# Dr. Heather Haig, BSc (Hons), MSc, PhD

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## Education

PhD Biology (January 2012- September 2018) University of Regina, Regina, Saskatchewan
- Thesis title: Analysis of lakewater isotopes in the Northern Great Plains: Insights from long-term monitoring and spatial surveys

MSc Biology (May 2009- May 2011) Queen's University, Kingston, Ontario
- Thesis title: Diatom-inferred changes in effective moisture from Gall Lake, Northwestern, Ontario, over the past two millennia

BSc Honours Biology (Sept 2005- May 2009) Queen's University
- Dean's honors list 2009

## Research Interests

Water quality; Hydrology, Natural and anthropogenic influences on aquatic systems; Drought variability; Environmental change; Climate change impacts on society; Paleolimnology.

## Career History

**Postdoctoral Researcher** *University of Regina, September 2018- present*
- Responsible for continuing research into the relationship between biogeochemical characteristic of lakes and their hydrological status
- Mentor current master's and undergraduate honours students studying biogeochemistry of lakes and streams in southern Saskatchewan

**Researcher** *J.D. Mollard and Associates March 2017 – Aug 2017*
- Compilation of biological and physical sediment data from multiple collaborators
- Aided in the organization and analysis of data for a technical report
- Retrieve sediment cores from multiple locations in Southern Indian Lake, MB

**National Socio-Environmental Synthesis Center (SESYNC)** *January 2015- April 2017*
**Fellow**
- Awarded a grant to conduct an integrative study of the relationship between governance and ecological surprise with 6 other prominent graduate students
- 2 peer reviewed publications, 4 conference abstracts accepted

**Acting Laboratory Manager** *University of Regina May 2014-2016*
- Managed undergraduate staff for three large scale >$50,000 projects
- Trained staff in scientific collection and analysis including: routine water sampling, zooplankton identification, chlorophyll extraction and spectroscopy techniques

**Long-Term Monitoring Assistant** *University of Regina May 2011-September 2011*
- Aided in biweekly stream sampling of 16 sites of both control and impacted sites
- Set up and sampled a stream urea degradation microcosm experiment
- Collected lake and stream YSI profiles, water, zooplankton, and isotope samples

**Limnology Field Assistant** *Queen's University Sept 2009-Sept 2010, ON*

- Demonstrator for Limnology and Aquatic Ecology field trips. Instructed sampling techniques for benthic invertebrates, sediments, zooplankton, and water chemistry
- Collected and dissected fish to survey mercury contamination
- Conducted sediment core collection for geochemical analysis of metal contamination
- Instructed foreign exchange students on limnological techniques as part of a field course at Queen's University Biology Station

**Lab Assistant** *Queen's University Sept 2008- May 2009, Kingston, ON*

- Processed and prioritized samples to be analyzed
- Identified and measured aquatic macroinvertebrates in a mesocosm study
- Entered data and transcribed field notes

**Field Assistant** *Queen's University May- Aug 2008, Dorset, ON*

- Modified ethanol preservation protocol in the field reducing post collection lab time and significantly reducing ethanol waste
- Public awareness campaign working with cottage association on *Bythotrephes* invasion
- Developed equipment for sampling, demonstrating the capacity to frequently troubleshoot and problem solve
- Collected light, dissolved oxygen, pH profiles, and chlorophyll samples

## Funded Research Projects

Water source identification of Big Quill Lake, SK, for evaluation of solute extraction under a changing climate, $24,939
Role: Post-doctoral fellow, co-writer
Funder: Natural Sciences and Engineering Research Council of Canada (NSERC)-Engage

## Published Manuscripts and Theses

Nicole M Hayes, **Heather A Haig**, Gavin L Simpson, Peter R Leavitt. Local and regional effects of lake warming on the seasonal risk of toxic cyanobacteria exposure Limnology and Oceanography Letters. (Submitted November 2019)

**Heather A Haig,** Nicole M Hayes, Gavin L. Simpson, Yi Yi, Bjoern Wissel, Kyle R. Hodder, Peter R. Leavitt. Relative importance of seasonal-, and interannual -scale, hydrological variability in a chain of seven sub-humid lakes measured using water isotopes ($\delta_2$H, $\delta_{18}$O). Journal of Hydrology. (Moderate revisions- Manuscript Number HYDROL32338)

