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Relationship between Seagrass and Dwarf Seahorse (*Hippocampus zosterae*) Abundance and Distribution in Texas

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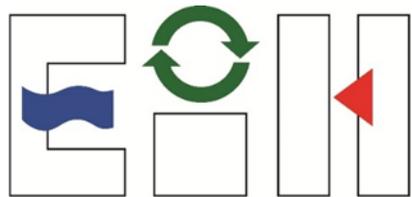
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Texas Academy of Science

Houston, TX

February 26, 2022



Environmental Institute of Houston



University
of Houston
Clear Lake



Dwarf Seahorse (*Hippocampus zosterae*)

- Range: Gulf of Mexico, Atlantic Coast of Florida, and the Caribbean
- Smallest species in U.S waters, averaging 2 cm in height
- Males carry brood in pouch
- Habitats of choice: seagrass, seaweed, coral reef
- Candidate species for federal listing



Seagrass

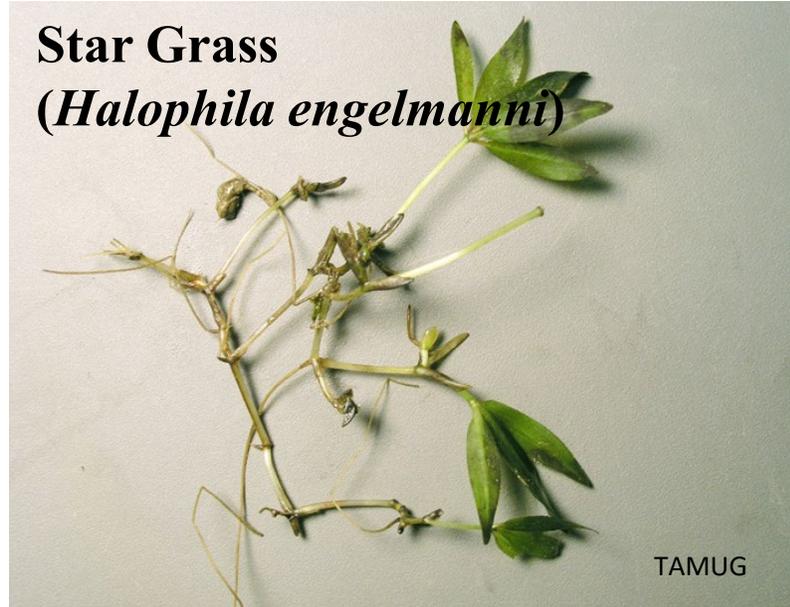
- Marine flowering plants that grow in mono- and poly-specific beds
 - Water depth, light/nutrient availability, sediment type
- Provide essential nursery grounds, feeding areas, and refuge
- Contribute organic matter into nutrient cycles
- Root systems stabilize sediments and shoots slow water currents
- Beds threatened by human activity
 - Water turbidity
 - Physical damage

Shoal Grass
(Halodule wrightii)



Jennifer Bronson, TPWD

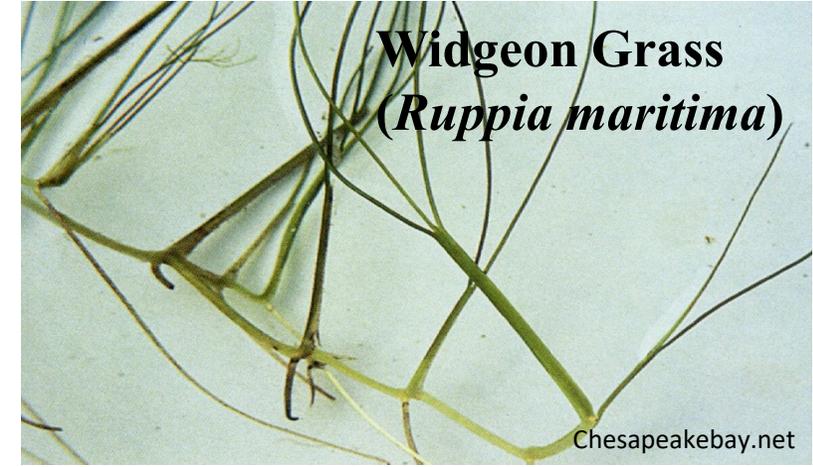
Star Grass
(Halophila engelmanni)



TAMUG

5 Seagrass Species in Texas

Widgeon Grass
(Ruppia maritima)

