

Science for decision-making:

Moving oyster reef restoration science forward through collaboration and innovation

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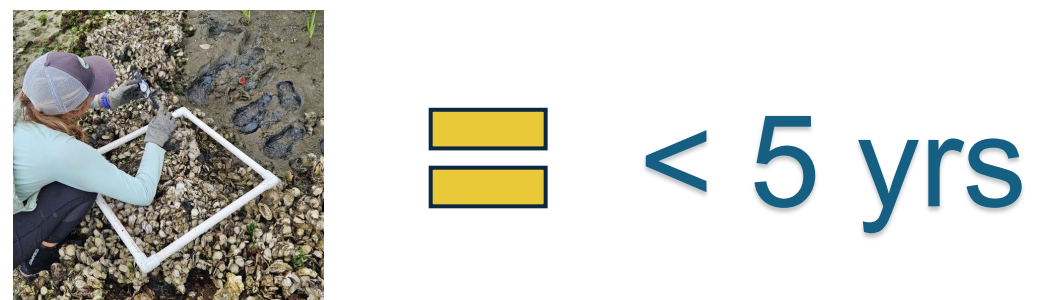
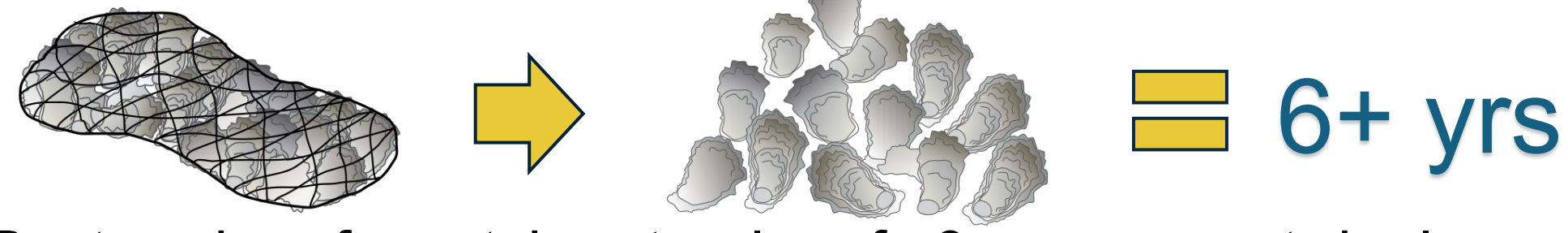


Overview

University researchers, resource managers, and NGO scientists worked together to create a guidance document for long-term monitoring and management of aging intertidal oyster reef restoration projects.

Motivation

The goals of oyster reef restoration are often recovery of ecological and ecosystem services; however, restored reefs are often not monitored long enough to capture the return of these services and evaluate project success^{1,2,3}.

