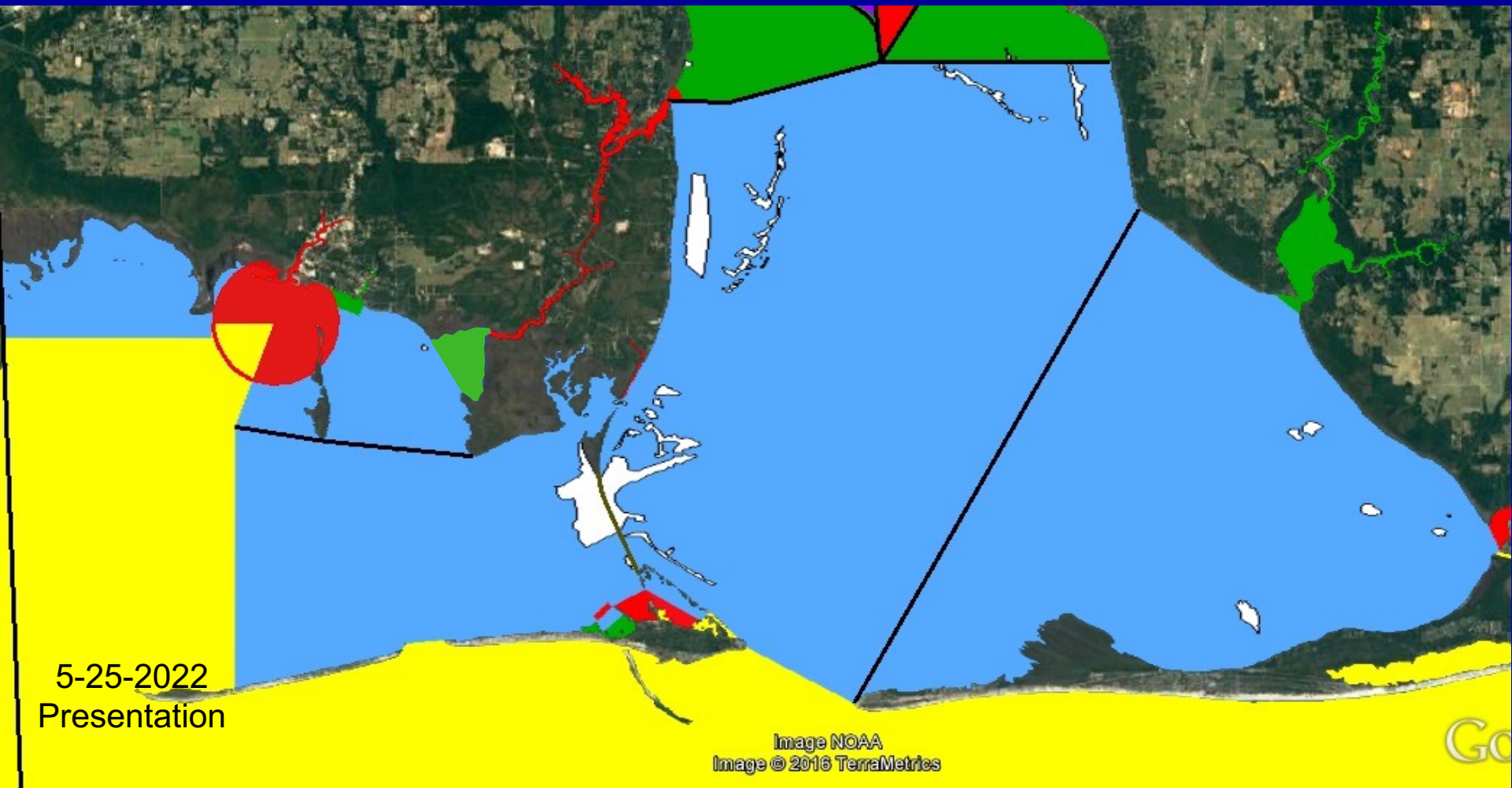
Alabama Oyster Management and Oyster Reef Restoration Strategy



5-25-2022
Presentation

Goal of Today's Presentation

To provide information about:

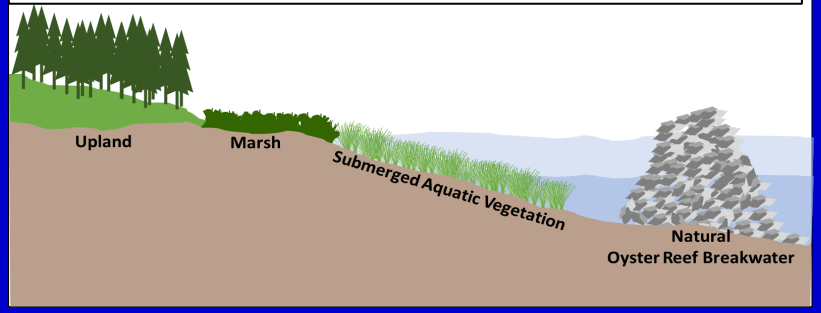
- **The Coastal Alabama Comprehensive Oyster Restoration Strategy as it relates to ongoing oyster reef restoration activities by the Alabama Marine Resources Division (AMRD)**
- **The role of AMRD and the Alabama Department of Public Health (ADPH) in oyster management**
- **The status of Alabama's Public Oyster Reefs**
- **How AMRD manages oyster harvest**
- **Oyster Reef Restoration Techniques Past, Present, Future Implementing the Coastal Alabama Comprehensive Restoration Strategy**

WHY ARE OYSTERS (and oyster reefs) IMPORTANT?

Finfish and Invertebrate Habitat / Foraging Grounds

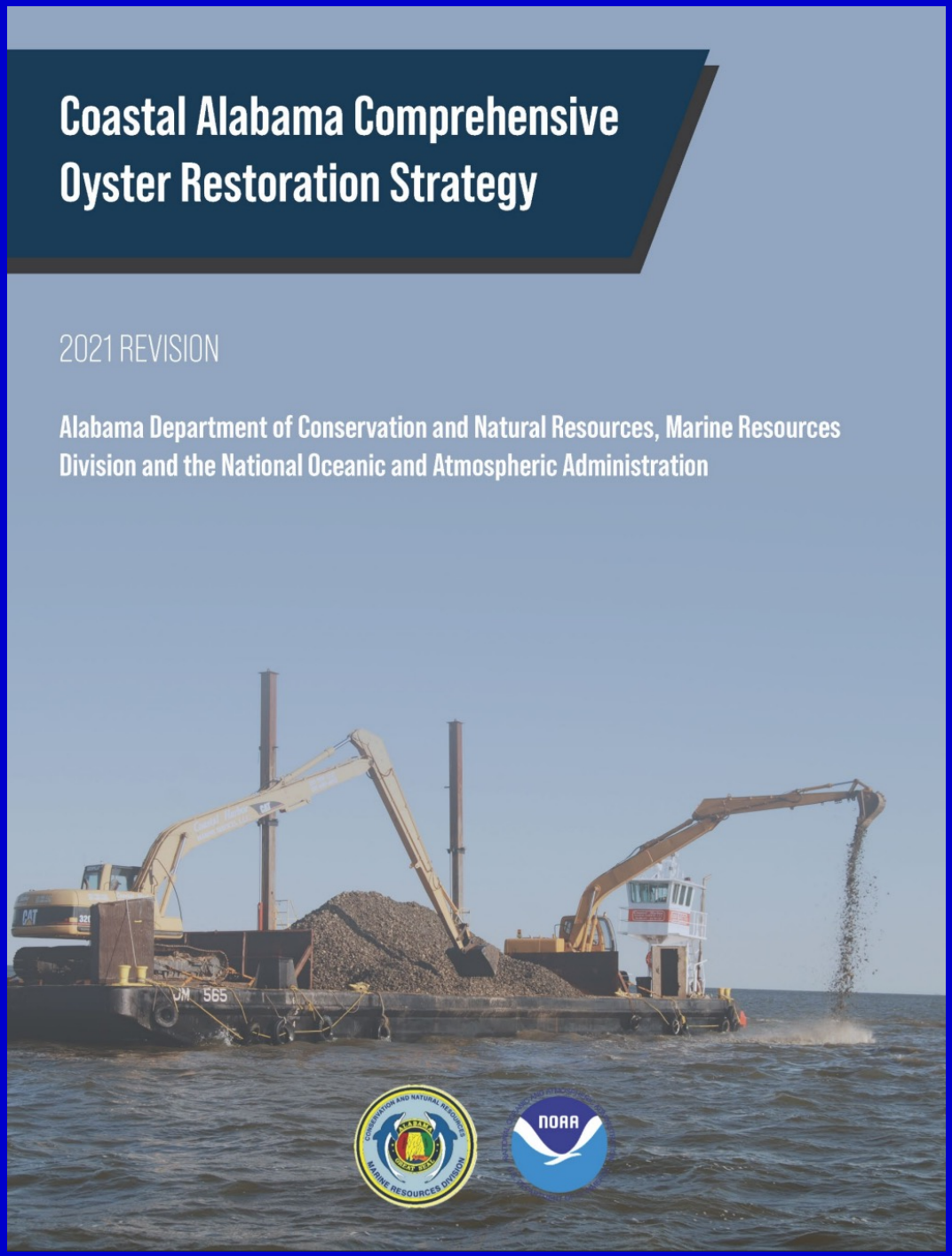



Filter Water, Shoreline Stabilization, Erosion Control, Support Marsh and Seagrass Habitats



Oyster Reef Restoration Guidance Document

- Co-Written by AMRD and NOAA
- Defines Oyster Reef Restoration Goals in Alabama and
- Aligns Alabama's Oyster Reef Restoration Goals to the Programmatic Damage Assessment and Restoration Plan/Programmatic Environmental Impact Statement (PDARP/PEIS)



Goals of the PDARP/PEIS

Restore Abundance, Resilience, Diversity

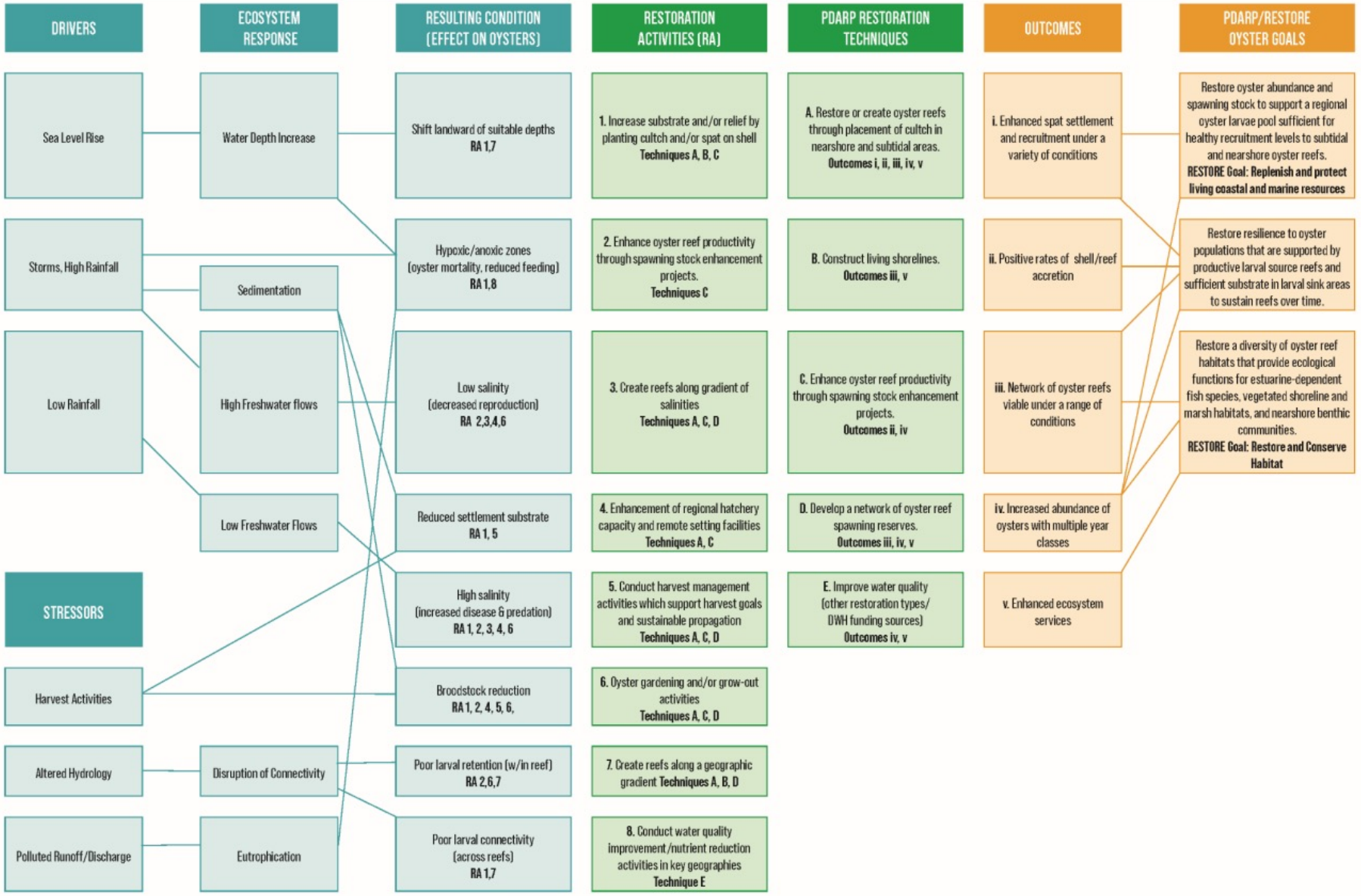
- "Restore oyster abundance and spawning stock to support a regional oyster larvae pool sufficient for healthy recruitment levels to subtidal and nearshore oyster reefs."
- "Restore resilience to oyster populations that are supported by productive larval source reefs and sufficient substrate in larval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

The specific goals of this Oyster Strategy Document are to:

Identify and Prioritize Restoration Strategies, Identify Data Gaps, Identify Adaptive Management Strategies

- Identify strategies to yield sustainable and resilient oyster populations in coastal Alabama;
- Prioritize potential restoration and enhancement strategies for implementation in the next 3-5 years;
- Identify science and/or data gaps that could help inform future restoration efforts; and
- Identify adaptive management strategies to address uncertainties associated with changing environmental conditions and/or project implementation.

The Conceptual Model



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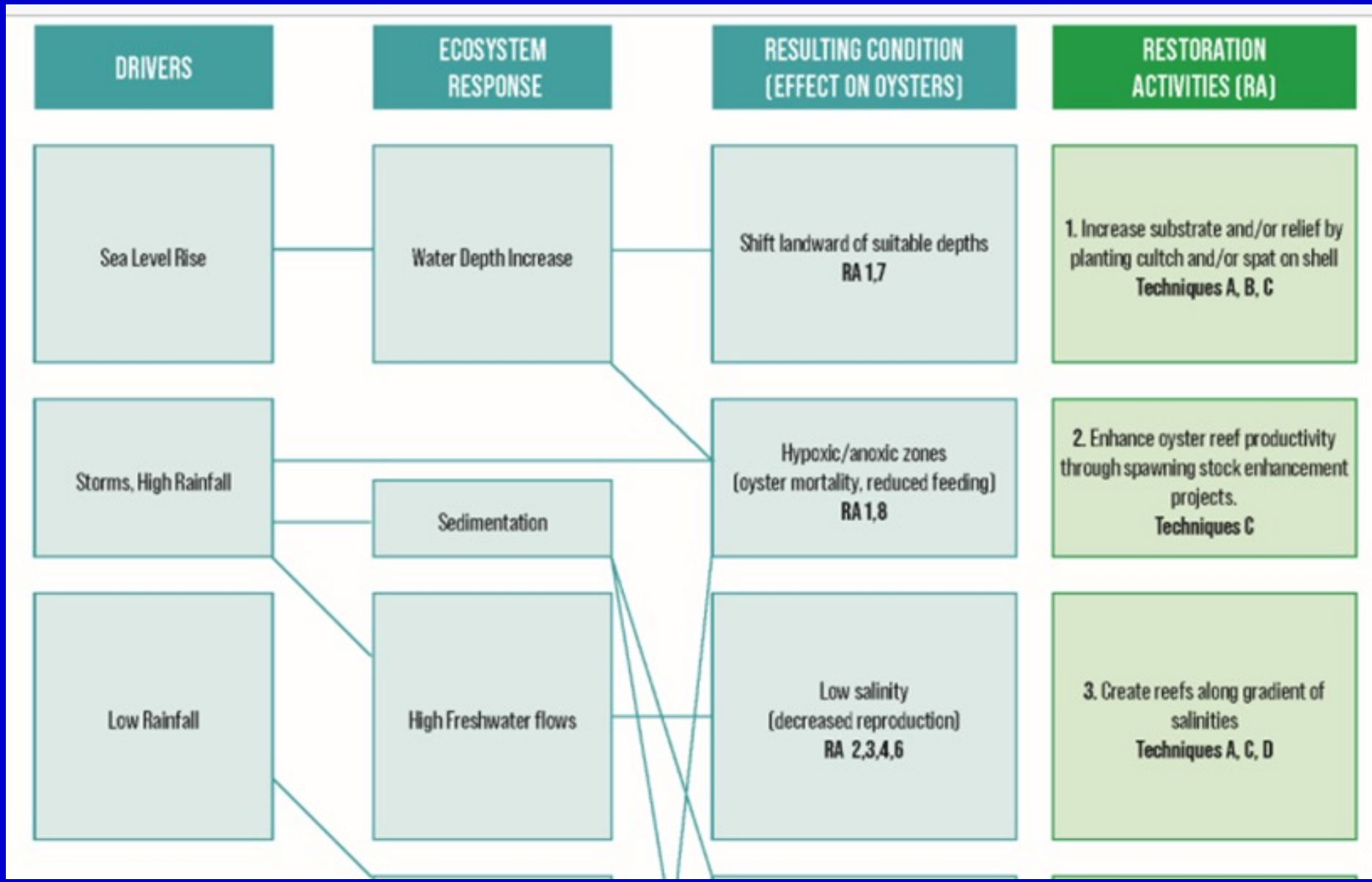