**Heather A Haig**, Nicole M Hayes, Gavin L. Simpson, Yi Yi, Bjoern Wissel, Kyle R. Hodder, Peter R. Leavitt. 2019. Comparison of isotopic mass balance and instrumental techniques as estimates of basin hydrology in seven connected lakes over 12- years. Journal of Hydrology. DOI: 10.1016/j.hydroa.2019.100046

**Heather A Haig.** and Peter R Leavitt. 2019, The Qu'Appelle Long-Term Ecological Research Program: A 26-Yr Hierarchical Platform to Study Freshwater Ecosystems of the Northern Great Plains. Limnology and Oceanography Bulletin, 28: 99-103. DOI:10.1002/lob.10337

Jackie R. Webb, Peter R. Leavitt, Gavin L. Simpson, Helen Baulch, **Heather A. Haig**, Kyle R. Hodder, and Kerri Finlay.2019. Regulation of carbon dioxide and methane in small agricultural reservoirs: Optimizing potential for greenhouse gas uptake. Biogeosciences DOI:10.5194/bg-16-4211-2019.

Kenny E. Wallen, Karen Filbee-Dexter, Jeremy Pittman, Stephen Posner, Steven M. Alexander, Chelsie Romulo, Drew Bennett, Elizabeth Clark, Stella J.M. Cousins, Brad A. Dubik, Margaret Garcia, **Heather A Haig**, Elizabeth A. Koebele, Jiangxiao Qiu,, Ryan C. Richards, Celia C. Symons, Samuel C. Zipper. 2019. Integrating team science into interdisciplinary graduate education: an exploration of the SESYNC Graduate Pursuit. Journal of Environmental Studies and Sciences DOI:10.1007/s13412-019-00543-2

Nicole M. Hayes, Alain Patoine, **Heather A. Haig**, Gavin L. Simpson, Vanessa J. Swarbrick, Emma Wiik, and Peter R. Leavitt. 2019. Spatial and temporal variation in nitrogen fixation and its importance to phytoplankton in phosphorus-rich lakes. Freshwater Biology 64: 269–283. DOI: 10.1111/fwb.13214

**Heather A Haig**. 2019. Analysis of lakewater isotopes in the Northern Great Plains: Insights from long-term monitoring and spatial surveys. PhD University of Regina, SK

Emma Wiik, **Heather A Haig**, Nicole M. Hayes, Kerri Finlay, Gavin L. Simpson, Richard J. Vogt, Peter R. Leavitt. 2018. Generalized Additive Models of Climatic and Metabolic Controls of Subannual Variation in pCO2 in Productive Hardwater Lakes. Journal of Geophysical Research: Biogeosciences 123: 1940-1959. DOI : 10.1029/2018JG004506

Karen Filbee-Dexter, Celia C. Symons, Kristal Jones, **Heather A. Haig**, Jeremy Pittman, Steven M. Alexander, Matthew Burke. 2018. Quantifying ecological and social drivers of ecological surprise. Journal of Applied Ecology. DOI: 10.1111/1365-2664.13171

Hiroya Araie, Hideto Nakamura, Jaime L. Toney, **Heather A. Haig,** Julien Plancq, Takashi Shiratori, Peter R. Leavitt, Osamu Seki, Kenichiro Ishida, Ken Sawada, Iwane Suzuki, Yoshihiro Shiraiwa. Novel alkenone-producing strains of genera Isochrysis (Haptophyta) isolated from Canadian saline lakes show temperature sensitivity of alkenones and alkenoates. Organic Geochemistry 121: 89-103. DOI 10.1016/j.orggeochem.2018.04.008

Julien Plancq, Bianca Cavazzin, Steve Juggins**, Heather A. Haig**, Peter R. Leavitt, Jaime L. Toney. 2018. Environmental controls on the distribution of long-chain alkenones in the Canadian Prairies. Organic Geochemistry.117, 43-55. DOI 10.1016/j.orggeochem.2017.12.005.

Karen Filbee-Dexter, Jeremy Pittman, **Heather A. Haig**, Steven Alexander, Celia Symons, Matthias Bass, Matt Burke. 2017. Ecological Surprise: Concept, Synthesis, and Social Dimensions. Ecosphere. 8, 12, 1-12. DOI 10.1002/ecs2.2005.

Moumita Karmakar, Joshua Kurek, **Heather A. Haig**, Brian F. Cumming. 2014. Consensus among multiple trophic levels during high- and low-water stands over the last two millennia in a northwest Ontario lake. Quaternary Research. 81, 2, 251-259. DOI:10.1016/j.yqres.2013.12.006.

