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Stable Isotope Compositions of Macroalgae, Sediment and Nitrate in Florida Springs

The aquifers supplying water to Florida's more than 700 karst springs are susceptible to human activities and land use change. Nitrate levels have increased in most springs over the last 30 years and are often associated with the proliferation of nuisance macroalgal mats while phosphate levels have remained relatively stable. However, no quantitative relationship exists between nitrate concentrations and algal biomass with which to establish protective nutrient criteria. In order to determine nitrate sources to benthic macroalgal mats and possible factors controlling algal abundance, the stable isotopes of macroalgae and spring sediments ($\delta^{15}N$ and $\delta^{13}C$) as well as nitrate in spring water ($\delta^{15}N$-NO_3 and $\delta^{18}O$-NO_3) were measured at three scales (1) regionally, at multiple boil sites throughout North Central Florida and the Panhandle (2) along four spring river runs and (3) within thick algal mats (>1m) at three spring boil sites. Additionally, seasonal variation in stable isotope composition of macroalgae was measured over the course of one-year at two springs, Manatee and Ichetucknee Blue Hole. Multiple factors are likely affecting $\delta^{13}C$ values in macroalgae. Results from the regional and gradient studies point to relatively distinct species-specific $\delta^{13}C$ compositions, which may be indicative of an algae's relative uptake of and degree of preference for CO_2 (aq) vs. HCO_3^- ion as a carbon source. Unlike $\delta^{13}C$, macroalgal $\delta^{15}N$ values did not show strong species-specific trends.

Key words: Florida Springs, algae, nitrate, stable isotopes

The challenge that this poster most closely addresses "Public health, wildlife health, ecosystem health and water resource sustainability" and the closest isuue is "Nutrient enrichment of surface, ground and coastal waters."