

# THE CURRENT

Society  
of Canadian  
Limnologists



Société  
canadienne de  
Limnologie

Newsletter of the Society of Canadian  
Limnologists



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The St. Lawrence floodplain in May 2019  
Photo credit: P-A Bordeleau, UQTR



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# Message from the president

*Björn Wissel, President*




In 2019, water-related issues have continued to make headlines across Canada. Extreme spring-flooding impacted large areas of eastern Canada, droughts are returning to the Prairie Provinces after a decade of excess precipitation and run-off, and 1000's of wildfires burned across Alberta and British Columbia. Despite substantial efforts by the federal government, 57 First Nations reserves are still suffering from the impacts of long-term drinking water advisories. Hopefully, this unacceptable situation will be resolved soon with all remaining advisories lifted as planned by March 2021 ([www.sac-isc.gc.ca](http://www.sac-isc.gc.ca)). In many cities, citizens are concerned about increasing contaminant loads in drinking water (e.g., lead, asbestos) due to aging infrastructure, which will take decades to replace. While Canada is home to some of the largest freshwater resources, current practices of high domestic, industrial and agricultural water use will neither ecologically nor economically be sustainable in the face of climate change and population growth. While safe drinking water is a Human Right, it is also critical to protect aquatic ecosystems from the impacts of anthropogenic activities, such as climate change, further development and invasive species. Earlier this year, members of the Royal Society of Canada called for the creation of new, water-focused national institutions and stronger collaborations between federal, provincial, territorial and Indigenous governments to solve the emerging water crisis (<https://rsc-src.ca/en/voices/how-canada-can-solve-its-emerging-water%C2%A0crisis>). This is an important initiative, but at the end it will be up to all of us to turn things around by

maintaining dedicated water-related research programs, providing critical information to decision makers, and participating in diverse outreach activities. In this regard, the 2018 significant increase in federal funding for Science was a good first step to support future research, and I applaud the addition of parental leave in the 2019 federal budget in support of Tri-Council-funded students and post-doctoral fellows. Similarly, the recent / ongoing implementation of the NSERC Alliance grants program will hopefully create many future opportunities to conduct large-scale interdisciplinary research projects in aquatic and other environmental sciences.

For SCL, 2019 was also a busy year finalizing the incorporation of the bylaws, supporting students to travel to GLEON21 in Huntsville, ON, and working with CCFRR to organize the upcoming joint meeting in Halifax and creating a joint Equity, Diversity and Inclusion committee. We also welcomed François Guillemette as new Communications Officer (francophone) to the Executive Committee and we are grateful for his new ideas and skills. At this point, I would also like to express my gratitude to Mike Rennie who will be stepping down as Communications Officer (anglophone) by the end of 2019. Since Mike joined the SCL Executive Committee in 2011, he tirelessly reached out to members and non-members, re-designed our web site, developed many newsletters and helped organize the annual membership drives. Please take the time to contact Mike and thank him for his exemplary service! With Mike's departure, SCL is now seeking nominations for a new Communications Officer (anglophone). In addition to the existing positions on the Executive Committee, SCL is seeking an Early Career Researcher (ECR; PhD within the last 10 years) Representative to give a stronger voice to emerging scientists at our society. Please consider applying or

nominating someone for these important and rewarding positions.

Finally, it is my great pleasure to congratulate Dr. Kyra St. Pierre and Dr. Brian Cumming as recipients of the 2019 Robert Peters and Frank Rigler awards, respectively. Kyra and Brian made substantial

contributions to the field of Limnology and they are joining a long list of highly accomplished awardees. These important contributions could not be recognized without the thoughtful letters of nomination and the hard work of the selection committees, so a big thank you to everyone who participated! 




## Society Updates



### Openings in the SCL executive


By Björn Wissel

**Early-Career Researchers (ECR)** represent the next generation of scientists, innovators and managers. ECR often fulfill dual roles of training and supervising students, while being mentored by senior researchers. Similarly, ECR transition from conducting research within existing programs to develop their own independent research. We recognize that support and guidance for ECR during this critical period is crucial, but not always readily available.

As part of SCL's efforts to provide ECR with a stronger voice and provide better services, we are creating a new, ECR position on our Executive Committee, starting in January 2020. We encourage nominations from anyone who is within 10 years of their PhD and is enthusiastic about advancing ECR issues. 

