

2022

Annual Report

Cooperative Freshwater Ecology Unit

"Clean Water

Water

A Message from the New Director March 2023

Hello Corop Unit friends and partners,

This 2022 CFEU Annual Report is starting a little differently than those you have read in the past...the rudder that steers this boat was passed from John to me in January 2023, so rather than recap what happened in 2022, I will focus more on what I hope to achieve going forward. I will do my best to stay the course, and even work on cresting a few new waves, all with the intent to fill the boat with people who have common goals and innovative ideas for reaching new horizons. But I have such big boots to fill! Thankfully, Karen and John have been instrumental in teaching me the ropes, and I know there is still much to learn.



During the 3 months that I have been in my new role of Director of the Lake Centre, I've had the opportunity to meet with members of the CFEU housed in the building, to learn about their projects and research programs. I sat down with Tom, Brie, and their team over a cup of tea to learn about their respective government research programs. The long-term monitoring of lake and stream fish communities, food webs, and water conditions undertaken by MNR and MECP are the backbone of the Corop; these are the data that tell the Sudbury Story of recovery in the aquatic landscape. I am inspired by David and Chantal's 'Up North' climate change project, and the true on-the-ground relevance and impact it has for First Nation communities in Northern Ontario. I met with Chantal B and Michelle to talk about the Science Communication program, its incredible reach supported by all three of the Canadian Tri-Council agencies (NSERC, IHR, and SSHRC); its unique training structure, and its pressing need for more permanent human resources. Next on my agenda is to meet with the Corop partners outside the building; our supporters from industry and collaborators from other universities and government agencies.

For those of you who I have not yet had the pleasure to meet, let me introduce myself. I hail from Southern Ontario, am an alumnus of the University of Guelph (BSc, MSc), and obtained my PhD even further south, from the University of South Carolina, USA. I've been a professor in the Biology programs at Laurentian University since 2004. My research program focuses on the life history, ecology, and conservation of at-risk reptiles (mostly turtles, some snakes), with an occasional foray into amphibian ecology and herpetological community ecology. I have extensive

experience working with government, industry, and First Nations, and my active research program is currently training 10 graduate students. My former students are now biologists with MNRF, Parks, Ducks Unlimited, Toronto Zoo, First Nation Lands Departments, consultants, and some are professors or are in other academic roles.

Looking to the future, Laurentian has emerged from CCAA we have new leadership, tenure track faculty positions are posted, and we have an opportunity to build something awesome, something that includes the CFEU as a significant contributor to the research mandate of the university. We can chart a course for a future that establishes the LWLC as an environmental research hub of the north. Of course, we have some work to do to get us there.

I have three main messages about

x Congratulations

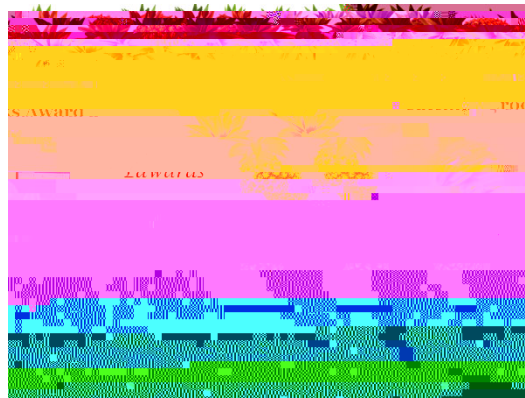
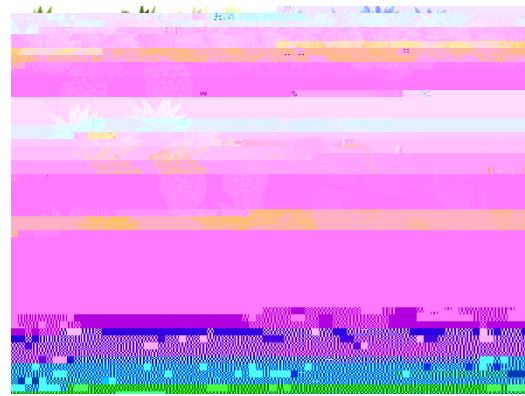
- x Congratulations to Science Communication Program Alumnus Anthony Morgan, who is a new co host of The Nature of Things! Anthony joined Chantal Barriault and David Pearson on CBC Morning North on December 14, 2022 to discuss how the Science Communication program set him up for success in this new role.
<https://www.cbc.ca/news/canada/sudbury/nature-of-things-co-host-anthony-morgan-1.6684102>

