

# SAMANTHA MEHLTRETTER, PHD

## EDUCATION

- University of Guelph 2024  
**PhD in Water Resources Engineering**
- Dissertation: “Braiding Anishinaabe and Western Knowledges to Inform Restoration of Ancestral Manomin Fields on the Upper Winnipeg River”
  - Advisor: Dr. Andrea Bradford
  - Community Partner: Niisaachewan Anishinaabe Nation
- University of Guelph 2019  
**Master of Applied Science – Specialization in Engineering Education**
- Thesis: “Active Learning Strategies in Engineering Design Education – Student Learning, Professional Skill Development, and Perceptions”
  - Advisor: Dr. Andrea Bradford
- University of Guelph 2016  
**Bachelor of Engineering – Water Resources Engineering**
- Honors: Graduated with distinction

## PROFESSIONAL MEMBERSHIPS

Engineer in Training, Professional Engineers of Ontario (PEO) – application for full license submitted  
Society for Ecological Restoration

## EXPERIENCE

- GHD Ltd. Sept 2023 –  
July 2024  
**Intermediate Stream Restoration Engineer in Training**
- Collaborated on stream restoration design projects in the Greater Toronto Area.
  - Determined erosion hazard limits for new developments using stable top of slope and meander belt width analyses based on Toronto and Region Conservation Authority’s guidance documents.
  - Prepared proposals for stream realignment and erosion control design projects and secured over \$100,000 worth of project work for public sector clients.
  - Performed rapid geomorphic assessments, detailed geomorphic assessments, bank condition assessments, topographic surveys, and other field activities to inform conceptual and detailed design.
- University of Guelph, School of Engineering Sept 2019 –  
April 2024  
**Water Resources Researcher**
- Collaborated with Niisaachewan Anishinaabe Nation to investigate manomin (wild rice in English) decline on the Upper Winnipeg River due to settler environmental change.
  - Designed and led a multi-year field program to collect water & sediment quality samples, and conduct macrophyte surveys in remote open water marsh & fluvial environments in Treaty #3 Territory (currently known as Northwestern Ontario).
  - Coordinated field work travel & logistics, administration & budgeting, as well as hired, trained, & supervised student research assistants.
  - Used advanced statistical techniques and data analysis methods to quantify historic manomin decline due to hydroelectric dam development using Indicators of Hydrologic Alteration (IHA).

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- Braided Anishinaabe and Western knowledge systems to assess historic manomin decline, evaluate current fluvial/wetland habitat, and propose manomin restoration strategies.

University of Guelph, School of Engineering

### **Pedagogical Researcher**

- Designed two mixed-methods quasi-experimental studies to analyze the impact of course activities on student learning and professional skill development.
- Investigated the impact of peer assessment on deep learning and professional skills in a senior engineering design course using validated self-assessment scales, course grades, and student reflections.
- Analysed the impact of intentional professional skill instruction in a problem-based learning course on skill development by triangulating self, peer, and instructor evaluations.

**Jan 2018 –  
Aug 2019**

W. F. Baird & Associates Coastal Engineers Ltd.

### **Water & Coastal Engineer in Training**

- Collaborated on all phases of water resources and coastal engineering projects including proposal writing, site reconnaissance, data management & analysis, numerical modelling, report writing, permitting & environmental approvals, and community presentations.
- Completed a shoreline hazard assessment for a retirement community on Lake Ontario, proposed shoreline protection design solutions, engaged community members in a public meeting, and completed all permit applications.
- Critically analyzed over 60 hydraulic structures in Barbados, prepared design solutions to mitigate coastal flooding, and led the Environmental Management and Monitoring Plans.
- Developed and critically analyzed results of a hydrodynamic and sediment transport numerical model in HEC-RAS to evaluate flooding and sedimentation in Bayou Lafourche, a tributary off the Mississippi River in Louisiana, USA.
- Led and collaborated on numerous proposal submissions. Selected to travel to Belize to submit a \$700,000 proposal, in recognition for excellence in contributions to the proposal preparation and coordination of sub consultants.
- Created the Career Champions inter-office network, which aims to facilitate communication, training, and mentorship among all levels of staff. Personally responsible for launching the company's first mentorship program.
- Mentored senior engineering undergraduate capstone design projects, including leading site visits.

