Gulf of Mexico Oyster Restoration

Deepwater Horizon Oyster Restoration Strategy- Laurie Rounds, NOAA

Oyster Integrated Monitoring and Mapping Program Workshop
St. Augustine, Florida
February 24, 2017

Presentation Overview

TOPICS

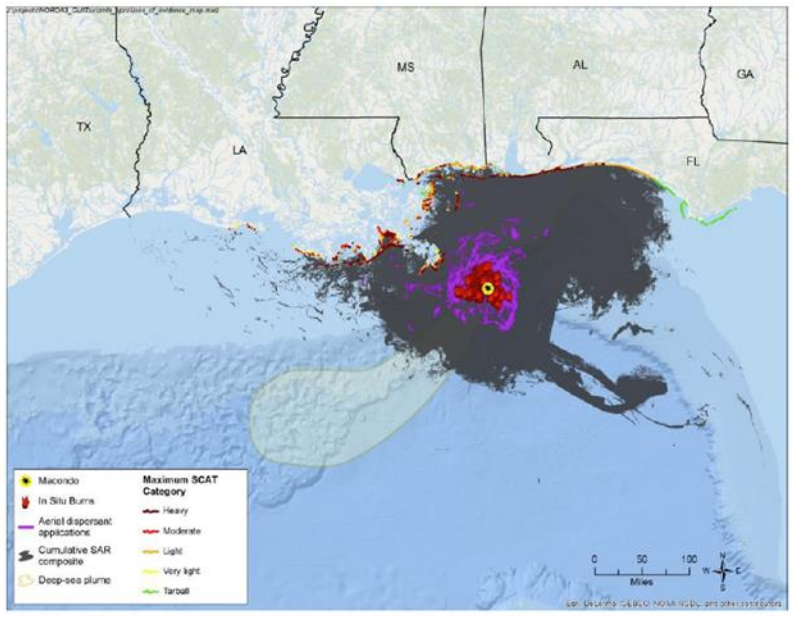
- *Deepwater Horizon* Natural Resource Damage Assessment
- Oyster Injury Assessment Data
- Oyster Restoration
- Monitoring and Adaptive Management for Restoration
- Restoration Data

SOURCES

- DWH Oil Spill Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement- www.gulfspillrestoration.noaa.gov/restoration-planning/gulf-plan
- DWH Administrative Record- Preassessment/ assessment- Oyster Injury- https://www.doi.gov/deepwaterhorizon/adminrecord

Deepwater Horizon Oil Spill

- Largest offshore oil spill in our nation's history
- More than 1,300 miles of shoreline fouled by oil
- Oil slicks were observed cumulatively across 43,300 square miles



Source: Abt Associates.

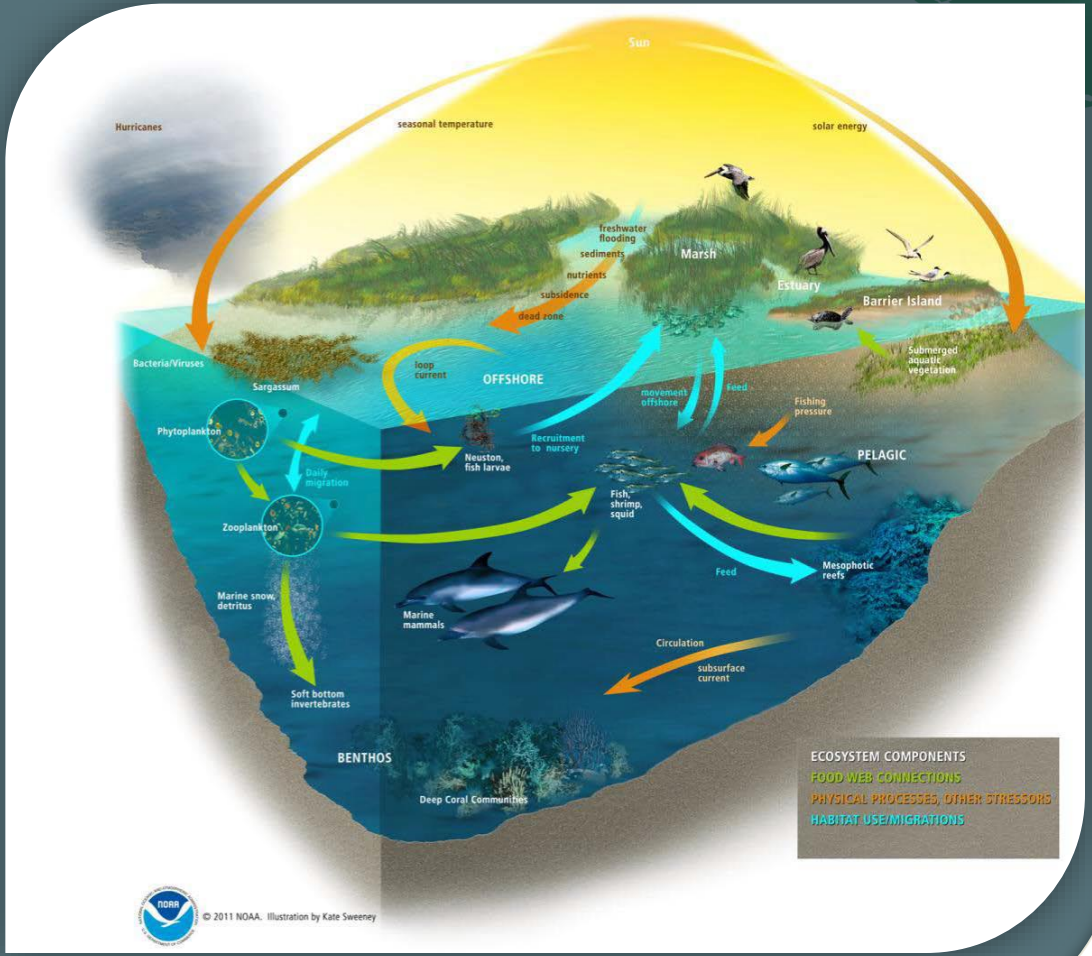
Figure 4.2-3. The cumulative DWH oil footprint covered a large swath of the northern Gulf of Mexico. Most surface slicks traveled toward shore, intersecting at least 2,100 kilometers (1,300 miles) of shoreline; some slicks followed currents to the southeast. A deep-sea plume migrated more than 400 kilometers (250 miles) southwest of the well (Payne & Driskell 2015a). In response to the surface slicks, more than 400 flights quantitatively sprayed dispersant, and more than 400 fires were set to burn off surface oil. These data are all discussed in greater detail throughout this section.

Ecosystem Impacts

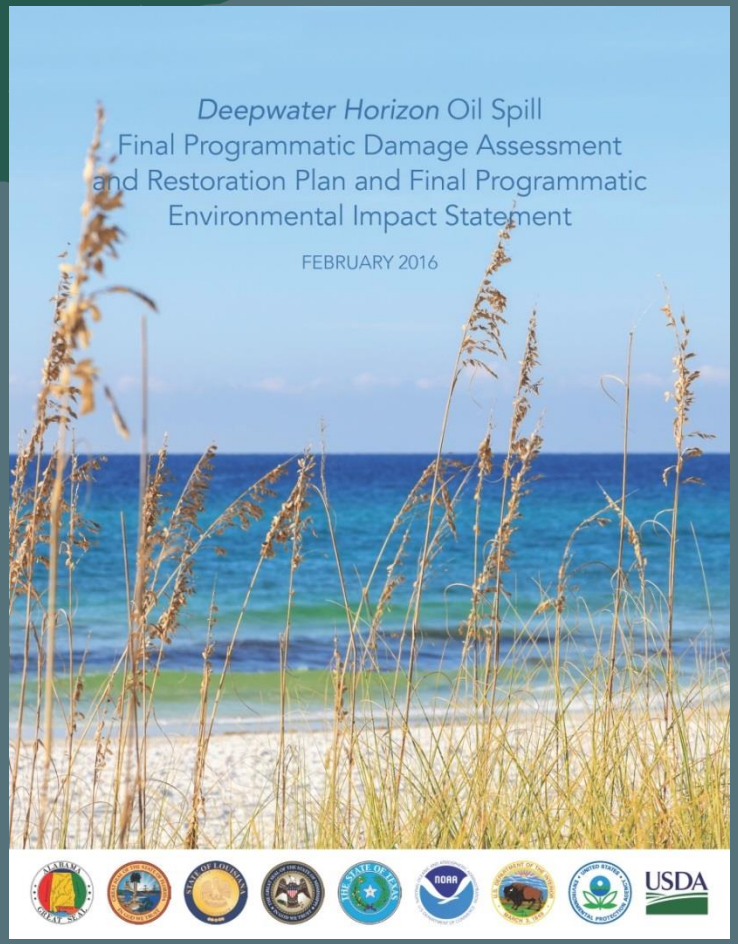
The Gulf of Mexico is a highly diverse & ecologically rich ecosystem.