Student Scholarships Fellowships Bursaries

- x Dr. Lucas Braga, PhD (Cambridge/Tanenzap) won a Marie Skłodowska-Curie Fellowship for work on ancient viruses in thawing permafrost.
- x Brooke Carroll, MSc Candidate Laurentian (Litzgus) received an NSERC Canadian Graduate Scholarship and a WCSCanada Weston Family Boreal Research Fellowship.
- x Lisa Cicchetti, MSc Candidate Queen's (Arnott), won a Craigie Award.
- x Nicole Corbiere, MSc Candidate Laurentian (Roy Léveillé/Basiliko), won an Indspire's BBF Proctor and Gamble Indigenous Student Bursary 2022, a WCSCanada Weston Family Boreal Research Fellowship, a Royal Canadian Geographical Society Graduate Research Grant, an Indspire's BBF-Individual Giving Indigenous Student

x AidanMaloney, MScCandidate Laurentian (Litzgus) was awarded a MITACS Accelerate Internship and a Queen Elizabeth II Science and Technology Scholarship.

x Troy Martin, MScCandidate Queen's (Arnott), wo471 14.64 re SBT 0 g05142t(O9.225 0TD (019) 18%3.2



Community Outreach

- x Dr. Shelley Arnott participated in the following public outreach initiatives:
 - a Gave the Royal Legacy Society Tea Talk entitled 'Freshwater salinization: why we need to use less salt.' Jun 2022
 - a Featured in article 'Useless salt! High levels of chloride from road salt are threatening Ontario's aquatic ecosystems' Skeleton Park Press Fall 2022.
- Dr. Arnott also gave the following media interviews:
 - a La Presse interview with Philippe Robitaille Grou, 20 Apr 2022.
 - a The Pointer.com interview with Joel Wittnebel, 12 Apr 2022.
 - a Queen's Gazette, Human induced salt pollution a major threat to biodiversity in lakes. 22 Mar 2022. https://www.queensu.ca/gazette/stories/human-induced-salt-pollution-a-major-threat-to-biodiversity-in-lakes?utm_source=Gazette+Newsletter&utm_campaign=22daae0042urrgqt&utm_medium=email&utm_term=0_a59e82e8e122daaeda42522027514
 - a News 8, Rochester NY interview about road salt. 17 Mar 2022.
 - a CBC Fresh Air interview about road salt, 13 Mar 2022. <https://www.cbc.ca/listen/live-radio/1-193-fresh-air/clip/15900339-new-study-queens-highlights-damages-salt-runoff-roads>

- a CBC Ontario Morning interview about road salt. 8 Mar 2022.
<https://www.cbc.ca/listen/liveradio/1112ontario-morning-from-cbc-radio/clip/15899216ontario-morning-march-8-2022-pt-2>
- a Kingston Whig Standard, Life saving road salt an environmental concern by Ian MacAlpine, 19 Jan 2022.

- x Dr. Chantal Barriault participated in the following outreach initiatives:
 - a Delivered science communications skill training for graduate students as part of the NSERC supported ReNew Zoo initiative. 2 May 2022
 - a Delivered a science communications skills workshop for graduate students in Laurentian's Rural and Northern Health research program. The interactive workshop focused on designing engaging and accessible presentations Mar 2022
 - a Delivered a science communications skills workshop for Forensic students at Laurentian University to encourage them to communicate their research findings with an audience focused approach Feb 2022

- x Dr. Peter Beckett, the Outreach Coordinator with the V-V-LCH, served in the following capacities in 2022:
 - a VETAC Chair Feb - June 2022

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- a Gave virtual talk Abundance of Lichens and Mosses in the Restored Landscape around Base Metal Smelters of Sudbury, Ontario, Canada to 140 delegates at the International Planning for Closure Conference in Santiago, Chile. 12 May 2022
- a Presented to 110 delegates at the 39th Annual Meeting of the American Society of Reclamation Sciences in Duluth, MN on 'Abundance of Lichens and Mosses on the Restored Landscape in the Nickel-Copper City of Greater Sudbury, ON, Canada'. 14 Jun 2022
- a With Dr. Graeme Spiers hosted a day long field trip for over 20 participants of the Jesuits of Canada Reflections on Ecology Workshop held by the field [6-06103-7] / TT0 1 Tf [0 Td

