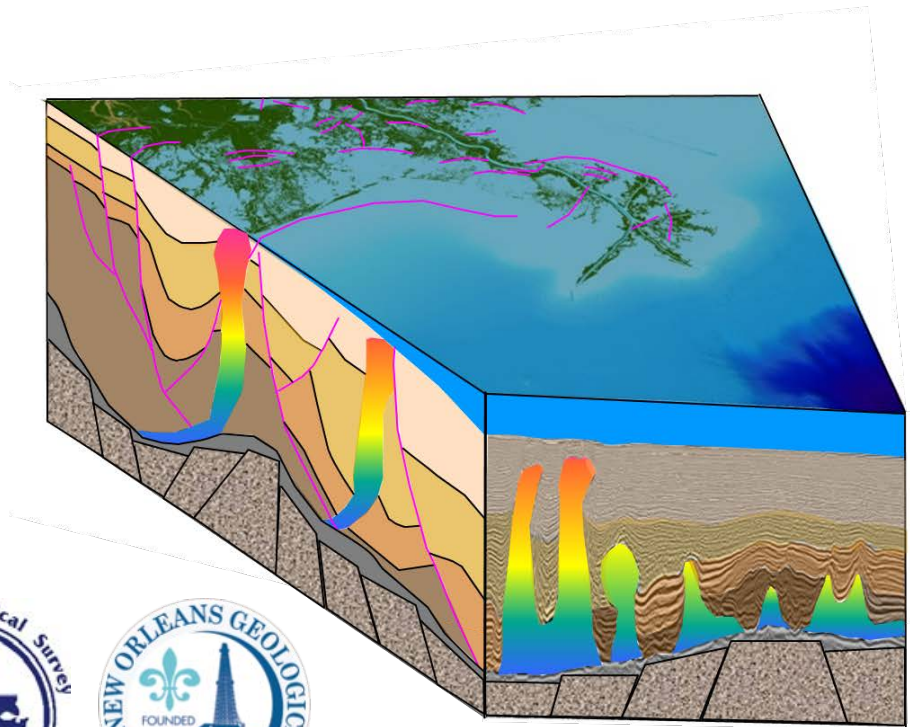


The Louisiana Coastal Geohazards Atlas Project



Coastal Geohazards Atlas – Overview



The Louisiana Coastal Geohazards Atlas Project is a joint development of the Louisiana Geological Survey (LGS) and the New Orleans Geological Society (NOGS). The Atlas will be published online in an open-access GIS format. The Atlas will have wide-ranging applications in the planning, design and construction of infrastructure for transportation, flood protection and sustainability. It is also anticipated that the Atlas will provide a foundational geological evaluation of the coastal zone that can be integrated into the study of subsidence, wetlands management and coastal ecology.

Initially the Atlas will be constructed through the designation of Project Areas for detailed geological evaluation. These areas will be selected by the Atlas Project Team with input from a number of interested stakeholders potentially including the Louisiana Coastal Protection and Restoration Authority, The Water Institute of the Gulf, the Louisiana Department of Transportation and Development, the Louisiana Department of Natural Resources, the Louisiana Department of Environmental Quality, and the U.S. Army Corps of Engineers. Project Areas will be offered in the form of research goals to a selected group of universities to undertake the geological evaluation. Each task order will cover one Project Area, and it will include the scope and definition of the project, the set of deliverables to be returned to LGS by the university, the seismic data license(s) to be provided to the university, and funding allocations for student stipends, university overhead, and additional data collection. Collectively over time the geological interpretations delivered to LGS by the universities for each Project Area will be compiled into the comprehensive Atlas.

Funding requirements for the Atlas Project will include the purchase of seismic data research licenses from seismic data owners, student stipends and university overhead costs for the participating universities, additional data collection costs such as sediment cores and high resolution seismic acquisition, and administrative cost and university overhead for LGS.

The Coastal Geohazards Atlas will provide resources that can have direct applications in five essential areas in coastal sustainability planning:

- **Strategic Adaptation Planning**
- **Transportation Infrastructure Management**
- **Flood Protection Infrastructure Management**
- **Groundwater Resources Management**
- **Subsidence and Wetlands Sustainability**

Strategic Adaptation Planning



The Louisiana Strategic Adaptations for Future Environments (LA SAFE) integrated a fault map provided through the Coastal Geohazards Atlas Project into their Regional Adaptation Strategy (page 45 of the linked document.) The LA SAFE program recognizes that "understanding fault slip movement in the region is critical when planning future investments". The Coastal Geohazards Atlas Project will continue to work cooperatively with LA SAFE to provide the most up to date and accurate fault and salt dome maps.