Highly interdependent network of organisms (from microbes to plants to animals) and their chemical, biological, and physical environment.

All these resources were threatened and many were injured, some severely, as a result of the *Deepwater Horizon* incident.



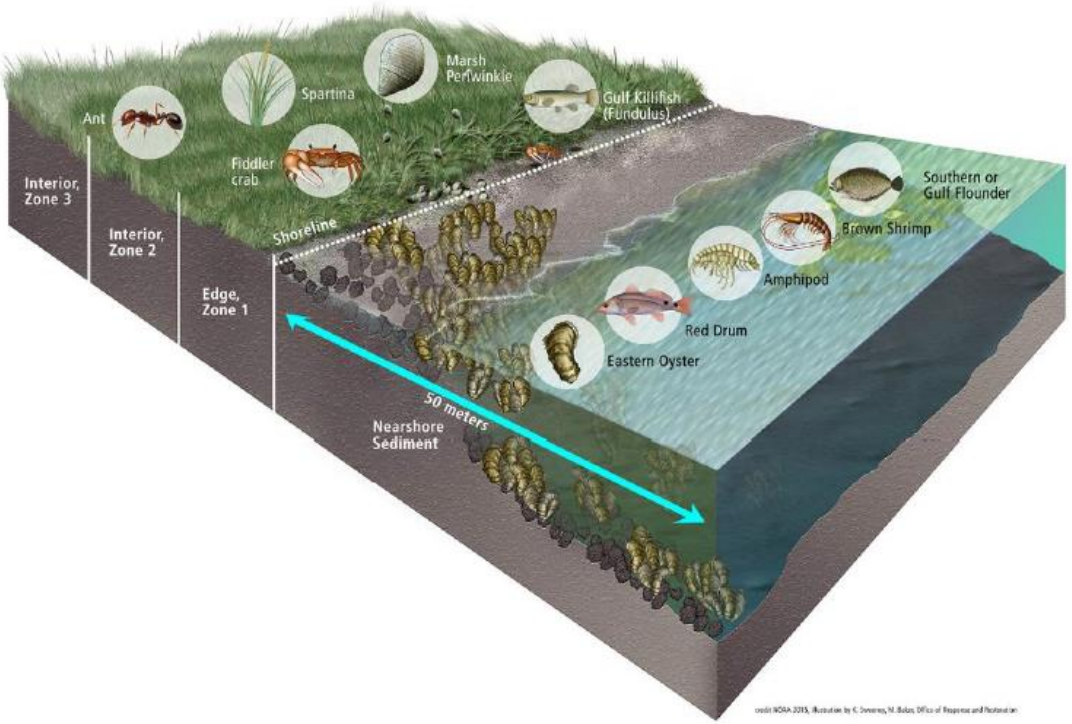
Restoration Plan Highlights



1. Introduction and Executive Summary
   - Regulatory context
   - Context for settlement decision
2. Incident Overview
   - Spill and response
3. Ecosystem Setting
   - Northern Gulf of Mexico focus
4. Injury to Natural Resources
5. Restoring Natural Resources
6. Environmental Consequences
7. Governance

www.gulfspillrestoration.noaa.gov/restoration-planning/gulf-plan

Nearshore and Subtidal Oyster Habitat

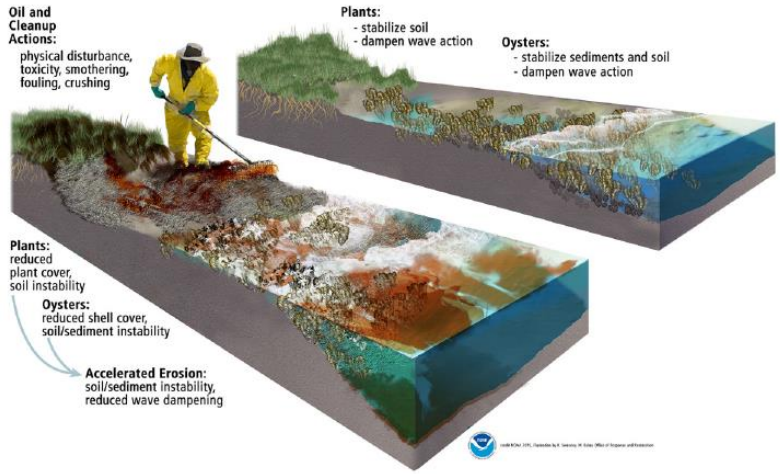


Source: Kate Sweeney for NOAA.

Figure 4.6-16. Schematic diagram of a generalized, tidally influenced salt marsh and nearshore environment illustrating the components studied to represent injury to the nearshore ecosystem. Coastal wetland vegetation impacts were studied at various distances from the wetland edge (illustrated here as zones 1, 2, and 3). All three zones are regularly inundated by tides.

Injuries to Oyster Resources

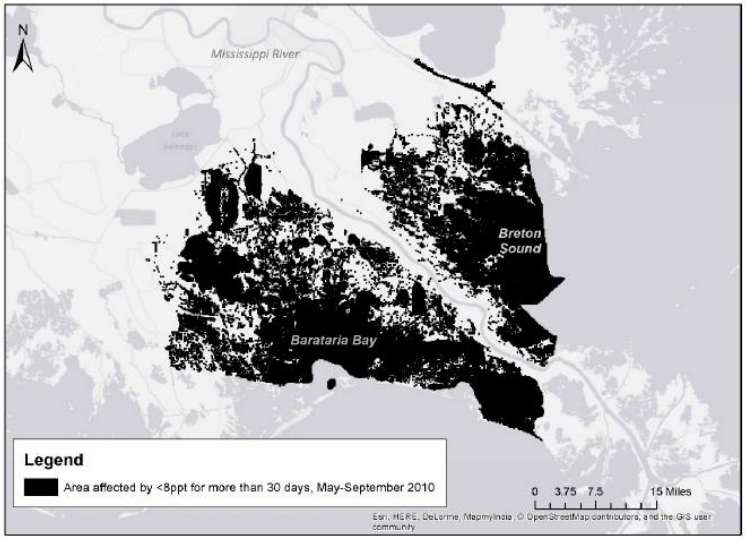
SHORELINE CLEAN-UP



Source: Kate Sweeney for NOAA.

Figure 4.6-38. Trustees explored relationships between shoreline oiling, cleanup actions, plant oiling, oyster cover, and erosion. Mechanisms that could enhance erosion as a result of spill impacts include a loss of soil stability (which could be affected by loss of plant cover, physical trampling, or other disturbance) and changes to the roughness of the bottom adjacent to the shoreline (for example, through the loss of oyster cover), which could increase wave energy over small spatial scales.