**Jan 2016 –  
Dec 2017**

University of Guelph, School of Engineering

### **Undergraduate Research Assistant**

- Collaborated with a PhD candidate to develop hydrological models for predicting sediment rating curves at ungauged sites using Artificial Neural Networks (ANN).
- Led data collection and management, completed modelling and analysis tasks, collaborated on disseminating research results in a peer-reviewed journal article.
- Provided writing feedback to PhD candidate (English was their second language).

**Apr 2015 –  
Dec 2015**

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### HONOURS AND AWARDS

NSERC Alexander Graham Bell Canada Graduate Scholarship - Doctoral	\$35,000/yr	May 2020 – May 2023
CEPS Dean’s Graduate Scholarship (Awarded twice)	\$3,500 x 2	Mar 2020 & Mar 2021
Higdale Farm Arthur and Rosemarie Spoerri Scholarship	\$10,000/yr	Sept 2019 – Sept 2021
Dean’s Tri-Council Scholarship	\$5,000/yr	May 2019 – May 2023
NSERC Canada Graduate Scholarship – Master’s	\$17,500	May 2019 – May 2020
Arthur D. Latornell Graduate Scholarship	\$5,000	Dec 2019
Ontario Graduate Scholarship (Awarded twice, declined in 2019 for NSERC Scholarship)	\$15,000	May 2018 – May 2020
Haessler Family Scholarship (Awarded twice)	\$5,000 x 2	Nov 2013 & Nov 2014
Andrew McMahon Standards of Excellence Award	\$2,665	Apr 2012

### PEER-REVIEWED PUBLICATIONS

- Mehltretter, S.,** Bradford, A., Longboat, S., and Luby, B. “In a Good Way: Braiding Indigenous and Western Knowledge Systems to Understand and Restore Freshwater Systems.” Submitted to *Water* (manuscript ID water-2899467).
- Mehltretter, S.,** Bradford, A., and Niisaachewan Anishinaabe Nation. “Learning from Manomin: Ecological Science,” in *Manomin: Past, Present, and Future* (Winnipeg: Manitoba Press, Fall 2024).
- Luby, B., Lehman, M., Bradford, A., **Mehltretter, S.,** and Mariotti, J. (Editors), A. *Manomin: Past, Present, and Future* (Winnipeg: Manitoba Press, Fall 2024).
- Mehltretter, S.,** Longboat, S., Luby, B., and Bradford, A. (2023) Indigenous and Western Knowledge: Bringing Diverse Understandings of Water Together in Practice (Technical Report), Global Commission on the Economics of Water, Paris. <https://watercommission.org/publication/indigenous-and-western-knowledge-bringing-diverse-understandings-of-water-together-in-practice/>
- Luby, B., **Mehltretter, S.,** Flewelling, R., Lehman, M., Goldhar, G., Patrick, E., Mariotti, J., Bradford, A., and Niisaachewan Anishinaabe Nation. (2021). Beyond Institutional Ethics: Anishinaabe Worldviews and the Development of a Culturally Sensitive Field Protocol for Aquatic Plant Research. *Water* 13, no. 5: 709. <https://doi.org/10.3390/w13050709>
- Mehltretter, S.,** Luby, B., Bradford, A., and Niisaachewan Anishinaabe Nation. (2020). Hydroelectric power and Anishinaabe diets: what oral testimony suggests about managing food (in)security. *Environment & Society Portal, Arcadia*, no.33. Rachel Carson Center for Environment and Society. <http://www.environmentandsociety.org/node/9112>.
- Mehltretter, S.,** and Bradford, A. (2020). Increasing student awareness of professionalism using the Professionalism Assessment Tool (PAT) in a senior undergraduate engineering design course. *Proceedings 2020 Canadian Engineering Education Association (CEEA-ACEG20) Conference*. Paper 171. Concordia and McGill Universities; June 18-21, 2020. <https://doi.org/10.24908/pceea.vi0.14202>.

