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Dwarf Seahorse (*Hippocampus zosterae*) Distribution, Abundance, and Sampling Gear Catch Efficacy in Texas

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Introduction

- Dwarf Seahorse live in shallow waters throughout the Gulf of Mexico, Atlantic Coast of Florida, and Caribbean
- July 2020 – NOAA determined Dwarf Seahorse do not warrant protection under the Endangered Species Act (ESA)
  - Only population viability study conducted in Florida
- No consistent monitoring of Dwarf Seahorse in Texas
  - Only records of random observation during TPWD routine monitoring
  - Routine monitoring gear may not be effective for catching this small species
- Objectives:
  1. Describe the distribution and abundance of Dwarf Seahorse in Texas
  2. Compare CPUE of Dwarf Seahorse using different sampling gears

Methods

- 80 sites sampled summer 2020 in density/distribution study
  - Highest CPUE in Aransas, and Lower and Upper Laguna Madre
- Gear comparison study – June 2021
- 8 sites with highest catch of Dwarf Seahorse from 2020 (Figure 1)
- Water Quality and Environmental Conditions
  - Ambient Conditions – Water depth (m), specific conductivity (uS), salinity (psu), dissolved oxygen (mg/L), temperature (C), turbidity (NTU), secchi depth (m), PAR (µmol/(m²s))
- Dwarf Seahorse Sampling
  - 5 different gear types used: pushnet (1/32” mesh), throw trap (1/32” mesh), beam trawl (1/32” mesh), 15ft straight seine (1/8” mesh), 60ft bag seine
- Site area divided into lanes to avoid re-sampling areas (Figure 1)
- Three replicates of each gear type (except only 1 replicate of 60ft bag seine at the nearest shoreline)

Study Area and Sampling Layout

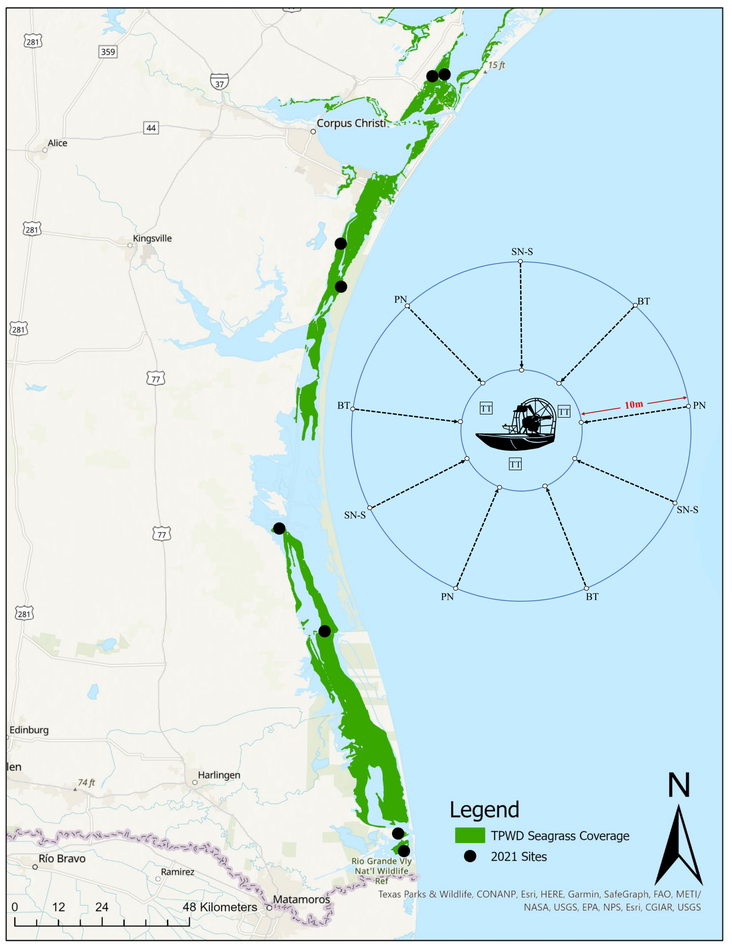

Figure 1. Map of the 8 site locations across lower Texas coast and an example site layout for gear comparison sampling. Three replicates of each gear type were conducted around the vessel as a central location. TT = throw trap, BT = beam trawl, PN = pushnet, SN-S = 15ft straight seine

Results

Dwarf Seahorse Catch

- 12 Dwarf Seahorse captured at 7 of 8 sites in 2021
  - Total of 91 individuals captured in 2020 and 2021 combined
- Dwarf Seahorse were captured in the throw trap, pushnet, and beam trawl, but none were detected using either of the seine gears
  - Throw trap provided significantly higher CPUE than the pushnet ($p = 0.0285$) and the beam trawl ($p = 0.019$) (Figure 2)
- CPUE of Dwarf Seahorse for all sites and replicates in 2021
  - Throw trap = 0.222 per m^2
  - Pushnet = 0.019 per m^2
  - Beam trawl = 0.003 per m^2

