

# THE CURRENT



Issue 7 June 17, 2015

## Newsletter of the Society of Canadian Limnologists

This issue:

|                           |   |
|---------------------------|---|
| Limnology in Action.....  | 1 |
| Research Highlight.....   | 3 |
| Diving into Science.....  | 4 |
| Student Update.....       | 5 |
| Upcoming Meetings.....    | 6 |
| 2016 Award Nominations... | 6 |
| Recent Citings.....       | 6 |



**Right:** Limnology in action at the IISD-Experimental Lakes Area on the LENS project (see page 3, inside). Left to right, graduate students Graham Blakelock (MSc, 2014), Andrea Conine, and Jon Martin (both PhDs in progress). Photo credit: Andrea Conine.

## Limnology in Action

**Mike Rennie, Communications Officer**

With a new year and a newly elected SCL executive now both well underway, it's a pleasure to have the opportunity to outline some future plans for the society as we continue to focus on engaging and growing our membership.

We are very lucky to have an number of new faces on the executive with a broad range of experience (for a list of our current executive, see page 2). Our new president, Jerome Marty, brings with him years of experience with the International Association of Great Lakes Research, and is keen on helping us grow as a society and have a stronger presence among scientific societies in North America. We're also happy to welcome Helen Baulch in the role of Vice President Anglophone, and new student representatives Daniel Gregoire (University of Ottawa) and Nicholas Fortin St. Gelais (UQAM).

A sincere and special thanks to the efforts of our past executive members: Jules Blais, who was a strong voice for our society through a tumultuous three years for science in Canada, and Alison Derry who did an incredible job on a number of files for the society, most notably her prominent role in organizing the Genomes to Biomes meeting in

Montreal last year, which was a smashing success. Student members Erik Szkokan-Emilson and Jorge Negrin Datsis did a fantastic job engaging our student members in a number of activities.

After much discussion, a revision of our bylaws is now under way, thanks to the significant effort and oversight of our Visioning Committee (Andrew Paterson, Jim Rusak, and Norman Yan). We are striving to have these bylaws finalized to be presented to the membership at the January business meeting, and they will be voted on by the general membership shortly thereafter. These revisions are necessary in order to help better reflect who we are as a society in this current day and age.

Additional discussions are ongoing regarding the legal status of the SCL: specifically, should the SCL become incorporated or not? The association will shortly become officially registered as a not-for-profit organization in Canada, but further assessment on the pros and cons of incorporation are needed. Feedback from the membership and those with experience from other organizations (or advice from those with contacts in the legal profession) is most welcome.

**Continued on page 2**

**Continued from page 1**

Also, watch for some exciting developments from our new student executive (see story, page 5). They will be seeking submissions from our student membership to discuss their research, providing students with an excellent opportunity to highlight their work and hone their science communication skills. Accepted submissions will appear in print in The Current as well as on our webpage as blog entries. Watch for solicitations from Dan and Nick very soon.

We have a good deal on the go for scientific meetings as well. There is much planning underway for the upcoming meeting with CCFR in St John's this coming January, and we are seeking input for session topics and leaders from the membership. Be sure to contact Alain Patoine if you have any ideas or suggestions. Also, the Annual Meeting for the International Association for Great Lakes Research returns to Canada in 2016, and the local arrangements are being led by our own Joe Ackerman. We are working on making sure SCL has a strong presence at this meeting, so stay tuned for details.

We also wish to continue to better embrace our bilingual status as a society, and are currently working on translating the static content of our website (page 4). As usual, any submissions to The Current or for the society blog will be accepted (and published) in either English or French.

We sincerely hope to continue to build on the momentum of the past three years with the revitalization of our society, and continue to engage the limnological community in our activities. As usual, we are always keen to receive your thoughts and suggestions as we move forward with this engagement. It is only through having an active society that we can continue to grow and better represent our community in Canada.

