

FLORIDA GULF OF MEXICO RESTORATION PROJECT SUBMITTAL FORM

Submit by Email

Form Purpose and Instructions:

- To assist the project proposal and review process, please complete this Submittal Form. Completion of the Form will contribute to the appropriate information being completely and accurately submitted for each project.
- Take as much space as needed for each question, but please keep responses as focused as possible. It may assist you to review all the questions before addressing any one question.
- If you have multiple projects – please submit one Form for each project.
- When you have completed the form hit the submit button in the upper right hand corner. Once your Form is successfully submitted, you will receive a confirmation email from the Florida Department of Environmental Protection.
- Submit all back-up maps, information, etc. to Restoration.Projects@dep.state.fl.us
- To submit updated information, please fill out this form and update fields as needed.

All of the following are **Required Fields** for project updates

New Project



Update to Previous Submittal



Project #

Project Name

Network of Autonomous, In-Water Sensors for Water Quality BioMonitoring in the Gulf

Contact Information: *(Include at least one name, phone number, email address, and organization name if applicable)*

Laura Bowie
Gulf of Mexico Alliance
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Project Location:

(Include a map, if possible, and the city, county, watershed, longitude/latitude dec.deg, Parcel # if Applicable)

Charlotte Harbor
Cedar Key
Panama City

Project Description:

(Describe all aspects of the project)

The primary aim of this project is to establish a demonstration network of three Environmental Sample Processor (ESP) instruments located at strategic sites along the Florida Gulf Coast. A fourth core ESP (i.e., not deployable) will be used to continue developing tests to detect emerging targets of concern to Gulf water quality. Deployment sites have been selected to achieve the highest and most immediate impact on management decisions benefitting from early warning of biological threats to shellfish harvesting/consumption, recreational use of coastal waters, and other local tourist activities. These installations will serve as a foundation for the

future build out of a wider ESP biomonitoring network to include other locations in the state of Florida and throughout the Gulf of Mexico and be integrated within the existing and planned infrastructure of the Gulf of Mexico Coastal Ocean Observing System (GCOOS). The ESPs will be coupled with (either physically or deployed in close proximity to) existing contextual sensors that currently monitor and report physical and chemical water quality characteristics as part of the GCOOS network, thereby effectively leveraging instrument assets and data streams contributed by a number of Gulf-based institutions.

Total project duration is four years. The ESP instrument is a mature technology, commercially available as a 'built-to-order' item from MRL. It is anticipated that fabrication of the three ESPs identified in this proposal will require 9 to 12 months for completion and delivery. During this time, team members will focus on 'bench testing' various components of the system, given that co-PI Doucette has a core ESP instrument on loan to his laboratory. This testing will include evaluating thermal stability of reagents, validating performance of the assay to detect *K. brevis* and its toxins (i.e., brevetoxins), and confirming accuracy/sensitivity of molecular methods to detect bacterial pathogens and microbial water quality indicators on the ESP.

Sites selected for location of the three fully-deployable ESPs, based on their high degree of relevance for our specific biological targets, include: Charlotte Harbor, an area of active shellfish harvesting in close proximity to waters with recurring *K. brevis* blooms; Cedar Key, a leading site for clam aquaculture and oyster harvesting subject to bacterial pathogen contamination; Panama City, a popular tourist destination included in the FL Healthy Beaches water quality monitoring program.

The initial capital investment to purchase the ESP instrumentation/mooring hardware/etc. and implement data acquisition/reduction/management is being absorbed by this project's budget. The primary costs associated with sustaining operation of this ESP biomonitoring network will be associated with the purchase of assay reagents and with the deployment/recovery/maintenance of instruments as required. It is anticipated that the Florida Dept. of Health and/or the Florida Dept. of Aquaculture and Consumer Services (FDACS) will operate and maintain these units beyond the project lifespan, based on successful implementation of the ESP network for generating real-time, actionable water quality monitoring data.

Estimated Project Costs:

(Describe the estimated costs of the project, including any assumptions for contingency and ongoing operations/maintenance. Identify other secured funding sources such as matching funds, in-kind contributions or state/federal dollars. In addition, if possible, complete and submit the Cost Appendix Sheet associated with this Form)

ESTIMATED PROJECT BUDGET:

Year 1

(cost of three, fully-deployable ESP units (with mooring hardware) = $3 \times \$393,800/\text{unit} =$

(cost of one core ESP unit) = $1 \times \$238,000/\text{unit} =$

Non-ESP Operations costs = \$785,000

Total for Year 1 = \$ 1,419,400;

Year 2:

Operation costs = \$785,000;

Year 3:

Operation costs = \$785,000;

Year 4:

Operation costs = \$785,000;

Total Project Cost: \$4,559,400

Other Funding:

(Indicate if the project is submitted for any potential funding or if it may be used to leverage additional funding, if so, please describe the funding source [e.g. State/Federal Grants])

None

Technical Feasibility:

(Describe the technologies involved and any relevant past experience or proven success with similar projects)

The ESP is a robotic, electro-mechanical platform capable of autonomous, in-water detection of microbes and their metabolites via onboard sensors specific for such targets. The ESP can be deployed sub-surface or on a pier, and results of tests conducted remotely on the instrument are available in real-time over the internet for further processing, evaluation, and incorporation into decision making processes. The ESP is a commercially available instrument sold by McLane Research Laboratories, Inc. (MRL; East Falmouth, MA), our primary corporate partner in this effort.