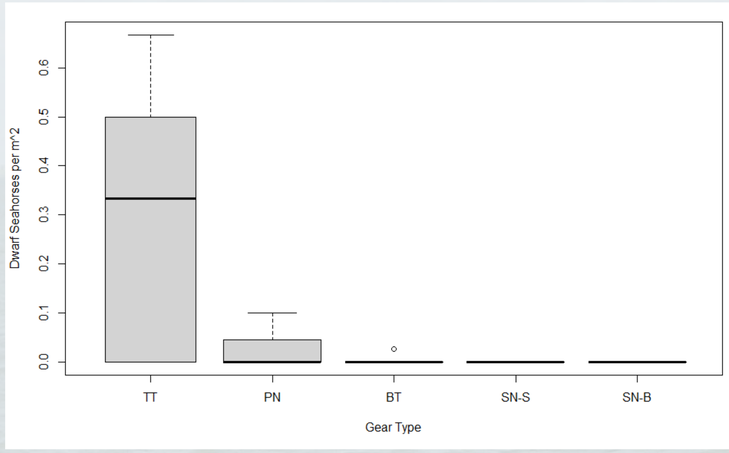

Figure 2. CPUE of Dwarf Seahorse by gear type. TT = throw trap, PN = pushnet, BT = beam trawl, SN-S = 15ft straight seine, SN-B = 60ft bag seine

Nekton Community

- 9,826 individuals captured from 30 families and 47 different species
  - Dwarf Seahorse had 10th highest CPUE of captured fish
  - Highest fish CPUE = 0.079 per m^2 of Pinfish (*Lagodon rhomboides*)
  - Highest invert CPUE = 0.321 per m^2 of Grass Shrimp (*Palaemonetes spp.*)
- Species richness and evenness differed significantly by gear, while Shannon H Diversity did not (Figure 3)
- ANOSIM shows significant difference in captured nekton community among gear types ($p \leq 0.003$) (Figure 4)
  - Clustering of sites with Dwarf Seahorse detection to the right along MDS1

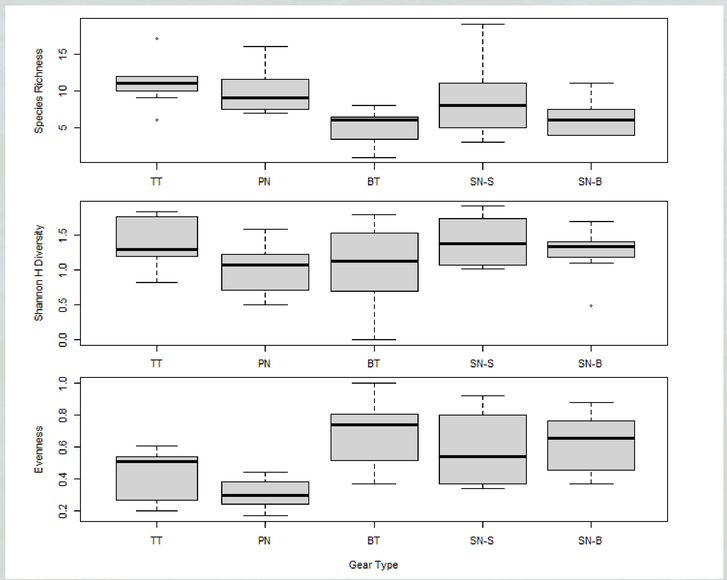

Figure 3. Overall nekton community species community metrics by gear type.

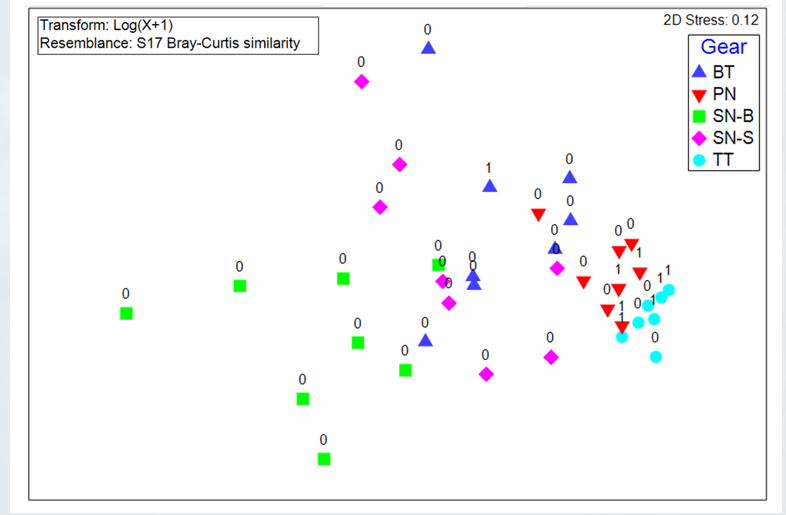

Figure 4. Non-metric MDS plot of nekton community catch by site. Shape/color of point indicates gear type and number indicates presence (1) or absence (0) of Dwarf Seahorse.

Conclusions

- Most effective gear type for capturing Dwarf Seahorse was throw trap followed by pushnet
  - Use of throw trap is recommended for future Dwarf Seahorse abundance studies, due to its exhaustive sampling technique
  - Use of pushnet is recommended for future demographic analysis, as it allows for coverage of a larger spatial area
    - Likely underestimates abundance
    - Fewer males captured with this gear type, may be a gear bias
    - Based on observational accounts, male Dwarf Seahorses may be located closer to the base of seagrass blades (Rose et al. 2019)
- No Dwarf Seahorse captured with seine gear types, which are used in long-term coastal monitoring projects (should not be used for population estimations)

Recommendations

- Future community assemblage studies would benefit from the use of a combination of gear types as indicated by our results.
- Unconventional gear types may be beneficial in these projects to assemble a more clear picture of the nekton communities along the Texas coast and provide accurate density and distribution data for the Dwarf Seahorse.

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Literature Cited

Oakley, J. W., Lesher, S., Dennis, G., Guillen, G., Smith, C., and Riechers, R. 2021. Distribution, abundance, and habitat use of the Dwarf Seahorse, *Hippocampus zosterae*, along the Texas Coast. Final Report. Submitted to Texas Parks and Wildlife Department, Contract 526332. EIH 21-001, 78 pp.

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