**Heather A. Haig**, Melanie V. Kingsbury, Peter R. Leavitt, Kathleen R. Laird, Brian F. Cumming. 2013. Assessment of drought over the past two millennia using near-shore sediment cores from a Canadian boreal lake. Journal of Paleolimnology. 50, 175-190, DOI 10.1007/s10933-013-9712-z

Kathleen R. Laird, **Heather A. Haig**, Susan Ma, Melanie V. Kingsbury, Thomas A. Brown, C.F. Michael Lewis, Robert J. Oglesby, Brian F Cumming. 2012. Expanded spatial extent of the Medieval Climatic Anomaly in lake-sediment records across the boreal region in northwest Ontario. Global Change Biology. 18, 2869–2881, DOI: 10.1111/j.1365-2486.2012.02740.x

**Heather A Haig**. 2011. Diatom-inferred changes in effective moisture from Gall Lake, northwestern, Ontario, over the past two millennia. MSc Queen's University Kingston, ON.

## Published Abstracts (*= primary presenter)

Jackie R. Webb, Kerri Finlay*, Peter R. Leavitt, Helen M. Baulch, Gavin L. Simpson, **Heather A. Haig,** Kyle R. Hodder. Greenhouse gas dynamics in small agricultural water bodies in the Northern Great Plains. Association for the Sciences of Limnology and Oceanography Aquatic Science. February 2019

Nathanael T. Bergbusch*, Zoraida J. Quiñones-Rivera, **Heather A. Haig**, Vanessa J. Swarbrick, Nicole M. Hayes, Peter R. Leavitt. Unintended effects of nitrogen-rich discharge from a tertiary wastewater treatment plant on primary producers in phosphorus-rich streams of the Northern Great Plains. Association for the Sciences of Limnology and Oceanography Aquatic Science. February 2019

Julien Plancq*., Bianca Cavazzin, Steve Juggins**, Heather A. Haig**, Peter R. Leavitt, Hiroya Araie, Hideto Nakamura, Yoshihiro Shiraiwa, Jillian M. Couto, Jaime L. Toney. Alkenone distribution and producers in Canadian lakes: Implications for palaeotemperature reconstructions. American Geophysical Union, Washington D.C. (USA), December 2018, Poster.

Mike M. Zwick*, Peter R. Leavitt, **Heather A. Haig,** Bianca Cavazzin, Jaime L. Toney. Long-chain diols of the Canadian Prairies – Occurrence and relationship with environmental parameters. Goldschmidt, Boston, MA, USA, August 2018. Poster.

Julien Plancq*., and Jaime L. Toney, Bianca Cavazzin, Steve Juggins**, Heather A. Haig**, Peter R. Leavitt, Hiroya Araie, Hideto Nakamura, Yoshihiro Shiraiwa, Jillian M. Couto. Alkenone

distribution and producers: insights from Canadian lakes. British Organic Geochemistry Society Meeting, Bristol (UK), July 2018. Oral.

Julien Plancq*., and Jaime L. Toney, Bianca Cavazzin, Steve Juggins**, Heather A. Haig**, Peter R. Leavitt, Hiroya Araie, Hideto Nakamura, Yoshihiro Shiraiwa, Jillian M. Couto. Distribution et producteurs d'alcénones lacustres: apports de l'étude de lacs canadiens. Réunion des Géochimistes Organiciens Français, Lyon, France, July 2018. Oral.

Peter R. Leavitt*, Helen M. Baulch, Nathanael Bergbush, Mathew J. Bogard, Lynda Bunting, Donald B. Donald, Donald B. Donald (Sr), Kerri Finlay, **Heather A. Haig**, Roland I. Hall, Nicole M. Hayes, Zoraida J. Quiñones-Rivera, Vanessa J. Swarbrick, Alain Patoine, James A. Rusak, Susanne McGowan, Gavin L. Simpson, Richard V. Vogt, Jackie R., Webb, Bjoern Wissel,. Coupled carbon and nitrogen biochemistry in productive hardwater lakes: insights from ass fluxes of gases, solutes and particles over 25 years. Association for the Sciences of Limnology and Oceanography Aquatic Science Meeting, Victoria, BC, Canada, June 2018. Oral.