On behalf of the entire SCL executive, thanks for your trust in us to lead the helm for the next few years, and we look forward to engaging with you in our future activities. 🌱

## Introducing your new SCL executive



**President**  
**Jerome Marty, Science Advisor**  
 Fisheries and Oceans Canada



**Vice President, Francophone**  
**Alain Patoine, Professeur en gestion de l'environnement,** Université de Moncton, campus de Shippagan



**Vice President, Anglophone**  
**Helen Baulch, Assistant professor,** School of Environment and Sustainability and Global Institute for Water Security  
 University of Saskatchewan



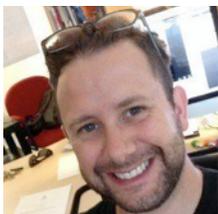
**Secretary-Treasurer**  
**Roberto Quinlan, Associate Professor of Biology**  
 York University



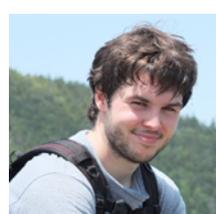
**Communications Officer**  
**Michael Rennie, Assistant Professor of Biology,** Lakehead University



**Student Representative**  
**Daniel Gregoire,** Biology Department, Center for Advanced Research in Environmental Genomics, University of Ottawa



**Communications Officer**  
**Alexandre Poulain, Associate Professor, Departments of Biology and Environmental Science,** University of Ottawa



**Student Representative**  
**Nicolas Fortin St-Gelais,** Département des sciences biologiques, Université du Québec à Montréal

### Special thanks to our outgoing executive members!

Jules Blais (President), Alison Derry (Vice President Anglophone), Erik Szkokan-Emilson (Anglophone student representative), Jorge Octavio Negrin Dastis (Francophone student representative)

## Research Highlight: putting nanosilver under the LENS

### The LENS research group

Due to their antimicrobial properties, silver nanoparticles are found in hundreds of consumer products from bandages to gym socks to cosmetics. Silver nanoparticles are currently the most common nanoparticle in consumer products today, and their use is expected to continue to increase dramatically in years to come. Currently, there are no policies in Canada that regulate the use and discharge of nanoparticles in the environment and few have directly asked what the environmental impacts of these substances might be.

Since 2011, a team of researchers from Trent University (Chris Metcalfe, Maggie Xenopolous, Paul Frost, Holger Hintelmann) and the Experimental Lakes Area (Mike Paterson, Scott Higgins and Mike Rennie) have been working on the LENS project (Lake Ecosystem Nanosilver Study). This project is examining the fate and effects of nanosilver in freshwater environments.

In early May of 2012, the LENS group initiated a small scale enclosure project at the Experimental Lakes Area (ELA) to examine how different nanosilver concentrations, dosing rates, and capping agents affected the transport and fate of nanosilver. Importantly, this information provided the background information necessary for a whole-ecosystem experiment. Monitoring on the lake identified for the whole-lake addition and several reference lakes was conducted to provide the necessary background data required to identify effects once the experiment started.

Later that month, the federal government announced they were ceasing operations at ELA and seeking a new operator for the facility, putting the entire project in jeopardy; No new whole-ecosystem experiments were permitted until a new operator of the facility was found and new legal agreements could be



**A plume of nanosilver entering Lake 222 at the IISD-Experimental Lakes Area.** Photo credit: Dan Rearick.

reached to permit whole-lake experiments at the ELA. The LENS group continued monitoring the reference and experimental lake in 2013 to provide an additional year of background data.

The successful transfer of the ELA facility to the International Institute for Sustainable Development (IISD) paved the way for this important experiment to continue. With an agreement in place on April 1st, 2014, herculean efforts by the IISD-ELA and LENS team allowed the only freshwater whole ecosystem nanosilver experiment in the world to commence in May, 2014. That summer, a team of graduate, undergraduate students, biologists, and research scientists began the first nanosilver additions and monitoring of the lake to determine effects on the ecosystem.

In both the experimental and reference systems, a wide range of ecological parameters were measured, from zooplankton to fish. Current graduate work is focused on changes to macroinvertebrate and zooplankton communities (Katarina Cetinic), sublethal effects to fish (Jonathan Martin, Laura Murray and Lauren Hayhurst), settling rates and suspended particle toxicity to daphnia (Andrea Conine), and changes to bacterial communities as well as the fate of nanosilver within the lake (Daniel Rearick).

