

# 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](mailto: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

GIREC Proposal 1: Science Program Development

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

Daniel R. Brown, 850-934-2613, [daniel\\_r\\_brown@nps.gov](mailto:daniel_r_brown@nps.gov)  
Richard A. Snyder, 850-474-2086, [rsnyder@uwf.edu](mailto:rsnyder@uwf.edu)

## **Project Location:**

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

Gulf Islands National Seashore Florida District; Escambia, Okaloosa, and Santa Rosa counties

## **Project Description:**

*(Describe all aspects of the project)*

The proposed project would provide essential base funding to support implementation of high-impact environmental research and STEM education programs for the new Gulf Islands Research and Education Center (GIREC). Through GIREC the University of West Florida and Gulf Islands National Seashore will jointly work to (1) provide the basic science needed to support the restoration and conservation of Gulf Coast ecosystems impacted by the Deep Water Horizon oil spill, and (2) increase student access to high-quality, hands-on STEM education to promote student achievement and environmental stewardship. (See attached GIREC proposal 1)

**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)*

To support science based resource management and STEM education, we are requesting a \$12M endowment to provide critical base funding for GIREC programs. The funds will be used to establish a Discover Science grants program to promote essential research, teacher training, and student participation in GIREC programs. The funds will also be used to hire a GIREC Coordinator and STEM Education Specialist. (See attached GIREC proposal 1)

**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])*

A separate proposal to support construction of labs, classrooms, and an environmental Discovery Center to replace the Seashores' existing Visitor Center will be submitted for consideration for RESTORE Act funding (GIREC Proposal 2: Facilities Construction and Operation). The goal of the GIREC Coordinator will be to leverage existing resources to develop new funding to support GIREC's research and education goals. Potential funding sources for individual research and education programs include the National Science Foundation, US Department of Education, National Marine Fisheries Service, and National Park Foundation. The NPS has initiated hiring for an Education Specialist to lead development of GIREC's STEM based educational programs and UWF has provided an initial two years support for a Project Coordinator to facilitate GIREC development. (See attached GIREC proposal 1)

**Technical Feasibility:**

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

The partners have the capacity and expertise to design and implement high-impact science programs that support regional coastal resource management and hands-on STEM education. Development of GIREC will be aided by support from the national network of Research Learning Center partners, which include hundreds of universities, K–12 schools, non-profit organizations, community groups, agencies, and a range of NPS programs. By engaging partners in park-based research, scholarship, and educational activities GIREC will be able to leverage in-kind funding and support for research and educational programming. As an example, the Coastal Southern California Science and Learning Center was established in 2002 as a virtual center with no dedicated facilities. By 2010 they had developed over 70 research and education partnerships and 36 funding partnerships supporting an annual budget of just over \$250,000. (See attached GIREC proposal 1)

**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)*

GIREC's mission to facilitate research and education with a focus on regionally important ecological resources and issues is directly in-line with UWF and NPS public service mandates. Proposed research, monitoring, and education programs will compliment and enhance existing activities at partner institutions, and talks are currently underway with area universities, colleges, state and federal agencies, and non-governmental organizations to ensure successful

coordination of efforts. (See attached GIREC proposal 1)

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

*(Describe any concerns or potential conflicts)*

State and Federal environmental regulations will be followed in all GIREC research and education programs. The efficacy and potential impacts of each GIREC supported research project will be reviewed by the Florida Fish and Wildlife Conservation Commission and the National Park Service. Projects including vertebrate animals will as well need to receive approval from both the NPS and UWF Institutional Animal Care and Use Committee which ensures the use of best research practices. (See attached GIREC proposal 1)

**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)*

Once base funding is secured the partners will immediately initiate GIREC research and education program development and implementation.

**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])*

GIREC programs will be designed to support a flexible response to evolving resource issues, with an emphasis on water quality, fisheries and wildlife restoration, and coastal flood protection. Specific program goals include:

- Directed research to improve fisheries and wildlife management
- Improved coastal sand management and coastal flood protection
- Continuous water quality monitoring in Santa Rosa Sound and Escambia Bay
- Enhanced environmental science education and training

- Development of Citizen Science and Environmental Stewardship programs
- Construction of a Water Quality Portal to provide real-time water quality data to the public (See attached GIREC proposal 1)

**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)*

GIREC programs will strengthen Gulf Coast economies and communities by promoting sustainable resource management, enhanced STEM education, and regional tourism. For every dollar invested in national parks there is a return of ten dollars in regional economic activity (NPCS 2011). GIREC will also increase UWF's profile, boosting student enrollment and faculty recruitment. Specific economic and social benefits include:

- Hands-on STEM educational opportunities tied to learning benchmarks
- Targeted STEM outreach to schools with a high-percentage of at-risk students
- Annual internships, student research grants, and STEM education workshops
- Directed research to improve coastal resource management
- Promotion of Gulf Coast tourism and increased national exposure for GIREC partners

