield, flows into and out of four square-mile Four Mile Lake, and disappears underground for some distance in limestone karst country, before re-emerging to flow into Balsam Lake.

Another characteristic of the Upper Lakes is the minor drainage inputs from the agricultural south. Small unregulated streams such as the Staples River (just a creek, but named for the broad channel entering Balsam Lake through marshlands at the south end), and Martin and Pearns Creeks entering Cameron Lake are the only significant contributors.

The net added inflow to the Upper Lakes in dry weather including that from the Burnt River, is about 200 cfs, while the 30 square-mile lake and wetland surface area evaporates approximately 60 cfs. The net quantity then tumbles over Fenelon Falls in the middle of the town bearing the same name.

Kevin Walters is an engineer at Dillon Consulting in Toronto, and a Director of KLSA.

The 2007 Carp Die-Off

BY DAN TAILLON

The MNR's Kawartha Lakes Fisheries Assessment Unit (KLFAU) was conducting an End of Spring Trap Netting (ESTN) survey on Lake Scugog between May 23 and June 8, 2007. This survey was part of routine monitoring conducted annually by the KLFAU on a rotational basis on four area lakes (Lake Scugog, Balsam, Rice and Buckhorn Lakes). On the weekend of June 2, 2007 carp captured in the trap nets displayed obvious signs of poor health including haemorrhaging, 'pop-eye', lethargic behaviour and fin deterioration. Carp collected in the nets prior to this date did not display obvious external signs of illness. Following the initial detection, the majority of carp sampled in the trap netting program on Lake Scugog displayed similar signs. In the subsequent weeks, dead carp were observed on Sturgeon, Pigeon, Buckhorn, Chemung, Little and Big Bald, Cameron, Sandy and Balsam Lakes. Generally, the carp die-off lasted between 2-3 weeks on each lake.

The analysis

Upon discovery of the carp with clear signs of illness, MNR staff immediately sent samples for analysis. Determining the cause of a fish die-off is often extremely difficult. Fish are resistant to many diseases, however, when fish are under stress (from spawning, rapidly changing water conditions, crowding, etc.) fish may not be able to fight off an illness.

There are several challenges faced when trying to determine what pathogen (a pathogen could be a bacterium, parasite or virus) has killed a fish and these include:

- Fish that are sick with a variety of different diseases often show the same, or similar, signs of illness;
- By the time people see a sick fish, that particular fish is very sick and may actually be sick with more than one pathogen because opportunistic pathogens will invade weakened fish; and,
- Since fish cannot tell us what symptoms they have or to what diseases they have been exposed, we must rely on the process of elimination in the laboratory to determine what might have caused the fish to get sick and/or die.

Growing pathogens in the lab takes time. Some bacteria grow very rapidly within a few days. However, viruses take longer and often require two growing periods, each taking 21 days. Viruses are more difficult to work with in the laboratory because they grow inside of cells and are prone to mutating, making identification challenging. For viruses never before observed in Ontario, a further period of time (usually several weeks) is required to send the virus sample to a federal government laboratory for confirmation.

The results

To date, the bacterium *Flavobacterium columnare* is the only confirmed pathogen found in carp sent for testing. *F. columnare* is commonly present in the environment where it is found naturally in water and mud and causes a disease in fish called columnaris. Environmental conditions during the summer of 2007 were conducive to the growth of *F. columnare*. Columnaris infections are commonly associated with exposure to biological or environmental stressors such as water temperature greater than 20°C, high fish densities and poor water quality. Heavily infected fish may die within 24 hours; however fish with infections of *F. columnare* on the skin may take longer to show signs of disease (two to seven days) (Tripathi et al., 2003).

Common external signs of columnaris include sores on the gills and body that are white to brown, greyish-white or orange-yellow in colour. These sores, that may occur on the fins, head and body, eventually increase in size and may expose the underlying muscle. Signs consistent with those listed above were observed on a number of carp (dead and alive) in the Kawartha Lakes in 2007. Once established, the infection can spread quickly and cause high mortality rates.

Estimates based on municipal waste collections and public reports indicate that between 12,000 – 24,000 carp were taken to municipal landfills between early June and early September. The size range of carp affected was varied, with carp as small as 30-35 cm (12-14 inches) and exceeding 75 cm (~30 inches) observed on area waterbodies.

Why carp?

Columnaris has been associated with large-scale fish die-offs in the past. In 2006, between 2000-4000 channel catfish died over a two week period in a 160km section of the Ottawa River. This event was linked to high temperatures, torrential rains and extreme runoff events in late July and early August of 2006. These factors combined to create an environment that was particularly stressful for juvenile channel catfish and allowed the columnaris bacteria to spread quickly (Punt and Castro, 2006).

A large-scale die-off of carp occurred in 2001 on the St. Lawrence River. Investigations determined that the ultimate causes of the die-off were opportunistic bacterial infections with A*eromonas hydrophila* and *Flavobacterium* species in fish with suppressed immune systems that resulted from a combination of biological (i.e., spawning) and environmental (i.e., high temperatures and low water levels) stressors (Monette et al., 2006).

Carp are a species that is not native to North America, but were introduced in the 1800s as a desired food fish. The introduction into Ontario waters is believed to be the result of an accidental introduction in the 1890s when a dam near Newmarket, Ontario burst. Carp are a prolific and fast growing species. Females mature as early as 4-5 years, males mature earlier, typically by age 3-4. Females produce a large number of eggs; a 10kg female may hold more than 2,000,000 eggs. Spawning occurs in late May or early June, but may continue throughout the summer if environmental conditions permit. Young are fast growing and may reach up to 8 inches in length by the end of their first year. Carp are generally able to tolerate poor environmental conditions including low oxygen and high temperatures. They are omnivorous, feeding on plant material as well as aquatic insects, crustaceans, annelids, and molluscs (Scott and Crossman, 1998).

Many of these features may make carp susceptible to a columnaris outbreak. Columnaris is believed to reside in the substrate, and the feeding behaviour of carp may increase the likelihood of exposure. The direct contact of fish during spawning may also facilitate the spread of an infection, as the bacteria are likely present on the body of infected fishes.

Although a large number of carp were killed during the summer of 2007, healthy carp were still present in the area lakes, and the prolific nature of the species should allow for a quick recovery of the population. Area lakes still provide optimal habitats for carp. Fall Near Shore Community Index Netting (NSCIN) surveys on Lake Scugog actually had a higher catch per unit effort for carp in 2007 (0.5 carp per trap net) than either 2006 (0.3 carp per trap net) or 2003 (0.4 carp per trap net) surveys.

Throughout the summer months, MNR received reports of dead sport fish species including walleye, largemouth bass, smallmouth bass and muskellunge. Typically, these were reports of individuals or very small numbers of dead fish, and were very few in number relative to reports of dead carp. Other factors, including angling stress, parasites, and natural causes may have contributed to the mortality of other fish species. Monitoring personnel, including MNR staff from the District Offices, Conservation Officers, and the KLFAU collectively spent a significant amount of time on area lakes each year and did not observe any abnormal mortalities of sport-fish species during the summer of 2007.

Sheila Gordon-Dillane

Safety checks

As a direct response to the carp die-off, MOE undertook a special water quality sampling survey in the Kawartha Lakes in mid-August to check for potential water quality impacts or conditions. Analytical results were obtained for a suite of general chemistry parameters indicative of lake water quality: heavy metals, nutrients, pH, alkalinity, conductivity, BOD5 (biological oxygen demand), suspended solids, and bacteria. Also, samples were collected for algae identification at two lakes. The samples collected from affected lakes (Sturgeon Lake, Balsam Lake, Mitchell Lake, and Canal Lake) showed no significant difference in water quality when compared to historic ranges. The samples collected from downstream/unaffected Rice Lake show no significant difference from historic ranges, however, nutrient levels and total suspended solids results were marginally elevated suggesting the possibility of an algae bloom in progress at the time of sampling. Algae identification of samples from Balsam and Mitchell Lakes indicated that blue-green algae were present, as expected, but not at densities necessary to produce toxins at levels that would explain the carp die-off. Field observations and measurements made while sampling did not indicate any apparent water quality impacts either. Based on the information collected by MOE and other agencies, there is no evidence to suggest that the 2007 carp die-off was directly associated with a water quality impact or pollution incident.

Sheila Gordon-Dillane

Possible preventive measures

Predicting the occurrence of a disease outbreak is virtually impossible. Die-offs resulting from infections from naturally occurring bacteria may not be preventable, but there are a number of steps that can be taken to prevent the introduction of exotic fish diseases. In addition to reducing the risk of introducing an exotic disease, these measures can also reduce the spread of aquatic invasive species. Best practices for anglers and boaters include:

- Use bait fish that have been harvested locally.
- Use roe (fish eggs) as bait only when fishing in the same waterbody where roe was collected.
- Do not discard roe or bait fish in lakes or rivers. Place unused bait in the garbage.
- Do not move live fish from one location to another.
- Remove all mud, aquatic plants and animals from all gear, boat motors and trailers before leaving a body of water.
- When cleaning/gutting fish, ensure that the waste products do not contact waterways. Dispose of fish internal organs, skin, scales, heads and tails in the garbage.
- Equipment and clothing used during angling activities should be thoroughly cleaned and disinfected.
- Before moving your boat from one waterbody to another, clean and disinfect live wells with a 10% household bleach/water solution (i.e., 100 ml of household bleach to 1 litre of water). Rinse well to remove residual chlorine and discard away from fish-bearing waters. Chlorine is toxic to fish.
- Empty bait fish containers, live wells and bilges away from water, in an area where the water will be absorbed into the ground.

In addition to preventative measures anglers and boaters can take, it is important to remember that it is illegal to release fish from an aquarium into natural waterways or to collect fish from a natural waterway for an aquarium. Following these rules can reduce the risk of introducing or spreading fish diseases.

The MNR is committed to learning from the events of the summer of 2007 and is working with our agency partners to develop a coordinated approach to addressing large scale fish die-offs should they occur in the future. The public and agency partners have emphasized that coordination and communication are critical for managing such events. Once developed, details associated with the coordinated approach will be shared.

Submitted February 22, 2008

Dan Taillon is Area Biologist, Peterborough District, Ministry of Natural Resources

References:

Monette, S., A.D. Dallaire, M. Mingelbier, D. Groman, C. Uhland, J.P. Richard, G. Paillard, L.M. Johannson, D.P. Chivers, H.W. Ferguson, F.A. Leighton and E. Simko. 2006. Massive Mortality of Common Carp (Cyprinus carpio carpio) in the St. Lawrence River in 2001: Diagnostic Investigation and Experimental Induction of Lymphocytic Encephalitis. Vet Pathol 43:302–310

Punt, K. and V. Castro. 2006. Information Report: Ottawa River Fish-Kill Event, August of 2006. Ontario Ministry of Natural Resources and Ontario Ministry of the Environment. 52 pp.

Scott, W.B., and E.J. Crossman. 1998. Freshwater Fishes of Canada. 4th edition. Galt House Publications, Oakville, ON.

Tripathi, N.K., K. S. Latimer and P.M. Rakich. 2003. Columnaris Disease in Freshwater Fish. University of Georgia. Vol. 25, No. 7. p. 528-535

Parks Canada

A Blanding's Turtle basking in a wetland.

Trent-Severn Waterway Good News for Species at Risk

By Beth Cockburn

The Trent-Severn Waterway (TSW) has been participating in the federal Species at Risk (SAR) program since 2006. Through the Waterway Wildlife-Action for Habitat Health program, TSW has been working to increase public awareness of the 40 flora and fauna species that have been designated "at risk" by the Committee on the Status of Endangered Wildlife in Canada. TSW has also been sponsoring research that will aid in making decisions about how to best protect these species. After two years, the Waterway Wildlife-Action for Habitat Health program is having a real impact, as partners work together to achieve the goal of protecting species at risk and their habitats.

Why is this important to you? These species contribute to our quality of life in many ways. They are sources of pleasure and excitement when unexpected encounters make our day. They are an intrinsic part of the atmosphere that attracts us to our varied destinations. Whether we're on our way to holiday on the TSW, visit the cottage, hike in the woods, or if we are fortunate enough to live there, some of our finest moments are defined as we watch life play out around us. Picture the Great Blue Heron feeding off the end of your dock, the turtle basking on a log at your shoreline or the hawk diving for its prey over a field. Would it be the same if these species, often taken for granted, disappeared? More importantly, SAR are indicators of the health of our planet, and its ability to support a diversity of species. Species loss is an indicator of the deteriorating quality of the environment, and loss or fragmentation of valuable natural habitats.

Three regional teams have been established throughout the Waterway to undertake communication and demonstration projects in their areas. They are: the Simcoe-Couchiching-Severn Regional Team, the Kawartha Lakes Regional Team and the Rice Lake-Trent River Regional Team. Teams include members from such groups as provincial and federal agencies, Conservation Authorities, conservancies and land trusts, field naturalist clubs, Stewardship Councils, First Nations, cottage associations, educators, non-governmental environmental groups and many others. As these teams get out and meet the public in a variety of forums, and undertake demonstration projects on both public and private lands, species at risk are becoming better recognized and understood. With the assistance of partners and volunteers, projects have been completed in each region that heighten awareness of species at risk and demonstrate simple actions that can be taken to protect them. Watch for these "Waterway Wildlife" teams. They will be visiting many events in your community, and have excellent information and assistance to offer.

Research has continued throughout the duration of the program, adding to current knowledge and databases. The turtle team completed its final year of a three-year inventory along the Waterway during the summer of 2007. The team also hosted a variety of information and outreach events at lock stations and other venues, which were well received by the public. A study initiated in 2007 by a Laurentian University Master of Science student is investigating whether or not the TSW lock and dam system is interfering with turtle movement and gene flow. Reptile inventories have been undertaken in the Severn River Region for the last two summers, and will continue in 2008. As well, the TSW continues to examine and adjust internal practices to ensure that everything possible is being done to reduce operational impacts on important ecosystems.

Habitat Assessment crews were out in the field last summer, completing year two of a three-year project designed to provide accurate vegetation inventories and SAR data to partners in the Information Management and Spatial Analysis Unit of the Ontario Ministry of Natural Resources (MNR) in Peterborough. The MNR team is in the process of creating a predictive mapping tool for species and habitat distribution throughout southern Ontario, which will aid biologists, planners and others in efforts to protect SAR and their habitats.

Year two of a Marsh Bird Monitoring program was undertaken in 2007, completing that inventory for Lake Scugog and on some of the Kawartha Lakes. The inventory of Marsh Bird SAR will continue in 2008.

Staff at the TSW have also been busy developing information that will help you learn to reduce your impact on the landscape of the Waterway and its wildlife. Visit the new website at www.waterwaywildlife.com and see what's there for you. Check out the calendar of events occurring throughout the Waterway, and join in. Get connected and Take Action for Habitat Health!

Beth Cockburn is Species at Risk Program Manager with Parks Canada, Trent-Severn Waterway National Historic Site of Canada. Email her at: Beth.Cockburn@pc.gc.ca

Phosphorus Testing

BY KATHLEEN MACKENZIE

In 2007, KLSA volunteers measured phosphorus 6 times from May to October at 39 sites in 15 lakes. Samples were analyzed by the Ontario Ministry of the Environment's Lake Partner Program. Why do we keep track of phosphorus levels? Generally, readings under 10 ppb guarantee clear water. Levels of 10 – 20 ppb indicate water of good recreational quality. However, at phosphorus levels over 20 ppb a rise in turbidity may become noticeable and there may be an increase in algal overgrowths or "blooms," which, despite their euphemistic name, are always unattractive. Higher phosphorus also eventually results in rich lake sediments, which encourage aquatic weed growth. A rise in lake phosphorus is therefore undesirable. Sources of excess phosphorus include sewage treatment plants (see KLSA report 2006), fertilizers, precipitation (which washes out airborne dust), existing rich lake sediments, and septic systems. Please see Appendix F for phosphorus and Secchi data and discussion of lake-by-lake results.

What did we find in 2007? Generally, phosphorus levels were slightly lower than in the past 5 years. This may have been due to a somewhat dry summer, resulting in less runoff, but that's just a guess. As discussed in the KLSA 2006 report, phosphorus levels do not correlate closely with rainfall. As described in the article on page 20, there was a major carp die-off in early and mid-July that left carp carcasses in Scugog, Sturgeon, Pigeon, Buckhorn, Chemong, Big and Little Bald, Cameron, Sandy and Balsam Lakes. Although the rotting of vegetation or animals does release phosphorus into the water, there seemed to be no unusual rise in phosphorus at that time (see Appendix F graphs).

Three phosphorus patterns seen in the past recurred in 2007.

