

# Hidden science centre produces RESEARCH that makes a difference

Article by Meghan Smith / Photography by Tomasz Szumski

Samples collected in Muskoka lakes provide much-needed research data that is used across Ontario when studying lake health.

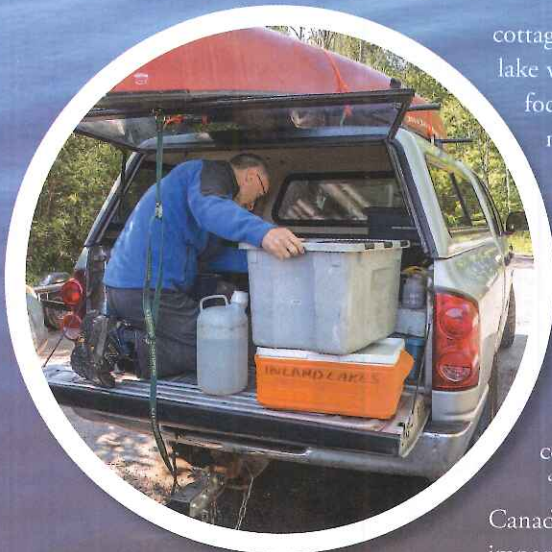


Just off Highway 117 in Lake of Bays Township is a collection of trailers containing thousands of samples, outfitted with state-of-the-art scientific instruments tabulating data that's monitored by a collective of scientists, students and analysts.

"You wouldn't know all of this was here driving by on Highway 117," muses

Andrew Paterson, Inland Lakes Research Scientist for the Ontario Ministry of Environment and Climate Change at the Dorset Environmental Science Centre (DESC).

In the mid-1970s, the government recognized the boom of cottage development and decided to fund a centre to quantify and model the impacts of



A member of the sampling team, student Sarah Yoshida collects specimens that will be studied at the Dorset Environmental Sciences Centre.

cottage development on ecology and lake water quality. The original research focused on a core set of lakes being monitored in the region. The research facility was established first in Vankoughnet and then moved to Paint Lake, near Dorset. The location of the centre allowed for the sampling and data to be collected from “typical” lakes in cottage country.

“Being located on the Canadian Shield is also important, as the majority

of Ontario’s inland lakes lie on the Shield,” says Paterson. “The information and findings generated at DESC are transferable to thousands of lakes on the southern Canadian Shield.”

While the initial reason for studying lakes in the Muskoka-Haliburton region was to discover the effect of cottage development, that focus shifted in the late 1970s with the



emergence of acid rain as a major environmental issue. The holistic approach employed by the Dorset Environmental Science Centre monitors the entire ecosystem, including the streams draining to watersheds, the atmosphere and the lakes.

“The long-term monitoring program includes physical information about lakes, things like temperature, how clear the lakes are. It includes chemical information, what’s being studied here in the chem lab. We measure all aspects of the nutrients,” explains Paterson. “The DESC became very well known for its study of acid rain; the pH and alkalinity. And then we look at some of the biology, as well. We look at everything up to the fish.” The fish, he says, are the focus of the Ministry of Natural Resources and Forestry.

Taking the entire ecosystem into account proved to be a well-suited strategy for



**The Dorset Environmental Sciences Centre employs university students such as Janna Ormond to assist with its research work.**

addressing the issue of acid rain as it emerged. Research at the Dorset Environmental Science Centre provided the clear evidence of long-range atmospheric transport of strong acids from industrial centres. The discovery that acid rain was being transported to remote sites in central Ontario was significant and the centre was crucial in monitoring this discovery.

Through the late-1970s and 1980s, monitoring and research on the impacts of acid rain on aquatic ecosystems continued at the Dorset Environmental Science Centre. Data collected and generated during this period in the centre’s history contributed to the development of environmental regulations to reduce sulphur dioxide emissions across North America.

“The questions we’re asking have changed over time as new issues have been identified. Many of the questions are about understanding the

multiple stressors together,” says Paterson. “You can’t really study acid rain on its own without also studying climate change because climate change affects how water moves through the system. The focus since the ‘90s has very much been on understanding multiple stressors and how they impact lakes.”

