## TRACING FREQUENCY AND MAGNITUDE OF FLOW REVERSALS IN FLORIDA SPRINGS

*Paul Donsky*[1]*, and* ***Samantha Howley*** [2]*, Matthew Cohen*[1]

[1]School of Forestry, Fisheries and Geomatics Sciences, University of Florida, Gainesville, FL, USA

[2]School of Natural Resources and Environment, University of Florida, Gainesville, FL, USA

Since the late 1990s, many of north Florida's springs have shifted from a state dominated by dense submerged aquatic vegetation (SAV) beds to one overtaken with filamentous algae, reducing ecosystem functions and value to humans. Deterioration due to anthropogenic press disturbances such as nutrient inputs and climate change have been well researched. In contrast, the impacts of pulse disturbances, including periodic reversal events, remain understudied. During a reversal, floodwaters from adjacent blackwater rivers displace the clear groundwater of the spring system, altering the light, oxygen, and solute regime causing potentially harmful effects on SAV and cascading detrimental ecosystem impacts. Despite preliminary evidence of their impacts, the dynamics of flow reversals are not adequately tracked among Florida's springs. We analyzed high frequency time series of stage and solute composition from ~15 springs in the Suwannee River basin to develop criteria for assessing the frequency, duration, and magnitude of flow reversals. Using the time series of electrical conductivity and river-spring head differential, we developed a signature for reversal disturbances. From the high frequency solute signals, we evaluated the dynamic responses of temperature, pH, dissolved oxygen and nitrate concentrations during and after reversals. Our results suggest that reversal events are readily detectable and constitute a significant, often prolonged, departure from the stable physical and chemical conditions typical in springs. This novel data-driven definition for flow reversals indicates a dramatic gradient in reversal incidence and duration across the population of springs, offering a promising tool to understand and predict the ecological consequences of these unique surface-groundwater exchanges. Moreover, as climate change and urban development continue to affect regional flow dynamics and alter the frequency and duration of reversals, this definition will allow managers to better understand the role of pulse disturbances in the widespread ecological regime shifts, and appropriate avenues for prevention and restoration.

**<u>PRESENTER BIO</u>**: Sam completed her undergraduate degree at UF where she conducted research on stormwater pond nutrient dynamics and prescribed-burn effects on pine savanna wetlands. She hopes to continue researching hydrologic ecosystems in her post-graduate career.