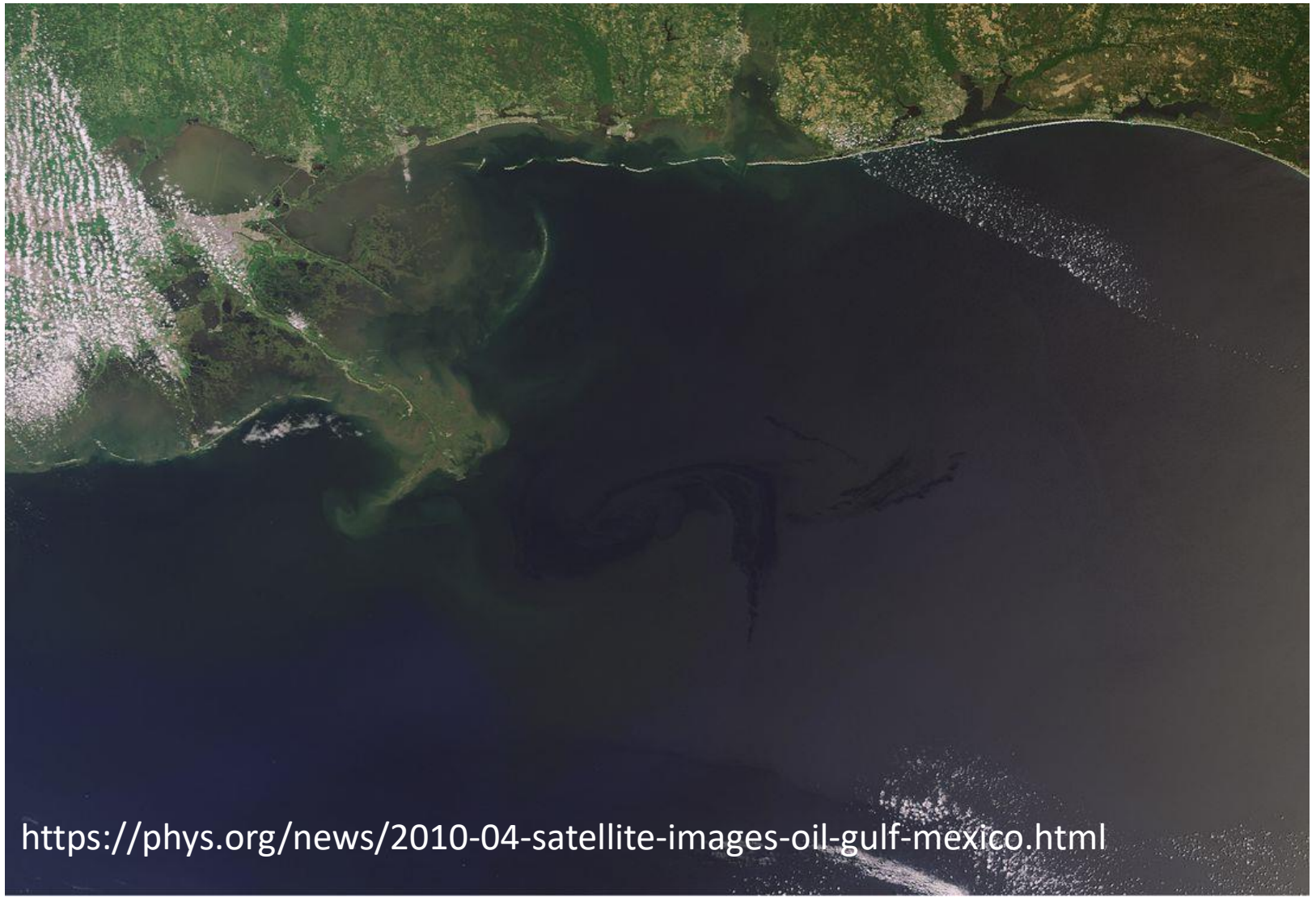
Mississippi/Alabama Working Group Update
CHAMP Meeting 2018



S. Ashby, Mississippi State University
B. Dzwonkowski, University of South Alabama
S. Howden, University of Southern Mississippi
J. Lopez, Lake Ponchartrain Basin Foundation
S. Milroy, University of Southern Misssissippi
R. Collini, Dauphin Island Sea Laboratory

Jan 9, 2018

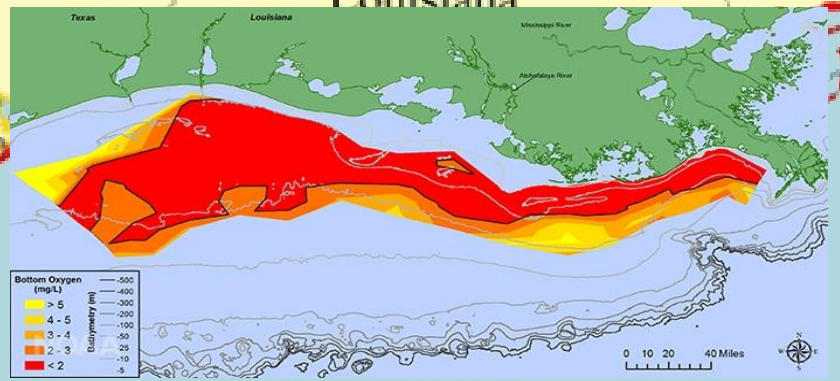
Summary of Work Group Activities

August 2017 – NGI Workshop

Fall 2017 – Proposal to GOMA for data compilation and assessment

Winter 2017 – Proposal in development to NOAA NCCOS CHRP for data compilation, assessment, additional observations, and enhanced economic assessment on fisheries

Much of the focus tends to be on the Texas-Lousiana coast due the "Dead Zone", second largest region of hypoxia in the world



?

However, Mississippi Bight is also strongly impacted by freshwater inputs, wind and wave dynamics, and nutrient loading, etc.

www.epa.gov via N. N. Rabalais and R. E. Turner

Historical Observations of Hypoxia

Christmas 1973

- **Several observations on inner shelf seaward of passes between barrier islands**

Turner and Allen 1982

- **Shelf seaward of passes between barrier islands**

Turner et al., 1987

- **Mobile Bay and nearby inner shelf**

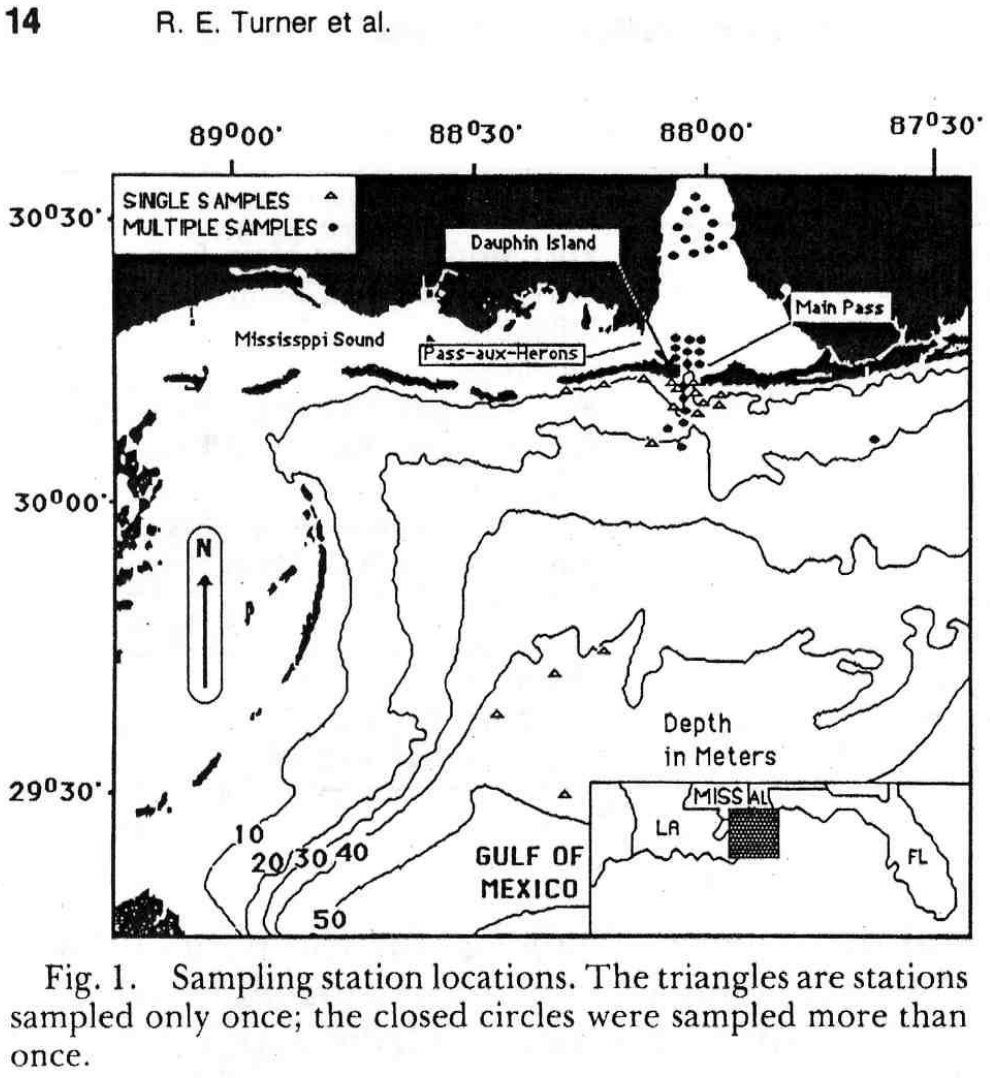
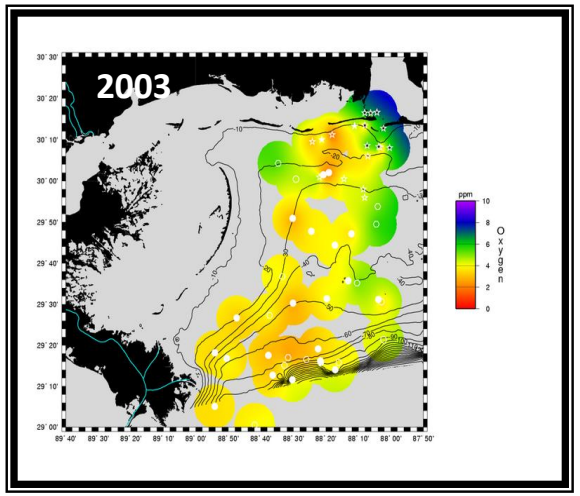
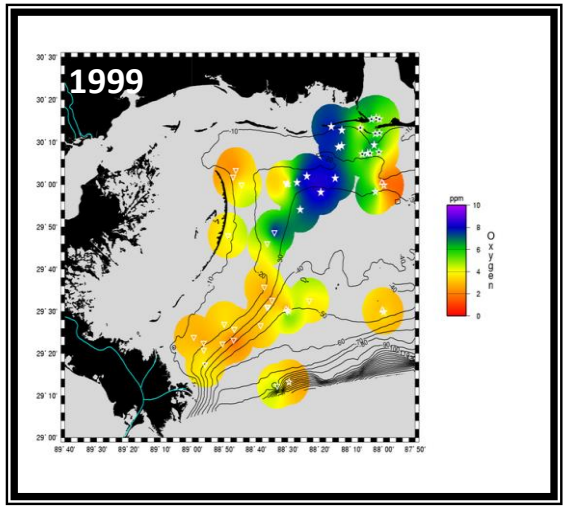


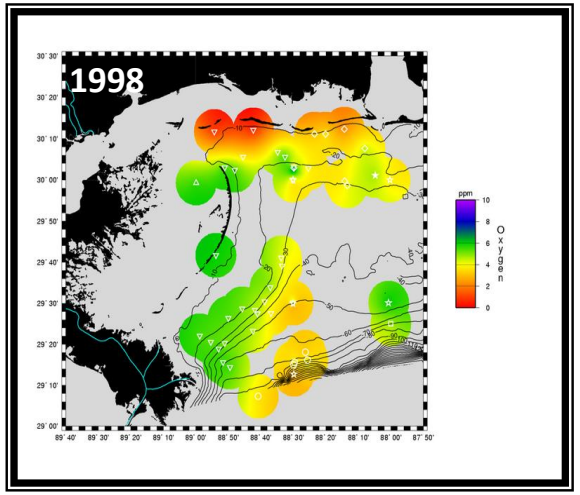
Fig. 1. Sampling station locations. The triangles are stations sampled only once; the closed circles were sampled more than once.