By Mike Rennie

**Communication Officer (Anglophone)** The SCL is seeking someone to represent anglophone communications. Duties include working with the Communications Officer (Francophone) to put together bi-annual newsletters, send e-mails on behalf of the society, update the website and coordinate membership renewals. Working with the SCL executive, significant opportunities exist for helping shape the future of the society.

Nominations and Voting for the position will take place at the business meeting in Halifax in January, and interested candidates should attend and make brief statement indicating their desire to fill the position and what they will bring to the society. 


Special thanks to our outgoing communication officer Mike Rennie for his service and dedication all these years!

## The SCL, 2011-2019 and beyond

By Mike Rennie

After serving 3 terms (9 years) as English Communications officer with the SCL, I thought this might be a good opportunity to look back on where we've come as a society over the past decade. It's been thrilling to see where the society has gone over this time; a new logo and new website really brought new life into the society, along with our newsletter *The Current* really saw a re-engagement of the membership with it's society. Membership rates have reflected this, having increased overall from before this rebranding and with both the website and newsletter providing the membership with an outlet for their work and achievements. We've seen some incredible engagement of the society with broader issues as well, including a strong voice in the campaign to Save the ELA and engaging with parliamentarians through a membership in PAGSE.

So where to go from here? With the incorporation of the society firmly in place, we are now well positioned for taking on a greater role in conference participation and organization, which will help increase membership and society engagement. The website needs a refresh, so stay tuned for a new look and feel for the society on-line. Also, there's plenty of discussion about where aquatic sciences in Canada is headed and how we should be best represented both as a society and in the conferences we participate in.

This is truly an exciting time for the Society, and the right time for someone with fresh ideas and enthusiasm to come in to the communications role. It's been a wonderful opportunity to play even a small role in where the Society has gone over the past decade, and I'm thrilled to see where it will go in the decade to come. 

## Did you know?

By Jérôme Marty

Never seen in more than 65 years: the dark, colored water of the Lac des Deux Montagnes, west of the Island of Montreal, became blue turquoise and transparent for a few days this fall. The location is the meeting point of 2 water masses, one coming from the north, the Ottawa river, draining the Laurentians and the second coming from the St Lawrence River, draining the Great Lakes. This fall, the massive amount of water from the St Lawrence pushed against the colored water of the Ottawa river and leading to very clear waters on the north shore of Island.



# Research Highlight: A new look at the multiple facets of the health of the St. Lawrence River

By François Guillemette


The Canadian population identifies with the St. Lawrence River (SLR), which provides water resources for its food, recreational, cultural and transportation needs, but its activities on land threaten the environmental integrity of the river. In particular, anthropogenic pollution (coliforms, pesticides, pharmaceuticals, nutrients) from cities and agriculture constitute a major environmental issue. Yet, the importance of pollutants at the landscape scale, and their persistence and dynamics along the SLR has remained elusive.

Two scientific missions aboard the *R/V Lampsilis*, bringing together SCL researchers in isotopy, analytical chemistry, bacteriology, and fish ecology from Quebec and Ontario, were conducted in July 2017-2018 between Lake Ontario and upstream of Quebec city in order to provide an integrated portrait of the composition and dynamics of human-derived pollutants in the St. Lawrence River.

So far, these missions have highlighted many known and less known issues related to the water quality of the SLR. For instance, in 44% of the sites visited, the concentration of the famous *E. coli* bacteria exceeded the acceptable threshold for swimming; all recreational activities (fishing, navigation) were compromised in 16% of the sites. Bad

news for those who like to have fun in the water, the waters loaded with *E. coli* tend to stay along the shores.

Several emerging pollutants were also detected in the SLR: Of the different pesticides targeted (e.g., atrazine, glyphosate and neonicotinoids), at least one was found in every water samples with concentrations generally compliant with guidelines for aquatic life protection. Yet, the sum of six priority neonicotinoids exceeded guideline values in 31% of the sites visited (See [Montiel-León et al. 2019](#) for details). Pharmaceutical such as antidepressant and anti-inflammatory drugs were also observed and were 8 and 10 times more elevated, respectively, in Montreal's effluent compared to upstream waters. Similarly, peak concentrations of gadalimium, a rare earth element used in medical imagery, were detected in the effluent likely reflecting untreated hospital waste. But perhaps most concerning is the fact that this "chemical cocktail" of human origin persisted hundreds of kilometers downstream, with potentially far reaching consequences for aquatic life and water quality of the SLR.