[LA SAFE Regional Adaptation Strategy](#)

Transportation Infrastructure Management



Access to oil and gas industry seismic data for the universities was provided through the Coastal Geohazards Atlas Project to study the impact of faulting on transportation infrastructure. This report recognizes that "the impact of surface, or near-surface, geologic faulting on critical infrastructure is insufficiently documented in southeastern Louisiana, but the state has a vast amount of energy-sector subsurface data that to date has been under-utilized for transportation and other near-surface engineering applications."

[Synthesis of Fault Traces in SE Louisiana Relative to Infrastructure](#)

Flood Protection Infrastructure Management



This presentation at the 2018 State of the Coast Conference examined four areas along the Mississippi River where there is evidence for recent fault movement. The potential for relationships between recent levee failures and crevasses of the river and historical crevasses of the river with faults and salt domes was also considered.

Each of these areas has been designated as a Special Area of Interest in the Atlas project to be studied in more detail through future university research projects.

[Using Oil and Gas Industry Data to Help Assess Levee Integrity](#)

Groundwater Resources Management



This presentation at the 2019 Louisiana Water Conference examined five areas where there is evidence that faults may be associated with migration of saline fluids from deep below the surface. Two of these areas show direct impacts on drinking water aquifers. One area of examination considered the potential that faults may provide communication between aquifers being used for wastewater injection and drinking water aquifers. Title 33 in the Regulations of the LA Dept of Environmental Quality considers proximity to faults in hazardous waste management. The Coastal Geohazards Atlas can provide the fault maps necessary to enforce those regulations.

[Applications of the Louisiana Coastal Geohazards Atlas in Groundwater Management](#)

Subsidence and Wetlands Sustainability



The 2017 RESTORE Act Center of Excellence Collaborative Research Grant was awarded to a consortium of universities, companies and agencies that are using data provided through the Coastal Geohazards Atlas Project to map faults in coastal Louisiana

The grant proposal states: "The objectives of our proposal are well aligned with the Center of Excellence (COE) Research Strategy, and the project is designed to produce data and results essential to understanding fundamental geologic processes operating in coastal Louisiana, with clear relevance to current and future Master Plan objectives".

[An evaluation of faulting in Holocene Mississippi River Delta strata through the merger of deep 3D and 2D seismic data with near surface imaging and measurement](#)



Members of the Coastal Geohazards Atlas Project team and students working on related research projects have participated in a series of Management Conferences and other meetings at the Barataria-Terrebonne National Estuary Program. Other participants in these meetings have included the Coastal Protection and Restoration Authority, the Water Institute of the Gulf, the Corps of Engineers, and the coastal managers from parishes within the estuary. These meetings provided a productive forum to discuss the integration of geology into sustainability planning.

[Integrating oil and gas industry knowledge base into understanding ecosystem evolution and coastal sustainability planning](#)

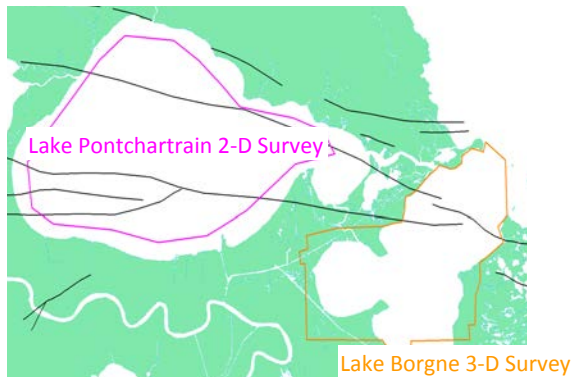
Ongoing University Research



Construction of the Coastal Geohazards Atlas is based on university research. Six ongoing research projects illustrate how 3-D seismic surveys are made available to the universities for MS theses and PhD dissertations through the Atlas Program. Individual projects may investigate a range of geological and coastal processes, but they all provide a detailed geological interpretations to be integrated into the Atlas.