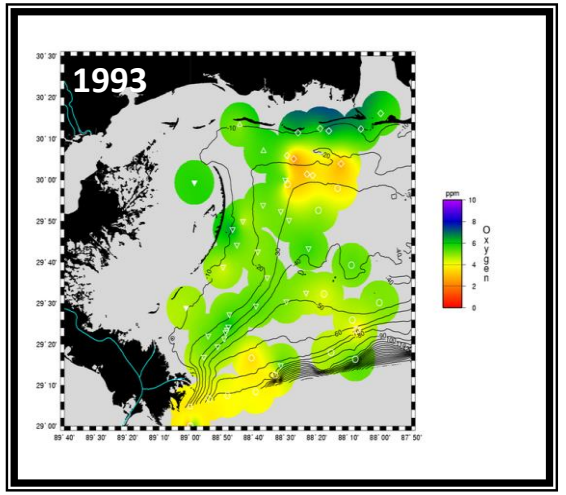
Historical Observations of Hypoxia

SEAMAP 1984-2003 ~50 sporadic hypoxic stations over this time period









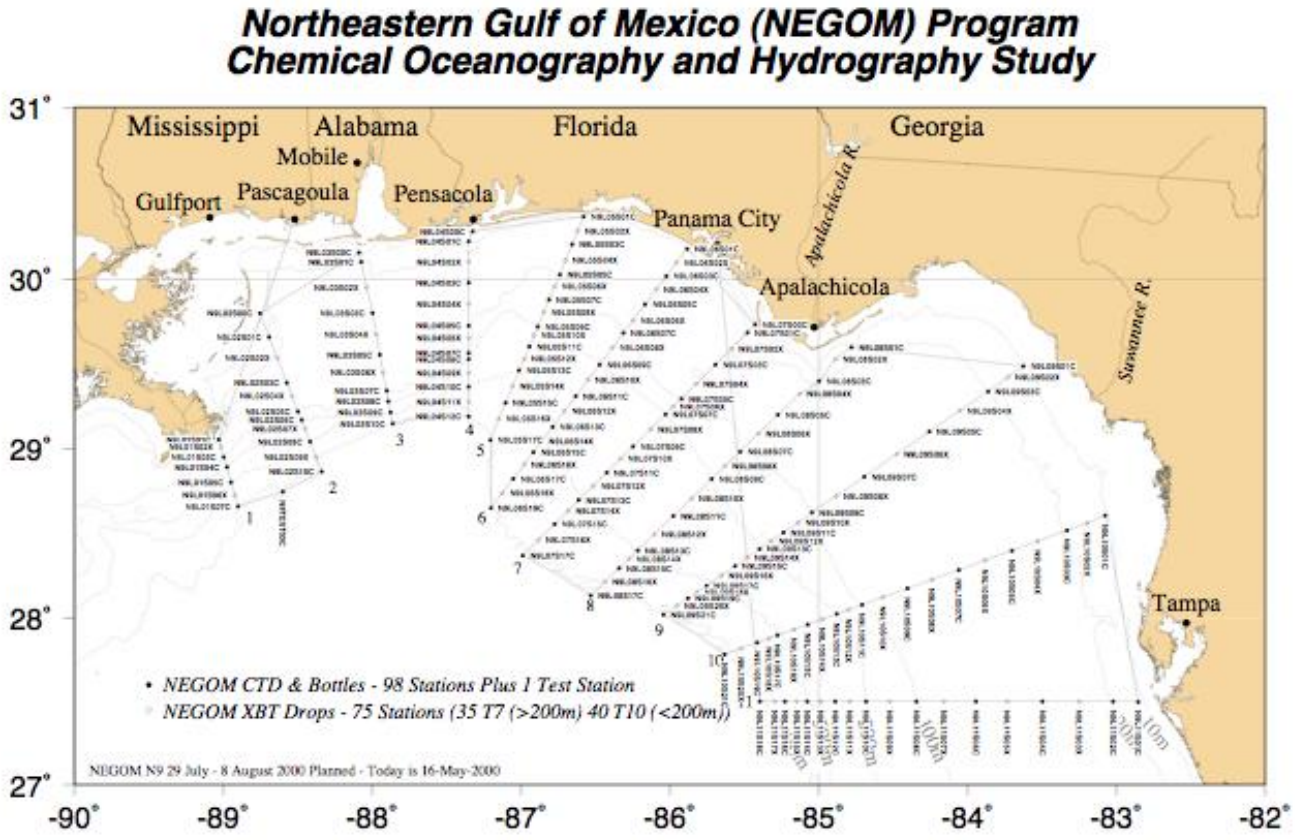
Historical Observations of Hypoxia

Jochens et al. , 2000

- **Hypoxic station on the inner shelf east of Chandeleur Islands**
- **Shelf in 25 m water south of Pensacola**

Jochens et al., 2002

- **One hypoxic station of**
- **~16 in summer between**
- **1997-2000 (Jochens et al.,**
- **2002)**



Historical Observations of Hypoxia

Brunner et al., 2006

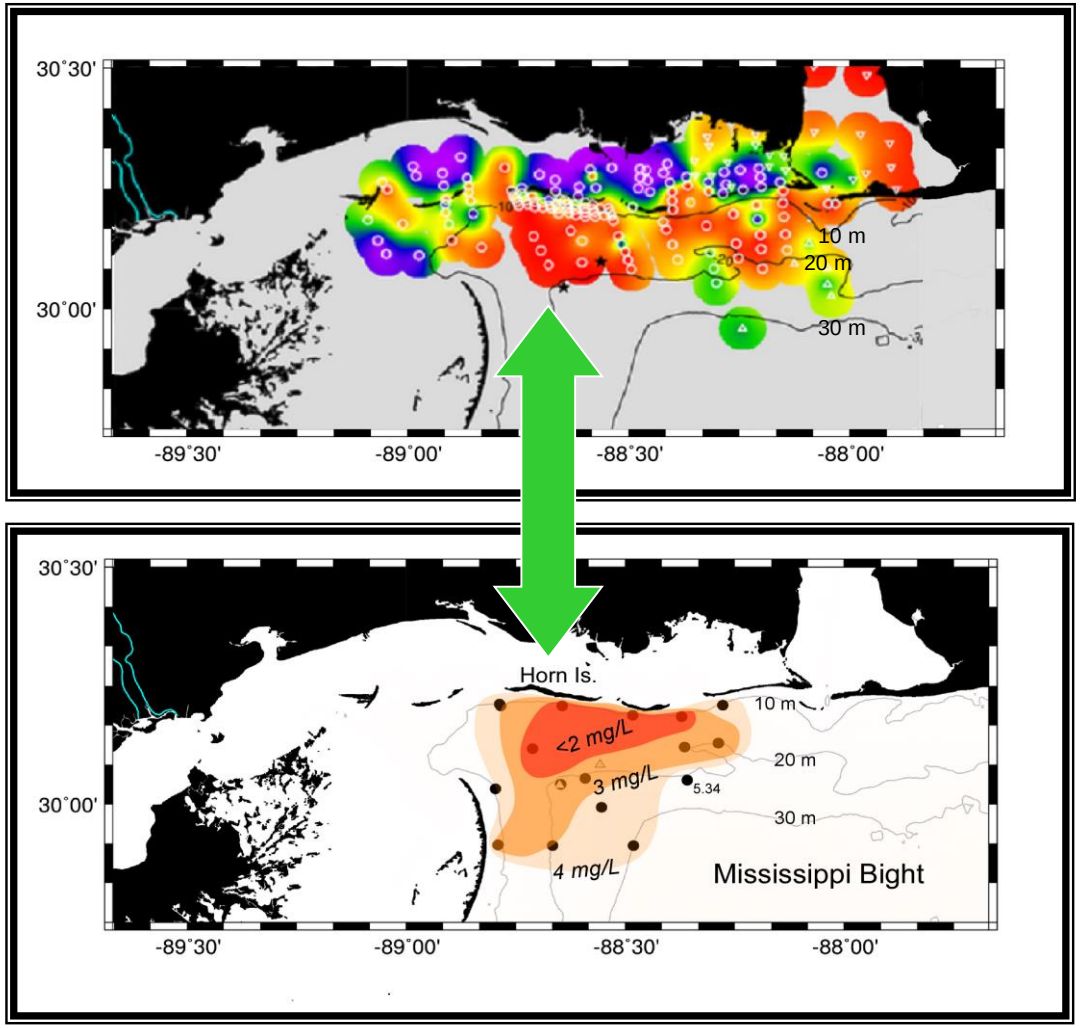
- **Benthic foraminiferal proxies indicate ”hotspots” of recurrent hypoxia areas seaward of the barrier islands in the Mississippi Bight**

<u>Hypoxia proxies:</u>

Foraminifera identification (1951-1956 samples)*

Ammonia sp.
Elphidium sp.

Pseudononion sp.
Epsistominella sp.
Buliminella sp.



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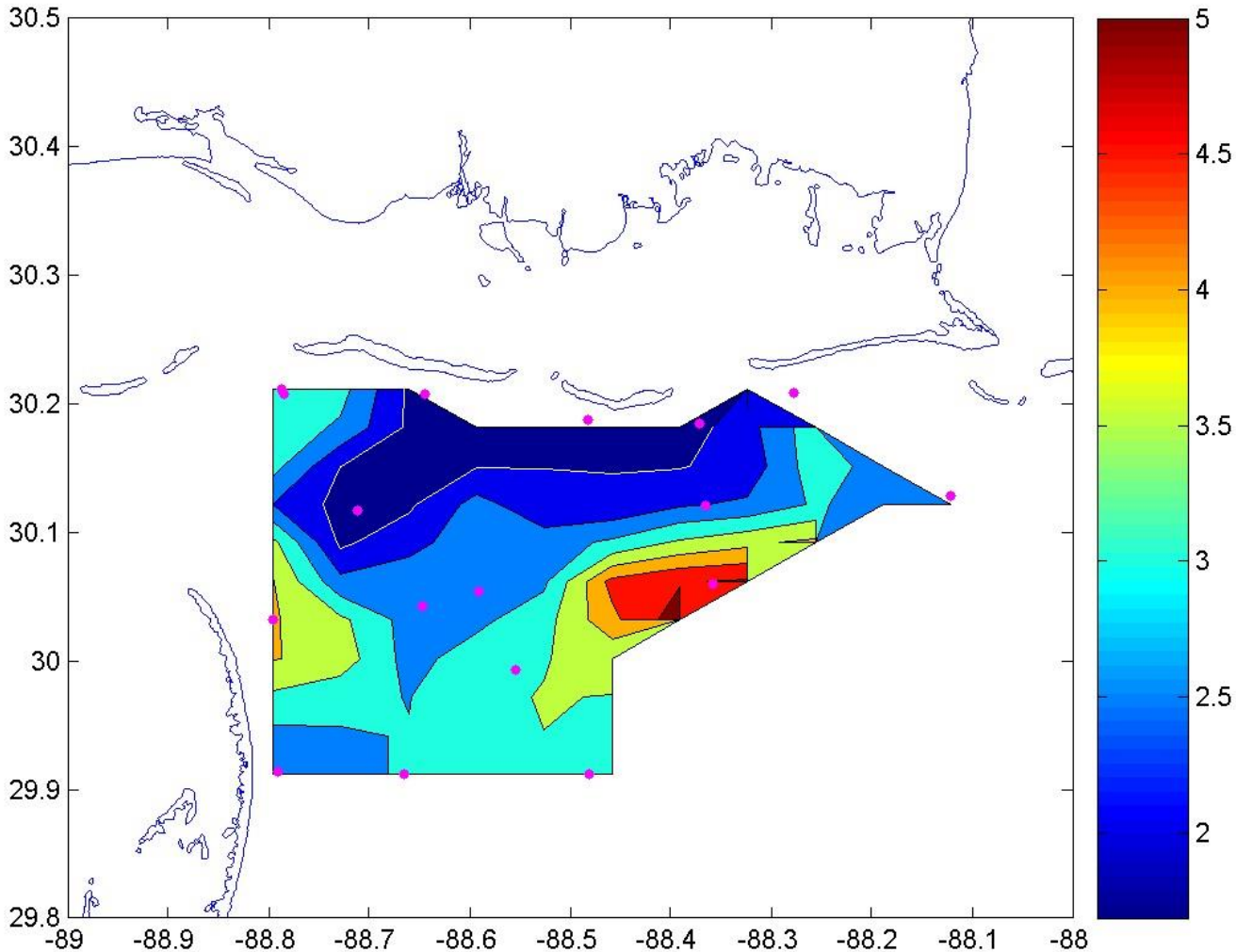
Brunner and Howden, 2006: First mapping of a hypoxic event in the Mississippi Bight: August 2006 Hypoxic Event



USM NGI Project
Monitoring and Assessments of Marine and Coastal Ecosystems (2006-?)