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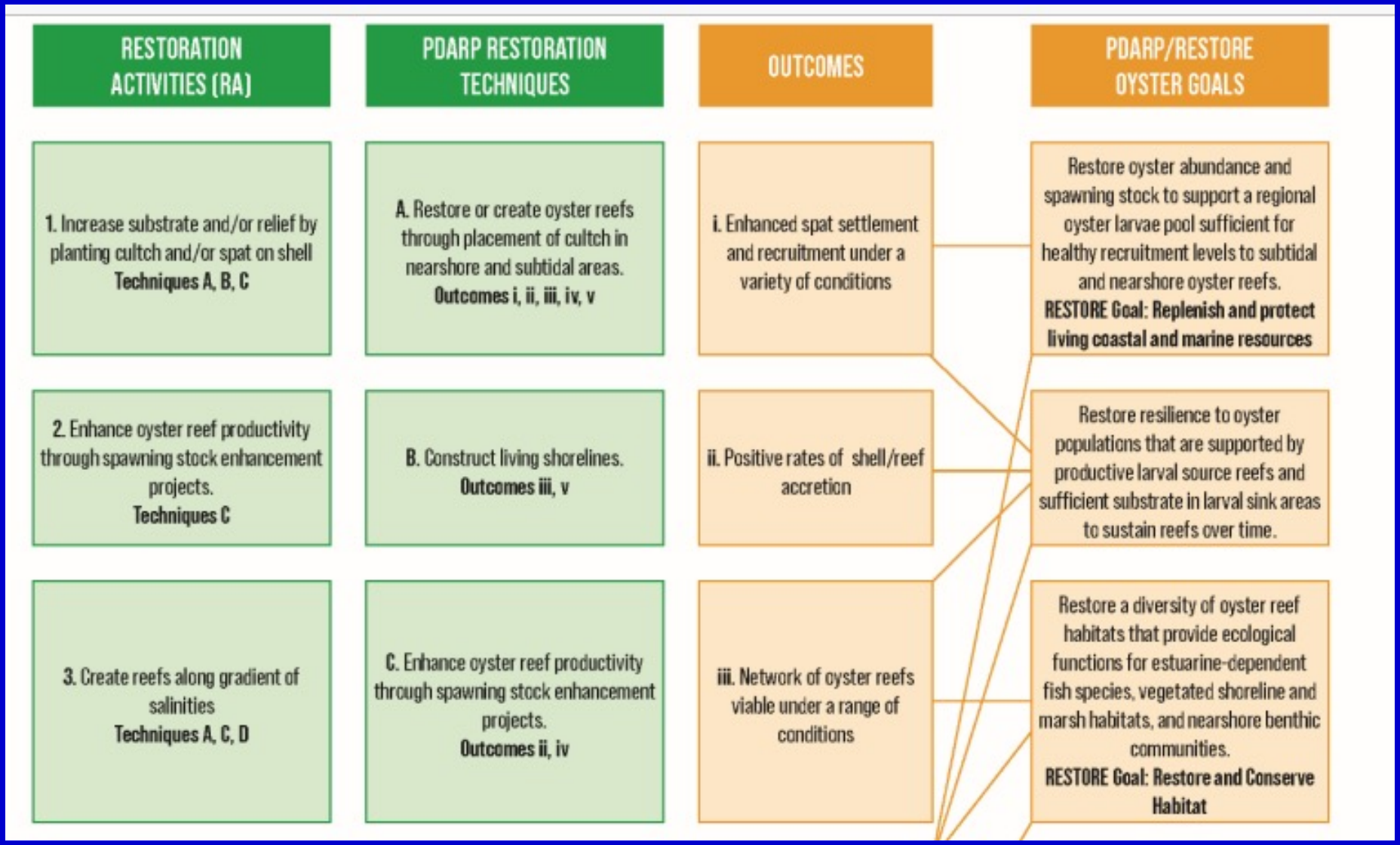


Oyster Reef Management

Alabama Marine Resources Division (AMRD)

AMRD Fisheries

- Collect Fisheries Dependent and Independent Data
- Oyster management includes reef productivity and harvest monitoring
- Planning and Execution of Reef Restoration Projects

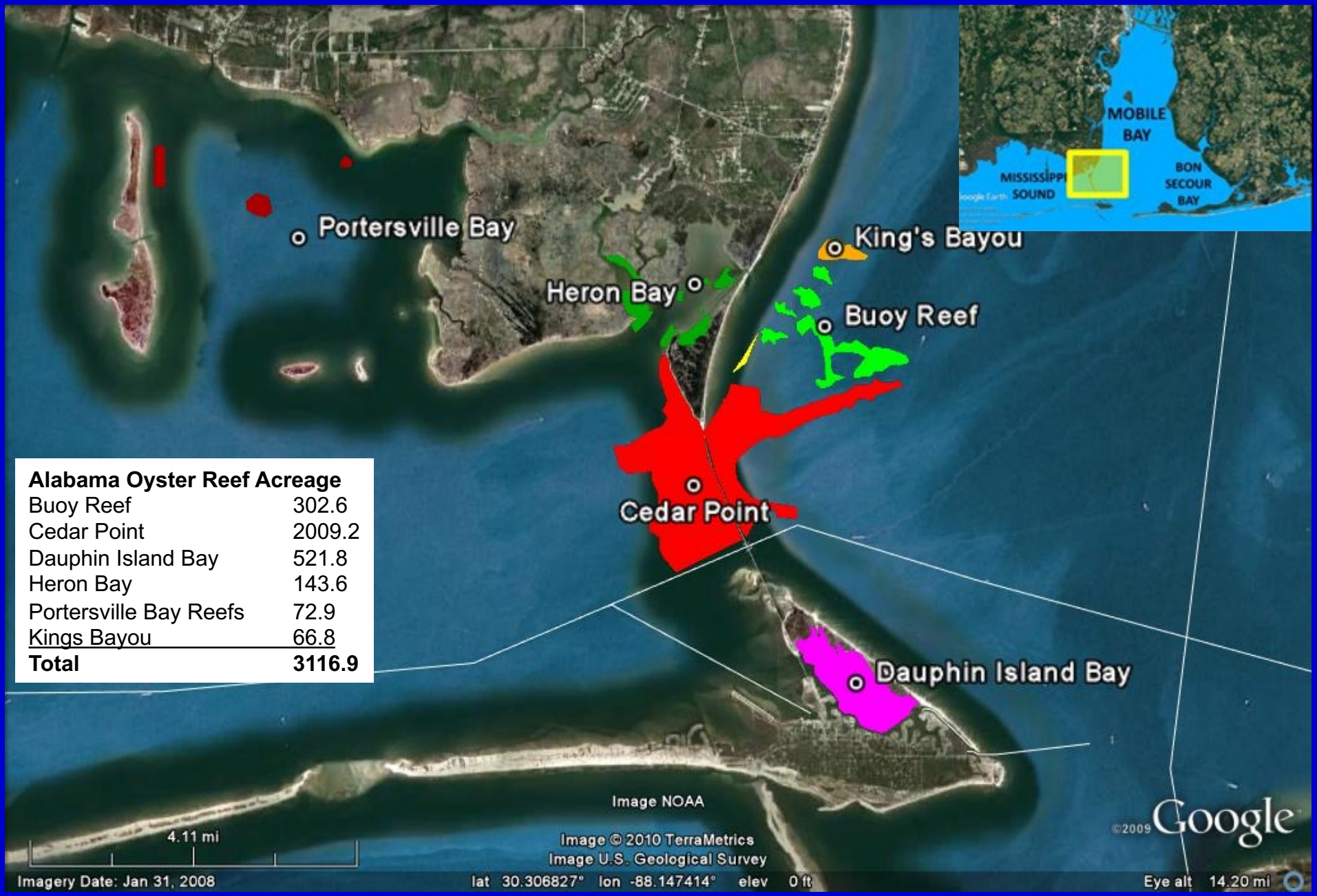
AMRD Enforcement

- Enforce Laws and Regs pertaining to catch and size limits and laws established by the Alabama Department of Public Health (ADPH)
- Oyster management includes patrol of harvest areas, enforcement of sack limits, monitoring no harvest zones, confiscation and handling of oysters harvested/ handled outside of legal compliance

Alabama Department of Public Health (ADPH)

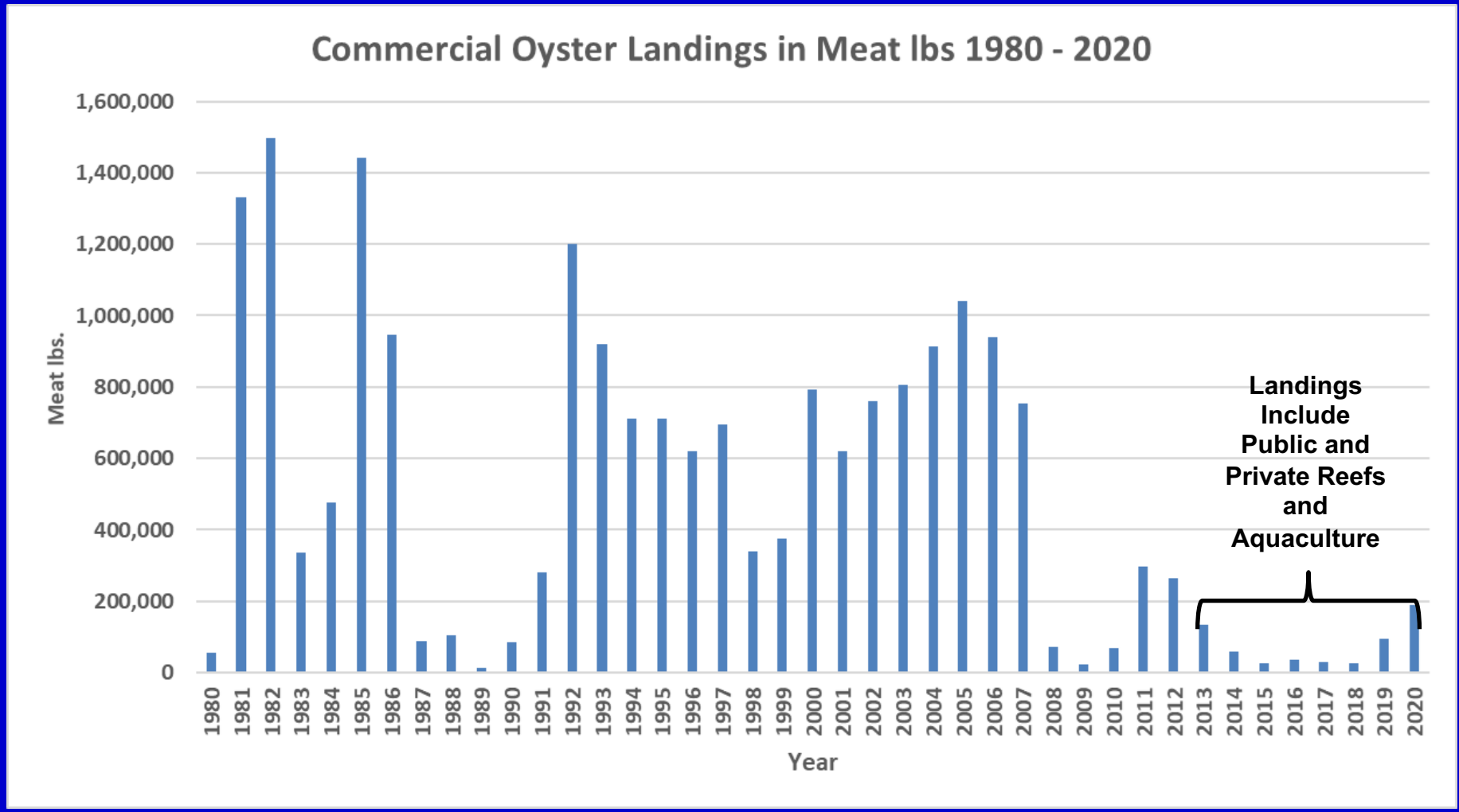
- Setting harvest/landing time limits based on seasonal water and air temperatures (and other parameters)
- Inspection of seafood dealers / processors for compliance in product handling
- Facilitating Shellfish Harvest Area Openings and Closings based on potential health risk criteria

Alabama's Main Oyster Reefs

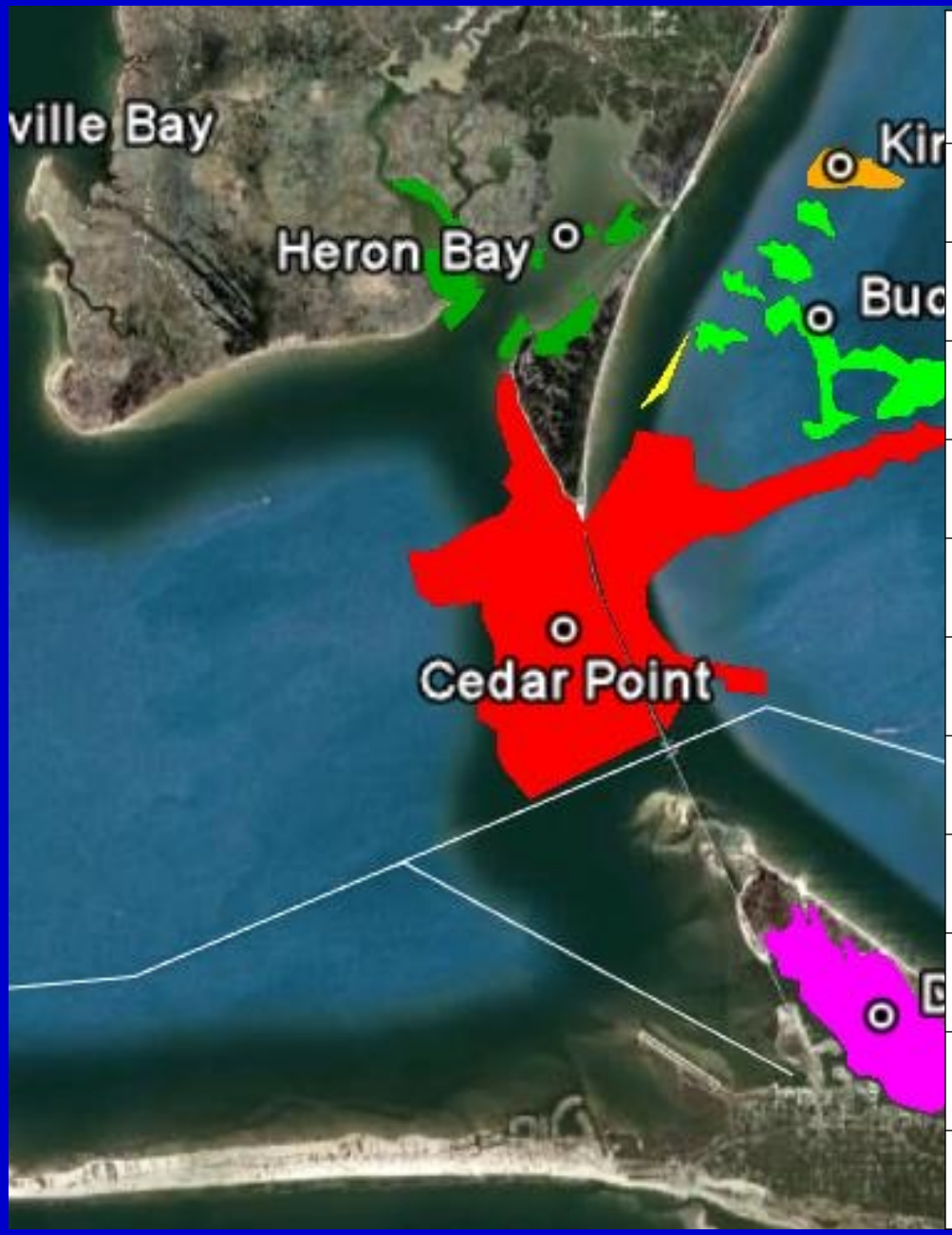


Alabama Oyster Reef Acreage	
Buoy Reef	302.6
Cedar Point	2009.2
Dauphin Island Bay	521.8
Heron Bay	143.6
Portersville Bay Reefs	72.9
Kings Bayou	66.8
Total	**3116.9**

