Is Water Quality Suitable for Oyster Reef Development in Naples Bay? A Reef Restoration Demonstration Project

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Introduction

- Suitability of Naples Bay to support oyster reefs.
- Demonstration project: Are conditions presently appropriate for reef development?
- Beginning of habitat restoration for Naples Bay.

Conditions for Oyster Reef Sustainability

- Suitable substrate: coarse-grained sediment, stable, little traction transport.
- Appropriate salinity: brackish water.
- Low rates of suspended sedimentation.
- Low levels of pollutants.
- Sustainable broodstock.


TAITRON

Naples Bay's Current Environmental Problems

- Loss of intertidal habitat & coastal fringe due to dredging & construction of bulkheads & marinas.
- Water management practices: Golden Gate Canal System and freshwater inundation.
- Storm-water runoff from urban surroundings.

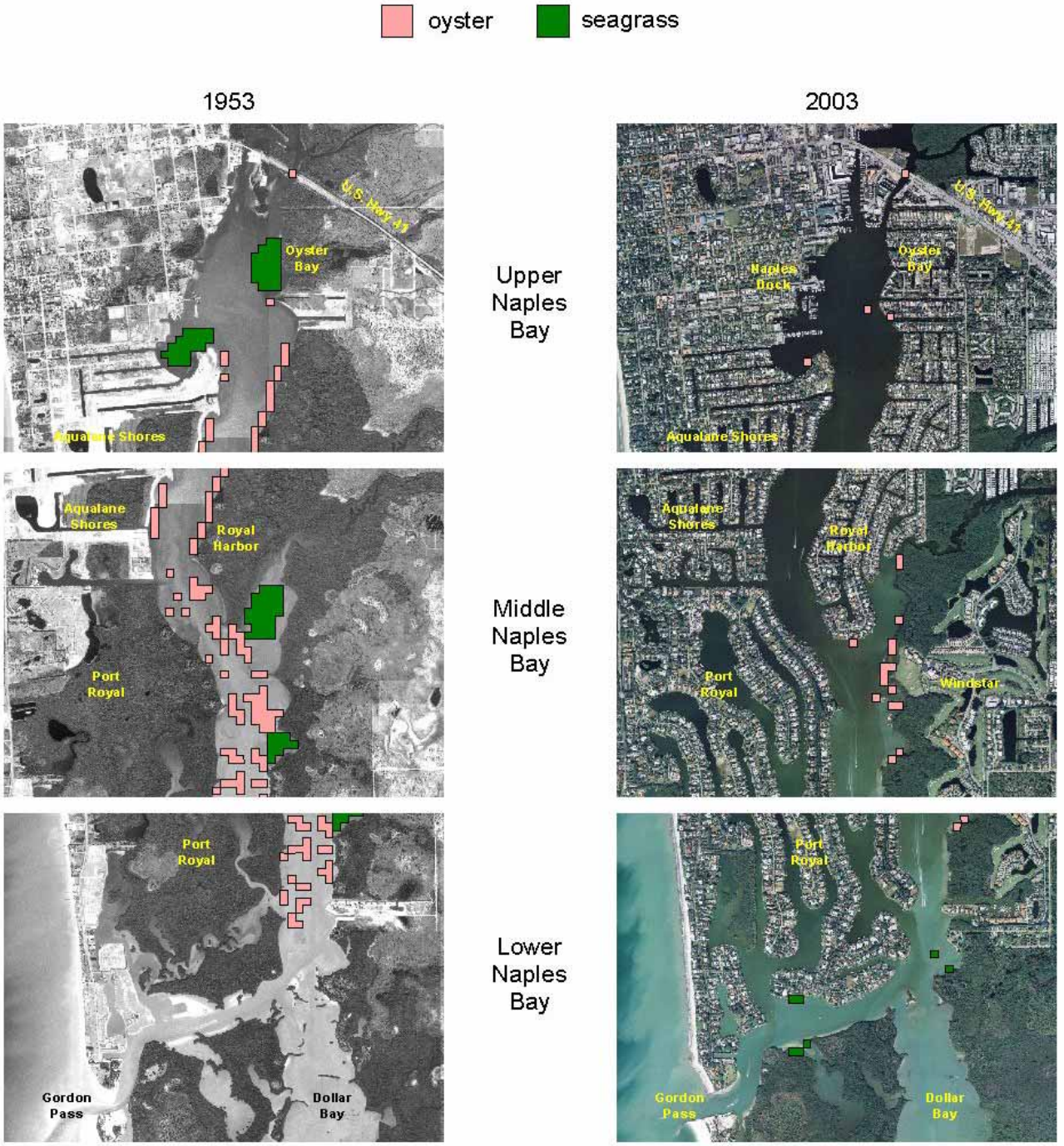
Naples Bay

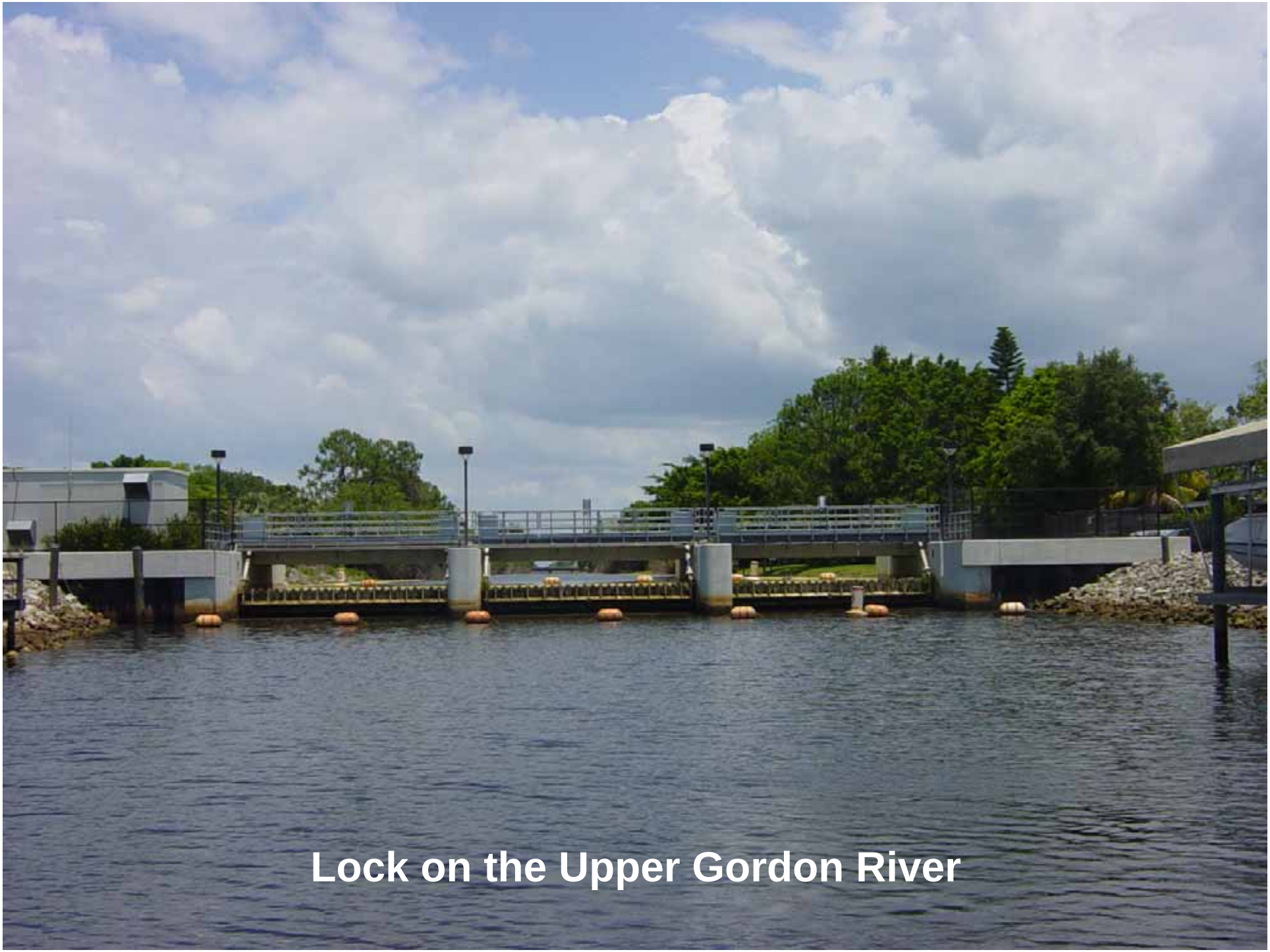
Schmid et al. 2006

1950 **2000**

Oyster Reef Distribution 1953 & 2003

Schmid et al. 2006





Lock on the Upper Gordon River

Central Question

- If a suitable substrate is provided, through construction of a reef foundation, are the water quality conditions appropriate for sustainable reef development (i.e., healthy growth and reproduction)?