Stephan Howden, Charlotte Brunner, Kevin Dillon, Kjell Gundersen, Steven Lohrenz, Don Redalje, Chet Rakocinski, Alan Shiller

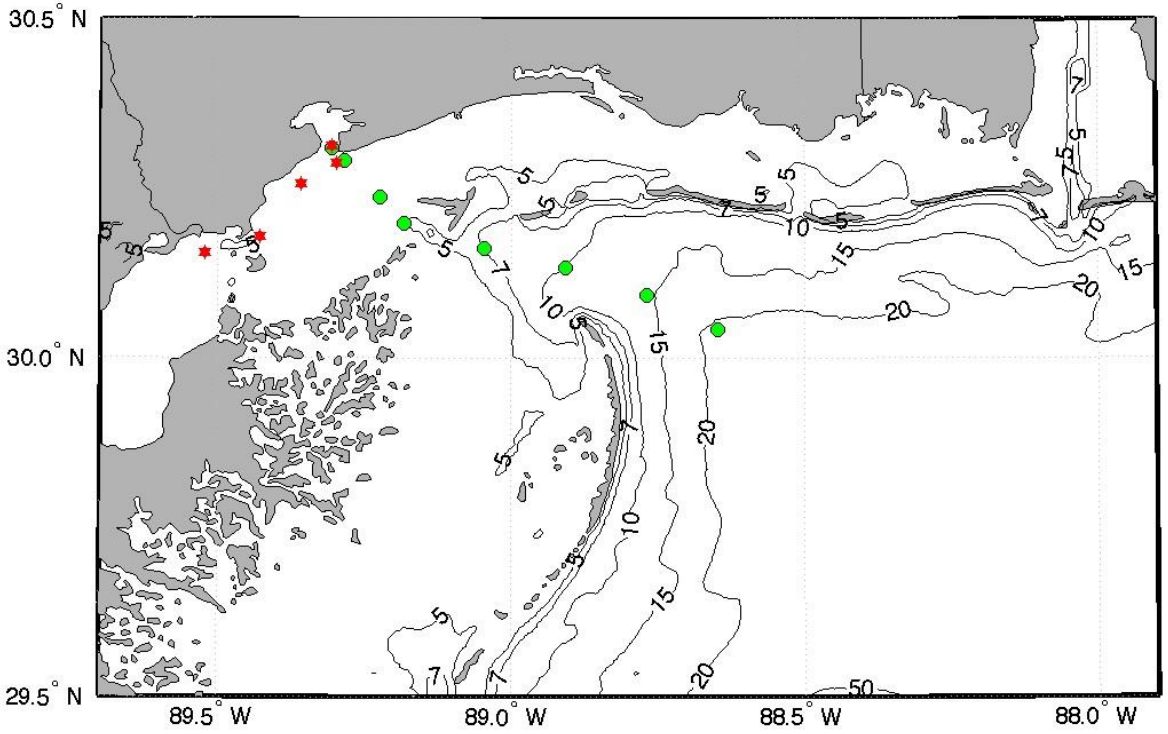
Monthly Transects

Profiles:

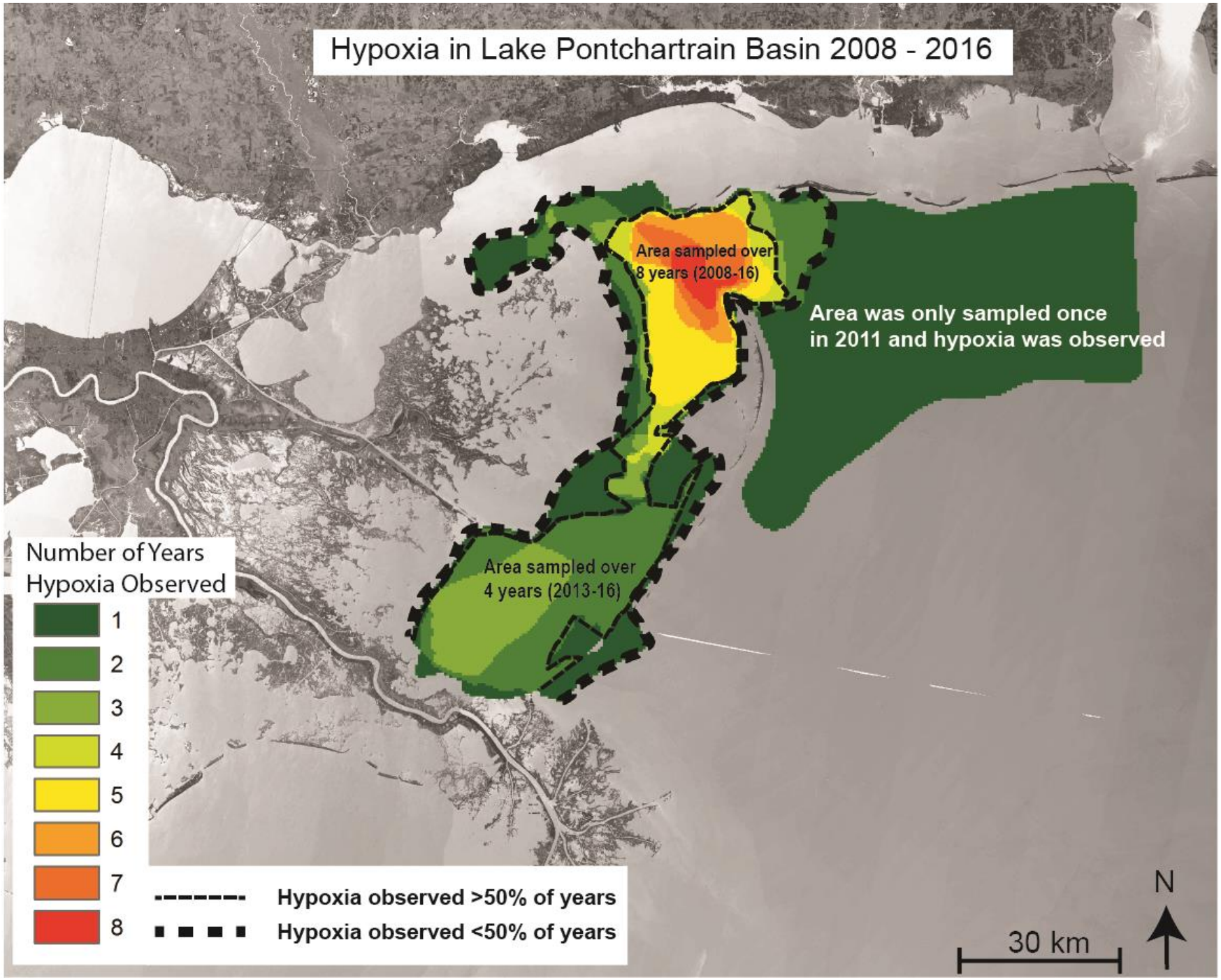
- temperature
- pressure
- conductivity/salinity
- dissolved oxygen
- pH
- turbidity
- chlorophyll fluoresence
- backscatter

Discrete Water Samples:

- salinity
- nutrients
- dissolved oxygen
- trace metals
- CDOM

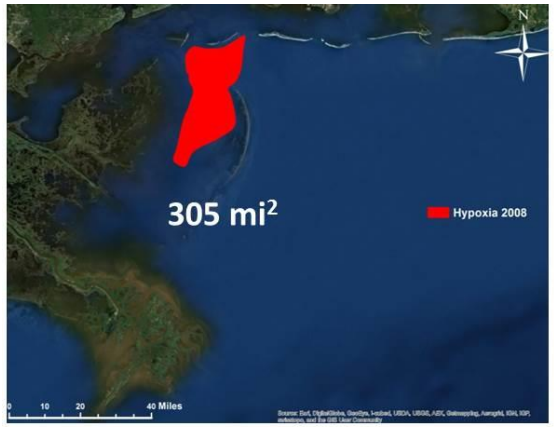


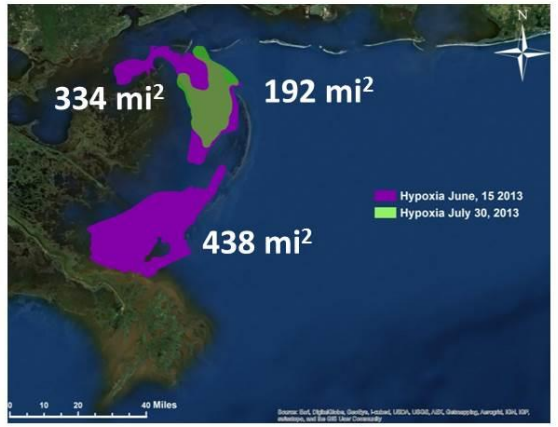
LPBF
SAVE OUR LAKE
SAVE OUR COAST
LAKE PONTCHARTRAIN BASIN FOUNDATION

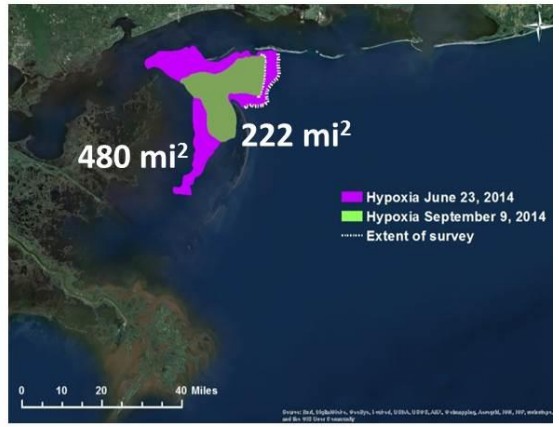


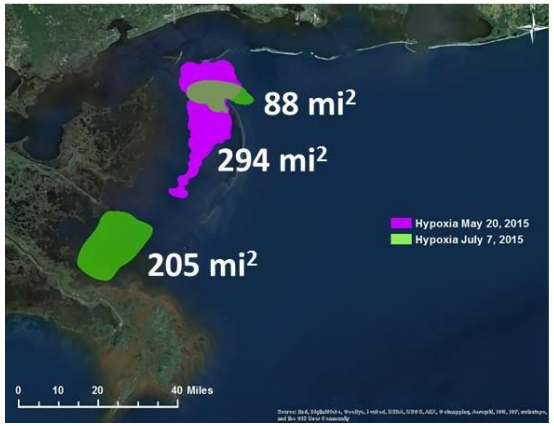
LPBF
SAVE OUR LAKE
SAVE OUR COAST
LAKE PONTCHARTRAIN BASIN FOUNDATION

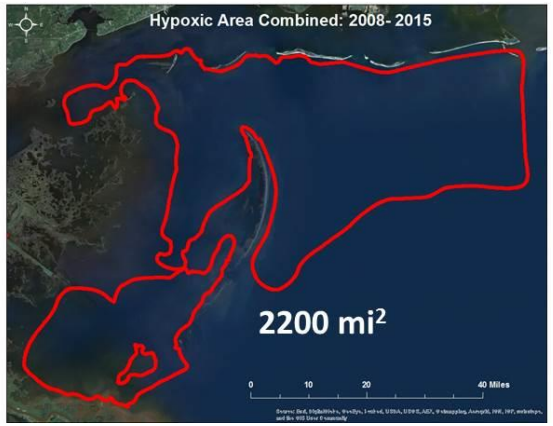
Hypoxia East of the River











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Milroy et al. 2016-2017

Offshore Artificial Reef Sites

Artificial Reef Site

NOT FOR NAVIGATION

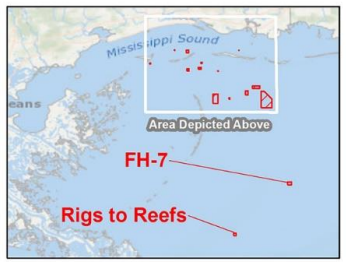
Nautical Miles

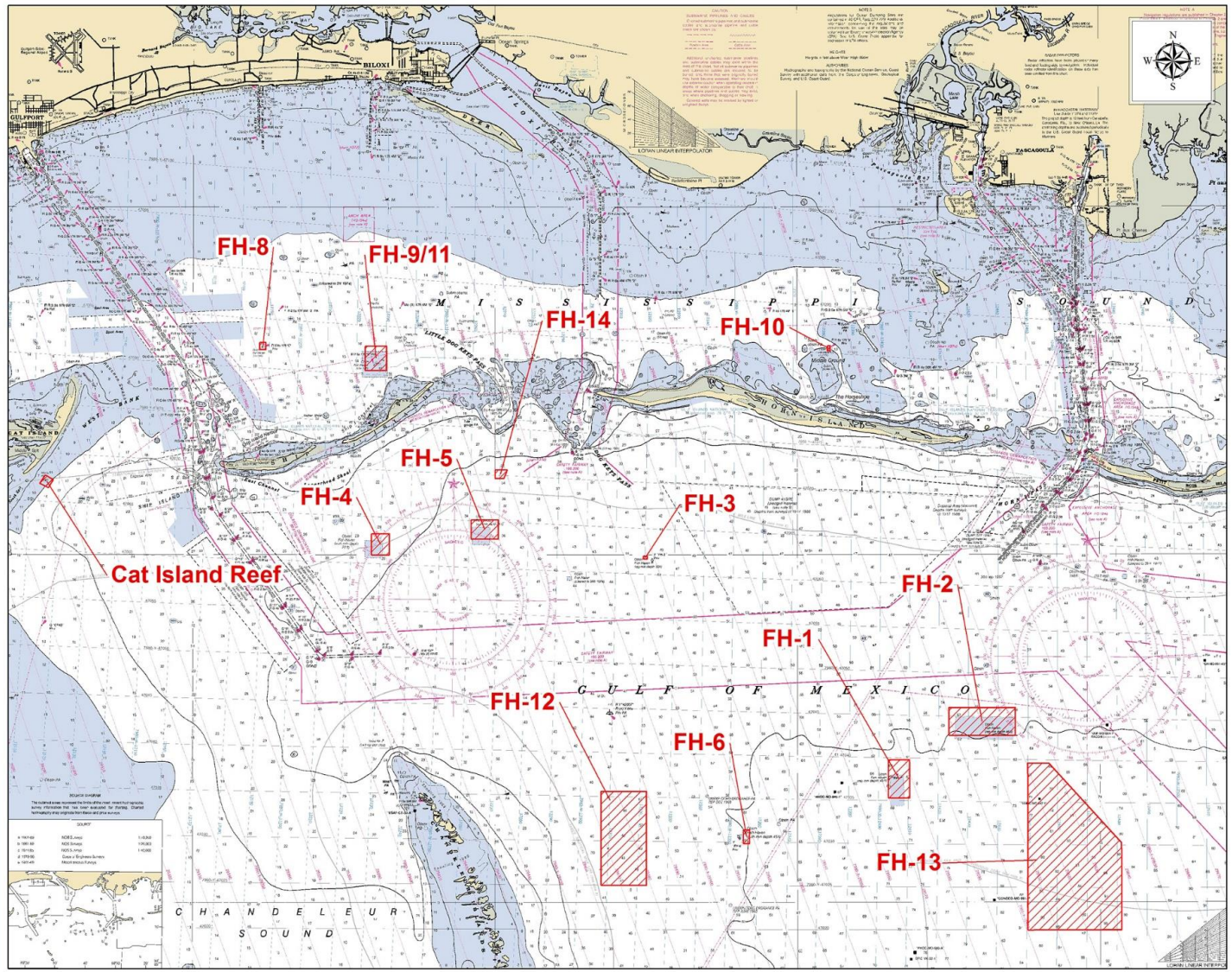
0 1 2 4 6 8

Based on NOAA Nautical Chart 11737
Mississippi Sound + Appr (Dauphin Island to Cat Island)

--FOR PLANNING PURPOSES ONLY--

Reef Center Points		
Fish Haven	Longitude	Latitude
FH-1	-88 36.648	30 03.552
FH-2	-88 33.9	30 05.202
FH-3	-88 45.03	30 09.918
FH-4	-88 53.802	30 10.302
FH-5	-88 50.352	30 10.728
FH-6	-88 41.7	30 01.902
FH-7	-88 24.102	29 37.098
FH-8	-88 57.702	30 16.002
FH-9/11	-89 04.854	30 12.102
FH-10	-88 38.952	30 15.93
FH-12	-88 45.75	30 01.848
FH-13	-88 30.852	30 01.188
FH-14	-88 49.8	30 12.318
Cat Island Reef	-88 53.952	30 15.648





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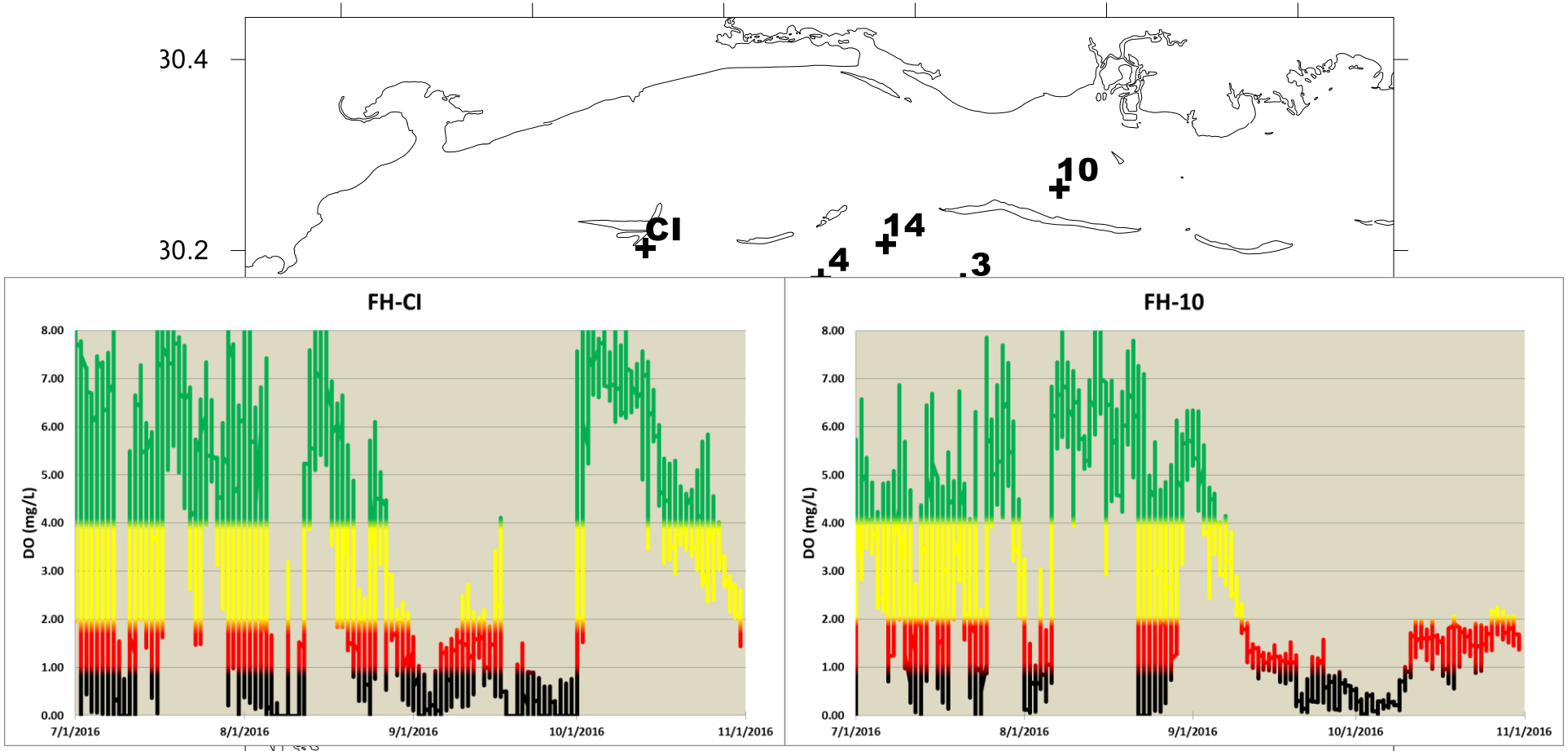
Hypoxia Data

Milroy et al. 2016-2017

3.5 – 5.0 m Fish Havens



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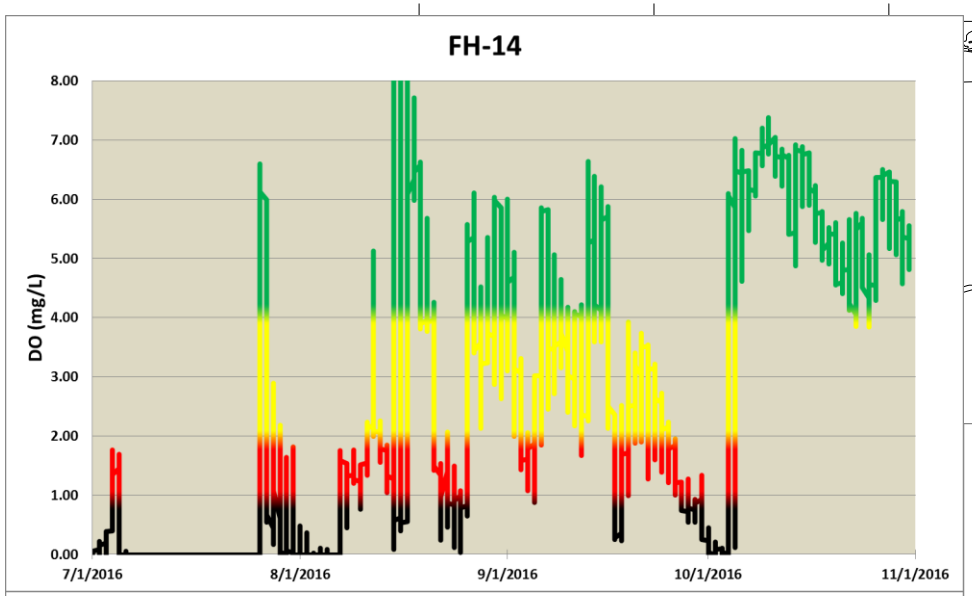
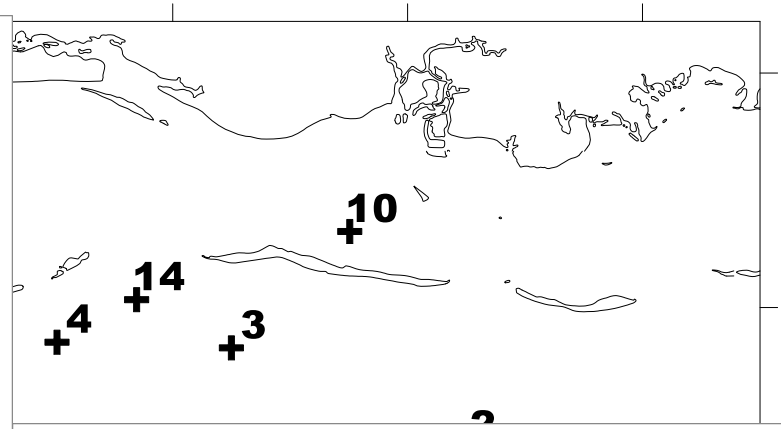
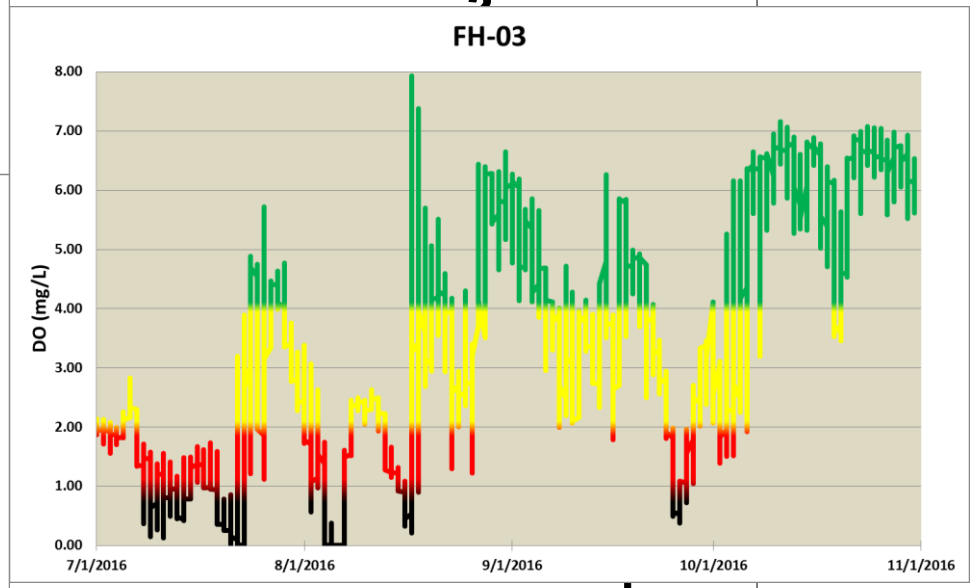
Hypoxia Data