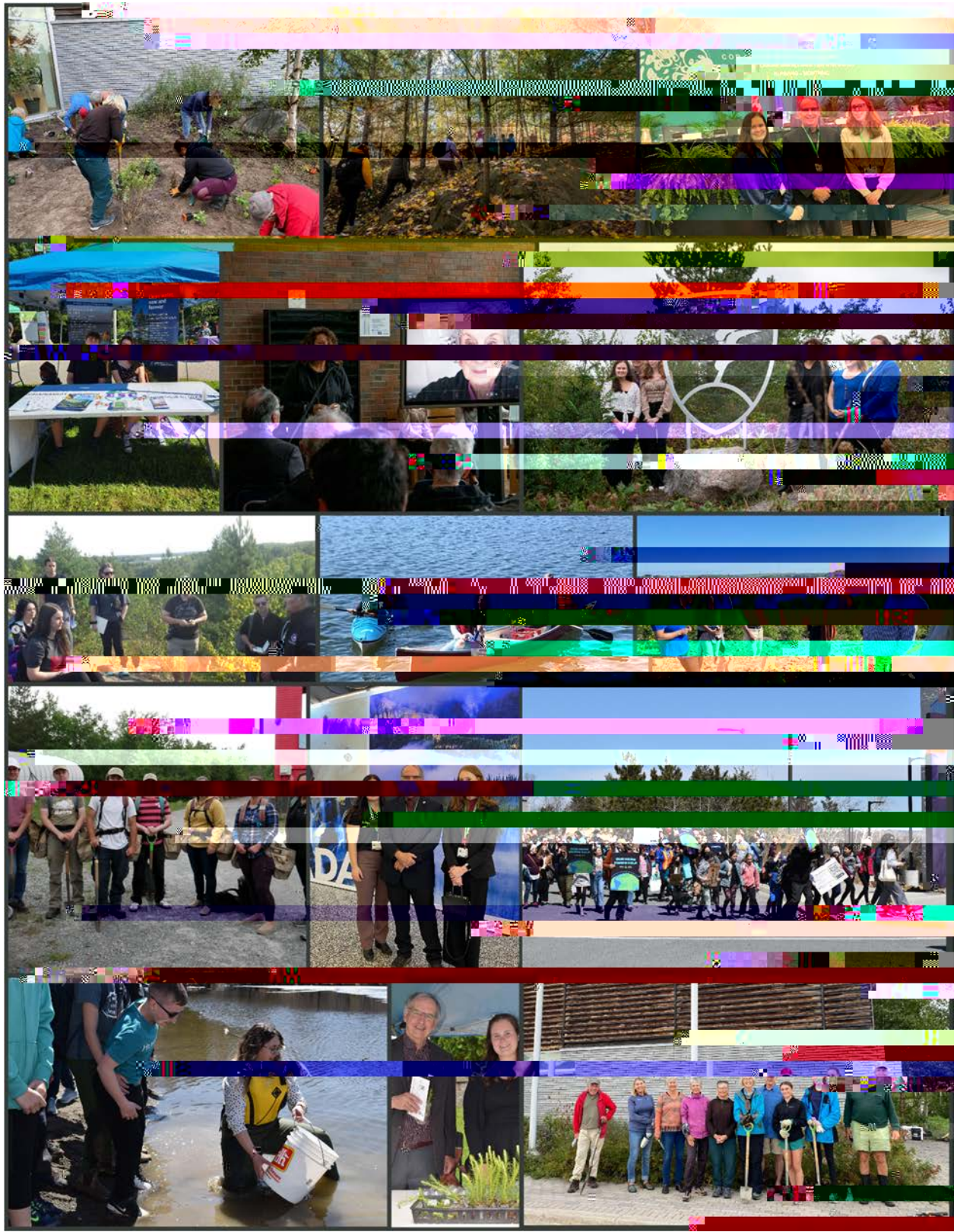
a Participated in the School of Natural Sciences Seminar Series giving a presentation

- a Was featured in 'NOBA2022: Nadia Mykytczuk is the Innovation Award winner' Casey Stranges, Sudbury.com 3 Jan 2023
- a Contributed Opinion column 'Laurentian must turn its legacy into a vision for the future', Sudbury Star 29 Aug 2022
- x Dr. David Pearsor participated in the following public outreach activities:
 - the ... its

-d [s

a Led the event logistics and provided a press release and short

x Dr. Heidi Swanson was featured



2022 Watershed Lecture with Dr. Charles Driscoll

Dr. Charles Driscoll, Distinguished Professor from Syracuse University gave the annual Watershed Lecture on Friday, October 28, 2022 entitled: 'Long Term Research at the Hubbard Brook Forest'.

Dr. Driscoll is a long term investigator of the Hubbard Brook Long Term Ecosystem Research study and his scholarly work addresses the effects of disturbance on forest, freshwater and marine ecosystems, including air pollution (acid and mercury deposition), land use, and climate change. He has testified at US Congressional and state legislative committee hearings, and provided briefings to government agency and stakeholder groups on environmental issues. He has served on local, national and international committees pertaining to environmental management and policy. He is a member of the National Academy of Engineering and a fellow of the American Association for the Advancement of Science.

On the same day, Dr. Driscoll, along with Dr. Colin McCarter from Nipissing University, hosted our graduate students for the Watershed Students Symposium. Lake Centre students presented their research projects and Dr. Driscoll provided feedback and guidance. While here, Dr. Driscoll also planted a tree along the United Nations Restoration Trail on campus contributing to Laurentian's Carbon Offset Forest.

Watershed Lectures can be found on our website at:

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20. Complete necessary fisheries assessment to allow additional lake trout fish stocking in lakes with suitable pH (e.g. OSA, Norway, Killarney, Ruth Roy, Frederick, Dougherty, Marjorie etc.) in support of government agency restoration

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MEC also provided information and analytical support for a chemical and biological recovery assessment of Killarney Provincial Park, in collaboration with Ontario Parks, Dr. John Gunn and MSc candidate Haley Moskal.

