

Examination of trace metals in gastropods to determine the potential for accumulation in the Border Marsh Region

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The Border Marsh Region (BMR), located on the Isthmus of Chignecto at the head of the Bay of Fundy, is a major feeding ground for waterfowl and contains significant coastal wetland systems including salt marshes, ponds, lakes, and impoundments created by Ducks Unlimited Canada. The purpose of this study was to examine various open water wetland sites across the BMR to explore the potential for bioaccumulation of Pb and As in higher-trophic level species through natural and anthropogenic sources. Gastropods were chosen to sample as vectors for metal transfer to waterfowl because they are effective indicators of metal accumulation and are an important food source for breeding birds. A previous study indicated significant lead and arsenic concentrations in bottom sediments at most wetland sites. It was hypothesized that gastropods would accumulate these metals in similar concentrations to the sediments. Eleven sites (two natural brackish ponds, eight freshwater impoundments and one natural freshwater lake) were sampled and element concentrations in gastropods were analyzed using an XRF spectrometer. Relative levels of metals in gastropods were analyzed, without removing small debris, and compared to sediment concentrations. Preliminary analysis indicates there were no significant correlations between lead and arsenic concentrations in sediment and gastropods. Although metal concentrations in gastropods were not toxic, there were three important observations: (1) greatest proportions of lead and arsenic concentrations in gastropods to sediment were detected in the natural brackish ponds; (2) arsenic was detected in gastropods from all sites whereas lead was only detected in gastropods from the brackish ponds and the freshwater lake; and (3) arsenic concentrations in gastropods were higher in recently constructed freshwater impoundments. The results of this study indicate that the salinity and redox properties of the wetlands, rather than concentration in sediments, may be the critical factors in determining whether lead and arsenic will bioaccumulate in gastropods.