(See attached GIREC proposal 1)

**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])*

GIREC research initiatives will be designed to support a flexible response to evolving issues with specific emphasis placed on (1) declining water quality, (2) fisheries and wildlife restoration, and (3) coastal flood protection. To strengthen existing water quality monitoring in the Pensacola Bay watershed the GIREC coordinator will work to establish a network of continuous, multi-parameter water quality monitors in Santa Rosa Sound and Pensacola Bay. GIREC will also work to promote the critical research needed to assess and manage threatened Gulf of Mexico coastal and estuarine populations, including the identification of essential habitat, accurate assessment of stock boundaries and stock abundance, and expected recovery time of impacted populations. To assist state and federal management agencies in overcoming the historic challenges of protecting vulnerable barrier islands, coastal dunes, beaches, and wetlands from frequent high-intensity storms, GIREC will prioritize the development of partnerships and funding to support research into regional sediment transport dynamics and coastal flood hazard mitigation. (See attached GIREC proposal 1)

**Public Acceptance:**

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

When discussed with agency administrators, managers, teachers, and the general public, the responses to the proposed project has been overwhelmingly positive, suggesting there will be strong public acceptance and engagement in GIREC programs.

**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](mailto:Restoration.Projects@dep.state.fl.us)

See attached GIREC proposal 1

## 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 |  |
|-------------|--|

**Subtotal:**

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

**TOTAL:**

|  |   |
|--|---|
|  | 0 |
|--|---|

**Estimated Costs by Year**

|        |  |
|--------|--|
| Year 1 |  |
| Year 2 |  |
| Year 3 |  |
| Year 4 |  |
| Year 5 |  |
| Year 6 |  |

# GIREC Proposal 1: SCIENCE PROGRAM DEVELOPMENT

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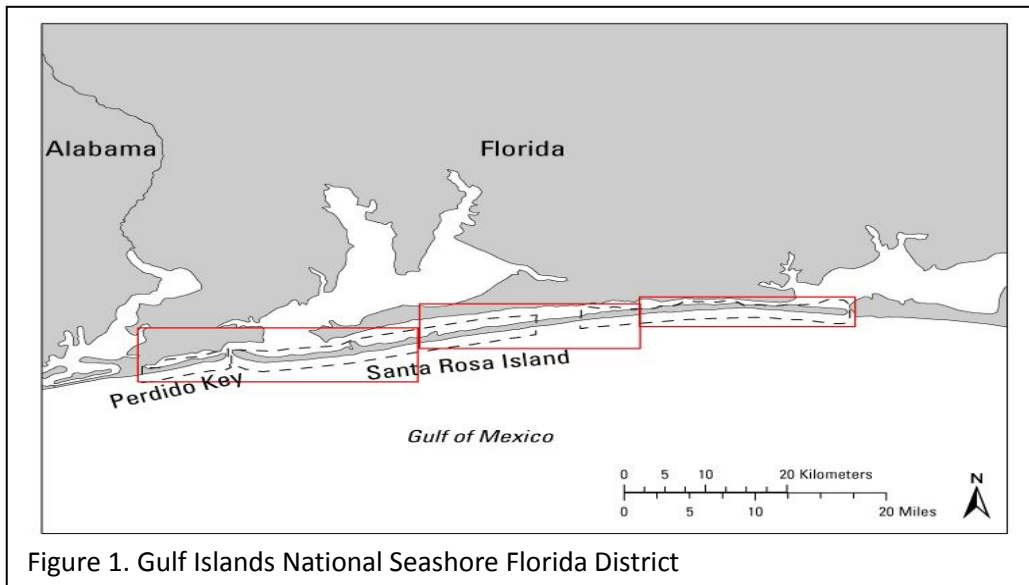
## Contact Information

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## Project Location

Gulf Islands National Seashore Florida District; Escambia, Okaloosa, and Santa Rosa Counties (Figure 1)



## **Gulf Islands Research and Education Center: A conservation, research, and science education partnership between Gulf Islands National Seashore and the University of West Florida**

### **Project Description**

The proposed project would provide essential base funding to support implementation of high-impact environmental research and STEM education programs for the new Gulf Islands Research and Education Center (GIREC).

GIREC represents an innovative partnership between the University of West Florida (UWF) and Gulf Islands National Seashore (GUIS) to better engage scientists, students, and the public in essential environmental research and science education. Together, UWF and GUIS are proposing to develop integrated research and education programs that will (1) support the conservation and restoration of Gulf Coast ecosystems impacted by the Deepwater Horizon oil spill, and (2) increase student access to high-quality, hands-on science education to promote student achievement and environmental stewardship. A separate proposal (GIREC Proposal 2: Facilities Construction and Operation) will be submitted to provide a permanent home for GIREC programs.