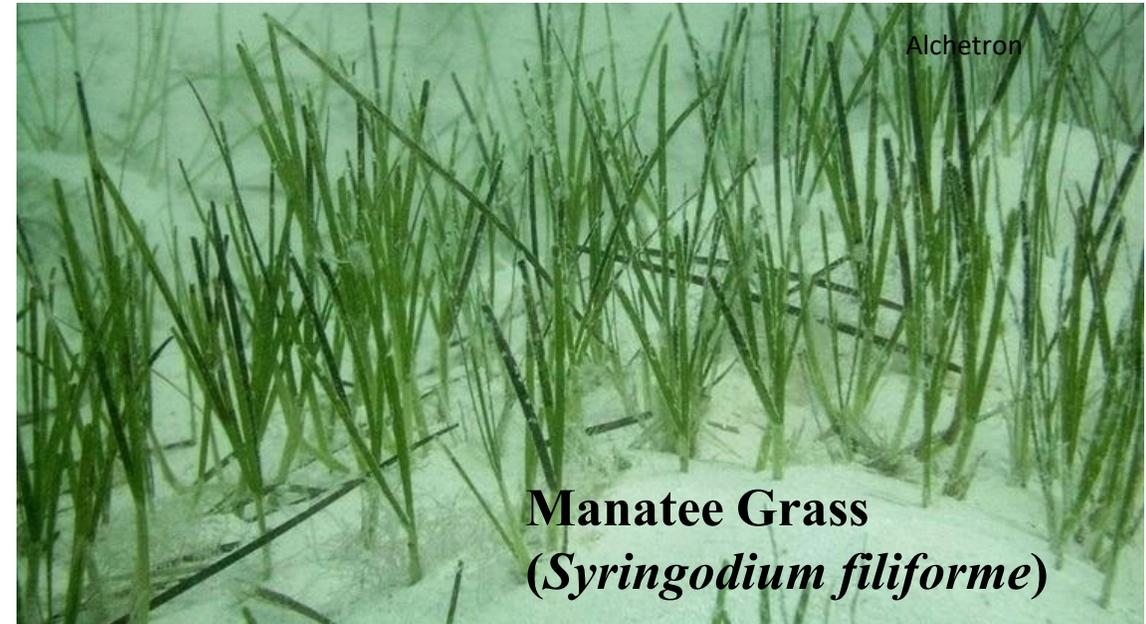


Chesapeakebay.net



Oceanlight.com

Turtle Grass
(Thalassia testudinum)



Alchetron

Manatee Grass
(Syringodium filiforme)

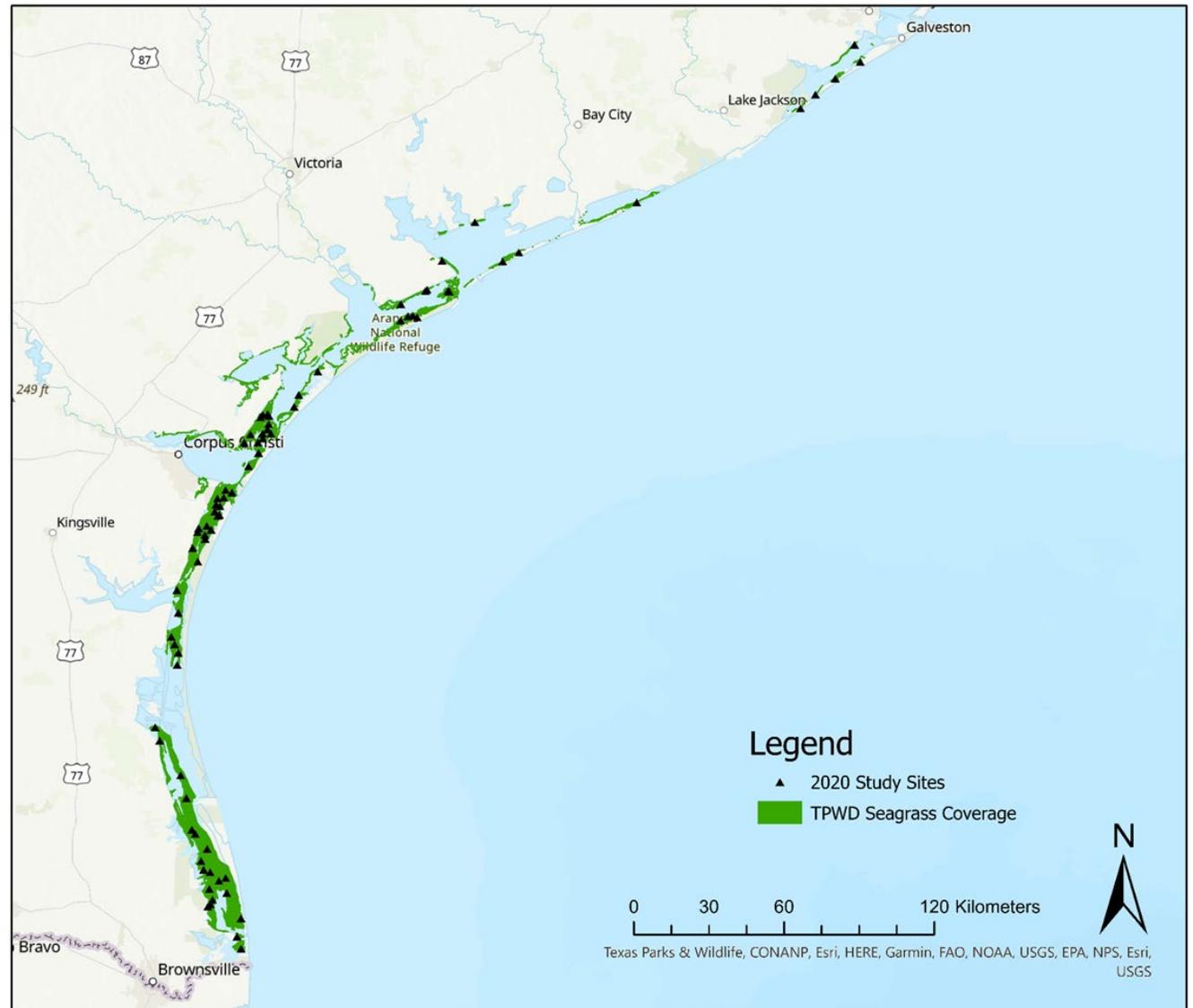
A close-up photograph of a person's hand holding a small, dark green Dwarf Seahorse. The seahorse is curled up and positioned in the palm of the hand. The background is blurred, showing what appears to be a rocky or sandy surface.