A second year of nanosilver additions to the lake began this year, and the research team is beginning to bring

the data collected together to start determining the effects of this experiment on the ecosystem; interesting results have already been reported at a number of conferences, including the last annual CCFR/SCL meeting in 2015 in Ottawa and recent meetings at SETAC in Canada and Europe. Keep an eye on the “recent citations” section in upcoming issues of The Current for all the latest results from this study!

For more information, please contact Chris Metcalfe (project PI) at [cmecalfc@trentu.ca](mailto:cmecalfc@trentu.ca).

#### FAST FACTS:

**WHO?** The LENS research team.

**WHERE?** Trent University, IISD-Experimental Lakes Area.

**WHAT?** A whole-lake experiment focused on evaluating the environmental effects of nanosilver in lakes.

**WHY?** To provide critical information on environmental effects of nanosilver to guide policy.

**WEB:** [www.trentu.ca/iws/lens](http://www.trentu.ca/iws/lens)

**Do YOU have a story to share in the next issue of The Current? Have an idea for a blog? Send ideas, photos or contributions to: [comms@socanlimnol.ca](mailto:comms@socanlimnol.ca).**

# Diving into Science

by Nigel Waltho

Throughout Canada, if an academic institution is interested in scientific research diving, the Canadian Association for Underwater Science (CAUS) defines the training standards that need to be followed to carry out the work involved. However, in Ontario, the Ontario Ministry of Labour requires by law (Occupational Health and Safety Act, Ontario Regulation 629/94 Diving Operations) that scientific divers be trained to the Canadian Standards Association (CSA) Z275.4 Diving Competency. These CSA standards are designed for traditional commercial diving (e.g., underwater construction, dam or pipe inspection, welding, explosives, vessel recovery). This commercial dive training is a full, one-year program (\$13 500 minimally), and constitutes a level of training that is well outside the time and financial constraints of Masters or PhD research programs. As a consequence, academic-based research diving in Ontario has either been driven underground or has stopped completely.

To overcome these above constraints, faculty from Carleton University, Guelph University and Queen's University collaborated to design and run a 2 1/2 week practical Restricted Occupational Diving course recently approved by the Ontario Ministry of Labour (July 2013) and accredited by the Diving Certification Board of Canada (January 2014). This new course trains the academic research community (i.e., fourth-year undergraduate students, Master or PhD students, and Lab Technicians and Faculty) to conduct scientific dives in compliance with Ontario regulations.

Upon successful completion of the course, including all formative and summative activities, students will be able to design, develop, and illustrate a comprehensive research dive program in accordance to their stated research objectives, and the Occupational Health and Safety Act Ontario Regulation

629/94 Diving Operations. Specific learning outcomes include:

- Describe safe diving practices as a (a) diver, (b) safety diver, and (c) dive tender in accordance to the Occupational Health and Safety Act Ontario Regulation 629/94 Diving Operations.
- Explain diving physics, physiology, equipment, diving hazards, communication and rigging as these relate to the Canadian Standards Association (CSA) Z275.5.
- Design safe non-decompression multi-day research dive-plans using Canadian DCIEM dive tables.
- Compare the advantages and disadvantages of various sampling methodologies used by research divers (e.g., transects, quadrats, benthic sampling, habitat profiling, sediment coring, behavioural observations, photo stratification, video transects) to address different research goals.
- Choose appropriate statistical models to analyze complex data sets typically obtained from scientific research diving activities.