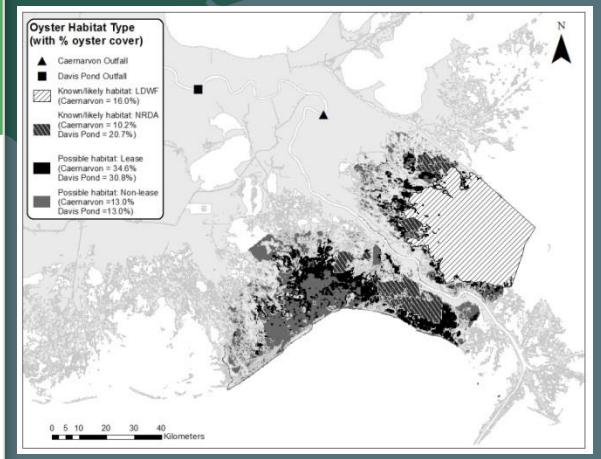
FRESHWATER RELEASES

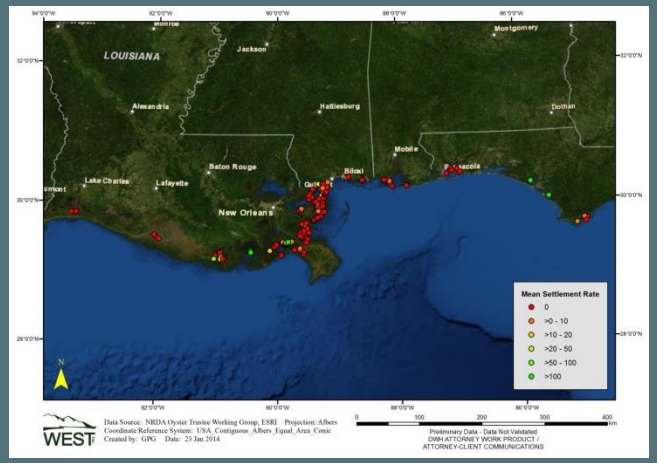


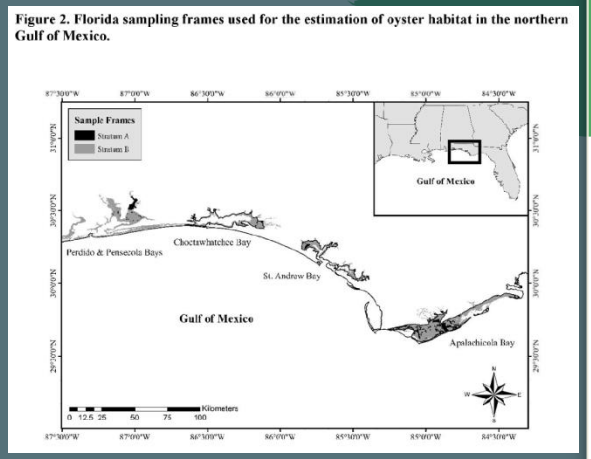
Source: Rouhani and Oehrig (2015b).

Figure 4.6-49. Locations in Barataria Bay and Black Bay/Breton Sound basins with more than 30 consecutive days below salinity thresholds of less than 8 parts per thousand in 2010. These locations represent the influence of freshwater releases in response to the DWH spill.

Assessment Data, Maps, & Methods





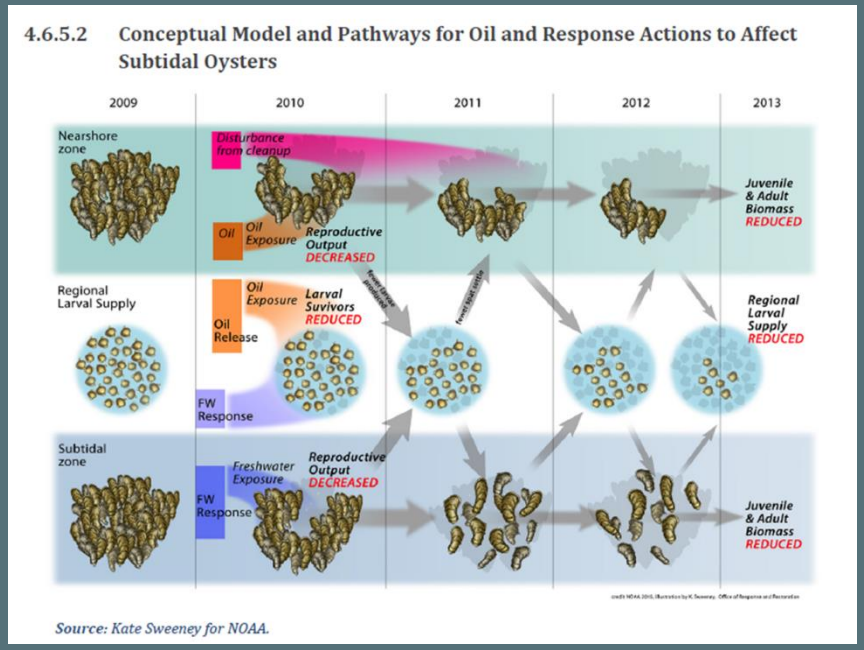


Preassessment/Assessment Materials: Work Plans, Technical Reports, Data Sets, References/Literature, Other Materials

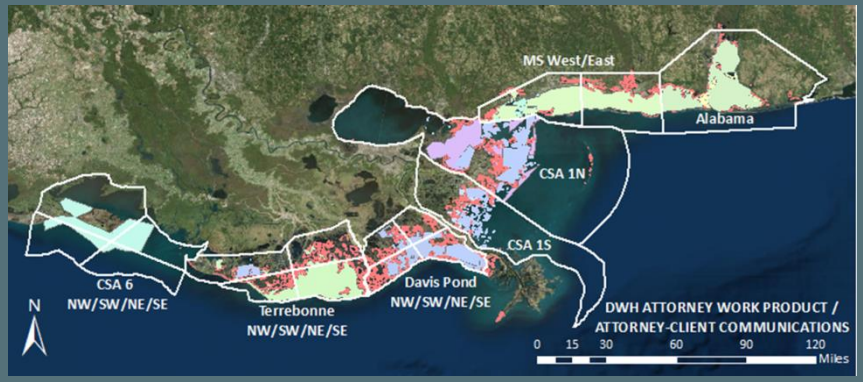
https://www.doi.gov/deepwaterhorizon/adminrecord

Oyster Population Dynamics

CONCEPTUAL MODEL- OYSTER INJURY



ADCIRC ANALYSIS OYSTER HABITAT POLYGONS



Oyster Restoration Goals

- Restore oyster abundance and spawning stock to support a regional oyster larvae pool sufficient for healthy recruitment levels to subtidal and nearshore oyster reefs.
- Restore resilience to oyster populations that are supported by productive larval source reefs and sufficient substrate in larval sink areas to sustain reefs over time.
- Restore a diversity of oyster reef habitats that provide ecological functions for estuarine-dependent fish species, vegetated shoreline and marsh habitat, and nearshore benthic communities.

