# MACROALGAE DECAY RATES AND DIVERSITY EFFECTS ON SEDIMENT BIOGEOCHEMISTRY IN A FLORIDA ESTUARY

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When macroalgae blooms form from eutrophic conditions, their microbial decomposition can have negative impacts on seagrass beds and water through hypoxic conditions, nitrogen retention, and the smothering of benthic communities. Macroalgae are natural and diverse components of soft-bottom marine benthic ecosystems that can display a wide variety of traits such as morphological structure, nutrient uptake kinetics, lability, and decay rates. For example, some macroalgae grow quickly and assimilate and store nitrogen in excess of their growth requirements, generally undergoing fast decay rates when they die. However, our ability to predict the effects of macroalgae blooms is hindered by a poor understanding of how these algal traits affect bloom dynamics. In Matlacha Pass, Charlotte Harbor, FL a newly prevalent green alga, *Caulerpa fastigiata*, has recently smothered the benthos and driven unprecedented die-offs of seagrass beds. The legacy effects of this alga on benthic communities are largely unknown because *Caulerpa* spp., unlike other macroalgae, can uptake nutrients directly from the sediment, and as invasive ecological engineers, they can alter sediment properties in ways that prevent the recovery of otherwise competitively dominant species such as seagrasses. Here, we compared the traits of *Caulerpa* with two native macroalgal species, and correlated differences in ecological functions, including net $N_2$ flux and sediment nutrient content, with those traits to examine how different algae may reengineer soft sediment habitats following blooms. Specifically, we conducted field experiments and sediment core incubations in the summer of 2021 to (1) compare the decay rates and elemental ratios (carbon: nitrogen) of three algae (*Caulerpa, Acanthophora*, and *Gracilaria*) independently and in a mixed algae treatment, and (2) examine differences in dissolved gas, and nitrogen and phosphorous fluxes among different species of decomposing algae within *Caulerpa* fields and experimental *Caulerpa* removal plots. Our study provides insight on how the traits of different macroalgae may relate to their legacy effects on the biogeochemistry of soft-sediment ecosystems, with implications for seagrass recovery potential following harmful algae blooms.

**PRESENTER BIO**: Patrick Saldaña is a PhD candidate at the University of Florida and is advised by Dr. Andrew Altieri. He has conducted research on the marine ecology of kelp forests, coral reefs, and seagrass beds with specific interests on the legacy effects of habitat-forming species on ecosystem phase shifts.