Familiar Phosphorus Pattern One: Three "phosphorus personalities"

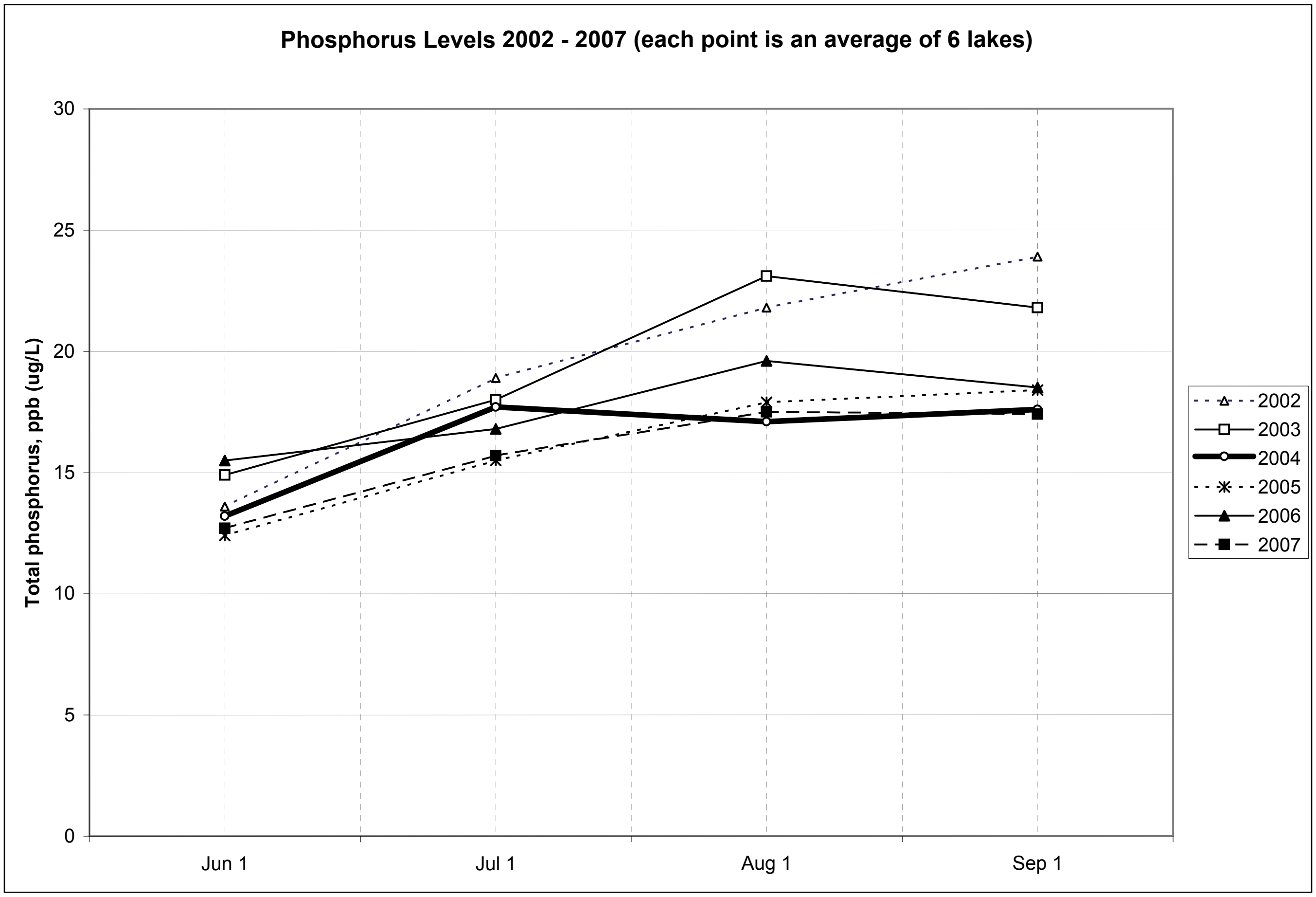
Over the past years, we have seen the KLSA lakes exhibit three different "phosphorus personalities", as described in the table below:

	High-phosphorus Lake	Low-phosphorus lake	Marl lake
Phosphorus level in lake	Less than 15 ppb in May and June: exceeds 15 ppb in July and August	Less than 13 ppb	Less than 10 ppb
Source of water	Main inflow from north, some water from south	Inflows only from north, water flows from these lakes *into* the Trent-Severn Waterway	Mainly local groundwater
Characteristic of watershed	"two-tone" watershed. To the north is granite-based coniferous forest (low-phosphorus). Watershed to south is limestone-based with rich soil, agriculture, higher population density (high-phosphorus).	Granite-based coniferous forests.	High in calcium carbonate, which precipitates phosphorus
Number of lakes	10	2	3
Appearance	Slightly turbid; some visible algal growth (floating green dots, slime on rock, etc.), some areas of muddy sediments	Very clear water; little visible algae	Usually clear, occasionally milky look; powdery sediments

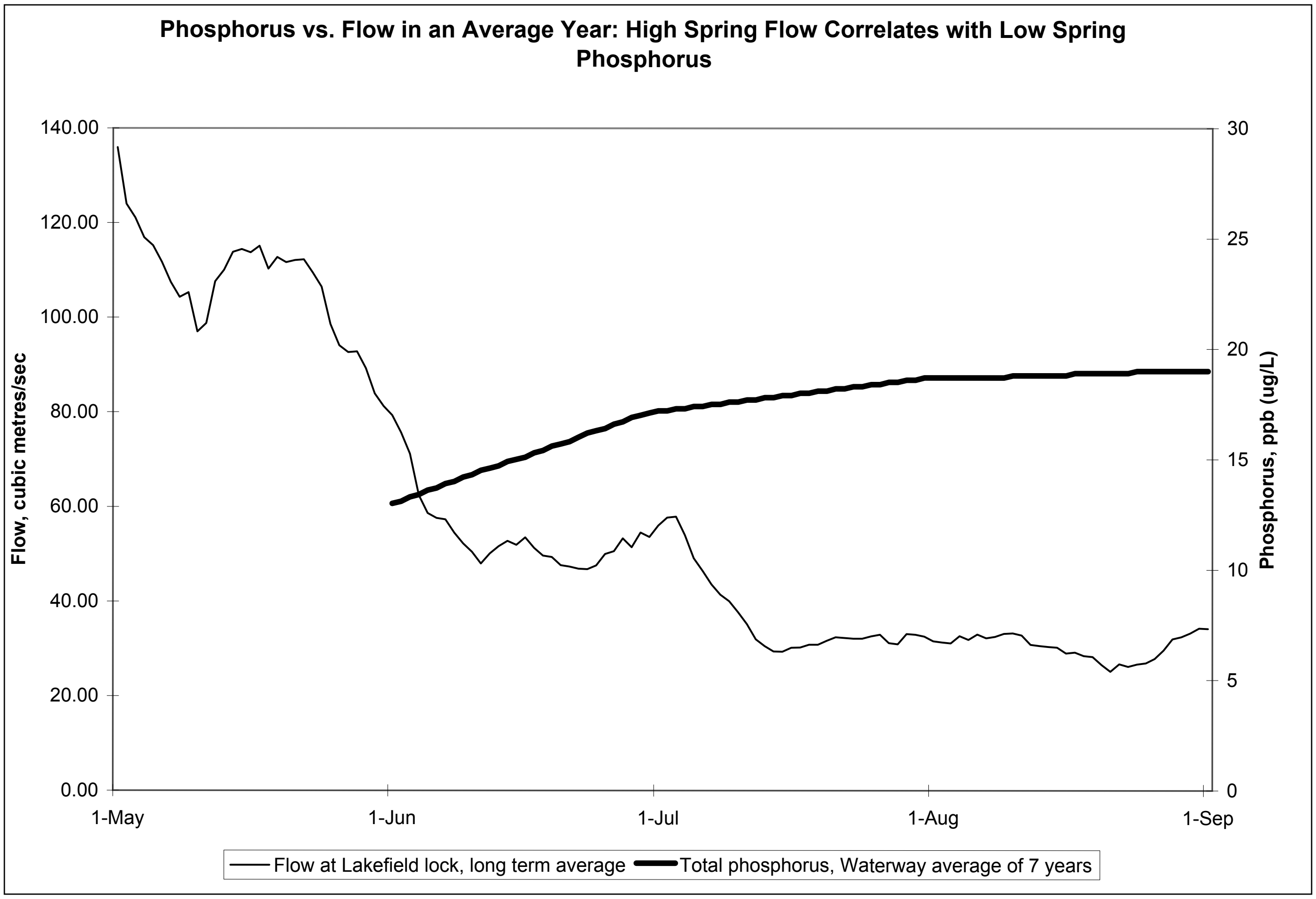
When looking at the Appendix F lake-by-lake graphs (Upstream, Midstream, Downstream, Low-phosphorus), it's easy to see which lake has which "phosphorus personality."

Familiar Phosphorus Pattern Two: Levels low in spring, increasing through summer – but why?

As seen in the graph, "Phosphorus Levels 2002-2007," phosphorus concentrations start in May at 12 – 15 ppb, rise to 17 – 25 ppb by August 1, and then level out. (The exceptions to the rule are the low-phosphorus lakes and marl lakes, whose phosphorus levels remain as they were in M



KLSA has stated that we believe that low spring phosphorus levels are caused by the spring flush in May and June, during which time large quantities of low-phosphorus water from the north dilute the system (see below). As this flow tapers off at the end of June, it seems that local conditions cause phosphorus to rise (see graph, "Phosphorus vs. Flow in an Average Year").



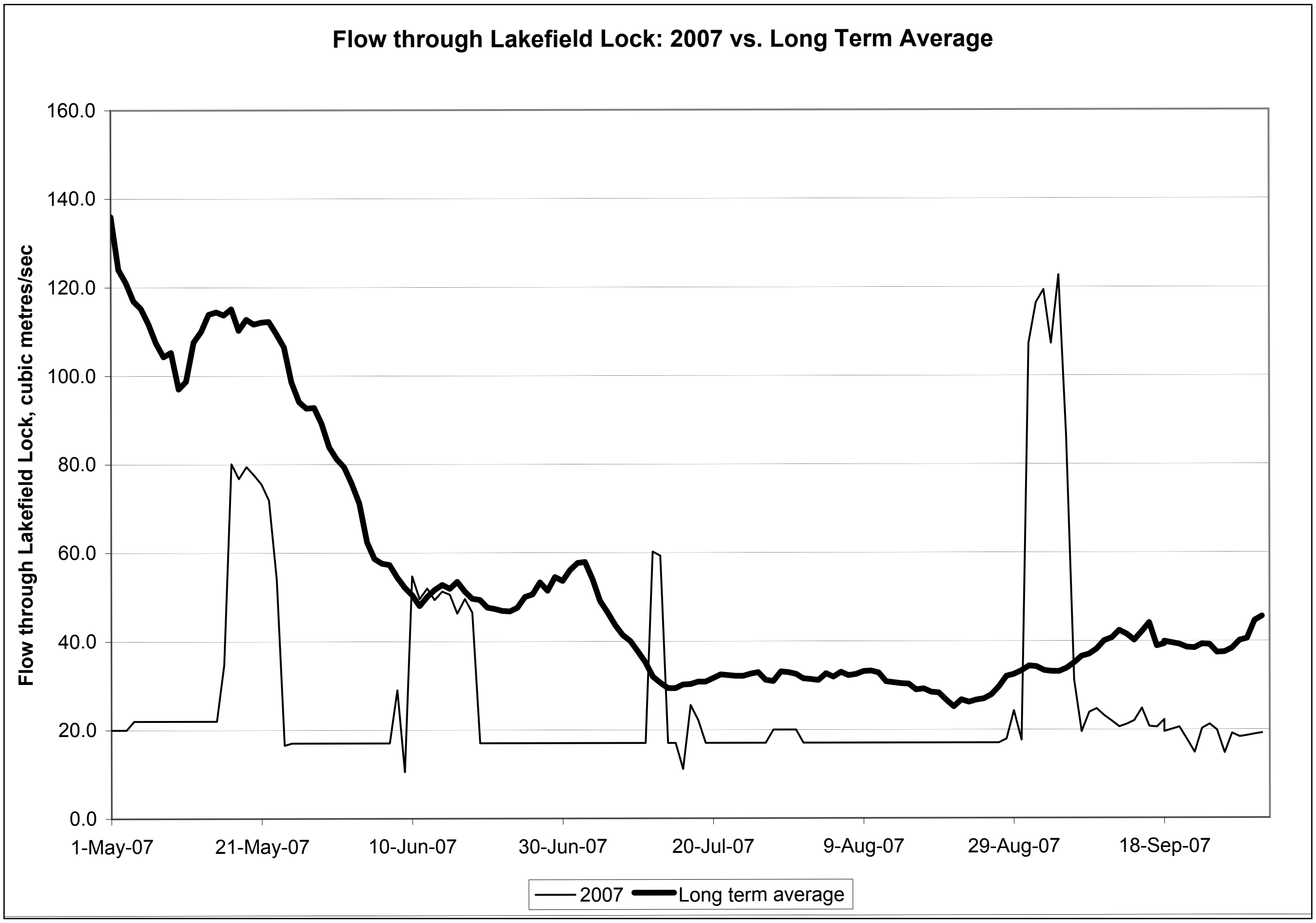
2007, however, was not an average year for flow. As seen in the graph and table below ("Flow through Lakefield Lock: 2007 vs. Long- Term Average"), the May flow was only one-third the normal flow, flows in June and July were about one-half the normal, and August's flow was about two-thirds the normal.

Comparison of Canal Flow: 2007 vs. Long-Term Average

Flow through Lakefield Lock	May	June	July	August	September
2007	1010	813	632	626	1,071
Long-term average	3,292	1,605	1,139	935	1,153

If the spring flush causes low phosphorus, did 2007's unusually low flows (both in spring and summer) result in higher phosphorus levels? The answer, surprisingly, seems to be "NO." As seen in the graph above ("Phosphorus Levels 2002 – 2007"), phosphorus levels in 2007 were somewhat lower than in other years. This seeming non-correlation between flow and phosphorus begs some questions, such as:

- Does the spring flush actually reduce phosphorus levels, or is something else pulling spring phosphorus levels down?
- Would the phosphorus curve (lower in spring, higher in summer) be the same if the flow remained low all year round?
- If the spring flush isn't the main cause of low spring phosphorus, what is?



It would be interesting to measure phosphorus levels throughout the year; perhaps that would give another clue as to when and why phosphorus levels vary seasonally on the Kawartha Lakes.

Familiar Phosphorus Pattern Three: Levels increase as water flows downstream, with a slight decrease in Stony Lake

Balsam Lake receives large quantities of low-phosphorus water directly from the north. As water flows downstream from Balsam Lake, phosphorus levels gradually increase. This trend reverses after the Burleigh Channel site on Stony Lake, because of low-phosphorus water flowing in from Upper Stoney Lake. Levels then rise slightly again in Clear and Katchewanooka Lakes (see 'Downstream Lakes' graph in Appendix F).

Kathleen Mackenzie is Vice-Chair of the Kawartha Lake Stewards Association.

Bacteria Testing

by Kathleen Mackenzie

What we did

2007 was KLSA's seventh year of testing for *E.coli* bacteria. In total, our volunteers tested 92 sites on 12 lakes, and each site was tested up to 6 times through the summer. Samples were taken to SGS Lakefield Research for analysis. Please see the basic rationale for testing and the complete results in Appendix E.

What we found

For lake-by-lake results with commentary, please see Appendix E.

Generally, *E.coli* counts on the lakes tested were very low throughout the summer, indicating excellent recreational water quality. The 84 sites that were tested regularly (4 or more times) could be classified as follows:

Site Classification	Number of sites	Comments
Very Clean: no readings above 20 *E.coli*/100 mL	66	This indicates very clean surface water.
Clean: 1 or 2 readings between 21 and 100 *E.coli*/100 mL, plus 0 or 1 readings over 100 *E.coli*/100 mL	13	It is normal for Kawartha lakes to have the occasional reading over 20.
Slightly Elevated: 3 readings between 20 and 100 *E.coli*/100 mL, plus 0 or 1 readings over 100 *E.coli*/100 mL	1	This site, Sturgeon WS1, receives drainage from agricultural land, which may be a source of bacteria. It is also an area of high boat traffic, which may be stirring up sediments.
Needing Observation: 4 to 6 readings between 21 and 100 *E.coli*/100 mL, AND/OR 2 or more readings over 100	4	Possible causes of these higher counts: • high levels of waterfowl: Sturgeon 2 • near inflow from large wetland area: Lower Buckhorn 3, 4B • drainage from wetland area: Sturgeon 3

Generally, then, the water in the Kawartha Lakes is very swimmable, though not directly drinkable. To keep *E.coli* counts low near your shoreline, it is important to remember to:

- minimize places where waterfowl can congregate. Short grass is very inviting to geese; it tastes good and can't hide predators. If you do have an area of grass, intersperse it with some bushes, or have some tall foliage at the shoreline to discourage geese from walking up on shore.

- encourage *E.coli* testing at streams coming in from agricultural areas. Farmers have created excellent programs to train for and partially fund stream management programs. Encourage your upstream farmers to follow these best management practices.

E.coli and rainfall

In the 2004 KLSA report, a review of the data up to that point indicated that an increase in *E. coli* counts became noticeable when there was more than 10 mm rainfall in the 48 hours before bacteria testing. This rainfall effect is well known: Peterborough's public beaches are automatically closed for at least 24 hours after a rainstorm of at least 25 mm.

This year, there was one rainfall of more than 10 mm that occurred just before a testing date. On July 14, the Trent University and Oliver Centre weather stations recorded 14.6 and 16.6 mm rainfall respectively. Our volunteers confirmed this. There were 4 volunteers who kept track of rainfall during this period, and all 4 recorded heavy rainfall in the 48 hours previous to testing dates July 15 or 16. It seems, then, that this was a widespread rain event, and we can assume that there would have been about 15 mm rain at all sites tested on July 15 and 16.

Did this mean that counts were higher on July 15/16 than at other dates during the summer? We looked at 52 sites on 8 lakes that were tested on July 15/16. As seen below (Table 1), there didn't seem to be any noticeable rise in *E.coli* counts on these two testing dates. Why not? There are a number of possibilities:

- It had been very dry for a few weeks before this; perhaps there wasn't too much runoff.

- We are not really sure where the *E.coli* are coming from. Some scientists are now finding *E.coli* can survive and reproduce in beaches and lake sediments. Perhaps a windy rainstorm will stir up sediments, resulting in higher counts. The rainfall on July 14 seems to have been a quiet drippy rain. The Peterborough weather station recorded wind speed on July 14 of "less than 31 km/hr," which is their minimum measurement.

We will continue to monitor the rainfall/*E.coli* relationship.

Table 1: *E.coli* counts vs. rainfall in previous 48 hours

	Number of Sites	**Week 1** Jul 2-6	**Week 2** Jul 15/16	**Week 3** Jul 22-25	**Week 4** Jul 29-Aug 1	**Week 5** Aug 6-8	**Week 6** Sep 3-5
Rainfall in previous 48 hours (mm)		4 - 7	14 - 17	0 - 1	0	0	0
Lake							
Big Bald	6	0	0	No data	1	0	0
Clear: Kawartha Park	6	0	1	0	0	0	0
Clear: SW	2	0	0	0	0	0	0
Lower Buckhorn	9	1	3	3	3	0	1
Pigeon: Con 17	3	0	0	0	1	1	0
Pigeon: Victoria Place	5	0	0	0	0	0	0
Stony	11	1	1	1	0	1	0
Sturgeon: North Shore	10	4	2	1	1	2	3
Total	52	6	7	5	6	4	4

Carp die-off had no effect on *E.coli* counts

During the summer, dead carp appeared in huge numbers in several of the Kawartha Lakes (see "The 2007 Carp Die-Off," p. 20). It was interesting that *E.coli* counts did not seem to be affected. Even when the bacteria were being tested in areas where dead carp were numerous, counts did not rise (Pigeon Lake Con. 17/July 15 and 22; Pigeon Lake Victoria Place July 16, Sturgeon sites). Carp don't contain *E.coli* because they are not warm-blooded, but we had expected that animals feeding on the carp might cause a rise in counts. This, however, did not happen.

Kathleen Mackenzie is Vice-Chair of the Kawartha Lake Stewards Association.

Sustainable Lakeshore Living & Shoreline Naturalization – What you can do

BY KEVIN WALTERS

We've been hearing a lot about sustainable development these days. Many may be wondering how that might apply to lakeshore living, especially along the Kawartha Lakes. Sustainable development means minimizing one's impact on the environment, working with nature and not against it.

