

## **The Center for Gulf Studies - A Mississippi Research Center of Excellence**

### ***Guiding Principles***

**The University of Southern Mississippi (Lead)**  
**University of Mississippi**  
**Mississippi State University**  
**Jackson State University**

### ***Preface***

*This document establishes the Guiding Principles for The Center of Gulf Studies. Input on these Principles has been provided from a broad swath of the ocean and coastal sciences community in Mississippi. The document is intended to provide a roadmap for decision-making by CGS leadership, involvement by stakeholders, participation by agency partners, and activities by scientists. The Principles outlined here are intended to be discussed and vetted openly, and the document will be modified from time to time. Please direct suggestions for improvement to the cognizant Center administrator identified below.*

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### ***Mission Statement***

*The Center for Gulf Studies, a partnership of Mississippi research universities seeks sound, comprehensive science and technology-based understanding of chronic and acute stressors, both anthropogenic and natural, on the dynamic and productive waters and habitats of the northern Gulf of Mexico and seeks to facilitate sustainable use of the Gulf's important resources.*

### ***Introduction***

The *Center for Gulf Studies* (CGS) will serve as a focal-point for new, long-term research and socioeconomic initiatives along the northern Gulf of Mexico. The CGS will serve the people of Mississippi and the northern Gulf region with a scientifically-based understanding of ecosystem status and trends (past to present, predictive) with special emphasis on improved forecasting abilities to ensure sustainable coastal and ocean ecosystems of the Gulf of Mexico.

Administered through the USM's Department of Marine Science, the Center will work within a consortium of stakeholders including Mississippi's research universities under the Mississippi Research Consortium, State and Federal agencies, local communities, private industry, and Non-Governmental Organizations.

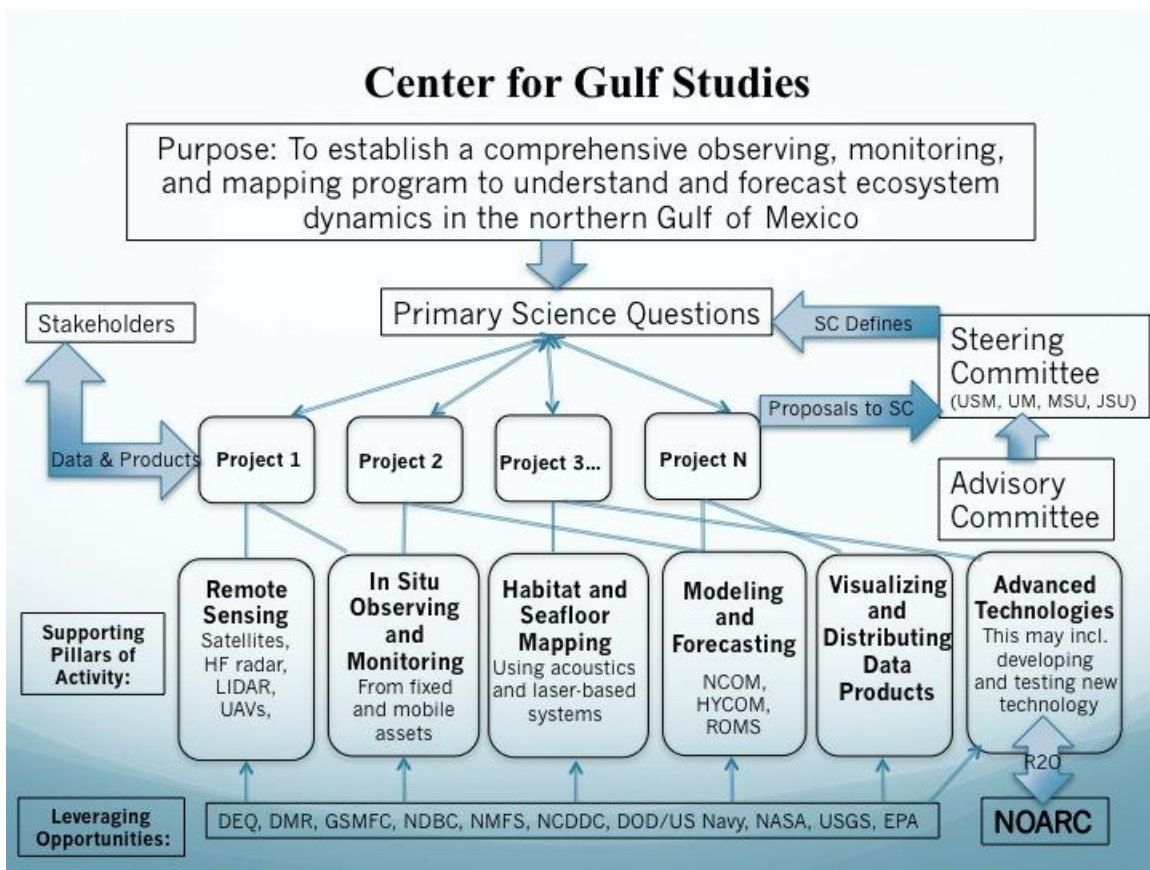
### ***Research Center of Excellence for Ocean Observation, Monitoring and Mapping***

Under the RESTORE Act, 2.5% of the Clean Water Act fines levied against BP for the *Deepwater Horizon* oil spill, and contributed to the Gulf Coast Restoration Trust Fund, are dedicated to Research Centers of Excellence in each of the five Gulf States. The *Center for Gulf Studies* partnership will submit to the State of Mississippi a proposal to serve as the

Research Center of Excellence. This proposal will pull together the vast intellectual capacity of Mississippi's four major research universities and will leverage their capabilities with additional resources from a very broad cross-section of participants with interest and expertise in any of the five Disciplines in the RESTORE Act, such as:

- Mississippi Department of Environmental Quality (MDEQ)
- Mississippi Department of Marine Resources (MDMR)
- Gulf States Marine Fisheries Commission (GSMFC)
- National Oceanic and Atmospheric Administration (NOAA)
  - National Marine Fisheries Service (NMFS)
  - National Data Buoy Center (NDBC)
  - National Coastal Data Development Center (NCDDC)
  - Ocean Exploration and Research (OER)
  - Mississippi-Alabama Sea Grant Consortium (MASGC)
- Department of Defense, US Navy (NAVO, NRL)
- National Aeronautics and Space Administration (NASA)
- United States Geological Survey (USGS)
- Environmental Protection Agency (EPA)
- U.S. Fish and Wildlife Service (USFWS)
- Gulf of Mexico Fishery Management Council (COMFMC)
- National Oceans and Applications Research Center (NOARC)

Some of the existing relationships with NOAA are especially noteworthy. The Northern Gulf Institute (NGI), NOAA's cooperative institute in the northern Gulf of Mexico, is led by MSU with USM being co-lead. NGI members also include Louisiana State University, the Dauphin Island Sea Lab (the state of Alabama's Marine Science Institution), and Florida State University, which will enhance collaboration among the five Gulf Centers of Excellence. The National Institute for Undersea Science and Technology, NIUST, is a large NOAA-sponsored program, led by UM with USM being co-lead. USM hosts the MASGC Program Office, with USM, MSU, and UM each having representatives on the MASGC Board of Directors.



*Figure 1. Program Chart for the Center for Gulf Studies.*

### Scientific Focus of CGS

The *Center for Gulf Studies* addresses a central scientific purpose: To establish a comprehensive and integrated observing, monitoring, and mapping program to understand and forecast ecosystem dynamics in the northern Gulf of Mexico. Here, the ecosystem broadly includes all components of the coastal and ocean system including human use. The CGS will operationally focus on:

- Gaining a comprehensive understanding of the productive northern Gulf ecosystem, including humans, as it relates to environmental forcing,
- Adaptive and deployable platforms, sensors, and mapping systems to improve studies, monitoring (such as monitoring to help measure the success of RESTORE-funded restoration projects in MS) and forecasts
- Development of a vertically structured observing system – from sub-seafloor to satellites,
- A breadth of spatial and temporal scales from basin depth to coastal and the geologic past to the forecast future,
- Development and application of new, integrated ocean monitoring and observing technologies and data processing strategies for enabling improved ecosystem knowledge and prediction,
- Exploratory approaches utilizing observing and mapping platforms to identify and characterize novel biotechnologies,

- Event-driven impacts such as storms, earthquakes and other geologic events, e.g. new oil and gas seeps, oil spills and other incidents,
- Integration of social and economic drivers with new data and technological resources,
- Visualization tools and data products for scientists, the public, and decision-makers, and
- Supporting development of integrative computational tools used in coastal resource Management Strategy Evaluation approaches.

### ***Priority Issues for Mississippi and the Northern Gulf Region***

Mississippi's unique coastal ecosystem is influenced by regional forcing such as proximity of large, pulsed-discharge rivers to offshore and deep-water environments. The combination of large rivers, highly productive waters, temperate seasonality, Loop Current eddies, active deep-water geology, and strong ocean currents create a diverse, dynamic and globally significant ecosystem. Through the CGS, Mississippi's residents and industries will be provided with a powerful new ocean observing and forecasting system for improved use of the ocean in a manner analogous to atmospheric weather forecasting. The resulting trend information and predictions will provide decision-makers and residents with a unique capability to prepare for and respond to changes in the ecosystem. The research studies will improve Mississippi's intellectual base and enable it to be more successful in obtaining competitive funding and participating in the international research community.

The CGS will emphasize research that meets the mandates of the RESTORE Act and the State and Federal Trustees as directed by law. One role of CGS will be to identify and target key stakeholder and decision-maker needs. Four primary resources CGS will draw upon are the Gulf of Mexico Alliance (GOMA), the Gulf of Mexico Coastal Ocean Observing System (GCOOS), the Mississippi Gulf of Mexico Commission's "Vision for Gulf Coast Recovery, Restoration, and Protection", and Governor Bryant's developing GoCoast 2020 report. As a partnership of the five Gulf states, GOMA has articulated existing priority areas for the Gulf from state resource management, emergency preparedness and response, and economic development perspectives. GCOOS, through broad involvement of federal, state and local resource managers, private industry, academia, targeted stakeholder workshops and other direct stakeholder engagement, has developed plans for building a real-time monitoring system in the Gulf to provide the information the stakeholders require and has produced the data management infrastructure needed to accomplish this. The Mississippi Commission's report provides a roadmap for Gulf restoration activities and includes the Mississippi Institutions of Higher Learning "Gulf of Mexico Research Plan Executive Summary."

Northern Gulf of Mexico Priority Issues<sup>1,2,3,4</sup>:

- Water Quality & Human Health
- Habitat Conservation & Restoration

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<sup>1</sup> Gulf of Mexico Alliance (<http://www.gulfofmexicoalliance.org>)

<sup>2</sup> Gulf of Mexico Coastal Ocean Observing System (<http://gcoos.tamu.edu>)

<sup>3</sup> Mississippi GoCoast 2020 (<http://www.gocoast2020.com>)

<sup>4</sup> Mississippi's IHL Gulf of Mexico Research Plan (<http://www.mississippiresearch.org/files/GulfResearchPlan.pdf>)

- Ecosystem Integration & Assessment
- Nutrients & Nutrient Impacts
- Coastal Community Resilience
- Environmental Education & Outreach
- Coastal Hazards & Risk Assessment
- National Security
- Marine Transportation
- Ocean Resources & Resource Management
- Ecosystem Health
- Climate Variability & Sea Level Rise
- Oil Spills & Other Human Disasters
- Technology Development

### ***Operations and Governance***

A Steering Committee comprised of voting membership from CGS partner universities and *ex officio* representation of key non-university partners will develop core research questions related to the CGS Purpose Statement (see Figure 1) and will develop and implement a long-term sustainability plan. Project proposals will be developed collaboratively by University researchers, with emphasis on multi-institutional collaborations that leverage with non-CGS entities. Project proposals will be evaluated internally by the Steering Committee and externally by an Advisory Committee comprised of national and international leaders in the ocean sciences.

