Guidance for Monitoring Oyster Reefs in Florida

Florida Oyster Recover Science (FORS) Working Group

Oyster Monitoring Subcommittee

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Objectives for Monitoring subcommittee

1. Provide guidance on designing oyster monitoring projects, including minimum recommended monitoring metrics and references to existing accepted method

2. Identify knowledge gaps and prioritize research needs related to oyster monitoring.

Identify the monitoring goal

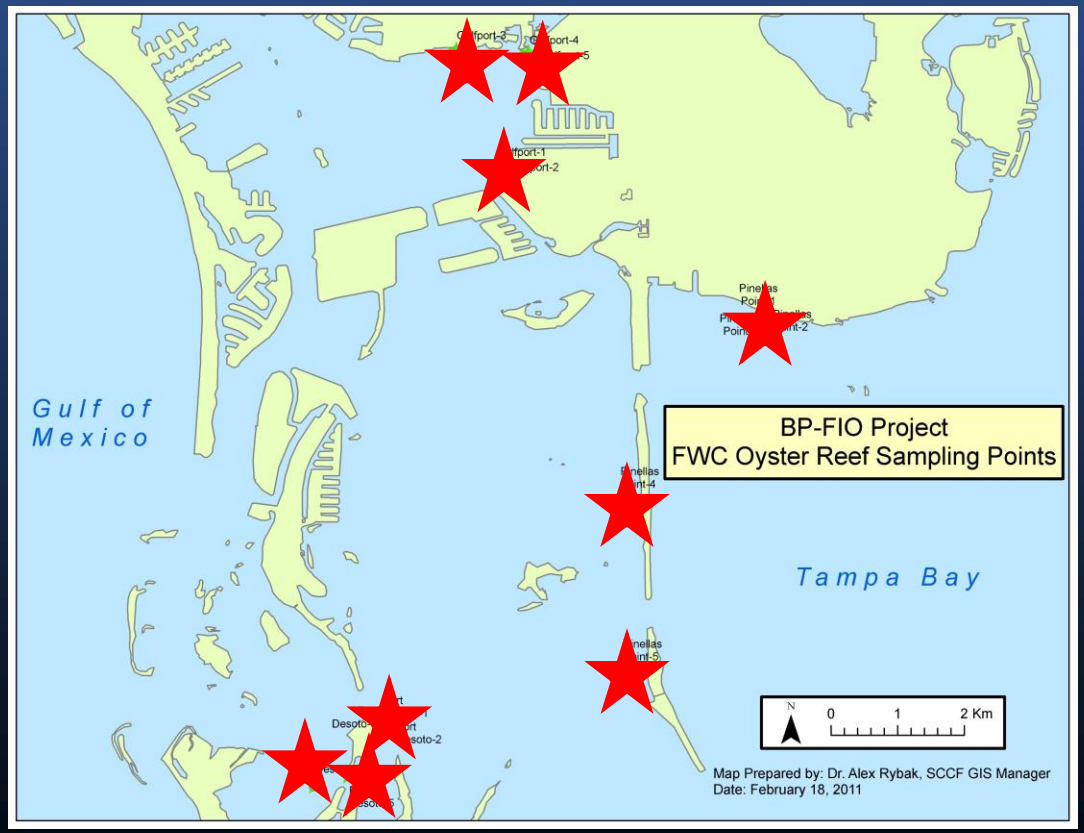
1. Detect spatial or temporal changes in a region or an estuary through long-term monitoring

2. Detect small scale changes such as fisheries, restoration or enhancement actions, acute events

3. Many programs blend these two objectives

Sample Design

1. Define the spatial extent of the area to be monitored
2. Define the sampling frequency and duration
3. Quadrat Placement (assuming basic measure is density)
4. Sample Size



Selection of the sample locations

1. The best sample program design will be enabled with the most thorough mapping of the target region

2. Random or Stratified Random vs Fixed

3. What is the sample unit ? (typical unit is “reef” but designation of transects based on area is one alternative)

Sample frequency

1. In Florida we need to acknowledge there are seasonal patterns.

2. With one annual sample a winter sample post-spawn is least likely to be affected by large spat-sets

3. If possible, sample just before spawning (spring) and after (fall)

4. If monitoring for fisheries management, sampling maybe dictated by the season

Quadrat Placement

1. The best sample design is enabled when the reef area is known precisely

2. In ideal conditions fixed quadrats on transects placed across the major gradient (often elevation) can lead to the lowest variance

3. In some cases of very irregular reefs stratified random quadrats would be an alternative

4. In many cases, especially subtidal reefs, haphazard placement may be the most logistically feasible approach

What are some off the other metrics?