GIREC research initiatives will address some of the most pressing environmental issues affecting northern Gulf of Mexico marine and coastal ecosystems, including declining water quality, fisheries and wildlife conservation, and sand resource management. These efforts will provide the basic science needed to support effective and sustainable management of the region's private, state, and federal coastal lands, with an emphasis on the management needs of Gulf Islands National Seashore and the Universities property on Santa Rosa Island.

Through GIREC, UWF and GUIS will also work to promote high-impact STEM education. To meet this goal, GIREC research and education programs will be integrated to provide students and the public with the opportunity to work side by side with scientist conducting essential environmental research. Because not all students will be able to participate in GIREC directed research, GIREC and GUIS Education Specialists will develop standard-based science curriculum for students grades 6-12. Science curriculum will incorporate up-to-date research findings and schools with a high percentage of at-risk students will be prioritized for participation in GIREC programs.

To effectively support science based resource management and regional STEM education, we are requesting an endowment to provide critical base funding for GIREC programming. Annual returns on the endowment will be used to establish a Discover Science grants program to promote essential research, teacher training workshops, and student participation in GIREC programs. The endowment will also be used to hire a full-time coordinator and a STEM Education Specialist. The coordinator will work to leverage existing resources and to develop new funding to support GIREC programming. The Education Specialist will work with GUIS Interpretation and Education staff to design innovative, park-based STEM education programs that incorporate the natural resources and management challenges of

the region. Only with sustainable base funding will GIREC be able to grow into a nationally recognized Center for coastal research and environmental science education.

## The Partners

### *Gulf Islands National Seashore*

Gulf Islands National Seashore manages 160 miles of coastline from Cat Island Mississippi to Okaloosa Florida. The Seashore is the 9<sup>th</sup> most visited US national park with nearly 5 million visitors in 2012, and visitors to the Seashore are a major regional economic driver (Figure 2).

The Seashore is managed as both a nature preserve and an outdoor classroom for exploring the natural and human history of the Gulf of Mexico's barrier islands and coastal environments. The Seashore protects the habitats, breeding grounds, and migratory stop-over sites for more than 300 species of birds, and manages habitat for more than 106 animals, including six species of marine mammals, and ten species listed as threatened (t), endangered (e), or species of special concern (ssc). State or federally listed wildlife protected by the Seashore include the Perdido Key beach mouse (e), corn snake (ssc), gopher tortoise (ssc), piping plover (t), four species of sea turtles (e), american alligator (t), and the manatee (e). Essential coastal habitats under GUI management include barrier islands, beaches, dunes, wetlands, forests, seagrass beds, oyster reefs, and other submerged marine habitats, many of which provide essential nursery habitat for commercially important fish.



**Figure 2. Gulf Islands National Seashore provides critical nest sites for four species of endangered sea turtles, and turtle hatchings always an attraction.**

The GIREC partnership comes at a critical time for the Seashore. Impacts from the Deepwater Horizon oil spill as well as those from high-intensity storms, invasive species, and increased urbanization threaten the Seashore's resources, habitats, and species. GIREC research programs will promote the basic research needed to support science-based resource management and planning. Educational programming proposed for GIREC will facilitate the Seashore's efforts to move away from traditional interpretation programs towards goal based experiential and hands-on stewardship, citizen science, and environmental education. Together, GIREC programs will promote improved conservation and science education by strengthening connections between resource managers, researchers, and students.

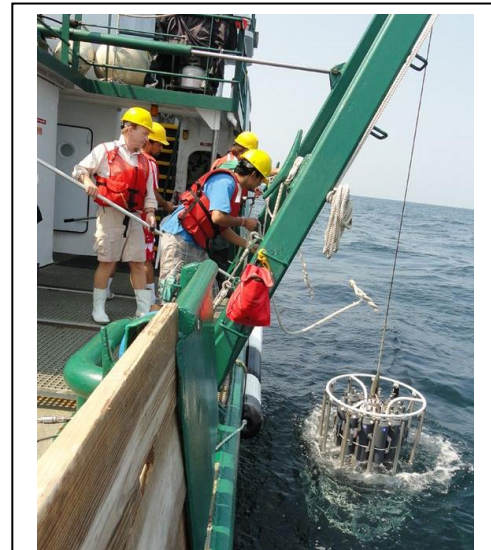
To support proposed GIREC research initiatives, GUI plans to hire a Ph.D. level marine biologist, a permanent biological technician, and seasonal biological technicians. Planned science based activities in part include the identification, protection, and restoration of all species within the Seashore that are listed under the Endangered Species Act. To support GIREC educational programming, the Seashore will hire a professional level education coordinator and two education technicians who will work directly

with the GIREC staff and area scientists to integrate current research into educational programming and to create opportunities for students to directly participate in scientific research.