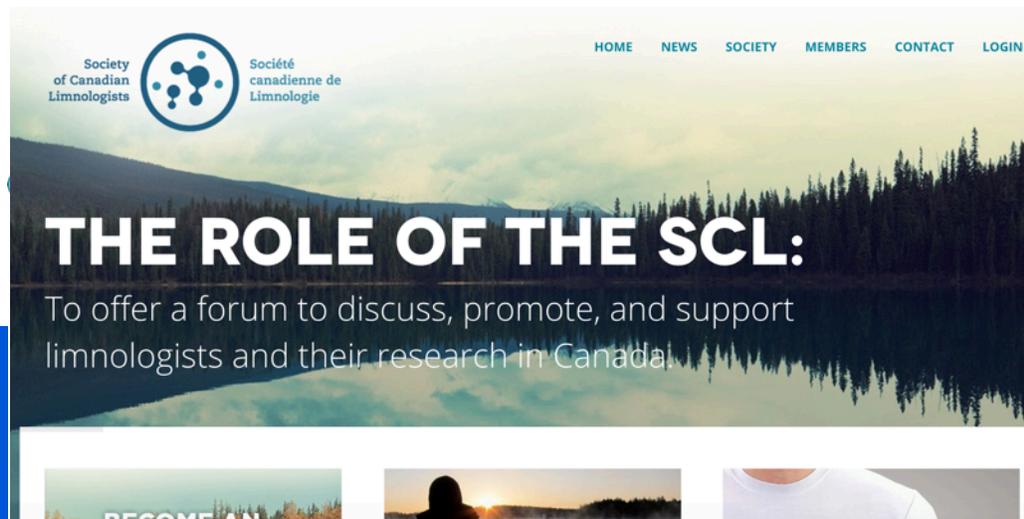
For more information on the course and to register, see the advertisement on the back page of the newsletter, or contact Dr. Nigel Waltho, Carleton University, tel: 613-520-2600 x8764, email: [nigel.waltho@carleton.ca](mailto:nigel.waltho@carleton.ca), or Dr. Geof Hall, Queen's University, tel 613-533-3412, email: [gh26@queensu.ca](mailto:gh26@queensu.ca) . 

## Maintenant en français, s'il vous plaît

Alexandre Poulain

Avec le renouveau de notre site web, nous profitons aussi de la possibilité d'offrir notre contenu dans les deux langues officielles. Nous allons travailler dans les prochaines semaines à traduire la plupart des pages du site. N'hésitez pas à soumettre vos suggestions sur ce que vous aimeriez voir apparaître en Français. 

We're in the process of translating our static website content into french. We look forward to your feedback as we proceed!



Society of Canadian Limnologists / Société canadienne de Limnologie

HOME NEWS SOCIETY MEMBERS CONTACT LOGIN

## THE ROLE OF THE SCL:

To offer a forum to discuss, promote, and support limnologists and their research in Canada

BECOME AN

## SCL Strong in 2014

**Roberto Quinlan**

It was a great year for SCL in 2014. Our total SCL membership increased from 100 in 2013 to 128 in 2014, well above the 5-year membership average of 96.

Continued recent increases in membership numbers may reflect the increased convenience of membership payment via PayPal, and the increased visibility of SCL efforts in science advocacy. Of our total membership, 31% of 2014 SCL members were students, which is above the 5-year average of 25.1%. There was a noticeable increase in membership, particularly by students, associated with the early registration deadline of the May 2014 Genomes to Biomes conference, where society membership (in either CSEE, CSZ or SCL) conferred reduced conference registration cost.

SCL attendance at the Genomes to Biomes conference in May 2014 was excellent, representing the highest proportion of society membership attending the conference (with 53 SCL attendees versus a total SCL membership of 126 at the time). Also, the Canadian Science Publishing group has very generously sponsored the conference travel and registration costs of the Rigler Award winner.

SCL student members continue to benefit from applying to the Clemens-Rigler Travel Fund (CRTF) awards when attending the annual CCFFR meeting, to which SCL contributes funding, with 27 SCL student members receiving awards out of a total of 108 CRTF student

applications for funding. Don't forget to get those applications in! ☺

## SCL Student Update

**Daniel Gregoire**

As your new anglophone student representative, it's my pleasure to introduce myself and my colleague, Nicholas Fortin St. Gelais, as your new student representatives on the SCL executive. I work at the Centre for Advanced Research in Environmental Genomics in the Poulain lab at the University of Ottawa.

As students reps we'd like to showcase the work of fellow graduate students by providing short profiles of SCL student members performing new and exciting research in future issues of the newsletter. The goal here is to highlight why being a student studying limnology is so exciting in Canada and to get the word out on the excellent research within the society. Please don't hesitate to get in touch if you'd like to contribute. Any other ideas or suggestions on how to improve the students' corner are welcome. ☺

## Conference Round-up: CCFFR 2015, Ottawa

**Michael Rennie**

Ottawa was again the site of the 2015 meeting for the Society of Canadian Limnologists and Canadian Conference For Fisheries Research. Two superb plenaries were given; Marty

Krkosek gave the Stevenson lecture, and Daniel Schindler gave an excellent presentation following his acceptance of the 2015 Rigler Award.