Oyster Restoration Strategy

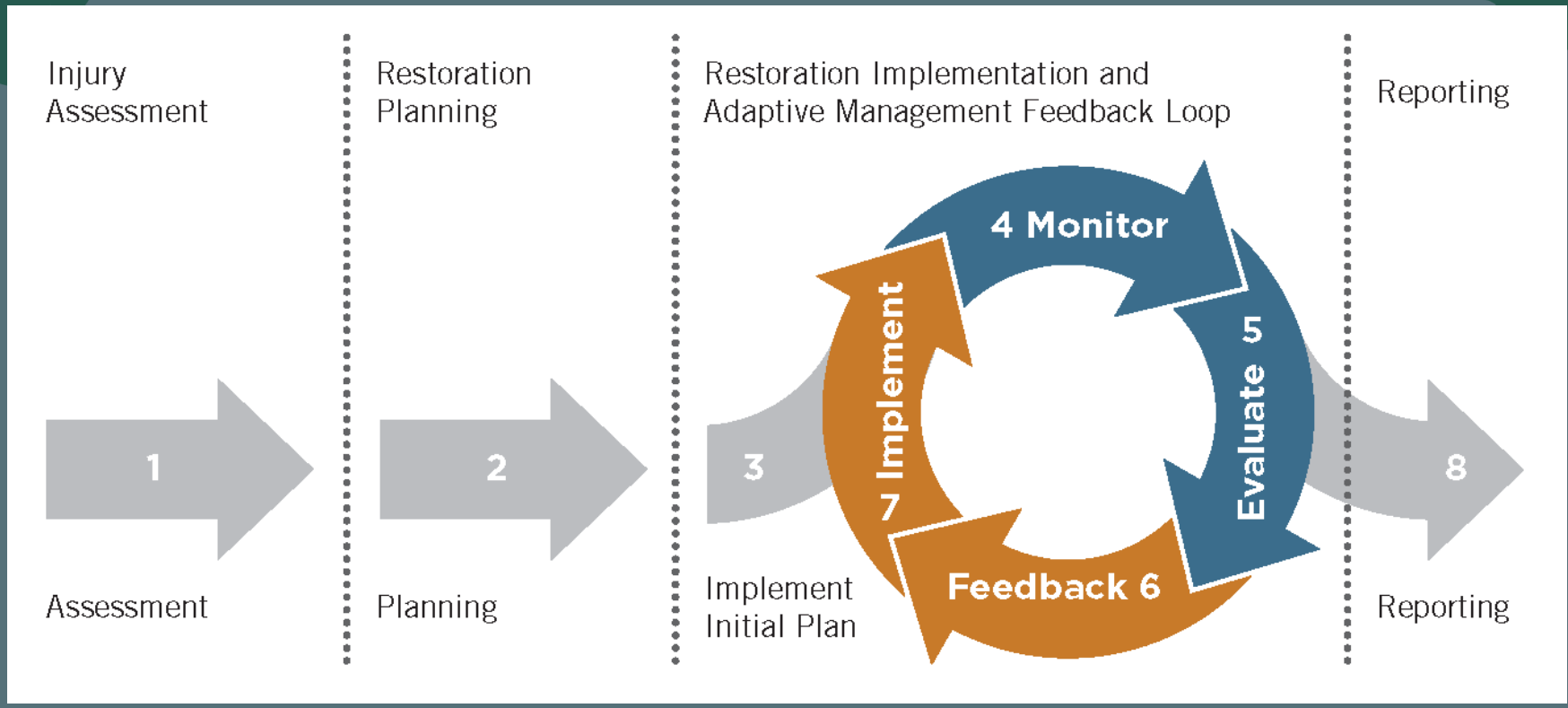
STRATEGY KEY POINTS

- Prioritize nearshore oyster reef restoration
- Prioritize projects to restore recruitment
- Phase projects to build resilient populations
- Restore multiple ecosystem benefits through oyster reef restoration
- Implement consistent monitoring for adaptive management

RESTORATION TECHNIQUES

- Restore or create oyster reefs through placement of cultch in nearshore and subtidal areas.
- Construct living shorelines.
- Enhance oyster reef productivity through spawning stock enhancement projects.
- Develop a network of oyster reef spawning reserves.

Adaptive Management Feedback



Data & Mapping for DWH

DIVER Explorer:

Learn about the status of restoration projects; access monitoring plans and data.

https://dwhdiver.orr.noaa.gov/explore-the-data

Early Restoration Projects

Purpose: Make first investment toward making environment and public whole through restoration and/or compensation. Approved 65 projects at an estimated cost of ~$877M.

Oyster injury related early restoration projects in Florida:

- Florida Oyster Cultch Placement Project, Phase III, $5,370,596
- Florida Cat Point Living Shoreline Project, Phase III, $775,605
- Florida Pensacola Bay Living Shoreline Project, Phase III, $10,828,063

* http://www.gulfspillrestoration.noaa.gov/restoration/early-restoration/

Questions

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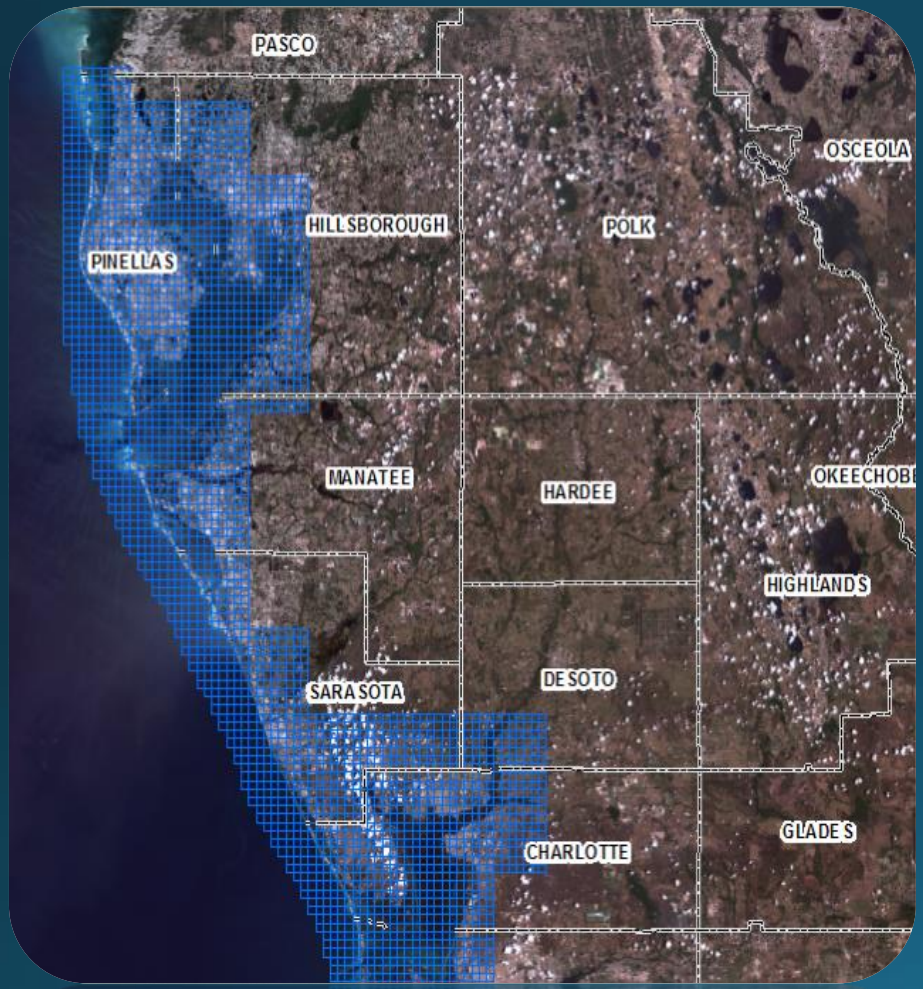
Oyster Mapping Techniques