### *University of West Florida*

The University of West Florida is a fast growing, comprehensive Research University with a current enrollment of nearly 13,000 undergraduate and graduate students. The University was the first school in the United States to feature a Marine Biology undergraduate major and marine biology and coastal research continue to be a major focus at the undergraduate and graduate levels. Annually, University faculty secure more than \$20 million in grants to support research and educational programs. In 2012 these included support for research from the National Science Foundation (NSF), National Oceanic and Atmospheric Administration (NOAA), National Institutes for Health (NIH), Department of Environmental Protection (DEP), Gulf of Mexico Alliance (GOMA), and the Gulf of Mexico Research Initiative's (GoMRI).

The University's excellence in environmental research is best exemplified by the Center for Environmental Diagnostics and Bioremediation (CEDB), which will coordinate development of GIREC research programs with faculty from UWF's Departments of Biology, Environmental Studies, and Archaeology. In the last eight years CEDB has been awarded more than \$18 million in research grants, resulting in 72 research publications with contributions to the fields of Estuarine and Marine Ecology, Biogeochemistry, Fisheries Biology, Environmental Restoration, Microbiology, and Environmental Toxicology. CEDB's research has played a critical role in early assessment of the impacts of the Deepwater Horizon oil spill (Figure 3), including monitoring for oil in GUIs, and research to characterize regional marine productivity (Deep Sea to Coast Connectivity in the Eastern Gulf of Mexico; Deep-C) and biodiversity (Center for Integrated Modeling and Analysis of Gulf of Mexico Ecosystems; C-Image).



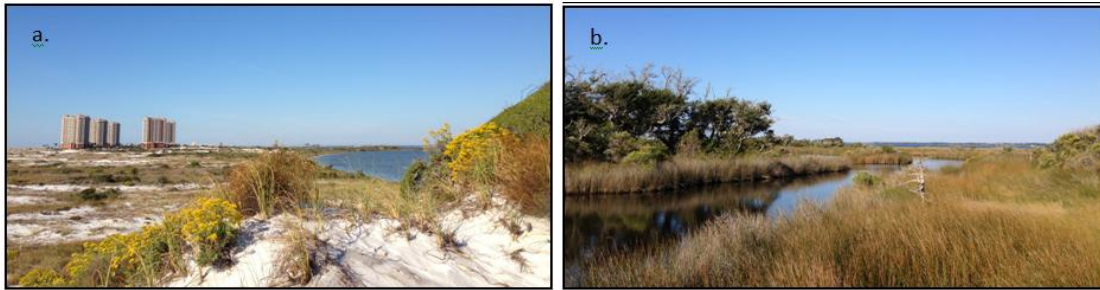
**Figure 3. UWF students and faculty conducting research to investigate the impacts of the Deep Water Horizon oil spill.**

CEDB faculty and affiliate researchers have a long-history of conducting the basic science required to support effective science-based natural resource management. Some recent examples include:

- Synthesis of water quality data for Gulf of Mexico coastal parks
- Acoustic tracking of coastal fishes
- Assessing the restoration success of transplanted seagrass
- Tracking post-hurricane dune vegetation recovery
- Characterizing the impacts of storm surge flooding on coastal water quality
- Measuring the economic benefits of artificial reefs

This work reflects a fundamental emphasis on using modern research methods to better understand and manage marine and coastal systems. With regional, state, and federal partners CEDB will work to promote development of GIREC into a nationally recognized center for coastal research and education.

Support for GIREC will also aid the University in its management of 152 acres of undeveloped barrier island habitat on Santa Rosa Island, located between the heavily developed Portofino Island Resort and the protected GUI Santa Rosa Area. The diversity of habitats on the property includes fore and back dunes, swales, maritime and flatwood forest, marshes, and tidal creeks (Liebens 1998; Figure 4).



**Figure 4. UWF's Santa Rosa Island property. A. Looking west towards Portofino Island Resort. B. Tidal creeks connected to Santa Rosa Sound.**

