

Impact of regional geology on water quality in the Cumberland Marsh Region, Canada

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The Cumberland Marsh Region, located on the coast of the Bay of Fundy, is a major feeding ground for waterfowl and contains significant coastal wetland systems. At this site there is concern over the mobility and toxicity of metals in lake sediments and management practices that may influence these processes. Metals are partitioned amongst soluble phases, suspended and bottom sediments and biota in lake systems. Metals have strong affinities for particulate organic matter, necessitating the study the factors that influence in-lake productivity including nutrients sources and pathways to better understand the capability of lake sediment to sequester metals.

This study focusses on evaluating nitrogen and phosphorous in both surface and ground water. A three-month study was carried out near the Beuabassin Research Centre that included collection and analysis of surface and ground water samples, identification of natural and anthropogenic sources, and consideration of the influences of regional geology and geomorphology. The water quality analyses were conducted weekly on eleven surface water sites and a groundwater site using the persulfate and acid persulfate digestion method. Water chemistry parameters were measured in conjunction with sample collection. Preliminary results indicate the impact of regional sources on the sampled wetland sites is relatively small, and phosphorus loading is primarily autochthonous. This has been supported by low nitrogen readings at all sites with little seasonal variation, and higher (eutrophic) phosphorus levels that fluctuate without external input. Although land use may not be an important contributor to nitrogen levels in surface water, a spike in ground water levels suggest that significant anthropogenic sources exist.

Future research will include an investigation of the associations between water quality and chemistry parameters with strata, geomorphology, land use and time. Conclusions will be made on the nature of nutrient cycling and loading within these systems, and what geological variables affect them.