Oyster Landings 1980 – 2020



Status of Alabama Oyster Reefs



Harvest Season	# Days	# Sacks	Sacks/Day
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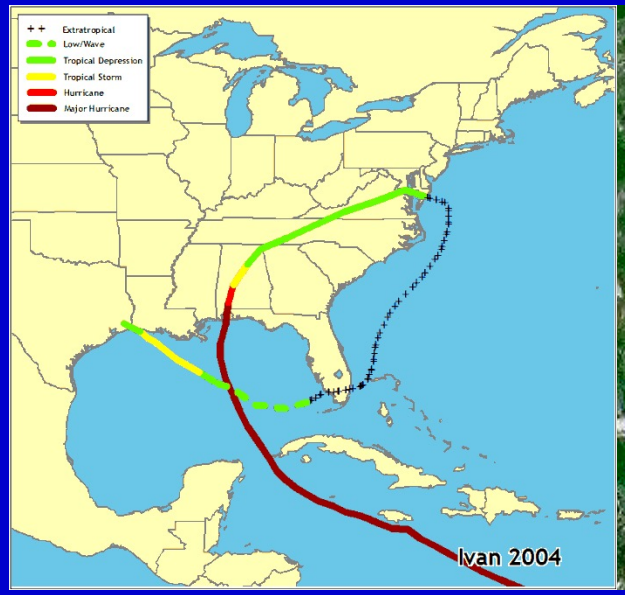
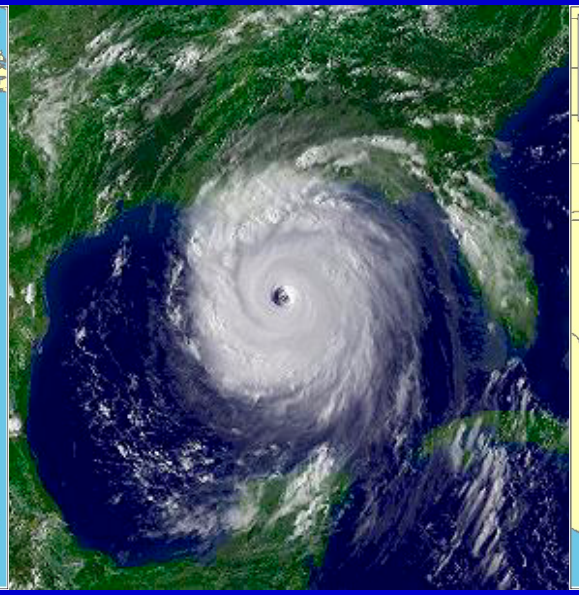
Fall 2021 - Spring 2022	79	50,020	633.2

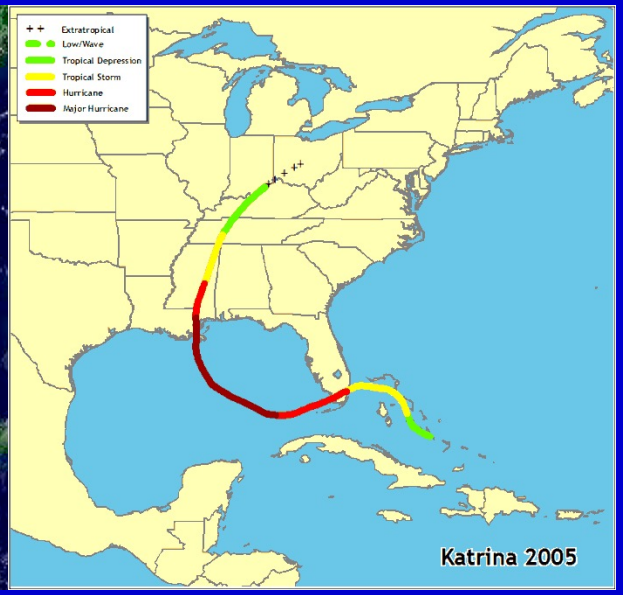
Hurricanes, Droughts, and Drills

Ivan





Katrina



Hurricanes Caused:

- Physical Devastation to Oyster Reefs
- Silting to Occur on Many Productive Reefs

Drought Caused:

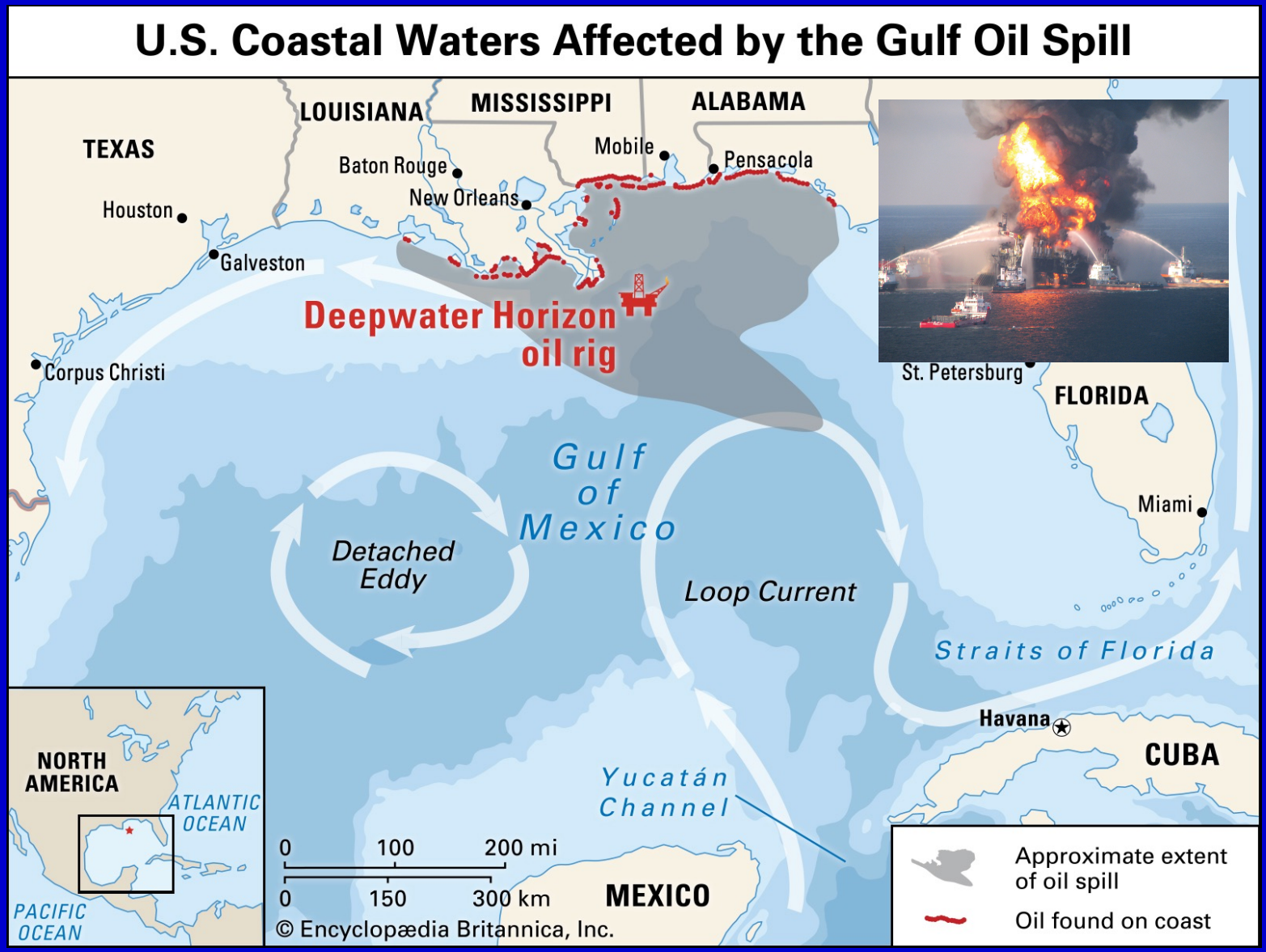
- Decreased Fresh Water Flows Over Reefs
- Increased Average Salinity on Alabama's Main Oyster Reefs
- Ideal Conditions for Oyster Drills to Proliferate and Decimate Oyster Reefs