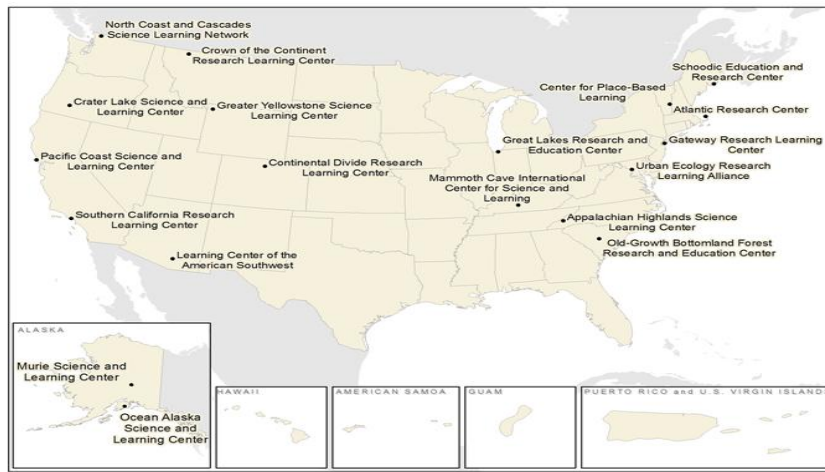
Along Santa Rosa Sound there is an extensive tidal creek and sand bar system that supports a diverse community of nesting and feeding birds such as coots, loons, ducks, and shorebirds including endangered piping plovers (Liebens 1998). The tidal creeks and adjacent seagrass meadows are important nursery ground for many fish, including popular commercial and sport fish (Heck et al. 2003). Along the Gulf of Mexico, a nearly continuous dune ridge provides a critical barrier to storm-induced shoreline erosion, and essential nesting habitat for four species of endangered sea turtles and the endangered Santa Rosa Beach Mouse.

### **Connecting Students, Scientists, and Resource Managers**

Support for GIREC base funding will help to promote development of an integrated, collaborative approach to long-term Gulf of Mexico marine and coastal conservation and environmental education by (1) directing research to high-priority resource management issues; (2) promoting greater interaction between students, scientists, and resource managers; and (3) by providing high-impact STEM educational opportunities for area students.

Nineteen National Park Service Research Learning Centers (RLCs) have been established to promote research and education opportunities within each of the nation's unique eco-regions; however, none of the existing RLCs serve the National Parks located along the Gulf of Mexico (Figure 5). The overall objective of RLCs is to support the mission of US National Parks by facilitating research within the parks and by integrating research findings into park resource management and educational programs. Each year national RLCs in collaboration with partner institutions involve thousands of scientists and tens of thousands of students in park-based research. In 2012 these efforts resulted in over 200 peer-reviewed scientific publications and more than 90 reports supporting sustainable resource management. Research Learning Centers also regularly host in-park workshops, seminars, and symposia to develop regional

scientific expertise and bring current scientific information to resource managers, science educators, and the public.



**Figure 5. Location of the 19 Research Learning Centers (US Dept. of Interior graphic)**

Established in 2002, the Southern California RLC (SCRLC) provides an informative example of the contribution research learning centers can make to regional environmental research and educational programming. The SCRLC currently includes more than 70 education and research partnerships, and 36 individual funding partnerships. Together these partnerships have allowed the SCRLC to develop innovative programs to support the Park's conservation initiatives and to promote science education in regional schools. Recent examples of the SCRLC supported projects include technology training workshops for teachers, urban minority service learning, and more than a dozen Citizen Science resource inventory and monitoring projects (Figure 6). In 2010, hundreds of students from across southern California participated in SCRLC programs that included contributions by more than 30 scientists. At the same time more than 200 people participated in Citizen Science projects, and 35 students conducted independent research within the park. Work supported by the SCRLC resulted in 25 peer reviewed research papers with contributions to resource management within the park and adjacent lands. The successful model for integrating research and educational programs demonstrated by the SCRLC and other RLCs will be implemented at GIREC to improve resource management and STEM education across the northern Gulf.



**Figure 6. 2010 SCRLC Urban Minority Service Learning Program.**

GIREC reflects UWF and GUI's shared commitment to establish state-of-the-art research and education programs focused on the natural and cultural resources of Gulf Islands National Seashore and northern Gulf of Mexico. GIREC will be promoted nationally to encourage research, symposia, and workshops related to Gulf Coast resource management, k-12 teacher training, citizen science and service learning. Resident and visiting scientists will contribute valuable expertise to the management of Seashore's

natural and cultural resources, and will expand education opportunities for students from communities in West Florida, Alabama, and Mississippi. GIREC will particularly benefit at-risk students by increasing opportunities for hands-on STEM based learning that integrates technology and field science.

### **Integrating Research and Education Programs**

GIREC will bring science and Education Specialists from UWF and GUIS together with regional and national partners to develop comprehensive, integrated research and educational programs focused on the unique habitats, species, and natural resources of the northern Gulf. The core goal of the programs will be to engage scientists, students, and the public in research to support effective management of the regions coastal resources, habitats, and species. Programs will be designed to support a flexible response to evolving issues with specific emphasis placed on developing research and education programs to address (1) declining water quality, (2) fisheries and wildlife restoration, and (3) coastal flood protection. In each case scientists will partner with GIREC and GUIS Education Specialists to create opportunities for students and the public to directly participate in research. GIREC staff will also work with partner agencies from across the region to enhance the value of existing and proposed research programs to the Seashore, UWF, and the region. Regional partners include the Florida Public Archaeology Network which has agreed to assist with development and implementation of educational programming highlighting the history of natural resource use along the northern Gulf Coast.

