



Crassostrea virginica as a foundation species: assessing the impact of fishery harvest on oyster reef communities in North Inlet, South Carolina

Maggie Pelton^{1,2*} Robert Dunn^{1,2}

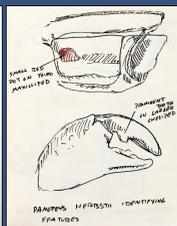
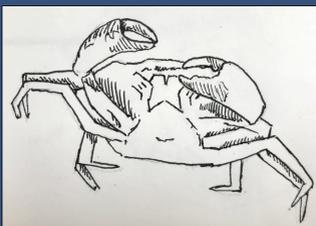
¹North Inlet – Winyah Bay National Estuarine Research Reserve
² Baruch Marine Field Laboratory, University of South Carolina



North Inlet Oyster Reefs



North Inlet is an ocean dominated estuary with fringing oyster reefs that provide habitat for a diverse faunal community¹. Recreational oyster harvest varies within North Inlet, potentially impacting the physical structure of reefs as well as the abundance and diversity of reef-associated fauna². However, to date, we lack quantitative information regarding the impacts of this recreational fishery within an otherwise unaffected estuary.



Panopeus herbstii, the Atlantic Mud Crab, is a prevalent predator on oyster reefs².

Research Questions:

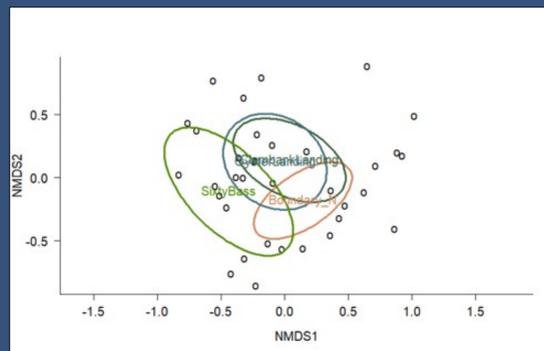
1. What is the impact of recreational harvest on the North Inlet oyster reef communities?
2. What is the impact of reef characteristics on oyster reef communities?

Methods:

8 sampling trays were deployed across 4 sites experiencing a range of harvesting pressure. Sixty Bass is open to harvest, Clambank and Oyster Landing are open but less frequently harvested, and North Boundary is closed to harvest. Sampling trays were deployed for 4 weeks³, after which organisms that colonized the trays were collected, identified to the lowest possible taxonomic level, measured, and sexed. We investigated three response variables (*P. herbstii* density, Crab Size, and Community Diversity) and measured five physical metrics for each reef (Reef Height, Reef Slope, Rugosity, Percent Shell Cover, and Clump Height).

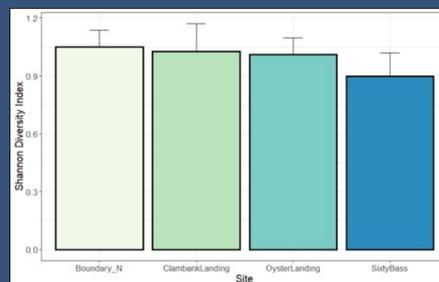
Impact of Recreational Harvest on Oyster Reef Fauna

Shellbaskets were planted on reefs for four weeks to allow organisms to colonize.

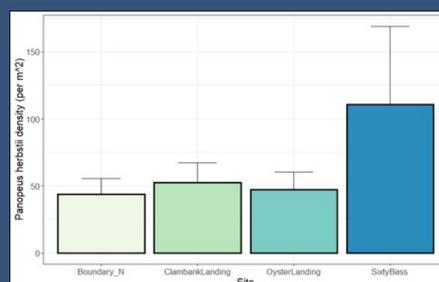


Site was not a significant factor affecting the faunal community (PERMANOVA $p=0.14$).