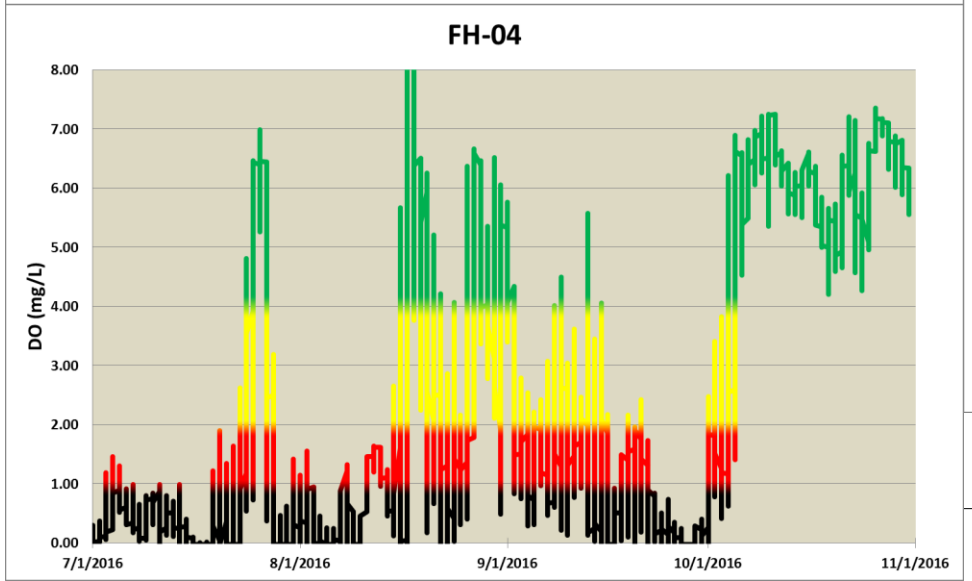
Milroy et al. 2016-2017

10.0 – 14.0 m Fish Havens







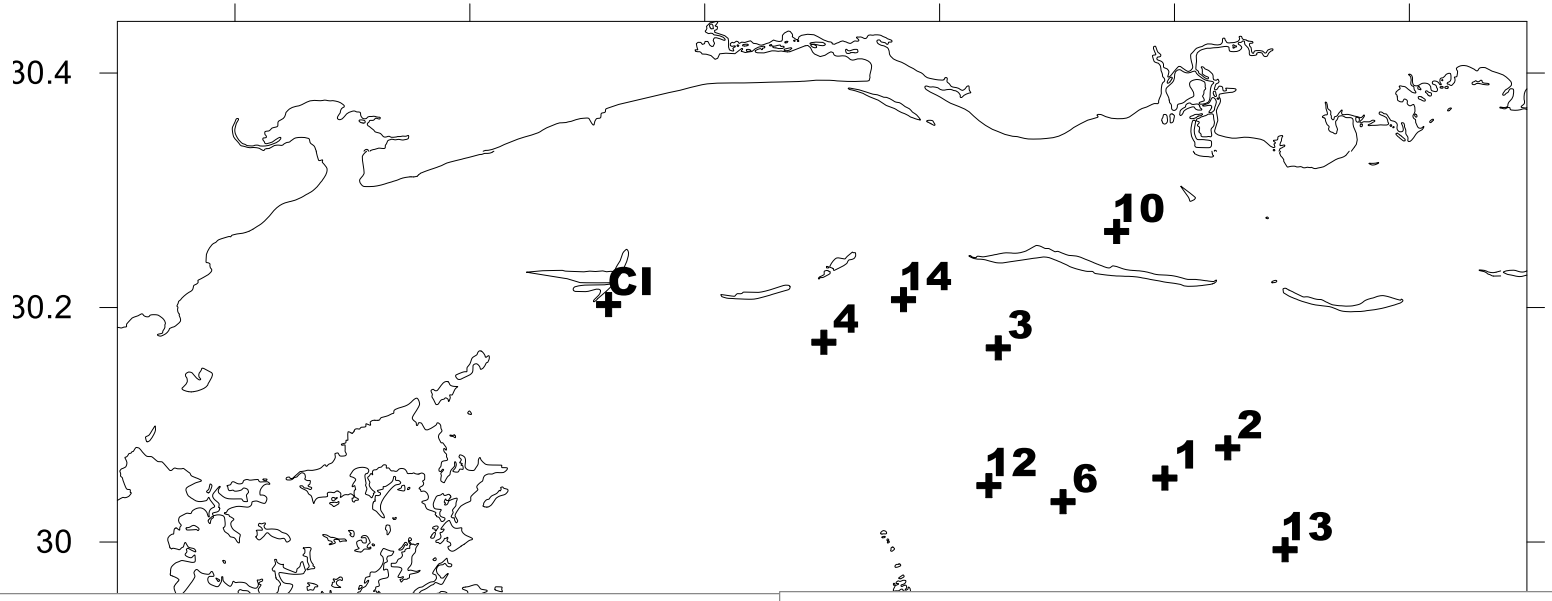


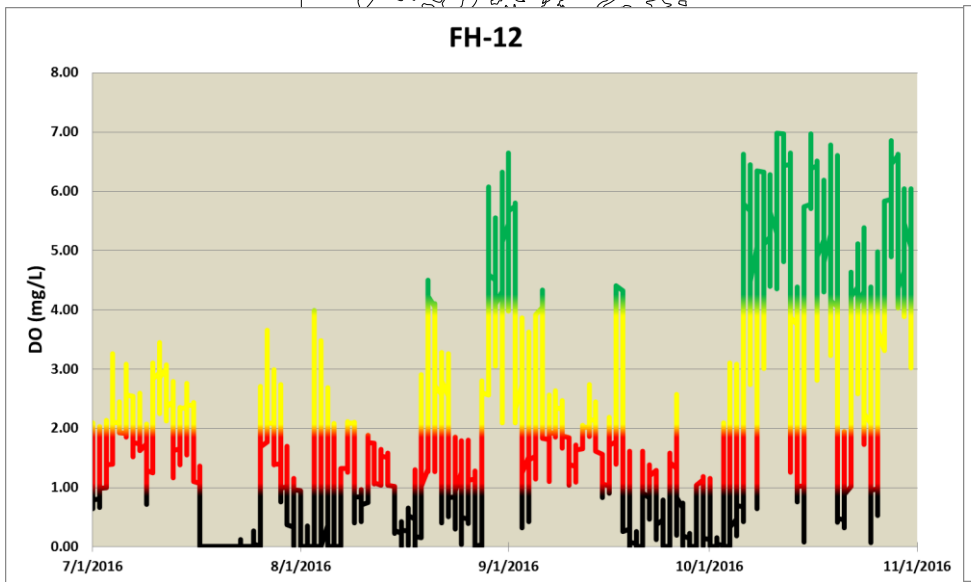
-88.8 -88.6 -88.4

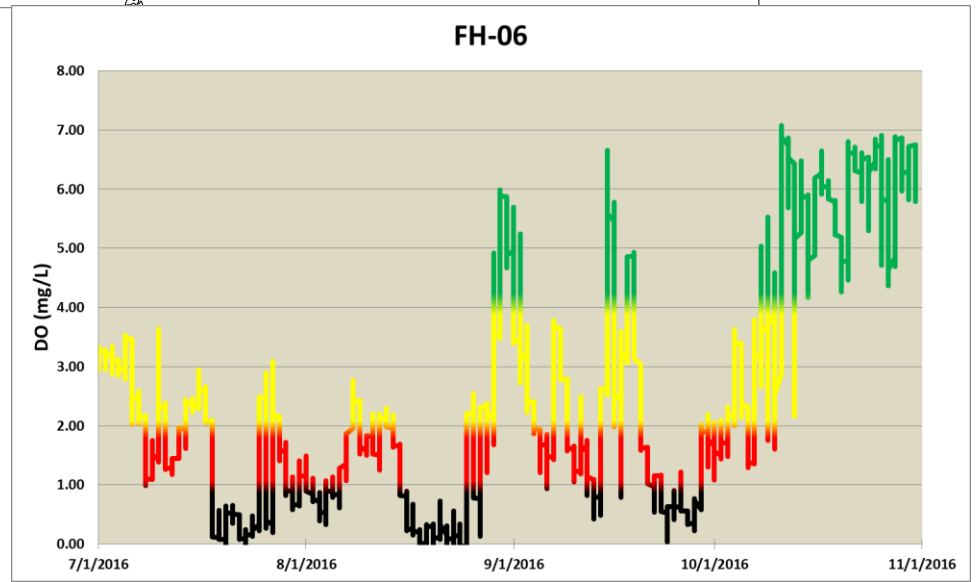
Hypoxia Data

Milroy et al. 2016-2017

14.0 – 18.5 m Fish Havens







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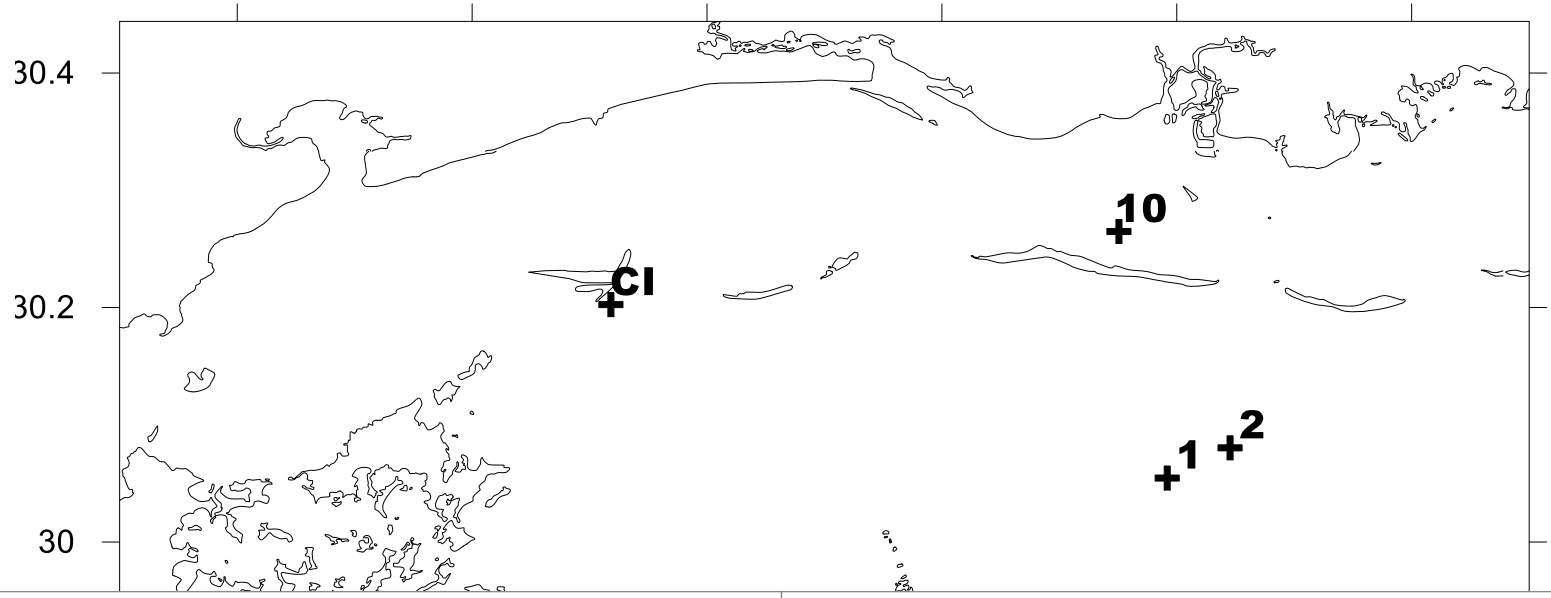
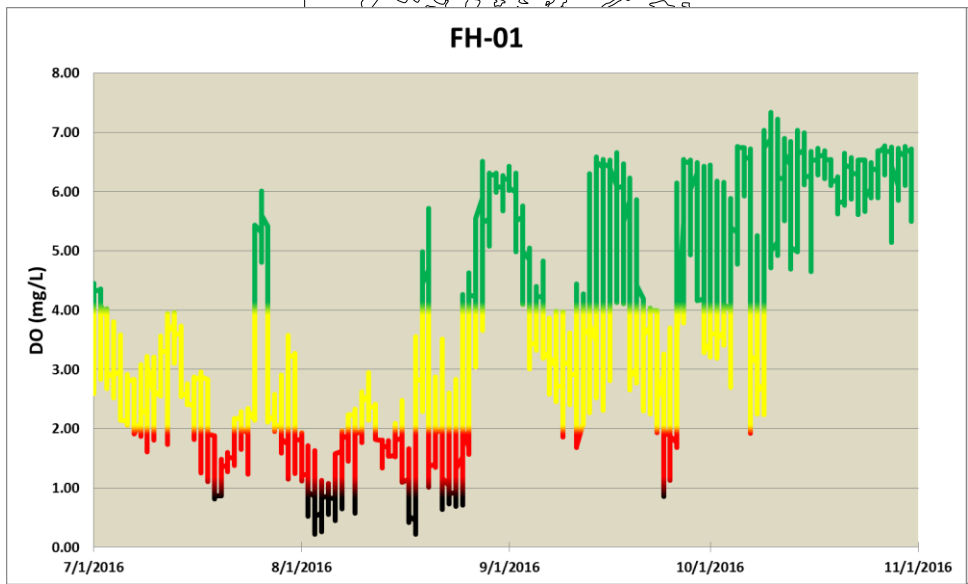
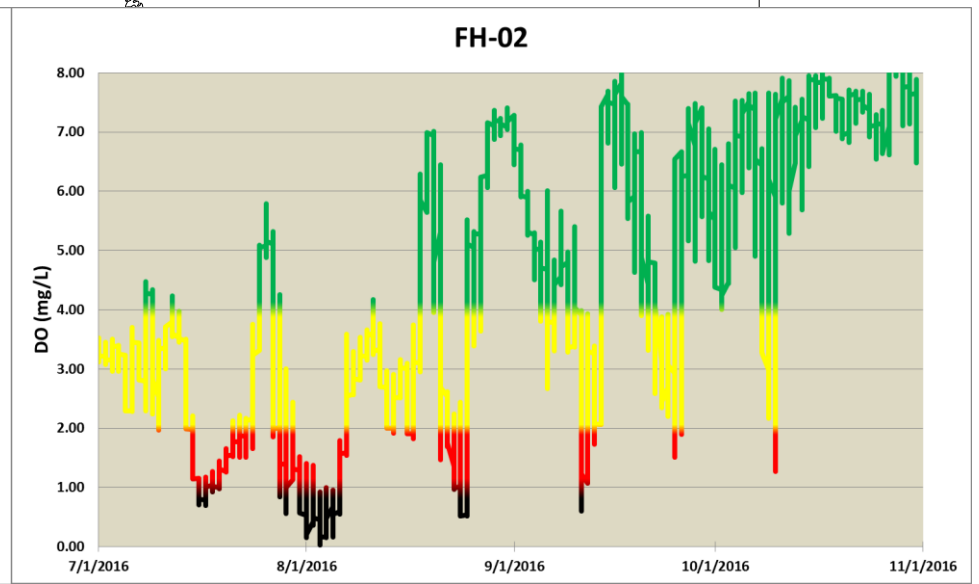
Hypoxia Data

Milroy et al. 2016-2017