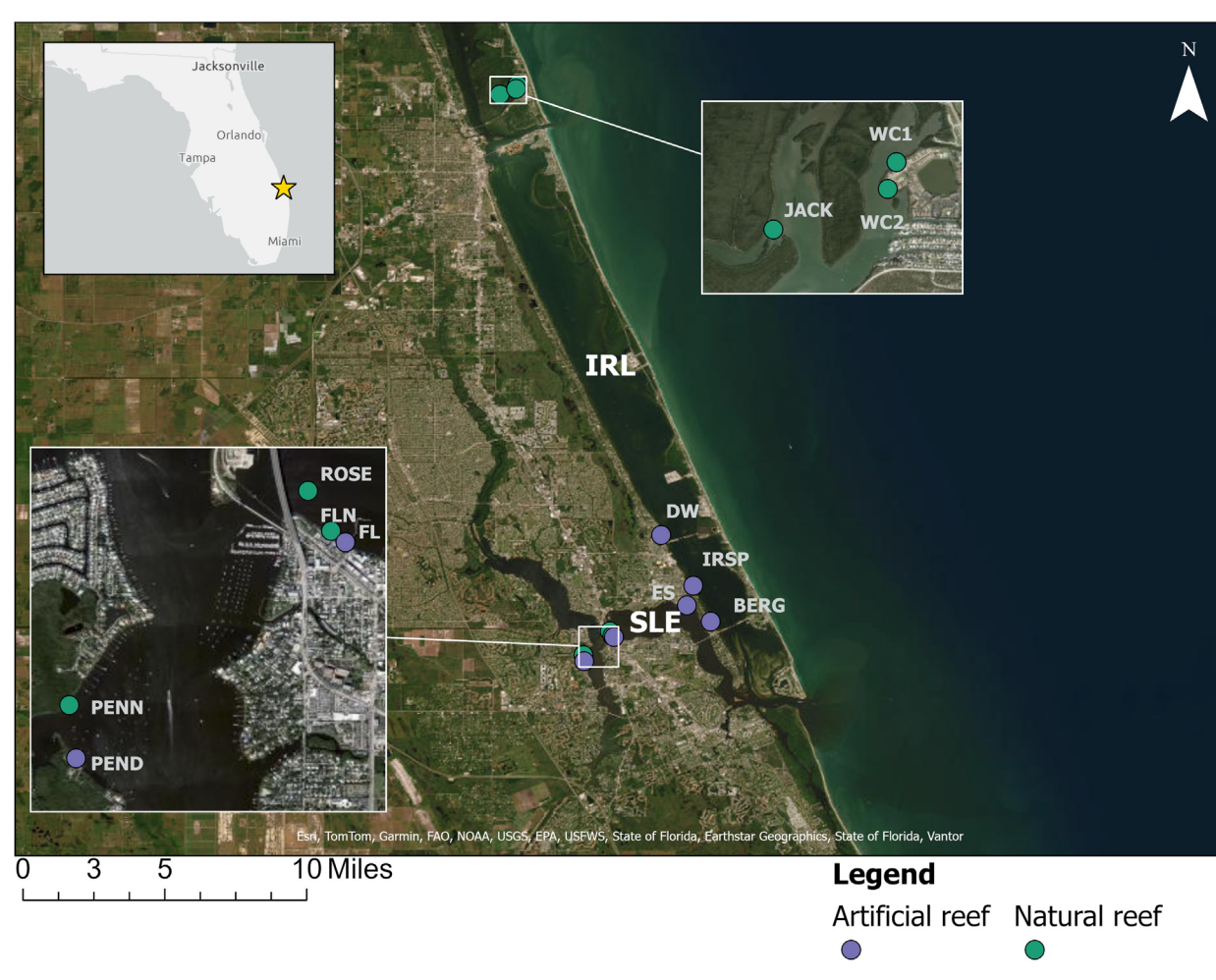


Project goals:

- Evaluate long-term success of aging human-made reefs through comparison to natural reefs.
- Create a guidance document to encourage long-term oyster project monitoring.