Baggett LP, Powers SP, Brumbaugh R, Coen LD, et al. 2014. Oyster habitat restoration monitoring and assessment handbook. Arlington, VA: The Nature Conservancy. http://www.oyster-restoration.org/wp-content/uploads/2014/01/Oyster-Habitat-Restoration-Monitoring-and-Assessment-Handbook.pdf

FWRI (Fish and Wildlife Research Institute). 2021. Florida Fish and Wildlife Conservation Commission Fish and Wildlife Research Institute Oyster Monitoring Procedures. Chapter 11 in: Radabaugh KR, Moyer RP, Geiger SP (editors) Oyster Integrated Mapping and Monitoring Program Report for the State of Florida. St. Petersburg, FL: Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission. FWRI Technical Report 22, Version 2. https://myfwc.com/media/27745/oimmp-v2-ch11.pdf

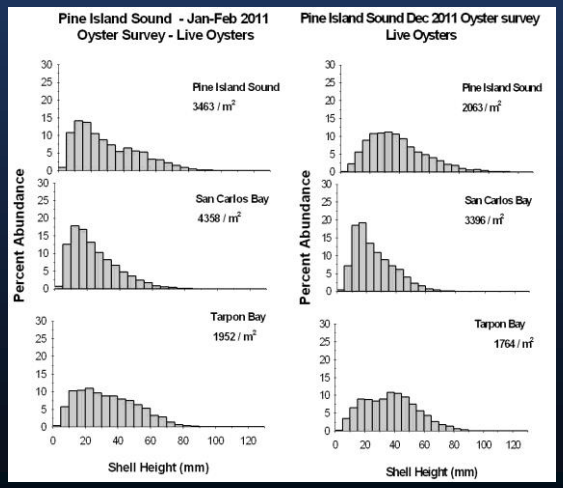
Dix N, Marcum P. 2018. Oyster monitoring protocol. Guana Tolomato Matanzas National Estuarine Research Reserve. May 2018 revision. https://drive.google.com/file/d/1INi7fm_TF4liiAcE2SgFS6silL4ZqUC3/view

What are some off the other metrics?

Water quality
Shell budget metrics
Reef height
Reef Thickness
Reef area
Cluster Density
Burial/Sedimentation
Slope
Reef type

Shell Height
Disease
Shell pests
Reef fauna
Associated fauna

Spat Settlement
Reproductive state
Growth rate
Mortality
Condition index



Data analysis

Analysis will largely be driven by stated goals:

1. Long term monitoring
2. Is this an impact assessment
3. Is the project related to harvest management
4. Is the project an evaluation of restoration

Questions for FORS Monitoring Subcommittee OIMMP meeting discussion

1. Should we count all oysters (including spat) while monitoring on a reef, or should we set a minimum size?

a) Is misidentification of spat with other species (e.g., jingle shells, slipper shells) more problematic for smaller oysters? If so, is there a size where misidentification becomes less problematic?

b) Do you think counting small spat increases the error rate between observers?

c) Do you think there is a bias towards larger or smaller oysters when only a subset of oysters are measured within a quadrat?

d) How do different size-counting strategies affect review of historical data?

2. What counting biases occur when counting oysters on a reef with very high density? What counting biases occur on reefs with very low density?

3. How useful is it to include other metrics such as disease, predator density, faunal community, and growth rate to monitoring efforts?
Are there other metrics we need that are not commonly monitored?

4. When quantifying the volume of shell on a reef, how deep should we dig to remove shell (to a specified depth, stop at black shell, other metric)?
Would reef volume or rugosity be more meaningful?