In this article we'll look at a number of issues that commonly face property owners along the lakeshore, and what can be done to be more sustainable in your approach to the stewardship of your land.

Lawns and maintenance

Lawns have a huge impact on our lakes, by allowing nutrients to run off them into the water. Lawns are both unnatural and high maintenance, requiring inputs of energy and chemicals.

Peterborough Green-Up

You can start by not fertilizing them, as that is where the nutrient input issue primarily arises. A natural system does not require the input of externally-sourced chemical nutrients. More on that a bit later.

We also hear that planting a buffer of natural vegetation along the lakeshore is important. These are narrow plantings of native shoreline-type vegetation, instead of a lawn to the water's edge. It will certainly make your property look more natural, help stop erosion, and shade the water shallows, and it might even deter Canada geese. But is this enough?

Runoff and grading

There is another, probably more important component to the lawn issue, and this arises from the grading of your lot. Natural vegetation along the shoreline, i.e. , trees and shrubs, will have little ability to absorb runoff-borne nutrients if the water runs right past them to the lake.

Natural shoreland, as with any natural land, is not smoothly graded downhill, to the lake in our case, but is hummocky, and peppered with little depressions. If you have a natural woodland near you, take a walk through it and see how it is graded.

When people develop a property nowadays, they typically fill in all the depressions and remove the little hummocks to create a smooth terrain. This further necessitates the removal of almost all the native vegetation.

Peterborough Green-Up

Shoreline naturalization at the Macarthur property, Stony Lake: during planting.

In the natural state, those depressions collected runoff, where it sat until it soaked away. This meant that most nutrients were trapped in the soil. Only very well-filtered water would leave the site, sinking beneath the surface, and little, if any, actually flowed overland to the lake or stream.

Most older cottages tended to have minimal lot re-grading. The buildings sat on blocks or rocks that conformed to the contours of the ground. Most trees were left in place, and regrading was minimal, only enough to meet the needs of the user.

With the tendency today to build four season urban type homes, urban-style lot grading is being applied along with it.

Municipal regulations are often at fault, as they oblige landowners to grade their lands in an 'urban-type' perfectly-draining manner. This may be valid over your septic tile bed, but elsewhere we should be encouraging a different approach to lot grading near waterways, by allowing numerous small pockets to collect runoff, or providing at least one larger depression, or paired depressions either side of a front yard pathway, a short distance from the water.

Nonetheless, if your property is currently graded in an 'approved' but unnatural, perfect manner, once approved by the municipality, there is usually no legal obligation to keep it this way. By introducing some undulations, with the goal of collecting runoff for seepage into the ground, you can improve the situation considerably. It also produces a more interesting landscape, and provides opportunities to introduce varying types of vegetation that can take advantage of differing moisture conditions, as one finds in the natural landscape, while absorbing both the nutrients and water.

This doesn't mean you have to introduce mosquitoes. The depressions should be sized and modified as needed to allow for only a few hours of 'storage'. That woodland near you might show you how deep your depressions can be without holding standing water for longer than you want. Free draining material such as sand can also be imported to create low barriers to produce ponding that then allows the water to filter through it, where native soils are heavy, such as clay.

If you have a paved driveway, a nearby depression to collect the runoff from the driveway is particularly important, as it will capture and filter water from washing cars and boats. In some cases, this runoff can be instead directed to a wooded natural area to rely on those natural depressions as well as deep, loose soils, to do the filtering work. This is particularly important if you have a driveway that becomes a boat ramp at the lake.

Peterborough Green-Up

Shoreline naturalization at the Macarthur property, Stony Lake: growing phase.

As well, many lot owners have more land than they actually need for their day to day living, but somehow feel obliged to manicure the entire property. Why not convert some of your lot to natural conditions, and re-grade, or rather un-grade, and plant native trees? And don't ever rake the leaves in this area.

Then, for the area that you do want to keep usable and open, what can you do instead of a grass lawn?

Trees and leaves

Many people admire the property that is covered in big pines (usually white pine) with their majestic beauty, vast open space beneath, and carpet of soft pine needles that don't require any maintenance. These pines are usually quite old and this means, to most people, that they can't reproduce that scene on their property. But it can be done.

White pines are fast growers, and while you won't get that magnificent old-growth in a few years, you can get a reasonable and attractive facsimile. In addition to introducing a few hummocks and depressions, scatter a planting of White Pines across your lawn, leaving critical view paths open if you like.

As pines grow, they add a new ring of branches each year to the top of the tree. When the pines reach a height of two metres or so, the lower ring of branches, which are typically spaced about a foot apart up the trunk, can be pruned off. This forces the tree to grow upward faster, as it puts its energy into new higher branches and the remaining lower ones. Each year, prune off the lowest row until you have attained the open area beneath that you prefer. In relatively short order, you will have a pine-covered lot with diminishing grass cover and expanding needle cover.

Your property value will likely soar along with it, as these properties usually command a premium. You will also be adding to the scenery of the lake, offering yourself more shade, and all for the price of less work on your lawn.

This approach can also be used to allow any type of tree to occupy the space in front of your home or cottage. Instead of cutting a tree down because it is blocking your view, or not planting it in the first place, just prune it from the bottom up in the same manner, and it will grow rapidly above your field of view leaving only the trunk visible in few short years.

There is another sustainable approach to lawn maintenance, as most people will still retain some amount of grassed area, and there is nothing inherently wrong with that. It's just how it is maintained.

What can you plant in a buffer zone?

Close to the shore, try growing plants that are native to Ontario and easy to maintain. The following grow well in land that may be wet or flooded part of the year:

- Joe Pye weed
- Swamp milkweed
- Sweet gale
- Dogwood
- Shrub willow
- Elderberry

For more information visit Peterborough Green-Up: www.greenup.on.ca

In the autumn, many landowners rake their leaves and take them to the dump, or somewhere off-site. This is an unsustainable practice that depletes the natural nutrients and minerals in the soil that all vegetation requires. This in turn leads to the perceived need to fertilize the lawn or trees to encourage growth. The better approach is to add nothing and take nothing away, mimicking natural systems.

Get a mulching mower. Mulch those grass clippings and leaves on your lawn instead of raking and removing. The grass and leaves are loaded with the nutrients that both the grass and the trees need, and these nutrients are released slowly from the decaying mulch, with much less opportunity for it to reach the waterways.

Also, if you clear away branches and other yard waste, don't haul it to the dump. Again you are removing valuable nutrients and minerals that have existed on your lot for millennia, that have constantly been recycled until you came along. Set aside an area as your compost area, and allow it all to decay there, or, if you have a larger enough area in a natural state, distribute the waste material through the woods to let it return to the land more naturally. Always strive to add nothing and take nothing away.

Septic systems

Now, what about those septic systems? Here we have a necessary departure from that "add nothing, take away nothing" goal, because septic systems essentially add nutrients to the land, in a subsurface mode that minimizes impacts on our waterways. These nutrients came from the food that you brought to your home or cottage.

Peterborough Green-Up

Shoreline naturalization at the Macarthur property, Stony Lake: post-restoration, year two.

It goes without saying that you should keep your septic in good repair. Have it checked and pumped every few years, depending on your usage. Replace old leaky steel tanks with concrete, plastic or fibreglass ones. Generally speaking, septic systems perform very well, with most nutrients staying onsite, rather than reaching the water. Some output does make its way to the waterways, but there are things you can do to reduce that. The soil itself can only hold so much. You need something more to uptake those inputs to the lot, before they reach the lake.

First, your septic system should be as far from the water as practical. There is no magic distance, it is simply a case of the farther the better. Then, the ideal situation is to have a wooded area or a grove of trees between the lake and your tile bed. Trees have a voracious appetite for water in the growing season, which is typically the time when most lakeshore properties have the greatest usage, and therefore receive the greatest inputs from those septics.

During this period, if weather is fairly dry, your trees may uptake every bit of water that enters the septic system, and with it, the nutrients. The trees then redistribute this nutrient back to the land as fall leaves, and ultimately as fallen branches and trunks. Some is sent to the lake when the wind blows the leaves into it, but generally this is a small percentage. In many cases, the waves wash much of this back to the shore where the wind blows it back onto the land. But this can only happen if you have a natural shoreline, and not a shorewall. More on this below.

In this manner, most of your septic system inputs will never reach the waterways. If you can plant a small forest in between your septic system and the lake, you will be doing the lakes a favour.

Shore protection

Finally, what about those shorewalls?

So commonly seen around the Kawartha Lakes are developed properties with hardened shorelines of concrete or crib walls, which are both unnatural looking and usually totally unnecessary. There seems to be a need in many people's minds to provide a hard definition between lake and land. They want no grey area or land between.

Severe erosion along our lakes is relatively rare and rarely warrants an approach such as this. The best shorewall is none at all, with the lake determining, and creating a beach condition where the waves run-up into increasingly shallow water until they break and the land takes over just beyond. Beaches allow a place for the waves to toss the flotsam which can then blow back onto the land.

Unfortunately, most of our lakes were raised by dams, and this means that the original shorelines are submerged, and the lakes are still adjusting to the higher water level, even over a century later. We see this in the slow erosion that is occurring in various places, and the numerous windfalls along the shoreline with upturned tree roots, often with bare rock or soil exposed underneath. The lakes are trying to create a beach zone again.

In time, the lakes will achieve the more natural beach condition with either exposed sand or rock all along the shore, making room for wave uprush, but, most people, we must recognize, are not prepared to wait for it. They also don't like to see the loss of their land or trees along the shore.

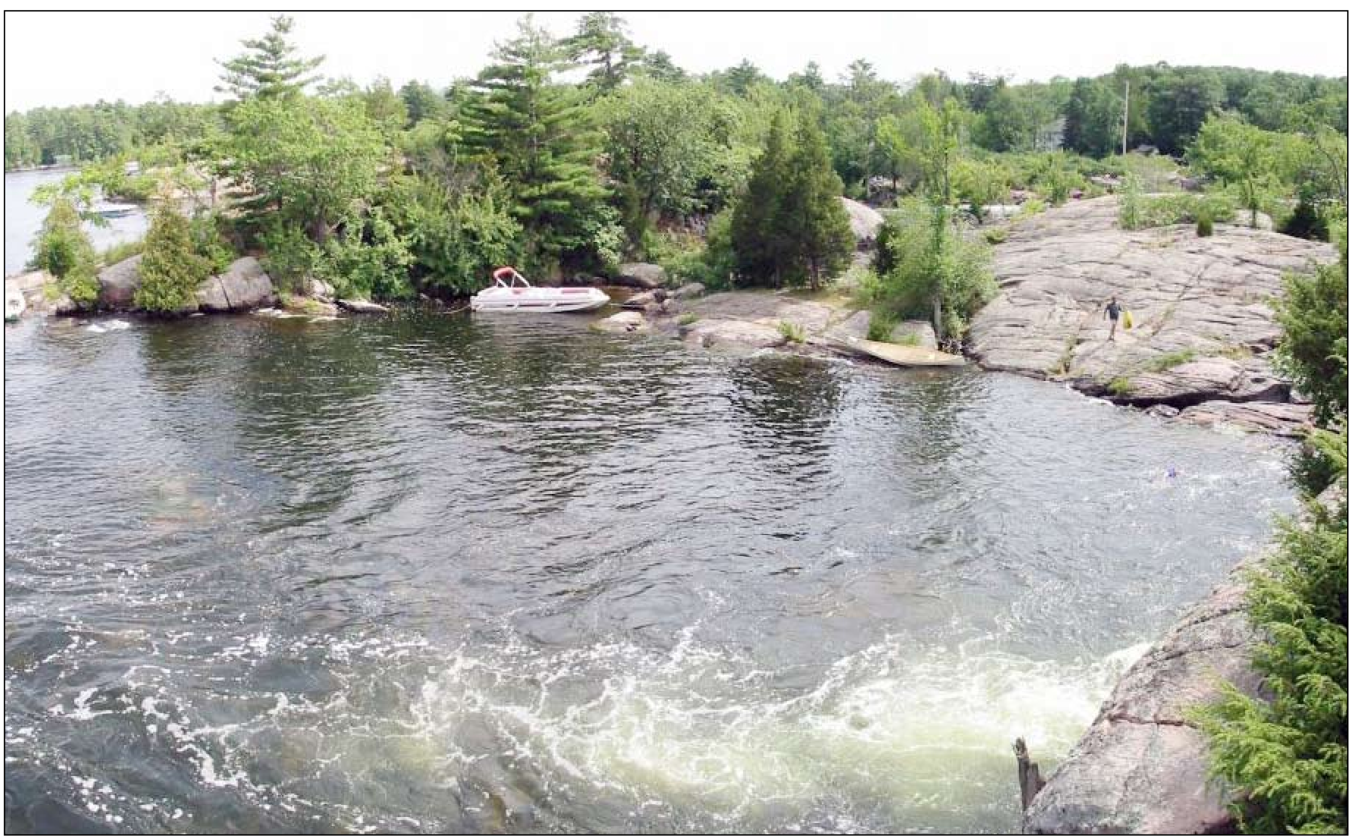
The best erosion control systems mimic naturally occurring ones where tree deadfalls along the shore, along with wave tossed flotsam, produce a wooden barrier slowing erosion. In other areas, rocks found in the shallows or along the beach become bulldozed by moving ice into barriers of rocks at the water's edge. There are many examples of this around the Kawartha Lakes, where centuries of ice movement under undammed conditions created rows of rocks along now-submerged shorelines, often mistaken for old farm fences.

These features are very effective in slowing erosion, and are obviously natural looking. You can use these natural techniques and incorporate both together to produce a naturally protected shoreline. By placing deadfalls tight up against the edge of the land and then covering with rocks (you can get the rocks from a gravel pit operator or quarry, or buy a pile from a farm owner), you get double the effectiveness. The rocks keep the wood in place, and they collect additional detritus adding to the shoreline stability, and absorb much of the wave action.

The rock-buried logs, which form a barrier to soil migration, very slowly decay where they meet the land, and this allows tree and shrub roots to invade them, both anchoring the shore protection as well as themselves. This won't entirely stop the process, but it will usually slow it to an imperceptible rate, while looking like it has always been there.

Taken together, these and other sustainable development approaches to lakeshore living will minimize your negative impact on your lake as well as your land, and add to the scenic shorelines of the Kawartha Lakes.

Kevin Walters B.A.Sc., P.Eng. is a Director of the Kawartha Lake Stewards Association



Ian Mackenzie

Janet Duval

An especially weedy scene in the Kawarthas.

Aquatic Weeds Management Study

BY PAT MOFFAT

The rationale

For the past several years, Dr. Eric Sager and his colleagues and students at Trent University and the Oliver Ecological Centre have been working with KLSA to try to understand the patterns in aquatic weed growth that we have been experiencing in the Kawarthas. They have looked at water chemistry, tried to gauge the effects of zebra mussels, and studied algae in the water and clinging onto the plants. An important question has been: Is the current bout of weed growth part of a natural pattern? Are the Kawarthas trying to revert to an earlier state, before the canal was built, in which they were shallow and rich with marshes, wild rice and waterfowl? Or is the prolific growth of weeds that we have been seeing over the last five years due in part to human impacts such as phosphorus inputs into the lakes from agriculture, sewage treatment plants, urban runoff and septic systems? If so, surely we could take action to lessen those impacts and cut back on the weed growth. There is also the question of climate change: Are today's weedier lakes just a sign of things to come, as our climate warms up and promotes longer growth periods for all plants?

These are important questions, and they continue to drive Dr. Sager's work. But last year, there was such an outcry of frustration from KLSA members and other shoreline residents and businesses that KLSA decided to turn also to more practical research. Heavy beds of weeds, both native and invasive, clog swimming and docking areas in many places throughout the Kawartha Lakes. Shoreline owners have to rake floating weeds out of the water and dispose of them on land. Unfortunately, large, smelly "mountains" of weeds near docks are a common sight in many of our lakes by late summer. Some shoreline residents have been attempting to deal with the weed beds off their docks themselves, using various means of harvesting, herbicides, and other physical methods of control.

But how effective are such controls? Should you pull up aquatic plants by the roots or just cut them back? What type of harvesting is easiest and most effective? What herbicides are legal in Ontario, and are they really safe for the aquatic environment? Will they have adverse long-term effects on habitats? What about benthic mats, which smother weed growth? They are in fact not advised as a means of weed control because they can interfere with fish spawning, but many people use them anyway – are they effective?

The research

Last fall, KLSA applied for an Ontario Trillium Foundation grant to make it possible for us to answer these questions, and at the same time we approached local businesses and cottage associations for help. The Trillium Foundation approved our request for $49,400.00, and as of this writing, we have received another $2,400 from local businesses and $2,500 from Cottage Life magazine's Green Cottager Award. Most of this money will provide salaries for five students who will be carrying out field work this summer, and their back-up needs such as boat and truck rental, gas, and other equipment. Some of the money will be used to produce a Weed Control Manual when the research is finished.

This season is Year One of the project. One graduate student and four undergraduates will be hired in April. The graduate student will help us set up a public survey on our new website, to solicit opinions on the weed situation from Kawartha residents and to find out if they have been using methods of weed control. The graduate student will also perform a literature search on methods of weed control that have been used in our area and other areas. This will provide background for the field work, which will begin with the growing season in June.

Janet Duval

Meanwhile, in May, the students, with guidance from Dr. Eric Sager, will choose at least 10 sites for their summer field work within KLSA's watershed of interest from Balsam Lake south to Katchewanooka. This is where you come in! We are looking for places where people have been using a particular means of aquatic plant control. The students will be aiming to cover all available means of weed control at these ten sites. For each study site, they will find a nearby area that is very similar in physical characteristics but has not experienced any method of weed control. This site will serve as the necessary "control" site when the students evaluate whether the particular method is effective (Are there more or fewer weeds at the study site than at the control site?) and what its effects are on the aquatic habitat (Are the benthic invertebrate communities the same at the test and control sites?)

In the fall of 2008, when all the research is finished and the data analyzed, the graduate student and Dr. Sager will present the methods and conclusions of the study in a scientific paper to be submitted to an academic journal.

The manual

In the winter of 2008-2009, KLSA volunteers – most likely our hard-working annual report committee, but other volunteers are welcome to join in! – will turn the scientific paper into the Weed Control Manual. This manual will distill all the background research and field work results into language that is clear and accessible. Producing and distributing the manual will take place in Year Two of the project, 2009.

