

# Golden Triangle Marsh Creation

## RESTORE Proposal Coastal Protection & Restoration Authority

### I. Summary Sheet

#### Appendix A: Council Member Applicant and Proposal Information Summary Sheet

<b>Council Member:</b> State of Louisiana	Point of Contact: Jerome Zeringue
	Phone: (225) 342-7669
	Email: Jerome.Zeringue@LA.GOV
<b>Project Identification</b>	
Project Title: Golden Triangle Marsh Creation	
State(s): Louisiana	County/City/Region: Orleans and St. Bernard Parishes, Southeastern Louisiana
Specific Location: <i>Projects must be located within the Gulf Coast Region as defined in RESTORE Act. (attach map or photos, if applicable)</i> Please see attached.	
<b>Project Description</b>	
<b>RESTORE Goals:</b> <i>Identify all RESTORE Act goals this project supports. Place a P for Primary Goal, and S for secondary goals.</i>	
<input checked="" type="checkbox"/> Restore and Conserve Habitat	<input checked="" type="checkbox"/> Replenish and Protect Living Coastal and Marine Resources
<input checked="" type="checkbox"/> Restore Water Quality	<input checked="" type="checkbox"/> Enhance Community Resilience
<input checked="" type="checkbox"/> Restore and Revitalize the Gulf Economy	
<b>RESTORE Objectives:</b> <i>Identify all RESTORE Act objectives this project supports. Place a P for Primary Objective, and S for secondary objectives.</i>	
<input checked="" type="checkbox"/> Restore, Enhance, and Protect Habitats	<input checked="" type="checkbox"/> Promote Community Resilience
<input checked="" type="checkbox"/> Restore, Improve, and Protect Water Resources	<input checked="" type="checkbox"/> Promote Natural Resource Stewardship and Environmental Education
<input checked="" type="checkbox"/> Protect and Restore Living Coastal and Marine Resources	<input checked="" type="checkbox"/> Improve Science-Based Decision-Making Processes
<input checked="" type="checkbox"/> Restore and Enhance Natural Processes and Shorelines	
<b>RESTORE Priorities:</b> <i>Identify all RESTORE Act priorities that this project supports.</i>	
<input checked="" type="checkbox"/> Priority 1: Projects that are projected to make the greatest contribution	
<input checked="" type="checkbox"/> Priority 2: Large-scale projects and programs that are projected to substantially contribute to restoring	
<input checked="" type="checkbox"/> Priority 3: Projects contained in existing Gulf Coast State comprehensive plans for the restoration ....	
<input checked="" type="checkbox"/> Priority 4: Projects that restore long-term resiliency of the natural resources, ecosystems, fisheries ...	
<b>RESTORE Commitments:</b> <i>Identify all RESTORE Comprehensive Plan commitments that this project supports.</i>	
<input checked="" type="checkbox"/> Commitment to Science-based Decision Making	
<input checked="" type="checkbox"/> Commitment to Regional Ecosystem-based Approach to Restoration	
<input checked="" type="checkbox"/> Commitment to Engagement, Inclusion, and Transparency	
<input checked="" type="checkbox"/> Commitment to Leverage Resources and Partnerships	
<input checked="" type="checkbox"/> Commitment to Delivering Results and Measuring Impacts	
<b>RESTORE Proposal Type and Phases:</b> <i>Please identify which type and phase best suits this proposal.</i>	
<input checked="" type="checkbox"/> Project <input checked="" type="checkbox"/> Planning <input type="checkbox"/> Technical Assistance <input type="checkbox"/> Implementation <input type="checkbox"/> Program	
<b>Project Cost and Duration</b>	
<b>Project Cost Estimate:</b>	<b>Project Timing Estimate:</b>
<b>Total:</b> \$4,347,733	Date Anticipated to Start: 09/2015
	Time to Completion: 3 months / years
	Anticipated Project Lifespan: 20 years

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## **II. Executive Summary**

