An integrated water quality forecasting model to restrict the harvesting of shellfish following extreme weather events

Charity Mouland[1], Timothy Webster[2], Ian Spooner[1], and Nathan Crowell[2] - *1. Department of Earth and Environmental Sciences, Acadia University, Wolfville, Nova Scotia B4P 2R6, Canada <116282m@acadiau.ca> ¶ 2. Applied Geomatics Research Group, Nova Scotia Community College, Middleton, Nova Scotia B0S 1M0, Canada*

Prince Edward Island (PEI) is well known for its thriving agriculture industry and is also host to one of Canada's largest estuarine shellfish industries. Designated areas for shellfish cultivation exist near the confluence of the Orwell, Seal and Vernon rivers, eastern PEI. Licensed species being farmed include the Blue Mussel, *Mytilus edulis*, Eastern Oyster, *Crassostrea* virginica and Soft- Shell Clam, *Mya arenaria* all of which are filter feeders. The contamination of shellfish aquaculture sites by fecal coliforms is strongly correlated with runoff from livestock farms during severe rainstorms. A more accurate system of forecasting nearshore fecal coliform concentrations under varying environmental conditions is required to strategically and effectively manage shellfish operations. A combination of topographical, hydrological, hydrodynamic and meteorological factors and associated processes affect the microbial quality of these waterways and need to be considered when developing an effective forecasting tool. In this study, Geographic Information Systems (GIS) as well as a fluvial and estuarine modeling platform are used to simulate processes related to fecal coliform growth and decay. These complex models required the input of many continuous variables (field measurements) in order to accurately simulate the transport and fate of fecal coliforms. The three rivers were flow gauged during the 2012–2013 field season and stream rating curves were established. Two barometric pressure sensors and a weather station were also installed in the watershed. Water samples taken during the study period indicate a significant relationship between high fecal coliform concentrations and high stream discharge in the three rivers. Drive-by surveys, in addition to air photo interpretation, indicate many agricultural point sources of pollution in the watershed. Modeling scenarios will be calibrated to reflect these results and a precipitation driven forecasting tool will be developed which will provide a model of the spatial extent of contamination. Effective forecasting will promote the strategic management of aquatic resources while reducing closures and revenue loss.

Atlantic Geology, 2014, Volume 50, Number 1
Atlantic Geoscience Society Abstracts: 40th Annual Colloquium & Annual General Meeting 2014
doi: 10.4138/atlgeol.2014003