With the help of our many partners – other volunteer organizations and government agencies – KLSA will spread the manual far and wide throughout the Kawarthas, bringing useful information to all shoreline residents, businesses such as resorts, and anyone else concerned with the overgrowth of aquatic weeds. The manual will contain clear information about each method of weed control, evaluating each for its effectiveness and its effects on the aquatic habitat. We will not be endorsing any particular method of weed control, but will provide detailed, accurate information so that you can make an informed decision about what method, if any, to employ. An important aspect of the manual will be setting the phenomenon of aquatic weed growth within the bigger picture of the environmental health of the Kawartha Lakes.

Janet Duval

How you can help

- Take KLSA's public survey at http://klsa.wordpress.com
- If you have been using a method of weed control, allow the students to use your property as a confidential test site. You can volunteer for this through the survey or by directly contacting Dr. Eric Sager (705-731-0183 or 705-748-1011 ext. 7647 or esager@trentu.ca)
- Share your photos with us, because we will need to illustrate the Weed Control Manual with pictures of weed beds, control methods, and a few scenic shots. Email photos to Simon Conolly at the Lakefield Herald: sconolly@gmail.com
- If you have talent and experience in writing, editing, or setting up documents, we could really use your help next winter, as the report committee will be producing both the annual report and the manual. Please email kawarthalakestewards@yahoo.ca or phone Pat Moffat, Sheila Gordon-Dillane or Janet Duval at our numbers listed in Appendix A.
- If you or an organization you belong to has access to a large group of Kawartha-area shoreline residents or businesses, you can help in distributing the Weed Control Manual in the spring of 2009. Contact us by email or phone.

Janet Duval

- Show your interest and support by sending a donation, either as an individual or as an Association or agency that you belong to. Make out a cheque to "Kawartha Lake Stewards Association" and mail it to: KLSA c/o RR#2, 2124 Howard Dr., Lakefield, ON K0L 2H0. Please mark "Weeds Study" on the cheque so that we can continue to keep this money separate from our water testing and operating funds.

2008 is going to be an exciting year as KLSA moves into this next level of research and public education! Your participation will help make it a success!

Pat Moffat is Chair of the Kawartha Lake Stewards Association.

Appendix A:

KLSA Mission Statement, Executive Board & Other Volunteers

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. The Kawartha Lake Stewards Association ensures that water quality test results, prepared according to professionally validated protocols with summary analysis, are made available to all interested parties. The Kawartha Lake Stewards Association 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.

Directors

Pat Moffat, Chair Lovesick Lake Association	(519) 884-6549, (705) 654-4012 email: patmoffat@yahoo.com
Kathleen Mackenzie, Vice-Chair Assoc. of Stony Lake Cottagers	(416) 283-7659, (705) 654-3051 email: k_mackenzie@sympatico.ca
Ann Ambler, Secretary Lovesick Lake Association	(705) 654-4537 email: annambler@hotmail.com
Jeff Chalmers, Treasurer Birchcliff Property Owners' Association (Clear Lake)	(705) 652-8992 email: jeffreychalmers@yahoo.ca
Janet Duval, Director Deer Bay Reach and Black Duck Bay, Lower Buckhorn	(905) 877-1994, (705) 657-8491 email: j_duval@sympatico.ca
Sheila Gordon-Dillane, Director Conc. 17 Pigeon Lake Cottagers Association	(416) 225-9236, (705) 657-1389 email: sgdillane@rogers.com
Mark Potter, Director Newcomb Dr. Cottagers' Association (Lower Buckhorn)	(416) 232-4007, (705) 654-4340 email: potter4@sympatico.ca
Mike Stedman, Director White Lake Cottagers Association	(705) 877-1735 email: mike.stedman@sympatico.ca
Kevin Walters, Director Lovesick and Harvey Lakeland	(416) 778-5210 email: kwalters@dillon.ca

KLSA email: kawarthalakestewards@yahoo.ca
On the Web: http://klsa.wordpress.com

Other Volunteers

Balsam Lake Association
Ross Bird, Leslie Joint, Dave Stamper, Richard Braniff, Drew Davison

Balsam Lake – Killarney Bay-Cedar Pt. Cottage Association – Jim and Kathy Armstrong

Big Bald Lake Association – Mark Thiebaud, John Shufelt, Ron Brown

Buckhorn Lake – Buckhorn Sands Property Owners – Mary and Mike Belas

Chemong Lake – Smith-Ennismore-Lakefield Ratepayers' Association – Rosalind Macquarrie

Chemong Lake – Lakeside Common – Jo Hayward-Haines

Clear Lake Birchcliff Property Owners' Association – Jeff Chalmers

Clear Lake – **Kawartha Park Cottagers' Association** – Judith Platt

Clear Lake – **Southwest shore** – Gord Evans

Clear Lake – Sandy Point Road Association – Michael Hendren

Julian Lake Cottagers – George Loyst

Katchewanooka Lake – Lake Edge Cottages – Peter Fischer, Mike Dolbey

Lovesick Lake Association – Ann Ambler, Ron Brown, Pat Moffat, Bev Richards

Lower Buckhorn Lake – Janet Duval

Lower Buckhorn Lake Owners' Association –
Wally Kralik, Jeff Lang, Peter Miller, Mike Piekny, Mark Potter, Harry Shulman, Dave Thomson, Bruce Ward

Concession 17 Pigeon Lake Cottagers Association
Sheila Gordon-Dillane, Jim Dillane

North Pigeon Lake Ratepayers' Association – Tom McCarron, Francis Kerr

Pigeon Lake – Victoria Place – Ralph Erskine, Dennis Hearse, Glen Williamson

Sandy Lake – Harvey Lakeland Common Owners' Association - Percy Payette

Association of Stony Lake Cottagers – Gail Szego, Ralph Reed, Bob Woosnam

Sturgeon Lake Association
Don Holloway, Ken LeMasurier, Rod Martin, Doug Ridge, Sonny Seymour, Ann Shortt

Upper Stoney Lake Association – Karl, Kathy, Ken and Kori Macarthur

White Lake Cottagers' Association – Mike Stedman, Norma Walker

Listed are our primary volunteers; many others helped on occasion.
Many thanks to all for sharing your time, your energy, and your gas tanks!

Appendix B: Financial Partners 2007

Parks Canada, Trent-Severn Waterway

Beachwood Resort
Big Bald Lake Cottagers Association
Birchcliff Property Owners
Buckhorn District Tourist Association
Buckhorn Sands Property Owners Association
Concession 17 Pigeon Lake Cottagers Association
Dr. Dolbey-Katchewanooka Lake
Eganridge Inn & Country Club
Fred G. Reynolds Group
Harvey Lakeland Cottage Association
Julian Lake Cottagers Association
Katch Fund-Katchewanooka Lake
Lovesick Lake Association
Lower Buckhorn Lake Owners Association
Rod & Ellynn Martin
Mattamy Homes Limited
Stinson's Bay Property Owners Association
Stony Lake Heritage Foundation
Twp. of Douro-Dummer
Twp. of Galway-Cavendish and Harvey
Twp. of Smith-Ennismore-Lakefield
Victoria Place Association Inc., Pigeon Lake

Thanks to all our generous supporters.

Appendix C: Financial Report

Kawartha Lake Stewards Association
2007 Bank Account Statement – December 31, 2007

Item	Date	Chq #	Name	Cleared	Debit	Credit	Balance
1	1-Jan-07		Balance Forward	Y			1,435.64
2	1-Jan-07		Monthly Service Charges	Y	3.75		1,431.89
3	1-Feb-07		Monthly Service Charges	Y	3.75		1,428.14
4	1-Mar-07		Monthly Service Charges	Y	3.75		1,424.39
5	1-Apr-07		Monthly Service Charges	Y	3.75		1,420.64
6	20-Apr-07		Deposit	Y		3,200.00	4,620.64
7	25-Apr-07		GIC Interest	Y		50.38	4,671.02
8	25-Apr-07		Matured GIC	Y		2,015.24	6,686.26
9	25-Apr-07		GIC Purchase	Y	2,065.62		4,620.64
10	1-May-07		Monthly Service Charges	Y	3.75		4,616.89
11	2-May-07		Deposit	Y		1,500.00	6,116.89
12	7-May-07	880	LMS Prolink (Insurance)	Y	1,683.72		4,433.17
13	15-May-07	882	Ann Ambler expenses	Y	91.12		4,342.05
14	17-May-07		Deposit	Y		210.00	4,552.05
15	17-May-07	881	Fleming College (Report printing)	Y	3,693.60		858.45
16	18-May-07	885	Kathleen Mackenzie expenses	Y	38.65		819.80
17	23-May-07	883	Pat Moffat expenses	Y	130.00		689.80
18	24-May-07		Deposit	Y		820.00	1,509.80
19	30-May-07	884	Buckhorn Community Centre	Y	100.00		1,409.80
20	1-Jun-07		Monthly Service Charges	Y	3.75		1,406.05
21	6-Jun-07		Deposit	Y		1,250.00	2,656.05
22	29-Jun-07	886	Ann Ambler expenses	Y	207.98		2,448.07
23	3-Jul-07		Monthly Service Charges	Y	3.75		2,444.32
24	24-Jul-07	887	Ontario Environment Network	Y	40.00		2,404.32
25	1-Aug-07		Monthly Service Charges	Y	3.75		2,400.57
26	15-Aug-07		Deposit	Y		950.00	3,350.57
27	20-Aug-07	888	SGS Lakefield Research	Y	1,733.10		1,617.47
28	4-Sep-07		Monthly Service Charges	Y	3.75		1,613.72
29	12-Sep-07	889	SGS Lakefield Research	Y	1,741.05		-127.33
30	12-Sep-07		Returned	Y		1,741.05	1,613.72
31	14-Sep-07		NSF Fee	Y	35.00		1,578.72
32	21-Sep-07		GIC Redemption with 2.65% interest	Y		2,087.97	3,666.69
33	21-Sep-07		GIC Redemption with 3.00% interest	Y		1,007.56	4,674.25
34	21-Sep-07	890	SGS Lakefield Research (replacement)	Y	1,741.05		2,933.20
35	21-Sep-07	891	FOCA membership	Y	181.53		2,751.67
36	26-Sep-07		Deposit	Y		750.00	3,501.67
37	26-Sep-07	892	SGS Lakefield Research	Y	795.00		2,706.67
38	1-Oct-07		Monthly Service Charges	Y	3.75		2,702.92
39	4-Oct-07		Deposit	Y		1,200.00	3,902.92
40	19-Oct-07	893	Ann Ambler expenses	Y	52.32		3,850.60
41	19-Oct-07	894	Pat Moffat expenses	Y	149.79		3,700.81

42	1-Nov-07		Monthly Service Charges	Y	3.75		3,697.06
43	5-Nov-07	895	SGS Lakefield Research	Y	39.75		3,657.31
44	6-Nov-07		Deposit	Y		100.00	3,757.31
45	28-Nov-07		Deposit (weed project)	Y		400.00	4,157.31
46	1-Dec-07		Monthly Service Charges	Y	3.75		4,153.56
47	1-Dec-07	896	Borne Digital Printing	Y	418.60		3,734.96
48	3-Dec-07		Deposit (weed project)	Y		250.00	3,984.96
49	11-Dec-07		Deposit (weed project)	Y		350.00	4,334.96
50	12-Dec-07	897	Jim Keyser (weed project expenses)	N	394.61		3,940.35
51	12-Dec-07	898	Dr. Eric Sager -ongoing projects	N	500.00		3,440.35
52	18-Dec-07		Deposit	Y		600.00	4,040.35
53	21-Dec-07		Deposit (weed project)	Y		750.00	4,790.35
54	31-Dec-07		Est. other expenses to year end	N	100.00		4,690.35
55							4,690.35
					Account Balance		$4,690.35

2007 Investment Account Statement

Date	Transaction	Cleared	Debit	Credit	Balance
1-Jan-07	Balance Forward	Y			6,000.00
25-Apr-07	GIC Redemption	Y	2,000.00		4,000.00
25-Apr-07	GIC interest	Y		65.62	4,065.62
25-Apr-07	GIC Reinvestment 2.65%	Y		2,000.00	6,065.62
21-Jun-07	GIC Redemption	Y	4,000.00		2,065.62
21-Jun-07	GIC interest	Y		72.00	2,137.62
21-Jun-07	GIC Reinvestment 3.00%	Y		4,000.00	6,137.62
21-Sep-07	GIC Full Redemption 2.65%	Y	2,065.62		4,072.00
21-Sep-07	GIC Redemption 3.00%	Y	1,000.00		3,072.00
					3,072.00
					3,072.00
					3,072.00
					3,072.00
			Account Balance		$3,072.00
			Grand Total		**$7,762.35**

A. Jeffrey Chalmers, Treasurer

Kawartha Lake Stewards Association

Full audited financial report can be viewed at the KLSA website – http://klsa.wordpress.com – when available.

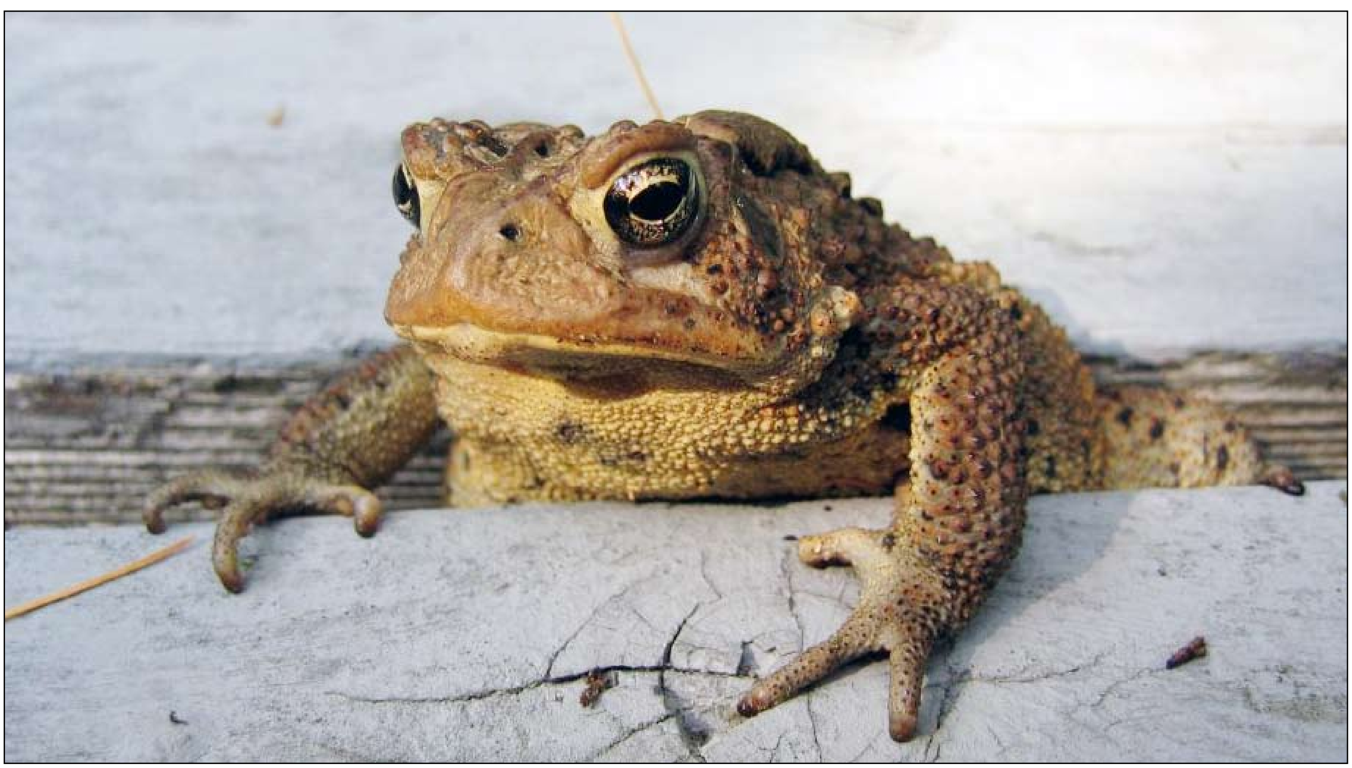
Appendix D: Privacy Policy

As a result of recent Federal Privacy Legislation changes, all businesses and associations that collect personal information from their customers and members must develop and post a Privacy Policy. The following is the policy that your Board has developed to protect you and your personal information held by the Kawartha Lake Stewards Association (KLSA).

To our Membership: Your privacy is important to us. This policy tells you what information we gather about you, how we would use it, to whom we may disclose it, how you can opt out of the collection, use or disclosure of your personal information, and how to get access to the information we may have about you.

Collecting Information: We collect information about our members and volunteers such as name, address, relevant telephone numbers, email address and preferred method of communication. We obtain this information through the attendance form at our workshops and AGM, and by information provided by the many volunteers assisting in our lake water quality testing programs. We may keep the information in written form and/or electronically. Keeping your email address information at our email site allows us to send you information in an efficient and low cost manner. By providing this information to us, you enable us to serve you better.

Using Information: We use the information collected to provide you with information about the association activities and related lake water issues of interest to residents of the Kawartha Lakes. We will retain your personal information only for as long as required by law or as necessary for the purposes for which it is collected. Your personal information will not be used for other purposes without your consent.



Ian Mackenzie

Disclosing Information: We will not disclose any personal information collected about you to anybody else, unless required to do so by law. We will comply with all laws, which require us to supply the information to government agencies and others. We will not otherwise sell, transfer or trade any mailing list, which includes your information.

Keeping Information Secure: We will keep written information in a secure place.

Access to Information: If you wish to review the personal information we keep about you please contact the association c/o "Privacy Officer" at the address set out below. At your request, subject to applicable law, we will delete your personal information from our records. The Privacy Officer is not intended to be an elected position. It is an appointment to one of the elected directors of the board providing they are in good standing and have the support of the Chair and other directors.

Obtaining Your Consent: By providing personal information to us, you are consenting to us using it for the purposes set out above and disclosing it to the parties described above. If you do not want us to use any personal information about you, or wish to limit the use or disclosure of such personal information by us, please contact the Privacy Officer at the address set out below by mail.

