

Grain size analysis of sediments from the surrounding cliffs of the Minas Basin, Nova Scotia, Canada

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The Minas Basin of the Bay of Fundy in Nova Scotia is a dynamic macro-tidal system providing great potential for harnessing tidal power. Tidal power extraction would affect flow speeds, which in turn may alter sediment size on the seabed. Because sediment size is a fundamental determinant of benthic community structure, extraction of energy could affect habitats in the Basin. A previous study indicated that the sediment distribution within the Bay of Fundy is not in equilibrium with the maximum tidal bed shear stress. Based on comparison of stresses predicted by a 3-D ocean circulation model and measured sediment sizes, the study showed that the competent mean grain sizes within the Bay of Fundy are generally coarser than observed mean grain sizes; suggesting that bed shear stress is not the dominant determinant of sediment texture in the Bay of Fundy. My work will examine an alternate hypothesis that seabed sediment texture of the Minas Basin is determined by the texture of sediments entering the basin through erosion of the surrounding cliffs, and not by local seabed stresses exerted by tidal currents. The objectives of this study are to (1) determine the grain size distribution of eroding cliffs based on rock type and (2) compare the mean grain sizes to those found within the Basin. To test this hypothesis, samples of bedrock, unconsolidated beach sediments, and till (N = 54, 29, and 7, respectively) were collected from four locations around the Minas Basin and compared to seabed samples collected from the Basin (N = 161) by others. If the grain sizes of eroding cliffs and tills are similar to the grain sizes in the Basin, then it is unlikely that changes in energy caused by in-stream tidal turbines would have a large effect on the size of sediments in the Basin.