THE ROLE OF SPONGES IN MODULATING NITROGEN CYCLING IN THE FLORIDA KEYS

***Ashley R. Smyth*[1] *and Shelly Krueger*[2]**

[1]University of Florida, Homestead, FL, USA

[2]Florida Sea Grant UF IFAS Extension, Key West, FL USA

Sponges dramatically alter ecosystem water quality by combining extraordinary pumping rates and rapid, dynamic biogeochemical transformations. Large-scale sponge die-offs in the nearshore waters of the Florida Keys have led to a deficit in water filtration capacity, affecting water clarity. Rapid rates of organic matter remineralization by some sponge species can make them critical sources of dissolved inorganic nitrogen (DIN) in tropical ecosystems. Given the importance of nitrogen (N) for controlling primary production, there is a need to understand the influence sponges have on N in the surrounding water column. The overarching goal of this research is to establish the rates and mechanisms of sponge-mediated N cycling processes in Florida Bay by quantifying DIN transformations for 3 sponge species. Specifically, we measured net fluxes of N_2, ammonium, and nitrite+nitrate associated with glove (*Spongia cheiris*), loggerhead (*Spheciospongia vesparium*), and sheepswool (*Hippospongia lachne*) sponges found in the Florida Keys. Preliminary results suggest that all 3 species of sponges are net nitrogen-fixing, as indicated by a negative N_2 flux. Additionally, all 3 sponge species were a source of DIN as signified by positive fluxes for ammonium and nitrite+nitrate. Nitrogen fixation rates were higher for sheepswool and loggerhead sponges compared to the glove sponges. DIN production was highest for the sheepswool sponge. Regardless of species, nitrogen fixation was more substantial than the DIN flux to the water column. The newly fixed nitrogen may be retained by the sponge or the associated microbial community, while the DIN flux is associated with nitrification and remineralization of organic matter. Our results reinforce previous findings that sponges, and their associated microbial community, are essential to the productivity and nutrient cycling in tropical ecosystems.

PRESENTER BIO: Dr. Smyth is an assistant professor in the Soil and Water Sciences at The Topical Research and Education Center. Her research focuses on understanding how anthropogenic activities impact nutrient cycling in coastal and aquatic ecosystems. She has previously measured denitrification rates associated with seagrass meadows, oyster reefs and shellfish aquaculture.