Database management activities during 2022 included: 1. Updating and cleaning the Reference and Sentinel data sets, and preparation of the chemistry records for posting to the Province's open data portal, data.ontario.ca 2. Updates to the Zooplankton and Phytoplankton databases and preparation of the Sentinel lake time series for assessment in the next MEC Reporting cycle and eventual posting to the open data portal, 3. In addition, several data requests were addressed from partners and collaborators. Support for other projects, including graduate student projects was also provided (data, expertise and logistics).

These monitoring programmes continue to be a critical component of Canadian and international efforts to assess the effects of acid deposition and the responses of lakes to sulphur emission controls, as well as numerous emerging concerns for Boreal Shield waters. Results from these sampling programmes have been presented and interpreted by CFEU partners and numerous collaborators. Publication highlights included an MEC Red assessment (Sorichetti et al. 2022) of increasing chloride trends in Ontario's surface waters.

Northern Benthic Biomonitoring

Biological Indicator such as benthic macroinvertebrates

data provide information on the unique freshwater environments that potential resource extraction activities could impact.

The Northern Biomonitoring Program also includes a set of 16 Sudbury area Sentinel Stream locations, consisting of both local reference and impacted sites, which are monitored every 4 years beginning in 2005. In 2022, preliminary assessment of temporal trends in water chemistry and community metrics were completed for MECP's Inland Waters Program.

Aquatic Science Conference in Montreal in Feb 2023. MSc Student Taylor Nicholls from Wahnapitae First Nation is currently doing an assessment of contaminants in fish from lakes south of Toronto.

Ontario University Program in Field Biology (OUPFB)

The OUPFB Program offered field courses within Canada this year; however,

different phases of this operation, as well as researchers and specialists from UNAM and the Core Foundation Corporation.

New collaboration opportunities with several

Funding for this project came from the [Centre for Research on Pandemic Preparedness and Health Emergencies](#). Based on the program's "Communicate with Intent" Framework, each interactive workshop spans 3 days (9 total hours), and reaches 75 researchers from across Canada over Zoom. For this pilot offering, CIHR opened registration for 4 sessions of this workshop, and all 300 seats were claimed in less than a week. Three of the workshops were delivered in English, and one in French. In 2022, the SCOM program delivered two of the four sessions, receiving very positive feedback from participants and CIHR.

SCOM Faculty awarded Knowledge Mobilization Activities and Initiatives Fund Grant from Laurentian University's internal SSHRExchange program. As part of an ongoing research project investigating the professionalization of science communication across Canada, the SCOM faculty was awarded funds to run a 1-day symposium titled "Science Communication in the Workplace Symposium: Creating Capacity for Canada's Current and Future Needs." This project will bring together science communication professionals, employers, and academics to share our program's preliminary research on science communicator core competencies, and explore ways to align our curriculum and our professional development workshop content with the evolving needs of the science communication employment field. Preparation for this event began in 2022, and the event will

students, developed infographics based on the online course 'Environmental Remediation: Global Lessons from the Sudbury Story', and wrote media releases based on the published work of lake centre researchers. The Science Communication students were judges for the graduate research presentations at the Graduate Research Symposium in 2022. The (the 02031711) of graduate were

First Nation communities or Tribal Councils move towards climate change adaptation. Steps include learning about climate change and adaptations, gathering knowledge from the community, discussing adaptation options, implementing projects, and evaluating success.

All resources are posted on UpNorthOnClimate.ca. The website also showcases locally developed data visualizations, graphics, and GIFs on seasonal temperature

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Councils all of whom were a06 a06 of 4m

On March 14 and 15, 2022 with safe ice for a MNRF helicopter to land, and generous support from the Friends of Killarney, John Gunn, Michelle Giroux and MSc student Haley Moskal returned to assess chemical changes in 24 of the historic

The assessment was led by LWLC staff Ryan Coady, with able assistance of technicians Ben Schlosser, Chris Bissorand, and Alex Lieou. Water sampling, lake habitat mapping and submission of tissue samples for contaminant analysis were all part of the project. The CFEU crews and AAFN staff also assisted Queen's University students in the collection of sediment cores which will be used to reconstruct the history of these lakes, lakes that have very little background information. The data and findings from the fisheries assessment have been transferred to AAFN for their retention and use. The project began with a presentation by Dr. Gretchen Lescord to the community to describe the purpose and procedures of such studies. The follow up presentation of results occurred on March 6, 2023.

Participation in The IMAX film with Dr. Jane Goodall

Beckett, P

- x Served on the Technical Committee for the Planning for Closure International Conference, Santiago Chile, May 2022
- x Co Chair of the Ontario Nature Annual Gathering and AGM held in Sudbury, Jun 2022
- x Served as Reviewer for Science of the Total Environment, Environmental Pollution, Water Air and Soil Pollution, Environmental Science and Pollution Research, Remote Sensing and the International Journal of Environmental Research and Public Health
- x Served on the Review Panel for CFI (Colleges)
- x Served on the Environmental Technician/Technologist College Review Panel for the Ontario Ministry of Universities and Colleges

Roy Léveillé, P

- x Served as a session convener at the American Geophysical Union for C52D Drained Lake Basins in Permafrost

Swanson, H

- x Associate Editor, Arctic Science
- x Associate Editor, Canadian Journal of Fisheries and Aquatic Sciences

Tanentzap, A. J.