Stramonita haemastoma

Drill Predation

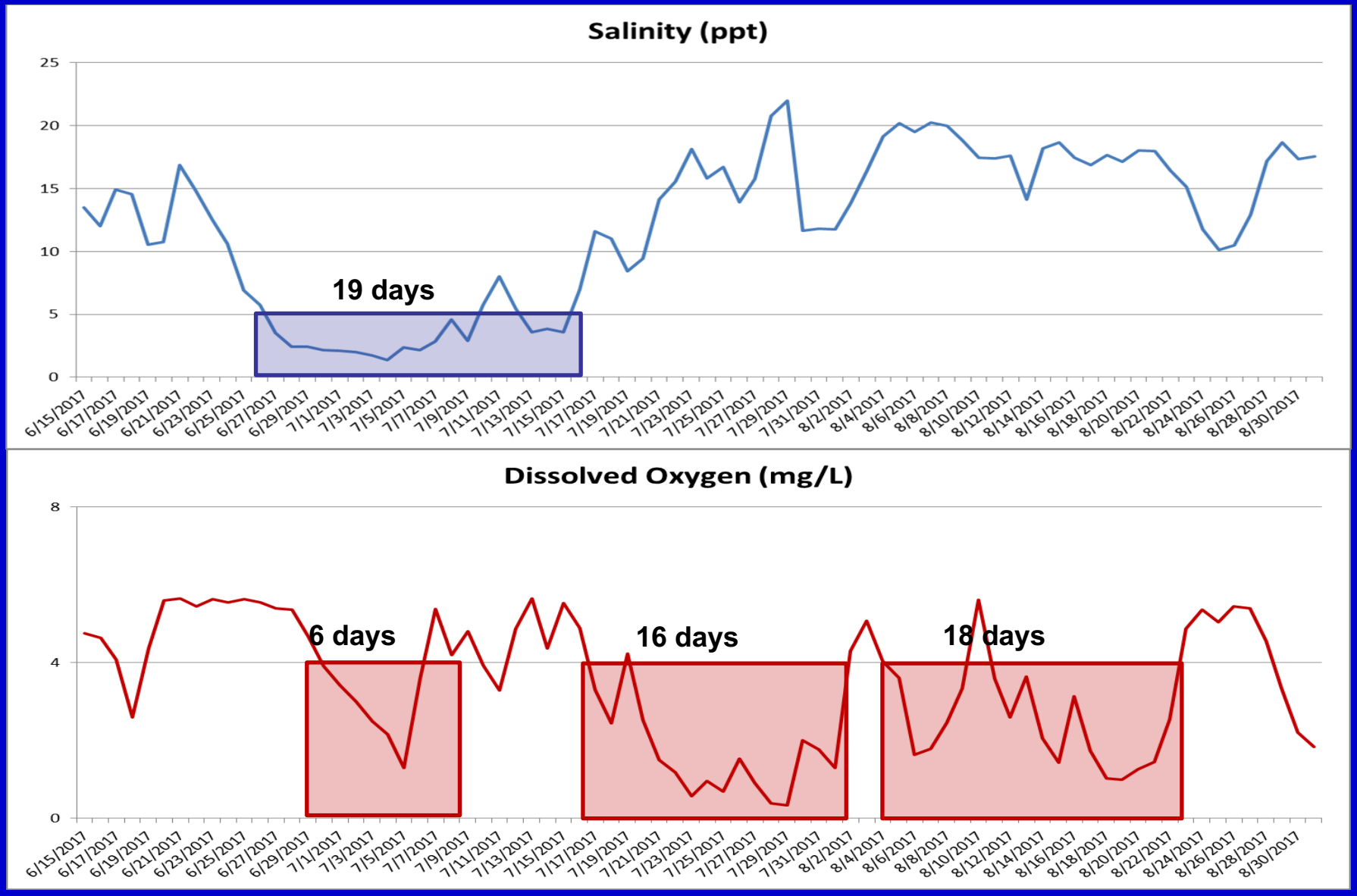
Stramonita haemastoma

Deepwater Horizon Oil Spill



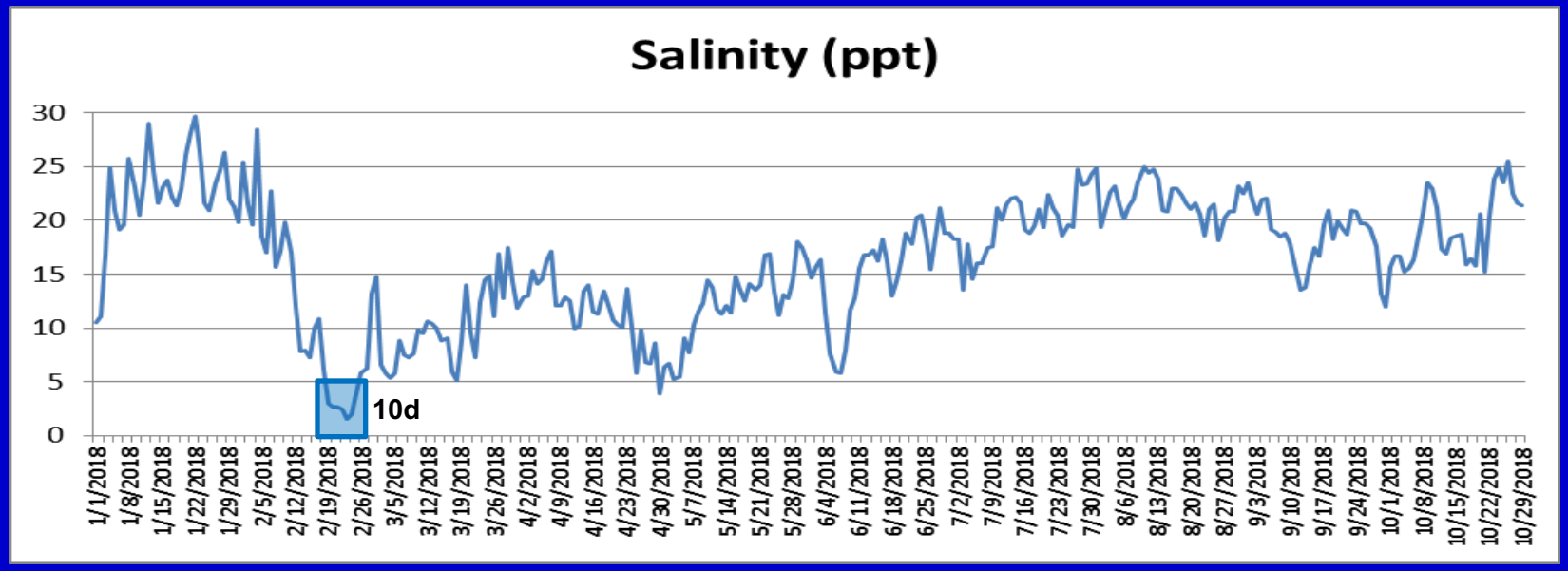
Salinity and Dissolved Oxygen Levels

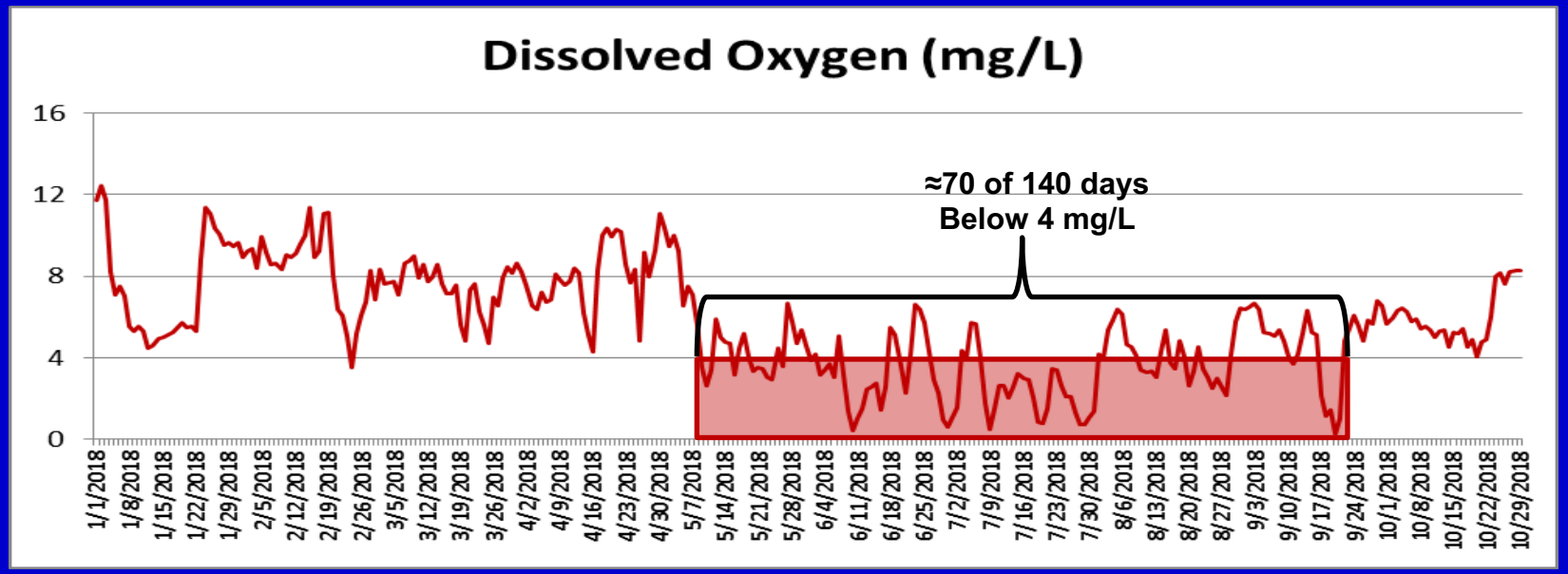
Buoy Reef Jun 15, 2017 – Aug 31, 2017



Salinity and Dissolved Oxygen Levels

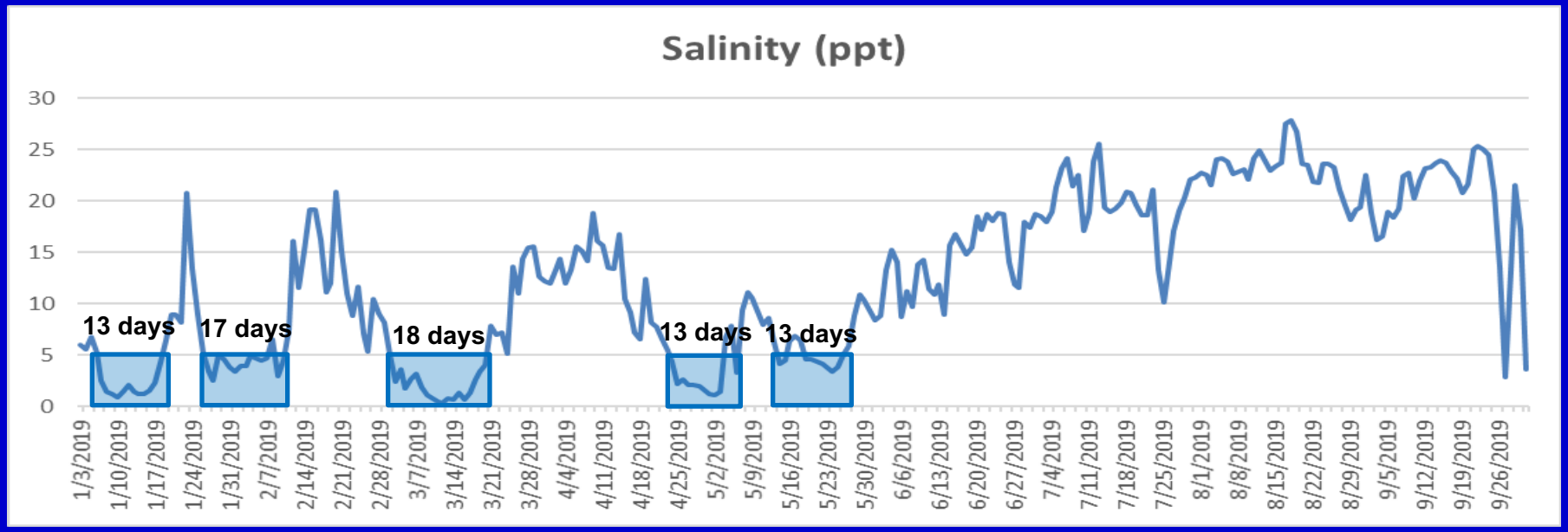
Buoy Reef Jan 1, 2018 – Oct 29, 2018

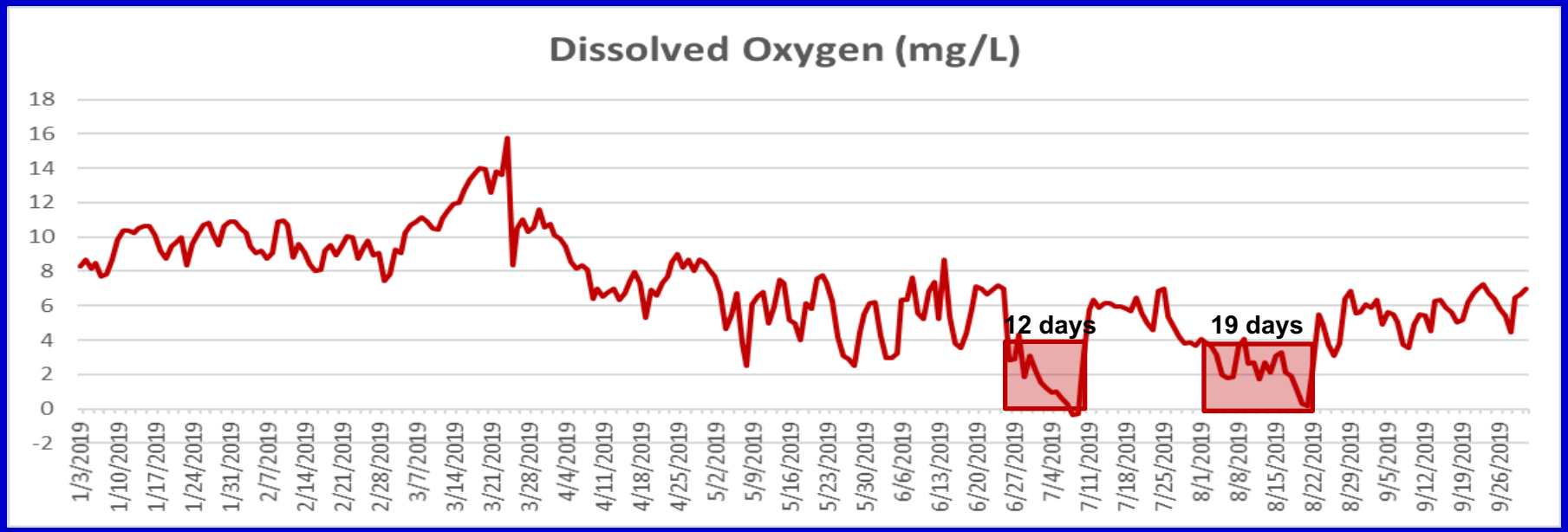




Salinity and Dissolved Oxygen Levels

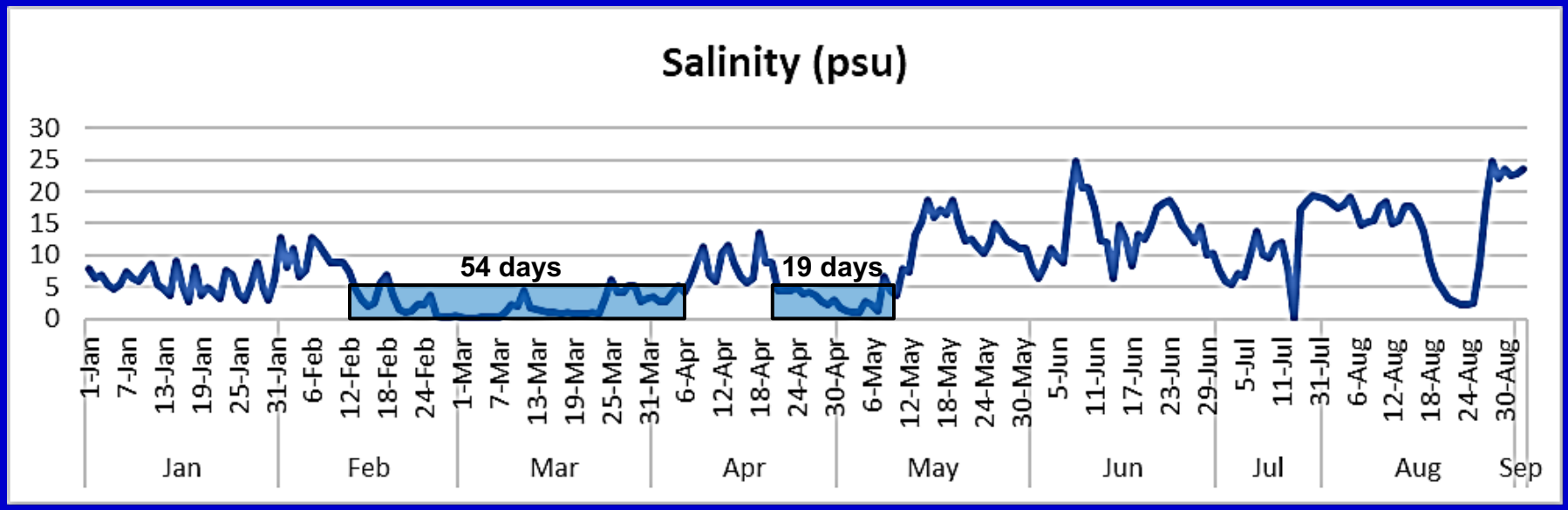
Buoy Reef Jan 3, 2019 – Oct 1, 2019

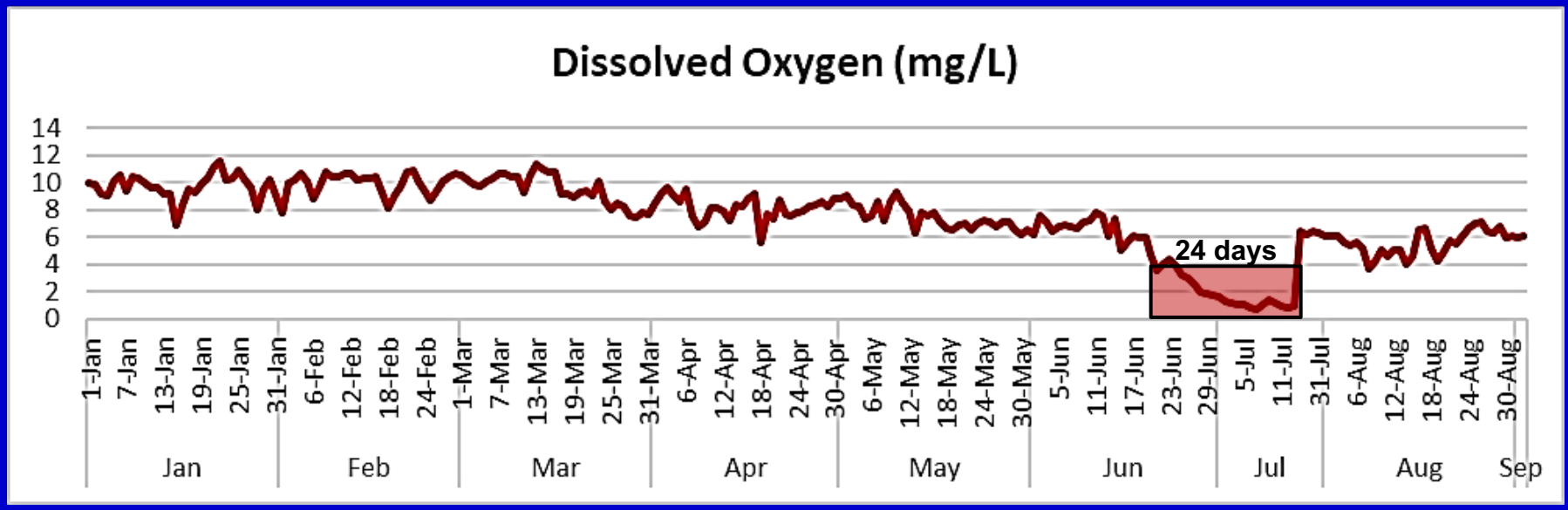




Salinity and Dissolved Oxygen Levels

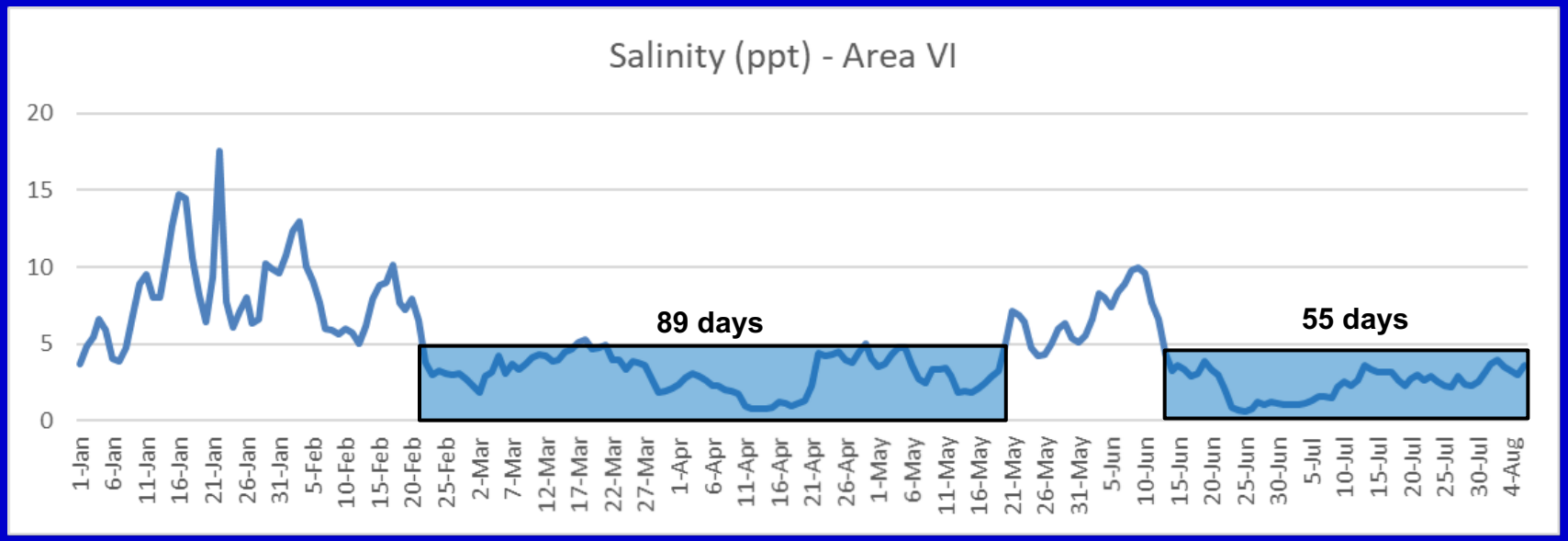
Cedar Point Jan 1, 2020 – Sep 2, 2020

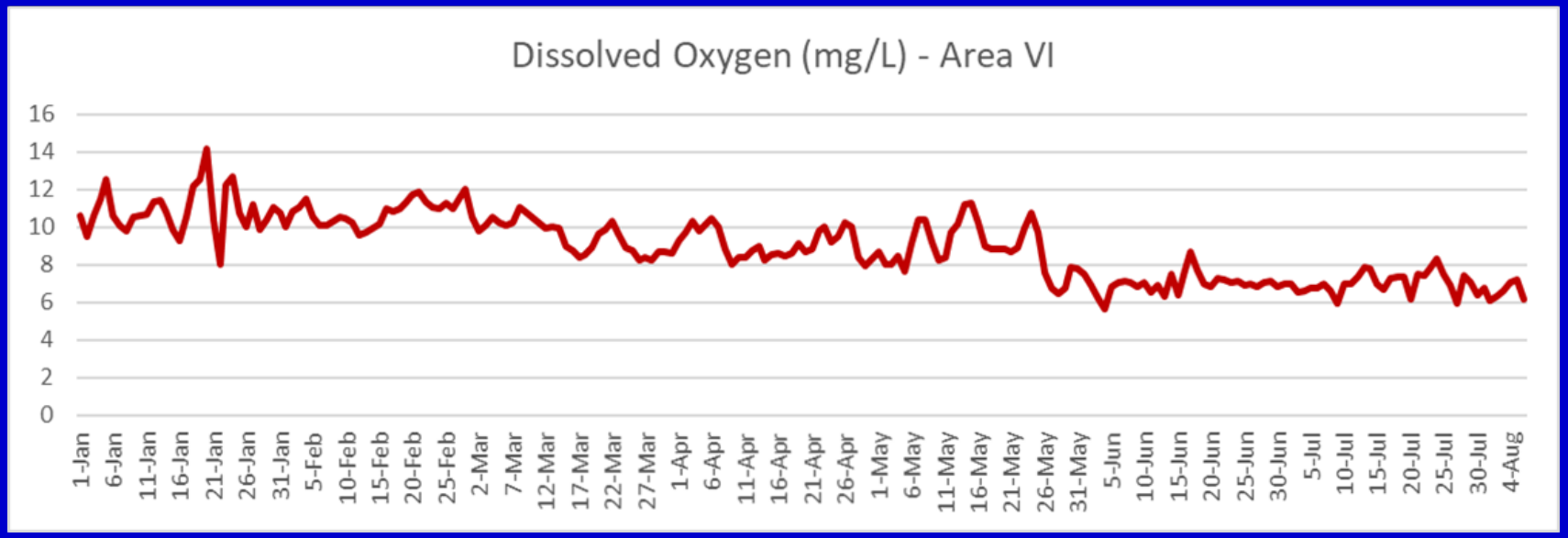




Salinity and Dissolved Oxygen Levels

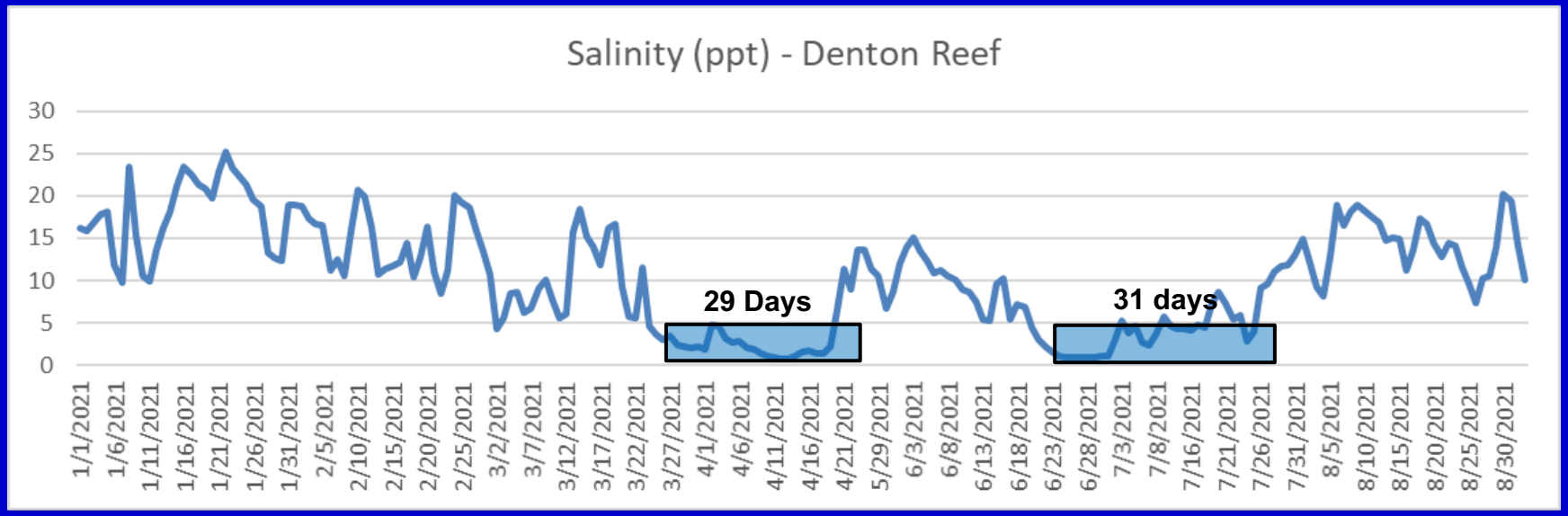
East Fowl River Jan 1, 2021 – Aug 6, 2021

