FLOOD DISTURBANCES IMPACT THE AUTOTROPHIC COMMUNITIES IN THE KARST SPRINGS OF THE SUWANNEE RIVER, FL

***Paul Donsky**, Matthew J. Cohen, Sam Howley, and Geraldine Klarenberg*
University of Florida, Gainesville, FL, USA

The karst springs of the Suwannee River Basin in northern Florida have experienced a dramatic loss of submerged aquatic vegetation (SAV) and increased proliferation of nuisance algae in recent decades. While most explanations focus on press-disturbances such as nutrient pollution, this ecosystem shift may be principally driven by flow-reversal and brownout pulse disturbance events. During these events, tannic and acidic floodwaters from adjacent blackwater rivers displace the clear, alkaline groundwater in the spring, reducing light availability and depleting dissolved oxygen (DO) with potentially dramatic consequences for autotroph communities. The spatial variation in pulse disturbance frequency between springs provides a natural laboratory to investigate their effects on autotrophic community structure. I surveyed the autotrophic community at 62 springs across the disturbance gradient. My results show disturbance frequency has a significant impact on both algae and SAV cover. The impact of disturbance on algae cover was shown to be mediated by DO concentrations, with more frequent flood disturbances associated with increased algal cover in high DO springs but reduced algal cover in low DO springs. Those high DO springs are also more likely to support SAV, suggesting that disturbances promote algal proliferation by reducing the competitive advantage of SAV. My results indicate springs experiencing flood disturbances greater than 20% of the time do not support SAV. This threshold is relevant for SAV protection and restoration efforts. We also observed evidence of alternative stable states, possibly arising through interactions between DO and flood disturbances. Considering these findings, I investigated variables that predict a springs disturbance rate, finding that a spring's elevation relative to its adjacent river and the magnitude of the local flood pulse were strong predictors. These findings illuminate how the interacting effects of press and pulse disturbances shape autotrophic communities and will help water managers set restoration targets to protect them.

PRESENTER BIO: Mr. Donksy began his PhD. at UF after receiving his master's there in 2023. He currently serves as an Ambassador for the Water Institute and on the board of the Ichetucknee Alliance, a local nonprofit. His main career goal is to protect and restore Florida's springs and aquifer.