Objectives

1. Determine the health of seagrass beds on the Texas Coast based on response variables (seagrass: biomass, percent cover, species richness).
2. Determine if seagrass health indicators are correlated with the levels of stressor variables (turbidity, dissolved oxygen, salinity, pH).
3. Determine if the presence and density of Dwarf Seahorse populations are correlated with indicators of seagrass bed health.
4. Determine what areas would be best to protect for essential Dwarf Seahorse habitat based on these habitat suitability metrics.

Sampling Protocol

- 80 sites
 - 7 bay systems
- Summer 2020
(breeding season)



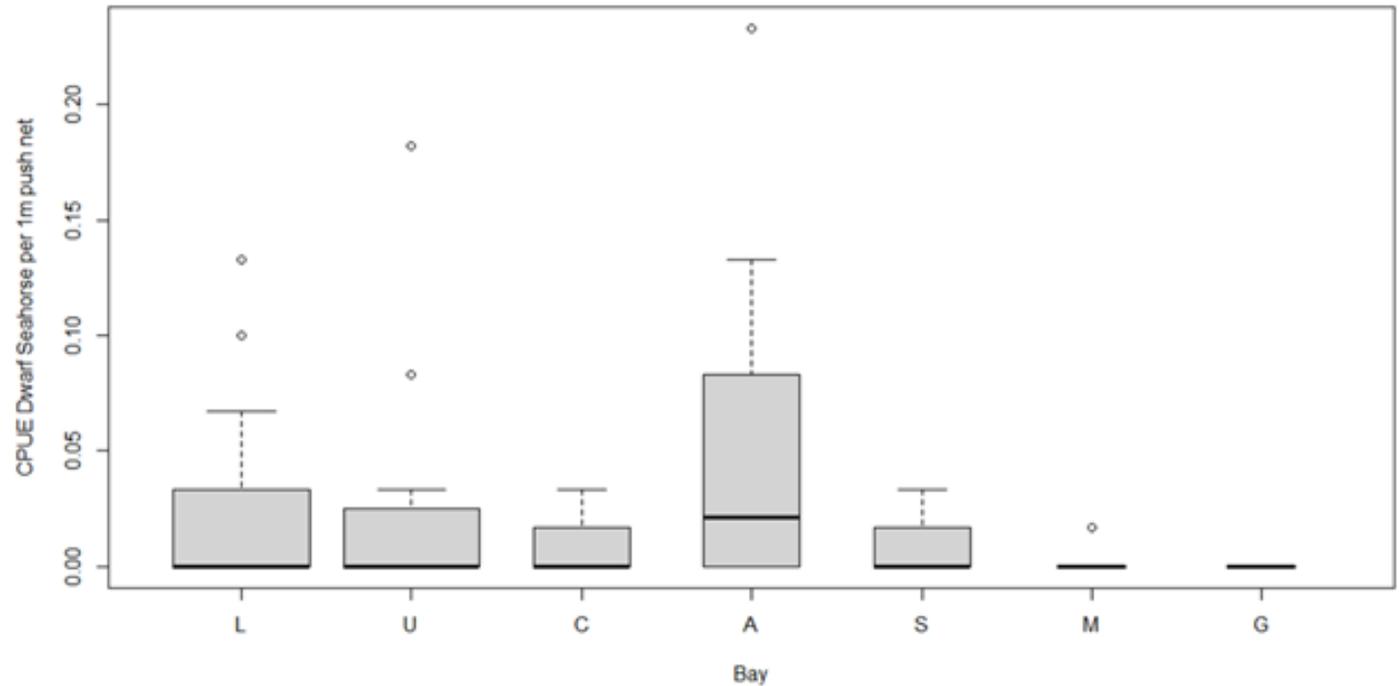
Data Collection

- Water Quality
 - Temperature ($^{\circ}\text{C}$)
 - Salinity (ppt)
 - Specific conductivity ($\mu\text{MHOS}/\text{cm}$ @ 25°C)
 - pH
 - Turbidity (NTU)
 - Dissolved oxygen (%sat and mg/L)
 - Secchi (m)
 - PAR ($\mu\text{mol m}^{-2} \text{s}^{-1}$)
- Seagrass
 - Percent Cover
 - Biomass
- Nekton community



Results

- 79 Dwarf Seahorse captured at 30 sites



Major Bay System	Lower Laguna	Upper Laguna	Corpus Christi	Aransas	San Antonio	Matagorda	Galveston	Grand Total
Number of sites	20	20	10	10	10	5	5	80
Number of Dwarf Seahorse Captured	28	19	6	20	5	1	0	79
Percent of Sites with Dwarf Seahorse Detection	45	35	40	60	30	20	0	37.5
CPUE of Dwarf Seahorse	0.023	0.017	0.011	0.038	0.008	0.003	0.000	0.017

Water Quality

- No significant correlations with Dwarf Seahorse catch
- Trends
 - Higher salinity, specific conductivity, and temperature in lower bays
 - Higher turbidity and dissolved oxygen in upper bays