To learn more about this research and the future of the scientific missions, please visit our [Facebook page](#) and the "[La Semaine Verte](#)" report on Radio-Canada (in French). -FG 

## Scientific Team

François Guillemette, UQTR  
Gilbert Cabana, UQTR  
Jean-François Lapierre, UdeM  
Jérôme Comte, INRS/ECCC  
Marc Amyot, UdeM  
Milla Rautio, UQAC  
Roxane Maranger, UdeM  
Sébastien Sauvé, UdeM  
Thomas Edge, McMaster U./ECCC



The *Lampsilis* research vessel from Université du Québec à Trois-Rivières in Lake St. Louis, West of Montreal. Shiptime financial support was provided by the Réseau Québec Maritime (RQM) and the Gouv. of Québec.

# 2020 Award Winners


## Frank Rigler Award

By Jérôme Comte

**Brian Cumming** - It is with great pleasure that the SCL executive announces that the 2019 Frank Rigler Award will be presented to Dr. Brian Cumming. Brian has significantly advanced the fields of Limnology and Paleolimnology, making lasting and significant contributions to our understanding of the coupling between climate and lakes in both semi-arid and boreal regions.

His research has directly influenced policy, providing information for informed water management. For example, Cumming's research was incorporated into the National Acidic Precipitation and Assessment Program's State-of-Science report (NAPAP SOS), which provided the critical data needed to amend the Clean Air Act in the early 1990s.

In addition, Professor Cumming has made outstanding contributions to our understanding of the complex relationship between climate and lakes, and how on sedimentary records can be used to help understand the modes, durations and frequencies of past climate change in semi-arid regions across the world. Prof. Cumming's impact and influence as a mentor and educator are well documented by his teaching awards. Taken together, we believe that Brian F. Cumming is a world leader in paleolimnology, a spirited and dedicated educator, and a selfless model of leadership in the regional, national and international matters.

The Frank Rigler Award is the highest honour given by the Society of Canadian Limnologists to recognize and honor major achievements in the field of limnology by Canadians or those working in Canada. Brian will give an overview of his research during the plenary session of the annual meeting of SCL/CCFFR, January 2-5, 2020 in Halifax (NS). 




## Robert Peters Award

By Kerry Finlay

**Kyra A. St. Pierre** - The 2020 Rob Peters Award for best student paper in Limnology was awarded to Kyra A. St. Pierre for her paper "Proglacial freshwaters are significant and previously unrecognized sinks of atmospheric CO<sub>2</sub>", published in PNAS (116: 17690-17695).

In her paper, Dr. St. Pierre used a novel whole-watershed approach, integrating principles from glaciology and limnology, to conclusively show for the first time that certain glacier-fed freshwater ecosystems are significant and previously overlooked CO<sub>2</sub> sinks. She sampled waters across an entire downstream freshwater network (i.e., the proglacial environment), from glacier termini through to river deltas and into a large High Arctic lake, using the glacierized Lake Hazen watershed (Nunavut, Canada) as a model system. On the watershed scale, the inclusion of these previously overlooked glacial-fed freshwaters increased the watershed CO<sub>2</sub> sink by 35% and transformed the summed aquatic components of the budget from being a net CO<sub>2</sub> source to a net CO<sub>2</sub> sink.

Building on this whole watershed study, Kyra used *in situ* measurements from other proglacial networks in southern Greenland and the Canadian Rockies, combined with the few available literature estimates of proglacial freshwater CO<sub>2</sub> concentrations, to conclusively show that glacier-fed freshwaters are likely a globally relevant CO<sub>2</sub> sink, with important implications for regional carbon budgets.

The Rob Peters award is given by SCL each year to recognize the best aquatic sciences paper published in the preceding year by a Canadian student or a student working in Canada. 