In the 1990s, research at the Dorset Environmental Science Centre evolved to

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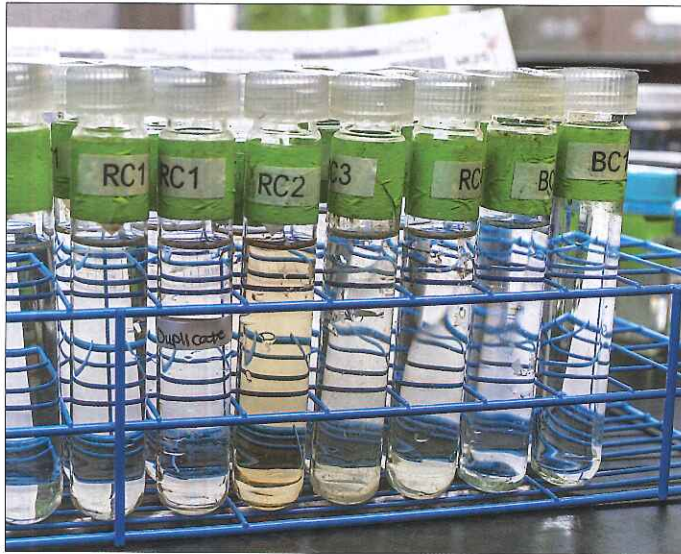
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focus on the multiple and interacting environmental stressors that affect lakes, including shoreline development, pollutants, introductions of non-indigenous species and climate change.

“These things that we’re looking at in the lab, they’re not pollutants per se, like PCBs or dioxins. These are naturally occurring environmental variables. Elements like calcium, magnesium, sodium and potassium,” says Peter Sutey, senior analytical technologist for the Ontario Ministry of Environment and Climate Change at the Dorset Environmental Science Centre. “This lab deals with all low-level (elements and nutrients) because we’re on the Canadian Shield. That’s what we’re known for.”

Research and monitoring at the Dorset Environmental Science Centre were instrumental in the discovery that calcium concentrations are declining in Precambrian



**Testing done last year at the Dorset Environmental Sciences Centre generated 120,000 numbers that will assist in determining the health of aquatic ecosystems.**

Shield lakes as decades of acid rain, coupled with logging in some watersheds, have depleted watershed stores of calcium, with implications for aquatic life.

“I lead an Ontario-wide biological monitoring program called the Ontario

Benthos Biomonitoring Network,” explains Chris Jones, benthic monitoring research scientist for the Ontario Ministry of Environment and Climate Change.

“We monitor bottom-dwelling aquatic invertebrates, which are small animals that live in the bottom sediments and don’t have backbones, and they’re used as indicators of the condition or health of streams, lakes and wetlands,” says Jones.

The Dorset Environmental Science Centre is a laboratory with a mission to investigate the effects of multiple stressors, including climate change, on water quality and quantity in Ontario’s inland aquatic ecosystems and sustain the

functions and services that these systems provide. The work at the Dorset Environmental Science Centre has shown that the water quality and ecology of inland lakes reflect watershed geology and vegetation, but are also modified by the

A large advertisement for EXCEL ENCLOSURES &amp; RAILINGS. The background is a photograph of a wooden deck with white railings overlooking a blue lake. In the top left corner, there is a logo for 'mba MUSKOKA BUILDERS ASSOCIATION'. In the top right corner, the text 'EXCEL ENCLOSURES &amp; RAILINGS' is displayed in a bold, sans-serif font, with 'excelrailings.ca' and the phone number '705-646-2508' below it. The deck has two white Adirondack chairs and a striped umbrella. The railing is made of white posts and balusters.

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many interacting stressors.

"This is an inorganic, analytical laboratory; so we don't do microbiology or bacteria, we don't do drinking water, we don't do legal samples. We're a freshwater research laboratory," says Sutey.

While the Dorset Environmental Science Centre may be somewhat hidden to the regular passerby, the long-standing history of collaborative research and partnerships at the centre, and the incredible volume of data, are well known across the country and beyond in the scientific and political world.

"When I left university, I wanted to work on something that had a chance of making a difference," says Paterson. "I think that the work that we do is very applied, so there's a chance that the science that you generate will actually help to inform policy and make a difference in the province."

Projects, and the subsequent research, are developed by the scientists at the research facility, with input and direction from policy experts and decision makers. With the establishment of the Dorset Environmental Science Centre, monitoring assisted in defining the issues with shoreline development and nutrient enrichment caused by development.

The algal blooms in Lake Erie and other lakes causing concern were addressed by research at the centre. However, monitoring to address shoreline development led to the discovery of acid rain in central Ontario. Acid rain findings identified the need for new research on the long-term effects on ecosystems.

Today, the long-term monitoring program studies the impact of calcium decline – a legacy effect of acid rain – in Ontario lakes.