#### *Water Quality*

To strengthen existing water quality monitoring in the Pensacola Bay watershed the GIREC Coordinator work to establish a network of multi-parameter water quality monitors in Santa Rosa Sound and Pensacola Bay (Figure 7). Following National Water Quality Council recommendations water quality measures including chlorophyll, turbidity, and total nitrogen will be continuously tracked in real-time.



**Figure 7. Continuous multi-parameter water quality monitoring buoy.**

The resulting data will help identify water quality issues and will improve water quality management. To improve public awareness of water quality issues funding will be sought to incorporate live streaming water quality data into an interpretive display in the GUIS Visitor Center. An internet accessible Water Quality Portal will also be established to allow fisherman to determine safe times and locations to fish. To promote a collaborative whole watershed approach, the GIREC Coordinator will work with federal and state agencies to support integration of data from the GIREC water quality monitoring network with data from multiple sources to provide

a coherent assessment of the condition of and trends of regional coastal and estuarine water quality. The resulting combined measures of water quality will improve the information available to researchers and resource managers, including in the NPS Vital Signs Inventory and Monitoring Program Vital, EPA Integrated Water Quality Assessment, and Florida DEP's Regional Water Quality Monitoring Councils.

### *Fisheries and Wildlife Restoration*

GIREC will promote the critical research needed to assess and manage threatened Gulf of Mexico coastal and estuarine populations. Together with collaborators from across the country, UWF and CEDB faculty will work to enhance existing regional research programs and to develop new research initiatives focused on identifying the key factors responsible for the maintenance and restoration of northern Gulf of Mexico fisheries and threatened coastal populations. Priority issues include identification of essential habitat, accurate assessment of stock boundaries and stock abundance, and expected recovery time of impacted populations. Partnerships currently being developed as part of the GIREC Conservation Biology program include NOAA National Marine Fisheries Service (NMFS; Figure 8; “Characterization of shark pupping and nursery habitat in Northwest Florida”), the University of Miami (“Assessing the impact of ocean currents on the resilience of northern Gulf Coast estuarine fish populations”), and NPS Inventory and Monitoring Program (“Diversity and distribution of coastal reptiles and amphibians”).



**Figure 8. NOAA Gulf of Mexico Shark Pupping and Nursery survey.**

### *Coastal Flood Protection*

To assist state and federal management agencies in overcoming the historic challenges of protecting vulnerable barrier islands, coastal dunes, beaches, and wetlands from frequent high-intensity storms, GIREC will prioritize the development of partnerships and funding to support research into regional sediment transport dynamics and coastal flood hazard mitigation. Recent research has demonstrated significant degradation of barrier island habitats in the northern Gulf due to ineffective management of sediment resources, including land-loss related to channel maintenance and disruption of natural along shore sediment transport (Morton 2008). GIREC supported research will build off the technical framework presented in the Gulf of Mexico Alliance Gulf Regional Sediment Management Master Plan (Martin 2009) to establish guidelines for the effective management of sediment resources within the Seashore and across the region, including the successful integration of dredging and beach renourishment projects into the natural geomorphological processes. Development of sediment management guidelines for GUIs will make the application of federal and state restoration funds more efficient, and will improve coastal community resiliency and protection.

### *Hands-on STEM education*

A focus for GIREC outreach will be elementary and secondary schools from across the region that serve primarily minority and low social economic status (SES) communities. Dropout rates are high and levels of achievement are low in these communities (Rumberger 1995); however, because of funding constraints few opportunities currently exist for off campus experiential learning activities, which have been shown to improve student learning and engagement in course material.

In Escambia County, schools with the highest minority enrollment, 40 to 45% of students failed to graduate (Florida Department of Education 2011). Of those graduating, less than 25% will attain a college degree (Ryan and Siebens 2012). Low high school and college graduation rates decrease the chances of finding a job and increase the likelihood of being poor and relying on public assistance (Rumberger 2011). Strategies identified to increase student retention and progression on to higher education include increasing school-community collaborations to provide students with meaningful experiential learning opportunities (Cantor 1997). As the extent of experiential learning increases so does student engagement in the material, class attendance, and overall achievement (Felder et al. 1998).

Discussions are underway with Escambia County Science Specialist Kim Walden and Santa Rosa County Mathematics and Science Coordinator Wesley Underwood to develop annual teacher training workshops and a comprehensive science educational program for GIREC that meets current educational benchmarks. The goal of GIREC educational programs will provide students with engaging hands-on experience with the tools and methods commonly used in environmental science. To increase at-risk student achievement and STEM education, the GIREC Discover Science grants program will provide funding to cover student transportation costs associated with participation in GIREC programs. The grants program will also be used to support up to six student research internships each year. Interns will work side by side with UWF and GUIS scientists collecting data to promote the conservation and protection of vulnerable coastal ecosystems.