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Atieh, M., **Mehltretter, S. L.**, Gharabaghi, B., and Rudra, R. (2015). Integrative neural networks model for prediction of sediment rating curve parameters for ungauged basins. *Journal of Hydrology*, 531, 1095–1107. <https://doi.org/10.1016/j.jhydrol.2015.11.008>

## CONFERENCES AND PRESENTATIONS

**Mehltretter, S.**, and Bradford, A. (2023). “The Manomin Spirit: Braiding Knowledges Systems from the Roots.” Oral Presentation at EcoSummit. Gold Coast, Australia; June 2023.

**Mehltretter, S.**, and Bradford, A. (2023). “The Manomin Spirit: Understanding Manomin’s Past through Archival, Hydrometric, and Indigenous Knowledge.” Poster at EcoSummit. Gold Coast, Australia; June 2023.

Bradford, A., and **Mehltretter, S.** (2023). “The Manomin Spirit: Restoration and Resilience.” Poster at EcoSummit. Gold Coast, Australia; June 2023.

**Mehltretter, S.**, Longboat, S., Luby, B., and Bradford, A. (2023). “Respectful Braiding of Indigenous and Western Knowledge Systems for Freshwater Ecosystem Restoration.” Oral Presentation at World Water Day 2023, *Accelerating Change*. University of Guelph, Guelph, Ontario; Mar 2023.

**Mehltretter, S.**, Bradford, A., Luby, B., and Niisaachewan Anishinaabe Nation. (2022). “Restoring Ecosystems to Increase Sustainable Food Production: A Case Study with Manomin (Wild Rice).” Oral Presentation at Institute of Food Technologists’ Conference, *Food Improved by Research Science and Technology*. Hybrid, hosted in Chicago, Illinois, USA, attended virtually; Jul 2022.  
**\* Finalist for the Graduate Student Oral Competition Sustainable Food Systems Division**

**Mehltretter, S.**, Bradford, A., Luby, B., and Niisaachewan Anishinaabe Nation. (2022). “Weaving Anishinaabe Knowledge and Western Science to Understand Historic Manomin Decline on the Upper Winnipeg River.” Oral Presentation at Canadian Water Resources Association Annual Conference. Canmore, AB; Jun 2022.

Anderson, K., **Mehltretter, S.**, Bressan, T., Donald, J., & Miller-Koren, F. (2022). Workshop 5: Exploring Indigenous Ways of Knowing in Engineering. Oral Presentation for Guelph Engineering Leadership Workshops 2021-22. Virtual, hosted by the University of Guelph; Feb 2022.

Bradford, A., and **Mehltretter, S.** (2021). “Differential teaching & learning to engage engineering students and stimulate sustainability mindset.” Oral Presentation at Canadian Engineering Education Association (CEEA-ACEG21) Conference. Virtual, hosted by the University of Prince Edward Island; June 2021.

**Mehltretter, S.**, Bradford, A., Luby, B., and Niisaachewan Anishinaabe Nation. (2020). “Weaving Anishinaabe Knowledge and Western Science to Understand Manomin Decline on the Upper Winnipeg River.” Latornell Student Symposium. Virtual; Nov 2020.  
**\* Student Spotlight Award**

**Mehltretter, S.**, Bradford, A., Luby, B., and Niisaachewan Anishinaabe Nation. (2019). “Integrating Indigenous Traditional Knowledge and Scientific Understanding to Assess the Impacts of Settler-Imposed Environmental Change on the Upper Winnipeg River’s Wild Rice (Manomin) Productivity.” Oral Presentation at Canadian Water Resources Association Annual Conference. Collingwood, ON; Jun 2019.