Successful projects will directly address the core research questions and will engage the supporting pillars-of-activities technologies, including:

- Remote Sensing – satellites, High Frequency Radar, Light Detection and Ranging (LIDAR), etc.
- In Situ Observing and Monitoring – fixed and mobile manned and unmanned assets, measurements from geologic past to modern processes
- Habitat and Seafloor Mapping – manned, unmanned and autonomous vehicles
- Ocean Ecosystem Modeling and Forecasting – exploiting data assimilation, and uncertainty, existing and novel applications
- Visualizing, Distributing and Integrating Data Products – products and applications useful to stakeholders and decision-makers
- Developing Advanced Ocean Technologies – potential development and testing of new monitoring, sampling and mapping technologies, including biotechnologies, as needed for the operational environment.

### ***Leveraging Opportunities***

The *Center for Gulf Studies* will be Mississippi's Research Center of Excellence and will be administratively managed out of the USM Department of Marine Science located at NASA's John C. Stennis Space Center. This location provides unique leveraging opportunities with existing federal resources and assets (e.g., NOAA, NASA, US Navy, EPA, and USGS) and with existing and planned Gulf-wide observational programs such as IOOS participants GCOOS and SECOORA. Even if RESTORE funds are in the upper range of estimations, high-end, technologically rich monitoring, mapping and observing infrastructure could reduce the

scope of scientific understanding we seek. We will balance the need for increased technological capacity with leveraged assets from with RESTORE-related resources. CGS will coordinate with the Gulf Restoration Council and with other states' Centers of Excellence to maximize effectiveness of RESTORE funds.

The effort to coordinate Gulf-wide activities will be strengthened considerably by the National Oceans and Applications Research Center (NOARC), which, together with CGS will provide enabling infrastructure such as oceanographic research platforms, including vessels and unmanned systems, and major shared instrumentation. As the RESTORE Research Center of Excellence for Mississippi, CGS is also centrally located among the other four states' Centers and could offer to serve as a coordinating body for Gulf-wide activities through the Gulf of Mexico Universities Research Collaborative (GOMURC).

The *Center for Gulf Studies* will coordinate with NOARC primarily through the 'Advanced Technologies' pillar. We anticipate a strong need for novel ocean technologies, research vessels and data processing for which NOARC is uniquely positioned to deliver. Further, NOARC will develop, validate and implement new ocean technologies and research platforms utilizing CGS university partners through a formal Agreement. This opportunity will provide a conduit between research and operational decision-makers for ocean product evaluation and validation. Additionally, the CGS will use this Research-to-Operational (R2O) avenue to improve products and respond to decision-makers by enhancing research products.

CGS will leverage existing outside university Consortia and Centers of Excellence funded through the BP Gulf of Mexico Research Initiative (GoMRI) and RESTORE to improve understanding across the Gulf. This program cross-fertilization will aid in boundary condition development as well as the optimization Gulf-wide resources (e.g., ship time) and standardization of ocean measurements.

### ***Economic Impact***

The *Center for Gulf Studies* will have direct economic impact on the northern Gulf of Mexico (including the whole MS coast) by engaging in private-public research and educational activities. First, CGS will partner directly with the National Oceans and Applications Research Center (NOARC) to serve as the University-based research branch to conduct NOARC's research and development on new advanced technologies. Second, CGS will work with economic development and technology transfer agencies such as Mississippi Development Authority (MDA), IHL's Business and University Relations Office, Mississippi Enterprise for Technology (MSET), the USM Business and Innovation Assistance Center (USM-BIAC), and the Mississippi State University Extension Service (MSU-ES) to transition research technologies into economic development. We envision strong collaborative partnerships with existing and start-up marine technology companies working to develop or refine ocean technology products in the working research environment of CGS. And finally, marine technical training curricula will be developed through University, Community College and private sector partnerships to help ensure a well-trained work force along the whole MS coast.