The meeting also provided an excellent opportunity for some workshop meetings, including one held at the University of Ottawa to discuss future research plans and experiments at the IISD-Experimental Lakes Area.

The local organizing committee provided a fantastic experience for all, including a most memorable and enjoyable banquet. Though the conference received a record number of funding requests through the Clemens-Rigler Travel Fund, a record amount was fundraised to help support those applications.

As usual, there was a fantastic diversity of presentations, both during the presented talks and in the poster sessions. Students were well represented at the meeting, including our own Sophie Chiasson-Gould who presented her Peters Award paper.

The last day of the conference saw a new feature- panel discussions on a range of topics, with an excellent line-up of panelists. Discussions ranged from publication strategies, to job hunting strategies, to public

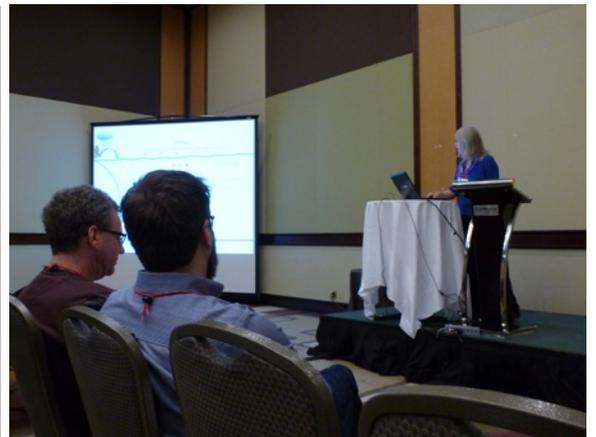
communication of science. It was by all accounts well received, and hopefully will be repeated in future meetings. Thanks to all those who helped to make this meeting such a great success! ☺



### SCL at CCFFR, 2015 in Ottawa

Left: Outgoing president Jules Blais presents the 2015 Rigler award to Daniel Schindler.

Right: SCL member Sherry Schiff presents her work at the special session organized around research based at the IISD-Experimental Lakes Area.



## Upcoming SCL Meetings



### Alain Patoine

The annual SCL/CCFFR meeting will take place January 8-10, 2016 at the Sheraton Hotel in St. John's, Newfoundland. Craig Purchase (Memorial University) is organizing local arrangements, and Ian Bradbury and Martha Robertson (DFO St. John's) are leading the science program. Alain Patoine is the SCL liaison on the science program for the St. John's SCL/CCFFR meeting in 2016. Make sure to follow the web site for all the developments on the meeting as they arise at: [www.uwindsor.ca/glier/ccffr/](http://www.uwindsor.ca/glier/ccffr/)

We invite SCL members to start thinking about themes for special sessions and submit them to [comms@socanlimnol.ca](mailto:comms@socanlimnol.ca). Special session themes are due in September, and the deadline for abstract submissions will be in October.

## 2016 Award Nominations

### Helen Baulch

The Frank Rigler Award is SCL's highest honour. Now in its 31st year, it honours major achievements in limnology. The award winner will provide a plenary presentation at SCL/CCFFR in 2016, and will receive complementary registration and a one-year membership in SCL. For more information see: <http://socanlimnol.ca/awards/frank-h-rigler/#about>. Nominate your worthy colleague today! Nomination packages are due 11 Sept, 2015.

The Peters' award is given each year to the best paper in the aquatic



*Left: 2015 Rigler Award recipient Daniel Schindler, Professor, University of Washington.*

*Right: 2015 Peters Award recipient, Sophie Chiasson-Gould, University of Ottawa.*

sciences, led by a Canadian student, or student working in Canada. The award is for \$500 and includes a 1-year membership in SCL. The winning student must present a summary of their paper at SCL/CCFFR 2016. For more information see: <http://socanlimnol.ca/awards/robert-peters-award/#about> A call for nominations will be made in early September, so get that student paper published and stay tuned!