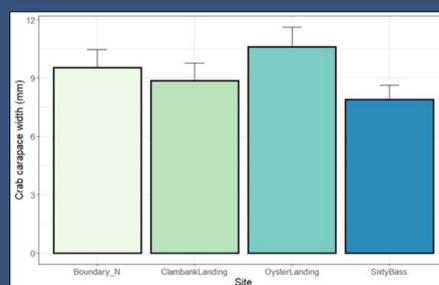
Diversity is a measure of the relative abundance of species in a community. We did not find a significant difference in Shannon Diversity Index between sites (ANOVA $p=0.89$).



Density of *P. herbstii* is the number per shellbasket with an area of 0.057m². We did not find a significant difference in *P. herbstii* Density between sites (ANOVA $p=0.22$).



Crab Carapace Size is the measure across the widest point of the carapace. We found no significant differences in Crab Carapace Size between sites (ANOVA $p=0.23$).

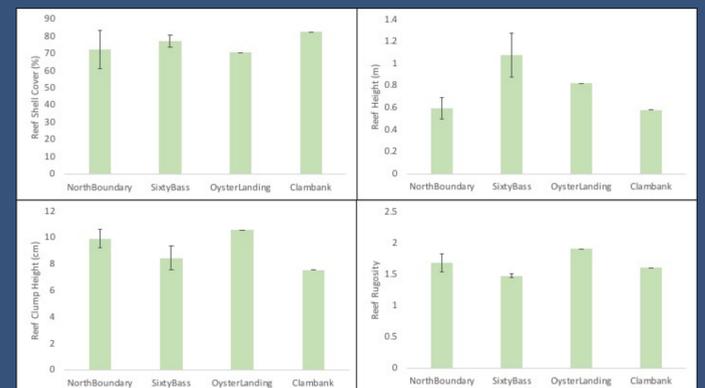


Harvest pressure, proxied by site, was not a significant predictor of our three response variables. This led us to wonder if reef characteristics, rather than harvest, may have more of impact on oyster reef faunal communities.

Impact of Reef Characteristics on Oyster Reef Fauna

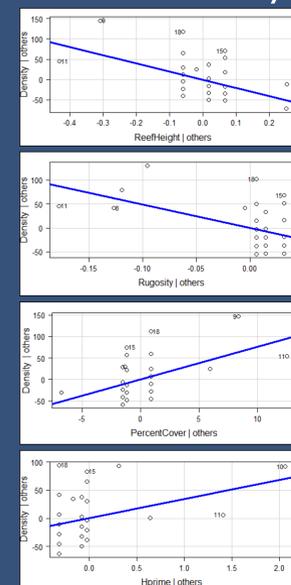


Percent Cover estimated using Image J software

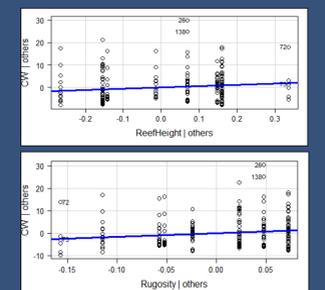


Reef Height, Percent Shell Cover, Rugosity, and Clump Height were predictors of *P. herbstii* Density. Reef Height and Rugosity were predictors of crab size. Shannon Diversity Index was not predicted by any reef characteristic.

P. herbstii Density



Crab Size



<i>P. herbstii</i> Density			
Predictor Variable	Slope	t-value	p-value
Reef Height	-201.9	-3.21	0.003
Rugosity	-493.4	-3.24	0.003
Percent Cover	7.65	3.27	0.002
Clump Height	34.27	2.17	0.037

Crab Size			
Predictor Variable	Slope	t-value	p-value
Reef Height	5.44	1.89	0.05
Rugosity	15.78	2.16	0.03

Key Takeaways: Recreational oyster harvest may be a less important factor in oyster reef faunal communities than reef physical characteristics including Reef Height, Rugosity, Percent Shell Cover, and Clump Height. This could be a result of the high recruitment and fast life history strategy of oysters in North Inlet⁴.

Next Steps:

1. Seasonal sampling differences- winter sampling will be critical
2. Assess other reef metrics such as density, reef area, size-frequency distribution, biomass, inundation duration, depth of inundation
3. Test for differences in reef metrics across sites

