

# Does more variety mean higher stability?

## Exploring how seagrass species diversity impacts resilience

Jamila Roth<sup>1</sup> & Laura K. Reynolds<sup>2</sup>

<sup>1</sup>School of Natural Resources and the Environment, University of Florida, jroth2@ufl.edu

<sup>2</sup>Soil and Water Sciences, University of Florida, lkreynolds@ufl.edu

### Background

- Temperatures predicted to rise by up to 3°C this century.
  - As a result, tropical herbivores (green turtles, emerald parrotfish, and manatees) are all increasing in abundance in the northern Gulf of Mexico (i.e. tropicalization).
- Seagrass stability will be needed to maintain seagrass coverage and associated ecosystem services under increased grazing pressure.
  - Stability = resistance (ability to remain unchanged) and resilience (rate of recovery).
  - Genetic diversity increases seagrass stability, but less is published about the effects of seagrass species diversity. Since different species have different responses to disturbances along with niche differences, species diversity can result in positive interactions, increased habitat complexity, and increased resilience.
  - The Gulf of Mexico contains up to 5 seagrass species, making it an ideal location to investigate the impact of species diversity.

Research question: How does seagrass species diversity impact resilience to grazing?

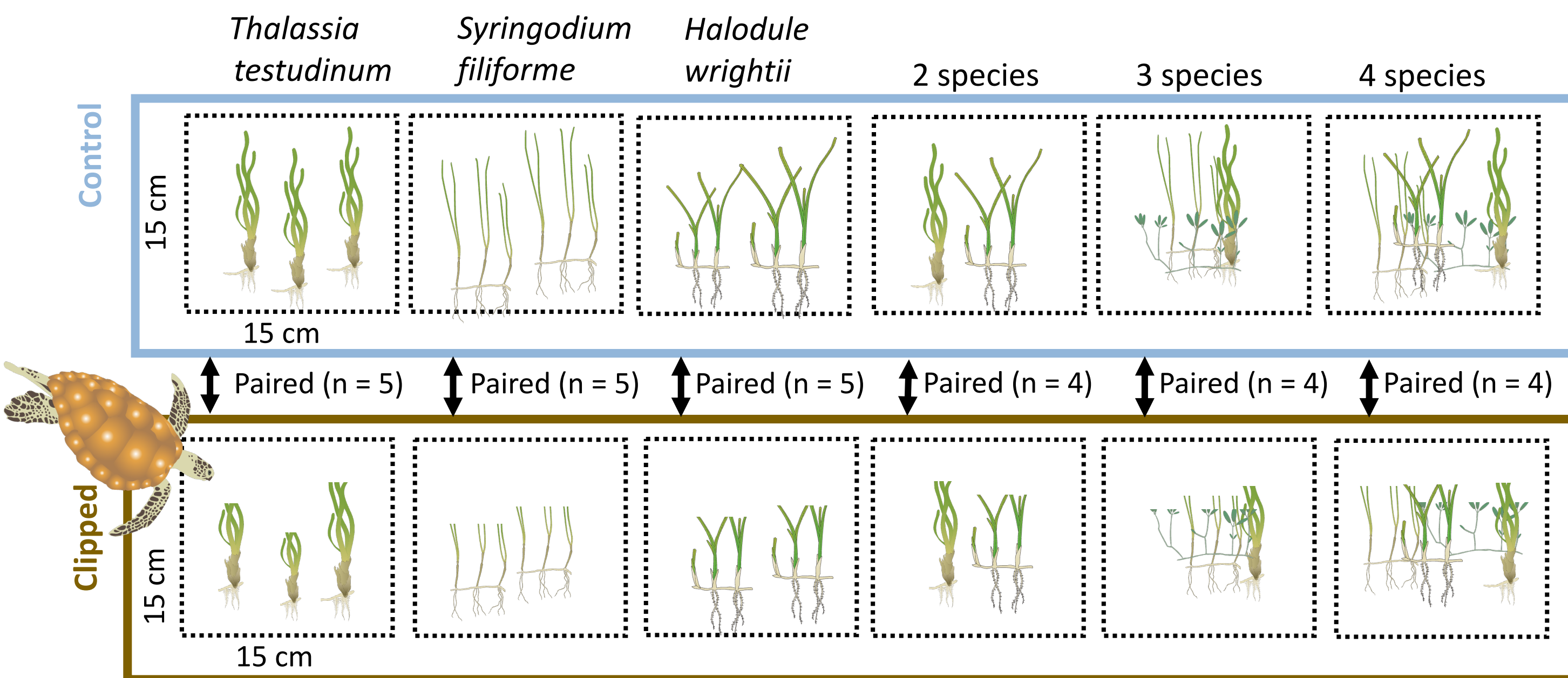
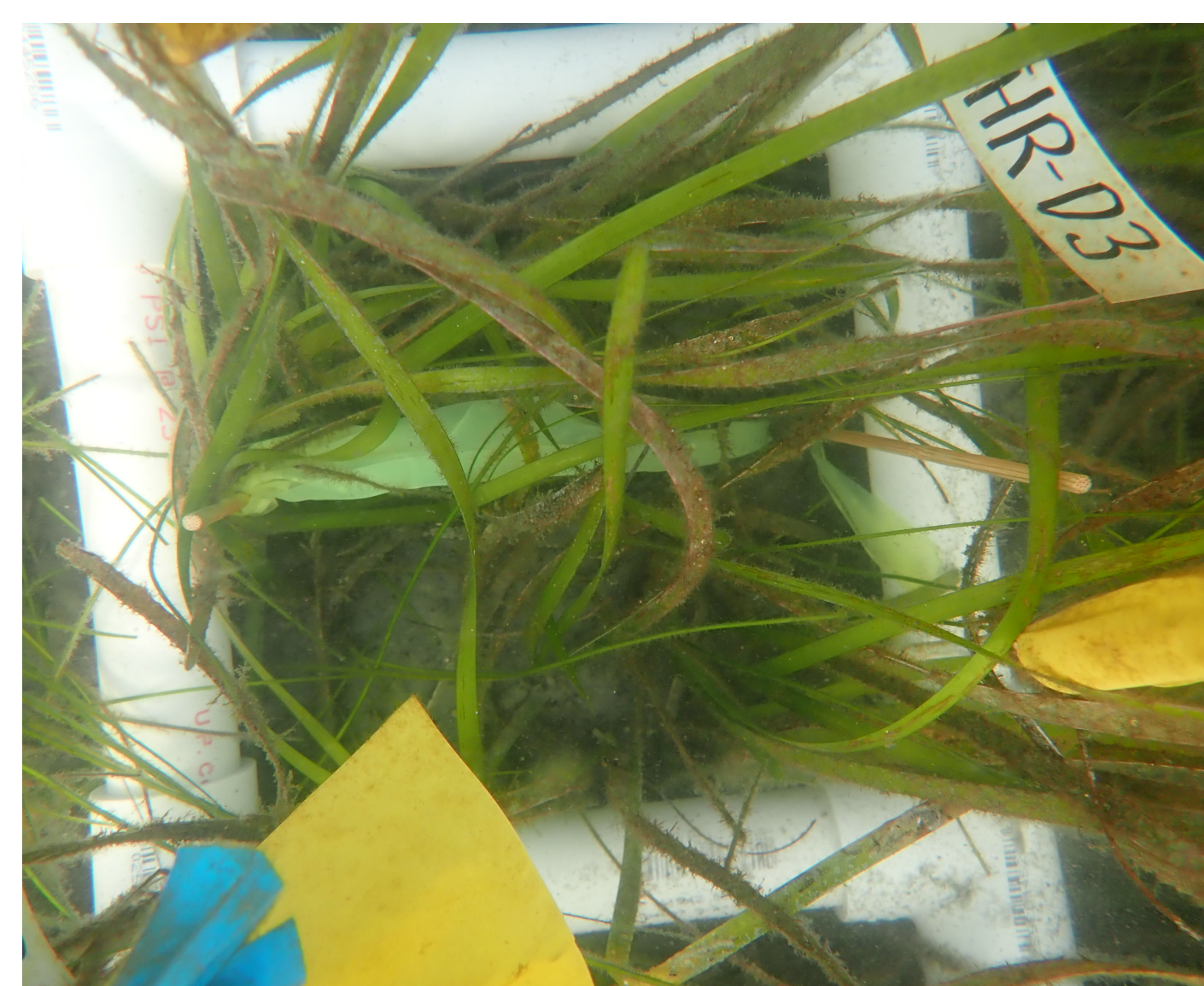
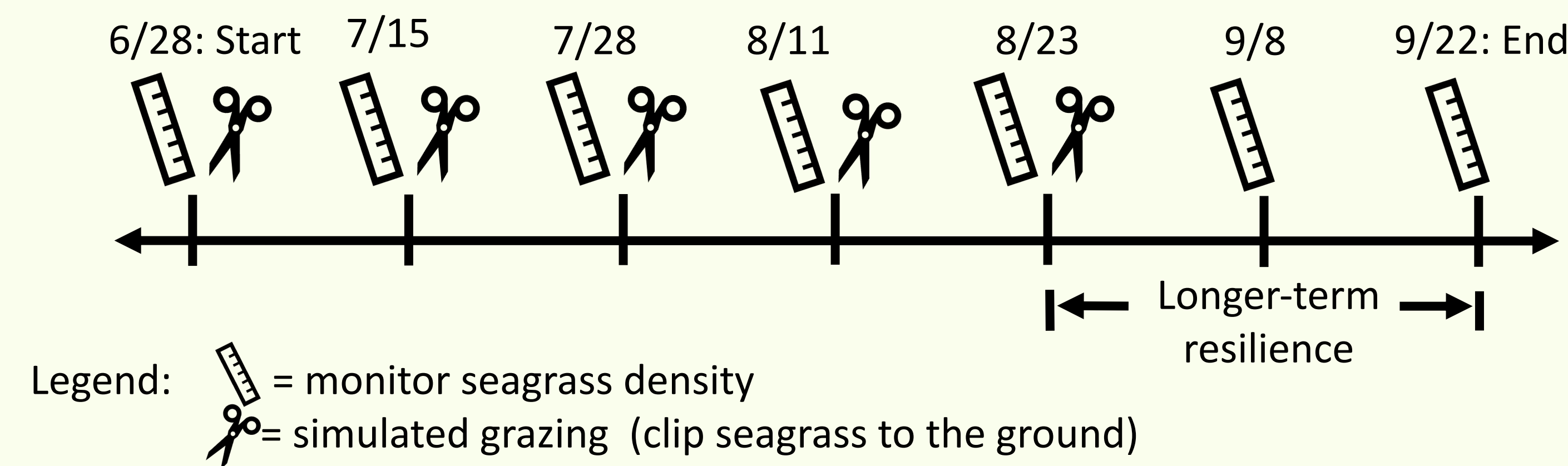