Source: Southwest Florida Water Management District



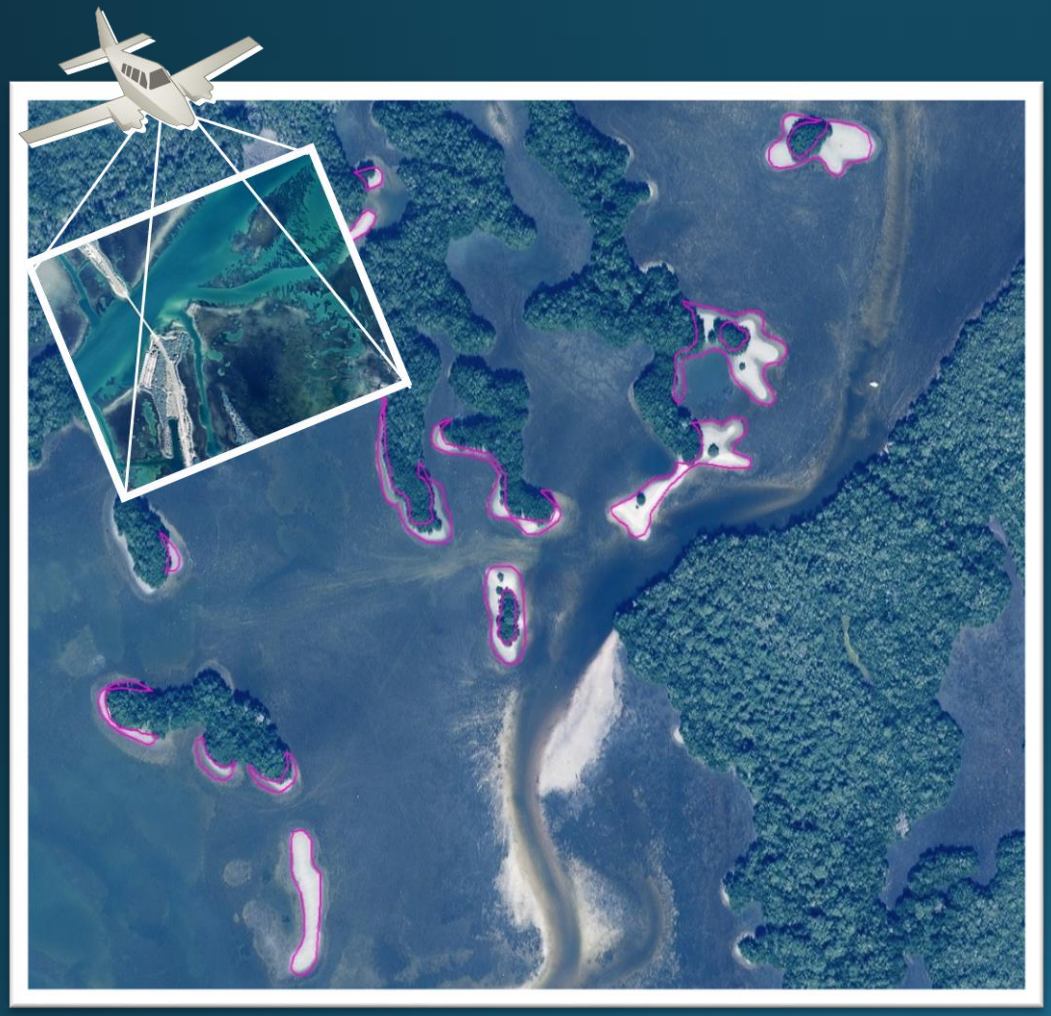
SWFWMD Seagrass Mapping Program

What's that have to do with oysters?

Aerial Mapping 1988-2018

Objective: Classify & delineate underwater features.

Oysters were added as a new class in 2014.



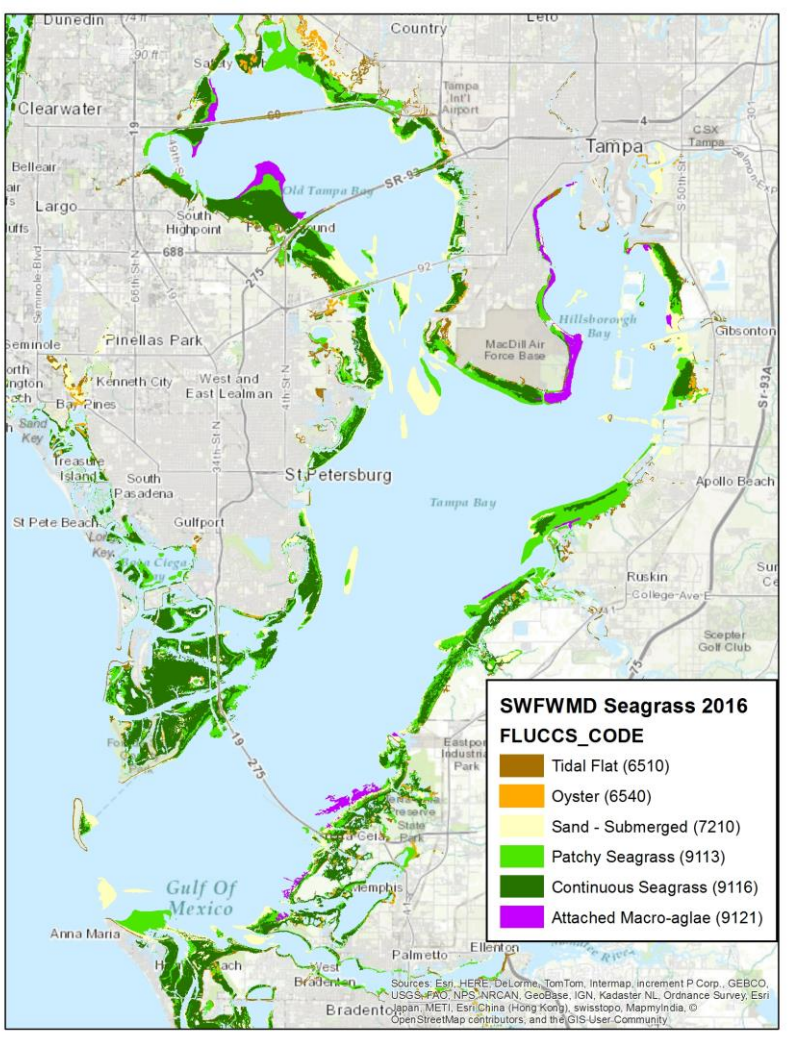
Oyster Mapping

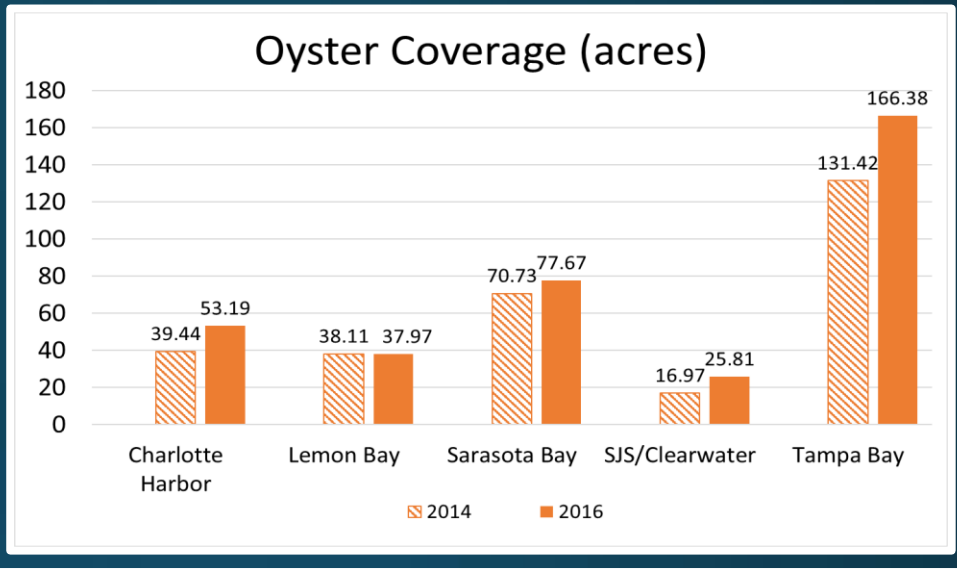
Imagery Collection:

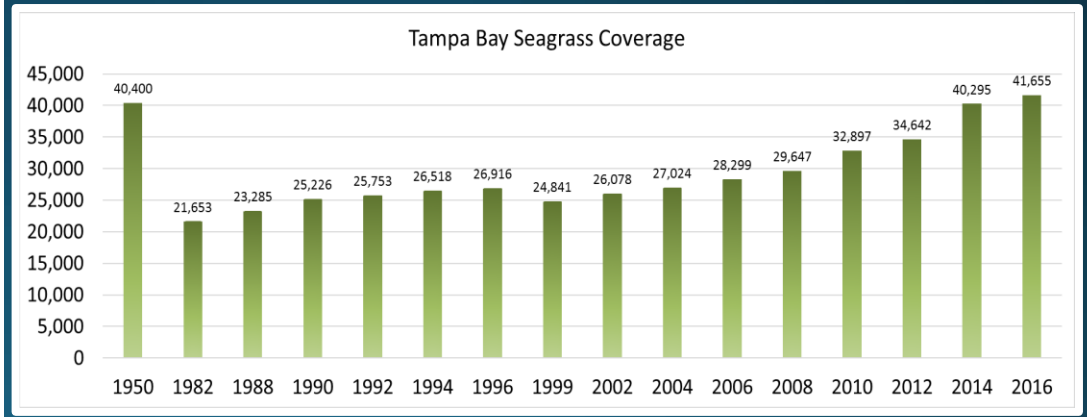
- Winter, Dec ‘15 – Feb ‘16
- 1 ft. digital natural color
- Leica ADS80 –push-broom digital camera
- Strict environmental conditions required to fly

- Digitizing manually on-screen in ArcMap
- MMU: 0.25 acre for oyster & 0.5 acre for seagrass

Oysters (6540) – Dense collection of sessile mollusks found as linear or oval shaped substrates. Hash or dead oyster shell is not differentiated from live oysters and can be included in this class.







**To visualize oysters at this scale, polygons were enhanced using a 1 pt. outline

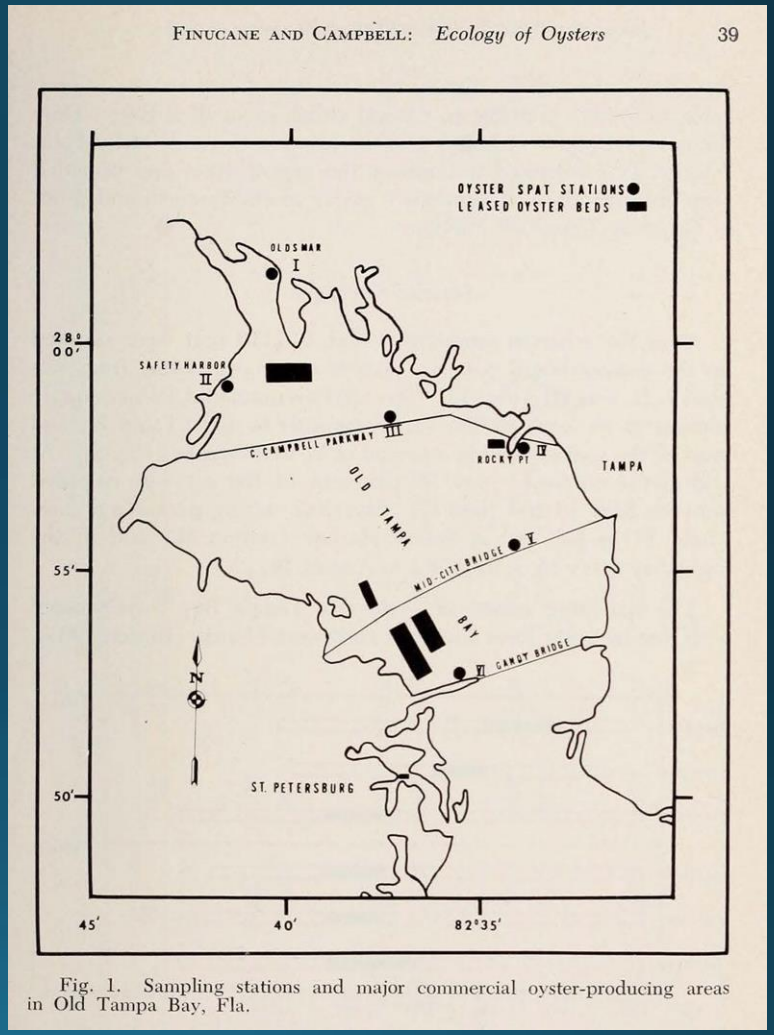
Historical Distribution

Historical information provides context for current resource status

- Older broad scale data is lacking
- Spatial data sets must be created

Historical References:

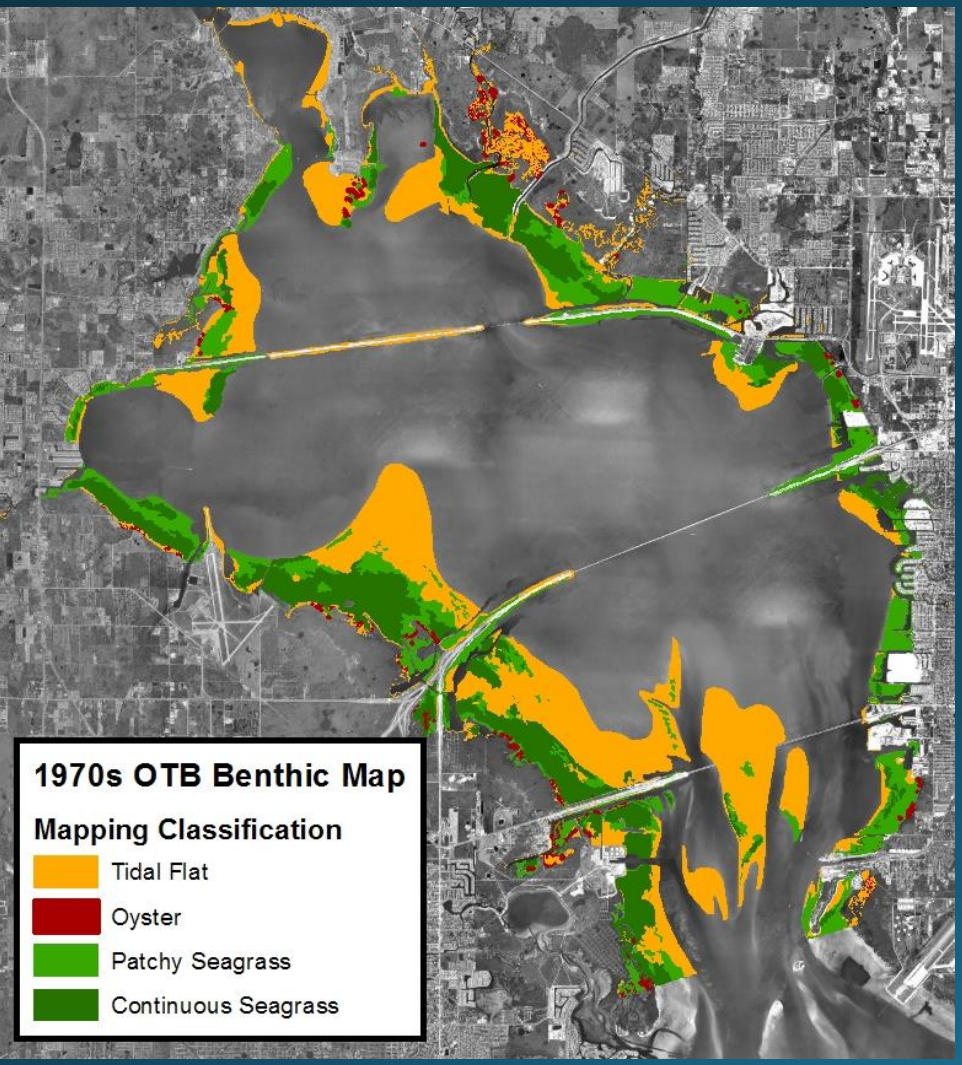
- Leases and Spat Study sites–
  - Finucane et al. 1968
  - McNulty et al. 1972
  - Tampa Bay Environmental Atlas
  - Whitfield (1973) Commercial Oyster Reefs (rehab) 1949-1971