18.5 – 21.0 m Fish Havens







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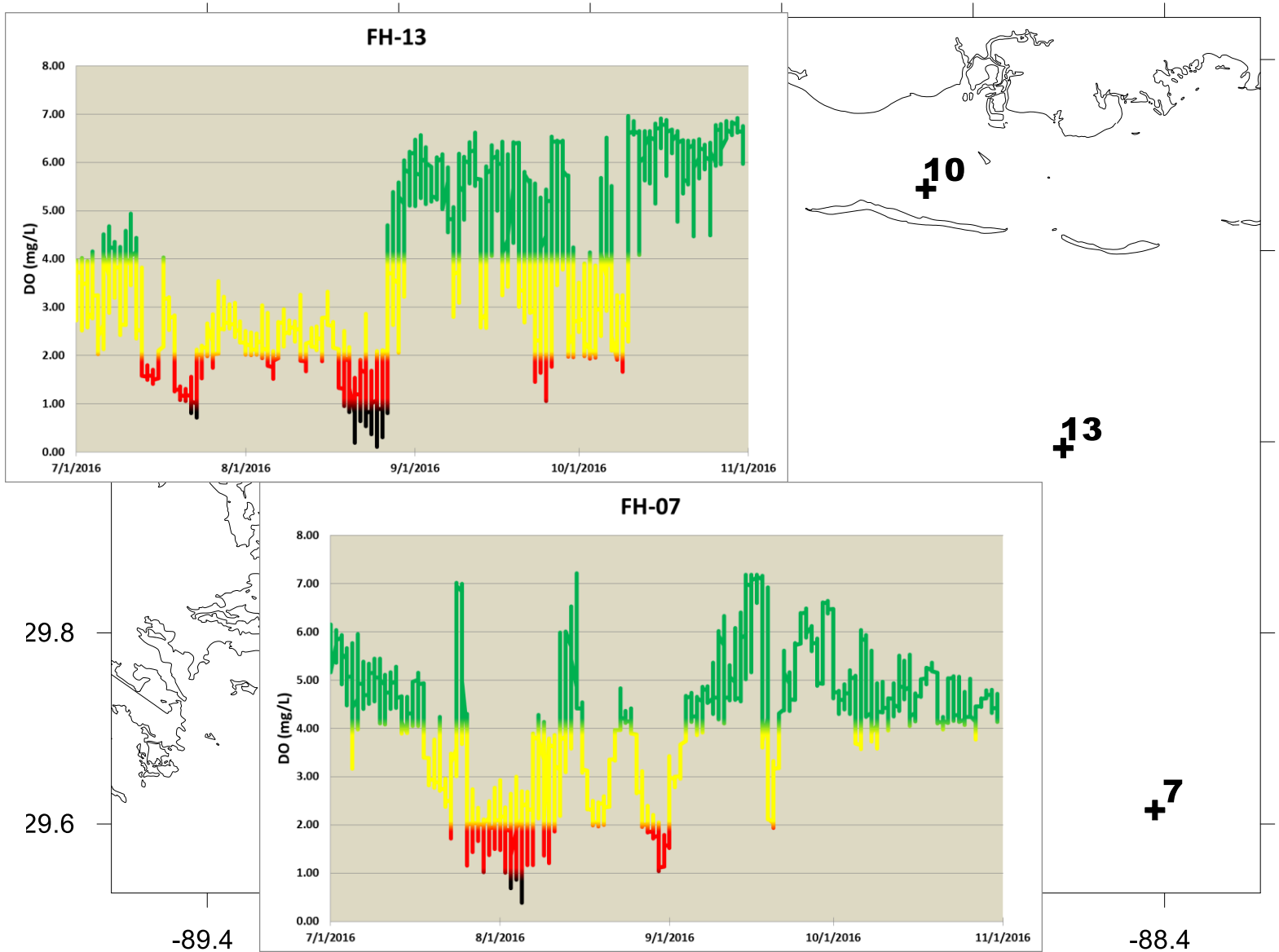
Hypoxia Data

Milroy et al. 2016-2017

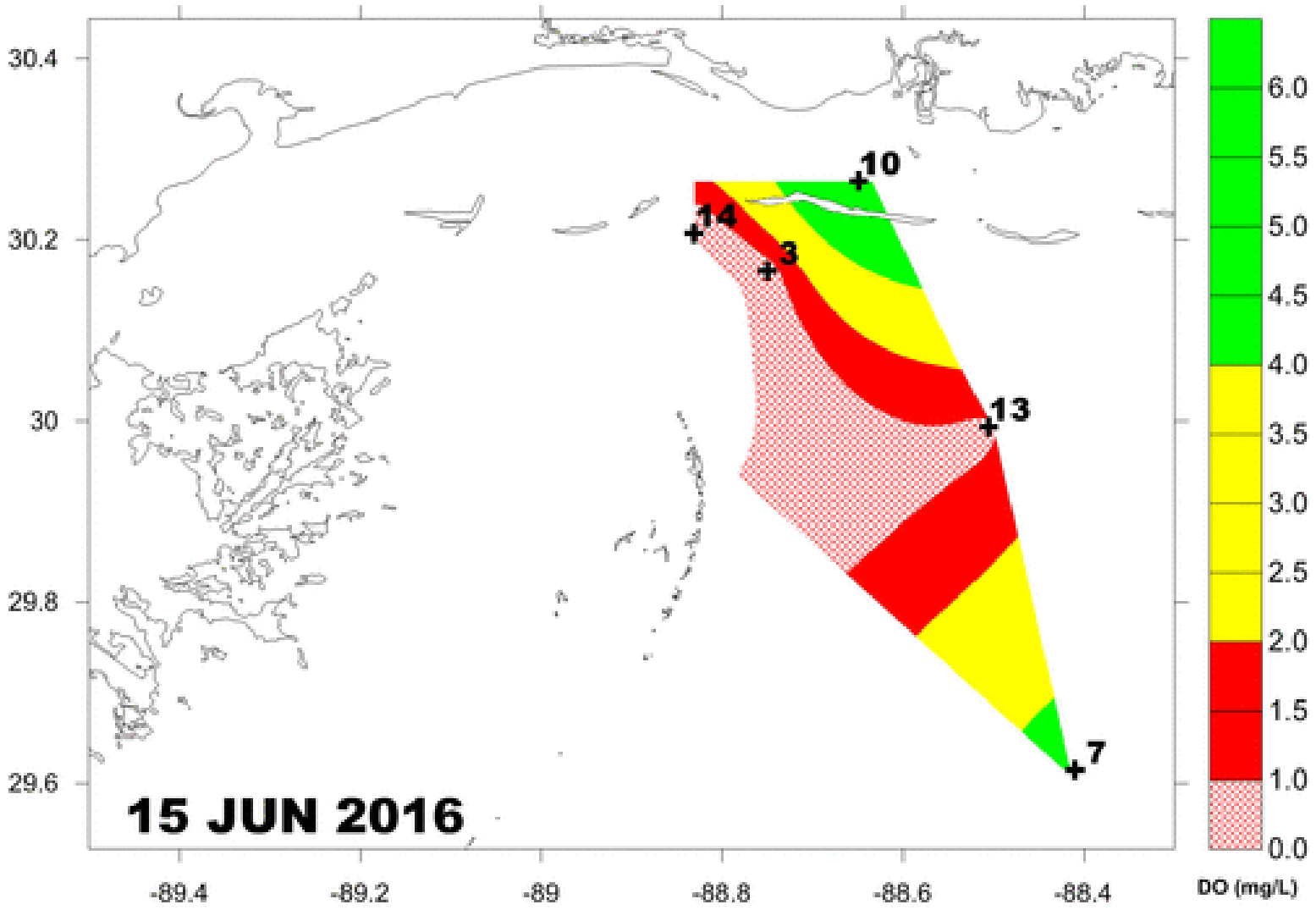
27.0 – 41.0 m Fish Havens



Milroy et al. 2016-2017

Hypoxia Data

Spatio-temporal patterns of hypoxia in 2016



Conclusions

- **Nearshore reefs (10 & CI) witnessed the onset of significant hypoxia in September, while the opposite occurs (*i.e.* hypoxia season ends) for offshore reefs in September.**

