EFFECTS OF REGULARLY REVERSING ENERGY GRADIENTS ON SEDIMENT TRANSPORT IN A TIDAL WETLAND SYSTEM

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Abstract Increased awareness of the importance of biological diversity has resulted in a marked increase in the number of tidal wetland restoration projects around the country. As part of the design of these wetland systems, engineers often have to consider the net sediment transport potential, and its effects on erosion and deposition, in the channels that run through these wetlands. This aspect of design is significantly more complicated in a tidal wetland channel than it is in a typical fluvial channel due to the constantly changing, and reversing, energy gradients that result from the rise and fall of the tides.

Initial work on this topic is taking place under the U.S. Army Corps of Engineers' (Corps) System Wide Water Resources (research) Program. Specifically, the Corps is studying the hydraulic processes and geomorphic relationships that are found in tidal wetland channels. Tidal wetland systems at four sites in coastal New England are being studied. As of January, 2006 data had been collected from four channels in those wetland systems, with data collection focusing on planform and hydraulic geometry data, changing water depths, and velocity profiles at various locations in the channels.

Preliminary results show the hydraulics of the particular channels studied are not dominated by traditional long-wave tidal hydraulics but are instead driven by differences in hydraulic head. Data presented in the paper include plots showing how water level, mean channel velocity, energy gradient, and bed shear stress change throughout a flood-ebb tidal cycle.

Tidal wetland in Seabrook, New Hampshire