Historical Mapping Methods

Source Data

- 1970s Black & White Aerials from Florida DOT
  - Dates of acquisition by County
  - Scanned at 14 microns
  - Horizontal accuracy tested against 1999/2000 DOQQ
  - 1:24,000 map compliant in most locations

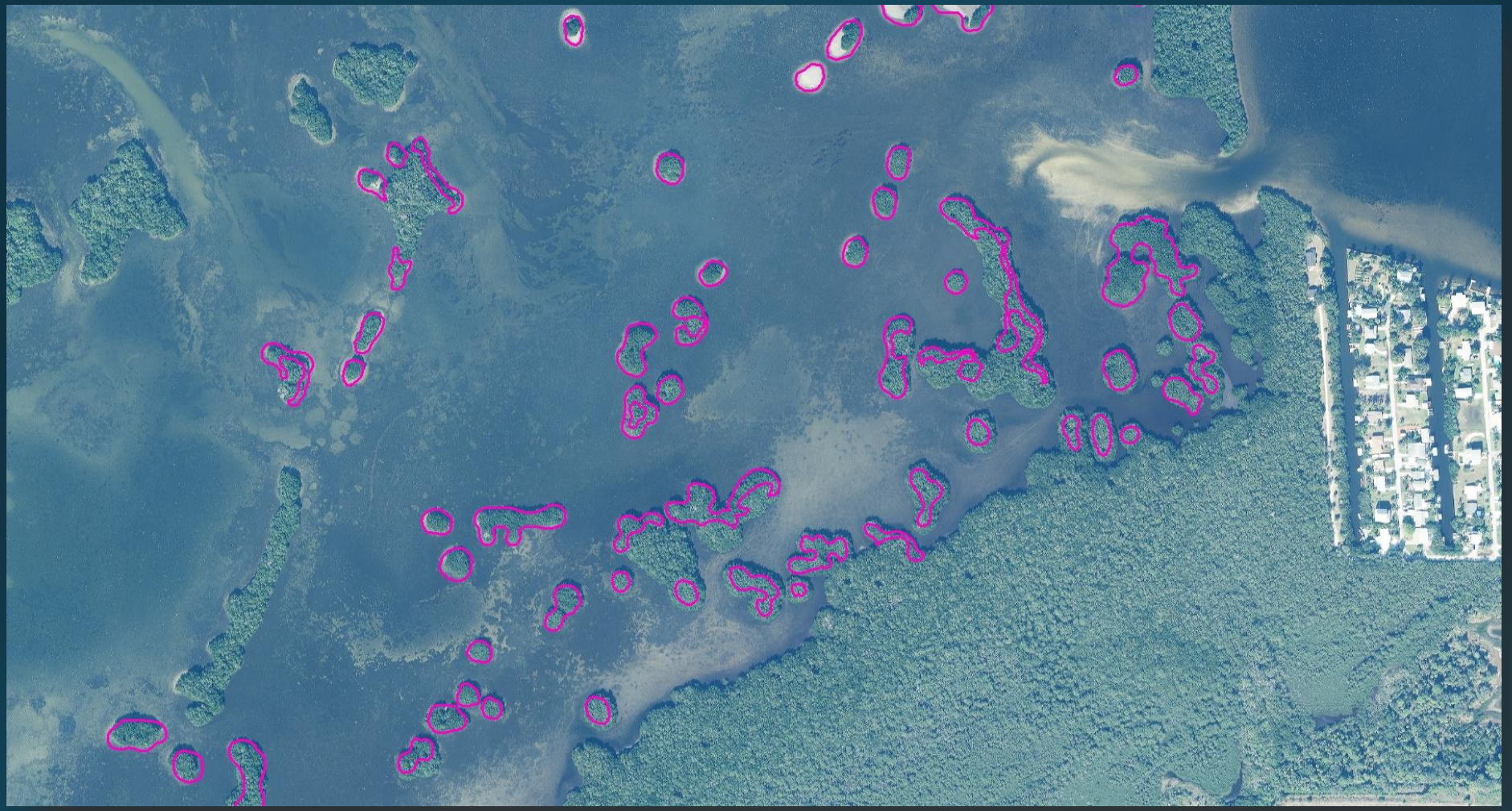


Historical Map

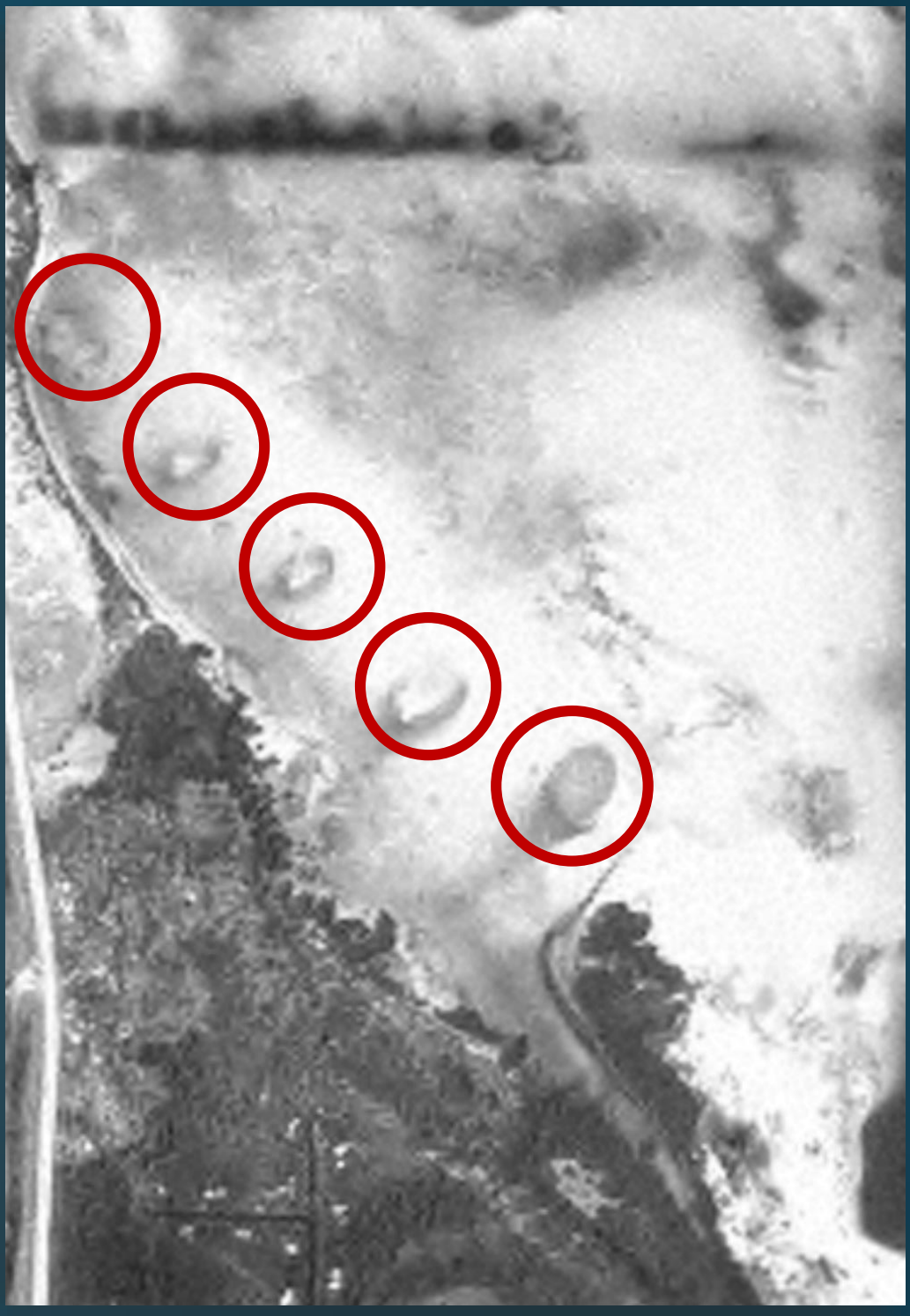
Old Tampa Bay

- Hillsborough Co. – Feb. 1973
