Eastern Oyster restoration project success metrics and goals in the Florida Gulf Coast

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Introduction

- Oyster habitats have faced a population collapse, leading to a reduction of 85% of oyster habitat[1].
- Contributors: overfishing, habitat destruction, natural disaster.
- Multi-milion dollar projects are conducted to restore these reefs but the successes remain undetermined.
- Oysters provide ecosystem services such as filtering/cleaning water, create habitats, and shoreline protection[2].

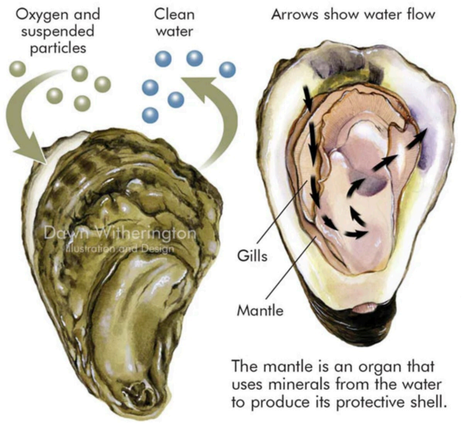

Figure 1. Diagram of the eastern Oyster (*Crassostrea virginica*). **Figure 2**. Map of the distributions of *Crassostrea virginica* in Florida.

Objective

The purpose of this study is to identify and analyze projects in order to reach a deeper understanding of the project metrics, definitions of success, and overall goals

Methods

28 cases in literature were identified and extracted for information.

Case Criteria:
1. Within the state of Florida.
2. Dated anytime between the year 2000-present.
3. Details that entail project action, excluding review papers.

Key concepts that were coded for are displayed in figure 3. These were used for cross comparison.

Example of a thriving oyster habitat.

Substraight placement = 26

Multispecies outplant = 1

General Goal groups	Restoration Method Group
Habitat enhancement	Spat-on shell
Increase oyster population	Substraight + seed
Recover ecosystem services	Seed Deployment
Research	Cultivation of reefs
Habitat creation	Substraight placement
Alternative Species Habitat creation	Multi-species out plant
Biodiversity enhancement	Adult Outplant

Examples of data extracted with common themes.

Results

53% of cases monitored post-restoration.

Project timelines ranged from 6 months to 11 years. Some projected to monitor until 2050.

78% of cases did not have any defined success metric thresholds.

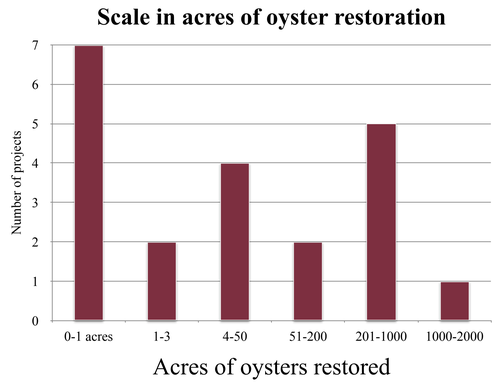

Figure 3. Number of acres of *Crassostrea virginica*a habitat source listed as restored.

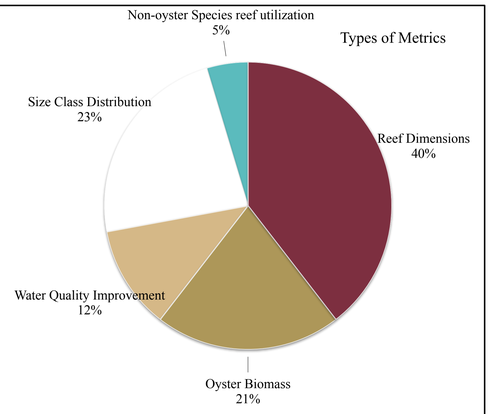

Figure 5. Percentage of success metrics the projects were aiming to see an increase or change in that is quantifiable in some way.

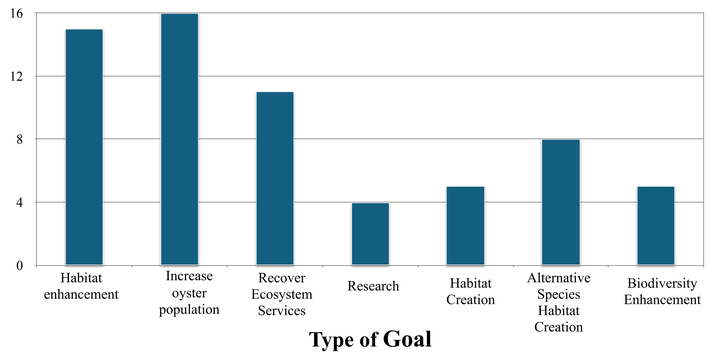

Figure 4. Number of times a specific goal was referenced in a source. Multiple goals were allowed, but limited to three per project.

Discussion/Results

- Oyster habitats are located on all coasts of Florida. (Fig 2). Yet, our data found majority of restoration projects were located on the North West Coast.
- The majority of projects were conducted on a small scale, under an acre (Fig 3).
- Larger projects focused more on ecosystem health recovery, smaller acre projects were community education based.
- All projects defined restoration goals in some form (Fig 4).
- Success metrics to meet the goals were described qualitatively, we found no defined metric thresholds.

Questions Raised:
1. How can a project be deemed successful if it has no quantifiable objective to fill?
2. If a project has zero follow-ups/monitoring, what is deeming its success?
3. Is money the main constricting factor for restoration method?
4. Given the primary restoration method was substrate placement, does this imply that substrate limitation is the primary cause of decline?

Implications

- Recommendations for future restoration: Develop a pre-restoration assessment of proposed areas for comparison and to help inform specific restoration goals for specific project.
- Implement a guideline to restoration projects that quantify and standardize success metrics.
- Establish guidelines for timing of monitoring success metrics and associated outcomes.
- State policy-makers can standardize these practices across the state for comparison.

Acknowledgments

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Literature Cited

1. Beck, Michael W., et al. "Oyster reefs at risk and recommendations for conservation, restoration, and management." *BioScience*, vol. 61, no. 2, Feb. 2011, pp. 107–116, https://doi.org/10.1525/bio.2011.61.2.5.
2. Fisheries, NOAA. "Oyster Reef Habitat." *NOAA*, 4 Feb. 2022, www.fisheries.noaa.gov/national/habitat-conservation/oyster-reef-habitat#:~:text=Oysters%20are%20a%20crucial%20component,and%20protecting%20productive%20estuary%20waters.

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