Figure 1. Design of field experiment

### Timeline



Seagrass plot



Clipping seagrass

### Hypothesis: seagrass species diversity increases resilience



1 species	Multiple species
Uniform canopy height	Varied canopy height
Lower habitat complexity	Higher habitat complexity
Lower invertebrate diversity and abundance	Higher invertebrate diversity and abundance
• Reduced epiphyte consumption	• Greater epiphyte consumption
Potential photoinhibition	Reduced photoinhibition
More leaf breakage	Less leaf breakage
Uniform rooting depth	Variable rooting depth
• Reduced nutrient partitioning	• Increased nutrient partitioning
Lower resilience	Higher resilience

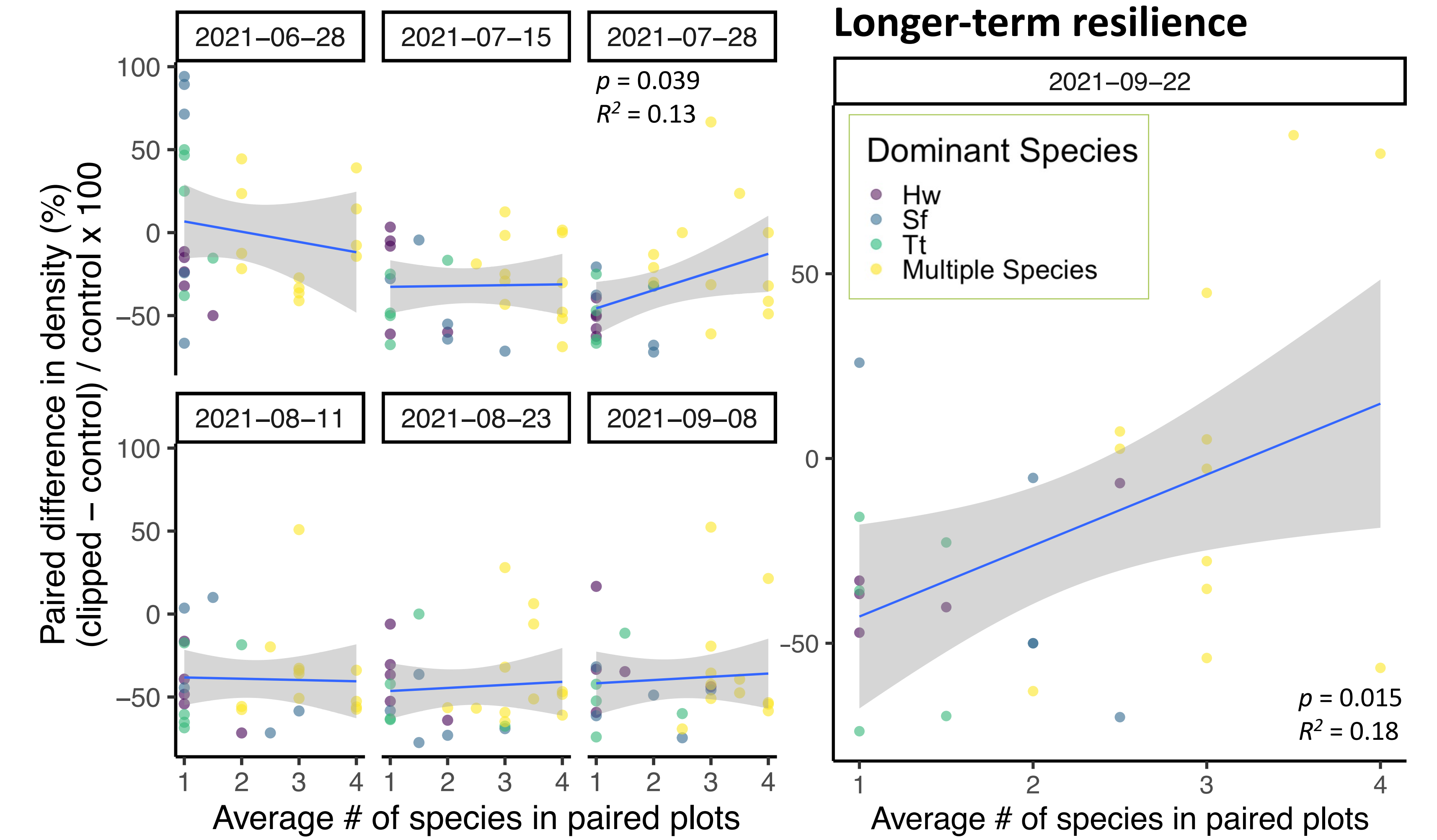


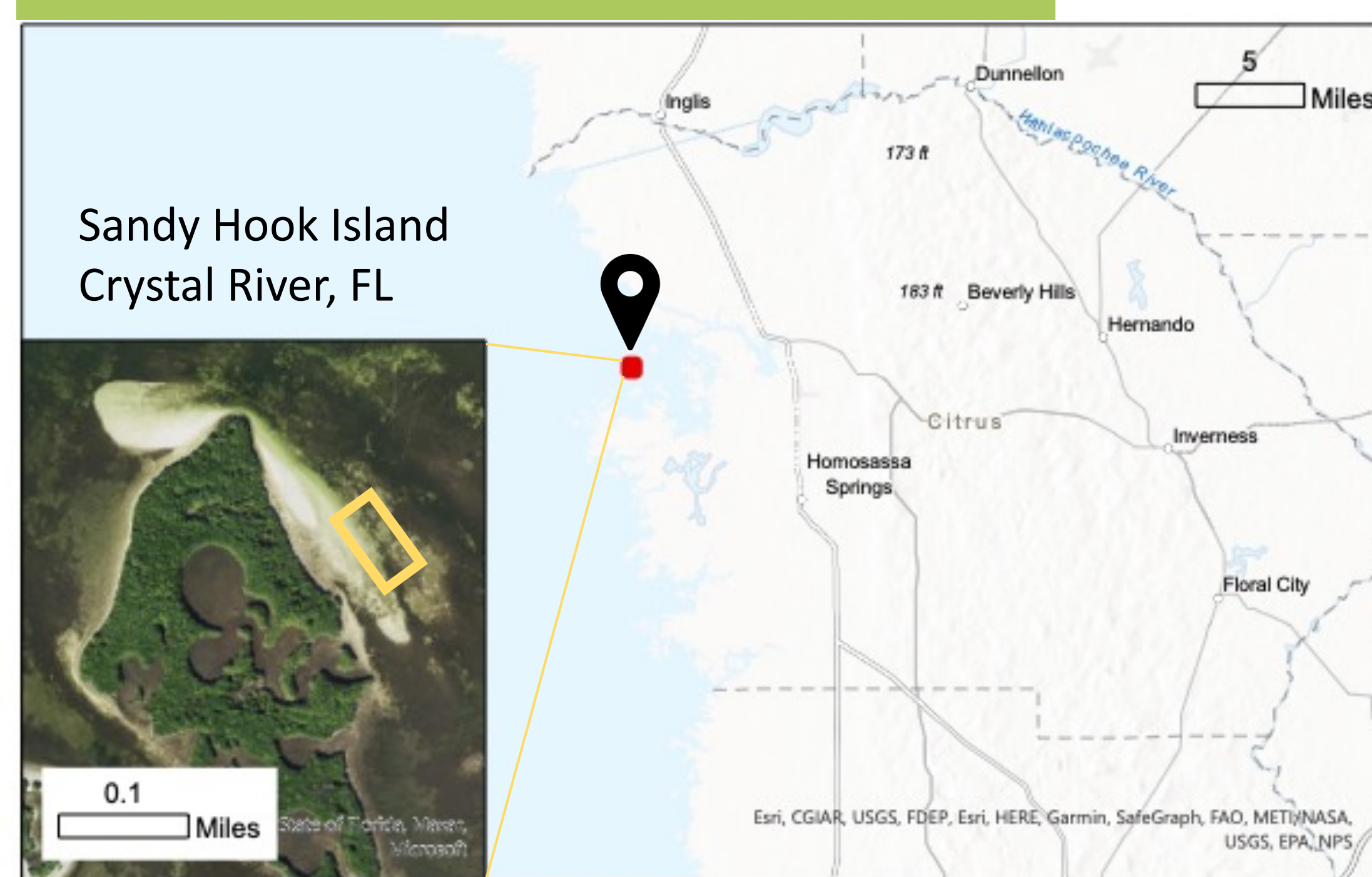
Figure 2. Species diversity increased longer-term seagrass resilience.

- Species richness positively impacted seagrass recovery from grazing on 7/28 (2 weeks after simulated grazing) and on 9/22 (4 weeks after final simulated grazing event).
- The 3 dominant seagrass species had similar responses to simulated grazing and similar recovery rates.

### Conclusions

- One month after the last simulated grazing event, plots with more species had recovered seagrass shoot density better than plots with fewer species.
- This indicates that seagrass species diversity may increase seagrass resilience.
- Planting and/or conserving diverse seagrass assemblages may provide a tool for managing seagrass beds and maintaining seagrass stability.

### Location: Gulf Coast of Florida



### Connections!

For more information and access to youth education activities related to this research:

