

Supporting science and restoration through the Mississippi Based RESTORE Act Center of Excellence (MBRACE)

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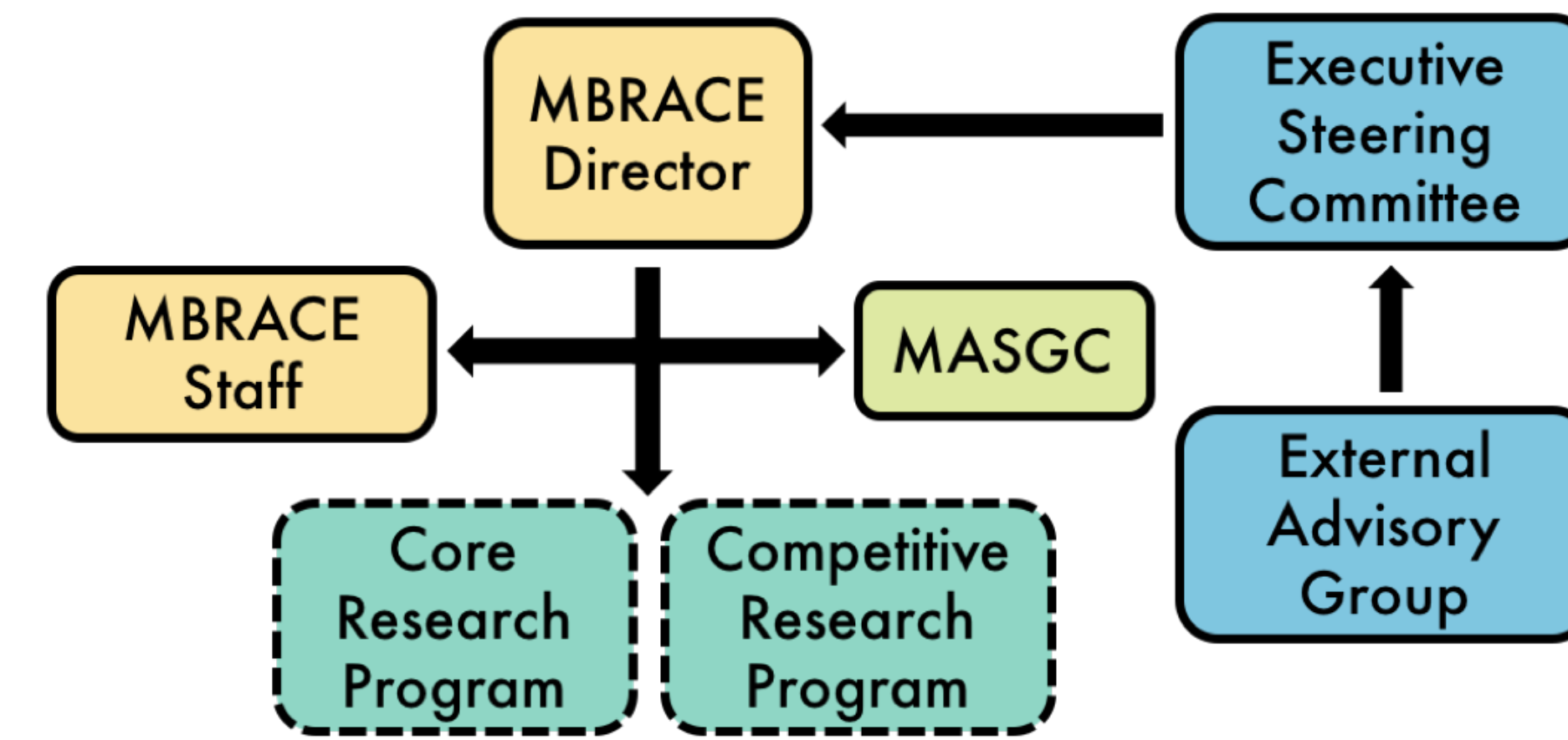
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What is MBRACE?

- MBRACE is a consortium of Mississippi's four main research universities: Jackson State University (JSU), Mississippi State University (MSU), University of Mississippi (UM), and The University of Southern Mississippi (USM), which serves as the lead institution
- The Mississippi Department of Environmental Quality (MDEQ) is the state entity that oversees MBRACE
- MBRACE's **mission** is to seek sound comprehensive science-and technology-based understanding of the chronic and acute stressors, both anthropogenic and natural, on the dynamic and productive waters and ecosystems of the northern Gulf of Mexico, and to facilitate sustainable use of the Gulf's important resources

- Several groups are integral to the functioning of the MBRACE program:



- MBRACE receives funding from the Gulf Coast Restoration Trust Fund in the U.S. Department of the Treasury*

Goals

- Serve as a focal point for new, long-term research and socioeconomic initiatives along the northern Gulf with relevance to Mississippi's resources
- Serve the people of Mississippi and the northern Gulf region with a scientifically based understanding of ecosystem status and trends (past, present, and predictive) with special emphasis on improved forecasting abilities to ensure sustainable coastal and ocean ecosystems of the Gulf, and
- Work within a consortium of stakeholders including Mississippi's research universities, state and federal agencies, local communities, private industry, and non-governmental organizations

Funding Programs

MBRACE has two peer-reviewed funding programs:

1. MBRACE's first funding cycle, the **Core Research Program**, funded activities that cross discipline areas and include all four member universities (JSU, MSU, UM, USM). These two-year projects totaling \$2.5M were funded in Fall 2017
2. The **Competitive Research Program** will allow investigators from at least two of the four main research universities in Mississippi to propose collaborative original research projects that address at least one of the five discipline areas. Details about this funding cycle are expected to be announced in 2018.

The Four Funded Core Research Program Projects Focus On *Understanding Oyster Reefs and Their Sustainability*

Biosensors for the Measurement of Bivalve Valve Movement

Jackson State University

Principal Investigators: Kamal Ali (Lead), Francis Tuluri, Hui-Ru Shih, Ramzi Kafoury, Sudha Yerramilli

Abstract: The Jackson State University team will make use of the advances in electronic and computer technology to develop and build a sensor system that can remotely measure and record the valve movement of bivalves. This system will be used in Mississippi Gulf oyster reefs to continuously measure and report the valve gaping of oysters. This data, together with data from the other University partners, may be used to better assess the health of oyster reefs.



Water Quality and Benthic Habitat Observations for Enhanced Understanding and Sustainable Management of Oyster Reefs in Mississippi Sound

Mississippi State University

Principal Investigators: Robert Moorhead (Lead), Padmanava Dash, Adam Skarke

Abstract: This project will use field sampling and remote sensing data collected from traditional platforms as well as novel autonomous aerial and marine vehicles to quantify the spatiotemporal variability of water quality and benthic habitat conditions at oyster reef sites in Mississippi Sound. Specifically, we will: (1) Develop robust predictive algorithms to relate in situ water quality parameters at oyster reefs in Mississippi Sound to remotely sensed reflectance data collected with satellites and unmanned aerial systems, (2) create benthic habitats maps of seabed sedimentary characteristics proximal to oyster reefs in Mississippi Sound through the collection and synthesis of physical samples and acoustic reflectivity data, and (3) evaluate geologic controls on the location of submarine groundwater discharge and resulting modification of water quality parameters proximal to oyster reefs in Mississippi Sound through the collection and synthesis of seismic and isotopic tracer data.