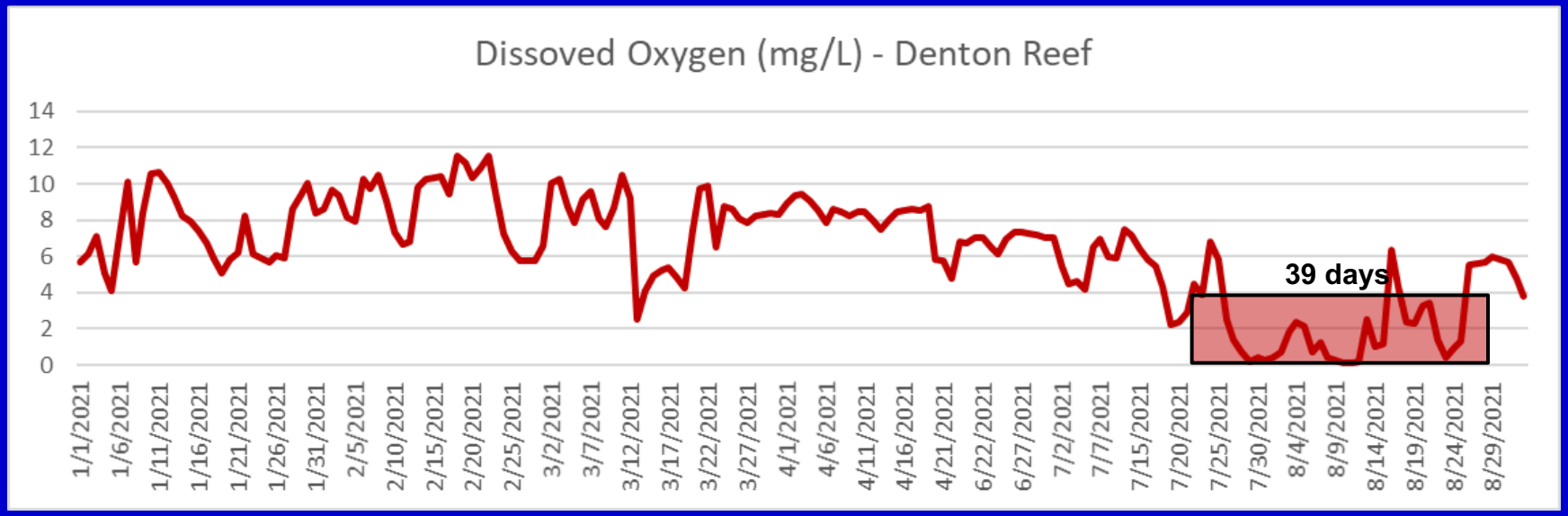




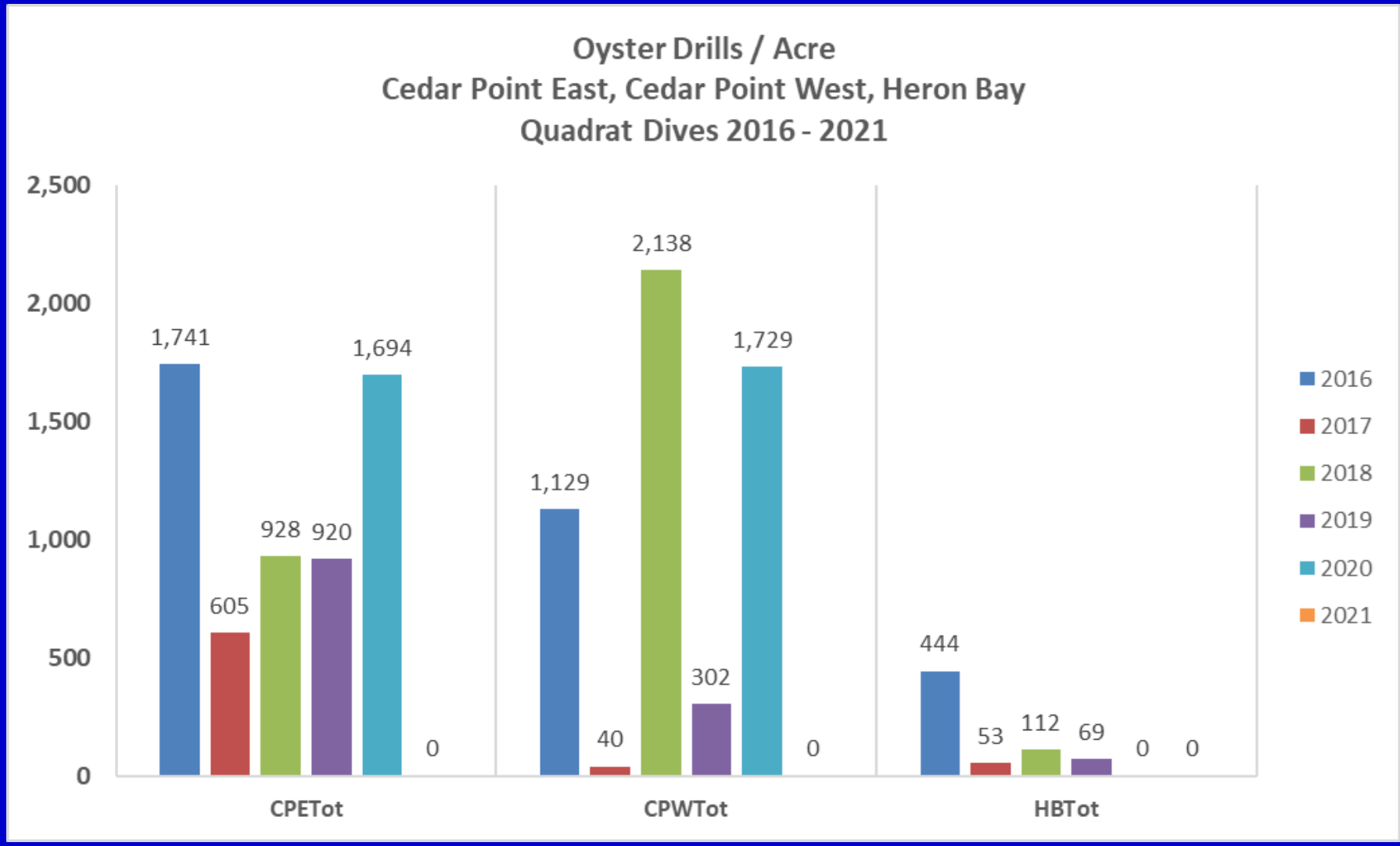
Salinity and Dissolved Oxygen Levels

Denton Reef Jan 1, 2021 – Sep 2, 2021





Oyster Drills / Acre
Quadrat Dives 2016 - 2021



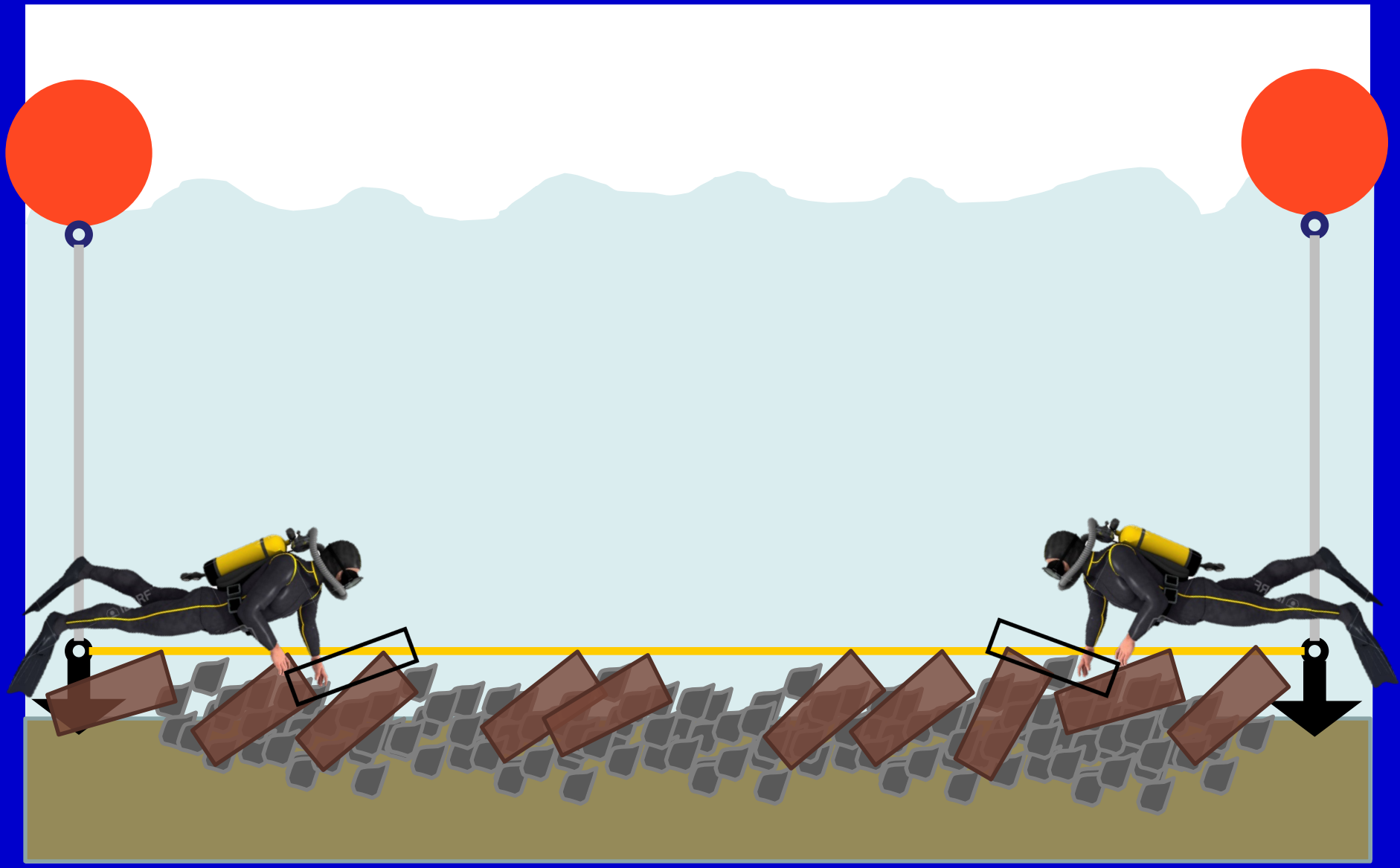
Oyster Reef Assessment

Annual SCUBA Quadrat Dives:

- **To determine oyster density on public reefs**
- **To set initial harvest goal for season**

SCUBA Quadrat Sampling

(not to scale, enhanced water clarity)



SCUBA Quadrat Sampling

(not to scale, water clarity… about right)

Quadrat Sample Processing

Additional Oyster Reef Sampling Techniques

Hand Dredge

Hydraulic Patent Tongs

Harvest Monitoring

Flexible Harvest Goal utilizing:

- **Oyster Management Station**
- **Reef Grid System**
- **On-water Harvester Surveys**

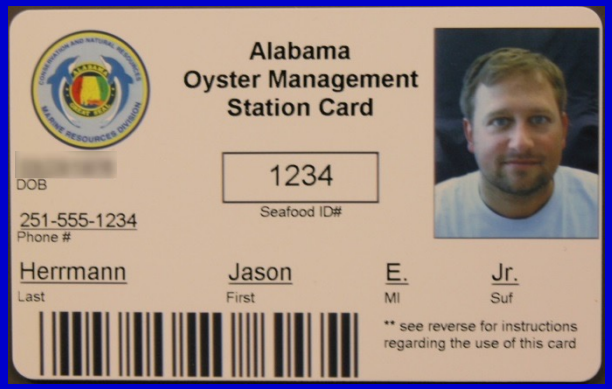
Laws and Regulation Changes

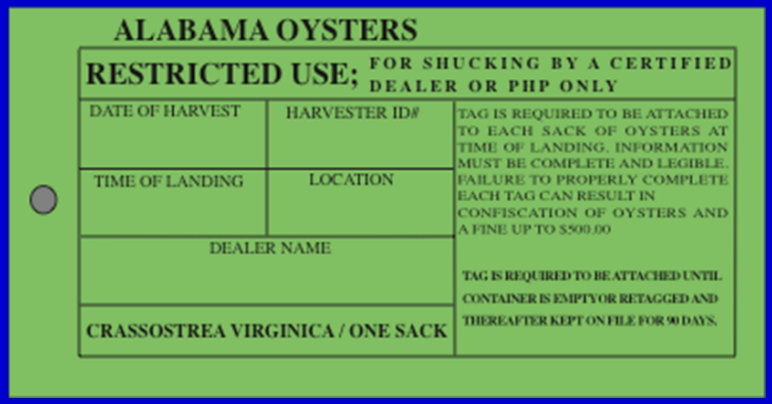
Implemented 2011

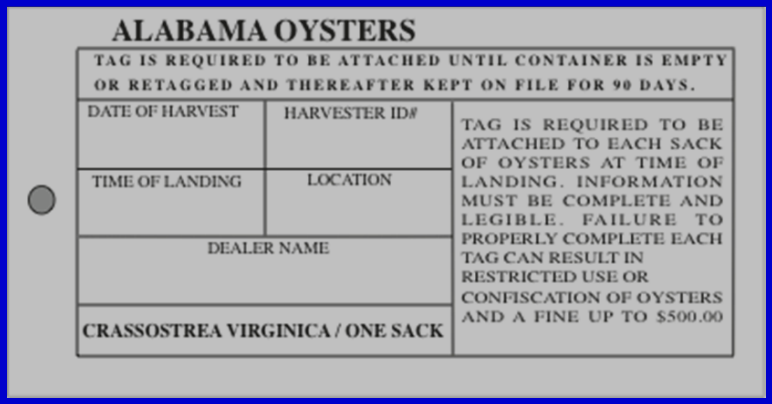
Public Reef Harvest Season Closed May 1 – Sept 31

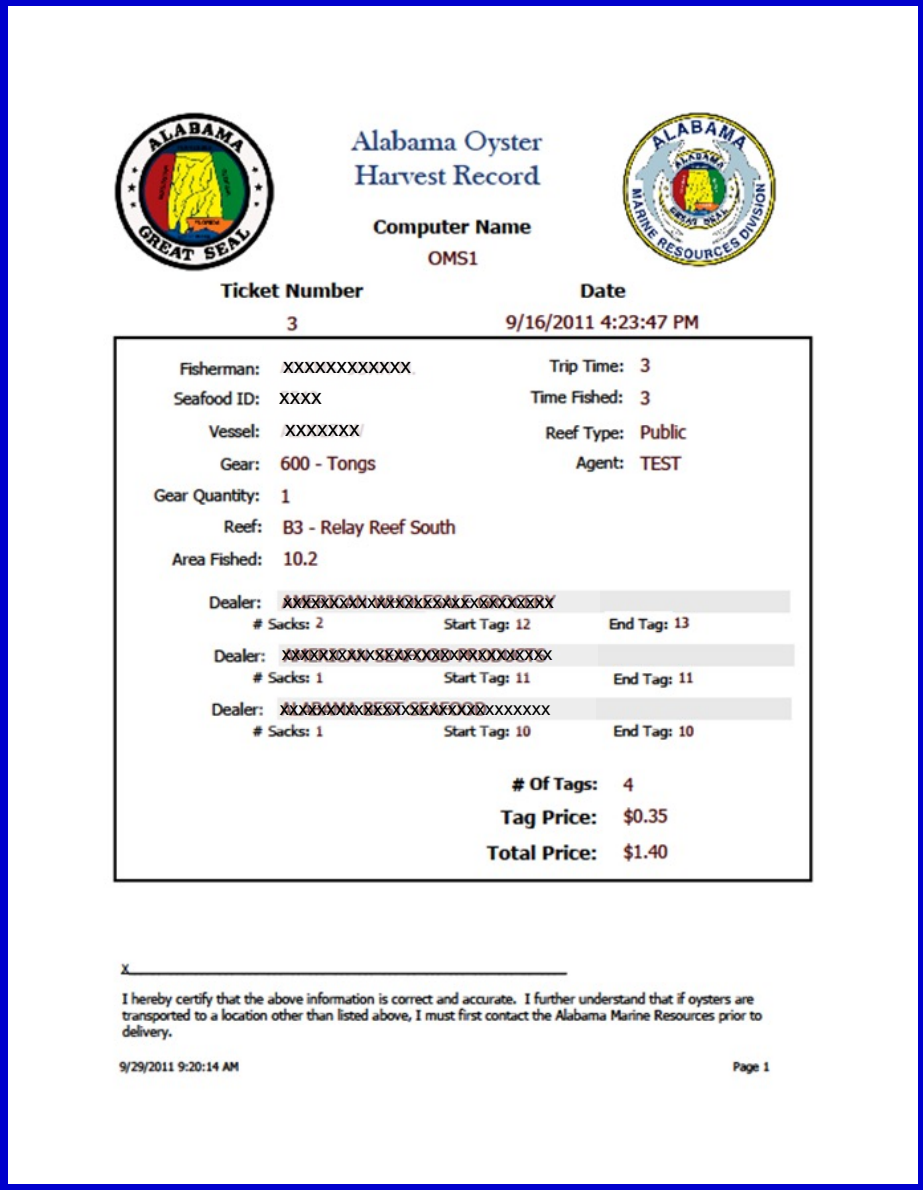
Establishment of Oyster Management Stations

Oyster Management Station









OMS Overview: Benefits

- To Consumer Safety
- To the Oyster Industry
- To Oyster Reefs

NEW TAG FOR RECREATIONAL OYSTER HARVEST

all recreational harvesters must purchase a recreational harvest tag at the Oyster Management Station