Left: 2020 Rigler Award recipient,  
Brian Cumming, Queen's University

Right: 2020 Peters Award recipient,  
Kyra A. St. Pierre, U. Alberta

**Congratulations to you both!**

**Björn Wissel** and **Roxane Maranger** are among the 2019 ASLO fellows who are recognized as having achieved excellence in their contributions to ASLO and the aquatic sciences. <https://www.aslo.org/congratulations-to-the-2019-aslo-fellows/>

**Bob Hecky** and **Ray Hesslein** (both previous Rigler Awardees) received the John H. Martin Award which recognizes a paper in aquatic sciences that is judged to have had a

high impact on subsequent research in the field.

Contributions of benthic algae to lake food webs as revealed by stable isotope analysis” established the use of stable isotopes as a robust tool for studying energy fluxes in aquatic ecosystems and demonstrating a new paradigm for carbon flow in littoral food webs.

## Conferences Round-up 2019

By Kristen Coleman and Kerry Finlay

### **GLEON 21 All Hands' Meeting, 4–8 November 2019, Deerhurst Resort, Huntsville (Muskoka), Canada.**

SCL members had a fantastic time at the Global Lake Ecological Observatory Network (GLEON) meeting held in Canada this year at the Deerhurst Resort in Muskoka. The aim of GLEON is to conduct innovative science through data sharing and interpretation of high-resolution sensor data. Since 2005, GLEON members have gathered across the globe to share data and discuss new project ideas to move toward the goal of understanding, predicting and communicating the role and response of lakes in a changing global environment. The 2019 GLEON meeting involved 210 participants from 21 different countries and we were happy to have a strong SCL contingent to represent the great limnology research being conducted in Canada. We were especially pleased to be able to provide travel awards to allow our SCL student members to participate in this fantastic networking opportunity. All four awardees presented their research at a poster session and actively participated in




From left to right: Daniel Gillis (University of Toronto), Xinyu Sun (Queen’s University), Kristen Coleman (York University), Kerri Finlay (University of Regina), and Qi Wang (Queen’s University). Photo credit: Kristen Coleman.

working groups and workshops throughout the week. We’re all looking forward to GLEON 22 in Poland in Oct 2020! 🌐

## Upcoming SCL Meetings

The Annual CCFFR / SCL meeting is quickly approaching, and will be held January 2-5, 2020 in Halifax (NS). The theme for this year's meeting is "resilience, adaptation, and mitigation strategies for conserving Canada's aquatic resources", and will include a number of exciting symposia and special sessions on related topics. In addition, plenary lectures by the Stevenson, Rigler, and Peters awardees will feature on Friday the 4th.

Another item to mark in your calendar is SCL's Annual Society Meeting, also on Friday January 4th from 5:00 pm – 6:00 pm. Finally, SCL's student representatives have been working hard to organize a diverse and dynamic panel discussion on "Tips to get a job in aquatic science", which early career researchers will certainly find interesting! We look forward to seeing everyone in January! Make sure to follow along for all the developments on the meeting as they arise on our website, which also has links to the conference website. 



### List of 2020 conferences

- [SCL/CCFFR annual meeting](#) • Jan 2-5 • Halifax, Nova Scotia
- [Ontario Chapter of the American Fisheries Society](#) • Feb 20-22 • Geneva Park, ON
- [Canadian Geophysical Union](#) May 3-6 Banff, AB
- [Canadian Society for Zoologists](#) May 11-15 Saskatoon, SK
- [Canadian Society for Ecology and Evolution](#) May 28-31 Edmonton, AB
- International Association for Great Lakes Research [IAGLR 2020](#) • June 8-12 2019 • Winnipeg, MB
- [ASLO-SFS Joint Summer Meeting](#), June 7-12 Madison WI, USA
- [American Society for Ichthyology and Herpetology](#), July 20-26 Norfolk, VA, USA
- [ESA 2020](#) Aug 2-7, Salt Lake City, UT, USA
- [AFS 2020](#) (150<sup>th</sup> Anniversary) Aug 30-Sept 3, Columbus OH USA
- [NALMS 2020](#) Nov 16-20 Minneapolis, MN USA



# Student Spotlight

## **Who are you? What's your career path?**

I am currently a PhD candidate at the Paleocological Environmental Assessment and Research Laboratory (PEARL) at Queen's University, under the supervision of Dr. Brian Cumming. Currently, I am using paleolimnological techniques to assess the impacts of watershed disturbance and climate changes on important fisheries lakes in interior British Columbia. I completed my undergraduate degree at McMaster University, where I undertook an Honours thesis using paleoenvironmental techniques to contribute to a reconstruction of paleo water-levels in a flooded cave system in Mexico. This is where I got hooked on paleoenvironmental research. After completing an M.Sc. with my current supervisor in 2016, I worked for several months as an Assistant Aquatic Research Biologist with the Ontario Ministry of Natural Resources and Forestry. Ultimately, in 2017 I decided to pursue my PhD.