#### *Citizen science*

GIREC will prioritize development of a Citizen Science program to engage volunteers of all ages, many with little or no prior scientific training, in collecting data related to important regional environmental issues (Figure 9). Citizen Scientists gain a greater sense of environmental stewardship and a deeper knowledge about the natural resources in their community, while contributing valuable information to assist in natural resource management. Levels of participation in the GIREC Citizen Science program will vary between projects and individuals depending on their interests, but in each case participants will gain a better understanding of the scientific process and the challenges of successfully managing natural resources in the face of increasing impacts.

Because funding constraints have historically limited the scope of GUIS' research and monitoring programs, increased community participation in research can play an important role in generating the data needed to effectively plan management actions. Some of the programs being developed for GIREC Citizen Scientists include research to improve seagrass and oyster reef habitat restoration, and field studies to better understand the potential impacts of climate change on estuarine and coastal communities. GIREC Citizen Scientists will also have an opportunity to work with scientists from the



**Figure 9. Citizen Scientist conducting a survey of seagrass habitat.**

NPS Inventory and Monitoring Program on multi-park projects designed to identify invasive species and monitor ecologically critical communities, including: insects, amphibians, and reptiles.

### Estimated Project Cost (\$12 M)

GUIS and UWF are proceeding in laying the administrative foundation for the GIREC partnership. This request is for a \$12 million endowment to provide the critical base funds GIREC needs to grow into a nationally recognized center for Gulf of Mexico coastal, estuarine, and marine research and science education.

Expected annual endowment returns of 3% will be used to support the GIREC Discover Science grants program, as well as the GIREC Coordinator and STEM Education Specialist. The Discovery Science grants program will provide competitive awards to promote research and improved STEM education. Grants will be provided in the form of student internships, seed funding for essential research, travel support for visiting students and scientists, teacher training workshops, and STEM participation grants to increase at-risk student participation in high-impact hands-on learning.

**Table 2. Estimated annual expenses for GIREC Discover Science grants program (A) and endowed positions (B).**

A.

| GIREC Discover Science grants program              | Expected annual awards | Award amount       |
|----------------------------------------------------|------------------------|--------------------|
| Student research internships                       | 6                      | \$5,000 - \$13,000 |
| Applied research seed grants                       | 6                      | \$2,000 - \$10,000 |
| Travel grants for visiting students and scientists | 8                      | \$1,000 - \$2,000  |
| STEM teacher training workshops                    | 3                      | \$3,000 - \$5,000  |
| STEM education participation grants                | 20                     | \$500 - \$1,000    |

B.

| Endowment supported positions | Estimated annual expense |
|-------------------------------|--------------------------|
| GIREC grants coordinator      | \$102,000                |
| STEM Education Specialist     | \$53,000                 |

### Other Funding

The requested base funding for GIREC will foster the development of a grant supported research and education program, enhancing regional environmental research, stewardship, and STEM education. A separate proposal (GIREC Proposal 2: Facilities Construction and Operation) will be submitted to provide a permanent home for GIREC programs.

The NPS has initiated hiring for new GUIS Interpretative and Education staff who will work with GIREC to develop innovative STEM based educational programs that provide students hands-on experience with the tools and methods of environmental science. UWF has provided an initial two years support for a Project Coordinator to facilitate development of the Center.

The Florida Public Archaeology Network has agreed to assign one intern to assist in the development and implementation of educational programs that highlight the historic interactions between humans and the environment within the Gulf Coast region. This work builds off of FPANs effective engagement of the public and student groups in research and cultural resource stewardship. FPAN staff will help to incorporate a historical perspective of Gulf Coast resource use into interactive exhibits for the new Gulf Islands Discovery Center, educational programs for visiting students, and educational materials including lessons and videos. FPAN will also assist with establishing teacher workshops focused on the Seashore's archaeology and biology, and training workshops in cultural and natural resource protection for park rangers, city/county land managers, and law enforcement.

### **Technical Feasibility**

Development of GIREC will be aided by support from the national network of RLC partners, which include hundreds of universities, K–12 schools, non-profit organizations, community groups, agencies, and a range of NPS programs. By engaging partners in park-based research, scholarship, and educational activities GIREC will be able to leverage in-kind funding and support for research and educational programming. As an example, the Coastal Southern California Science and Learning Center was established in 2002 as a virtual center with no dedicated facilities. By 2010 they had developed over 70 research and education partnerships and 36 funding partnerships supporting an annual budget of just over \$250,000.

### **Environmental Benefits**

GIREC supported research will promote long-term sustainable management of the region's coastal, estuarine, and marine habitats by providing a scientific foundation for resource management, public outreach, and educational activities both inside and outside of the Seashore. GIREC programs will be designed to support a flexible response to evolving resource issues, with specific emphasis on water quality, fisheries and wildlife restoration, and coastal flood protection (see above "Integrated Research and Education Program"). The GIREC Education Program will emphasize hands-on STEM education focused on the region's unique natural and cultural resources.

