



**University  
of Victoria**

Graduate Studies

Notice of the Final Oral Examination  
for the Degree of Master of Science

of

**JEREMY KROGH**

BSc (University of Victoria, 2014)

**“Dissolved Oxygen and Carbon Dynamics in a High-Energy Coastal  
Environment near Victoria BC’s Untreated Municipal Sewage Outfalls”**

School of Earth and Ocean Sciences

Wednesday, April 12, 2017

10:00 A.M.

Bob Wright Centre

Room A319

Supervisory Committee:

Dr. Roberta Hamme, School of Earth and Ocean Sciences, University of Victoria (Co-Supervisor)

Dr. Debby Ianson, School of Earth and Ocean Sciences, UVic (Co-Supervisor)

Dr. Kenneth Denman, School of Earth and Ocean Sciences, UVic (Member)

Mr. Christopher Lowe, Marine Program, Capital Regional District

External Examiner:

Dr. Sophie Johannessen, Science Staff, Institute of Ocean Sciences

Chair of Oral Examination:

Dr. Justin Albert, Department of Physics and Astronomy, UVic

Dr. David Capson, Dean, Faculty of Graduate Studies

## **Abstract**

Wastewater disposal often has deleterious impacts on the receiving environment. Low levels of dissolved oxygen are of particular concern. Here I investigate the impacts on dissolved oxygen and carbon chemistry of screened municipal wastewater in the marine waters off Victoria BC Canada. I analyzed data from a series of undersea moorings, ship-based monitoring, and underwater remote operated vehicle video, and used these observations to construct a two-layer box model of the nearfield receiving environment. Despite the lack of more advanced treatment, I find that dissolved oxygen levels near the outfalls are well above the commonly used  $63 \mu\text{mol kg}^{-1}$  hypoxic threshold and that the outfalls' impact on water column oxygen is likely less than a few  $\mu\text{mol kg}^{-1}$ . Likewise, dissolved inorganic carbon is not elevated and pH not depressed. Strong tidal currents, cold water temperatures, and the light limited nature of the marine environment surrounding Victoria give these waters a high assimilative capacity for organic waste.