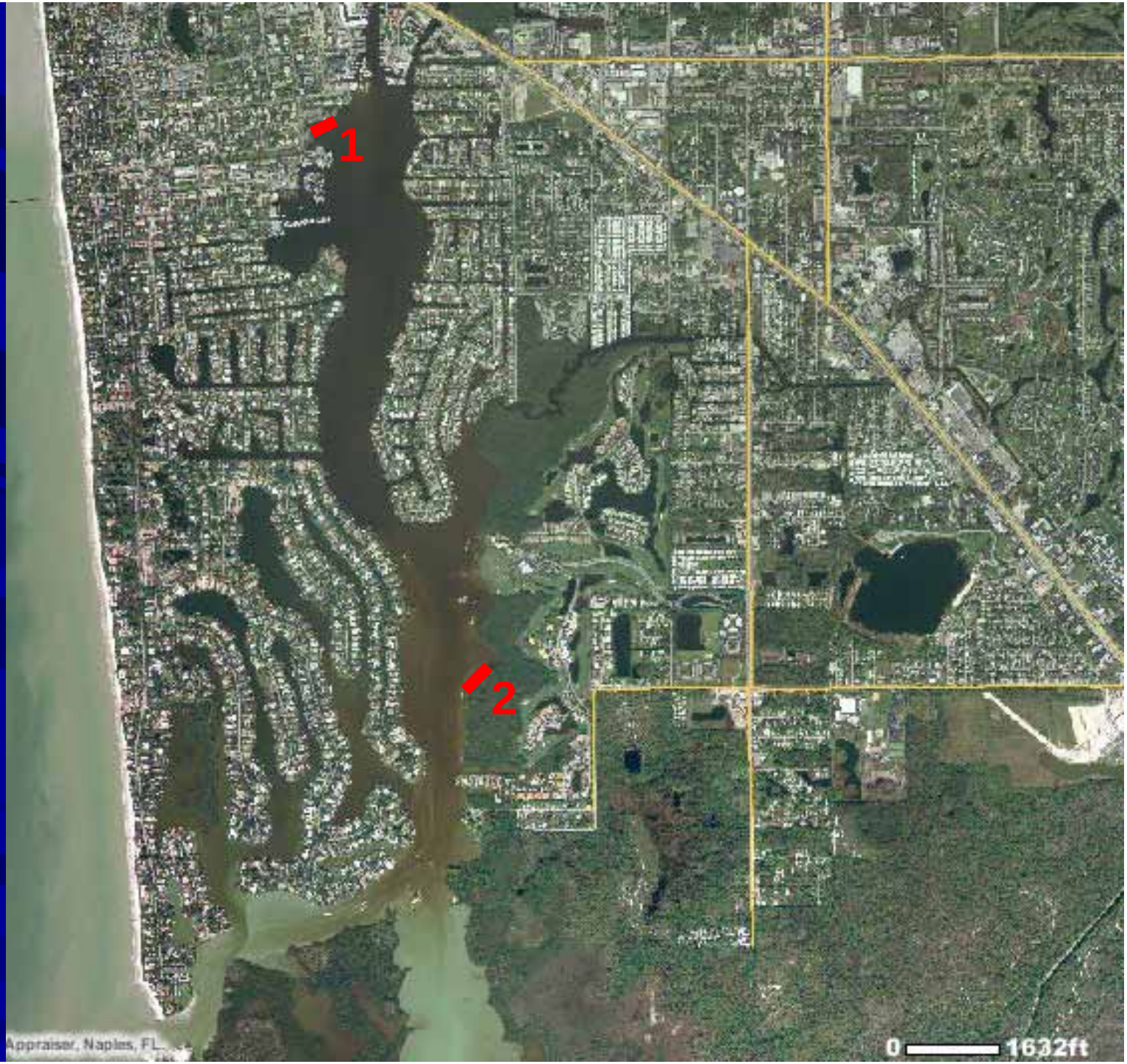
Experimental Design

- Two reef foundations constructed in different salinity regimes.
- Use fossil shell (cultch) to build a raised substrate.
- Rely on natural and artificial recruitment of oysters.
- Recruitment and survival monitored using “living densities”.

Reef Localities

1 Naples Landing

2 South Bay



Building of Reef Foundation

- Use of shell cultch & shell loaves.
- Conducted on Sept 17, 2005. Postponed because of Hurricane Katrina.
- 50 volunteers, 4 boats, 400 bags of oyster cultch.
- Volunteers from: FGCU, City of Naples, Rookery Bay NERR, Mariner High School, Twin Eagles Golf Club, and Naples Dock & Marine.