Specific GIREC environmental benefits include:

- Directed research to improve fisheries and wildlife management
- Improved coastal sand management and coastal flood protection
- Continuous water quality monitoring in Santa Rosa Sound and Escambia Bay
- Enhanced environmental science education and training
- Development of Citizen Science and Environmental Stewardship programs
- Construction of a Water Quality Portal to provide real-time water quality data to the public

### **Environmental Impacts**

There are no known significant environmental impacts from planned GIREC research and education programming. While individual research projects may result in modest impacts to study species or

habitats, each project is required to go through a multi-tiered review process prior to project initiation. As a result, the efficacy and potential impacts of each GIREC research project will be reviewed by the Florida Fish and Wildlife Conservation Commission and the National Park Service. Projects including vertebrate animals will as well need to receive approval from both the NPS and UWF Institutional Animal Care and Use Committee which ensures the use of best research practices.

### **Economic and Social Benefits**

Support for GIREC programs will strengthen Gulf Coast economies and communities by promoting research to support the sustainable management of Gulf Coast resources, and by providing enhanced learning for students and the public. GIREC will as well enhance the Seashore as a national ecotourism and citizen scientist destination; for every dollar invested in national parks there is a return of ten dollars in regional economic activity (NPCS 2011). GIREC will also increase UWF's profile, in turn boosting student enrollment and faculty recruitment.

Specific economic and social benefits of the GIREC will include:

- Hands-on STEM educational opportunities tied to learning benchmarks for regional schools
- Targeted STEM outreach to schools with a high-percentage of at-risk students
- Increased experiential learning opportunities for regional University and College students
- Annual internships and student research grants
- STEM training workshops for area teachers
- Directed research to improve coastal resource management
- Increased national exposure for UWF and regional GIREC partners
- Promotion of Gulf Coast tourism through national parks and NPS Research Learning Centers.

### **Community Resilience**

Community and ecological resilience are tightly linked (Adger 2000). GIREC will promote community resilience by supporting sustainable resource use and conservation through direct research and improved environmental education. For natural systems, sustainability decreases as ecological stressors increase (Adger 2006). GIREC will address prevalent regional stressors through support for scientists and students conducting research on Gulf of Mexico coastal, estuarine, and marine systems. Examples of proposed GIREC initiatives with direct benefits to sustainable resource use are detailed above (see "Environmental Benefits").

Indirectly, the GIREC will support improved resilience for communities across the northern Gulf Coast by promoting greater STEM education and environmental stewardship through in-park activities, educational field trips, volunteering opportunities, and K-12 outreach. STEM based environmental education activities and materials will be developed by GIREC and NPS Educational Specialists in collaboration with resident and visiting scientists. Through GIREC students will gain valuable experience with current scientific methods and equipment, and will in turn be better prepared for academic success. The most promising students will be encouraged to conduct independent research through GIREC Internship and Grants program. Student led projects at other RLCs have made important

contributions to natural resource management. Some examples include tracking pollution levels in local rivers and restoring habitat for threatened and endangered species.

### **Compliments to Existing Efforts**

The mission of GIREC to facilitate research and education with a focus on regionally important ecological resources and issues is directly in-line with UWF and NPS public service mandates. Base support for GIREC would strongly compliment existing programs at both institutions. GIREC will integrate and manage a research program for scientists and students from UWF and across the country. This activity would provide a scientific foundation for improved regional resource management, public outreach, and educational activities. GIREC programs would offer distinctive learning opportunities for students of all ages, enhance community engagement for UWF and NPS staff, support the development of high-quality services and infrastructure, foster recruitment of dedicated high-quality staff and scientists, and address pressing regional environmental and social issues.

Support for GIREC will as well compliment and promote existing research, monitoring, and science education programs at partner organizations. Collaborations are being built with regional universities, colleges, state and federal agencies, and non-governmental organizations to ensure successful coordination of efforts. Developing collaborations include the US EPA lab in Gulf Breeze, NOAA National Marine Fisheries Service, US Fish and Wildlife, Florida Department of Environmental Protection (DEP), University of Miami, Florida State University, University of Southern Mississippi, and Escambia and Santa Rosa County School Districts.

### **Compliance with Laws and Regulations**

State and Federal environmental regulations will be followed in all GIREC research and education programs (see Environmental Impacts above).

### **Readiness for Implementation**

Once base funding is secured the partners will immediately initiate GIREC research and education program development and implementation.

### **Public Acceptance**

When discussed with agency administrators, managers, teachers, and the general public, the responses to the proposed project has been overwhelmingly positive, suggesting there will be strong public acceptance and engagement in GIREC programs.

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