Contacting Us: We may be contacted by email at kawarthalakestewards@yahoo.ca or by regular mail as follows:

Jeffrey Chalmers, KLSA Privacy Officer
858 Birchview Rd., RR #4, Lakefield, ON K0L 2H0

Ian Mackenzie

Appendix E: Basic Rationale for *E.coli* Testing and Lake-by-Lake Results

Choosing sites

The goals of this testing were threefold:

- to see how safe the water was for swimming at these sites
- to provide baseline data for ongoing monitoring in future years
- to discover sources of elevated bacterial counts

Almost all sites were chosen because it was thought that they would have the highest *E.coli* counts in the lake; that is, we were "looking for trouble". Therefore, please realize that the readings shown here do not represent the average bacterial levels on our lakes; rather, they would represent some of the highest bacterial levels on our lakes. Test sites included:

- Areas of high use (resorts, live-aboard docking areas, etc.)
- Areas of low circulation (quiet, protected bays)
- Areas near inflows (from culverts, streams, wetlands)
- Areas of concentrated populations of wildlife (near wetlands, areas popular with waterfowl)

Please note:

- *KLSA does not test drinking water. Only surface waters are tested. All untreated surface waters are considered unsafe for drinking.*
- *KLSA results are valid only for the times and locations tested, and are no guarantee that a lake will be safe to swim in at all times and in all locations.*

Why did we test for E.coli?

E.coli was the bacteria of choice because:

- The presence of *E.coli* indicates fecal contamination from warm-blooded animals such as birds or mammals, including humans. It is not found, for instance, on rotting vegetation. The presence of *E.coli* indicates the possible presence of other disease-causing organisms found in fecal material, such as those causing gastrointestinal and outer ear infections.

- *E.coli* is present in fecal material in very high numbers. Healthy humans excrete about 100 million *E.coli* per ¼ teaspoon of fecal matter! Therefore, it is easier to "find" than most other less plentiful bacteria.

- *E.coli* itself can be dangerous. Although most strains of *E.coli* are harmless, some strains cause serious disease, such as in the Walkerton tragedy, or occasionally in ground beef "scares." The basic analysis done by SGS Lakefield Research cannot distinguish the difference between the harmless and the deadly, so we always treat *E.coli* as if we were dealing with a harmful strain.

Lake-by-Lake *E.coli* Results

To put the results in perspective:

- 100 *E.coli*/100 mL is the level at which public beaches are posted unsafe for swimming;
- Kawartha Lake Stewards Association believes the safe swimming level for our lakes should be more stringent than this, and has set the acceptable level at 50 *E.coli*/100mL. KLSA regards counts over 50 as cause for concern;
- Counts 20 and below, with an occasional reading between 20 and 50, are normal for the Kawartha Lakes;
- A "–" indicates no data available for that date.

Big Bald Lake

2007 *E.coli* Lake Water Testing
E.coli/100mL

Site No.	5-Jul-07	16-Jul-07	1-Aug-07	8-Aug-07	5-Sep-07
1	6	3	0	0	1
2	2	3	25	0	2
3	1	0	0	0	1
5	0	0	3	0	1
7	0	0	2	0	0
8	1	0	0	0	0

As in previous years, counts were uniformly low in all locations on Big Bald Lake.

Buckhorn Lake: Buckhorn Sands

2007 *E.coli* Lake Water Testing
E.coli/100mL

Site No.	3-Jul-07	17-Jul-07	25-Jul-07	30-Jul-07	7-Aug-07	4-Sep-07
B	2	0	3	0	0	6
C	0	0	1	0	3	1
D	0	1	1	10	0	4
E	3	2	2	1	2	2

As in previous years, counts were uniformly low in all locations in the Buckhorn Sands area.

To put the results in perspective:

- 100 *E.coli*/100 mL is the level at which public beaches are posted unsafe for swimming;
- Kawartha Lake Stewards Association believes the safe swimming level for our lakes should be more stringent than this, and has set the acceptable level at 50 *E.coli*/100mL. KLSA regards counts over 50 as cause for concern;
- Counts 20 and below, with an occasional reading between 20 and 50, are normal for the Kawartha Lakes;
- A "–" indicates no data available for that date.

Clear Lake: Sandy Point Road Assoc.

2007 *E.coli* Lake Water Testing
E.coli/100mL

Site No.	2-Jul-07	17-Jul-07
1A	0	0
1B	1	0
2A	31	1
2B	48	2

This is the first year of testing at these locations. Results were slightly elevated in Sites 2A and 2B on July 2, but an occasional reading between 20 and 50 is normal on the Kawartha Lakes.

Clear Lake: Kawartha Park

2007 *E.coli* Lake Water Testing
E.coli/100mL

Site No.	3-Jul-07	16-Jul-07	23-Jul-07	31-Jul-07	7-Aug-07	4-Sep-07
AA	0	0	0	3	0	0
B	1	1	3	0	0	0
C	0	46	0	4	0	0
D	0	0	4	0	4	3
P	0	5	3	0	0	0
S	0	5	0	0	0	0

As in previous years, the Kawartha Park area exhibits very low counts. An occasional slightly elevated reading such as seen at Site C/July 16 is normal for these lakes.

Clear Lake: Southwest Shore

2007 *E.coli* Lake Water Testing
E.coli/100mL

Site No.	3-Jul-07	16-Jul-07	23-Jul-07	30-Jul-07	6-Aug-07	4-Sep-07
1	0	7	0	0	1	1
2	0	3	5	0	0	1

As in most previous years, counts were uniformly low.

To put the results in perspective:

- 100 *E.coli*/100 mL is the level at which public beaches are posted unsafe for swimming;
- Kawartha Lake Stewards Association believes the safe swimming level for our lakes should be more stringent than this, and has set the acceptable level at 50 *E.coli*/100mL. KLSA regards counts over 50 as cause for concern;
- Counts 20 and below, with an occasional reading between 20 and 50, are normal for the Kawartha Lakes;
- A "–" indicates no data available for that date.

Julian Lake

2007 *E.coli* Lake Water Testing
E.coli/100mL

Site No.	2-Jul-07	23-Jul-07	29-Jul-07	6-Aug-07	3-Sep-07
A	0	0	0	0	5
B	13	2	3	5	3
C	2	3	1	3	1

As in previous years, counts were uniformly low.

Katchewanooka Lake

2007 *E.coli* Lake Water Testing
E.coli/100mL

Site No.	3-Jul-07	16-Jul-07	17-Jul-07	23-Jul-07	30-Jul-07	1-Aug-07	7-Aug-07	4-Sep-07
1	9	4	–	–	0	–	5	0
2	6	–	11	26	–	24	5	–
3	6	–	7	22	–	23	4	–
4	1	–	1	2	–	**212**	12,**71**,5,7,0	–
5	0	–	3	2	–	0	0	–
6	0	–	3	10	–	0	8	–
7	13	9	–	–	0	–	6	2

The high count at Site 4/Aug 1 may have been due to a high amount of boat and swimming activity. This site had two high readings in 2001, but has had none since.

It is reassuring that Site 5, which had several high counts in 2003 and 2004, has had none in the past three summers.

A raft at Site 7 regularly had large deposits of otter droppings, but this didn't seem to raise bacteria counts. This was interesting as, in past years, several sites near rocks or docks with excessive bird droppings showed elevated counts.

To put the results in perspective:

- 100 *E.coli*/100 mL is the level at which public beaches are posted unsafe for swimming;
- Kawartha Lake Stewards Association believes the safe swimming level for our lakes should be more stringent than this, and has set the acceptable level at 50 *E.coli*/100mL. KLSA regards counts over 50 as cause for concern;
- Counts 20 and below, with an occasional reading between 20 and 50, are normal for the Kawartha Lakes;
- A "–" indicates no data available for that date.

Lovesick Lake

2007 *E.coli* Lake Water Testing
E.coli/100mL

Site No.	3-Jul-07	17-Jul-07	23-Jul-07	31-Jul-07	7-Aug-07	4-Sep-07
9	1	8	3	5	7	3
13	0	4	2	1	1	1
14	0	0	1	0	0	3

Counts were uniformly low, as they have been for the past two years at these locations.

Lower Buckhorn Lake

2007 *E.coli* Lake Water Testing
E.coli/100mL

Site No.	6-Jul-07	15-Jul-07	25-Jul-07	31-Jul-07	6-Aug-07	3-Sep-07
1	6	8	12	19	6	7
2	4	5	2	9	0	3
3	20	37	24	25	16	31
4A	6	26	36	8	5	4
4B	40	**76**	42	33	15	13
5	2	0	0	**83**	5A-1, 5B-0, 5C-3	0
8	2	2	2	18	0	1
9	2	2	0	1	0	0
10	2	0	0	–	1	0
11	–	9	–	3	0	1
12	_	12	–	3	0	5
13	_	19	–	–	0	4
14	2	0	2	34	0	1

Counts at Site 4B were lower than in previous years. At Site 4B, there is an inflow from a wetland area; perhaps the relatively lower rainfall resulted in less bacterial input from the wetlands.

It was unusual to see a count over 50 at Site 5. There was no obvious reason for this, and the counts were very low the next week.

To put the results in perspective:

- 100 *E.coli*/100 mL is the level at which public beaches are posted unsafe for swimming;
- Kawartha Lake Stewards Association believes the safe swimming level for our lakes should be more stringent than this, and has set the acceptable level at 50 *E.coli*/100mL. KLSA regards counts over 50 as cause for concern;
- Counts 20 and below, with an occasional reading between 20 and 50, are normal for the Kawartha Lakes;
- A "–" indicates no data available for that date.

Pigeon Lake: Concession 17 Pigeon Lake Cottagers Assn.

2007 *E.coli* Lake Water Testing
E.coli/100mL

Site No.	2-Jul-07	15-Jul-07	22-Jul-07	29-Jul-07	6-Aug-07	9-Aug-07	3-Sep-07
A	5	7	8	49	**97**	0,1,0,1,1	7
B	1	10	2	0	1	–	6
3	1	1	1	2	1	–	5

It is noteworthy that there were very low bacterial counts on July 15 and July 22, as there were many dead carp visible, especially near Site 3. Carp would not have contained *E.coli* themselves because they are not warm-blooded, but one would have expected that some bird or mammal attracted to the carrion might have caused higher counts.

Pigeon Lake: North Pigeon Lake Ratepayers' Assn.

2007 *E.coli* Lake Water Testing
E.coli/100mL

Site No.	2-Jul-07	27-Jul-07	30-Jul-07	7-Aug-07	4-Sep-07	1-Oct-07
1A	2	6	7	14	1	1
5	0	16	2	2	0	3
6	9	8	16	15	16	17
8	0	2	0	0	0	0
13	3	4	3	7	1	9

Counts were uniformly low at all sites tested in the north area of Pigeon Lake. This is the first year there have been no readings over 20 at Site 6.

To put the results in perspective:

- 100 *E.coli*/100 mL is the level at which public beaches are posted unsafe for swimming;
- Kawartha Lake Stewards Association believes the safe swimming level for our lakes should be more stringent than this, and has set the acceptable level at 50 *E.coli*/100mL. KLSA regards counts over 50 as cause for concern;
- Counts 20 and below, with an occasional reading between 20 and 50, are normal for the Kawartha Lakes;
- A "–" indicates no data available for that date.

Pigeon Lake: Victoria Place

2007 *E.coli* Lake Water Testing
E.coli/100mL

Site No.	2-Jul-07	16-Jul-07	23-Jul-07	01-Jul-07	7-Aug-07	5-Sep-07
1	0	9	0	0	3	5
2	0	1	0	0	0	2
3	0	2	0	1	0	4
4	0	3	0	0	0	2
5	2	1	1	1	2	3

Counts were all less than 10, which is somewhat low for the Kawartha Lakes. It is noteworthy that there were low bacterial counts on July 16, as there were many dead carp visible in the area. Carp would not have contained *E.coli* themselves because they are not warm-blooded, but one would have expected that some bird or mammal attracted to the carrion might have caused higher counts.

Stony Lake: Association of Stony Lake Cottagers

2007 *E.coli* Lake Water Testing
E.coli/100mL

Site No,	3-Jul-07	16-Jul-07	23-Jul-07	30-Jul-07	7-Aug-07	4-Sep-07
E	4	6	**59**	10,14,18	2	2
I	3	14	7	9	8	3
J	13	11	6	6	2	6
K	2	4	0	0	1	0
L	15	3	0	15	0	1
P	0	–	0	0	0	2
24	1	10	0	0	2	0
25	6	7	0	1	2	1
26	3	10	1	0	26	0
27	42	21	2	10	17	7
28	1	3	1	0	0	2

Counts were uniformly low, similar to other years. The elevated count at Site E/Jul 23 had no discernible cause.

To put the results in perspective:

- 100 *E.coli*/100 mL is the level at which public beaches are posted unsafe for swimming;
- Kawartha Lake Stewards Association believes the safe swimming level for our lakes should be more stringent than this, and has set the acceptable level at 50 *E.coli*/100mL. KLSA regards counts over 50 as cause for concern;
- Counts 20 and below, with an occasional reading between 20 and 50, are normal for the Kawartha Lakes;
- A "–" indicates no data available for that date.

Sturgeon Lake: North Shore Combined Group

2007 *E.coli* Lake Water Testing
E.coli/100mL

Site No.	13-Jul-07	16-Jul-07	23-Jul-07	30-Jul-07	7-Aug-07	4-Sep-07
2	**136**	20	5	11	45	65
2A	3	1	2	0	5	7
3	27	38	27	17	23	**440**
4	5	1	1	3	2	0
5	1	5	0	1	3	1
SPG	0	0	0	0	0	1
SPPD	0	2	0	0	0	0
WS1	35	**137**	7	1	3	42
SB1	**55**	5	3	40	1	6
SB2	2	5	0	1	1	9

A large carp die-off occurred on Sturgeon Lake during July. This didn't seem to raise *E.coli* counts. Counts throughout July were somewhat lower than in the past three years.

Site 2's counts were somewhat lower than in previous years, but there is still room for improvement. This is next to a dock where waterfowl like to gather.

The count of 440 at Site 3/Sep 4 was unusually high. This is at the mouth of a creek which is habitat for various wildlife.

WS1 receives runoff from agricultural land and is near an area of high boat traffic, which may disturb the sediments. Scientists are finding that *E.coli* can exist and reproduce in lake sediments, so possibly churning up an area may raise counts.

SB1 is a quiet bay where water movement is limited. In three previous years there have been higher counts at this site.

To put the results in perspective:

- 100 *E.coli*/100 mL is the level at which public beaches are posted unsafe for swimming;
- Kawartha Lake Stewards Association believes the safe swimming level for our lakes should be more stringent than this, and has set the acceptable level at 50 *E.coli*/100mL. KLSA regards counts over 50 as cause for concern;
- Counts 20 and below, with an occasional reading between 20 and 50, are normal for the Kawartha Lakes;
- A "–" indicates no data available for that date.

Upper Stoney Lake: Upper Stoney Lake Assn.

2007 *E.coli* Lake Water Testing
E.coli/100mL

Site No.	2-Jul-07	12-Jul-07	23-Jul-07	30-Jul-07	7-Aug-07	4-Sep-07
6	6	16	3	3	11	4
20	7	10	1	1	0	1
21	4	2	0	0	0	0
52	1	8	13	13	7	2
65	3	4	0	0	12	1
70	1	2	1	1	0	0
78A	1	4	0	0	1	1

As in previous years, *E.coli* counts were uniformly low in Upper Stoney Lake. This is likely because Upper Stoney is a deep lake, and tends to have a fairly open shoreline.

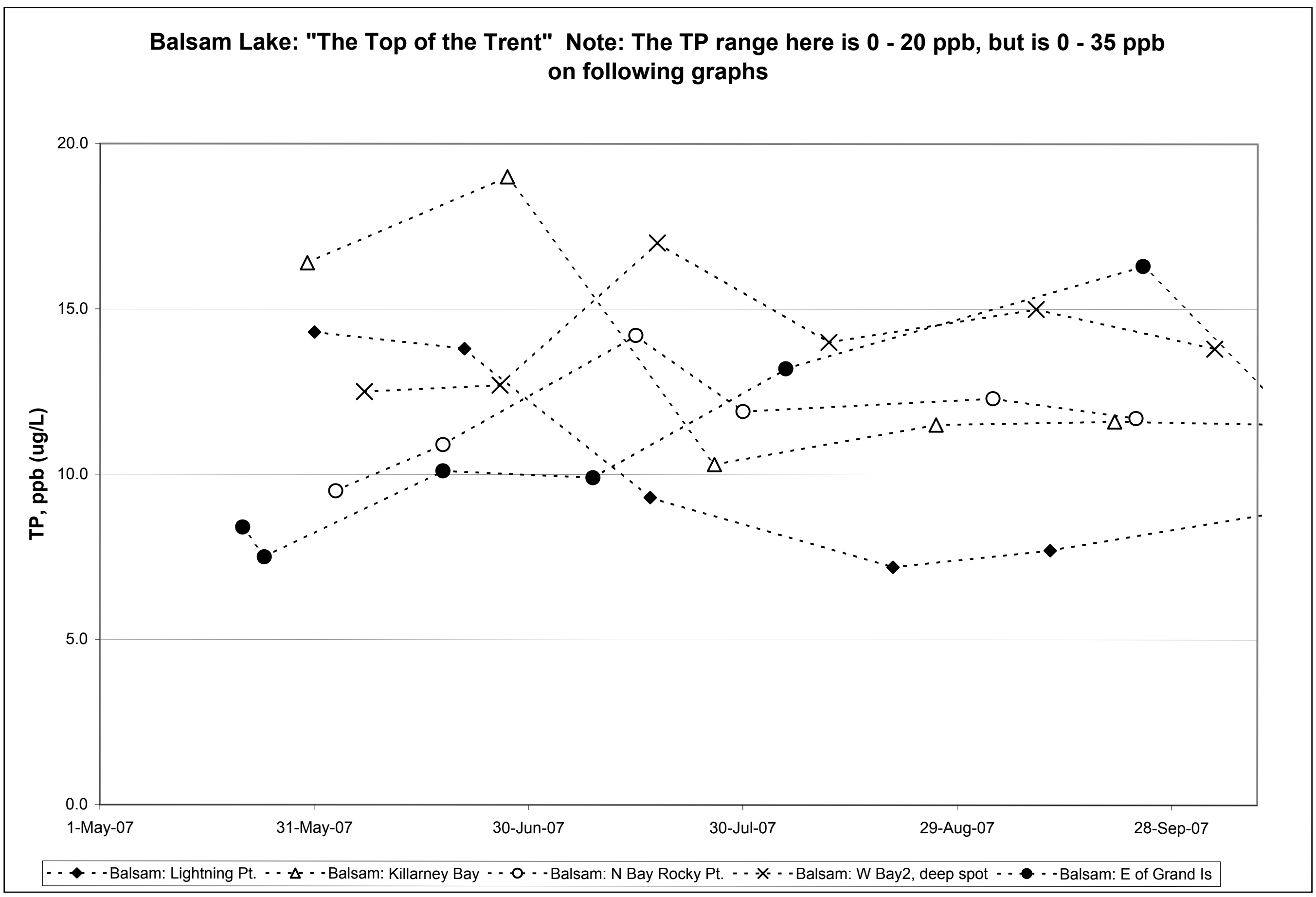
Ian Mackenzie

Appendix F: 2007 Phosphorus and Secchi Data

The graphs below show phosphorus levels at each testing site from June 1 to September 1.