- **Reefs located in 10-18 m (3, 4, 6, 12, 14) in the western Bight experienced significant, persistent hypoxia which would likely prevent invertebrate colonization / reef habitat stabilization.**

- **Reefs located in 19-47 m (1, 2, 7, 13) in the eastern Bight were somewhat more protected from hypoxia events and therefore represent a more favorable location for reef creation and long-term habitat success.**

- **Companion WQ data (CTD casts, TSS, chl-a, nutrients, POC) are still being analyzed as part of a larger effort to assess the genesis of these recurrent WQ issues…**

Milroy et al. 2016-2017

Acknowledgements

NATIONAL FISH AND WILDLIFE FOUNDATION
NFWF

MISSISSIPPI DEPARTMENT OF MARINE RESOURCES

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

COVINGTON
CIVIL AND ENVIRONMENTAL

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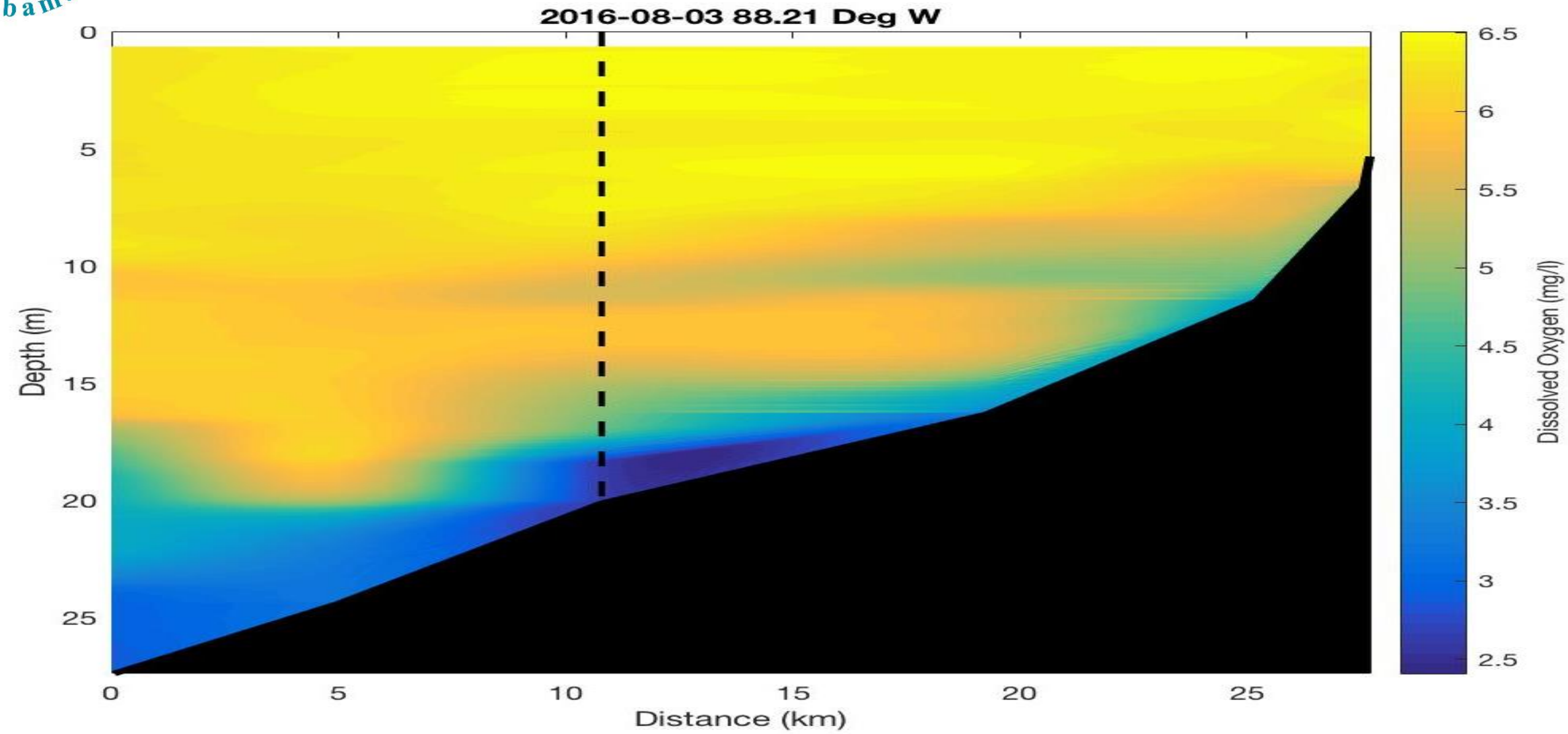
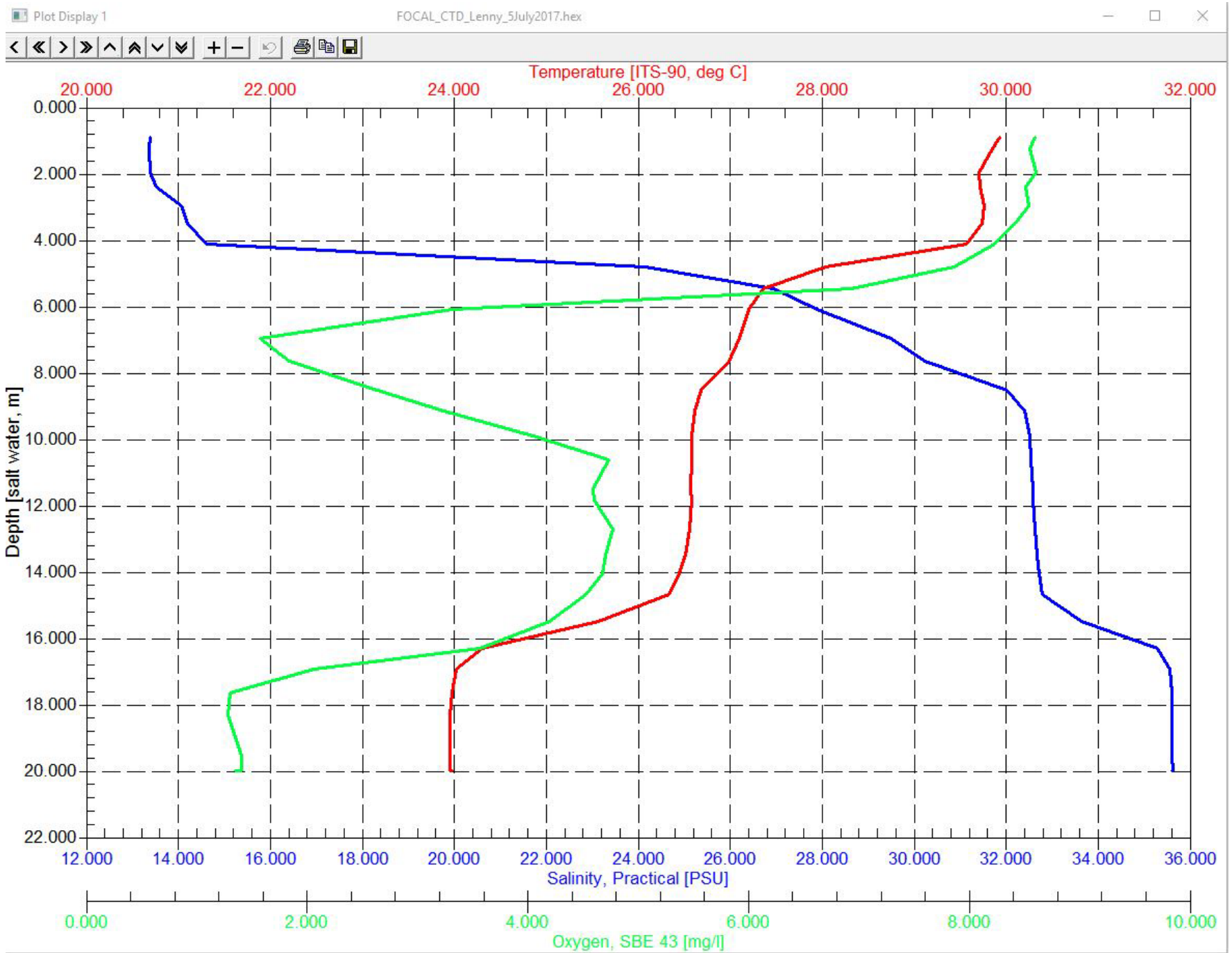
GULF COAST RESEARCH LABORATORY

Alabama Real-time Coastal Observing System

Transect south of Dauphin Island showing summer hypoxia



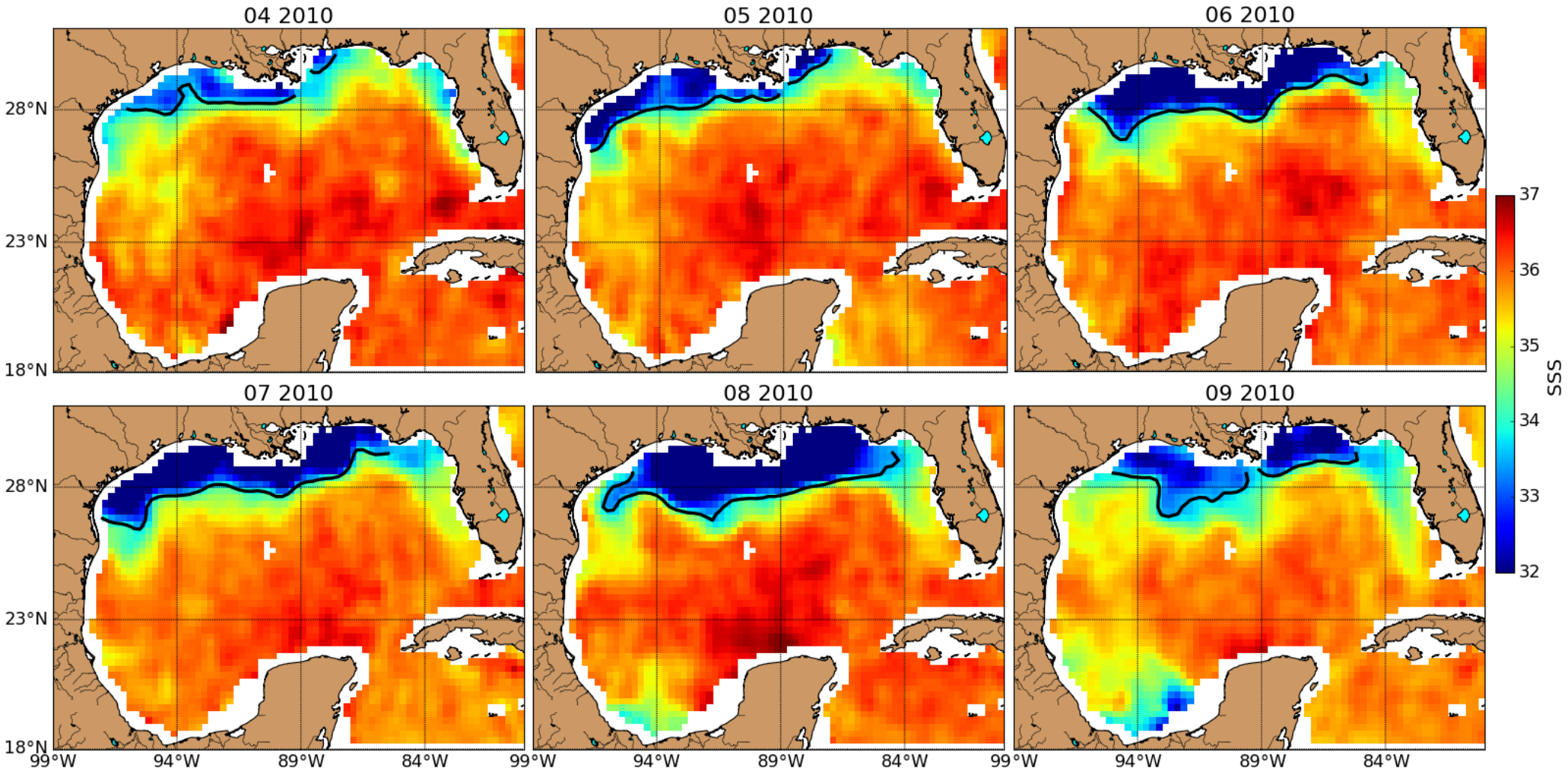
Dauphin Island Sea Lab
Alabama



Brian Dzwonkowski et al.