Recreational tags cost $0.35

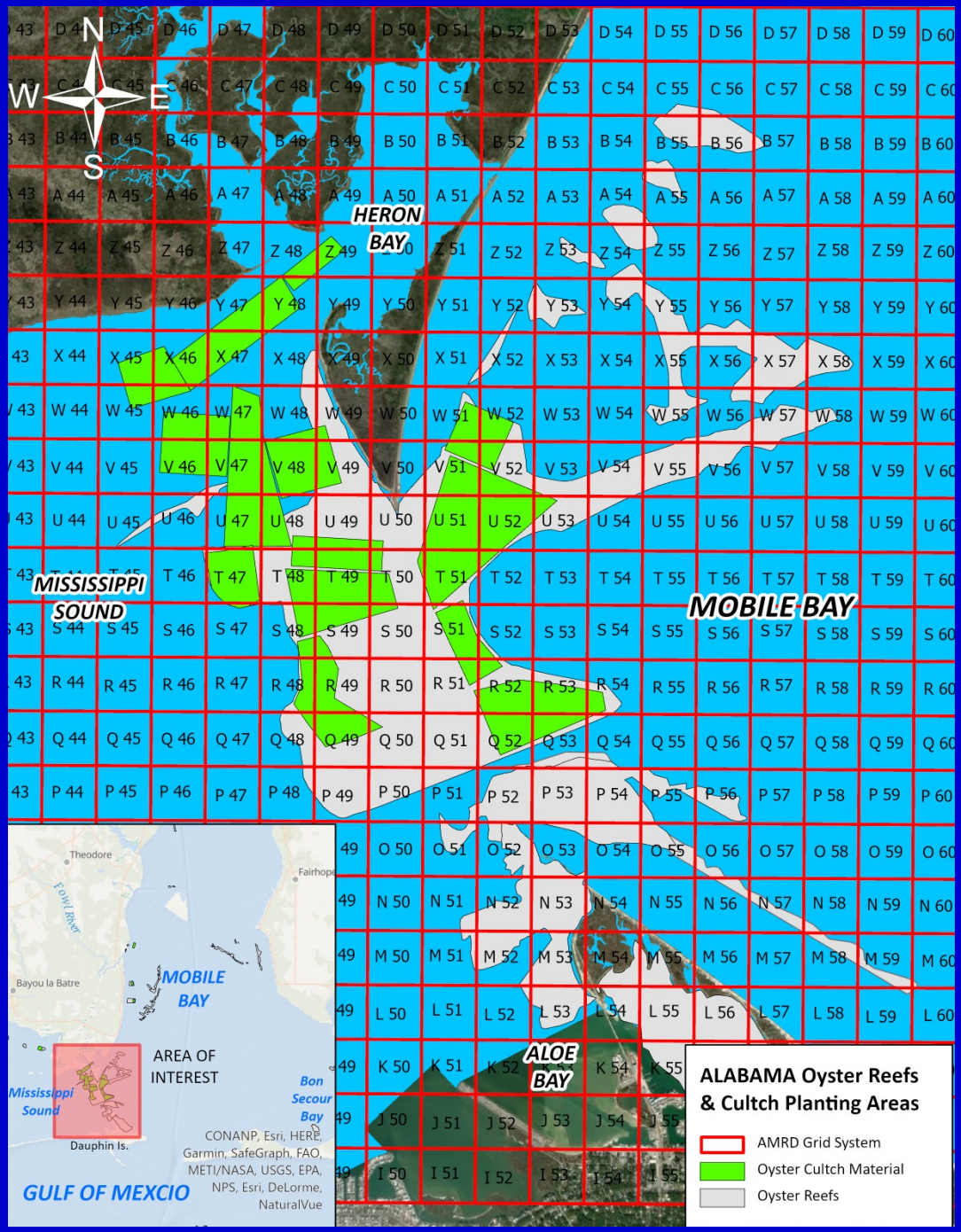
Recreational harvesters may harvest up to 100 legal size oysters per person per day and harvest may only occur during times and in areas open to public harvest.

Introduced New Reef Grid System in 2020

to help monitor harvest and

to reduce overharvesting in specific areas

with better resolution we may be able to allow additional harvest instead of closing large reef areas



AMRD closes blocks of grids when they are harvested sufficiently

How do harvesters know they are in the correct grid?

1. Navigate to the following link on your smart phone: https://www.outdooralabama.com/oysterharvest

2. Push this button at the top of the page

   2021 ALABAMA OYSTER HARVEST GRID MAP

3. Push the “Target” Button

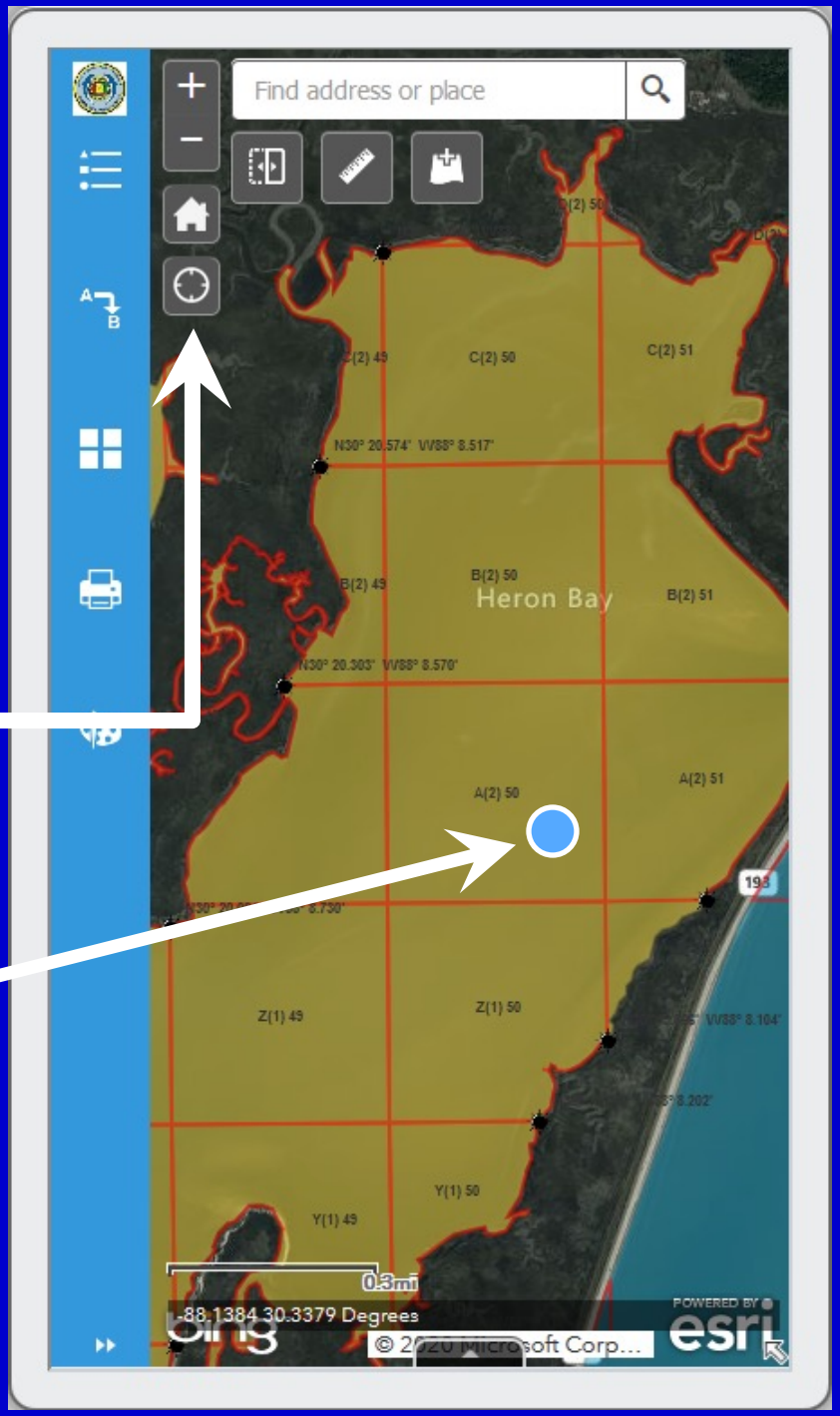
4. Follow directions to turn on location

5. Push the “Target” Button again to display position on Map

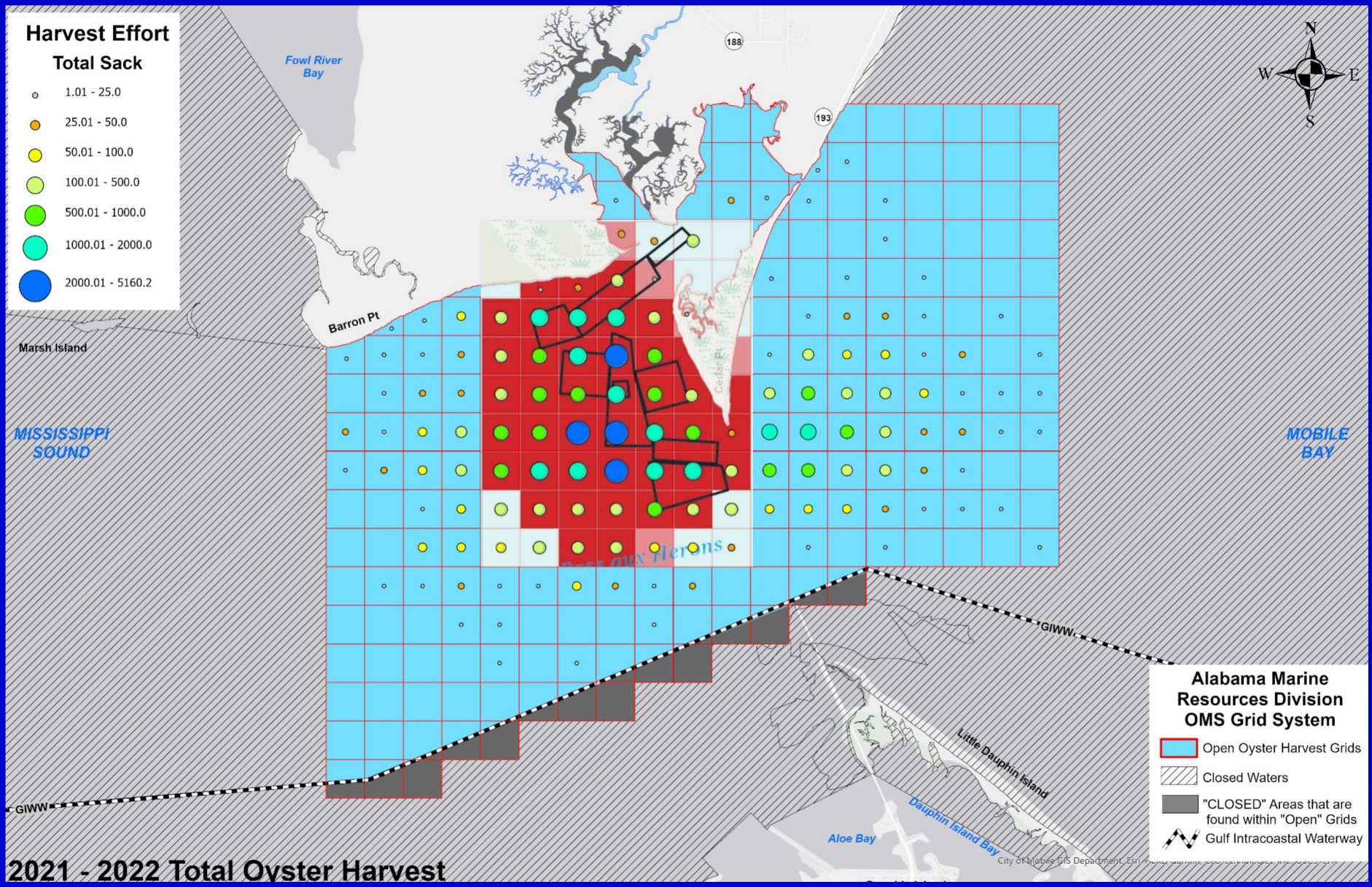
Harvester is the BLUE DOT

The BLUE DOT WILL MOVE ON THE MAP WHEN THE HARVESTER MOVES

Only Open Grids are Displayed



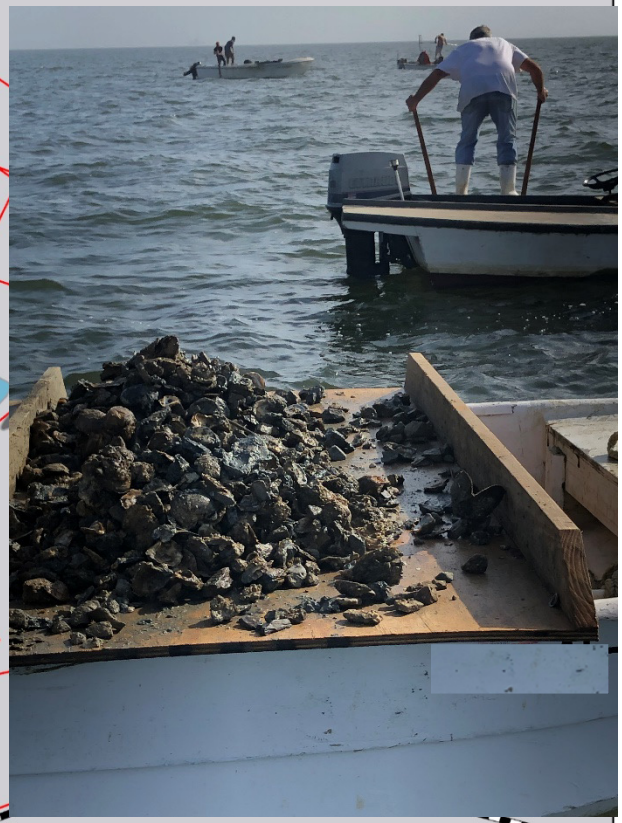
Harvester Reports the Grid Harvested



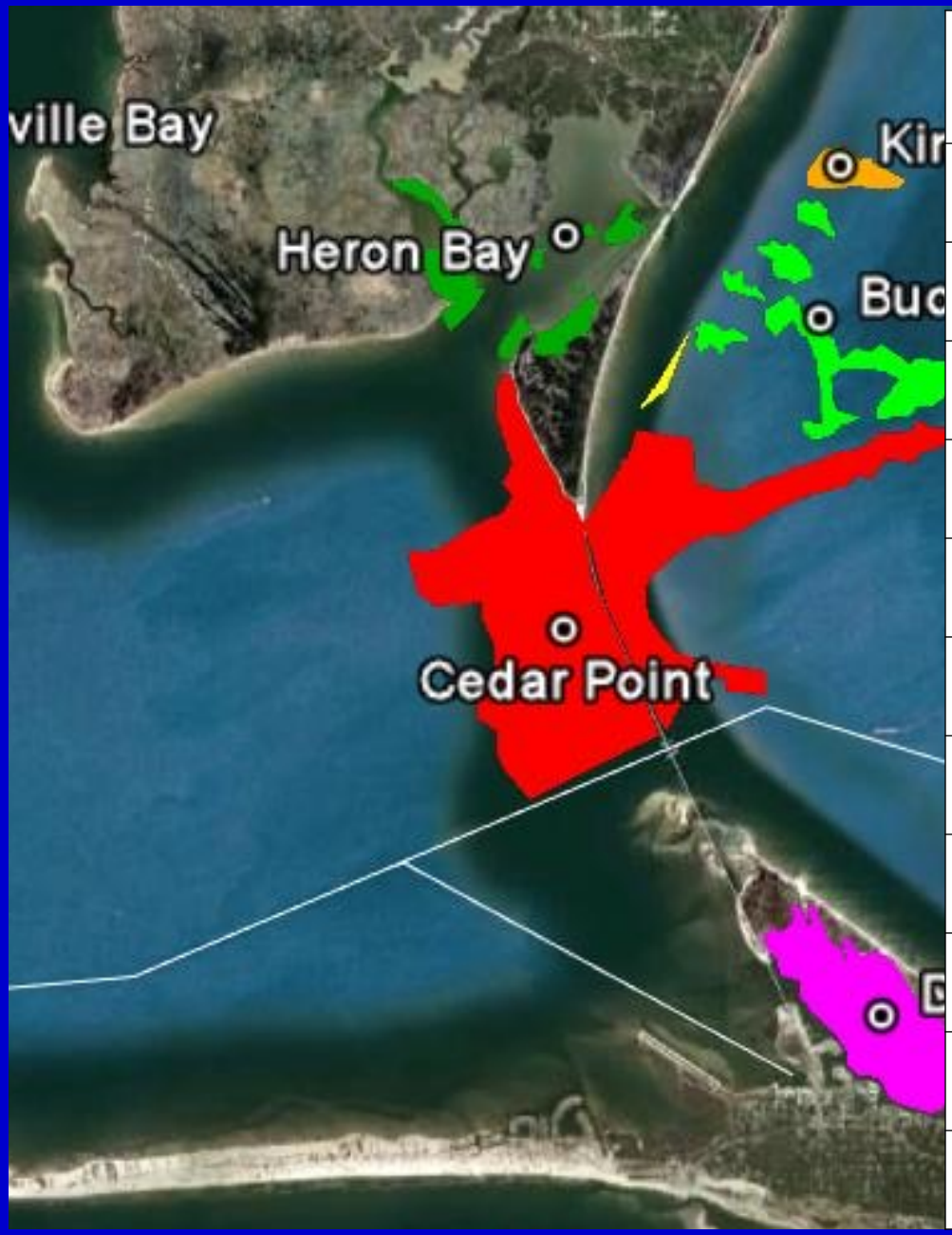
AMRD Conducts Harvester Surveys

Purpose of Harvester Surveys:

- **Verification of Grids Reported**
- **Assess harvest status by evaluating oysters and reef material on harvest vessel cull board**



Status of Alabama Oyster Reefs



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AMRD Oyster Reef Restoration Projects

Past:

- Cultch Planting
- Oyster Relaying
- Oyster Seed Planting

Present:

- Cultch Planting
- Oyster Relaying
- Oyster Seed Planting
- Experimental Projects Including:
    - Remote Setting of Oysters
    - Reef Cultivation
    - Reef Cultch Height and Cultch Configuration
- Side Scan Sonar and Multibeam Surveys

Future:

Implementation of the **Coastal Alabama Comprehensive Oyster Restoration Strategy**

Cultch Planting
782,062 cubic yards of cultch material planted between 1972 and 2016

Deployment of oyster shell, limestone, or other cultch material to provide a substrate for oyster settlement and growth

Oyster Relay Operations

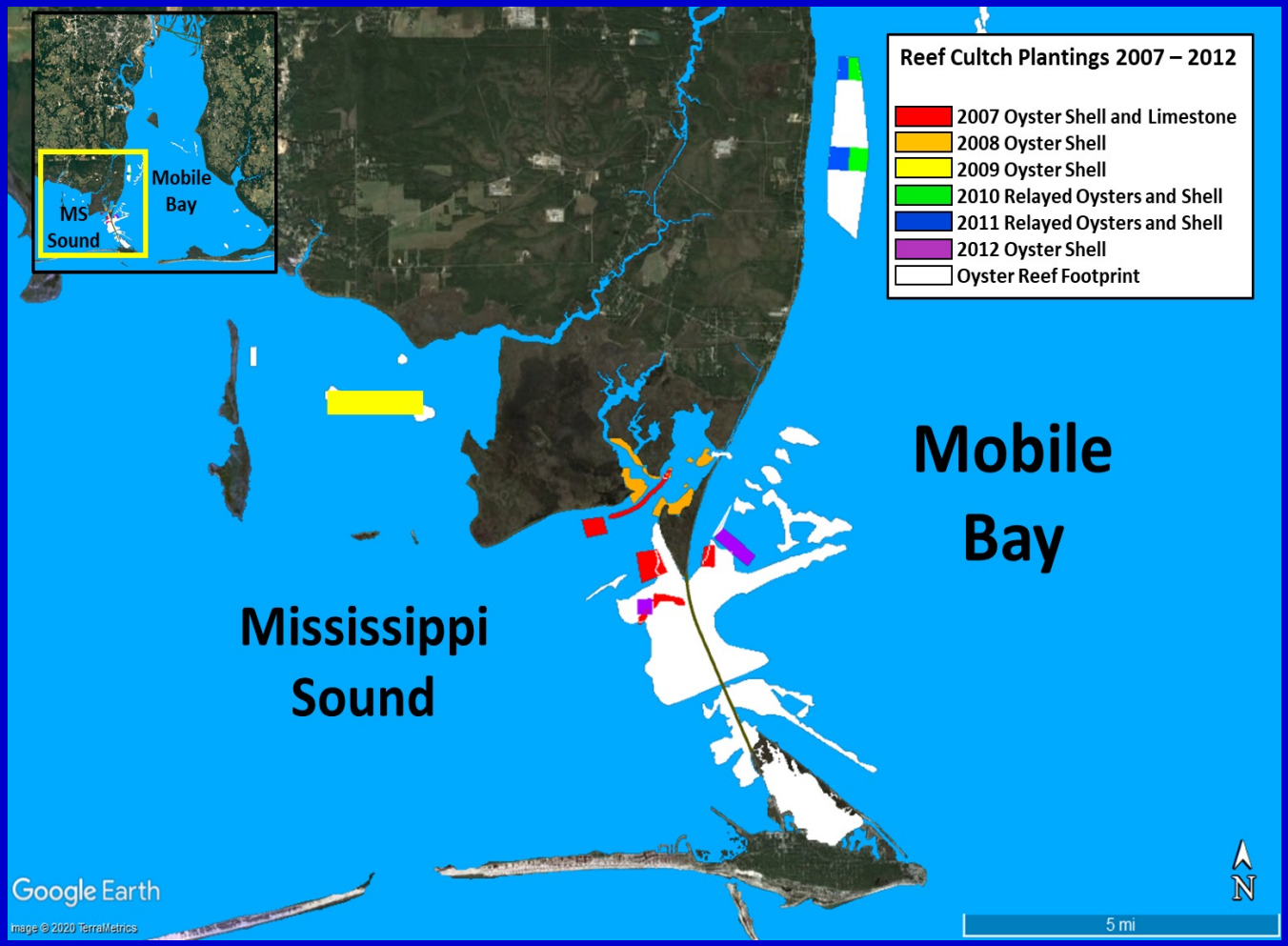
(Large Scale)

Oyster Harvesters were paid to harvest oysters and cultch and deposit on barge (2010) or transplant to deployment area directly (2011)

Oyster Seed Planting

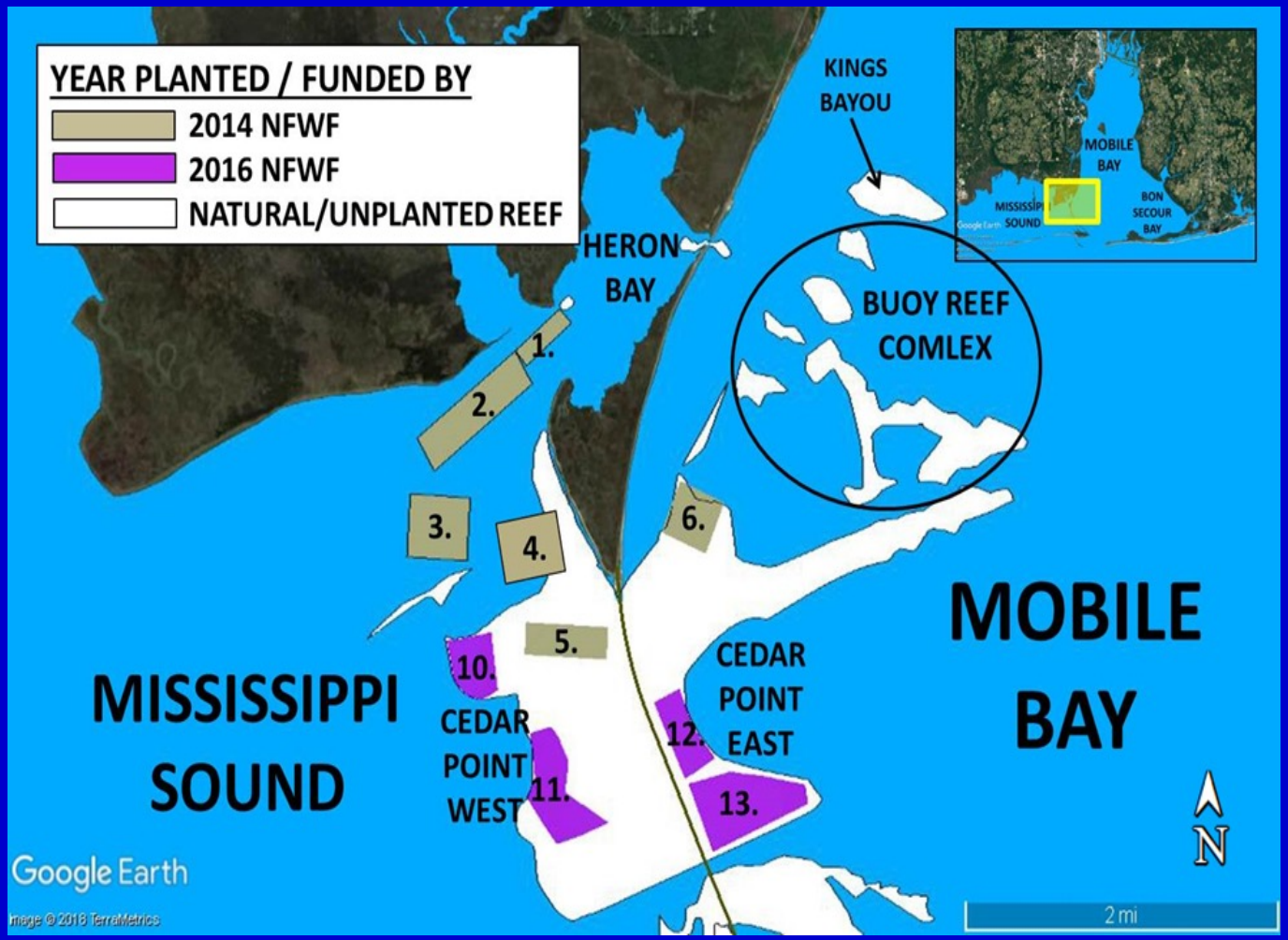
AMRD Staff
Deploying
Aquacultured Seed

AMRD Cultch Plantings and Relays 2007 – 2012 (Emergency Disaster Relief Program)



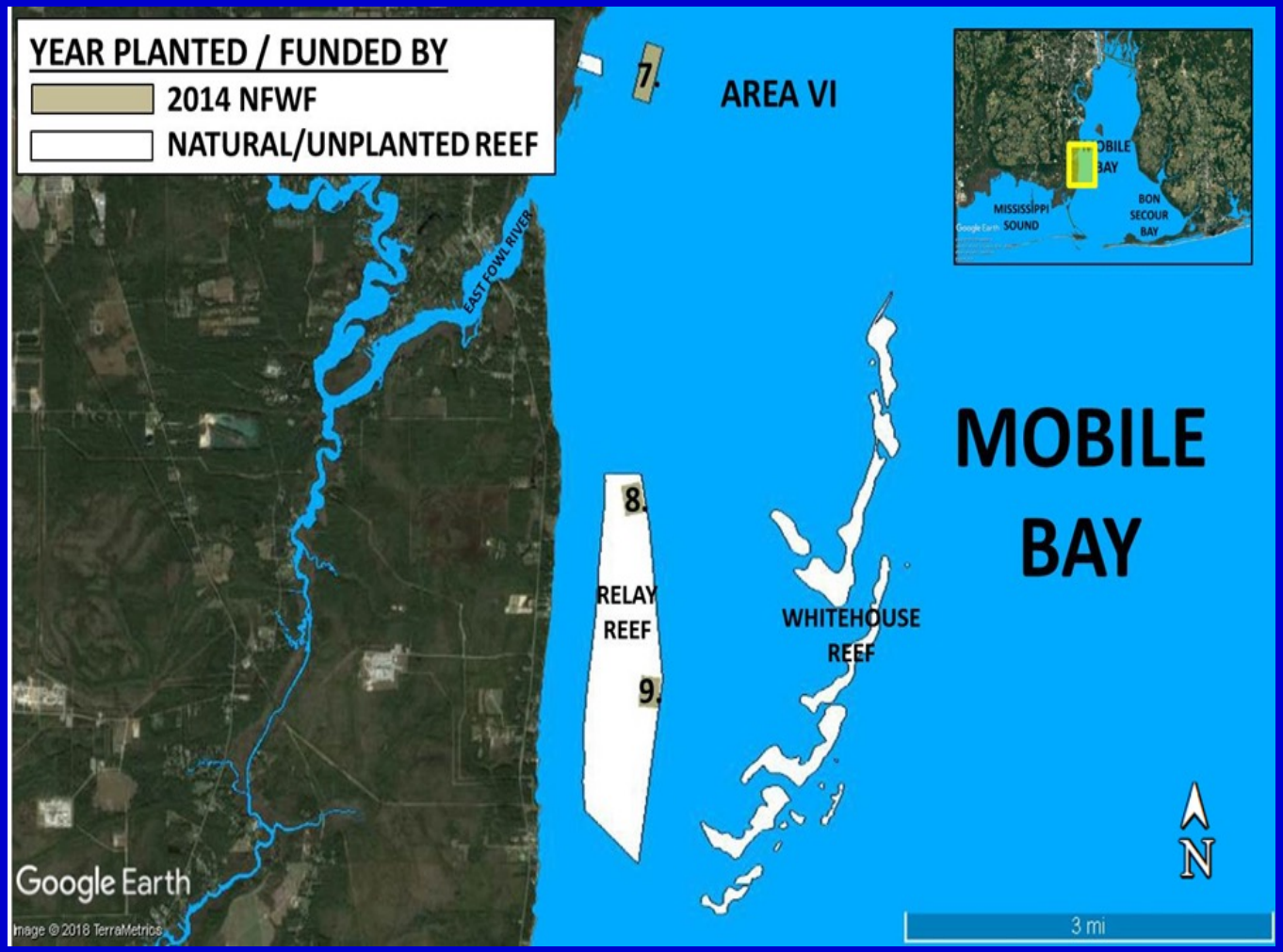
Year	Cultch (c.y.)
2007	31,500
2008	24,000
2009	16,733
2010	4,757 (Relay)
2011	4,457 (Relay)
2012	5,104
Cultch	**77,337**
Relay	**9,214**
Total	**86,551**

AMRD Cultch Plantings
Lower Mobile Bay / MS Sound Spring 2014 and 2016
(National Fish and Wildlife Foundation)



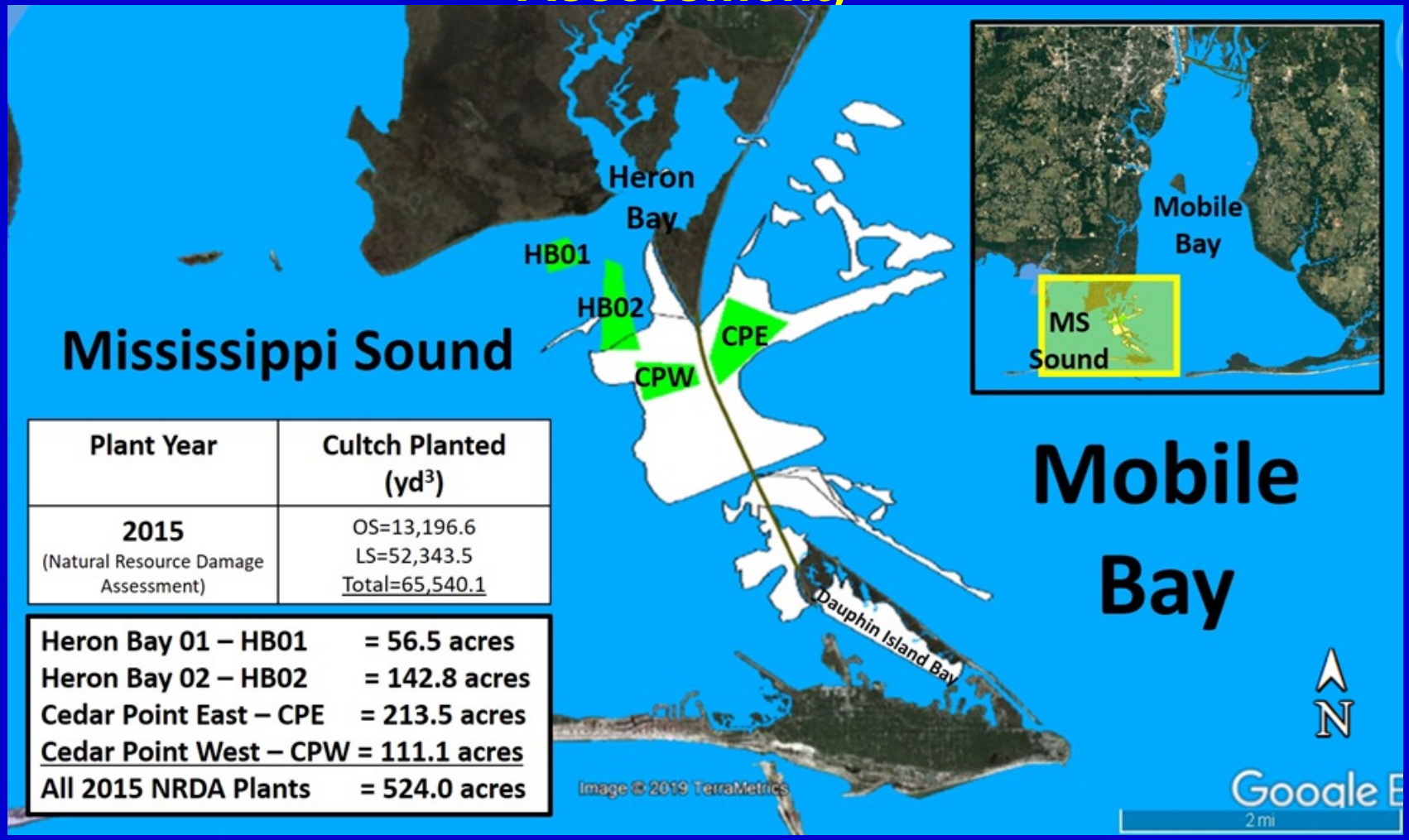
Year	Cultch (c.y.)
2014	27,957
2016	21,554
Total	**49,511**

AMRD Cultch Plantings
Mid - Mobile Bay Fall 2014
(National Fish and Wildlife Foundation)