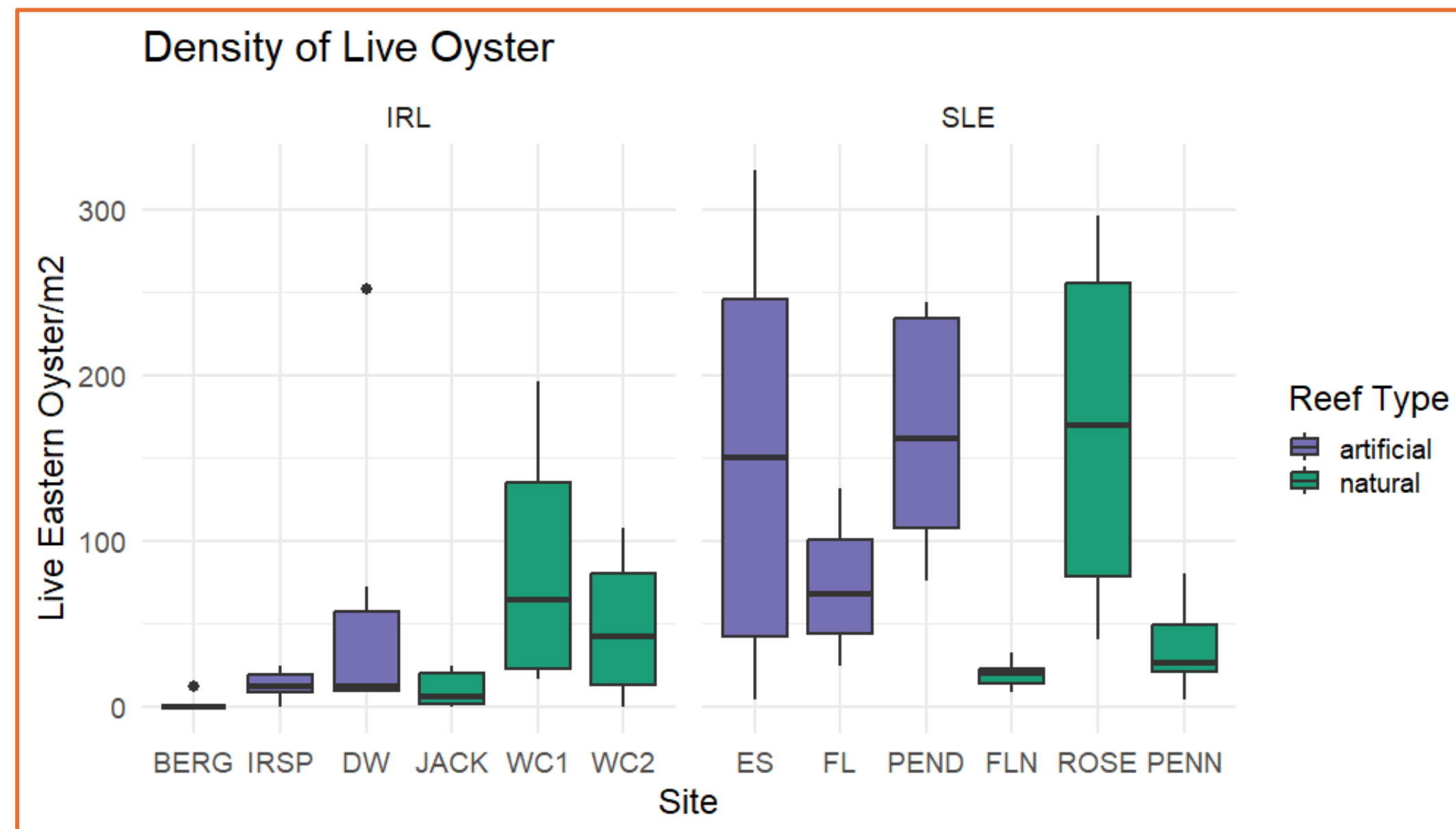
Methods

Our team conducted a case study in the southern Indian River Lagoon (IRL) and St Lucie Estuary (SLE) comparing aging (6+ yrs) human-made reefs (IRL n = 3, SLE n = 3) to natural reefs (IRL n = 3, SLE n = 3) by sampling for multiple metrics to evaluate project success.



Case Study Results

Results of each metric were analyzed by reef site.



Results were then used to evaluate site success.

Success Metric	BERG	IRSP	DW	ES	FL	PEND	Legend
Mean percent cover live oysters	-	-	+	-	+	+	+ similar or exceeds natural reef average for waterbody
Mean density live oysters	-	-	+	+	+	+	- below natural reef average for waterbody
Mean shell height	-	-	-	-	+	-	- low adult & no harvest size oysters
Size class frequencies	-	-	-	-	+	+	+ maintained height - height decreased
Mean reef height	-	-	-	+	-	-	+ similar or exceeds natural reef average for waterbody
Mean reef rugosity	+	+	+	+	+	+	
Mean spat settlement	+	+	+	+	+	+	
Associated organism richness	+	+	+	+	+	+	
Mean mud crab abundance	+	+	+	+	+	+	

Document Features

- Detailed SOPs for every metric
- Invertebrate & fish ID guides
- Wave gauge programming GitHub
- Case study results



Contact

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Long-term Monitoring Recommendations