Region of Freshwater Influence

- Large region to the east and west of the Mississippi Delta



Courtesy of SeverineFournier

Steps to Pursue – *translation - $*

- **Primary objective: Better characterize hypoxia in the Mississippi Bight during stratified summer season**

Focus on:

- **Aggregating existing data sets to determine the historical temporal and spatial extent of hypoxia in the Mississippi Bight**
- **Conducting a gap analysis and conduct additional observations to more fully determine the extent of hypoxia in the MS Bight**
- **Strengthen the existing network of researchers and observers collecting dissolved oxygen data in the Mississippi Bight**
- **Provide easy access and visualization of hypoxia conditions in the Mississippi Bight for researchers and decision-makers**

Management Product 1: Identify annual mid-summer hypoxic zone areal extent east of the Mississippi River

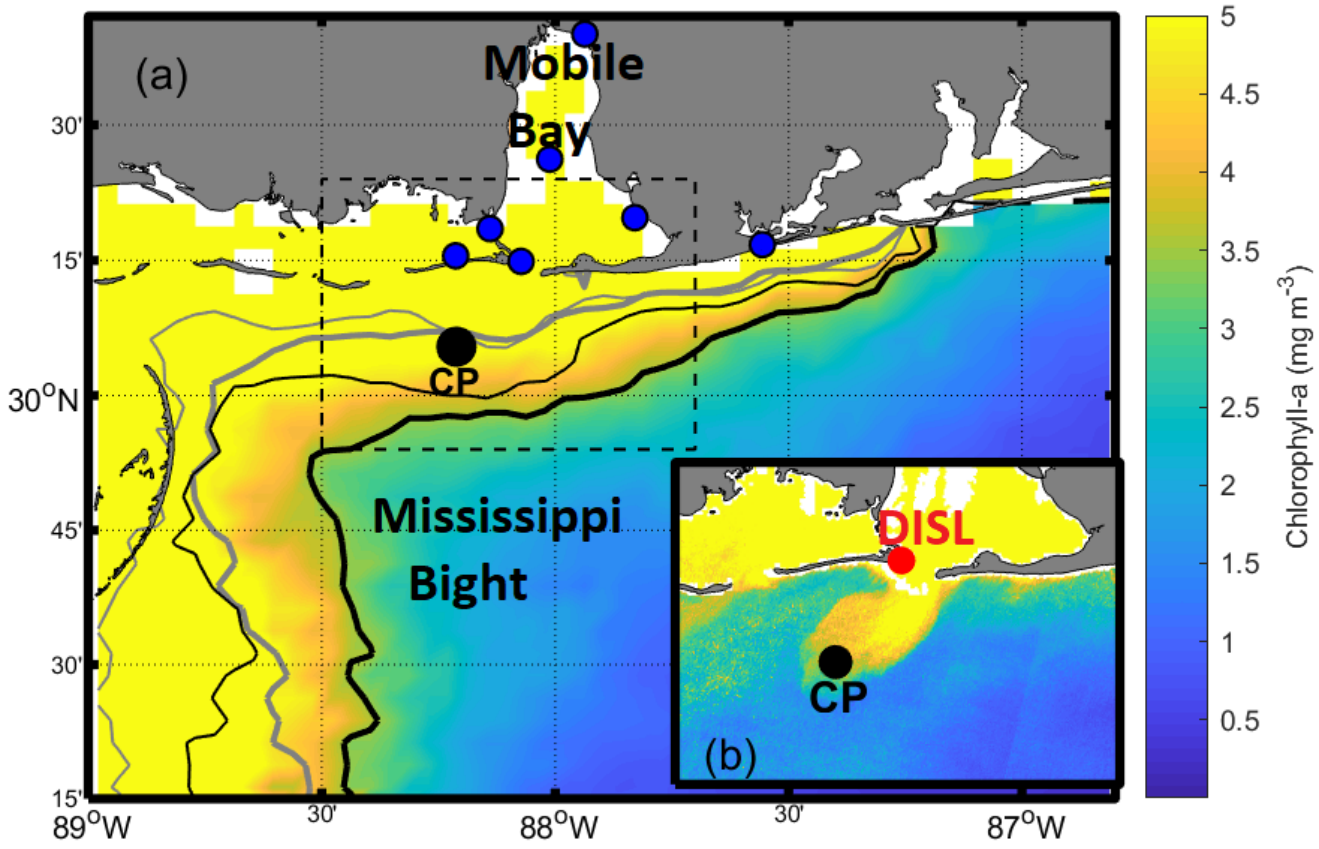
While focused on LATEX shelf, reason to think some mapping should be occurring in the MS Bight region

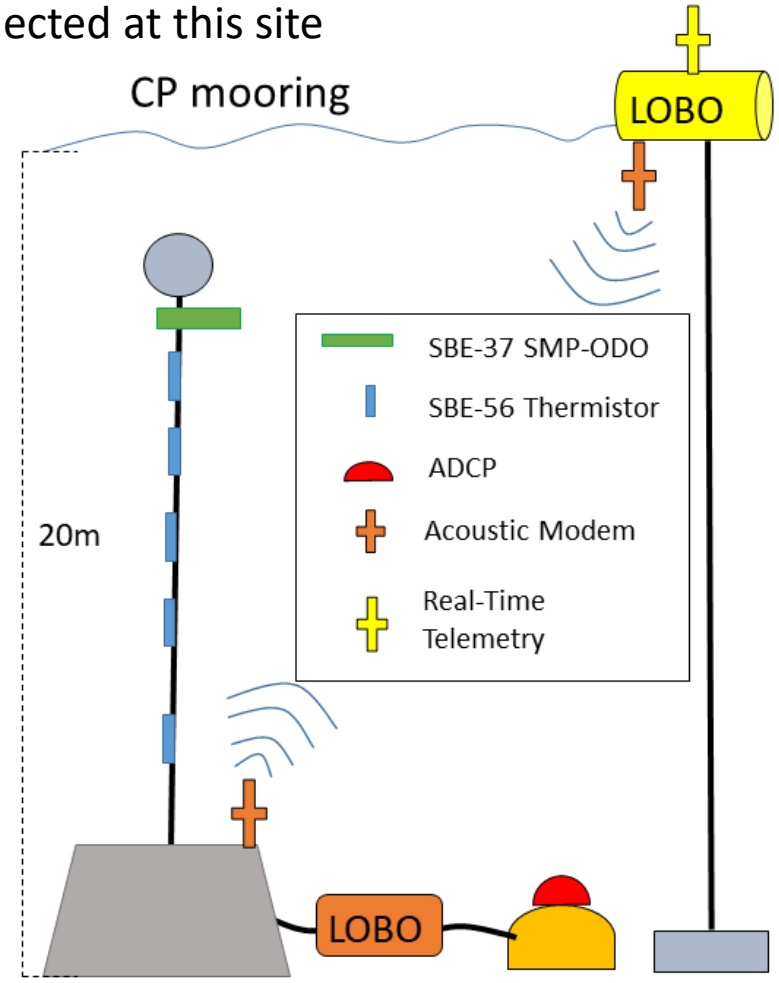
Currently several organizations and institutions are doing some level of mapping with regard to the areal extent of the hypoxia east of MS delta

USM – Sustain continuous monitoring at essential fish habitats
LPBF- Seasonal surveys around Chandeleur Islands
DISL – (Primarily Mobile Bay) – 7 water quality stations
All – Develop recommendations for “comprehensive” observations

Management Product 2: 3D time variable model characterization of hypoxic zone spatial and temporal dynamics

Temporal aspects of shelf hypoxia will be advance with new buoy system being installed at long-term FOCAL mooring site – surface and bottom DO will be added to the data regularly collected at this site





Management Product 3: Hypoxia effects on living resources and habitats

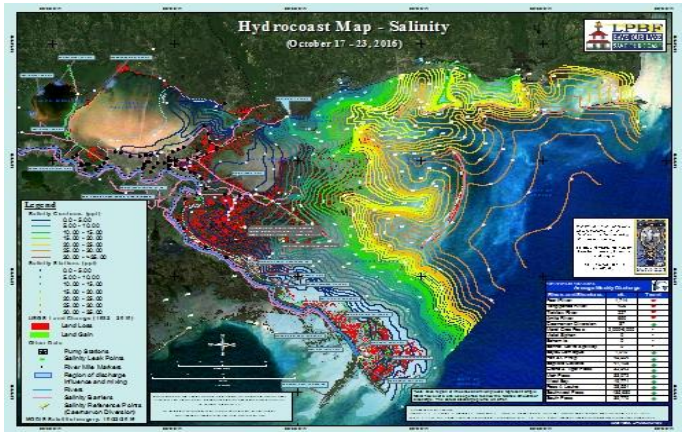
Interact with Fisheries and Ecosystem Modeling Projects (NGOMEX)

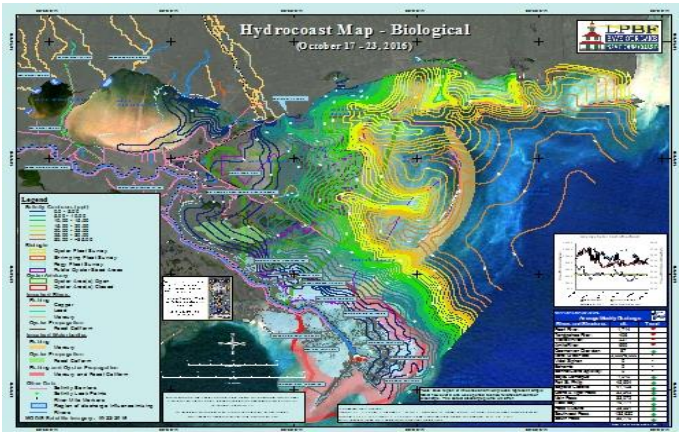
Interact with RESTORE Act Centers of Excellence

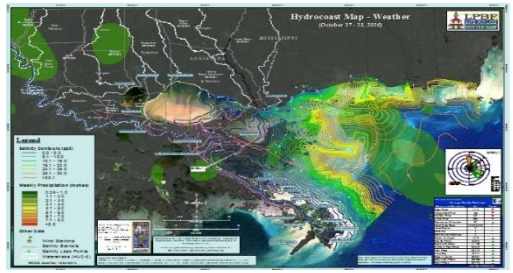
Interact with State and Federal Resource Management Agencies

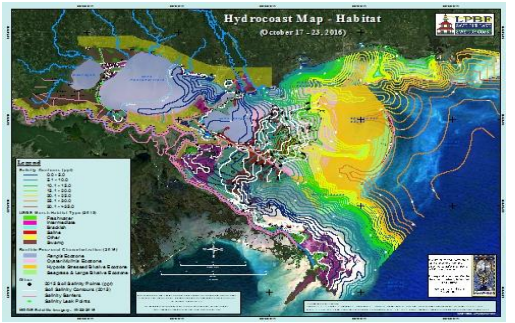
Propose to RESTORE etc.

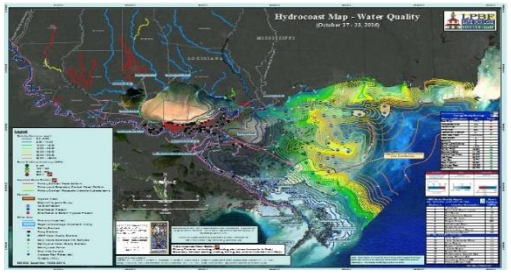
Pontchartrain: -Bi-weekly Hydrocoast Map Suite











Goal : Approximately Real-time, “Snapshots” of the Estuary

Management Product 4: Scenario forecast model guidance on nutrient reduction requirements to meet HTF coastal goal

Not really relevant since focus on LATEX shelf - Argue that unclear MS water effect east to delta (Schiller work says not much), so can argue need to understand nutrient in rivers besides MS river.

Yes, I am a Pirate!

Any Questions?