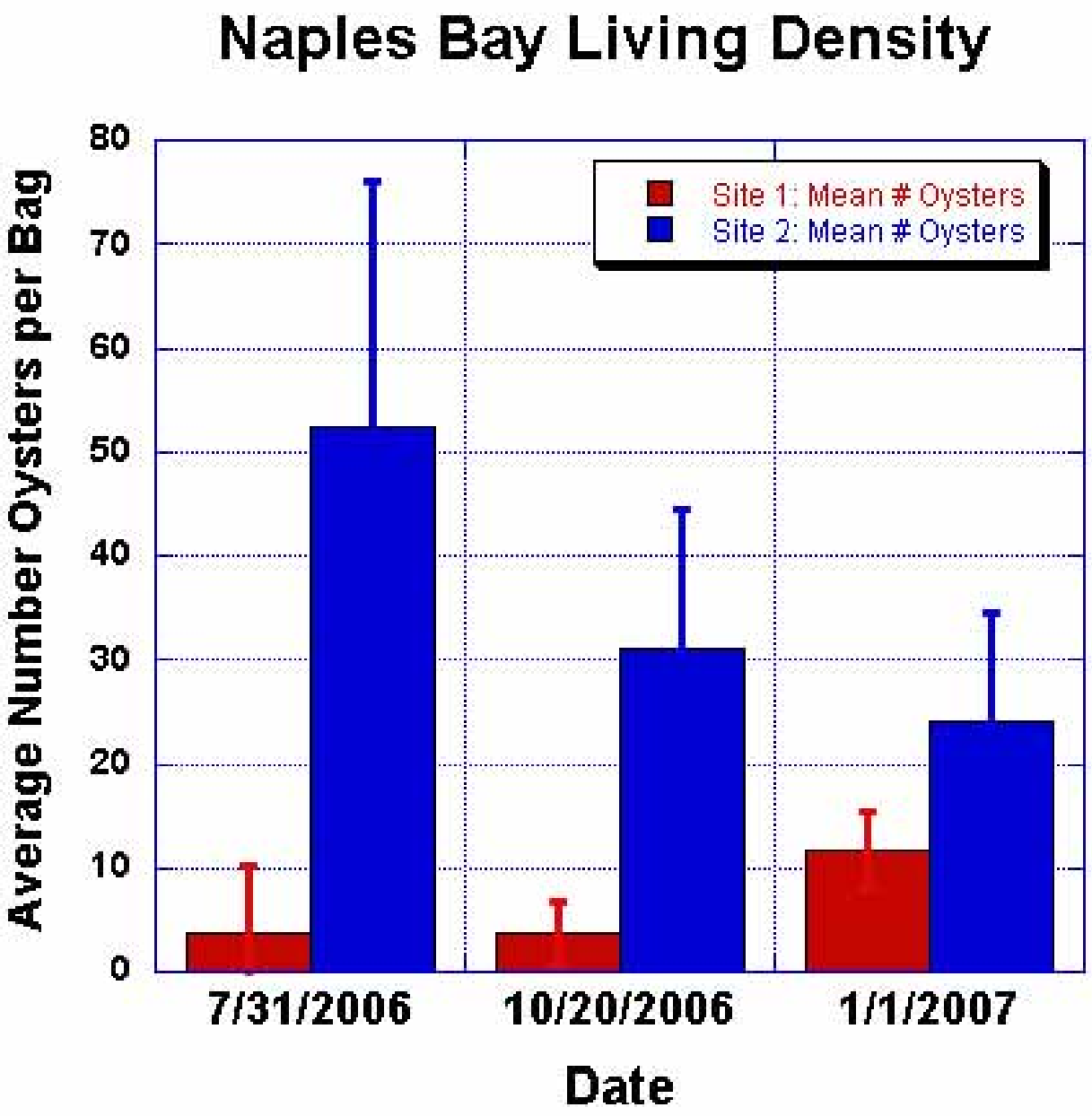
Building the Substrate
Transporting loaves to site