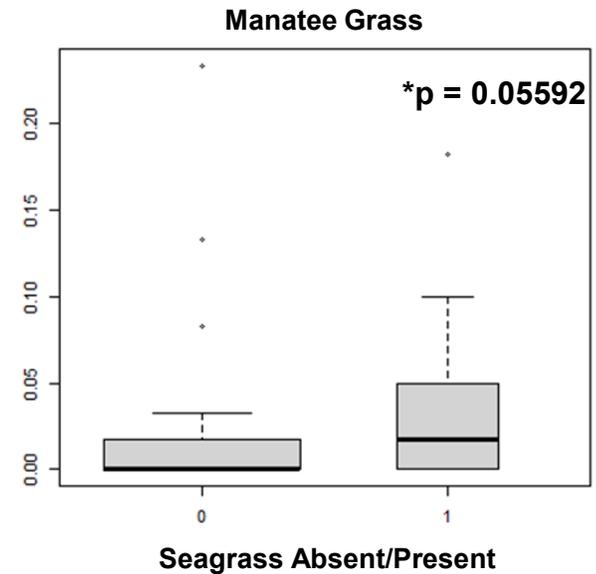
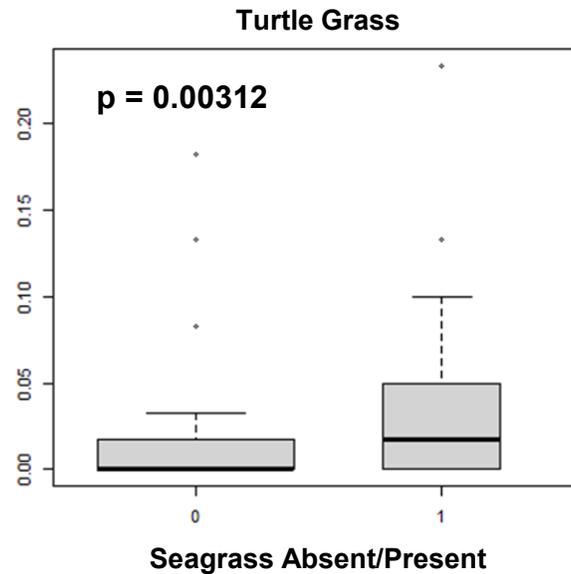
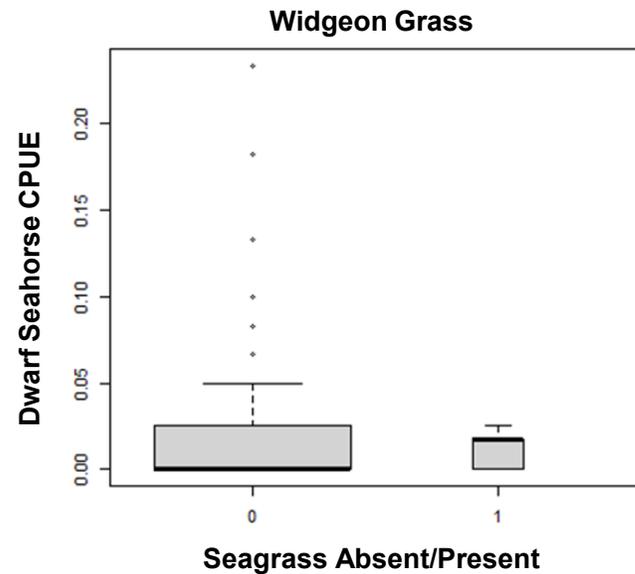
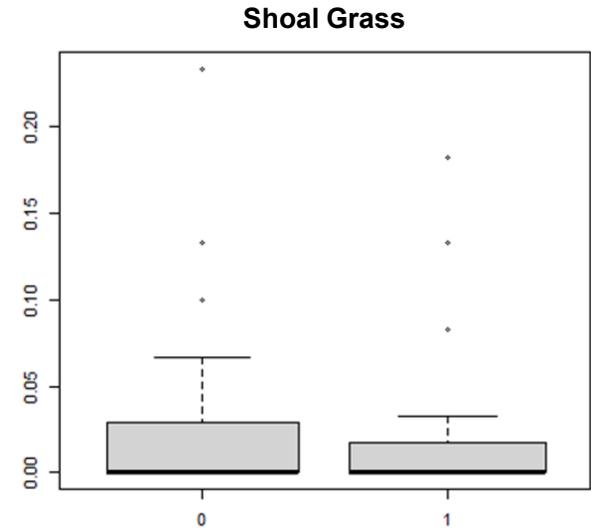
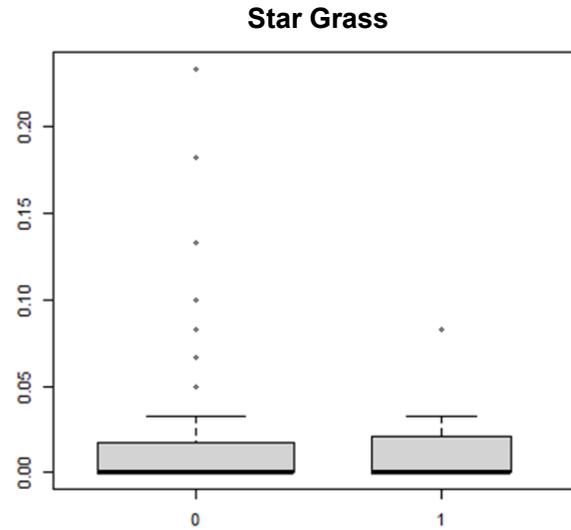
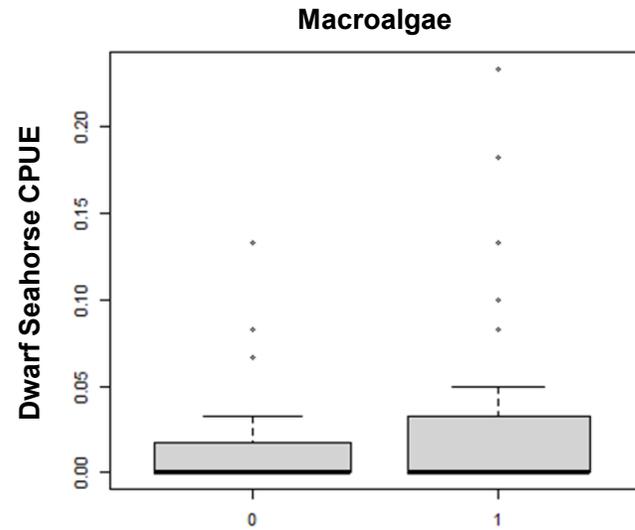