## Member Recognition

**John Smol** was recently recognized as one of Canada's top 100 explorers by the Fellows of the Royal Canadian Geographic Society. He also recently gave a Walrus talk entitled "under the radar", which is available on-line, and definitely worth watching: <http://thewalrus.ca/tv-under-the-radar/>

## Upcoming meetings

(meeting websites hyperlinked where available)

### SCL meetings

- [2016 with CCFFR, St. John's, NL \(Jan 8-10\)](#)

### Other meetings

- [Ecological Society of America, 9-14 August, Baltimore, Maryland](#)
- [American Fisheries Society, Aug 15-20, Portland, Oregon](#)
- [14th International Symposium on Aquatic Plants](#), 14-18 Sept, 2015, Edinburgh, Scotland.
- [2015 Society for Environmental Toxicology and Chemistry, North America](#) (36th Annual Meeting) Nov 1-5, Salt Lake City, UT
- [NALMS 35th International Symposium](#), Nov 17-20, 2015, Saratoga Springs, NY
- [2015 AGU Fall Meeting](#), Dec. 14-18, San Francisco, CA.
- [2016 CSZ meeting](#), London, ON May 8-13

- [2016 CSEE meeting](#), St. John's, NL
- [2016 ASLO Summer Meeting](#), Santa Fe, New Mexico June 5-10
- [2016 IAGLR meeting](#), Guelph, ON, June 6-10
- [2016 ASIH meeting](#), New Orleans, July 6-10

## Recent Citings

Do you have recent publications from the last 6 to 12 months that you'd like highlighted in the the next issue? Send it to [comms@socanlimnol.ca](mailto:comms@socanlimnol.ca).

Blais, J.M., Rosen, M.R. and Smol, J.P. [Editors]. 2015. **Environmental Contaminants: Using Natural Archives to Track Sources and Long-Term Trends of Pollution**. Springer, Dordrecht. <http://www.springer.com/us/book/9789401795401>

Dalton R.L., Boutin C. and Pick F.R. 2015. **Nutrients override atrazine effects on riparian and aquatic plant community structure in a North American agricultural catchment**. *Freshwater Biology*. In Press. DOI: 10.1111/fwb.12563.

Dalton R.L., Boutin C. and Pick F.R. 2015. **Determining in situ periphyton community responses to nutrient and atrazine gradients via pigment analysis**. *Science of the Total Environment*. 515–516: 70–82. DOI: 10.1016/j.scitotenv.2015.01.023.

Hewlett, C., North, R.L., Johansson, J., Vandergucht, D., and J. Hudson. 2014. **Relevance of shoreline erosion and slumping to the nutrient budget of a large reservoir: Lake Diefenbaker, Saskatchewan, Canada**. *Journal of*

Great Lakes Research. <http://dx.doi.org/10.1016/j.jglr.2014.11.020>.

de Kerckhove, D.T., Rennie, M.D. and Cormier, R. 2015. Censoring government scientists and the role of consensus in science advice. *EMBO reports*, 16: 263-266. DOI 10.15252/embr.201439680.

Samarasin, P., Minns, C.K., Shuter, B.J., Tonn, W.M., and Rennie, M.D. 2015. **Fish diversity and biomass in northern Canadian lakes: northern lakes are more diverse and have greater biomass than expected based on species-energy theory.** *Canadian Journal of Fisheries and Aquatic Sciences*. 72: 226-234. doi:10.1139/cjfas-2014-0104

Taranu ZE, Gregory-Eaves I, Leavitt P, Bunting L, Buchaca T, Catalan J, Domaizon I, Guilizzoni P, Lami L, McGowan S, Moorhouse H, Morabito G, Pick F, Stevenson MA, Thompson PL, and Vinebrooke RD. 2015. **Acceleration of cyanobacterial dominance in north temperate-subarctic lakes during the Anthropocene.** *Ecology Letters* doi: 10.1111/ele.12420

Thompson, M.S, R. Giesler, J. Karlsson and J. Klaminder. 2015. **Size and characteristics of the DOC pool in near-surface subarctic mire permafrost as a potential source for nearby freshwaters.** *Arctic, Antarctic and Alpine Research* 47: 49-58.