Year	Cultch (c.y.)
2014	10,990
Total	**10,990**

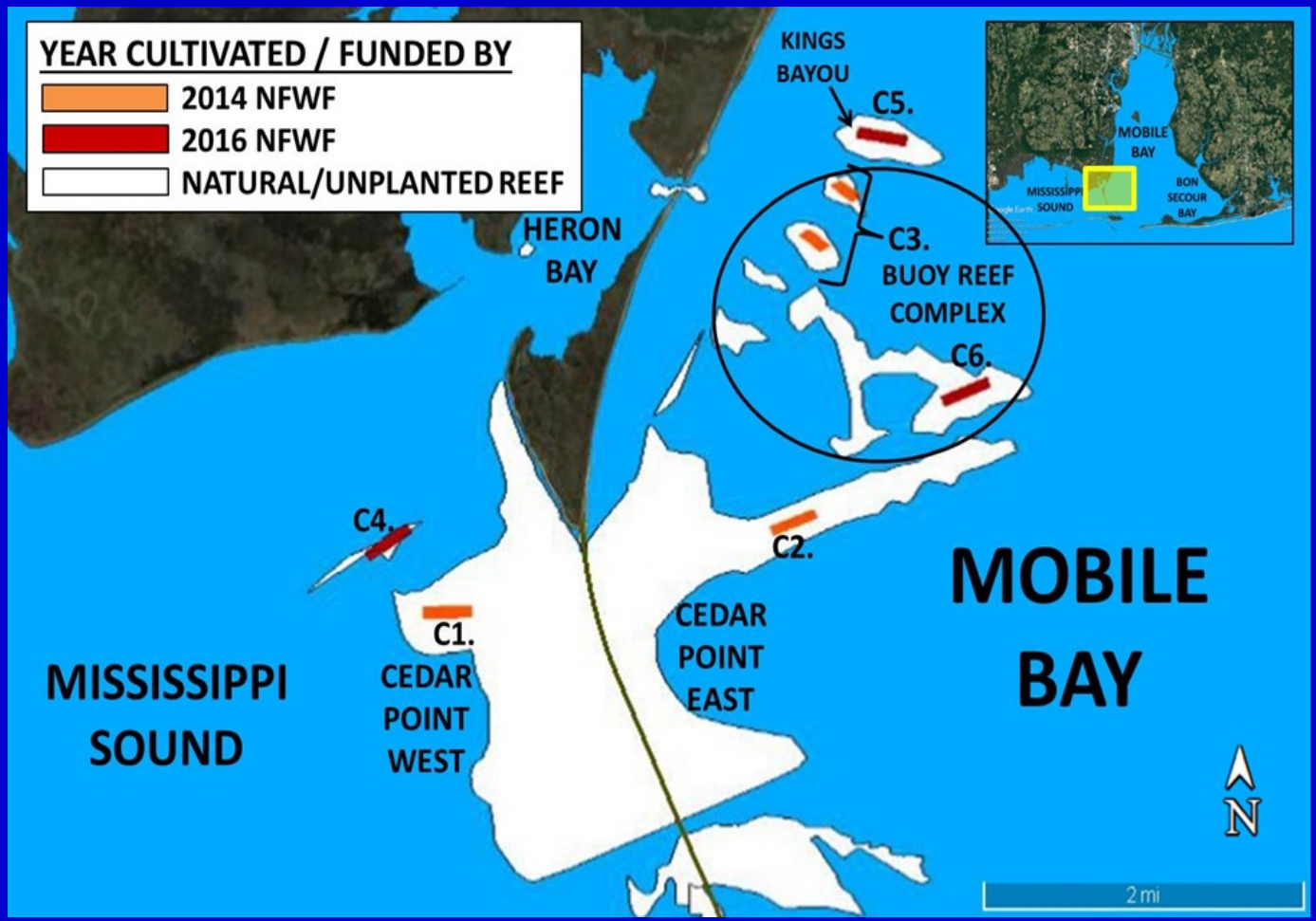
AMRD Cultch Planting
Lower Mobile Bay / MS Sound 2015
(National Oceanic and Atmospheric Administration, Deepwater Horizon National Resource Damage Assessment)



Plant Year	Cultch Planted (yd^3)
2015 (Natural Resource Damage Assessment)	OS=13,196.6 LS=52,343.5 Total=65,540.1

Heron Bay 01 – HB01	= 56.5 acres
Heron Bay 02 – HB02	= 142.8 acres
Cedar Point East – CPE	= 213.5 acres
Cedar Point West – CPW	= 111.1 acres
All 2015 NRDA Plants	= 524.0 acres

AMRD Experimental Reef Cultivation
Lower Mobile Bay / MS Sound 2014 and 2016
(National Fish and Wildlife Foundation)



Year	Area (Acres)
2014	18
2016	18
Total	**36**

AMRD Experimental Remote Setting
Lower Mobile Bay / MS Sound 2016 and 2017
(National Fish and Wildlife Foundation)

Year	Deployment Events
2016	2
2017	10
Total	**12**

AMRD Seed Planting
Lower Mobile Bay / MS Sound 2013 – 2015
(for the NFWF made possible by the generous seed donations from the Auburn Shellfish Laboratory, Dauphin Island, AL)

Year	Individual Oysters (<0 mm – 50 mm)
Total 2013 - 2015	41,069,890

Remote Setting of Oysters

Funded by the
National Fish and Wildlife Foundation

in collaboration with the
Auburn University Shellfish Laboratory

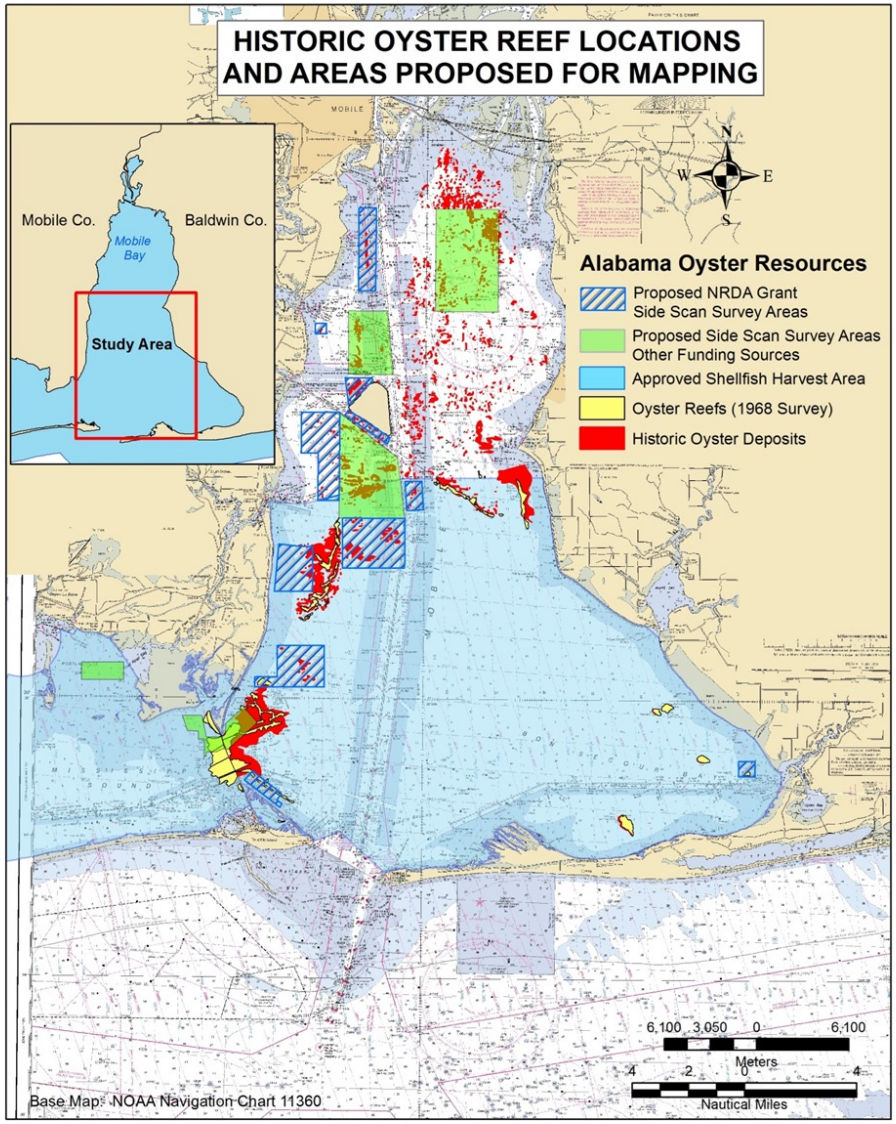
Purpose of Study:
To determine if there is a significant difference in final oyster density of remote set oysters when compared to natural oyster recruitment on cultch material.

DWH NRDA Restore Act Funds

Experimental Restoration Strategies

- Evaluating New Areas to Plant
- Evaluating New Techniques to Plant Cultch
- Reducing Mortality Through Remote Setting of Oysters

Projects Through DWH NRDA Restore Act



Oyster Reef Mapping

AMRD is using side scan sonar to survey recent and historical oyster reef footprints.

This data will be used to find suitable bottoms for reef restoration and update oyster reef maps by determining the area of known oyster reefs.

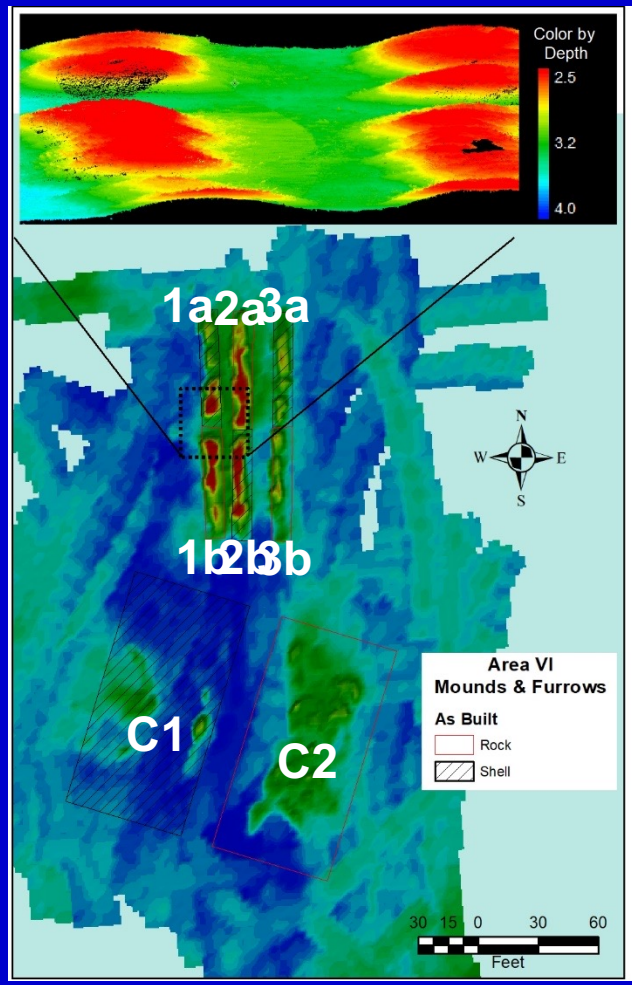
This will aid in planning future oyster restoration projects.

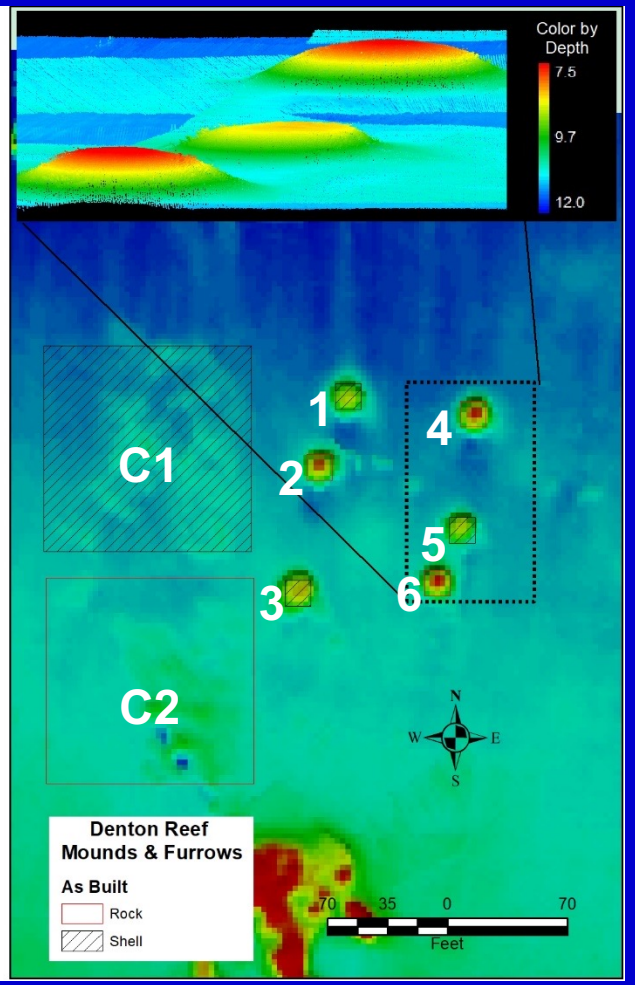
Reef Height and Configuration Experiments

Small scale experimental projects to look at alternate methods of planting cultch including:

- **Planting Cultch in Mounds**
- **Planting Cultch in Lines to Create Furrows**

Post Construction Results Denton Reef and Area VI of Oyster Shell (OS) and #4 Limestone (LS) Mounds
Denton Mounds
1. OS (45 c.y.)
2. LS (45 c.y.)
3. OS (45 c.y.)
4. LS (45 c.y.)
5. OS (45 c.y.)
6. LS (45 c.y.)
Control 1. OS (45 c.y.)
Control 2. LS(45 c.y.)
Area VI Mounds
1a. LS (15 c.y.)/1b. OS (15 c.y.)
2a. LS (15 c.y.)/2b. OS (15 c.y.)
3a. LS (15 c.y.)/3b. OS (15 c.y.)
Control 1. OS (22.55 c.y)
Control 2. LS (22.55 c.y.)





Future Projects Through DWH NRDA Restore Act

Deploying Remote Set Oysters Strategically

in certain areas and in conjunction with certain projects such as living shorelines and marsh restoration.

AMRD Oyster Reef Restoration Projects

Future:

Implementation of the
Coastal Alabama Comprehensive Oyster Restoration Strategy

- Cultch Planting various planting techniques
- Oyster Relaying
- Oyster Seed Planting
- Remote Set of oysters on Half Shell
- Side Scan Sonar and Multibeam Surveys to identify additional suitable bottoms for oyster reefs
- Surveys of intertidal oyster populations
- Larval Transport Modeling
- Seasonal flow and hydrology modeling

Larval Transport and Flow Modeling

Kim, C.K., Park, K., Powers, S.P., Graham, W.M. and Bayha, K.M., 2010. Oyster larval transport in coastal Alabama: Dominance of physical transport over biological behavior in a shallow estuary. *Journal of Geophysical Research: Oceans*, *115*(C10).

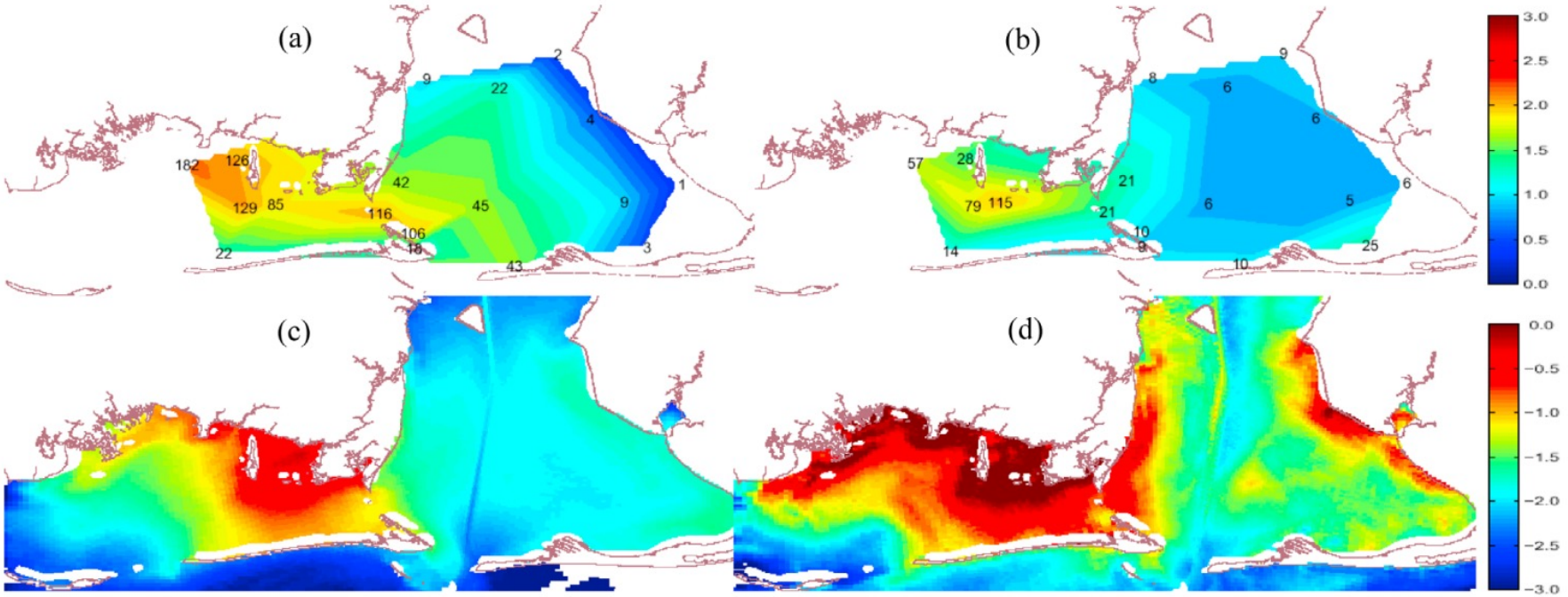


Figure 5. Observed (a) oyster spat settlement (spats m^{-2} d^{-1}) and (b) bivalve larval concentration (larvae per 10 L) compared with the model results (c) by physical transport only and (d) by physical transport and biological movement, averaged over surveys 11 to 19. Color bars indicate $\log_{10}$-transformed data and model results.

Image from Kim et al., 2010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Questions?