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 Administrative Record-Preassessment/assessment- Oyster Injury- [https://www.do.gov/deepwaterhorizon/adminrecord](https://www.do.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

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.
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.
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

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.

Source: Kate Sweeney for NOAA.
Injuries to Oyster Resources

SHORELINE CLEAN-UP

FRESHWATER RELEASES

Source: Kate Sweeney for MDA.

**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.

Source: Rouhani and Oohrig (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.
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

4.6.5.2 Conceptual Model and Pathways for Oil and Response Actions to Affect Subtidal Oysters

Sources: Kate Sweeney for NOAA.
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

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<thead>
<tr>
<th>STRATEGY KEY POINTS</th>
<th>RESTORATION TECHNIQUES</th>
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<tbody>
<tr>
<td>✗ Prioritize nearshore oyster reef restoration</td>
<td>✗ Restore or create oyster reefs through placement of cultch in nearshore and subtidal areas.</td>
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<td>✗ Prioritize projects to restore recruitment</td>
<td>✗ Construct living shorelines.</td>
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<td>✗ Phase projects to build resilient populations</td>
<td>✗ Enhance oyster reef productivity through spawning stock enhancement projects.</td>
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<td>✗ Restore multiple ecosystem benefits through oyster reef restoration</td>
<td>✗ Develop a network of oyster reef spawning reserves.</td>
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<td>✗ Implement consistent monitoring for adaptive management</td>
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Adaptive Management Feedback

1. Injury Assessment
2. Restoration Planning
3. Restoration Implementation and Adaptive Management Feedback Loop
   - 4. Monitor
   - 5. Evaluate
   - 6. Feedback
   - 7. Implement
   - 8. Reporting

Assessment
Planning
Implement Initial Plan
Reporting
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

<table>
<thead>
<tr>
<th>Habitat</th>
<th>FLUCCS</th>
<th>Acres</th>
<th>% Contribution</th>
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<tbody>
<tr>
<td>Tidal Flat</td>
<td>6510</td>
<td>7,701.72</td>
<td>49.35%</td>
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<tr>
<td>Oyster Bed</td>
<td>6540</td>
<td>83.83</td>
<td>0.54%</td>
</tr>
<tr>
<td>Seagrass</td>
<td>9113 &amp; 9116</td>
<td>7,822.15</td>
<td>50.12%</td>
</tr>
<tr>
<td>Total Habitat</td>
<td></td>
<td>15,607.69</td>
<td>100.00%</td>
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GIS Change Analysis:
Comparison of 1970 and 2014 Oyster Extent