THE APALACHICOLA BAY SYSTEM INITIATIVE (ABSI)

SCIENCE UPDATE
Community Advisory Board Meeting
February 1, 2023

Funded by Triumph Gulf Coast Inc. in April 2019
ABSI overarching goals are:

- Understand why the Apalachicola Bay oyster populations have not recovered and identify restoration approaches that will inform larger efforts
- Determine whether loss of oyster populations is causing a decline in overall ecosystem health?
- Work with local stakeholders to develop a science-based restoration and management plan for Apalachicola Bay
ABSICOMPONENTS

Research

- Restoration experiments
- Management strategies
- Community Advisory Board

Science Advisory Board
Table of Contents

1. Introduction 6
2. Habitat and environment 6
   2.1 Subtidal mapping 6
   2.2 Fresh-water flow dynamics 8
   2.3 Bio-physical model of the Apalachicola Bay System 9
   2.4 Predictive habitat suitability modeling 12
3. Oyster biology 14
   3.1 Genetic structure 14
   3.2 Disease and other stressors 19
      3.2.1 Identifying the impacts of disease on oysters 19
      3.2.2 Understanding disease thresholds in the Apalachicola Bay 20
      3.3 Exploring consequences of disease for Apalachicola Bay 20
   3.3 Stress responses and physiological tolerances 21
   3.4 Effect of salinity on juvenile oysters 23
   3.5 Stress responses of oyster early life-stages 24
4. Oyster ecology 24
   4.1 Intertidal monitoring 24
   4.2 Spatial and temporal patterns of intertidal oyster reefs 30
   4.3 Subtidal monitoring 32
   4.4 Intertidal and subtidal recruitment 35
   4.5 Impacts of oyster populations on community development 37
5. Restoration 38
   5.1 Oyster restoration experiments 38
   5.2 Improving restoration success in the bay scallop 40
6. System ecology 43
   6.1 Apalachicola Bay food web and sediments: 1994 vs. 2020 43
   6.2 Influence of oysters on function and change in coastal ecosystems 48
      6.2.1 Investigating changing benthic sediment characteristics ...... 49
      6.2.2 Oyster Shell Dissolution Dynamics ...... 50
      6.2.3 Coastal carbon dynamics occurring because of mangrove ...... 51
      6.2.4 Vulnerability of regional wetlands to sea-level rise ...... 53
   6.3 Apalachicola Bay environmental evolution and pollutant status 54
7. Research hatchery 58
   7.1 Hatchery accomplishments in 2021 58
   7.2 Hatchery goals for 2022 60
8. Outreach and Education 62
   8.1 Targeted outreach to the community 62
      8.1.1 Community Advisory Board 62
      8.1.2 Outreach and Education Subcommittee 63
      8.1.3 Successor Group Subcommittee 65
      8.1.4 Oystermen’s workshops 65
      8.1.5 Public outreach (in-person and virtual) 67
   8.2 ABSI website/online education 68
   8.3 Local news coverage 70
   8.4 Shell recycling program 71
9. Literature cited 71

https://marinelab.fsu.edu/absi/about-absi/
Development of a public-facing interactive tool
Habitat suitability models

Environmental project
Adam Alfasso*, Sandra Brooke

- Which areas are currently most likely to support oyster recruitment, growth and survival?
  - How will these areas change under future climate scenarios?
- What substrate types are most conducive to oyster population development?
- How do seasonal environmental regimes affect habitat suitability patterns?
- How do seasonal variations in larval dispersal impact habitat suitability patterns?
  - Is population connectivity an important variable for habitat suitability?
- Which areas within Apalachicola would be optimal for sanctuary (protected) reefs?
Working toward an analytical model

- Developing data management plan
- Implementing data QAQC
- Merging data streams into user-friendly master database(s)
- Master database(s) provide the means to build quantitative models and test hypotheses
Tonging surveys

Goals of the tonging surveys are:
- Understand oyster population status across the bay.
- Identify regions that are doing well/poorly
- Identify substrates that are doing well/poorly

Round 1 (2020/21): 154 sites
Round 2 (2021-22): 121 sites
Round 3 (2023): >200 sites

At each survey site:
- 6 tong samples around boat
- Type, volume, weight of substrate recorded
- Oysters counted and measured
- Boxes counted by size (spat, seed, market)
- Predators counted
2021-22 survey by region
2021-22 survey by substrate

Limerock is the only successful substrate

Other substrates do not support oysters
Limerock is not toxic.
Limerock is not the same as quicklime.
Tonging surveys 2023

Bay overlaid with 1nm² grid
Oyster survival and growth

1. Experimental approach

Cages with seed oysters deployed on ABSI restoration reefs on Jan 27, 2023

- Cages deployed on shell reefs
- 5 cages on Dry Bar
- 5 cages on Peanut Ridge
- 50 seed oysters (~31mm) per cage
- Number of live and dead will be counted and measured monthly
- Survivorship and growth curves compared across sites.

2. Analytical approach

Use existing data from FWC and FDEP to model survival and growth

Initiated in response to suggestions from Science Advisory Board meeting in December 2022
Location: Cat Point

Treatments:
1. Limerock ~5-8” (12-18 cm) diameter
2. Concrete ~4-6” (10-15 cm) diameter
3. Limerock ~5-8” (12-18 cm) and shell

Reef height: 18 inches (45 cm)
Reef footprint: 50 x 50 ft (15 x 15 m)
Replicates: 4 per treatment
Total: 12 reefs