



Monitoring and Assessment of Coastal and Marine Ecosystems in the Northern Gulf of Mexico

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Background

The Mississippi Sound and Bight are subject to a large freshwater input with associated land/sea exchanges of carbon and nutrients. The transformation and fate of these materials-which are important for the local ecosystems, as well as having much broader implications-are poorly known. The dynamics and thermodynamics in this coastal region are also strongly affected by the freshwater input, and they directly affect the transformation processes. Additionally, rivers and streams can carry contaminants such as heavy metals and bacteria. It is expected that the inputs and transformations of waterborne constituents will have a seasonal pattern, as do many of the factors affecting the inputs, such as weather and agricultural activities. We are implementing the first step in a larger monitoring effort in the coastal transition zone, that will ultimately provide environmental managers with the information to make better decisions regarding upland nutrient management, coastal habitat restoration, and post-hurricane coastal redevelopment.

Bay St. Louis to 20 m Isobath

Bay St. Louis has been listed by the MS Department of Environmental Quality as the most heavily impacted water body in the state due to inputs of substances into its tributaries and directly into the Bay itself. A monthly cruise will begin a set of sampling stations within the mouth of the Bay (Figure 1). The sampling line extends out to the 20 m isobath outside of the MS Sound. This offshore region has been the site of sporadically reported bottom hypoxia, and in summer 2006 the first mapping of a hypoxic event was performed. Profiles and/or discrete water samples for the following will be taken:

- Temperature,
- Salinity (conductivity)
- Dissolved Oxygen
- Chlorophyll
- Nutrients
- Dissolved metals
- Total suspended sediments
- Algal pigments
- CDOM

NGI Projects Supported

- Assessment of Localized Hypoxia in Shelf Waters: Macrofaunal Indicators of Hypoxia. Rakocinski, C.
- Data Tools for Ecosystem-based Fisheries Management
- The NOAA Ecosystems Data Assembly Center. Fulford, R., M. Peterson, and H. Perry.
- Enabling and Initiating Observing System Simulation Experiments of a Coastal High Resolution Oceanographic Model in the Northern Gulf of Mexico. Orter, P., et al.
- The NOAA Ecosystems Data Assembly Center. Beard, R.

Lower Pearl River Monitoring

Lower Pearl River (LPR) estuary reflects the inputs of nutrients and organic materials into the Sound. EPA lists LPR impaired due to high levels of mercury, copper cadmium, turbidity, nutrients, and sediment/siltation.

Establish monitoring station (Figure 2)

- In Situ Troll 9500
- Satlantic MBARI ISUS nitrate sensor
- Wetlabs phosphate sensor
- Campbell Scientific CR10X logger
- Telemetry

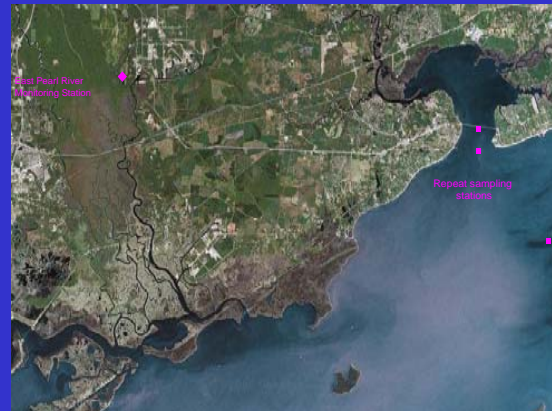


Figure 1 East Pearl River monitoring location and a subset of the monthly repeat stations from Bay St. Louis out into the Mississippi Bight.

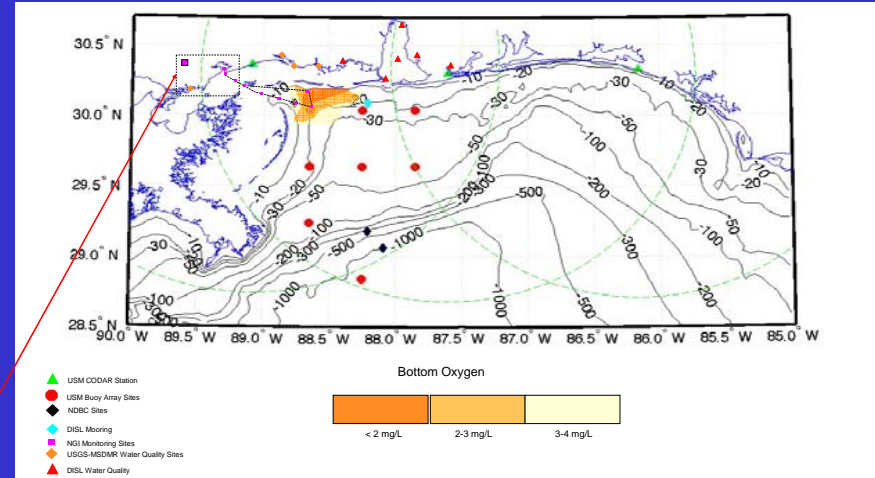


Figure 2 NGI monitoring within the context of other monitoring in the Northern Gulf of Mexico. The red octagons are proposed sites for CenGOOS buoys. The northwest site is where the first CenGOOS buoy was located before it was damaged by hurricane Katrina. The portions of the water of the dashed green circles show where surface current radials will be retrieved from, for waters deeper than about 15 m, when the CenGOOS CODAR stations are operational. The NGI sampling track will pass within the hypoxic zone mapped out in August 2006. The water quality parameters monitored at the USGS-MSDMR sites are limited to temperature, salinity, and turbidity.

Justification

- Information collected and developed will address three of the five priority issues of the Governor's Action Plan for the Gulf of Mexico: water quality, reduction of nutrient inputs, and wetland restoration.
- Supports NOAA Strategic Goals including the Ecosystem Goal

Macrofaunal Indicators of Hypoxia

Chet F. Rakocinski

Macrofaunal Responses to organic Enrichment and Hypoxia	Macrofaunal Metrics	2007 NOAA CY Sampling Scheme
<p>Top panel=normoxia Middle Panel=organic enrichment Bottom panel=hypoxia, due to extreme organic loading</p> <p>Changes in oxygen, food, and biogeochemistry induce shifts in community structure and function</p> <p>Inset graphs depict changes in abundances and size distributions of macrofaunal organisms</p>	<ul style="list-style-type: none"> • Abundance • Biomass (B) • Secondary Production Potential (P) • Body-Size Distributions • Biomass-Size Spectra • Community Turnover Rate (P:B) • Trophic Dynamics • USEPA Benthic Index (Diversity) 	<ul style="list-style-type: none"> • Integrate with Stennis ship surveys Pearl River and St. Louis Bay • Both hypoxic and reference sites • 10 – 11 site-time events in 2007 • Three macrofaunal grabs per event • Grab for sediment characterization?

(Figure devised using Integration and Application Network (IAN) symbol library:University of Maryland Center for Environmental Science (UMCES))