"We can monitor a certain number of lakes but we can't possibly monitor the hundreds of thousands of lakes in this province," says Paterson, regarding the development of the Lake Partner Program, a volunteer-based, water-quality monitoring program that provides nutrient and water clarity information for Ontario's inland lakes.

"People are very interested in understanding the status of the lakes and how their lakes have changed over time. If people are willing to sign up and willing to take the time and effort to go out and take samples, and send us the samples, then we provide the analysis and

the shipping,” says Paterson. “And then we post the results.”

Partnerships built through the years have helped the Dorset Environmental Science Centre expand the scope of the research and data they can analyze. Partnerships allow the centre’s core staff, made up of scientists, technicians, database managers, IT specialists and administrative staff, to interact and collaborate with other experts.

Working with conservation authorities, NGOs, the Federation of Ontario Cottagers’ Associations, the District of Muskoka, universities and the public allows the Ontario Ministry of Environment and Climate Change to expand the expertise as well as the breadth of work it’s capable of collecting and processing.

“Last year we generated 120,000 numbers, to be simplistic about it,” says Sutey. “One sample might come in from a lake and it will generate one hundred numbers; it depends how it was sampled. We’re quite efficient with the way the lab works and the choice of equipment. The science that we do is very crucial to delivering high quality data and large quantities at the same time.”



**Lake samples, collected by inland lakes technician Ron Ingram, will be researched at the Dorset Environmental Sciences Centre.**

Over the last four decades, hundreds of studies and more than 500 peer-reviewed papers and technical reports have been published using data collected at the Dorset

Environmental Science Centre, with the help of hundreds of students and scientists. The work and research conducted at the centre has made important contributions to understanding how lakes function and respond to environmental stressors, including shoreline development, acid rain, metal contamination, climate change and introductions of non-indigenous species.

“Job one is to answer questions about which water bodies are in good condition and which ones are in bad condition,” says Jones. “The next job is to understand exactly what mechanisms are causing these changes in community structure. Once we know the mechanisms, we can form a response.”

The Dorset Environmental Science Centre provides the Ontario Ministry of Environment and Climate Change and its partners with key data and monitoring to continually assess ecosystems and factors impacting their growth and development.

“In Ontario, we have published standards for water quality, but we have no published standards for biological community structure,” explains Jones. “We have studies underway now to derive these standards.”

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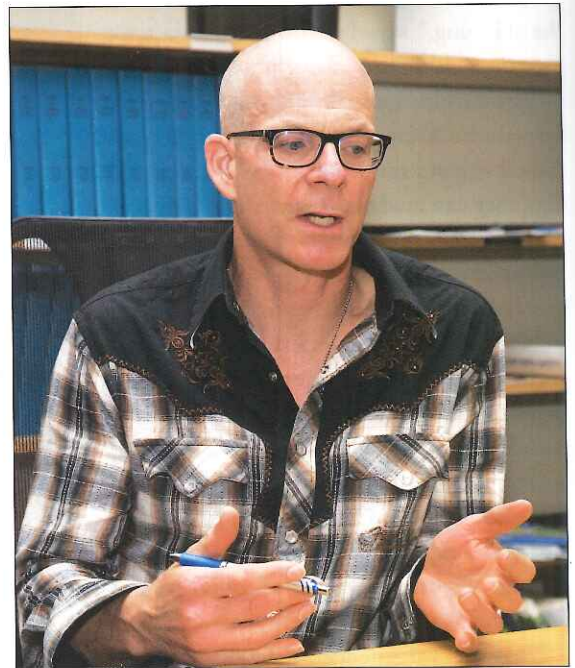
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This will provide data on invertebrates.


The Dorset Environmental Science Centre provides early warning of emerging stressors impacting water quality and provides the data necessary to develop evidence-based environmental policies. Maintaining the long-term monitoring program allows the centre to track the effectiveness of environmental legislation and policy in Ontario. It also assists with developing and calibrating new technologies and models that can be used to measure current conditions and forecast future conditions of inland lakes.

“What starts as one question, which is often the case with long-term monitoring, develops into new, emerging questions,” says Paterson.

Tackling complex environmental problems requires the diverse expertise and partnerships that have developed at the Dorset Environmental Science Centre to address the current and emerging issues in aquatic ecosystems. The



**Chris Jones leads a program monitoring bottom-dwelling aquatic invertebrates that are used as indicators of the health of waterways.**

centre is a well-designed source of status and trend information for monitoring and research on inland lakes, right in the heart of cottage country. 



**According to Peter Sutey, testing done in the laboratory near Dorset delivers high quality data on naturally occurring environmental variables.**