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- Luby, B., **Mehltretter, S.**, Bradford, A., and Niisaachewan Anishinaabe Nation. (2019). “Defining and Challenging Loss: Community Alliance as a Response to Wild Rice (manomin) Crop Destruction on the Winnipeg River.” Oral Presentation at McGill University’s *Loss: A Symposium*; May 2019.
- Mehltretter, S.**, and Bradford, A. (2019). “Teaching and Assessing Teamwork in a Problem-Based Learning Course.” Teaching and Learning Innovations Conference, University of Guelph; Apr 2019.
- Bradford, A. and **Mehltretter, S.** (2019). “Fostering and Assessing Professionalism in a Problem-Based Learning Course.” Oral Presentation at Teaching and Learning Innovations Conference, University of Guelph; Apr 2019.
- Luby, B., **Mehltretter, S.**, Bradford, A., and Niisaachewan Anishinaabe Nation. (2019). “Community-led Active Research in the Fight for Anishinaabe Food Sovereignty in the Winnipeg River Drainage Basin.” Oral Presentation at the American Society of Environmental History. Columbus, Ohio, USA; Apr 2019.
- Mehltretter, S.**, Bradford, A., Luby, B., and Niisaachewan Anishinaabe Nation. (2018). “Environmental Flow Assessment of the Winnipeg River for Wild Rice Crop Growth in the Ochiichagwe’ Babigo’ IningOjibway Nation.” Poster at the Natural Channel Systems Conference. University of Guelph, Guelph, Ontario; May 2018.
- Donald, J., and **Mehltretter, S.** (2018). “Creating Engaging Video Content to Support Curriculum Delivery.” Oral Presentation at the Canadian Engineering Education Association (CEEA-ACEG) Conference. Vancouver, BC; May 2018.
- Mehltretter, S.** (2016). “Increasing water resilience for coastal watersheds in Barbados.” Oral Presentation at the Young Coastal Scientists and Engineers Conference. Queen’s University, Kingston, ON; Jun 2016.
- Mehltretter, S.**, Atieh, M., Gharabaghi, B., and Rudra, R. (2015). “Artificial Neural Networks (ANN) Model for Prediction of Sediment Rating Curves (SRC) and Sediment Duration Curves (SDC) at Ungauged Sites.” Poster at the College of Engineering and Physical Sciences Undergraduate Student Research Poster Presentation. University of Guelph, Guelph, Ontario; Jul 2015.
- \* **Engineering Division Award**

## TEACHING & COURSE DESIGN

Dalhousie University, Faculty of Engineering

### **Guest Lecturer – Engineering Hydrology**

**Feb 2023**

- Invited to lecture on Coastal Hydrology and Flood Processes for a senior civil and resources engineering course.
- Created a lecture based on a coastal flooding design problem and explained relevant processes within the context of engineering design.

University of Guelph, School of Engineering

### **Specialized Teaching Assistant – Introduction to Environmental Engineering**

**Fall 2020 &  
2021**

- Co-designed and delivered seminars in a brand-new course on various topics like human impacts on the Great Lakes, environmental legislation, environmental disasters, environmental impact assessments.
- Delivered and assessed labs on geospatial and temporal data analysis, air pollution, noise pollution, and measuring hydraulic conductivity.

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- Developed seminar assignments and evaluated student work. All material was delivered online in 2020 and adapted for in-person delivery in 2021.

University of Guelph, School of Engineering

**Specialized Teaching Assistant – Engineering & Design III**

**Winter 2018,  
2019, 2020,  
& 2021**

- Collaboratively taught third year engineering students from all disciplines about problem solving and the design process using a problem-based learning model.
- Evaluated and provided written and oral feedback on course deliverables (proposal, design reports, memorandums, & presentation).
- Designed and delivered lab activities to help students develop professional skills (professionalism, teamwork, and lifelong learning), including course reflections.
- Designed and administered several graduate attribute assessments and created a design competencies evaluation tool for the teaching team.
- Created instructional videos to support transition to online learning in response to the COVID-19 pandemic.