Winegardner A, Beisner B, Legendre P and Gregory-Eaves I. 2015. **Are the landscape-level drivers of water-column and surface sediment diatoms different?** *Freshwater Biology* 60: 267- 281

Ziegler J, Solomon CT, Finney BP and Gregory-Eaves I. 2015. **Macrophyte biomass predicts food chain length in shallow lakes.** *Ecosphere* 6: 5. <http://dx.doi.org/10.1890/ES14-00158.1> 



Lake 240 at the IISD-Experimental Lakes Area. Photo credit: Lauren Hayhurst.

# YSI ProDSS *(Digital Sampling System)*



The ProDSS with its titanium bodied smart sensors is revolutionizing spot sampling and profiling instrumentation.



**Dissolved Oxygen (Optical)**  
**Total Suspended Solids (TSS)**  
**Total Dissolved Solids (TDS)**  
**Turbidity**  
**Depth**  
**pH**



**GPS**  
**ORP/Redox**  
**Conductivity**  
**Specific Conductance**  
**Salinity**  
**Seawater Density**  
**Temperature**

more info: [www.hoskin.ca/prodss](http://www.hoskin.ca/prodss)

[www.hoskin.ca](http://www.hoskin.ca) | Vancouver | Burlington | Montreal

## LR-24 Backpack Electrofisher

***Powered by 24V replaceable batteries***  
***400W continuous, 39,600W peak output***  
***Easy to use controls***  
***Store and load 10 custom waveforms***  
***ETL listed***  
***Conforms to UL and CSA standards***  
***Standard 3 year warranty***



**Hoskin Scientific Ltd.**

[www.hoskin.ca](http://www.hoskin.ca)



# ONTARIO UNIVERSITIES DIVING PROGRAM

## Course details:

**Schedule:** July 10<sup>th</sup> - July 26<sup>th</sup>, 2015. The daily routine comprises morning and afternoon dives (min. 25 required) with evening classes.

**Location:** Queens University Biological Research Station (QUBS) 280 Queen's University Rd., RR #1, Elgin, ON  
<http://www.queensu.ca/qubs/index.html>

**Accommodations:** Registration fee includes accommodation and daily meals at QUBS, and airfills for the duration of the course.

**Registration fee:** \$2200/participant (estimated)

**Equipment:** Participants are required to provide personal dive gear including: a cold water wetsuit or drysuit, dive knife, weight belt & weights (sufficient for drysuit diving), mask, snorkel, fins, dive flashlight, bottom timer (e.g., dive watch or dive computer), dive compass, 2 tanks, and regulator and BCD. A sleeping bag and pillow is also recommended.

A lap top is also required.

Designed for the research community  
Accredited by the Diver Certification Board of Canada

## PROGRAM

Accredited by the Diving Certification Board of Canada (January 2014) this training program was developed to bring research diving back into Ontario by meeting both the high regulatory requirements of Ontario's Labour Code and the specific needs of the scientific and research community.

## OUTCOME

Upon successful completion of the course participants will:

- Be eligible for accreditation as a Restricted Diver by the Diver's Certification Board of Canada (DCBC).
- Meet the competency requirements for occupational diving established by the Ontario Ministry of Labour – Ont. Reg. 629/94 – Diving Operations .
- For Graduate students, earn a Graduate course credit towards your Graduate program.

## ELIGIBILITY

This training program is open to 4<sup>th</sup>-year undergraduate students, Master or Ph.D. students, and Lab Technicians and Faculty Supervisors from any higher-level academic institution across Ontario planning to use SCUBA diving within their research programs.

## PREREQUISITES

To register for this course, participants must have:

1. Received medical clearance to dive through completion of an occupational diving medical.
2. Achieved at minimum, an open-water sport diving certification from a recognized sport diving organization.
3. Minimum of 20 dives and 10 hours bottom time logged.
4. Current First Aid and CPR certification.
5. Current Oxygen Provider certification.

For more information contact Dr. Nigel Waltho, Carleton University, tel: 613-520-2600 x8764, email: [nigel.waltho@carleton.ca](mailto:nigel.waltho@carleton.ca)