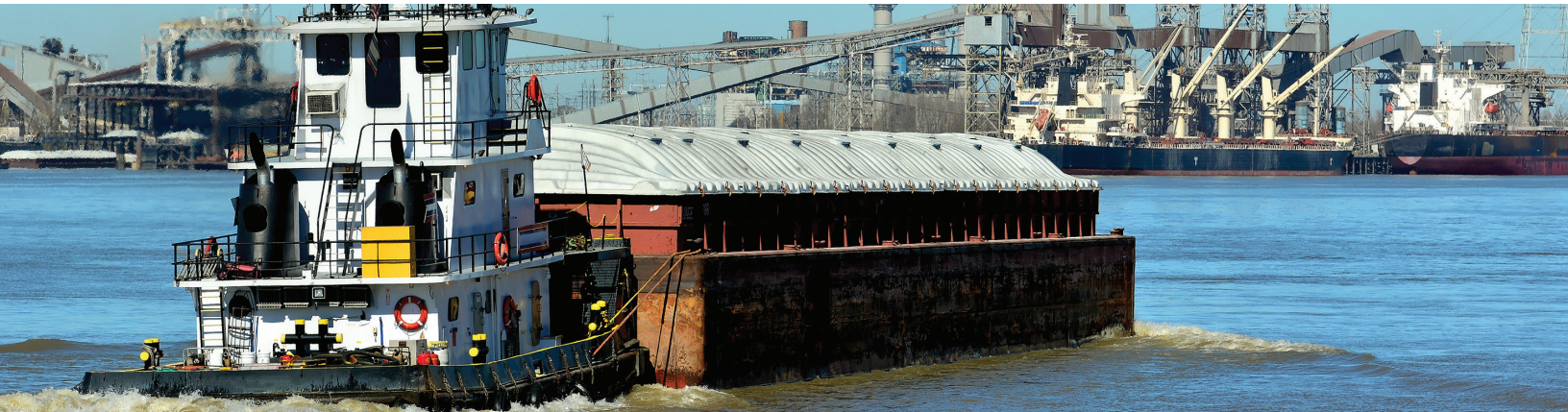**THE WATER INSTITUTE**
OF THE GULF ®

WATER INSTITUTE CAPABILITIES

The Institute's work helps ensure livable communities and a thriving economy and environment.

The Water Institute of the Gulf is a not-for-profit, independent research and technical services resource with a mission to support resilient coasts and sustainable water systems worldwide. Our work helps ensure livable communities and a thriving economy and environment.

The Water Institute of the Gulf connects academic, public, and private research providers and conducts applied research to serve communities and industry. The Institute was selected as the Resources and Ecosystem Sustainability, Tourism Opportunities, and Revived Economy of the Gulf Coast (RESTORE) Act Center of Excellence for Louisiana. In all endeavors, our goal is to increase understanding of natural and human aspects of deltaic, coastal, and water systems; to develop tools that apply knowledge to restore coasts and ecosystems; and to reduce risk for people and infrastructure.

Because life happens at the water's edge

APPLIED RESEARCH

Since The Water Institute's inception, we have evolved from working primarily on desktop research to focusing on active field- and laboratory-supported investigations that engage multi-disciplinary teams. Our applied research projects, from support for large-scale planning and decision making to targeted research, are characterized by an interdisciplinary approach and a commitment to scientific and engineering rigor.

FIELD INVESTIGATIONS

We undertake a wide range of boat-based and fixed-station observations and field investigations of riverine, deltaic, coastal, and continental shelf environments. Using a variety of sampling techniques and investigative tools, our team performs river channel surveys of bathymetry, hydrodynamics, and sediment dynamics. We also have technology that enables us to conduct sub-bottom acoustic surveys, preform geological measurements, characterize wetland vegetation and soil, and collect data in complex and rugged coastlines.

## REAL-TIME SENSOR DATA COLLECTION AND MONITORING DESIGN

We have a number of sensors and data collection platforms that we deploy for long periods of time in order to gather data for parameters such as flow characteristics, suspended sediment, water quality, and meteorology. We also design monitoring approaches to obtain repeated long-term measurements that can be analyzed to detect change that may result from a variety of sources, including large-scale restoration and protection projects, environmental disturbances, changing climate, and other major drivers.

Institute team members check a U.S. Geological Survey monitoring site in Breton Sound, Louisiana.

INTEGRATED NATURAL SYSTEMS MODELING

We develop and apply world-class integrated hydrologic, morphodynamic, and ecosystem numerical tools to understand short- and long-term dynamics of complex riverine, coastal, and deltaic systems. These predictive numerical models support and inform decision-makers on how to manage and sustain valuable natural resources and infrastructure. Our team uses a wide range of numerical models and is continually seeking and identifying the best available tools in the research and practitioner communities. Examples of modeling software that we currently utilize include: Delft3D, MIKE-FLOOD, OpenFOAM, and FLOW3D. We led the development of the Integrated Compartment Model (ICM), a comprehensive predictive landscape and ecosystem model that supports large-scale coastal planning efforts. In April 2015, we earned a Delft3D Modeling Center certification, the first North America-based organization to receive such a credential.
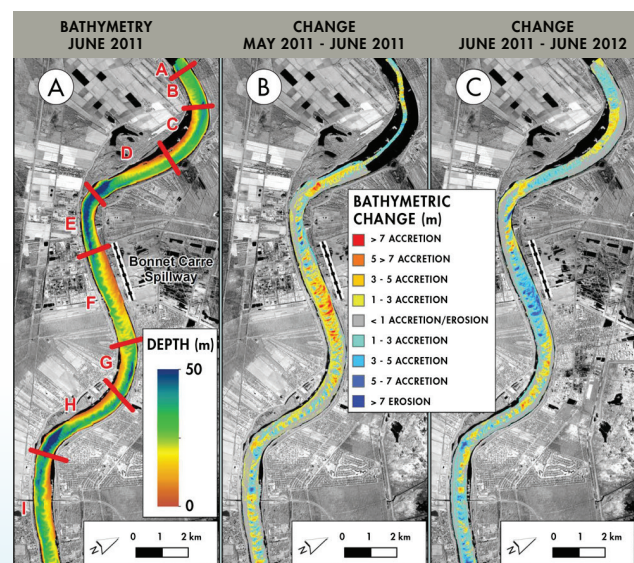
These maps depict changes to the Mississippi River due to the opening of the Bonnet Carré Spillway during the flood of 2011.