Celia Symons*, Karen Filbee-Dexter, Kristal Jones, **Heather A. Haig**, Jeremy Pittman, Steven Alexander, Matt Burke. Quantifying the socio-ecological dynamics of ecological surprise in aquatic ecosystems reveals mismatch between management and ecological processes Association for the Sciences of Limnology and Oceanography Aquatic Science Meeting, Victoria, BC, Canada, June 2018. Oral

Judith Bjorndahl, Peter Leavitt, **Heather A. Haig**, Kerri Finlay*. 2018. Impact of climate-induced water level fluctuations on aquatic phototropic communities in Saskatchewan. Society Canadian Limnologists, Edmonton, AB, January 2018. Oral.

Julien Plancq*., Bianca Cavazzin, **Heather A. Haig**, Peter R. Leavitt, Jillian M. Couto, Jaime L. Toney. Environmental controls on the distribution of long-chain alkenones in the Canadian Prairies: Insights for the development of the lacustrine alkenone-based temperature proxy. Tsukuba Global Science Week, Tsukuba (Japan), September 2017. Invited talk.

Bianca Cavazzin*, Mike M. Zwick, **Heather A. Haig**, Peter R. Leavitt, Stephen Juggins, Emma Pearson, Stefan Schouten, Jaime L. Toney. Development of lacustrine biomarkers to reconstruct Late Holocene temperature change in the Saskatchewan Great Plains. Goldschmidt conference, Paris (France), August 2017. Poster.

Julien Plancq*, Bianca Cavazzin, **Heather A. Haig**, Peter R. Leavitt, Jillian M. Couto, Jaime L. Toney. Environmental controls on the distribution of long-chain alkenones in the Canadian Prairies: Insights for the development of the lacustrine alkenone-based temperature proxy. Goldschmidt conference, Paris (France), August 2017. Oral

**Heather A Haig***, Nicole M Hayes, Gavin L. Simpson, Kyle Hodder, Peter R. Leavitt. Quantifying the relative effects of climate and catchment controls upon isotopic mass balances in lakes of the North American Great Plains. Association for the Sciences of Limnology and Oceanography Aquatic Science Meeting, Honolulu, Hawaii, USA, February 2017, Oral.

Nicole M Hayes*, **Heather A Haig**, Gavin L. Simpson, Peter R. Leavitt. Climatic and urban control of the timing and magnitude of microcystin peaks in harwater eutrophic lakes. Association for the Sciences of Limnology and Oceanography Aquatic Science Meeting, Honolulu, Hawaii, USA, February 2017, Oral.

Julien Plancq*, Jaime L. Toney, **Heather A Haig,** Peter R. Leavitt. The ALKENoNE project: Developing the lacustrine alkenone-based temperature proxy. , Laboratoire de Géologie de Lyon, University Lyon 1 (France), February 2017. Invited talk.

Julien Plancq*, Jaime L. Toney, **Heather A Haig**, Peter R. Leavitt. Development of the alkenone-based temperature proxy: insights from lakes in the Canadian prairies. American Geophysical Union , San Francisco, USA, December 2016, Poster.

Bianca Cavazzin*, Emma Pearson, **Heather A Haig**, Peter Leavitt, Stefan Schouten, Jaime Toney. Application of lacustrine biomarkers to reconstruct Late Holocene temperature change in the Saskatchewan prairies. American Geophysical Union, San Francisco, December 2016

**Heather A Haig***, Gavin L. Simpson, Nicole M Hayes, Bjoern Wissel Peter R. Leavitt. Quantification of hydrological variability in riverine lakes using stable isotopes of water. Association for the Sciences of Limnology and Oceanography Aquatic Science Meeting, Santa Fe, New Mexico, USA, 2016, Oral.

Peter R. Leavitt*, **Heather A. Haig**, Emma Wiik, Kerri Finlay, Samantha V. Pham, Gavin L. Simpson, Bjoern Wissel, Brian F. Cumming, and Kathleen R. Laird. Spatial and temporal analysis of the role of headwater and saline lakes in atmospheric CO2 exchange. Association for the Sciences of Limnology and Oceanography Aquatic Science Meeting, Santa Fe, New Mexico, USA, 2016, Oral.

**Heather A Haig***, Celia Symons*, Jeremy Pittman, Karen Filbee-Dexter, Steven Alexander, Matthias Bass, Matt Burke. What drives surprise in socio-ecological systems? Association for the Sciences of Limnology and Oceanography Aquatic Science Meeting, Santa Fe, New Mexico, USA, 2016, Poster.

