RESTORE ACT
CENTER OF EXCELLENCE FOR LOUISIANA (LA-COE)
QUARTERLY NEWSLETTER

The Water Institute
RESTORE ACT
CENTER OF EXCELLENCE
LOUISIANA

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Happy Holidays from LA-COE!

The LA-COE Team wishes you all a wonderful and safe holiday season, and we hope to see some of you at the American Geophysical Union Conference in New Orleans this week!

RFP3 Research Award Project Highlight: Dr. Corina Barbalata, Louisiana State University

RFP3-funded project, "An Automated Tool for Water Quality Assessment in Louisiana's Watersheds and Basins," led by Dr. Corina Barbalata focuses on developing advanced tools for improved water quality monitoring in Louisiana's coastal waters, with a particular emphasis on detecting and predicting Harmful Algal Blooms (HABs) in Lake Pontchartrain. As HABs pose significant risks to ecosystem health and public safety, timely, high-resolution monitoring and predictive capabilities are needed to overcome risks.

To address this challenge, Dr. Barbalata and her team are integrating autonomous sensing, data-driven modeling, and physics-based simulation to better understand nutrient transport and bloom dynamics. An unmanned surface vessel (USV) has been developed to collect persistent and repeatable water quality measurements. The vessel is equipped with sensors that measure chlorophyll, turbidity, salinity, nitrate, and temperature at multiple depths. A custom autonomy stack enables the USV to perform autonomous, precise, repeated lawnmower-style surveys, ensuring consistent data collection at the same spatial locations and depths over time, with minimum human input.

The collected data are used to estimate the timing and spatial distribution of HABs through

statistical modeling, complemented by predictive tools that incorporate lake bathymetry and geographic data. In addition, a hydrodynamic model of Lake Pontchartrain has been developed using COMSOL Multiphysics 6.3 and the Shallow Water Equations. The model includes inflows at the Bonnet Carré Spillway. Time-dependent simulations over a 24-hour period, with one-minute resolution, provide insight into circulation patterns and nutrient transport that influence HAB formation.

By combining autonomous in situ sensing with data-driven and physics-based modeling, this project provides an integrated framework for improved HAB monitoring and prediction in Lake Pontchartrain. The resulting tools will support early warning capabilities, enhance scientific understanding of nutrient transport, and offer a scalable approach that can be extended to other coastal and estuarine environments across Louisiana.

The Unmanned Autonomous Vehicle performing a data collection mission in Lake Pontchartrain.

RFP3 Research Award Project Highlight: James P. Bradley, MS, Chenier Environmental Consulting, LLC

James P. Bradley, a geologist with Chenier Environmental Consulting, LLC, and his team recently completed the first phase, the geophysical investigation, of LA-COE RFP3-funded project, "Reconnaissance Geophysical and Geotechnical Investigations to Characterize Sip Shoal." Ship Shoal, located on Louisiana's Outer Continental Shelf, is a critical source of sand for coastal restoration, due to its abundance of available sand and proximity to restoration efforts along the Louisiana coast.

Bradley and his team have two principal goals for the project. The first is to better characterize Ship Shoal's size, volume, sediment composition, boundaries, and geomorphology, while accounting for existing oil and gas infrastructure. The aim is to more accurately quantify the available volume of restoration quality sediment. Secondly, Bradley and his team will generate a dataset that can serve as a baseline for future scientific studies, including analysis of shoal migration and ecological function.

The team is combining existing databases (e.g., Louisiana Sand Resources Database and the National Centers for Environmental Information) with new geophysical surveys, including single-beam bathymetry, seismic sub-bottom imaging, sidecan sonar, and magnetometer surveys. These methods map the underwater surface, assess subsurface structures, and identify

pipelines that may limit sediment availability. Geotechnical core borings collected in this study will further inform understanding of the sediment characteristics including grain size, color, stratigraphy, and composition, enhancing planning for future marsh and barrier island restoration projects.

The next phase of the project, the geotechnical investigation, will begin in the spring. Geotechnical core borings will be collected to further inform understanding of the sediment characteristics including grain size, color, stratigraphy, and composition, enhancing planning for future marsh and barrier island restoration projects.

Dr. Bradley and his team during the project's geophysical investigation.

Why do ornithologists love the holidays?
Because it's peak season for tweet traditions!

Why don't field ecologists ever get lonely?
The mosquitos are always dying to hang out with them!

Why did the gumbo apply for a job?
It wanted to roux the world!

Why was the alligator hired as a wetland scientist?
They demonstrated great snap judgement in the field!

Resources for RFP3 PIs, including the PPR template, the LA-COE portal system, and a quick reference guide are available below.

Resources

Impacts

LA-COE IMPACTS

Since 2016:

$9.3 million in funding

108 undergrads, grads, and post-docs supported

13 theses accepted

30 journal articles published

39 datasets made publicly available

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