The Atlas Project will continue to seek opportunities to provide access to 3-D seismic surveys to universities for research projects. Over time the interpretations from these research projects will be combined into a comprehensive atlas.

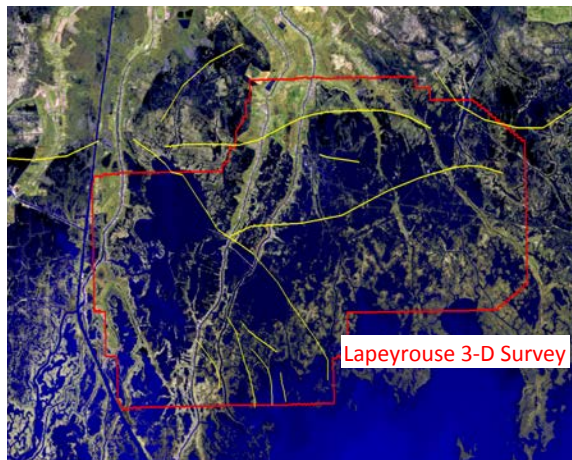
Lakes Pontchartrain and Borgne



This completed M.S. in Geology Thesis by Joseph Frank at UNO combined well logs, 2-D and 3-D seismic surveys and newly acquired high resolution “chirp” seismic to evaluate faults crossing Lake Pontchartrain, Lake Borgne and the New Orleans East Land Bridge. It determined that faults affected channel morphology and patterns of wetlands loss on the Land Bridge.

[Evidence of fault movement during the Holocene in Southern Louisiana: integrating 3-D seismic data with shallow high resolution seismic data](#)

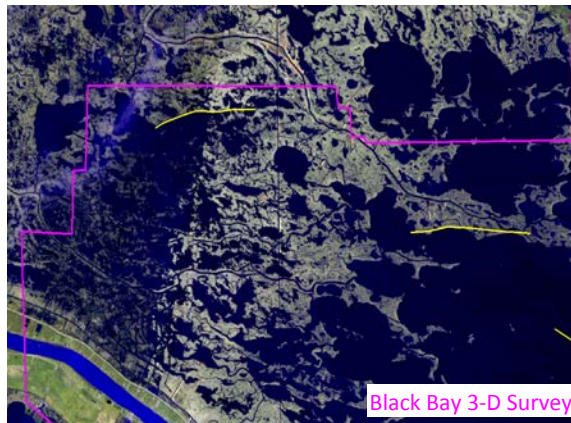
Montegut – Lake Boudreaux



This ongoing Ph.D. in Geology Dissertation by Akinbobola Akintomide at Tulane is utilizing well logs and a 3-D seismic survey to map fault surfaces. Surface traces are found to coincide with the edge of a cypress swamp near Montegut, historical patterns of wetland loss near Isle de Jean Charles, and marsh edges and wetland loss within the Madison Bay subsidence hot-spot along the Lake Boudreaux fault.

[Spatial and Temporal Variation of Fault Activity in the Terrebonne Salt Withdrawal Basin, Southeastern Louisiana: Response to Salt Evacuation and Sediment Loading](#)

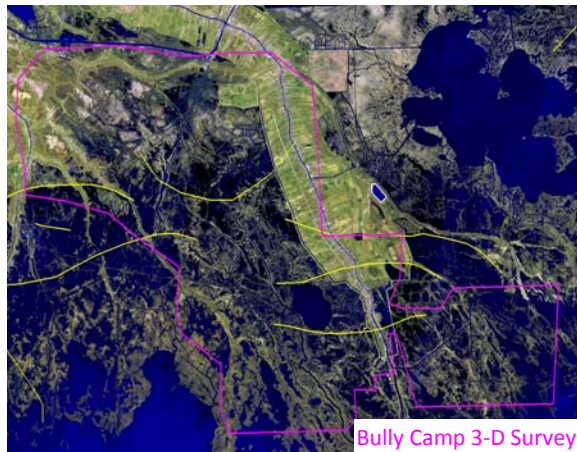
Delacroix Island



This completed M.S. in Geology Thesis by Jarrett Levesh at UNO combined well logs and a 3-D seismic survey to study the movement on the Delacroix Island fault over the past 13 million years to the present. Historic satellite imagery over the past 60 years depicts continuous wetland loss on the downthrown side of the surface fault trace, suggesting that recent and continued fault movement may be contributing to marsh submergence.