- Pinellas Co. – Dec. 1969

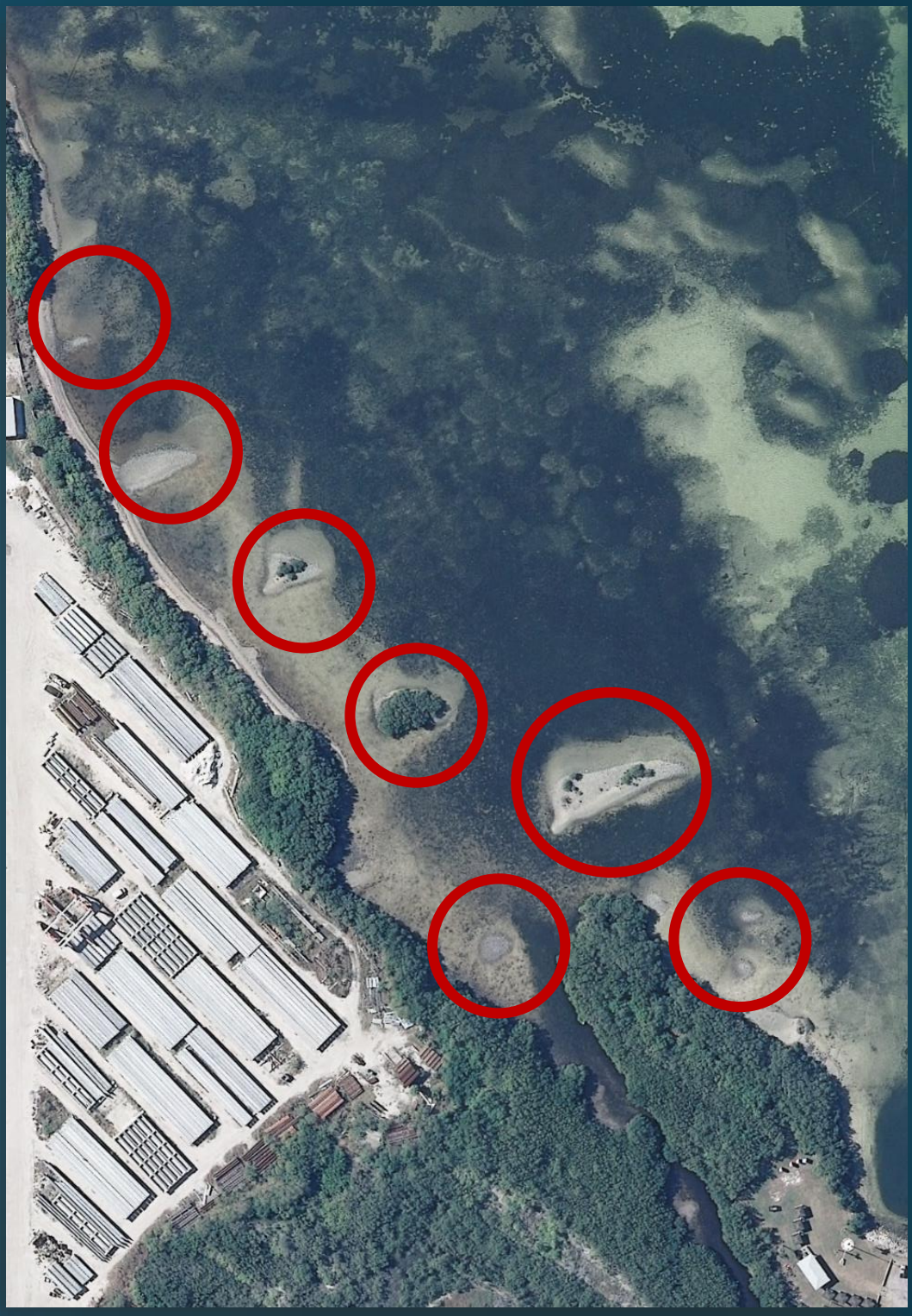
Habitat	FLUCCS	Acres	% Contribution
Tidal Flat	6510	7,701.72	49.35%
Oyster Bed	**6540**	**83.83**	**0.54%**
Seagrass	9113 & 9116	7,822.15	50.12%
Total Habitat		15,607.69	100.00%

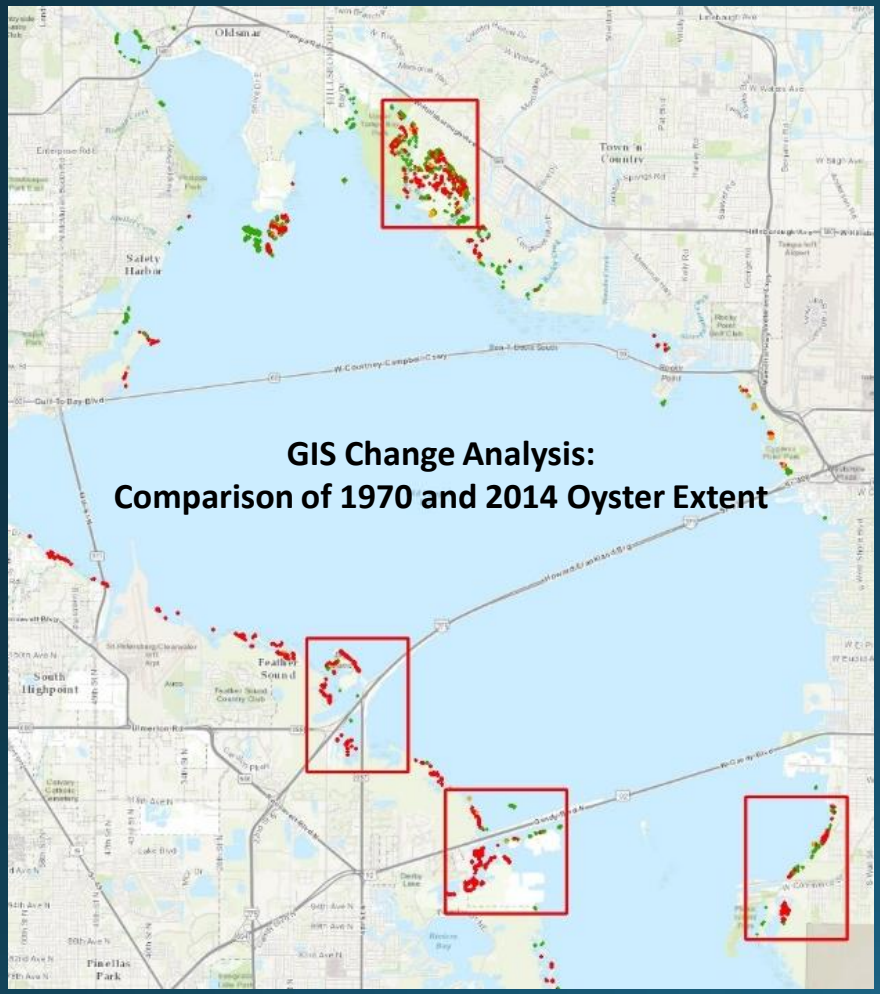


1970s



2014




GIS Change Analysis:
Comparison of 1970 and 2014 Oyster Extent