- x Associate Editor of Nature Scientific Reports
- x Associate Editor of Journal of Vegetation Science
- x Associate Editor for PLoS Biology
- x Dr. Tanentzap has also been coordinating a global network of >100 individuals from 70 sites worldwide that are sampling water as part of the GLEON DOM seasons project (<https://gleon.org/research/projects/domseasonstrackingseasonalitydissolvedorganicmatter>)

Watmough, S. A.

- x Director of the Trent School of the Environment (June 2016 – June 30, 2022)
- x Board Member, Canadian Colleges and University Environmental Network
- x Editorial Board Member for The Science of the Total Environment
- x Oversees site visit for Geography and Environmental Geoscience Cyclic Review
- x Reviewed 22 journal articles

Partners and Collaborators

- | | |
|---|---|
| x Acadia University | x Friends of Killarney |
| x Appalachian State University | x Government of Northwest Territories |
| x Boniferno Millworks | x Glencore Sudbury/INO |
| x Canadian Kraft Papers | x Grand Council Treaty 3 |
| x City of Greater Sudbury | x Great Lakes Forestry Centre, NR CAN CFS |
| x Clergue Forest Management | x Irving Pulp and Paper |
| x Cornell University | x Keewatinook Okimakanak (Northern Chiefs) Tribal Council and member First Nations |
| x Dehcho First Nations | x Laurentian University |
| x Dept. of Fisheries and Oceans Canada | x Manitoulin Streams Improvement Association |
| x DMI r Peace River | x Matawa First Nations Management Four Rivers Environmental Services Group and member First Nations |
| x Domtar Inc. | |
| x Dorset Environmental Science Centre | |
| x Dryden Forest Management Company | |
| x Environment and Climate Change Canada | |
| x Forest Protection Limited | |

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rangiferina and *C. mitis* in the past uranium mining region of Elliot Lake, Ontario, Canada.
Heliyon 8(12):e11863 <https://doi.org/10.1016/j.heliyon.2022.e11863>

CouturierM, YTPrairie,AM Paterson,EJSEmilsonandPAdel Giorgio.2022.Longterm trends in pCO₂n lakesurfacewater following rebrowning.GeophysicalResearchLetters 49:e2022GL097973.

CunilleraMontcusiDM, M Beklior, M CañedoArgüellesEJeppesenR Ptacnik,CAlves,S Arnott, SBerger,SBrucet,H Dugan,M Gerhard,ZHorvath,SLangenheder,JNejstg

Gunn JM and JLousteFillion. 2022. Adaptability of lake charr (*Salvelinus namaycush*) in a changing world: Newly colonized landscapes reveal the significance of traits shaped during the Pleistocene. *Env. Biol. Fish.* <https://doi.org/10.1007/s10641-022-01311-y>

Hajek J, Y Alarie, C J Bennetti, M Springer, L Hendrich, A Villastrigo and M Balke. 202X. Underestimated diversity and range size of Copelatus diving beetles in tank bromeliads: r beetles of “hygrofloric” lifestyle (Coleoptera: Dytiscidae). *Zoological Journal of the Linnean Society*. In press.

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Hébert MP[†], C S Symon[§], M Cañedo Argüelles[†], S E Arnott, A M Derry, V Fugère, W D Hintz, S J Melles, L Astorg, H K Baker, J A Brentrup, A L Downing, Z Ersoy, C Espinosa, J M Franceschini, G F Fussmann, A T Giorgio, N

Hu A, KSJang, FMeng, JStegen, AJTanentzap, M Choi, JTLennon, JSoininer and JWang. 2022.
Microbial and environmental processes shape the link between

Kellaway E, MCEimers and SAWatmough. 2022. Liming legacy effects associated with the world's largest soil liming and greening program in Sudbury, Ontario, Canada. *Science of the Total Environment* 805:150321.

Kim N, SAWatmough and ND Yan. 2022. Wood ash amendments as a potential solution to widespread calcium decline. *0*

MacGillivray KA, JW Greenwood, AM Paterson, SA Watmough, AJ Williams and MCEimers. 202X. Complex patterns of phosphorus delivery in the Lake of the Woods watershed. *Journal of Great Lakes Research*. In press.

Manga IV, WY Lam, H Huang, EJE Milson, RWMackereth and CPJ Mitchell. 2022. Molecular correlations of dissolved organic matter with inorganic mercury and methylmercury in Canadian boreal streams. *Biogeochemistry* 60:1271-44.