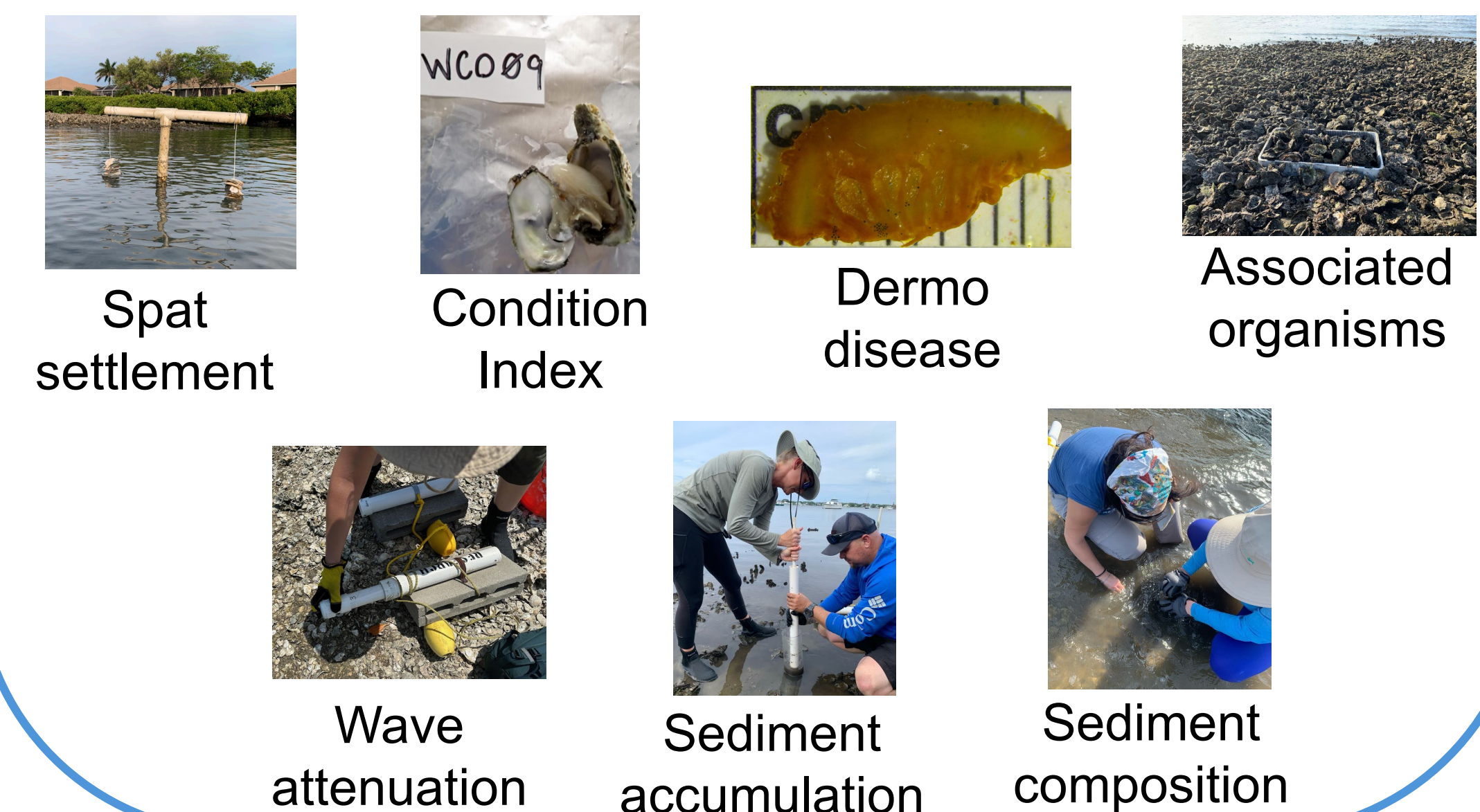
Tier 1: Minimum Core Metrics



Tier 2: Recommended Metrics



Tier 3: Advanced/Research Metrics



References

¹Hemraj, D.A., Bishop, M.J., Hancock, B., Minuti, J.J., Thurstan, R.H., Zu Ermgassen, P.S.E., & Russell, B.D. (2022). Oyster reef restoration fails to recoup global historic ecosystem losses despite substantial biodiversity gain. *Science Advances*, 8(47).

²Kennedy, V.S., Breitbart, D.L., Christman, M.C., Luckenbach, M.W., Paynter, K., Kramer, J., Sellner, K.G., Dew-Baxter, J., Keller, C., & Mann, R. (2011). Lessons learned from efforts to restore oyster populations in Maryland and Virginia, 1990 to 2007. *Journal of Shellfish Research*, 30(3), 719-731.

³Smith, R.S., Lusk, B., Castorani, M.C.N. (2022). Restored oyster reefs match multiple functions of natural reefs within a decade. *Conservation Letters*, 15.