University of Guelph, School of Engineering

**Guest Lecturer – Engineering & Design III**

**Winter 2018,  
2019, & 2020**

- Developed and delivered a series of lectures on teamwork, collaboration, leadership, and conflict resolution to a class of ~400 students.
- Included short activities and used interactive presentation software (e.g. Mentimeter) to reinforce concepts and keep students engaged.

University of Guelph, Multimedia Instructional Development Studio

**Faculty Educator and Research Assistant**

**Jan 2018 –  
Aug 2018**

- Developed multimedia content exemplars for faculty interested in including videos for flipped classrooms.
- Designed and delivered faculty training workshops on developing effective multimedia content for post-secondary courses.

University of Guelph, School of Engineering

**Graduate Teaching Assistant – Fluid Mechanics**

**Sep 2018 –  
Dec 2018**

- Delivered active learning style tutorials where students collaborated in small groups to solve fluid mechanics problems.
- Used questioning and probing to help students arrive at the solution themselves rather than giving them the answers.

University of Guelph, School of Engineering

**Guest Lecturer – Stream & Wetland Restoration**

**Feb 2018**

- Invited to deliver an 80min lecture on **Fluvial Geomorphology** to a graduate class.
- Drew upon knowledge and experience from industry, including using particle tracking videos from experience at W.F. Baird & Associates (with permission) to visualize sediment transport concepts

University of Guelph, Student Experience

**Engineering Peer Helper**

**Sep 2014 –  
Dec 2015**

- Facilitated group problem solving sessions for undergraduate engineering students in Mechanics I & Fluid Mechanics.
- Conducted 1-on-1 consultations to assist students with learning skills, study skills, and time management.
- Delivered midterm and final exam review sessions for problem solving courses.

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Queen's University, Engineering Society

### **Director of First Year**

- Advised and supported over 600 first year engineering students by creating and implementing programs for academic, personal, and professional growth.
- Sent weekly emails with available resources and upcoming events.
- Mentored and supervised over 50 student leaders.

**Mar 2012 –  
Feb 2013**

## CURRICULUM DEVELOPMENT

University of Guelph, School of Engineering

### **Graduate Attribute Faculty Panel – Individual & Team Work**

- Collaborated with faculty to improve the Individual and Team Work graduate attribute curriculum for the undergraduate engineering programs.
- Identified gaps in data collection, advised where in the curriculum Individual Team Work should be taught and assessed in the programs.
- Personally responsible for discussing how Individual & Team Work will be taught and assessed in the design core (Engineering & Design I through IV).

**Summer  
2019 & 2020**

University of Guelph, School of Engineering

### **Graduate Attribute Committee**

- Collaborated with faculty to determine appropriate graduate attribute indicators for the 2018 revisions.
- Engaged in discussions regarding what aspects of different attributes should be emphasized, and how they should be evaluated to ensure engineering graduates have attained the Canadian Engineering Accreditation Board's 12 graduate attributes.

**Fall 2018 &  
Winter 2019**

University of Guelph, School of Engineering

### **Water Resources and Environmental Engineering Curriculum Development**

- Provided insight as a recent graduate of the Water Resources Engineering B.Eng program for improvements to the curriculum.
- Collaborated with faculty in the Water and Environmental area to consider where certain courses should be offered, where there may be overlap in course content, and where relevant content is missing.

**Winter 2018**

## VOLUNTEER

University of Guelph, Student Wellness

### **Graduate Student Support Circle Facilitator**

- Facilitated virtual peer support groups for graduate students.
- Collaborated with facilitator team to schedule and plan 10-week programs.

**Feb 2021 –  
May 2023**

Big Brother's Big Sisters Guelph

### **Go Girls & Play On Mentor**

- Led 7-week programs for Grade 5 - 8 female students to provide a safe space for them to engage in fun games, have meaningful discussions, and build self-esteem.

**Sep 2018 –  
June 2020**

St. Mildred's-Lightbourn School

### **FIRST LEGO League Mentor**

- Mentored Grade 6 & 7 students on their FIRST LEGO League project, which required students to identify a water issue and create an innovative solution.

**Sep 2017 –  
Dec 2017**