McClymont AM, SE Arnett and JARusak 2023. The effects of increasing chloride concentrations and temperatures on freshwater zooplankton communities. *Limnology and Oceanography Letters* 8:56-64. DOI:10.1002/1012.10278

McCuaig S, R McKillop, C McGregor, P Roy Léveillé and A St Amour. 2022. Mapping surficial deposits and investigating permafrost along the proposed Kivalliq Hydro fibre link, Manitoba to Nunavut. *Proceedings of GeoCalgar 2022*, Calgary,

Mullin DI, RCWhite, JLMullen, AM Lentini, RJBrooksand JDLitzgus202X.Headstartingurtles to largerbodysizesfor multiple yearsincreases survivorshipbut with diminishingreturns. Journalof Wildlife ManagementAccepted.

Munford KE,SGilbert Parkes,NCMykytczuk,N Basiliko,KMYakimovichA PoulainandSA Watmough. 202X Howarseniccontaminationinfluencesdownslopewetlandplant and microbialcommunitystructureandfunction. Scienceof the Totaland

in the northwest Territories, Canada *Environmental Research* 203: 111800.
doi.org/10.1016/j.envres.2021.111800

Ponton, DE,

Sorichetti R, J M Raby, C Holeton, N Benoit, L Carson, A DeSellas, N Diep, B A Edwards, T Howell, G Kaltenecker, C McConnell, C Nelligan, A M Paterson, V Rogojin, N Tamana, H Yao and J D Young 2022. Chloride trends in Ontario's surface and groundwaters. *J. Great Lakes Res.* 48:512-525.

Sun X and S E Arnott. 2022. Interactive effects of increased salinity and heat wave on freshwater zooplankton communities in synchronous and sequential treatments. *Freshwater Biology* 67:1604-1617.

Sun X and S E Arnott. 2022. Evolved tolerance to NaCl does not alter *Daphnia* response to acute heat stress. *Evolutionary Ecology* DOI:10.1007/s10680-022-10220-6

Tafvizi A, A L James, H Yao, T Stadnyk and C Ramcharan 2022. Investigating hydrologic controls on 26 Precambrian Shield catchments using landscape isotope tracer and flow metrics.

Volponi SN, HL Wander, DC Richardson, CJ Williams, DA Bruesewitz, SE Arnott, JB Brentrup, HL Edwards, H Ewing, K Holeck, L Johnson, B Kim, A Morales, Williams, N Nadkarni, B Norman, L Parmalee, A Shultis, A Tracy, N Ward, K Weathers, CWigdahl, Perry and KYokota. 2022. Nutrient function over form: Organic and inorganic nitrogen additions have similar effects on lake phytoplankton nutrient limitation. *Limnology and Oceanography*. <https://doi.org/10.1002/lno.12270>

Watkinson A, M Juckers, L D Andrea, P Beckett and G Spiers. 2022. Ecosystem recovery of the Sudbury technogenic barrens 30 years post restoration. *Eurasian Journal of Soil Science* 55(5):663-672.

Watmough SA, SGilbert, Parkes, N Basiliko, L Lamit, E Lilleskov (core author group) and 58 others including N Mykytczuk, G Spiers, M Carson, P Levasseur. 202X. Variation in carbon and nitrogen concentrations in the St. Lawrence River. *Journal of Great Lakes Research* 48:1-10

Arnott SE, BHintz, CSymons, A Derry, SMelles, M CañedoArgüelles, JBrentrup, A Downing, D Gray, D Greco, McClymont, RRelyea, JRusak, CSearle, CSteiner, M PHébert, S Langenheder, O Langvall, SHylander, LLind, LAstorg, B Beisner, HBaker, Z Ersoy, CEspinosa, J Franceschini, A Giorgio, N Göbeler, EHassal, M Huynh, Konasen, A Kirkwood, H Laudon, M Lundgren, EMoffett, L Proia, M Schuler, J Shurin, M Striebel, S Thibodeau, P Urrutia Cordero, L Vendrell, Puigmitja, G Weyhenmeyer, Currentwater

Deslauriers C, P Roy Léveillé and M Allard. Permafrost thermal regime and thermokarstrates over decades in palsas and lithalsas near Kangiqsualujjuat Nunavik.

JuS, KAKidd, EJS, Emilson and CMitchell. Effects of spruce budworm defoliation on stream food webs and mercury

Levasseu P, J Newman and S A Watmough. The impact of severe pollution from smelter emissions on carbon and metal accumulation in peatland. NADP Fall Meeting and Scientific Symposium Monitoring for a sustainable future. Knoxville, TN. 16-18 Nov 2022.

Levasseu P and S A Watmough. Estimating mineral surface area and acid sensitivity of forest soils in Kitimat, British Columbia. Effective Energy and Chemical Recovery in Pulp and Paper Mills. Toronto, ON. 8-10 Nov 2022.

Rahman T and P Roy L'éveillé. Volume, morphology, and development of ice wedges in the barrens of the Hudson Bay Lowlands, northern Manitoba. ArcticNet Annual Scientific Meeting,

Vincent K, J Litzgus and J Popp. The influence of landscape variables on turtle and frog railway interactions. Canadian Herpetological Society conference, Fredericton, NB. 16-19 Sept 2022.