I thoroughly enjoy the work that I am doing, and I am excited to work towards bringing together my remaining PhD projects. As for the more distant future, I am committed to continuing to study freshwater ecosystems and the stressors they face, ideally from both a neolimnological and paleolimnological perspective. My list of "cool" ideas for side projects in my lab book continues to grow. Perhaps some will be good ideas for post-PhD endeavours.

## **What's your favorite hobby outside of your work?**

I try to spend my free time SCUBA diving, particularly in the summers, although I do



**Graham R. Mushet**  
**(Ph.D. Candidate) – Queen's University,**  
**Kingston, ON**

dive year-round. Kingston is well-known for its numerous shipwrecks, many of which lie between Amherst Island and Wolfe Island. I have been diving for ~10 years, and I've invested a lot in training. I hope to continue to take on more challenging dives as my training and experience level continues to grow in the years to come.

## **Describe your research in a few sentences:**

Lakes and their watersheds in interior B.C. have faced a number of stressors over the last century, such as forest harvesting, shoreline development, cattle grazing, and lake impoundment. Moreover, given that a large portion of central interior B.C. is semi-arid, it is particularly vulnerable to changes in water balance as climate changes. As such, we are studying sediment records from several lakes

in the region, over varying time scales (decades to millennia), to try to disentangle the relative importance of water level changes (due to climate) and watershed disturbance on water quality in lakes that support important recreational fisheries.

### **Any cool publications yet?**

Yes! The first bit of my PhD work was published in *Ecosystems* in September 2019.

<https://link.springer.com/article/10.1007/s10021-019-00443-0>

### **Nice! How did you go about answering your research question?**

We analyzed pigments, diatoms, and cladoceran remains in dated sediment cores from four lakes in central interior B.C., that have been stocked with rainbow trout since the early-to-mid 1900's. We used a novel study design, whereby two of our lakes were naturally fishless prior to stocking, and two of our lakes contained native fish populations prior to stocking. This enabled us to assess how natural fish status interacts with stocking (a top-down force) and nutrient enrichment (a bottom-up force).

### **What are the main results of your study?**

While we expected that fish stocking would have a stronger control over food web structure in naturally fishless lakes than in naturally fish-bearing lakes, we documented increases in large *Daphnia* spp. in all lakes over the last century that coincided with nutrient enrichment. This result was

inconsistent with size-selective predation from fish. We argue that in our lakes, large *Daphnia* spp. may seek deep, anoxic refuge to avoid the less anoxia-tolerant rainbow trout, and that increased food availability has contributed to the growth of *Daphnia* spp. populations.

### **What is the significance of this study, the big picture?**

Both naturally fishless and naturally fish-bearing lakes are widespread throughout interior B.C., largely due to the complex topography. Therefore, it was important to understand how natural fish-status contributes to variability in food-web response to fish stocking (and nutrient enrichment), especially because of the high density of lakes in the area that are stocked annually. Our findings also contrast the traditional paradigm of size-selective predation, which is often observed in naturally fishless alpine lakes that have been stocked. This will be of interest to both aquatic ecologists and fisheries managers.



## **Do you want to be our next student spotlight?**

If you want to share your research project, send us an email at [comms@socanlimnol.ca](mailto:comms@socanlimnol.ca)

## - • - Recent Citings - • -

*This section highlights some of the current work of our members. If you have a recent (past 6-12 months) contribution to the peer-reviewed literature that you'd like to share with the society, please e-mail it to [comms@socanlimnol.ca](mailto:comms@socanlimnol.ca)!*

