

An In-Flood Monitoring System for Bedload Sediment in a Restored Riffle-Pool Morphology

Chris Muirhead, Bruce MacVicar
University of Waterloo, Waterloo, Canada

Bedload tracking of sediment transport has progressed significantly in the past decade. In particular, Radio Frequency Identification (RFID) transponders have become a popular tool for tracking the mobility and transport paths of coarse bedload particles in natural and restored stream. However, existing studies require surveying before and after a storm event which is both time consuming and fails to capture the timing and characteristics of bedload movement during a flood. The objective of this research is to develop an automated station that records bedload transport of RFID-embedded stones during a flood. The study site chosen for the project is Henry Sturm Creek, a tributary of Schneider Creek in Kitchener, Ontario. Henry Sturm Creek is a recently restored stream (construction completed in 2014) with a pool-riffle design. The station used to measure bedload in-flood incorporates four antennae placed in the bed of the stream across one riffle-pool-riffle section with companion water level gauges to construct accurate water surface profiles at different water levels. A 2D HEC-RAS model was used to simulate flows and assess shear stress in the river. Data collection is ongoing. Anticipated results include an accurate measure of bedload transport during a flood event and a better understanding of the effect of the pool and riffle morphology on water surface profiles and bedload transport. The methodological aspect of the research should provide a new look at sediment transport in streams, with new in-flood and spatially discrete data allowing an assessment of the effects of particle size and morphology on mobility thresholds and transport paths. Ultimately the results will contribute to more robust designs of in-stream restoration structures.

Biography

Chris Muirhead is a student at the University of Waterloo working towards a Masters of Applied Science in Civil & Environmental Engineering under Dr. Bruce MacVicar. Chris specializes in sediment transport in urban restored streams and the impact of pool-riffle bedforms. Chris previously graduated from the University of Guelph with a degree in Water Resources Engineering in 2016.