Vincent K, J Litzgus, C Kozmik, S Kell and J Popp. Weaving Indigenous knowledge and western science to investigate the impacts of railway on wildlife. Laurentian University GSAD Discovery and Dissemination Graduate Research Symposium 30 Mar 2022. Winner of best talk in Faculty of Science, Engineering and Architecture and best talk with Indigenous content.

Vincent K, J Litzgus, C Kozmik, S Kell and J Popp. Weaving Indigenous knowledge and western science to investigate the impacts of railway on wildlife. Ontario Chapter of the Wildlife Society Conference. 26 Mar 2022. Virtual.

Warren C, J D Saurette, G A Spier and A Gillespie. Application of Radiometric Data to Predictive Digital Soil Mapping in Ontario. Canadian Soil Science Society Annual Conference Edmonton, AB. 23-27 May 2022.

Watmough S A. A community led wood ash recycling program to restore forest nutrition in Muskoka, Ontario. Forest Ecosystem Monitoring Cooperative Conference Burlington, VT. 15 Dec 2022. future. Knoxville, TN.

Watmough S A and A McDonough. The response of vascular plants in xeric Boreal forests to atmospheric nitrogen deposition depends on precipitation. NADP Fall Meeting and Scientific Symposium Monitoring for a sustainable future. Knoxville, TN. 16-18 Nov 2022.

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Research Grants

Arnott, S

- x NSERC Discovery A multi scale approach to identifying the ecological impact of co-occurring environmental stressors (2019-2024)
- x Canadian Institute of Ecology and Evolution. The regional extent of genetic adaptation in *Daphnia pulex* to freshwater salinization (2024)
- x Ecology Identifying the Ecology of freshwater extent *Daphnia* (2024)
- x Ecology Identifying the Ecology of freshwater extent *Daphnia* (2024)

- x NSERC Canada Research Chair Tier II in Environmental Microbiology (2018-2023)
- x NSERC Advancing Climate Change Science in Canada (ACCS) program. Winter carbon losses in wetland ecosystems under current and future climates. With F Rezanezhad et al. at (U Waterloo), Bill Quinton (Wilfrid Laurier), P Roy Léveillé (Lav

Johnston, T

- x NSERC Discovery Development Grant Program. The trophic niche in boreal lake food webs. (2020-2022)
- x Ontario Ministry of Natural Resources and Forestry, Aquatic Research and Monitoring Section. Northern fisheries research (2004– present, renewed annually)
- x Ontario Ministry of Natural Resources and Forestry, Canada Ontario Agreement (COA) on Great Lakes Water Quality and Ecosystem Health, The influence of female spawner characteristics on the early life survival and recruitment of lake whitefish (2020-2022)

Lescord, G

- x Dept. of Fisheries and Oceans (DFO) Ecosystems Oceans Science Contribution Framework. Impacts of land use change on lake sturgeon habitat use, feeding ecology, contaminant exposure and health in the James Bay Lowlands Partners: Moose Cree First Nation, WCS Canada Laurentian, MNRF, Ontario Tech University (2021-2023)
- x First Nations Environmental Contaminant Program (FNECP) Understanding contaminants of potential concern in fish from traditionally important water bodies around Wahnapiatae First Nation. Granted to Wahnapiatae First Nation with G. Lescord and B. Laird as scientific partners (2022-2024)

Litzgus, J

- x HIW, Pattern Energy Demography and spatial ecology of spotted turtles in inland and coastal populations in Parry Sound District (2022-2024)
- x MITACS Accelerate Impacts of wildfire and wind farm construction on herpetological community of eastern Georgian Bay (2022-2024)
- x Georgian Bay Biosphere Road mortality mitigation for SAR turtles in eastern Georgian Bay (2021-2025)
- x NSERC Discovery Integrating life history variation into conservation of reptiles (2017-2023)

Mykytczuk, N

- x NSERC Discovery Understanding variability in microbial biomineralization and bioremediation consortia; adaptation mechanisms for multiple extremes (2019-2024)
- x Ontario Research Fund. Research Excellence Round 8: Elements of Bio Mining (EBM): Genomics Driven Improvements in Bioleaching Sulfur and Selenium Stabilization in Mine Operations. Co-Lead (2016-2022)
- x NSERC Collaborative Research and Development Grant - Ontario Centres of Excellence Target GHG Program. Landscape Carbon Accumulation through Reductions in Emissions (LCARE) developing brownfield management protocols for carbon sequestration and habitat use (see Basiliko)

Pearson,D

- x NRCanBuildingRegionalAdaptationCapacityandExpertise(BRACE)(Jan2019Mar 2022)
- x TheResilienceInstitute.Adaptationresourceproductionproject (Jul2022Mar 2023)
- x MatawaFirstNationsManagement.Blastomycesresourceproductionproject (Dec 2022Mar 2023)

Ramcharan,C

- x TDFriendsof the EnvironmentFoundation,ClimateChangeAdaptationfor Northern CommunityManagement(2019-2021) TO C ET%0007 5 c 03 UC_0 1 d f 06 8 3. 7 6 5_0 A P B O T c, 4 0 ptation