- Anas, M.U.M., Scott, K. and Wissel, B. (2019) Water chemistry, landscape and spatial controls of  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  dynamics in boreal lakes: insights from taxon-specific zooplankton analyses. *Freshw. Biol.* DOI: 10.1111/fwb.13389
- Anas, M.U.M., Simpson, G.L., Leavitt, P.R., Cumming B.F., Laird, K.L., Scott K.D., Das B., Wolfe J.D., Hesjedal J., Mushet G.R., Walker A., Meegahage B.J., and Wissel, B. (2019) Taxon-specific variation in  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  subfossil invertebrate remains: insights into historical trophodynamics in lake food-webs. *Ecol. Indic.* 102:834-847.
- Bogard, M.J., S.E. Johnston, M. Dornblaser, R.G.M. Spencer, R. Striegl, D. E. Butman. 2019. Extreme rates and diel variability of planktonic respiration in a shallow sub-arctic lake. *Aquatic Sciences.* 81(4):60.
- Bogard, M.J., C. Kuhn, S.E. Johnston, R. Striegl, G. Holtgrieve, M. Dornblaser, R.G.M. Spencer, K.P. Wickland, D. E. Butman. 2019. Little terrestrial support of lake organic carbon cycling in many circumpolar landscapes. *Nature Geoscience.* 12: 180-185.
- Haig, H.A., Hayes, N.M., Simpson, G.L., Yi, Y., Wissel, B., Hodder, K.R., and Leavitt P.R. (2019) Comparison of isotopic mass balance and instrumental techniques as estimates of basin hydrology in seven connected lakes over 12-years. *J. Hydrol.* [doi.org/10.1016/j.hydroa.2019.100046](https://doi.org/10.1016/j.hydroa.2019.100046).
- Johnston, S.E., M.J. Bogard, J. Rogers, D. Butman, R. Striegl, M. Dornblaser, R. Spencer. 2019. Constraining Dissolved Organic Matter Sources and Temporal Variability in a Model Sub-Arctic Lake. *Biogeochemistry.* 146: 271–292.
- Nürnberg GK. 2019. Quantification of Anoxia and Hypoxia in Water Bodies (2). In: *Water Encyclopedia*. John Wiley & Sons, Inc. <https://doi.org/10.1002/9781119300762.wsts0081>
- Nürnberg GK. 2019. Hypolimnetic withdrawal as a lake restoration technique: Determination of feasibility and continued benefits. *Hydrobiologia* <https://doi.org/10.1007/s10750-019-04094-z>
- Vachon D., S. Sadro, M.J. Bogard, H. Baulch, J.F. Lapierre, J. Rusak, A. Laas, B. Denfeld, P. Staehr, G. Weyhenmeyer, B. Obrador, P.A. del Giorgio. Coupled O<sub>2</sub>-CO<sub>2</sub> dynamics in

surface waters as integrative insights on lake ecosystem functioning. *Limnology and Oceanography Letters*. In press.

Webb, JR\*, PR Leavitt, GL Simpson, H. Baulch, HA Haig, KR Hodder, K Finlay. 2019. Regulation of carbon dioxide and methane in small agricultural reservoirs: optimizing potential for greenhouse gas uptake. *Biogeosciences*. 16(21): 4211-4227.



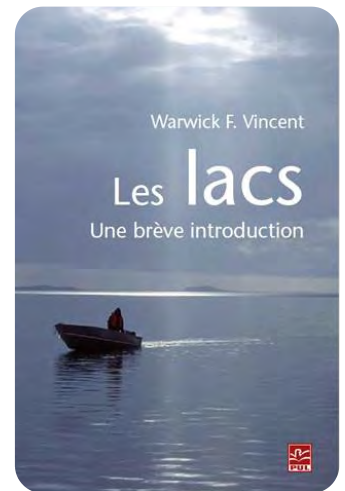
## 'Lakes' in French

A French version of Warwick Vincent's short introduction to limnology (Oxford University Press, 2018) has now been published: *Les lacs - Une brève introduction* (Presses de l'Université Laval, Québec, and Éditions Hermann, Paris). Details are available at:

<https://www.pulaval.com/produit/les-lacs-une-tres-courte-introduction>

Warwick has also produced an extended bibliography (in English only) on lakes, including a description of limnological journals, on the Oxford Bibliographies site:

<https://www.oxfordbibliographies.com/view/document/obo-9780199363445/obo-9780199363445-0107.xml>



**Thank you to all our members who contributed to this newsletter!**

If you would like to contribute to our next newsletter, share your stories, and cool research project, please contact

**[comms@socanlimnol.ca](mailto:comms@socanlimnol.ca)**

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