USING MULTIPLE TRACERS TO DETERMINE WASTEWATER CONTRIBUTIONS TO GROUNDWATER IN SPRINGS CONTRIBUTING AREAS

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A key strategy for springs restoration in Florida is the reduction of nitrogen inputs to groundwater in springsheds. Verifying groundwater nitrogen sources may allow for more cost-effective project development to address nitrogen load targets set by Basin Management Action Plans. Tracers of nitrogen source were sampled in priority springs, as well as Upper Floridan and surficial aquifer wells from the St. Johns River Water Management District (SJRWMD) monitoring well network. Areas adjacent to wells had varying septic tank density and reuse water application. Dual nitrate stable isotopes ($\delta^{15}N$, $\delta^{18}O$), boron stable isotope ratios ($\delta^{11}B$), and three wastewater indicators (Sucralose, Iohexol, and the Cl:Br ratio) were analyzed to infer the relative contribution of fertilizer and wastewater nitrogen sources. Bayesian isotope mixing models predicted fertilizer as the major nitrogen source for most wells, with the remaining wells having equal contributions from fertilizer and wastewater. Sucralose detections generally corresponded to wells with high predicted wastewater contributions, however, local geology was likely more important in determining whether sucralose was detected. Iohexol, a marker suitable for discriminating between septic tank effluent and reuse water, was not detected in this study. The present study demonstrates the utility of a multi-tracer approach in building multiple lines of evidence to develop locally-relevant nitrogen source reduction strategies for groundwater.

PRESENTER BIO: Dr. Canion is a supervising environmental scientist with experience in water quality analysis, biogeochemistry, and phytoplankton ecology. In his present position, he leads a team whose projects include lake and wetland restoration and water quality improvements.