The UNIVERSITY CONSORTIUM

Dr. Colby Steelman

Research Associate

- Hydrogeophysics, geophysics and hydrogeology
- Geophysical characterization of groundwater flow systems
- Imaging of hydrodynamics, landform architecture, and geologic structures
- Source water protection and management
- Water resource assessment and monitoring

Dr. Steelman's research focuses on the dynamic processes of groundwater flow systems through the integration of multi-dimensional and multi-scaled hydrogeophysical measurements. Specific interests include novel inter-disciplinary hydrogeophysical characterization and monitoring techniques from air, surface and boreholes that improve understandings of processes from the pore to regional-scale. Recently, he is exploring geophysical techniques that support regional-scale groundwater resource characterization, and how these styles of data can be integrated into high-resolution temporal monitoring networks.

He has made significant advancements in geophysical imaging techniques using ground-penetrating radar, electrical resistivity, electromagnetic induction, and seismic, in combination with direct hydrogeologic observations to better understand the parameters and processes that define complex groundwater flow systems across scales include critical zones. His research utilizes a combination of field-based geophysical, hydrogeological, and geological information in the context of local to regional-scale groundwater flow systems to better understand the complex relationship between anthropogenic and natural groundwater processes.

Selected Papers (2015-2018)

Steelman, C.M., E. Arnaud, P. Pehme, and B.L. Parker (2018), Geophysical, geological and hydrogeological characterization of a tributary buried bedrock valley in southern Ontario. *Canadian Journal of Earth Sciences 00, 00 – 00 doi:* 10.1139/cjes-2016-0120, published on-line May 11, 2017

Steelman, C.M., D.R. Klazinga, A.G. Cahill, A.L. Endres, and B.L. Parker (2017), Monitoring the evolution and migration of a methane gas plume in an unconfined sandy aquifer using time-lapse GPR and ERT. *Journal of Contaminant Hydrology*, 205, 12 – 24, *http://dx.doi.org/10.1016/j.jconhyd.2017.08.011*

Steelman, C.M., C.S. Kennedy, D. Capes, and B.L. Parker (2017), Electrical resistivity dynamics beneath a fractured sedimentary bedrock riverbed in response to temperature and groundwater/surface water exchange. *Hydrology & Earth System Science, 21, 3105 – 3123, http://doi.org/10.5194/hess-21-3105-2017*

Steelman, C.M., J. Meyer, and B.L. Parker (2017), Multi-dimensional investigation of bedrock heterogeneity/unconformities at a DNAPL-impacted site. *Groundwater Epub 2017 Apr 12, doi:* 10.1111/gwat.12514

Cahill, A.G., **C.M. Steelman**, O. Forde, O. Kuloyo, E. Ruff, B. Mayer, K.U. Mayer, M. Strous, M.C. Ryan, J.A. Cherry and B.L. Parker (2017), Mobility and persistence of methane in groundwater in a controlled release field experiment. *Nature Geoscience, 10(4) 289+, doi:10.1038/NGEO2919*

Steelman, C.M., B.L. Parker and C.S. Kennedy (2015), Evaluating local-scale anisotropy and heterogeneity in a fractured bedrock riverbed using EM azimuthal resistivity and ground penetrating radar. *Journal of Applied Geophysics* 116, 156 – 166, doi: 10.1016/j.jappgeo.2015.03.003

Steelman, C.M., C.S. Kennedy and B.L. Parker. (2015), Geophysical conceptualization of a fractured sedimentary bedrock riverbed using ground-penetrating radar and induced electrical conductivity. *Journal of Hydrology* 521, 433 – 446, doi: 10.1016/j.jhydrol.2014.12.001