

Bedload transport in urbanized creeks with and without stormwater management

**Elli Papangelakis¹,
Thomas Raso¹,
Julian Krick¹
Peter Ashmore²
André Roy³
Bruce MacVicar¹**

¹*University of Waterloo, Waterloo, Canada*

Urbanization and stormwater management (SWM) are known to affect the timing, duration and magnitude of flows in streams. However, considerably less is understood about the effects of this hydromodification on bedload transport. This gap is due, at least in part, to a lack of adequate data on bedload transport in urban rivers with and without SWM. The objective of this study is to examine the effects of urbanization on bedload transport and to assess the effectiveness of stormwater management practices in achieving sediment transport at rates similar to those of natural rivers. To this end, multiple water-level gauges and a large number of tracking stones (300 per site) equipped with Radio Frequency Identification (RFID) transponders are tracked in three creeks in the Greater Toronto Area. Wilket Creek, a tributary of the Don River, has a completely urbanized watershed and no SWM. Morningside Creek, a tributary of the Rouge River, is also urbanized but has SWM ponds implemented in the watershed. Finally, Ganatsekiagon Creek, a tributary of Duffins Creek, is largely rural. Preliminary results were obtained for this paper from tracer recoveries following two floods in the fall of 2015. The flow data shows the typical increase in peak discharge and reduction in response time in the urban catchment with no SWM as compared to the rural watershed and that with SWM, suggesting SWM practices are effective at reducing peak flows. As expected, significant differences in the sedimentary responses of the three sites were also found, with higher mobility rates and larger travel distances in the urbanized catchments. However, SWM was not found to be effective at maintaining sediment transport dynamics close to that of the rural catchment. Future work will attempt to tease out the complexities of the interaction between hydromodification and bedload transport by better characterizing the floods in the respective basins and tracking the sediment transport in additional floods.