Investigation of Phosphorus Deposition in Mount Hope Bay from Freshwater Inputs

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The importance of elemental phosphorus (P) bioavailability as a limiting nutrient within marine biological cycles has recently been refocused to quantifying the sources and sedimentary sinks within estuarine environments. Sedimentary P is an ecologically conserved critical nutrient for successful plant growth but can lead to eutrophication on the release of high anthropogenic concentrations. This study encompassed the environmentally exposed Mount Hope Bay (MHB) watershed spanning Rhode Island and Massachusetts state lines. MHB watershed is fed by four freshwater inputs (Taunton, Lee, Cole, and Kickemuit rivers) exiting out through the East Passage and the Sakonnet River to the Atlantic Ocean. Twenty-four surface (~5cm) sedimentary sampling sites were investigated across the watershed. The concentrations of nutrients (PO_4^{3-}, NO_3^-, NO_2^-, NH_4^+) were evaluated using Hach® spectrocolormeteric tests, using various chemical extraction methods: Total P (TP) (Koroleff 1983), Inorganic P (Ruttenberg 1992), Water Soluble Phosphorus (WSP), Readily Desorbable Phosphorus (RDP), Algal Available Phosphorus (AAP), and Bicarbonate Extractable Phosphorus (Olsen-P), (Zhou. *et al*). Confirmatory evidence for the presence of orthophosphate in extracts was also shown by P31 nuclear magnetic resonance. Each of these sites was further characterized by its carbon and carbonate content, granular size, pH, orp, salinity and acid extractable metals. This research demonstrated the various extraction techniques followed the same phosphorus content profile with an increasing concentration gradient transect from the river's source to the river's mouth paralleling increasing salinity.

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