Shin'ie Hiro*, Hideto Nakamura, Ken Sawada, **Heather A Haig**, J. Toney, P. Leavitt, Suzuki Ishine, Yoshihiro Shiraiwa. Discovery and isolation of alkenone-synthetizing algal species of from Canada inland lakes. Meeting of Japanese Marine Biotechnology. 2016 Oral

*Celia Symons, Karen Filbee-Dexter, Steven Alexander, Matthias Bass, Matt Burke, **Heather A Haig**, Jeremy Pittman. Conceptualizing ecological surprise in social-ecological systems. Western Society of Naturalists, Sacramento, California, 2015, Poster

***Heather A Haig**, Bjoern Wissel, Gavin L Simpson, Peter R Leavitt. Mechanism of climate regulation of lake hydrology revealed by stable isotopes of water: Insights from decadal-scale landscape analysis**.** Association for the Sciences of Limnology and Oceanography Aquatic Science, Granada, Spain 2015, Oral

***Heather A Haig**, Richard V Vogt, Bjoern Wissel, Peter R Leavitt. Linking water isotopes to hydrological variability in a chain of Canadian lakes. Association for the Sciences of Limnology and Oceanography Aquatic Science, New Orleans, LA,USA, 2013, Oral

***Heather A Haig**, Melanie V Kingsbury, Kathleen R Laird, Brian F Cumming, Peter R Leavitt. Relative effects of wave-induced mixing, irradiance regime, and thermocline depth on the distribution of phytoplankton across a depth gradient. International Paleolimnolgy Symposium, Glasgow, Scotland, UK, 2012. Poster

Kathleen R Laird, ***Heather A Haig**, Susan Ma, Melanie Kingsbury, C.F. Michael Lewis, Robert J Oglesby, Brian F Cumming. Expanded spatial extent of the medieval climate anomaly revealed in lake-sediment records across the boreal region in northwest Ontario. International Paleolimnolgy Symposium, Glasgow, Scotland, UK, 2012. Poster

*Kathleen R Laird, **Heather A Haig**, Susan Ma, Melanie Kingsbury, C.F. Michael Lewis, Robert J Oglesby, Brian F Cumming. Expanded spatial extent of the medieval climate anomaly revealed in lake-sediment records across the boreal region in northwest Ontario. American Quaternary Association Conference Duluth, MN, USA, 2012. Poster

***Heather A Haig**, Melanie V Kingsbury, Kathleen R Laird, Brian F Cumming, Peter R Leavitt. Relative effects of wave-induced mixing, irradiance regime, and thermocline depth on the distribution of phytoplankton across a depth gradient: Implications for future global change. Society Canadian Limnologists, Moncton, NB, 2012. Oral

*Kathleen R Laird, **Heather A Haig**, Susan Ma, Melanie Kingsbury, C.F. Michael Lewis, Robert J Oglesby, Brian F Cumming. Medieval Climate Anomaly signal in sediment records from drainage lakes in the boreal region of northwestern Ontario. American Geophysical Union, San Francisco, CA, 2011. Poster

***Heather A Haig**, Robyn Laing, Melanie Kingsbury, Kathleen Laird, Brian Cumming. Shits in effective moisture based on diatom and chrysophyte assemblages in Gall Lake, northwestern, Ontario. Queen's University Limnology Seminar Series, Kingston, ON, 2011. Oral

***Heather A Haig**, Robyn Laing, Kathleen Laird, Melanie Kingsbury, Brian Cumming. Diatom- and chrysophyte-inferred changes in effective moisture over the past two millennia from northwestern Ontario, Canada. American Society of Limnology and Oceanography, San Juan, Puerto Rico, 2011. Poster

***Heather A Haig**, Robyn Laing, Melanie Kingsbury, Kathleen Laird, Brian Cumming. Large magnitude shifts in effective moisture based on diatom and chrysophyte assemblages in a climatically sensitive region of northwestern Ontario. Society Canadian Limnologists, Toronto, Ontario, 2011. Oral

***Heather A Haig**, Melanie Kingsbury, Kathleen Laird, Brian Cumming. Diatom inferred depth reconstructions from Gall Lake, Northwestern Ontario. Québec-Ontario *Paleolimnology* Symposium, Kingston, Ontario, 2010. Oral

## Awards

Over my tenure as a post-secondary student and while pursuing my post-graduate research my achievements have been acknowledged with a total of $161, 030 in awards. During my PhD specifically I was awarded ~140 thousand dollars in scholarship including the NSERC Alexander Graham Bell Canada Graduate Scholarship