[Fault-Slip History of the Delacroix Island Fault System and its Effect on Holocene Salt Marshes of the Mississippi River Delta Plain](#)

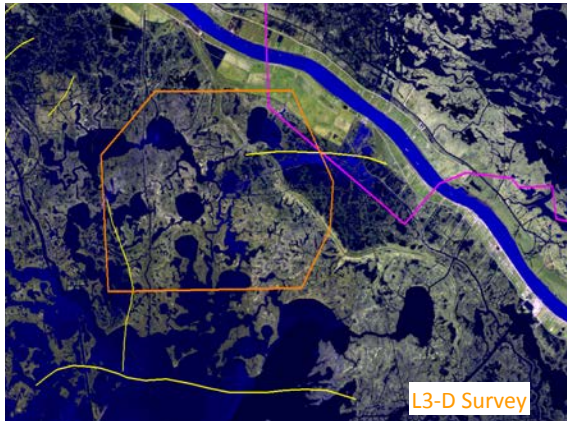
Bully Camp – Golden Meadow



This completed M.S. in Geology Thesis by Amanda Johnston at ULL combined well logs and a 3-D seismic survey to map subsurface horizons between depths of 4,000 and 600 feet. The preliminary data indicate that there is a relationship between surface geomorphology and subsurface structures, suggesting that active tectonics exert a control on land loss in southern Louisiana.

[Investigating the Relationship Between Tectonics and Land Loss near Golden Meadow, Louisiana by Utilizing 3D Seismic and Well Log Data](#)

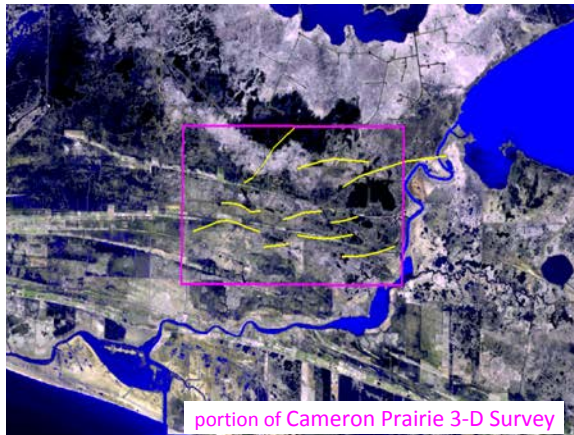
Magnolia



This ongoing M.S. in Geology Thesis by Jared Bullock at UNO used well logs and 3-D seismic data to map the Magnolia fault bounded on the west and east by two salt diapirs. Geologic investigation suggests an active, regional growth fault has caused rapid local subsidence.

[Evaluation of the Magnolia Growth Fault, Plaquemines Parish, Southeastern Louisiana](#)

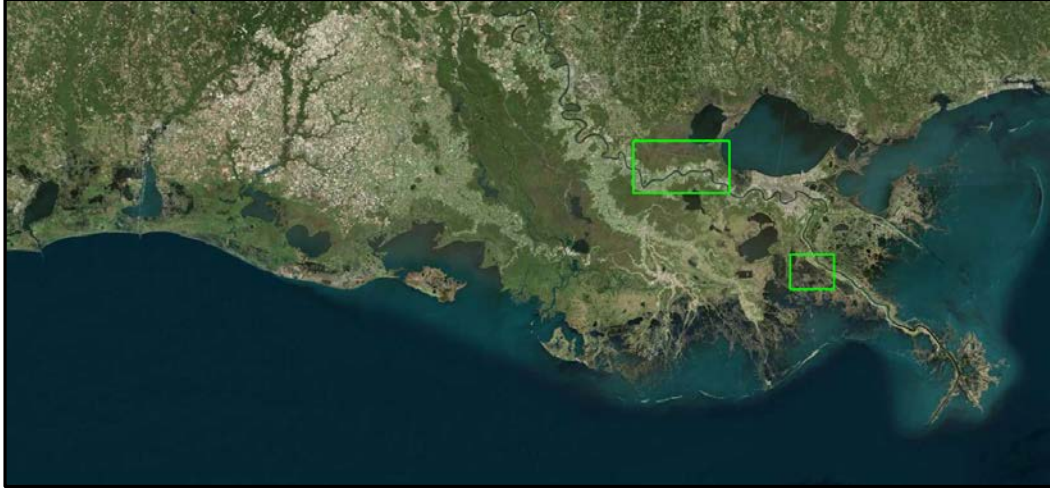
Cameron Prairie



This completed M.S. in Geology Thesis by Matthew O’Leary at ULL combined well logs, 3-D seismic data and LIDAR elevation data to investigate the relationship between faulting, subsidence, and land loss in Cameron Parish. Results found elevation differences across the faults and the occurrence of water bodies on the immediate downthrown sides of the fault traces.