Seagrass

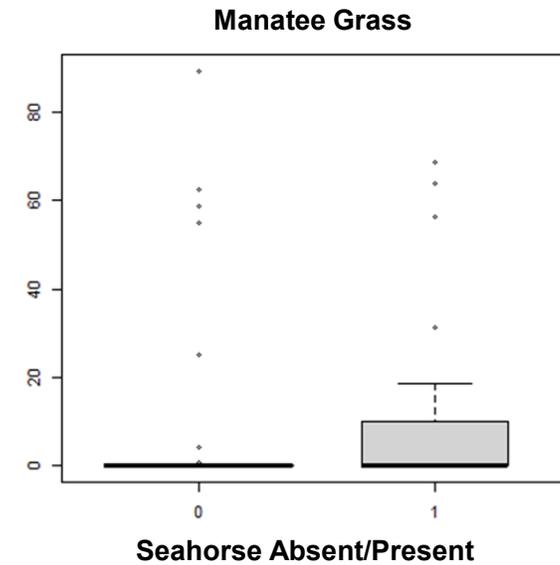
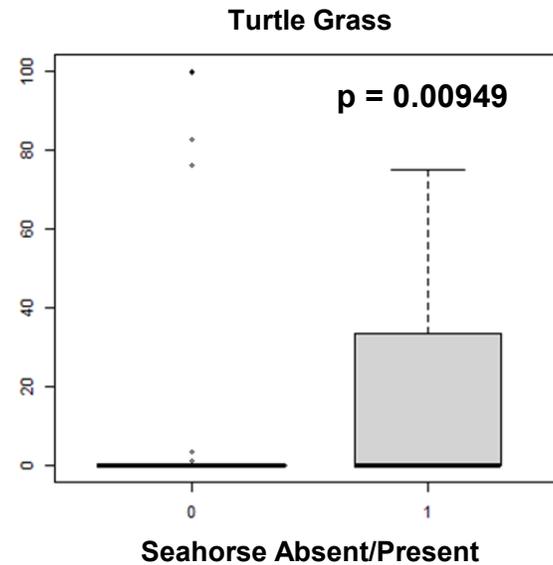
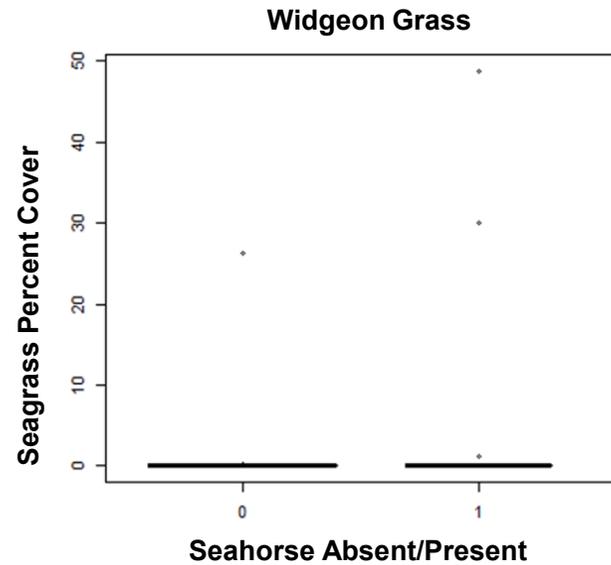
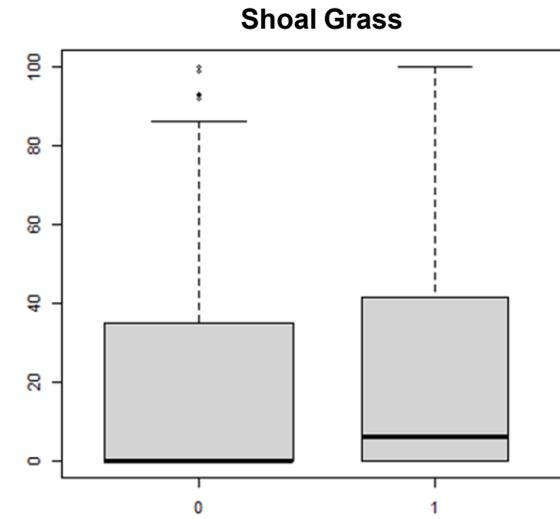
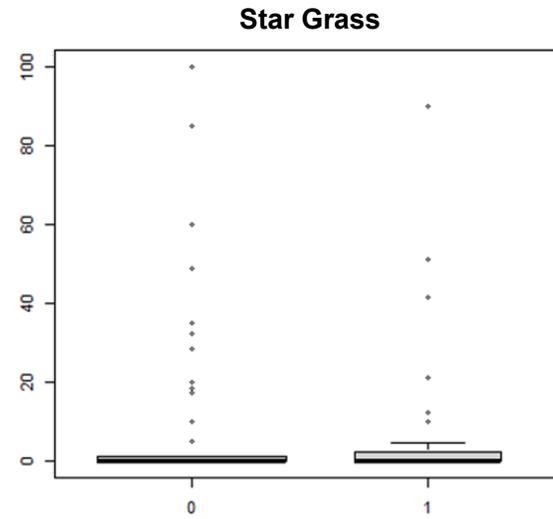
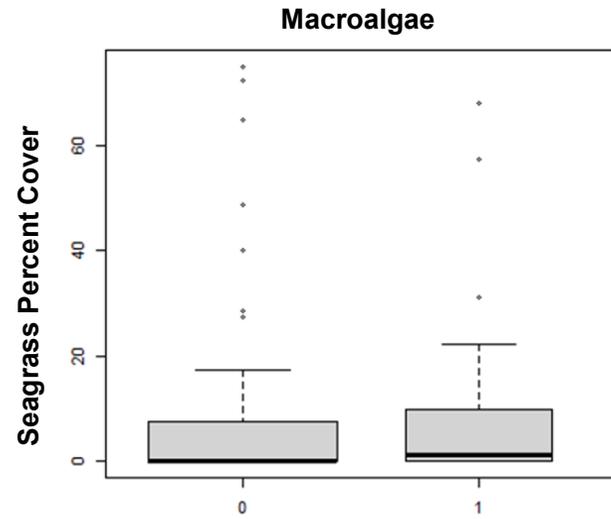
Upper ↓ Lower	Major Bay System	Number of Sites	Biomass (g)	Canopy Height (cm)	% Cover Seagrass	% Cover MACRO
	Galveston	5	N/A	3.0	18.7	0.0
	Matagorda	5	0.3	4.6	21.0	0.1
	San Antonio	10	0.9	10.3	45.4	8.0
	Aransas	10	1.5	18.6	50.8	5.1
	Corpus Christi	10	2.1	20.1	49.1	27.5
	Upper Laguna	20	1.2	20.9	57.5	11.2
	Lower Laguna	20	3.2	18.2	63.4	6.4