The ESP has been deployed successfully numerous times in California coastal waters and in the Gulf of Maine, and on pier-based stations in the Pacific Northwest. The main focus of these deployments has been detection of harmful algal bloom species and toxins, similar (but not identical) to the Florida Red Tide organism, *K. brevis* and its toxins. Bacterial pathogens and microbial water quality indicators have also been targeted successfully by the ESP. A patent for detection of enterococci for marine water quality monitoring was submitted recently by co-PI Paul. The biggest difference from previous deployments is the elevated ambient water temperature in the Gulf of Mexico, and therefore thermal stability of assay reagents will need to be validated – although some of the ESP sensors operate normally at temperatures well above expected water temperatures. There is thus a high level of confidence in the ESP's ability to perform as intended and generate the data streams required to support and inform critical management decisions.

Conflicts or Complements to Existing Efforts:

(Describe any ongoing activities in the project implementation area, if the project is part of another plan, and why the project does or does not interfere with that work. Please consider how the project may complement existing local, regional, and state efforts/plans/objectives)

No conflicts at all. All of the proposed work is very complimentary to existing efforts. Establishing this ESP-based biomonitoring network, as integrated within the existing and planned GCOOS infrastructure, has a number of clear community benefits for industries dependent on and influenced by coastal water quality and its effects on natural resources. The

Florida Fish and Wildlife Conservation Commission (FWC; K. Hubbard, co-PI, contact) monitors *K. brevis* in Florida coastal waters and provides data to other state agencies to direct shellfish harvest closures and protect public health. The Shellfish Environmental Assessment Section (SEAS; J. Seagle, contact) under FDACS classifies and manages shellfish harvesting areas impacted by both red tides and bacterial pathogens. Florida Dept. of Health established the Healthy Beaches Program to monitor and report levels of the US EPA-recommended microbial water quality indicator, enterococci. Real-time, ESP-generated data streams for *K. brevis*/brevetoxin, bacterial pathogen, and enterococci levels represent a new and powerful tool to inform timely decision-making by these state regulatory agencies.

Complies with Federal, State, Local, and Tribal Laws/Regulations:

(Describe any concerns or potential conflicts)

No concerns or conflicts

Readiness for Implementation:

(Describe if the project has had any design or permitting work started or completed [attach permits or design work]. Please address any issues that may delay start or finish of the project)

No design or permitting work has begun.

Environmental Benefits:

(Describe the nature, magnitude, and timing of any environmental benefits attributable to the project. If possible, describe potential environmental performance measures [e.g. pollutant reduction]. Please address any potential environmental impacts associated with implementing or maintaining the project [e.g. loss of a habitat or conversion of habitat from one type to another during implementation])

The output will be real-time reporting of biological, physical, and chemical data for critical locations on Florida's Gulf Coast that supports the targeted RESTORE outcomes of restoring, improving, and protecting water resources, as well as improving science-based decision-making processes.

Economic and Social Benefits:

(Describe the economic and social benefits including those related to the project's improved ecosystem services and any estimates on jobs created or preserved)

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Community Resilience:

(Describe if the project assists Florida's ability to anticipate, withstand, or recover from hazards or threats [e.g. hurricane preparedness, establishing living shorelines])

Not directly, but indirect benefits of real-time water quality monitoring would greatly benefit the communities that will be alerted to possible water quality issues so that they could manage the tourist expectations.

Public Acceptance:

(Describe any known or potential public approval or opposition to the project)

No opposition to the project.

Additional Information you wish to provide:

(Please include any maps, designs, drawings, photos or background resources that may assist in completely and accurately understanding the project. If these are too large to attach here, please email them to

Restoration.Projects@dep.state.fl.us

Cost Appendix Sheet

Cost Item

Cost Estimate

Planning

Contracts	
Feasibility	
Engineering, Design, Land Rights & Bid Prep	
Restoration Plan	
Site Visits & Cost of Site Selection	
Administration, Overhead and Indirect	
Other	

Planning Subtotal:

Construction

Contracts	
Administration & Mobilization/Demobilization	
Other	

Construction Subtotal:

Monitoring

Contracts	
Data Collection	
Monitoring Administration	
Other	

Monitoring Subtotal:

Project Cost

Supervision	
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Subtotal:

Contingency (<i>traditionally calculated at 10% of the subtotal</i>)	0
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TOTAL:

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Estimated Costs by Year

Year 1	1,419,400
Year 2	785,000
Year 3	785,000
Year 4	785,000
Year 5	785,000
Year 6	