Abiotic and Biotic Influences on Current and Historic Distributions of Oyster Reefs

The University of Mississippi

Principal Investigators: Marc Slattery (Lead), Greg Easson, Deborah Gochfeld, Stephanie Showalter, Kristie Willett

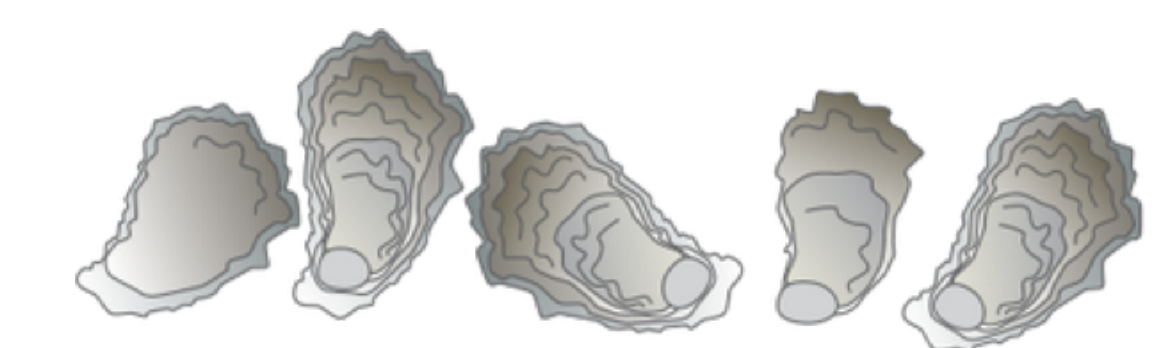
Abstract: The goal of this project is to identify differences in abiotic and biotic stressors at current and historic oyster reef sites, to better understand oyster reef health and to inform management regarding the best places and practices to improve oyster reef restoration strategies. To address this goal, The University of Mississippi researchers will undertake three interdisciplinary objectives. They will: 1) develop and deploy replicate Oyster Sensor Platforms to current and historic oyster reefs, 2) characterize the biochemical and physiological responses of oysters to natural and anthropogenic stressors at these sites, and 3) assess the ecological and environmental impacts of stress on oyster reefs.

Sustainability and Restoration of Oyster Reef Habitat in Mississippi Sound: A Larval Transport and Recruitment Approach

The University of Southern Mississippi

Principal Investigators: Jeremy D. Wiggert (Lead), Ken Barbor, Mustafa Kemal Cambazoglu, Arne Diercks, Stephan Howden, Scott Milroy, Chet Rakocinski

Abstract: The four Mississippi Sound-based project components for this project consist of: 1) an investigation of oyster recruitment that contrasts viability of wild vs. cultured oyster spat at both restored and control reefs; 2) benthic habitat mapping surveys that characterize sub-bottom structure and resolve seasonal evolution of oyster reef volume; 3) CODAR-observed hourly-resolved surface circulation over oyster beds of interest at 1 km resolution; and 4) application of a suite of interlinked models to investigate interactive impacts of hydrodynamic processes and environmental stressors on transport and recruitment of oyster larvae and the overall productivity of oyster beds.



For more information about MBRACE, please visit our website at www.mbrace.usm.edu

*On July 6, 2012, the Resources and Ecosystem Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act (RESTORE Act) was created in response to the Deepwater Horizon oil spill, the largest marine oil spill in U.S. history. The Act established the Gulf Coast Restoration Trust Fund in the U.S. Department of the Treasury, into which 80% of all administrative and civil penalties paid under the Federal Water Pollution Control Act are deposited. The Centers of Excellence Research Grants Program receives 2.5% of the penalties deposited into the Trust Fund plus 25% of the interest earned on the Trust Fund to establish Centers of Excellence in each of the five Gulf Coast states to focus on science, technology, and monitoring within the Gulf of Mexico Region and address the disciplines in the Act.

This project was paid for with federal funding from the Department of the Treasury under the Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act of 2012 (RESTORE Act). The statements, findings, conclusions, and recommendations are those of the author(s) and do not necessarily reflect the views of the Department of the Treasury. Oyster symbols are attributed to Tracey Saxby, IAN Image Library, ian.umces.edu/imagelibrary/