- Upper: shoal, star, and widgeon grass
- Lower: shoal, manatee, and turtle grass

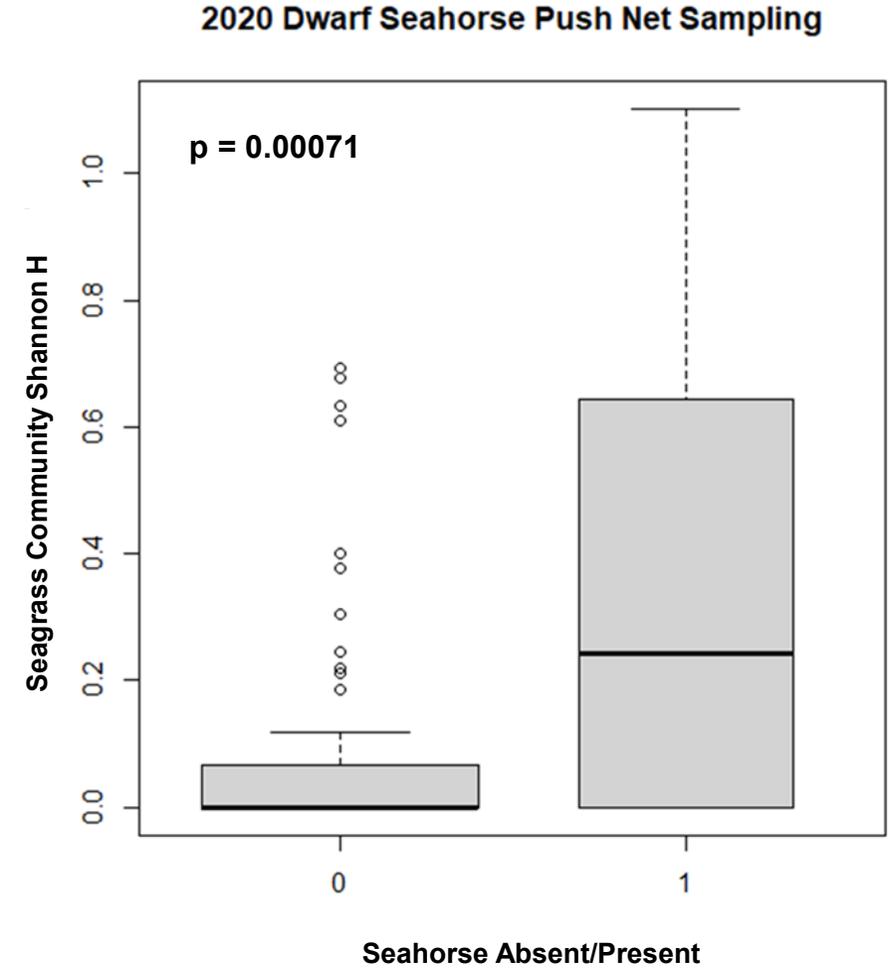
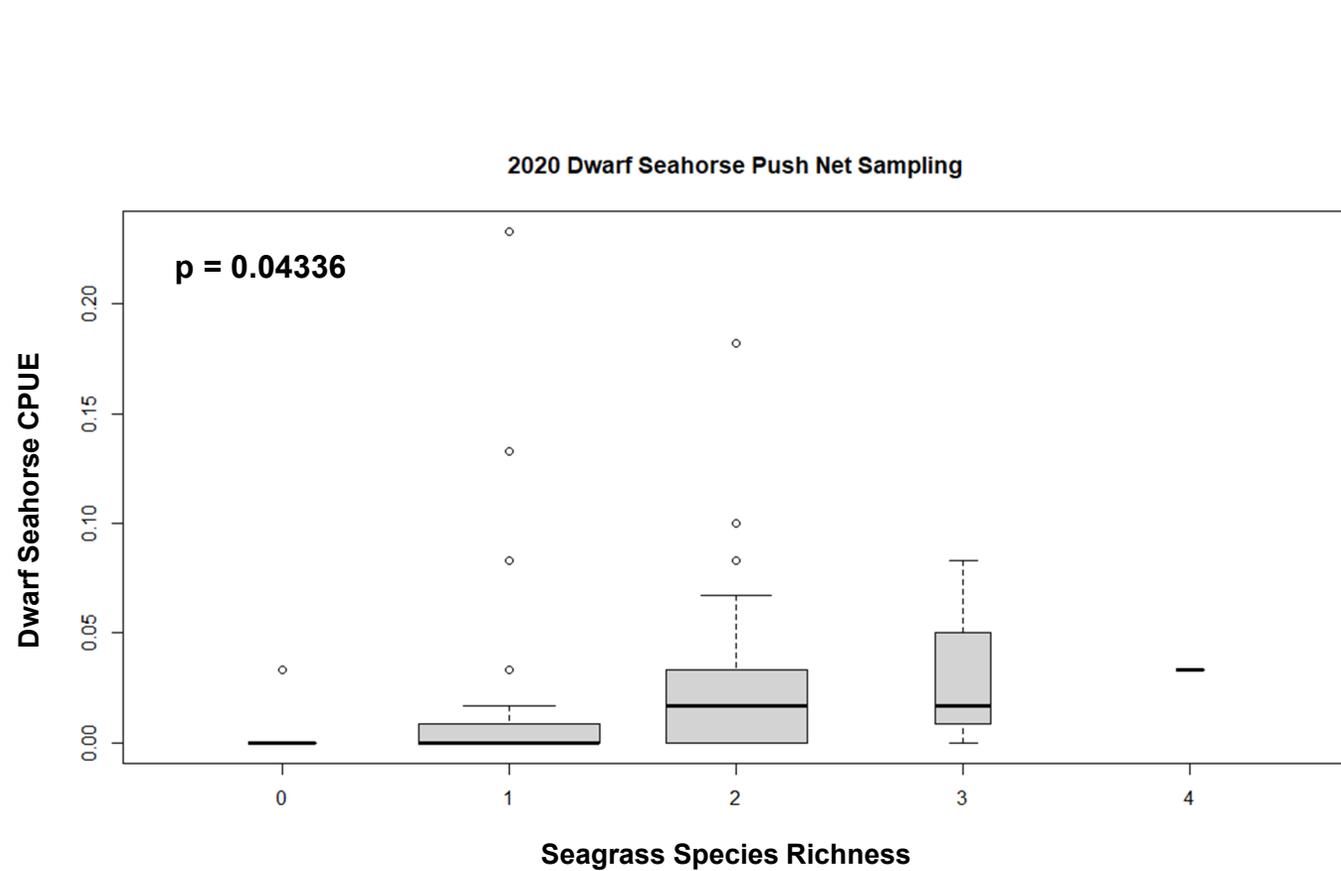
Seagrass Species Presence and Dwarf Seahorse CPUE



Seagrass Species Percent Cover and Dwarf Seahorse Presence



Seagrass Community Structure



Discussion

- Water conditions relatively consistent throughout sampling time
- No solid conclusions to association with turtle grass
 - Large biomass – slow water velocity
 - Climax species - indicates established bed
 - Nekton community exists with minimal disturbance