Balsam Lake, the "Top of the Trent": an enigma

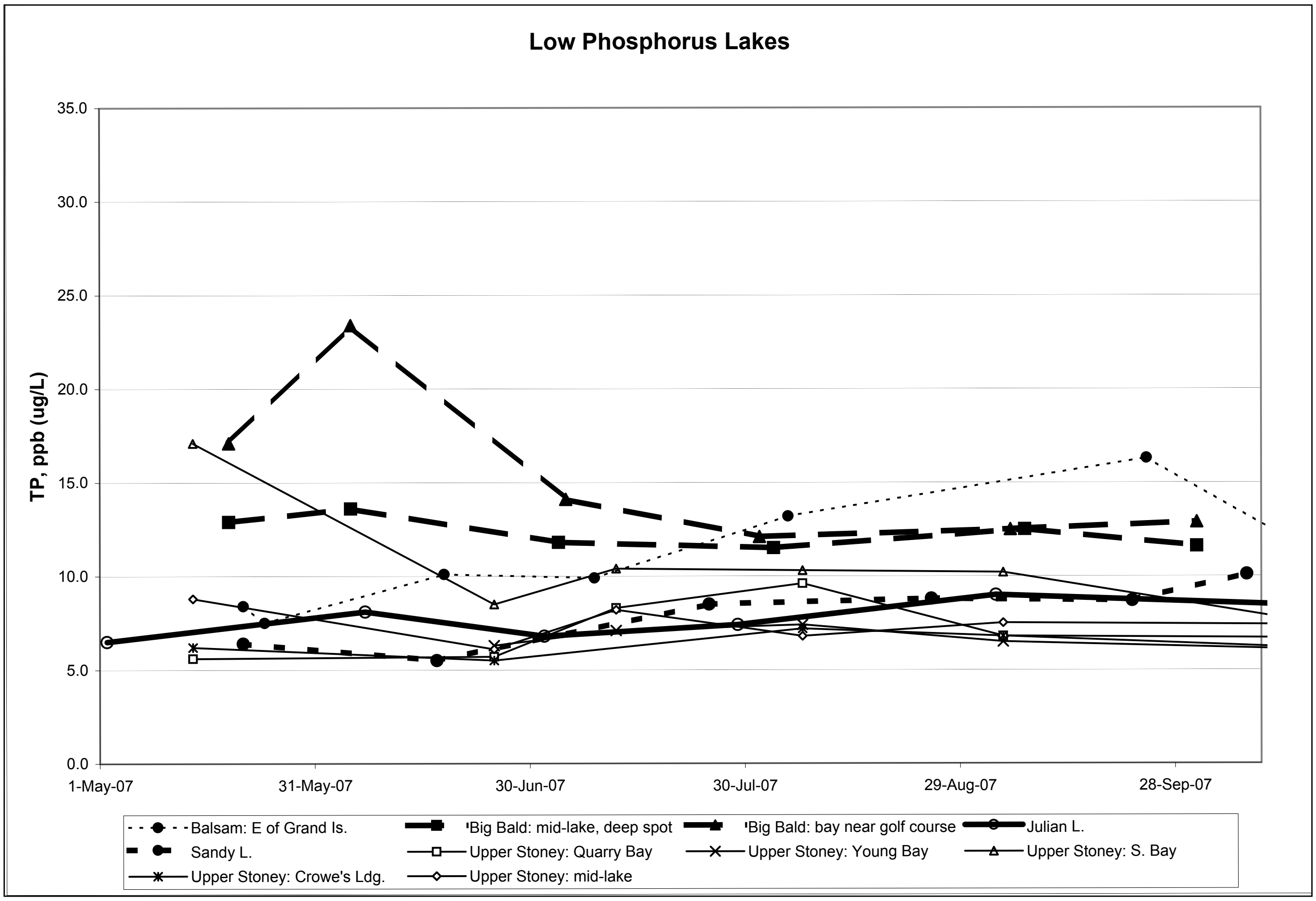
Balsam Lake is the highest lake on the entire Trent-Severn Waterway. Water flows into Balsam Lake from the north via the Gull River. Water then flows out of Balsam Lake in two directions; a small amount west to Georgian Bay and the large majority flows east into the Kawarthas and then to Lake Ontario. There is very little inflow from the south. One would expect the lowest phosphorus levels in the lake to be at the Lightning Point site (near Gull River inflow), followed by the site "E. of Grand Island" which is directly downstream from Lightning Point. One would also expect the other three sites, which have shallower water and less circulation, to have somewhat higher phosphorus. The graph below, however, doesn't show this. Why were Killarney Bay and Lightning Point high in the spring (not seen in the previous 2 years)? Why was the point "E of Grand Is." so different from Lightning Point throughout the summer? Perhaps it will take a few more years' data to see a consistent pattern in Balsam Lake.



Low-Phosphorus Lakes

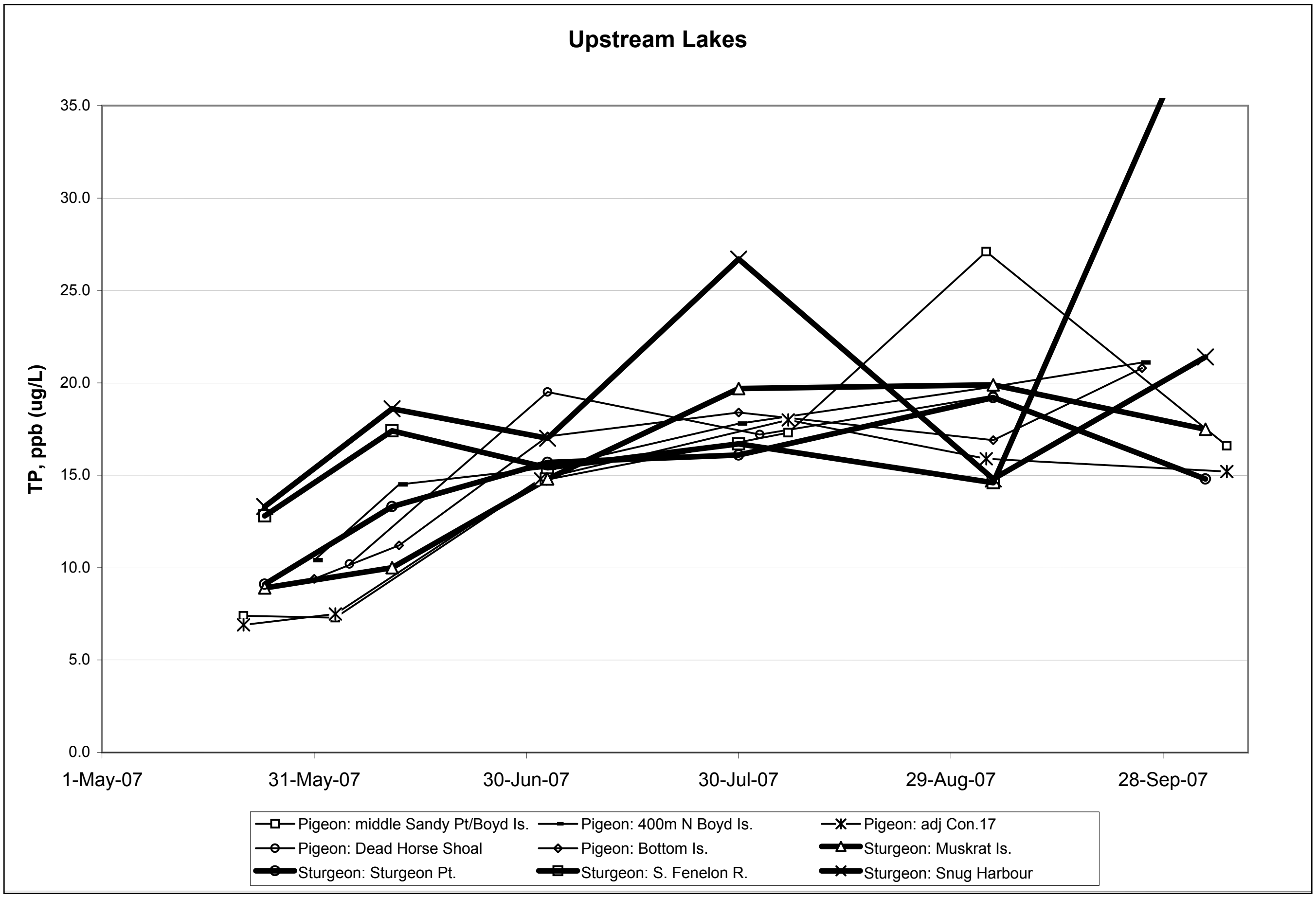
Both Big Bald Lake and Upper Stoney Lake receive low-phosphorus water from the north, which then flows into the Trent-Severn Waterway. The reading of over 20 ppb in Big Bald in early June may be an outlier, as this has not been seen before. Although South Bay, a shallow bay with low circulation, historically tends to be slightly higher than the rest of Upper Stoney Lake, its high May reading was also unusual.

Julian and Sandy Lake are both marl lakes, with phosphorus levels less than 10 ppb.



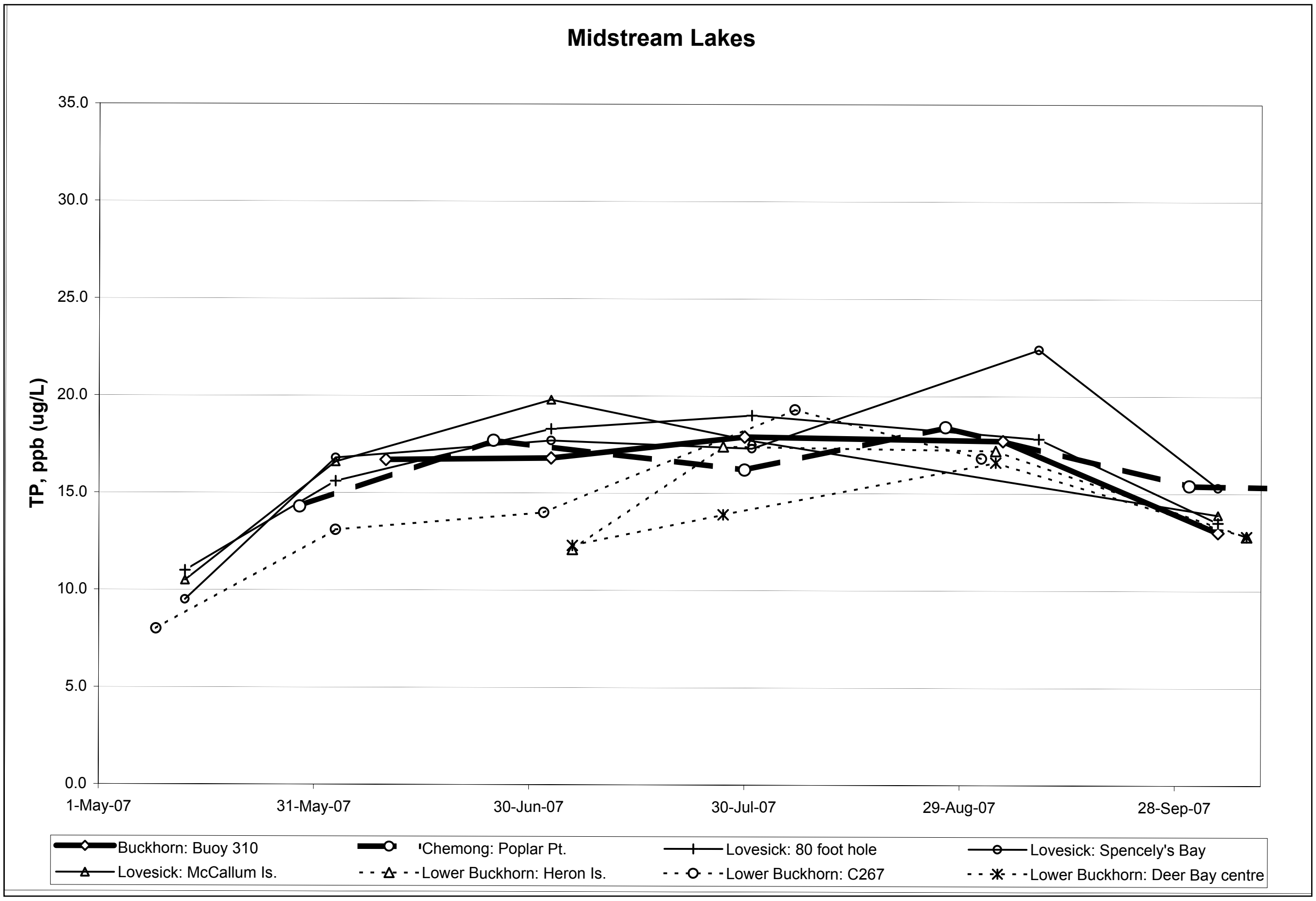
Upstream Lakes

These lakes contain about 5 ppb more phosphorus during July and August than Balsam Lake.



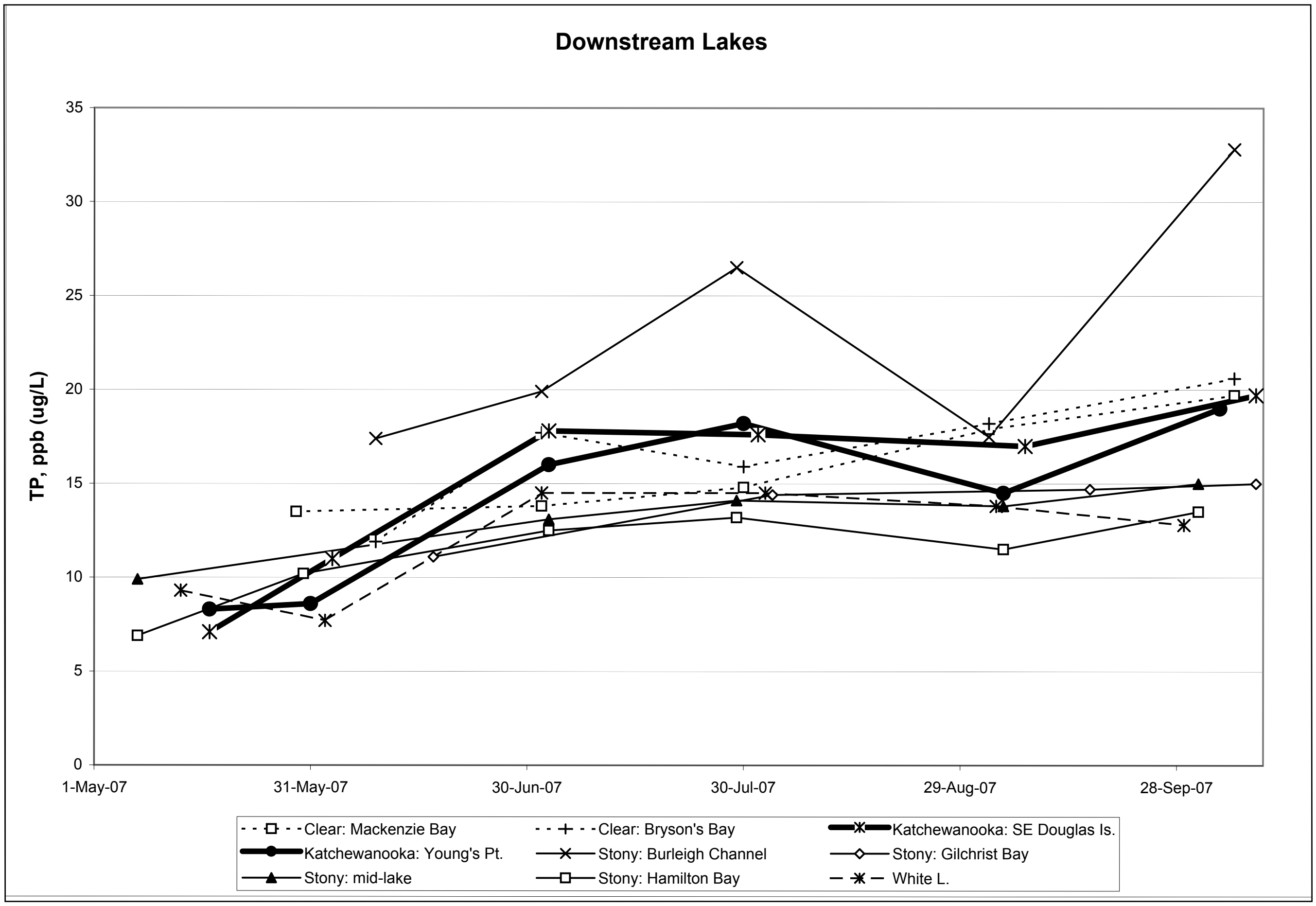
Midstream Lakes

In previous years, these lakes were higher in phosphorus than the Upstream Lakes. This year, the Upstream Lakes and Midstream Lakes had very similar phosphorus levels. This is probably because summer phosphorus levels generally remained low this summer.



Downstream Lakes

This was the first year phosphorus was measured in the Burleigh Channel, which is directly downstream from Lovesick Lake. Phosphorus levels seemed to be somewhat higher than in Lovesick Lake. The rest of the Stony Lake sites were all diluted with low-phosphorus water from Upper Stoney Lake. As water flowed into Clear Lake and Katchewanooka, phosphorus levels rose somewhat, as in previous years.



Following is the complete record of total phosphorus (TP) and Secchi disk measurements taken in 2007.

