

Field based correction of environmental flow estimates affected by aquatic vegetation growth at gauged sites

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Presence of aquatic plants near gauging stations is known to affect the reliability of stage-discharge relationships as macrophytes increase flow resistance. Furthermore, as this occurs during the summer months, it is often commensurate with the low flow season, when water resources management is paramount. Estimation of low flow discharge is related to crucial decisions concerning water allocation, assessment of drought severity and habitat conditions. Thus, this knowledge gap affects hydraulic engineers, biologists, hydrologists as well as, indirectly, the general public.

This research project was first developed on two reaches in a small watershed ($A = 60 \text{ km}^2$). Here it was quantified that using conventional rating curves and neglecting vegetative flow resistance may cause discharge overestimations approaching twice the field measured values. Specifically, in terms of daily volume, this translates to an average of $1,500 \text{ m}^3/\text{day}$ being overestimated during the summer months at this site.

This study presents a correction procedure able to greatly reduce these errors by adjusting flow estimates through field measurements of plants spatial distribution. This is done using non-disruptive and repeatable methods, which include in stream sampling techniques and use of high-resolution photogrammetry data obtained with unmanned aerial vehicles. The methodology was also validated on three other reaches (100-150 m in length) located in Southern Ontario, Canada and it is potentially adaptable to any stream of similar size, affected by similar issues.

Biography

Lorenzo is a water resources engineering intern at Stantec. He has always been interested in water resources and pursued this passion through his undergraduate and Masters studies as well as through his tenure as a PhD student in Civil and Environmental Engineering at the University of Waterloo. He is furthering his knowledge and experience in this field working with the stream restoration group at Stantec.