[Relationship between Growth Fault and Subsidence: Impact on Coastal Erosion, an Example from Cameron Prairie, Southwestern Louisiana](#)

Proposed Project Areas

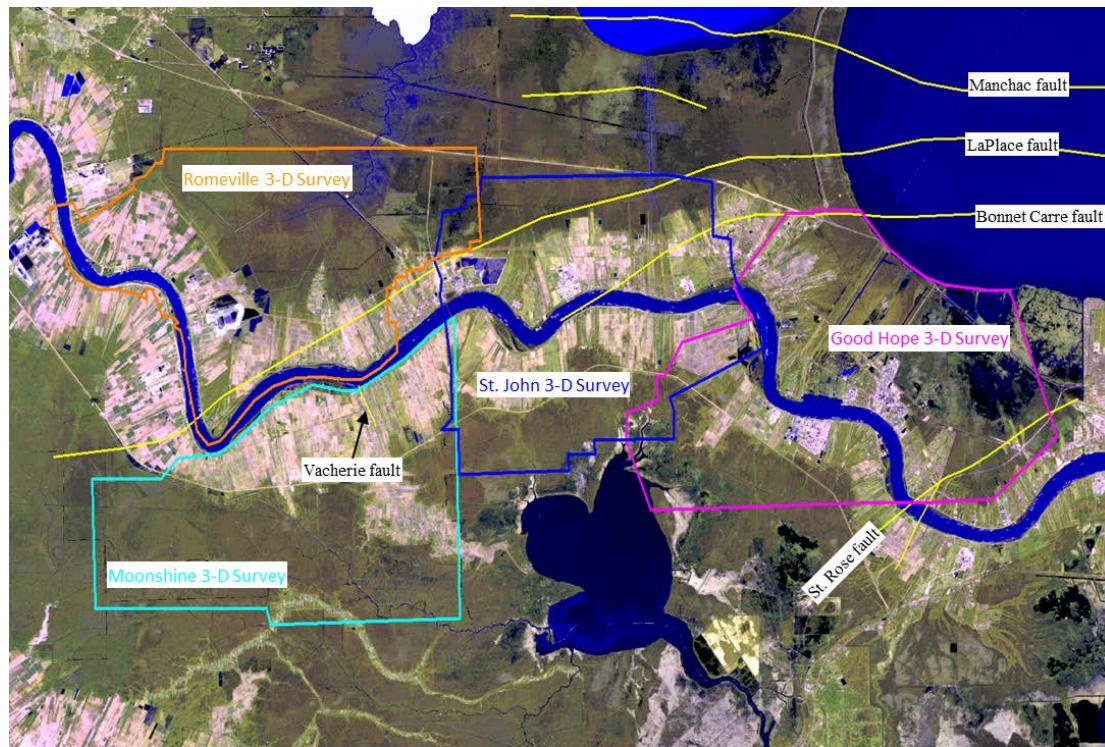


The ultimate objective of the Coastal Geohazards Atlas Project is to construct a detailed geological interpretation of the entire Louisiana coastal zone. The reality is that construction must occur on a project by project basis, and each of those projects must have a source of funding to come to fruition.

Two project areas are proposed here for consideration. Each of the five applications for the Atlas would be addressed in these two project areas.