Lake / Name	Site Description	Date	TP1 (ug/L)	TP2 (ug/L)	Avg. TP (ug/L)	Secchi (m)
BALSAM LAKE	N. Bay Rocky Pt.	3-Jun-07	9.3	9.6	9.5	5.5
BALSAM LAKE	N. Bay Rocky Pt.	18-Jun-07	11.4	10.4	10.9	5.5
BALSAM LAKE	N. Bay Rocky Pt.	26-Jun-07				4.5
BALSAM LAKE	N. Bay Rocky Pt.	15-Jul-07	14.3	14.1	14.2	3.5
BALSAM LAKE	N. Bay Rocky Pt.	30-Jul-07	12.2	11.6	11.9	5.5
BALSAM LAKE	N. Bay Rocky Pt.	19-Aug-07				4.5
BALSAM LAKE	N. Bay Rocky Pt.	31-Aug-07				4.3
BALSAM LAKE	N. Bay Rocky Pt.	3-Sep-07	12.3	12.2	12.3	
BALSAM LAKE	N. Bay Rocky Pt.	23-Sep-07	11.8	11.6	11.7	4.3
BALSAM LAKE	W. Bay, deep spot	22-Jul-07	15.0	12.6	13.8	3.9
BALSAM LAKE	N/E end-Lightning Point	31-May-07	14.5	14.0	14.3	4.0
BALSAM LAKE	N/E end-Lightning Point	21-Jun-07	13.8	13.7	13.8	6.5
BALSAM LAKE	N/E end-Lightning Point	17-Jul-07	9.3	9.2	9.3	5.4
BALSAM LAKE	N/E end-Lightning Point	9-Aug-07				5.2
BALSAM LAKE	N/E end-Lightning Point	20-Aug-07	7.2	7.2	7.2	4.6
BALSAM LAKE	N/E end-Lightning Point	11-Sep-07	7.5	7.9	7.7	4.7
BALSAM LAKE	N/E end-Lightning Point	14-Oct-07	13.7	8.9	8.9	5.7
BALSAM LAKE	South Bay-Killarney Bay	30-May-07	14.8	17.9	16.4	2.5
BALSAM LAKE	South Bay-Killarney Bay	27-Jun-07	16.7	21.2	19.0	3.3
BALSAM LAKE	South Bay-Killarney Bay	26-Jul-07	10.2	10.3	10.3	3.4
BALSAM LAKE	South Bay-Killarney Bay	26-Aug-07	11.6	11.3	11.5	4.1
BALSAM LAKE	South Bay-Killarney Bay	20-Sep-07	11.3	11.9	11.6	4.3
BALSAM LAKE	South Bay-Killarney Bay	17-Oct-07	12.5	10.5	11.5	4.1
BALSAM LAKE	W. Bay 2, deep spot	7-Jun-07	12.9	12.0	12.5	3.0
BALSAM LAKE	W. Bay 2, deep spot	26-Jun-07	12.8	12.5	12.7	3.8
BALSAM LAKE	W. Bay 2, deep spot	18-Jul-07	18.6	15.3	17.0	3.4
BALSAM LAKE	W. Bay 2, deep spot	11-Aug-07	14.5	13.5	14.0	4.0
BALSAM LAKE	W. Bay 2, deep spot	9-Sep-07	14.1	15.9	15.0	3.6
BALSAM LAKE	W. Bay 2, deep spot	4-Oct-07	15.4	12.1	13.8	3.7
BALSAM LAKE	E. of Grand Is.	21-May-07	7.9	8.9	8.4	
BALSAM LAKE	E. of Grand Is.	24-May-07	6.8	8.1	7.5	
BALSAM LAKE	E. of Grand Is.	18-Jun-07	10.0	10.2	10.1	
BALSAM LAKE	E. of Grand Is.	9-Jul-07	10.1	9.6	9.9	
BALSAM LAKE	E. of Grand Is.	5-Aug-07	14.8	11.6	13.2	
BALSAM LAKE	E. of Grand Is.	24-Sep-07	15.9	16.7	16.3	
BALSAM LAKE	E. of Grand Is.	21-Oct-07	10.4	10.4	10.4	

Lake / Name	Site Description	Date	TP1 (ug/L)	TP2 (ug/L)	Avg. TP (ug/L)	Secchi (m)
BIG BALD LAKE	Mid Lake, deep spot	19-May-07	14.0	11.8	12.9	5.4
BIG BALD LAKE	Mid Lake, deep spot	5-Jun-07	14.2	12.9	13.6	4.1
BIG BALD LAKE	Mid Lake, deep spot	4-Jul-07	11.2	12.4	11.8	4.4
BIG BALD LAKE	Mid Lake, deep spot	3-Aug-07	11.4	11.5	11.5	4.0
BIG BALD LAKE	Mid Lake, deep spot	7-Sep-07	12.3	12.7	12.5	4.3
BIG BALD LAKE	Mid Lake, deep spot	1-Oct-07	12.0	11.2	11.6	6.0
BIG BALD LAKE	Bay near golf course	19-May-07	19.7	14.4	17.1	
BIG BALD LAKE	Bay near golf course	5-Jun-07	19.9	26.9	23.4	
BIG BALD LAKE	Bay near golf course	5-Jul-07	12.9	15.3	14.1	
BIG BALD LAKE	Bay near golf course	1-Aug-07	12.2	11.9	12.1	
BIG BALD LAKE	Bay near golf course	5-Sep-07	11.9	13.0	12.5	
BIG BALD LAKE	Bay near golf course	1-Oct-07	12.9	12.8	12.9	
BUCKHORN LAKE (U)	Narrows, red buoy C310	10-Jun-07	17.9	15.5	16.7	2.5
BUCKHORN LAKE (U)	Narrows, red buoy C310	3-Jul-07	17.6	16.0	16.8	3.6
BUCKHORN LAKE (U)	Narrows, red buoy C310	30-Jul-07	17.5	18.2	17.9	2.4
BUCKHORN LAKE (U)	Narrows, red buoy C310	4-Sep-07	16.8	18.5	17.7	2.7
BUCKHORN LAKE (U)	Narrows, red buoy C310	4-Oct-07	12.7	13.3	13.0	4.6
CHEMONG LAKE	S. end, Lancaster Bay	24-May-07	6.5	8.5	7.5	
CHEMONG LAKE	S. end, Lancaster Bay	8-Jul-07	31.2	29.3	30.3	
CHEMONG LAKE	Poplar Pt.	29-May-07	13.9	14.7	14.3	
CHEMONG LAKE	Poplar Pt.	25-Jun-07	20.0	15.4	17.7	
CHEMONG LAKE	Poplar Pt.	30-Jul-07	16.3	16.1	16.2	
CHEMONG LAKE	Poplar Pt.	27-Aug-07	18.9	17.8	18.4	
CHEMONG LAKE	Poplar Pt.	30-Sep-07	15.6	15.1	15.4	
CHEMONG LAKE	Poplar Pt.	30-Oct-07	13.7	16.6	15.2	
CLEAR LAKE	MacKenzie Bay	29-May-07	13.6	13.4	13.5	
CLEAR LAKE	MacKenzie Bay	2-Jul-07	14.7	12.8	13.8	
CLEAR LAKE	MacKenzie Bay	30-Jul-07	15.5	14.1	14.8	
CLEAR LAKE	MacKenzie Bay	2-Sep-07	18.0	16.8	17.9	
CLEAR LAKE	MacKenzie Bay	6-Oct-07	19.4	20.0	19.7	
CLEAR LAKE	Brysons Bay	9-Jun-07	12.4	11.4	11.9	
CLEAR LAKE	Brysons Bay	2-Jul-07	17.4	17.9	17.7	
CLEAR LAKE	Brysons Bay	30-Jul-07	15.5	16.3	15.9	
CLEAR LAKE	Brysons Bay	2-Sep-07	18.9	16.5	18.2	
CLEAR LAKE	Brysons Bay	6-Oct-07	23.6	17.5	20.6	

Lake / Name	Site Description	Date	TP1 (ug/L)	TP2 (ug/L)	Avg. TP (ug/L)	Secchi (m)
JULIAN LAKE	Mid Lake, deep spot	2-May-07	6.1	6.8	6.5	5.5
JULIAN LAKE	Mid Lake, deep spot	7-Jun-07	7.2	9.0	8.1	6.8
JULIAN LAKE	Mid Lake, deep spot	2-Jul-07	6.2	7.3	6.8	5.6
JULIAN LAKE	Mid Lake, deep spot	29-Jul-07	7.9	6.9	7.4	5.1
JULIAN LAKE	Mid Lake, deep spot	3-Sep-07	9.1	8.9	9.0	4.6
JULIAN LAKE	Mid Lake, deep spot	11-Oct-07	7.8	9.2	8.5	6.0
KATCHEWANOOKA LAKE	S/E Douglas Island	17-May-07	7.1	7.0	7.1	4.8
KATCHEWANOOKA LAKE	S/E Douglas Island	3-Jun-07	10.4	11.5	11.0	4.5
KATCHEWANOOKA LAKE	S/E Douglas Island	3-Jul-07	17.3	18.2	17.8	5.3
KATCHEWANOOKA LAKE	S/E Douglas Island	19-Jul-07				6.4
KATCHEWANOOKA LAKE	S/E Douglas Island	1-Aug-07	17.0	16.2	17.6	5.6
KATCHEWANOOKA LAKE	S/E Douglas Island	7-Sep-07	16.8	17.1	17.0	5.3
KATCHEWANOOKA LAKE	S/E Douglas Island	9-Oct-07	20.2	19.2	19.7	6.5
KATCHEWANOOKA LAKE	Young's Pt. near locks	17-May-07	8.0	8.5	8.3	5.4
KATCHEWANOOKA LAKE	Young's Pt. near locks	31-May-07	8.5	8.6	8.6	5.8
KATCHEWANOOKA LAKE	Young's Pt. near locks	12-Jun-07				6.3
KATCHEWANOOKA LAKE	Young's Pt. near locks	3-Jul-07	16.8	15.2	16.0	5.2
KATCHEWANOOKA LAKE	Young's Pt. near locks	16-Jul-07				4.6
KATCHEWANOOKA LAKE	Young's Pt. near locks	30-Jul-07	18.7	17.6	18.2	3.8
KATCHEWANOOKA LAKE	Young's Pt. near locks	17-Aug-07				4.5
KATCHEWANOOKA LAKE	Young's Pt. near locks	4-Sep-07	14.5	14.5	14.5	5.1
KATCHEWANOOKA LAKE	Young's Pt. near locks	19-Sep-07				6.1
KATCHEWANOOKA LAKE	Young's Pt. near locks	4-Oct-07	19.5	18.5	19.0	5.5
LOVESICK LAKE	80' hole at N. end	13-May-07	11.6	10.4	11.0	5.3
LOVESICK LAKE	80' hole at N. end	3-Jun-07	15.0	16.2	15.6	4.5
LOVESICK LAKE	80' hole at N. end	3-Jul-07	19.7	18.9	18.3	5.0
LOVESICK LAKE	80' hole at N. end	31-Jul-07	20.6	17.3	19.0	4.8
LOVESICK LAKE	80' hole at N. end	9-Sep-07	17.7	17.9	17.8	3.5
LOVESICK LAKE	80' hole at N. end	4-Oct-07	13.2	13.7	13.5	4.5
LOVESICK LAKE	Spenceley's Bay	13-May-07	8.2	10.7	9.5	5.0
LOVESICK LAKE	Spenceley's Bay	3-Jun-07	17.3	16.2	16.8	5.0
LOVESICK LAKE	Spenceley's Bay	3-Jul-07	19.6	15.8	17.7	4.5
LOVESICK LAKE	Spenceley's Bay	31-Jul-07	17.3	19.2	17.3	4.5
LOVESICK LAKE	Spenceley's Bay	9-Sep-07	18.2	26.6	22.4	3.8
LOVESICK LAKE	Spenceley's Bay	4-Oct-07	15.6	15.0	15.3	4.5

Lake / Name	Site Description	Date	TP1 (ug/L)	TP2 (ug/L)	Avg. TP (ug/L)	Secchi (m)
LOVESICK LAKE	McCallum Island	13-May-07	10.0	11.0	10.5	5.3
LOVESICK LAKE	McCallum Island	3-Jun-07	17.1	16.0	16.6	5.0
LOVESICK LAKE	McCallum Island	3-Jul-07	19.7	19.9	19.8	5.0
LOVESICK LAKE	McCallum Island	31-Jul-07	17.1	18.2	17.7	4.3
LOVESICK LAKE	McCallum Island	9-Sep-07	**9.0**	**9.7**	N/A	3.5
LOVESICK LAKE	McCallum Island	4-Oct-07	14.4	13.3	13.9	4.5
LOWER BUCKHORN LAKE	Heron Island	21-Apr-07	9.9	9.7	9.8	4.2
LOWER BUCKHORN LAKE	Heron Island	6-Jul-07	11.6	12.5	12.1	4.4
LOWER BUCKHORN LAKE	Heron Island	27-Jul-07	17.3	17.4	17.4	3.2
LOWER BUCKHORN LAKE	Heron Island	3-Sep-07	17.4	16.9	17.2	2.6
LOWER BUCKHORN LAKE	Heron Island	8-Oct-07	12.9	12.7	12.8	
LOWER BUCKHORN LAKE	Deer Bay W. Buoy C267	9-May-07	9.2	6.7	8.0	5.3
LOWER BUCKHORN LAKE	Deer Bay W. Buoy C267	24-May-07				3.1
LOWER BUCKHORN LAKE	Deer Bay W. Buoy C267	3-Jun-07	13.6	12.6	13.1	4.3
LOWER BUCKHORN LAKE	Deer Bay W. Buoy C267	17-Jun-07				4.4
LOWER BUCKHORN LAKE	Deer Bay W. Buoy C267	2-Jul-07	14.6	13.3	14.0	4.6
LOWER BUCKHORN LAKE	Deer Bay W. Buoy C267	20-Jul-07				4.0
LOWER BUCKHORN LAKE	Deer Bay W. Buoy C267	6-Aug-07	19.9	18.7	19.3	3.3
LOWER BUCKHORN LAKE	Deer Bay W. Buoy C267	18-Aug-07				4.2
LOWER BUCKHORN LAKE	Deer Bay W. Buoy C267	1-Sep-07	17.9	15.7	16.8	3.6
LOWER BUCKHORN LAKE	Deer Bay W. Buoy C267	5-Oct-07				5.7
LOWER BUCKHORN LAKE	Deer Bay W. Buoy C267	11-Oct-07				5.7
LOWER BUCKHORN LAKE	Deer Bay W. Buoy C267	25-Oct-07				7.3
LOWER BUCKHORN LAKE	Deer Bay-centre	21-Apr-07	10.5	10.6	10.6	4.2
LOWER BUCKHORN LAKE	Deer Bay-centre	6-Jul-07	12.5	12.1	12.3	4.1
LOWER BUCKHORN LAKE	Deer Bay-centre	27-Jul-07	13.8	13.9	13.9	3.3
LOWER BUCKHORN LAKE	Deer Bay-centre	3-Sep-07	16.0	17.1	16.6	2.7
LOWER BUCKHORN LAKE	Deer Bay-centre	8-Oct-07	12.7	12.9	12.8	
PIGEON LAKE	Middle, Sandy Pt./Boyd Island	21-May-07	7.7	7.0	7.4	3.9
PIGEON LAKE	Middle, Sandy Pt./Boyd Island	3-Jun-07	7.6	6.9	7.3	3.8
PIGEON LAKE	Middle, Sandy Pt./Boyd Island	2-Jul-07	14.5	14.9	14.7	2.5
PIGEON LAKE	Middle, Sandy Pt./Boyd Island	6-Aug-07	17.2	17.4	17.3	2.8
PIGEON LAKE	Middle, Sandy Pt./Boyd Island	3-Sep-07	31.9	22.3	27.1	2.9
PIGEON LAKE	Middle, Sandy Pt./Boyd Island	7-Oct-07	17.6	15.2	16.6	3.4

Lake / Name	Site Description	Date	TP1 (ug/L)	TP2 (ug/L)	Avg. TP (ug/L)	Secchi (m)
PIGEON LAKE	N-400m N. of Boyd Island	31-May-07	11.2	9.6	10.4	3.3
PIGEON LAKE	N-400m N. of Boyd Island	12-Jun-07	13.5	15.5	14.5	3.8
PIGEON LAKE	N-400m N. of Boyd Island	3-Jul-07	15.2	15.5	15.4	2.9
PIGEON LAKE	N-400m N. of Boyd Island	30-Jul-07	19.1	16.4	17.8	3.0
PIGEON LAKE	N-400m N. of Boyd Island	4-Sep-07	17.7	21.8	19.8	2.8
PIGEON LAKE	N-400m N. of Boyd Island	25-Sep-07	22.1	20.0	21.1	3.5
PIGEON LAKE	N. end, adjacent Con. 17	21-May-07	5.9	7.9	6.9	4.1
PIGEON LAKE	N. end, adjacent Con. 17	3-Jun-07	7.9	7.0	7.5	3.6
PIGEON LAKE	N. end, adjacent Con. 17	2-Jul-07	14.5	15.1	14.8	2.4
PIGEON LAKE	N. end, adjacent Con. 17	6-Aug-07	16.8	19.2	18.0	2.6
PIGEON LAKE	N. end, adjacent Con. 17	3-Sep-07	15.7	16.1	15.9	2.9
PIGEON LAKE	N. end, adjacent Con. 17	7-Oct-07	14.9	15.5	15.2	3.5
PIGEON LAKE	C340 off Dead Horse Shoal	5-Jun-07	11.3	9.0	10.2	4.0
PIGEON LAKE	C340 off Dead Horse Shoal	3-Jul-07	19.7	19.2	19.5	3.5
PIGEON LAKE	C340 off Dead Horse Shoal	14-Jul-07				3.7
PIGEON LAKE	C340 off Dead Horse Shoal	2-Aug-07	16.3	18.0	17.2	3.8
PIGEON LAKE	C340 off Dead Horse Shoal	16-Aug-07				3.6
PIGEON LAKE	C340 off Dead Horse Shoal	4-Sep-07	19.2	19.3	19.3	3.3
PIGEON LAKE	N-300yds. off Bottom Island	31-May-07	10.0	8.7	9.4	3.3
PIGEON LAKE	N-300yds. off Bottom Island	12-Jun-07	11.0	11.4	11.2	3.8
PIGEON LAKE	N-300yds. off Bottom Island	3-Jul-07	16.8	17.5	17.1	3.8
PIGEON LAKE	N-300yds. off Bottom Island	30-Jul-07	17.9	18.8	18.4	3.5
PIGEON LAKE	N-300yds. off Bottom Island	4-Sep-07	17.4	16.4	16.9	3.0
PIGEON LAKE	N-300yds. off Bottom Island	25-Sep-07	20.7	20.8	20.8	3.5
SANDY LAKE	Mid Lake, deep spot	21-May-07	6.4	6.4	6.4	
SANDY LAKE	Mid Lake, deep spot	17-Jun-07	5.8	5.1	5.5	
SANDY LAKE	Mid Lake, deep spot	25-Jul-07	8.6	8.3	8.5	
SANDY LAKE	Mid Lake, deep spot	25-Aug-07	8.8	8.8	8.8	
SANDY LAKE	Mid Lake, deep spot	22-Sep-07	8.6	8.7	8.7	
SANDY LAKE	Mid Lake, deep spot	8-Oct-07	11.9	8.2	10.1	
SCUGOG LAKE	Viewlake - deep spot	24-May-07	25.3	26.2	25.8	0.5
SCUGOG LAKE	Viewlake - deep spot	9-Jun-07	38.5	38.2	38.4	0.4
SCUGOG LAKE	Viewlake - deep spot	24-Jun-07	32.0	33.7	32.9	
SCUGOG LAKE	Viewlake - deep spot	17-Jul-07	19.7	19.5	19.6	
SCUGOG LAKE	Viewlake - deep spot	25-Jul-07	23.3	22.7	23.0	.06
SCUGOG LAKE	Viewlake - deep spot	25-Aug-07	24.2	25.5	24.9	
SCUGOG LAKE	Viewlake - deep spot	10-Sep-07	19.6	20.4	20.0	0.9
SCUGOG LAKE	Viewlake - deep spot	25-Sep-07	18.5	18.5	18.5	0.9

