Vita

Candidate's name: Julia Rae Howland

Universities Attended:

University of New Brunswick (2014)
Bachelors of Science

University of New Brunswick (2019)
Masters of Science
Biology

Publications / Conference Presentations:

Howland, J. R., Alexander, A. C., Milani, D., Culp, J. M., & Peru, K. M. (2019). Risks of mixtures of oil sands contaminants to a sensitive mayfly sentinel, *Hexagenia*. Diversity, 11(8): 118; https://doi.org/10.3390/d11080118.

Howland, J. R., Alexander, A. C., Milani, D., Culp, J. M., & Peru, K. M. (2019). Effects of oil sands process water mixtures on the mayfly Hexagenia and field-collected aquatic macroinvertebrate communities. Ecotoxicology, 28(6): 658-668 https://doi.org/10.1007/s10646-019-02061-x.

Howland, J. R., Alexander, A. C., Culp, J. M. (2018). Toxicity of oil sands process water component, sodium naphthenate, to mayfly*Hexagenia* (Ephemeroptera: Ephemeridae). *In* Proceedings of the Society of Freshwater Science Annual Meeting. May 20-24, 2018. Detroit, MI.

Howland, J. R., Alexander, A. C., Culp, J. M. (2018). Toxicity of oil sands process water component, sodium naphthenate, to mayfly*Hexagenia* (Ephemeroptera: Ephemeridae). In proceedings of the University of New Brunswick 25th Annual Graduate Research Conference. March 23, 2018. Fredericton, NB.

Acute and chronic effects of oil sands process water components on the mayfly Hexagenia and field-collected aquatic macroinvertebrate communities

UNIVERSITY OF NEW BRUNSWICK

THESIS DEFENCE AND EXAMINATION

in Partial Fulfillment

of the Requirement for the Degree of
Master of Science

by

Julia R. Howland

in the Department of Biology

U.N.B., Fredericton, N.B.

Tuesday, August 13th, 2019
10:00 a.m.

Bailey Hall, Room 27

Examining Committee

Dr. Joseph Culp & Alexa Alexander-Trusiak	Co-Supervisors
Dr. Amy Parachnowitsch	Internal Examiner
Dr. Michelle Gray	External Examiner
Dr. Les Cwynar	Chair of Oral Examination

Abstract

Tailings ponds in northeastern Alberta, Canada contain massive amounts of oil sands process water (OSPW) that cannot currently be released due to toxicity of some components. Limited space and the need for reclamation of oil sands operation sites necessitates release of OSPW in the near future. Knowledge of the composition and toxicity of OSPW is often lacking yet is crucial for both risk assessment and management planning. This thesis examines the acute and chronic toxicity of environmentally relevant 10:1 mixtures of two process water components, naphthenic acid and sodium naphthenate, with and without the added stress of polycyclic aromatic hydrocarbon spiked sediment. We assess the effects of these simplified oil sands process water (OSPW) mixtures under planned and un-planned tailings release scenarios using traditional and novel bioindicators for aquatic invertebrate taxa. The results of this study demonstrate the significant negative effects of OSPW contaminants on aquatic communities.