ANALYTICS AND INTEGRATED DECISION SUPPORT

We develop and apply integrated decision support systems linking sensors, predictions, and analytics in a real time framework that can support coastal planning preparedness, operations, and emergency response at local and regional scales. Our goal is to make links between data, models, and end users more seamless in order to provide high quality information to support effective and transparent decision making.

SPATIAL ANALYSIS OF SOCIOECONOMIC AND ECOSYSTEM CHANGE

We use geospatial analytics and data visualization to better understand patterns of change and the relationship of the natural system to society. This includes analysis of U.S. Census and American Community Survey data, reconstruction of historic ecosystem change, and investigation of potential future system response to planned restoration and protection measures.
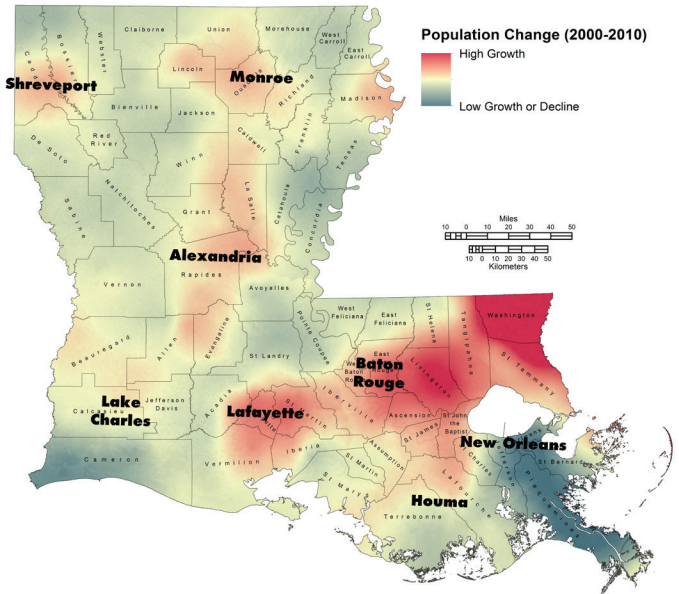
Through a variety of interpolation and clustering methods, Institute scientists produce clear visuals of social and economic data in ways that are accessible and useful for a variety of audiences and decision-makers.

DECISION SUPPORT

In addition to our applied research program, the Institute is often called upon to connect academic, public, and private research providers from around the world to find and evaluate solutions to coastal protection and restoration challenges. Our decision support efforts inform a range of implementation and policy decisions, from large-scale ecosystem restoration, to natural coastal infrastructure, to water systems management.

INDEPENDENT TECHNICAL EXPERT REVIEW

Independent review by subject matter experts not directly involved in projects is essential to ensure technical information used in decision making is sound, evidence-based, and meets the state of the practice. Because of our experience and relationships, we conduct peer reviews, either by using our experts within the Institute, or by tapping into our network of experts across the country and the world.

EXPERT OPINION AND ADVICE

Members of our technical team are called upon to provide expert opinion and advice as others work through complex coastal, deltaic, and water resource related challenges. This includes serving in an advisory role on large-scale restoration planning efforts and providing consulting support to others as they undertake new projects or initiatives.

The Institute's groundbreaking models show impacts of proposed sediment diversions on a number of variables, including future vegetation coverage.

LET'S WORK TOGETHER

The Mississippi River and Delta and the Gulf of Mexico are among the most complex riverine, deltaic, and coastal systems in the world. The same issues of land and estuary degradation, subsidence, endangered water supply, and rising sea levels that affect the Gulf impact the entire planet.

The Water Institute's invaluable applied research, knowledge, and experience gained in coastal Louisiana are already being extended globally, with engagements in Chile, Egypt, the Netherlands, and the Mekong Delta in Vietnam.

We also welcome the opportunity to apply our expertise and to partner with mission-driven organizations who share our passion for advancing resilient coasts and sustainable water systems worldwide.
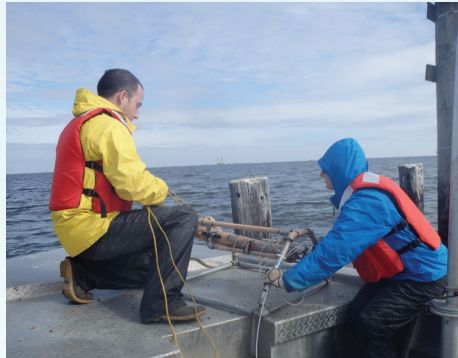
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