Lake / Name	Site Description	Date	TP1 (ug/L)	TP2 (ug/L)	Avg. TP (ug/L)	Secchi (m)
STONY LAKE	Burleigh locks channel	9-Jun-07	17.7	17.0	17.4	
STONY LAKE	Burleigh locks channel	2-Jul-07	18.3	21.4	19.9	
STONY LAKE	Burleigh locks channel	29-Jul-07	22.1	31.3	26.5	
STONY LAKE	Burleigh locks channel	2-Sep-07	17.8	17.2	17.5	
STONY LAKE	Burleigh locks channel	6-Oct-07	34.6	30.9	32.8	
STONY LAKE	Gilchrist Bay	17-Jun-07	10.4	11.7	11.1	4.8
STONY LAKE	Gilchrist Bay	3-Aug-07	15.0	13.7	14.4	4.5
STONY LAKE	Gilchrist Bay	16-Sep-07	13.7	15.7	14.7	3.7
STONY LAKE	Gilchrist Bay	9-Oct-07	15.5	14.5	15.0	4.8
STONY LAKE	Mouse Island	7-May-07	11.6	8.1	9.9	5.1
STONY LAKE	Mouse Island	30-May-07				4.6
STONY LAKE	Mouse Island	3-Jul-07	12.4	13.8	13.1	5.0
STONY LAKE	Mouse Island	29-Jul-07	14.4	13.8	14.1	4.3
STONY LAKE	Mouse Island	4-Sep-07	13.9	13.6	13.8	4.1
STONY LAKE	Mouse Island	1-Oct-07	14.7	15.3	15.0	5.5
STONY LAKE	Hamilton Bay	7-May-07	7.0	6.8	6.9	4.8
STONY LAKE	Hamilton Bay	30-May-07	10.0	10.4	10.2	4.1
STONY LAKE	Hamilton Bay	3-Jul-07	12.3	12.7	12.5	4.1
STONY LAKE	Hamilton Bay	29-Jul-07	12.5	13.8	13.2	4.1
STONY LAKE	Hamilton Bay	4-Sep-07	11.6	11.4	11.5	4.1
STONY LAKE	Hamilton Bay	1-Oct-07	13.5	13.4	13.5	4.1
STURGEON LAKE	Muskrat Island at Buoy C388	24-May-07	9.1	8.7	8.9	4.6
STURGEON LAKE	Muskrat Island at Buoy C388	11-Jun-07	11.7	10.2	10.0	3.8
STURGEON LAKE	Muskrat Island at Buoy C388	3-Jul-07	15.4	14.1	14.8	2.3
STURGEON LAKE	Muskrat Island at Buoy C388	30-Jul-07	20.0	19.3	19.7	3.4
STURGEON LAKE	Muskrat Island at Buoy C388	4-Sep-07	20.1	19.7	19.9	2.8
STURGEON LAKE	Muskrat Island at Buoy C388	4-Oct-07	18.4	16.5	17.5	4.0
STURGEON LAKE	Sturgeon Point Buoy	24-May-07	9.0	9.1	9.1	4.0
STURGEON LAKE	Sturgeon Point Buoy	11-Jun-07	13.7	12.9	13.3	3.1
STURGEON LAKE	Sturgeon Point Buoy	3-Jul-07	15.8	15.5	15.7	2.2
STURGEON LAKE	Sturgeon Point Buoy	30-Jul-07	15.9	16.2	16.1	3.4
STURGEON LAKE	Sturgeon Point Buoy	4-Sep-07	17.9	20.5	19.2	2.7
STURGEON LAKE	Sturgeon Point Buoy	4-Oct-07	14.7	14.8	14.8	3.4

Lake / Name	Site Description	Date	TP1 (ug/L)	TP2 (ug/L)	Avg. TP (ug/L)	Secchi (m)
STURGEON LAKE	S. of Fenelon R-Buoy N5	24-May-07	13.3	12.2	12.8	4.8
STURGEON LAKE	S. of Fenelon R-Buoy N5	11-Jun-07	16.6	18.1	17.4	3.4
STURGEON LAKE	S. of Fenelon R-Buoy N5	3-Jul-07	15.8	15.0	15.4	2.6
STURGEON LAKE	S. of Fenelon R-Buoy N5	30-Jul-07	17.0	16.3	16.7	3.1
STURGEON LAKE	S. of Fenelon R-Buoy N5	4-Sep-07	16.2	13.0	14.6	2.9
STURGEON LAKE	S. of Fenelon R-Buoy N5	4-Oct-07	45.9	35.5	40.7	3.2
STURGEON LAKE	Snug Harbour Pr-Buoy CP6	24-May-07	13.3	13.2	13.3	2.1
STURGEON LAKE	Snug Harbour Pr-Buoy CP6	11-Jun-07	18.6	18.5	18.6	2.1
STURGEON LAKE	Snug Harbour Pr-Buoy CP6	3-Jul-07	17.1	16.9	17.0	2.1
STURGEON LAKE	Snug Harbour Pr-Buoy CP6	30-Jul-07	27.7	25.7	26.7	2.1
STURGEON LAKE	Snug Harbour Pr-Buoy CP6	4-Sep-07	15.3	14.2	14.8	2.1
STURGEON LAKE	Snug Harbour Pr-Buoy CP6	4-Oct-07	21.0	21.8	21.4	2.1
UPPER STONEY LAKE	Quarry Bay	14-May-07	5.6	5.6	5.6	5.5
UPPER STONEY LAKE	Quarry Bay	25-Jun-07	5.6	5.8	5.7	7.3
UPPER STONEY LAKE	Quarry Bay	12-Jul-07	7.6	8.9	8.3	5.9
UPPER STONEY LAKE	Quarry Bay	7-Aug-07	10.1	9.0	9.6	5.5
UPPER STONEY LAKE	Quarry Bay	4-Sep-07	7.1	6.5	6.8	6.6
UPPER STONEY LAKE	Quarry Bay	14-Oct-07	6.9	6.5	6.7	6.0
UPPER STONEY LAKE	Young Bay	25-Jun-07	5.6	7.0	6.3	
UPPER STONEY LAKE	Young Bay	12-Jul-07	7.9	6.2	7.1	
UPPER STONEY LAKE	Young Bay	7-Aug-07	6.8	8.0	7.4	
UPPER STONEY LAKE	Young Bay	4-Sep-07	6.6	6.3	6.5	
UPPER STONEY LAKE	Young Bay	14-Oct-07	6.8	5.4	6.1	
UPPER STONEY LAKE	S. Bay, deep spot	14-May-07	19.6	14.7	17.1	5.3
UPPER STONEY LAKE	S. Bay, deep spot	25-Jun-07	8.4	8.6	8.5	7.4
UPPER STONEY LAKE	S. Bay, deep spot	12-Jul-07	10.8	9.9	10.4	5.3
UPPER STONEY LAKE	S. Bay, deep spot	7-Aug-07	9.2	11.4	10.3	5.6
UPPER STONEY LAKE	S. Bay, deep spot	4-Sep-07	9.8	10.6	10.2	6.0
UPPER STONEY LAKE	S. Bay, deep spot	14-Oct-07	7.0	8.3	7.7	6.0
UPPER STONEY LAKE	Crowes Landing	14-May-07	6.5	5.9	6.2	5.1
UPPER STONEY LAKE	Crowes Landing	25-Jun-07	5.3	5.7	5.5	6.2
UPPER STONEY LAKE	Crowes Landing	12-Jul-07				6.4
UPPER STONEY LAKE	Crowes Landing	7-Aug-07	7.8	6.6	7.2	5.8
UPPER STONEY LAKE	Crowes Landing	4-Sep-07	6.2	7.4	6.8	6.1
UPPER STONEY LAKE	Crowes Landing	14-Oct-07	5.8	6.5	6.2	6.1

Lake / Name	Site Description	Date	TP1 (ug/L)	TP2 (ug/L)	Avg. TP (ug/L)	Secchi (m)
UPPER STONEY LAKE	Mid Lake, deep spot	14-May-07	8.8		8.8	5.2
UPPER STONEY LAKE	Mid Lake, deep spot	25-Jun-07	6.4	5.7	6.1	3.7
UPPER STONEY LAKE	Mid Lake, deep spot	12-Jul-07	8.4	8.0	8.2	6.2
UPPER STONEY LAKE	Mid Lake, deep spot	7-Aug-07	6.4	7.1	6.8	5.8
UPPER STONEY LAKE	Mid Lake, deep spot	4-Sep-07	6.7	8.3	7.5	6.5
UPPER STONEY LAKE	Mid Lake, deep spot	14-Oct-07	7.5	7.2	7.4	5.7
WHITE LAKE	S. end, deep spot	13-May-07	9.9	8.7	9.3	4.5
WHITE LAKE	S. end, deep spot	2-Jun-07	7.7	7.7	7.7	4.3
WHITE LAKE	S. end, deep spot	2-Jul-07	15.0	14.0	14.5	3.8
WHITE LAKE	S. end, deep spot	2-Aug-07	15.2	13.8	14.5	3.7
WHITE LAKE	S. end, deep spot	3-Sep-07	13.9	13.6	13.8	3.6
WHITE LAKE	S. end, deep spot	29-Sep-07	12.2	13.4	1.0	3.6

Ian Mackenzie

Appendix G: Glossary

Algae – Simple, one-celled or colonial plant-like organisms that grow in water, contain chlorophyll and do not differentiate into specialized cells and tissues like roots and leaves.

Benthic mat – A piece of heavy textile placed on the nearshore substrate as a physical barrier to smother weed growth.

Canadian Shield – Also called the Precambrian or Laurentian Shield, it is the bedrock of much of central and northeastern Canada. The Shield is one of the oldest geological formations in the world, composed of metamorphosed rocks originally laid down between 4.5 billion and 540,000 million years ago. Often covered with forest, it provides relatively low-phosphorus water to the Kawartha Lakes.

***E.coli* bacteria** – Bacteria living in the intestines of warm-blooded animals such as birds, beavers and humans. While most are harmless, a few strains of *E.coli* cause severe gastrointestinal illness. Drinking water and recreational water are tested for the presence of these bacteria.

Esker – A long, narrow ridge of coarse gravel deposited by meltwater rivers flowing under glaciers or ice sheets.

Glacial till – Geological deposit of unsorted sand, clay and rocks carried along by a glacier and dumped when it melts.

Inlier – An area or formation of older rocks completely surrounded by younger layers.

Invertebrate – An animal without a spinal cord. Includes worms, leeches, and snails.

Karst – An area of irregular limestone in which erosion has produced fissures, sinkholes, underground streams, and caverns.

Macrophyte – A plant that is visible to the eye, i.e., not microscopic.

Marl lake – These lakes receive drainage from limestone dominated watersheds. Acidic rainfall dissolves the limestone as it percolates through the rocks or soil. When the high-calcium water in the lake warms in the summer, the carbon dioxide-forming carbonic acid is reduced and the dissolved limestone precipitates out. This limestone (calcium carbonate) that collects on the lake bottom is called marl.

Parts per billion (ppb) – A measure of concentration used for extremely small quantities of one substance within another substance. One part per billion of phosphorus, for example, means one unit of phosphorus within a billion units of water, which corresponds to one minute in 2000 years, a single penny in $10 million, or one drop of water in an Olympic-sized swimming pool. For our purposes, micrograms per litre and parts per billion are equal.

Pathogen – A disease-causing microorganism.

Phosphorus – A widely occurring chemical element that stimulates the growth of terrestrial and aquatic plants as well as algae. Much phosphorus in the Kawarthas comes from the atmosphere, from dissolving bedrock (especially the limestone), as well as from decaying vegetation and from deposits on the bottoms of lakes and streams. Much is also coming from human sources, especially agricultural fertilzers and sewage disposal systems.

Safe swimming level – The Ontario Ministry of Environment's stated level of 100 *E.coli* bacteria per 100 millilitres of lake or river water. At that level or higher, beaches are posted as unsafe for swimming.

Secchi disk – A circular disk with alternating black and white quarters, which is lowered to specific depths in surface water and used to estimate water clarity.

Substrate – The earthy material that exists in the bottom of a marine habitat, like dirt, rocks, sand, or gravel.

Tannic water – Brown-stained water containing astringent chemicals produced by the decay of vegetation.

Parks Canada

Appendix H: Rainfall in the Kawarthas

Rainfall (mm) at two locations in the Kawarthas, summer 2007
Oliver Centre (North Pigeon Lake) and Trent University (NE Peterborough)
Rainfall more than 10 mm in **Bold**

Date	Oliver Centre	Trent U.	Date	Oliver Centre	Trent U.
Jun 30	6.9	4.3	Aug 1	0.0	0.0
Jul 1	0.3	0.0	Aug 2	0.0	0.0
Jul 2	0.0	0.0	Aug 3	0.0	5.8
Jul 3	0.0	0.0	Aug 4	0.0	0.0
Jul 4	4.6	4.3	Aug 5	0.0	0.0
Jul 5	0.0	0.0	Aug 6	0.0	0.0
Jul 6	1.2	0.0	Aug 7	0.0	0.0
Jul 7	0.0	0.0	Aug 8	0.0	0.0
Jul 8	**17.0**	3.5	Aug 9	0.0	0.0
Jul 9	0.1	0.0	Aug 10	0.0	0.0
Jul 10	4.5	0.0	Aug 11	0.0	0.0
Jul 11	0.3	4.5	Aug 12	0.3	0.8
Jul 12	0.1	1.5	Aug 13	0.0	0.0
Jul 13	1.3	1.3	Aug 14	0.0	0.0
Jul 14	**16.6**	**14.6**	Aug 15	0.0	0.0
Jul 15	0.1	0.0	Aug 16	0.0	0.4
Jul 16	0.0	0.6	Aug 17	3.1	3.4
Jul 17	0.0	0.6	Aug 18	0.2	0.0
Jul 18	0.3	0.9	Aug 19	0.0	0.0
Jul 19	**19.2**	**12.1**	Aug 20	0.0	0.0
Jul 20	0.9	2.1	Aug 21	0.1	0.2
Jul 21	0.0	0.0	Aug 22	0.4	0.0
Jul 22	0.0	0.7	Aug 23	**20.0**	**27.2**
Jul 23	0.0	0.6	Aug 24	**19.8**	**10.6**
Jul 24	0.0	0.0	Aug 25	0.5	0.8
Jul 25	0.0	0.0	Aug 26	0.0	0.0
Jul 26	0.0	0.0	Aug 27	0.1	0.0
Jul 27	0.0	0.0	Aug 28	0.0	0.0
Jul 28	0.0	0.0	Aug 29	**30.2**	0.6
Jul 29	0.0	0.0	Aug 30	0.1	0.0
Jul 30	0.0	0.0	Aug 31	0.1	0.0
Jul 31	0.0	0.0	Sep 1	0.0	0.0

			Date	Oliver Centre	Trent U.
			Sep 2	0.0	0.0
Total July 2007	66.6	47.3	Sep 3	0.0	0.0
July average		68.4	Sep 4	0.0	0.0
			Sep 5	0.1	0.0
Total Aug 2007	94.9	49.8	Sep 6	0.0	0.0
August average		91.6	Sep 7	0.0	0.0

Ian Mackenzie

Appendix I: Contributors to the Weeds Study

Supporters of the KLSA Aquatic Plant Donor Campaign-Fall 2007

Beachwood Resort

Bell Haven Trailer Park

Big Cedar Lake Committee

Buckeye Marine

Camp Kawartha

Clearview Cottage Resort

Egan Marine

Eganridge Inn

Frederick G Reynolds Group

Heather Campbell

Kawartha Waterfront Realty

Lakefield Campgrounds

Pine Vista Resort

Reach Harbour Marina Inc.

Red Eagle Trailer Park Inc.

Rosedale Marina

Scotsman Point Resort

Shining Waters Bed and Breakfast

Appeal to Readers

Are you concerned about water weeds? In recent years, shoreline residents in some parts of the Kawarthas have felt that water weeds have reduced their enjoyment of swimming and boating. They have tried many removal techniques, from raking to laying sand to herbicides. But do any of them work? Do they just make the situation worse? Do they have ill effects on aquatic habitats? Does anyone know what to do?

This year, the Kawartha Lake Stewards Association has commissioned a study led by KLSA's scientific advisor Dr. Eric Sager of Trent University to find out **what methods of aquatic weed control work**, and how these methods affect the lake environment. The end products will be a scientific report and **a comprehensive aquatic weed control manual for shoreline residents and businesses**. This manual, in easy-read format, will include:

- A survey of weed management techniques now in use
- An evaluation of each technique
- A summary of existing literature and KLSA field studies, and
- Advice to help shore dwellers choose effective and appropriate weed management techniques.

To our knowledge, no government agency, academic institution or volunteer group has ever compiled such information. It will be a valued resource for Kawartha residents, business owners, the scientific community, and government agencies. But KLSA needs funding.

Will you help? You can give to this project, or you can volunteer to help on your lake. Please complete and mail the form below. *Any* donation is welcome.

☐ Yes! I want to support the weed study. Here is my cheque for ☐$100 ☐$50 ☐$25 ☐$______

Please make cheque payable to Kawartha Lake Stewards Association and indicate 'for Weeds Study'

☐ I am willing to be interviewed about weed control methods on my lake

☐ I would be willing to help test water quality on my lake during the summer

Name______________________________________

Permanent address____________________________

____________________________Postal code__________

Email______________________________________

Name of my lake______________________________

Telephone___________________________________

Kawartha Lake Stewards Association
c/o RR 2, 2124 Howard Dr.
Lakefield, ON K0L 2H0

kawarthalakestewards@yahoo.ca

website: klsa.wordpress.com