

HYDRODYNAMICS OF A RIVER UNDERGOING ENVIRONMENTAL RESTORATION: BUFFALO RIVER, BUFFALO, NY

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ABSTRACT

Due to its environmental degradation including contaminated sediment, poor water quality, and lost habitat, the lower 9.2 km of the Buffalo River is a Great Lakes Area of Concern (AoC). To better understand the river's hydrodynamics, particularly the interaction between the downriver and upriver flow, since 2009 five horizontal and five vertical Acoustic Doppler Current Profilers (H-ADCP and V-ADCP, respectively) have been deployed year round in the lower 9km of the Buffalo River. The ADCPs were programmed to take measurements every 15 (H-ADCPs) or 20 minutes (V-ADCPs). Data were processed to ensure integrity and permit temporal changes to be investigated. During the period of ADCP deployment, the Buffalo River has undergone dredging, including a large-scale environmental dredging project which widened and deepened some sections of the river's channel. ADCP measurements document several different flow behaviors including high flow events related to runoff from snowmelt and high precipitation and flow reversals related to the upriver propagation of Lake Erie wind-driven surges. River velocities generally are low (~10cm/s), but may reach up to 2 m/s during high flow events. The Buffalo River also has its own periodic (~1.75 - 2 hr) oscillation (river seiche) that is best observed during times of non-lake surge activity or low downstream velocities. The river seiche persists year round during open as well as ice-covered conditions.

Keywords: River, Hydrodynamics, ADCPs, Seiche, Restoration

