



CHEMISTRY/PHYSICS SEMINAR SERIES

Helene Engler, Ph.D Candidate

University of Edinburgh & Placement Student, Trent University

Wednesday, November 19th, 2025

11:00 a.m. to 11:50 a.m. in ENW 115

Manganese cycling and mobility in Scottish reservoir systems

ABSTRACT

Excess concentrations of the naturally occurring trace metal manganese (Mn) are a growing challenge for drinking water quality worldwide. My PhD research seeks to enhance our comprehensive understanding of Mn behaviour in Scottish reservoirs and their catchments, focusing on predicting seasonal release events and assessing climate change impacts.

Guided by our analysis of nationwide water quality data from Scottish public drinking water sources spanning over 10 years, combined with geospatial analysis of their catchment parameters, we focus our investigation on two reservoirs with regularly elevated Mn levels.

High-resolution elemental and soil analyses, combined with LiDAR-based mapping, demonstrate how the organic rich catchment soils supply Mn to the reservoirs. High-frequency water quality sensors and vertical water column metal profiling are used within the water column to examine the physicochemical processes driving Mn cycling throughout the year. Seasonal stratification and redox shifts trigger Mn release, with sediment–water interface processes playing a critical role. The oxidation state of sediment metals and the influence of organic matter on Mn mobility are further explored using advanced techniques such as X-ray Photoelectron Spectroscopy (XPS) and Fourier Transform Ion Cyclotron Resonance Mass Spectrometry (FT-ICR-MS).

BIOGRAPHY

Helene Engler

Helene Engler is a third-year PhD candidate in the School of Geosciences at the University of Edinburgh (UK). She holds a BSc in Environmental and Ecological Sciences, also from Edinburgh. Her doctoral research focuses on understanding manganese (Mn) mobility and cycling in Scottish reservoirs and their catchments. Her PhD is supervised by Prof. Margaret Graham, Dr. James Watt, and Dr. Nicholle Belle (University of Edinburgh) in collaboration with Graham Moore from Scottish Water. The project is jointly funded by Scottish Water and the Engineering and Physical Sciences Research Council (EPSRC). Helene is currently a recipient of the IIES Queen Elizabeth Scholarship, which supports her placement at Trent University in Canada. Here, she is working with Prof. Andrew Vreugdenhil and his research group, applying advanced surface characterization techniques to investigate Mn speciation in sediments. She is also conducting a littoral sediment incubation experiment to better understand Mn release under varying environmental conditions. Her research integrates geochemical analysis, field sampling and long-term dataset collection, and collaborative industry partnerships to address pressing challenges in freshwater quality and biogeochemistry.