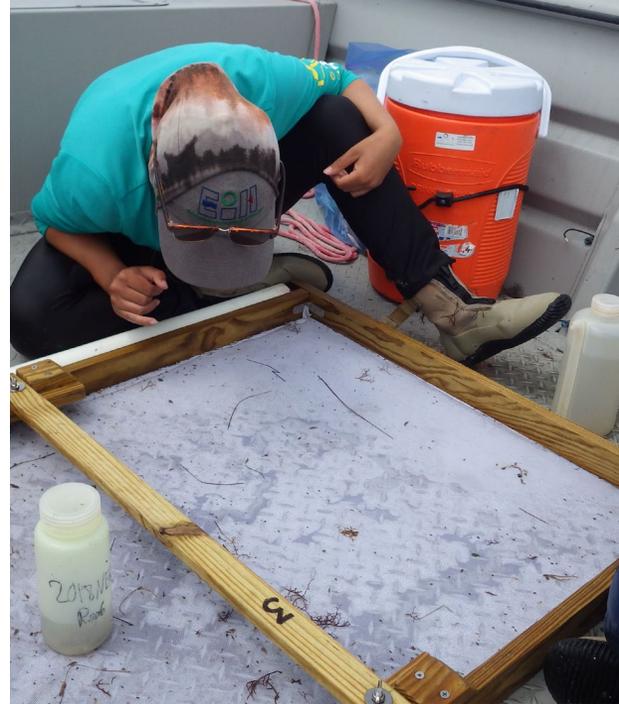
Project Conclusions

- Determined areas of highest Dwarf Seahorse CPUE
- Established significant associations between Dwarf Seahorse and seagrass community
- Florida
 - Health of Dwarf Seahorse population tied to health of seagrass beds (Carlson et al. 2019)
- Texas: unknown
- Candidate species for federal listing under the Endangered Species Act (ESA)



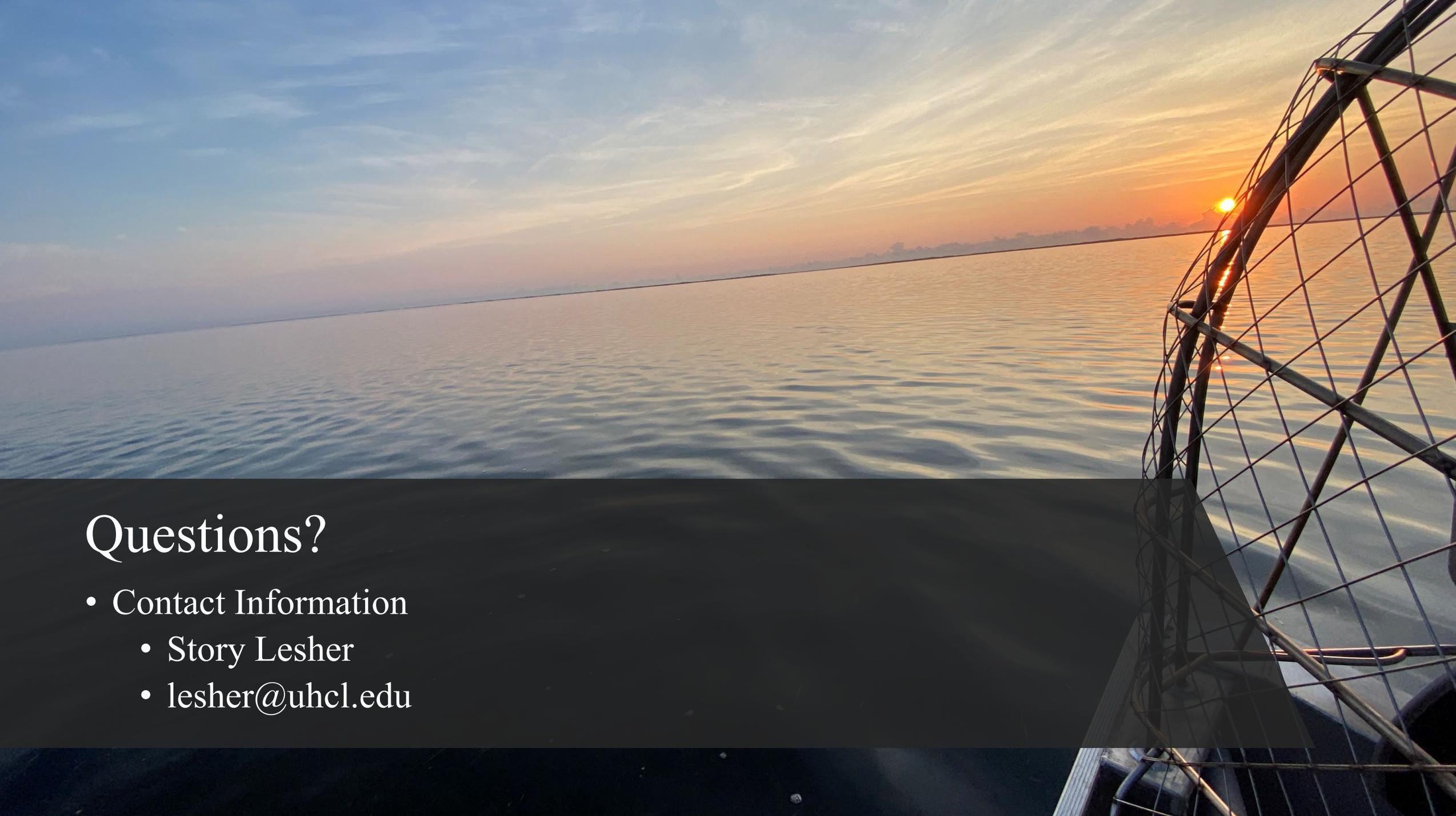
Future Work

- More intensive sampling
 - Galveston
 - Bays with high CPUE
- Use of other gear types – throw trap
- Sampling in areas with depths greater than 4ft
- Year-round sampling



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Questions?

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