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| 2016 | Saskatchewan Innovation Scholarship ($14,000) |
| 2016 | Edgar A. Wahn Scholarship ($5,000) |
| 2014 | NSERC Alexander Graham Bell Canada Graduate Scholarship ($70,000) |
| 2013 | Saskatchewan Innovation and Opportunity Scholarship ($10,000) |
| 2013 | Dean's Scholarship ($21,000) |
| 2013 | Graduate Studies Scholarship ($7,000) |
| 2012 | Graduate Student Travel Award ($500) |
| 2012 | Saskatchewan Innovation and Opportunity Scholarship ($8,000) |
| 2012 | Graduate Studies Scholarship ($7,000) |
| 2012 | Graduate Studies Scholarship ($7,000) |
| 2012 | Clemens-Rigler Travel Award ($275) |
| 2011 | Clemens-Rigler Travel Award ($500) |
| 2011 | Conference Travel Award ($200) |
| 2010 | Queen's Graduate Award ($6,000) |
| 2009 | Queen's Graduate Award ($8,600) |
| 2009 | Dean's honour list |
| 2005 | Queen Elizabeth II Aiming for the Top ($3,500) |
| 2005 | Queen's Admission Awards ($2,455) |

## Communication and Organization Abilities

**Communication**

- Successful writing, reporting and presentation of graduate research (e.g., 15 peer-reviewed publications, 30+ oral and poster presentations, 2 theses)
- Invited speaker at Pasqua and Sakimay First Nations council meetings
- CBC morning radio interview concerning Canada wide science fair (May 17th 2017), and the state of science in Canada (July 10th 2012)

**Community Service & Board Membership**

- Aided in the organization and outreach program to teach students about aquatic research at the treaty 4 gathering
- Elected vice president of communications for the University of Regina Graduate Students' Association (URGSA) 2015
- Graduate student member of Council Discipline Committee, Council Committee on Student Appeals, University Council, Faculty of Graduate Studies and Research Council, Vice President Research search committee, Strategic Research Plan Working Group
- Planning committee for Prairie University Biological Symposium (PUBS) 2014
- Elected graduate society social coordinator (Queen's University Biology) responsible for planning departmental events (100+ people) with budgets up to $4,000

## Technical Abilities

**Extensive Field Experience**

- Designed, managed, and executed Southern Saskatchewan survey of 107 lakes, collecting >3500 samples including water, sediment, phytoplankton, and zooplankton
- Aided in winter sampling under ice of saline lake respiration using isotopic techniques
- Collection, and deployment of nets (gill, seine) for fish sampling of littoral and pelagic species in isotopic and contaminant (Hg) studies
- Coordinated and conducted remote limnological sampling of ~30 Boreal Shield Lakes
- Night sample collection of zooplankton and water samples for experimental studies
- Proficient with a large range of aquatic sampling equipment: YSI- multiparameter probe, Secchi, seine nets, gill nets Swoffer gauge, Ekman dredge, Gravity and piston corers, Van Dorn, Schindler trap etc.

**Interpersonal and Teaching**

- International collaborations with University of Glasgow (Dr. Jamie Toney, Dr. Julien Plancq, Bianca Cavazzin, Mike Zwick), University of Tsukuba (Dr.Hiroya Araie), Portland State University (Dr. Angela Strecker), Cornell (Dr. Nelson Hairston Jr)
- Mentored students (3) during 4th year honors project
- Teaching Assistant for Data Management and Analysis, Community and Ecosystem Ecology, and Diversity of Life II, Introductory Biology I
- Guest Lectures in Environmental Biology (University of Regina), Limnology (University of Regina), and Environmental Science (Grade 10+11, William Derby, Strasbourg, SK)
- Initiated and collaborated to develop learning tools for Data Management and Analysis (e.g. online video tutorials, statistical manual)

**Data Management and Laboratory Skills**

- Design and manipulation of Microsoft Access databases for efficient management of data
- Competent with data entry using spreadsheets, statistical and word processing software
- Strong background in multivariate statistical analyses and experimental design
- Microscope expertise in identifying algae, zooplankton, and macroinvertebrates
- Proficient in the use of HPLC, UV visible spectrometry, Ring down spectrometry,

## Professional Development and Certifications

- MITACS-Foundations of Project Management II-2017
- MITACS-Essentials of Productive Teams-2015
- MITACS-Foundations of Project Management I-2015
- Standard First Aid and CPR A- updated 2017
- Workplace Hazardous Materials Information System (WHMIS)- last updated 2016
- Pleasure craft card- 2008
- ORCKA (Ontario Recreational Canoeing and Kayaking Association) basic canoeing- 2008
- PADI open water diver 2003