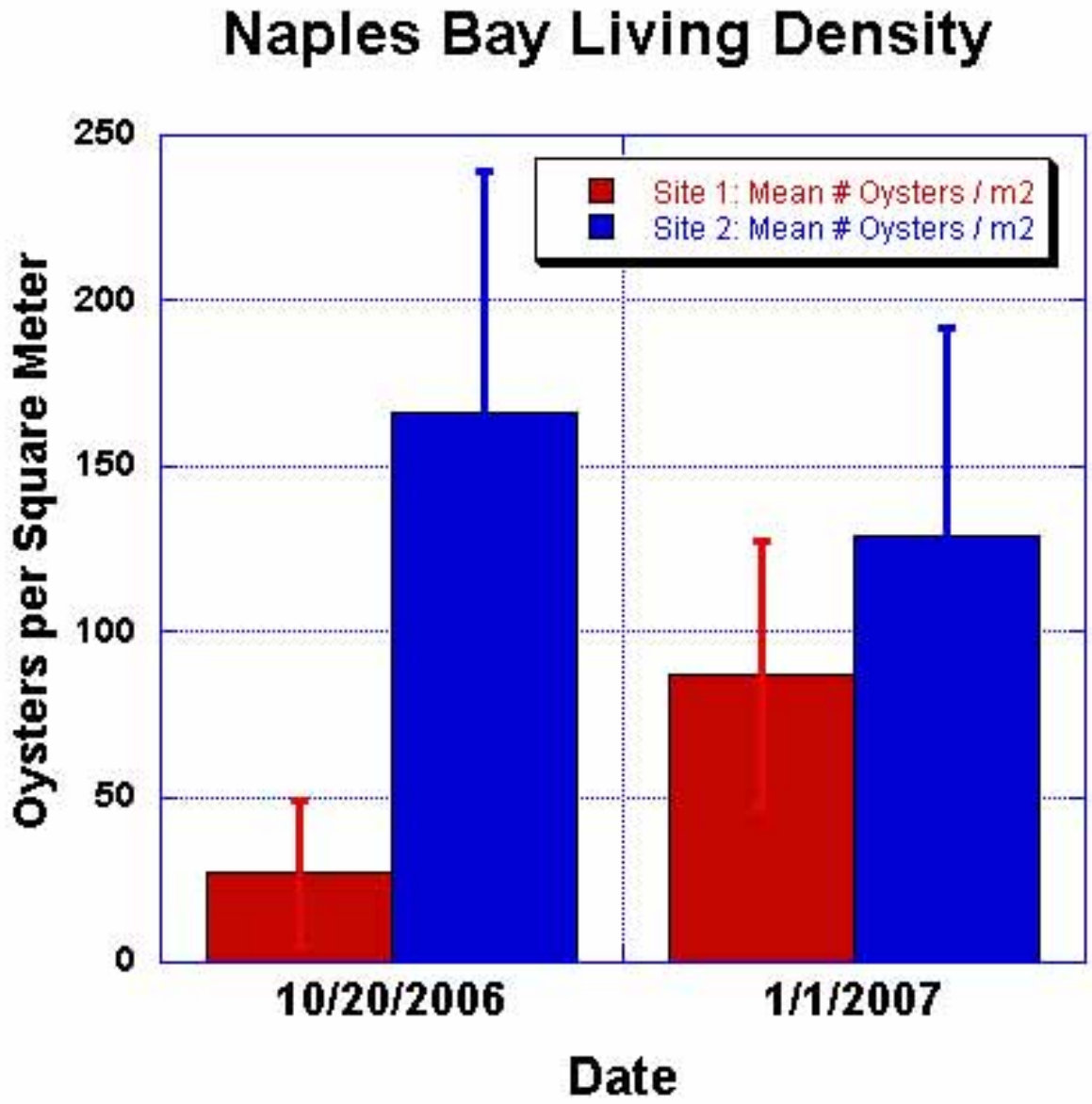

Building the Substrate
Placing loaves on the sea floor
SEP 17 2005

Site 1: Naples Landing

Site 2: South Bay

Quarterly Monitoring of Living Density


Naples Bay Living Density
Average Number Oysters per Bag
80
70
60
50
40
30
20
10
0
Site 1: Mean # Oysters
Site 2: Mean # Oysters
7/31/2006
10/20/2006
1/1/2007
Date


Naples Bay Living Density
Site 1: Mean # Oysters / m2
Site 2: Mean # Oysters / m2
Oysters per Square Meter
250
200
150
100
50
0
10/20/2006
1/1/2007
Date

Observations

- Seeded oysters did not establish.
- Natural recruitment and survival low.
- Densities low at both sites relative to pristine estuaries; site 1 had extremely low densities.
- Site 2 was highly agitated due to boat wakes.
- Both sites 1 & 2 experience high rates of sedimentation and oyster smothering.
- Site 2 experienced prolific fleshy algal growth.
- Not recruit limited.

Conclusions

- Even with appropriate substrate, sustainable reef development is not achieved.
- Some aspect of water quality (i.e., salinity, sedimentation, contaminants) is prohibiting reef development.
- Site 2, downstream, presently shows greater restoration potential, but a more protected environment is needed.
- Caveat: Monitoring of reef development was limited to 4 quarterly efforts.
- Follow up research . . .

Acknowledgments

- South Florida Water Management District
- City of Naples
- Community Volunteers
- Naples Dock & Marine
- FGCU Students & Interns

Photo by D. Graff