Spiers,G

- x NSERC InnovationLinks Grant. Constraints on northern aggregate mine reclamation and novel reclamation strategies for enhancing biodiversity and ecosystem functioning with M Hebert, M Nellis, R Rochon, S Bouchard, R Craig (Collège Boréal), and P Beckett and N Basiliko (Laurentian U) (2021-2024)
- x MITACS Testmark, MITACS Accelerate Grant. Development of passive sampling devices for natural and artificial radionuclides in the context of pre- and post-deployment of small nuclear reactors in remote areas. Spiers (PI, LU) with Caron (CoI, RMC), Chabonneau (Testmark Project Lead). (2022-2024)
- x NSERC Collaborative Research and Development Grant - Ontario Centres of Excellence Target GHG Program. Landscape Carbon Accumulation through Reductions in Emissions (LCARE) developing brownfield management protocols for carbon sequestration and habitat use (see Basiliko)

Swanson,H

- x Saugee Shores and Nuclear Innovation Institute. Pre-feasibility assessment for restoration of an urban lake, Fairy Lake, in Southampton, ON. Rooney and Swanson (2021-2023)
- x Great Lakes Fishery

x NSERC Collaborative Research and Development Grant, Ontario Centres of Excellence Target GHG Program. Landscape Carbon Accumulation through Reductions in Emissions (LCARE) developing

Montgomery, Jamie.MSc.Trophic ecologies of double crested cormorants and native piscivorous fishes in Lake Nipissing, Ontario. Laurentian University (Johnston/Gunn).

O'Neil, Kayla.MA. Nutrient Management in Forest Nutrient Planning. Trent University (Watmough)

Phathutshedzo, Molly Nethavhani.MSc.Geology.Geostatistical analysis and integration of soil chemistry data with remote sensing information in the Sudbury area, Ontario. Laurentian University (Spier).

Syeda Batool.MSc.Non industrial wood ash chemistry and its biogeochemical effects on sugar maple (*Acer Saccharum* Marsh.) in three central Ontario sugar bushes. Trent University (Watmough)

Vincent, Kyle.MSc.Weaving Indigenous knowledge and western science to investigate the impacts of railway on wildlife. Laurentian University (Litzgus/Popp)

Whitney, Jenna.MSc.Sediment and carbon fluxes in a permafrost floodplain, Blackstone River, Yukon, Arctic Canada. Laurentian University (Ielpi)

MSCom Major Research Papers/projects, Laurentian University

Chartrand, David.MSCom A systematic review: the science communication literature on biological evolution and informal learning.

de Faria, Ana.MSCom.The portrayal of wildfire in the Canadian media in the 1970s and early 1980s: How emotions and not science dictate the "good" or "bad" image.

Jiang, Gigi.MSCom.Skills, knowledge, and competencies prioritized by Canadian employers of science communication graduates.

Maitland, Mercedes.MSCom Who's talking about the evolutionary mismatch hypothesis? Investigating differences between the public health profession and popular media.

Mathioudakis, Yiorgio.MSCom Narrative structure in sci comm: How classical narrative structure provides insights into how we think and learn.

Reimer, Victoria.MSCom.The production of "Us vs. Them" dynamics in COVID-19 vaccine critical memes on Instagram.

Sheppard,Tabetha.

Ayoub, Natasha PhD Thesis Student, University of Waterloo (Swanson)
Britt, Meg. PhD Thesis Student, Laurentian University (Litzgus/Lougheed)
Chan Yam, Kelly. PhD Thesis Student, Laurentian University (Basiliko/Scott)
Choquette, Jonathan P/T PhD Thesis Student, Laurentian University (Litzgus/Pitcher)
Corcoran, Jason PhD Thesis Student, Laurentian University (Scott)
Fawcett, Claire. PhD Thesis Student, Laurentian University (Scott)
Freeman, Erika. PhD Thesis Student, University of Cambridge (Tanentzap/Emilson)
Gauthier, Miranda. PhD Thesis Student, Laurentian University (Scott)
Johnston, Caelan PhD Thesis Student, Queen's University (Arnott/Rusak)
Keevil, Matt. P/T PhD Thesis Student, Laurentian University (Litzgus)
Kirkwood, Adam. PhD Thesis Student, Laurentian University (Roy Léveillé/Basiliko)
Kontou, Danai. PhD Thesis Student, University of Cambridge (Tanentzap)
Lavigne, Jonathan PhD Thesis Student, Laurentian University (Basiliko/Beckett/Emilson)
Levasseur, Patrick. PhD Thesis Student, Trent University (Watmough)
Lockie, Jade. PhD Thesis Student, Laurentian University (Ielpi)
Munford, Kimber. PhD Thesis Student, University of Guelph (Glasauer/Mykytczuk)
Ngoma,

Chartrand,Derek.

McAuliffe, Cassidy- Communication Specialist, LU
McCourt, Jason Environmental Officer, MECP