West Lake Pontchartrain – River Parishes

Proposed Project Areas



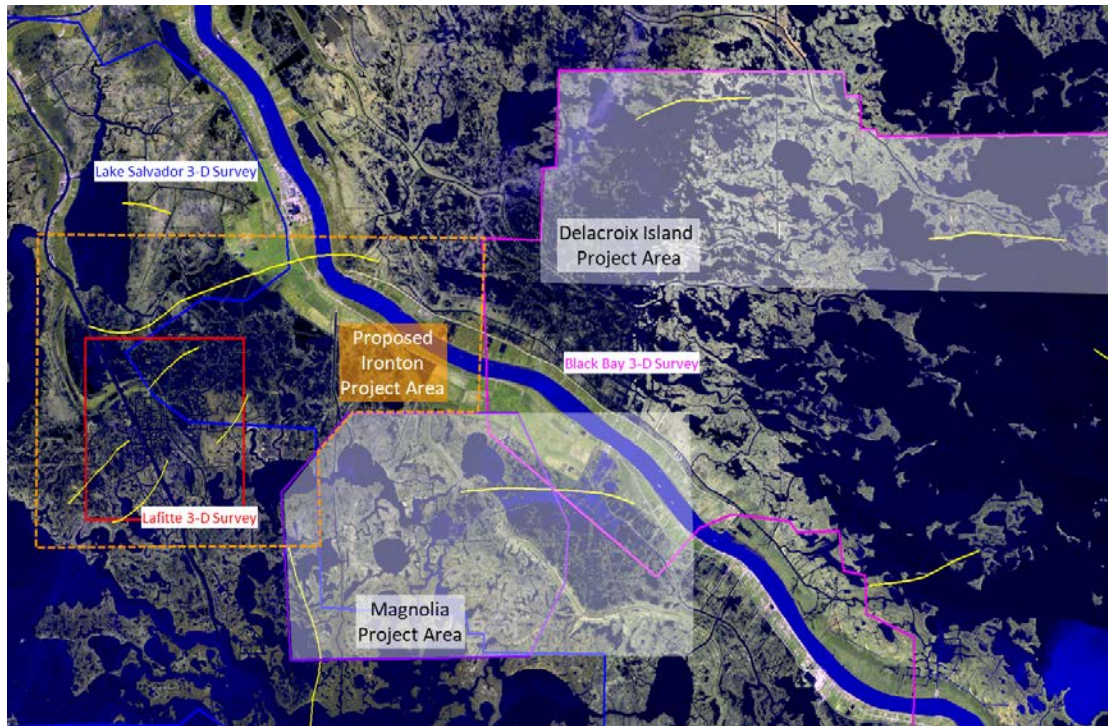
Faults have been documented in this area by several academic studies. Potential implications of these faults include causes of subsidence, threats to flood protection infrastructure, impacts on transportation infrastructure, the migration of saline fluids from depth, and the potential for communication between wastewater injection aquifers and drinking water aquifers.

The three initial projects in this area are being proposed for funding

- **VACHERIE FAULT** – the Vacherie fault is coincident with a historical crevasse of the Mississippi River. A 1943 rupture of the land surface along the fault is the best evidence for active fault movement in the area, and a clear indication of the potential threat to the Mississippi River levee and navigational channel. The study area is covered by a 3-D seismic survey, and it would be a good candidate for high resolution seismic.
- **ST ROSE FAULT** – the surface expression of the St. Rose fault is evident as a tree line in the swamp near the intersection of Airline Hwy and I-310. The fault has been shown to be coincident with a crack in at T-wall in the flood protection infrastructure and an elevation offset on LA Hwy 626. The study area is covered by a 3-D seismic survey, and could be further investigated with high resolution seismic and sediment cores.
- **WEST LAKE PONTCHARTRAIN LEVEE** – the proposed configuration for the West Lake Pontchartrain Levee system crosses the Bonnet Carre and LaPlace faults as shown on this map. The study area is covered by a 3-D seismic survey. Geological evaluation of the faults could be combined with geotechnical evaluations for the levee project.

Ironton

Proposed Project Areas



The proposed Ironton Project Area includes the sites of the Bayou Dupont Marsh Creation Project and the proposed Mid-Barataria Sediment Diversion Project. The study area is partially covered by the Lake Salvador and Lafitte 3-D surveys as well as several individual 2-D seismic lines. The Ironton area is adjacent to the Magnolia and Delacroix Island Project areas which are described in the Ongoing University Research section. Both of these projects have indicated evidence for subsidence and wetlands loss associated with recent fault movement.

This proposed project would serve as a partial fulfillment of the recommendations of these comments submitted to the U.S. Army Corps of Engineers:

[Comments to the U.S. Army Corps of Engineers, New Orleans Division, in reference to The Environmental Impact Statement for The Mid-Barataria Sediment Diversion](#)

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