The Golden Triangle Marsh Creation project's objective is to restore and protect wetland, fish, and wildlife habitat and help maintain landscape integrity and enhance community resilience. The Golden Triangle is a narrow band of brackish marsh directly east of New Orleans between Lake Borgne and the confluence of the Mississippi River Gulf Outlet and the Gulf Intracoastal Waterway. The Inner Harbor Navigation Canal – Lake Borgne Surge Barrier stretches across the Golden Triangle Marsh, so these wetlands are an important natural buffer in the multiple lines of defense protecting geographically and socially vulnerable communities in the city of New Orleans from storm surge. In addition, the Golden Triangle Marsh falls within Bayou Sauvage National Wildlife Refuge acquisition boundary, one of the last remaining marsh areas adjacent to Lakes Pontchartrain and Borgne (U.S. Fish and Wildlife Service 2009). It is the largest urban National Wildlife Refuge, as it falls within the city limits of New Orleans. The refuge includes fresh and brackish marshes, coastal hardwood forest, and serves as valuable wildlife, fish, and shellfish habitat. Because of its close proximity to New Orleans and the Bayou Sauvage National Wildlife Refuge, the Golden Triangle Marsh Creation project will provide an opportunity to promote natural resource stewardship and environmental education and outreach.

The Golden Triangle Marsh Restoration Project will be constructed by hydraulically dredging and pumping sediment from Lake Borgne approximately 16 miles to the designated fill site. The fill site is approximately 600 acres. The slurry fill will be constructed to an elevation of +2 feet. The borrow area currently has a depth of -10 feet and will be dredged to a depth of -30 feet and consists mostly of clays and silts. Earthen containment dikes will be constructed to facilitate the construction of the marsh. A cutterhead suction dredge will likely be utilized to construct this project and up to three booster pumps may be required. As stated above, Lake Borgne is currently the most cost effective borrow site for the project. However, other borrow sources (i.e. Mississippi River, offshore deposits, etc.) may be identified through a comprehensive planning and feasibility effort. The timeline for this project is three years for engineering and design and permitting, followed by four years of construction.

Measures of success for the Golden Triangle Marsh Creation project include wetlands and wildlife habitat restoration, as well as increased environmental education and outreach for the public in nearby New Orleans. At the project-scale, performance measures will track the progress towards meeting management goals and objectives. When monitored over time, performance measures can help reduce uncertainty surrounding predictive models and inform whether intended results are being achieved or if additional actions are needed to fulfill program expectations. In addition, performance measures can also be used to inform the public of the system's response to management actions. Defining the health of a system is inherently complex, however, and requires a systematic approach to develop a manageable list of metrics that can be quantified and monitored over time (The Water Institute of the Gulf, 2013).

CPRA is currently working with the Water Institute of the Gulf to more fully develop a System-Wide Assessment and Monitoring Program (SWAMP) that will bring existing monitoring and

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assessment programs under one comprehensive umbrella in an effort to avoid duplication and improve efficiency. SWAMP is envisioned to be a scalable program that will allow for data assessments to be completed at the project-, basin-, and program-scales. Individual projects will generate monitoring plans which will nest within the larger SWAMP framework and will allow for periodic assessment of project performance against performance expectations.

The largest single environmental uncertainty in planning and implementing restoration projects in south Louisiana is accounting for the potentially high, and highly variable, rates of relative sea level rise (RSLR). For marsh creation projects, maximum ecological benefits result when dredged sediments and the underlying native soils compact to where the marsh surface achieves intertidal elevation after a few years. Underestimating RSLR can result in a marsh surface that sinks below intertidal elevations and thus reverts to open water earlier than intended. In contrast, overestimating RSLR can result both in the overspending of limited funds during construction and in excessive sediments being placed on the marsh so that the marsh surface does not compact into intertidal elevations, reducing the ecological utility of the created habitat. For the Golden Meadow Marsh Creation Project, uncertainty also surrounds the ever-increasing costs for dredging actions and with the temporal availability of coarse-grained sediments (i.e. sand) from the options for material borrow, namely the Mississippi River and the Black Warrior and Tom Bigbee River system in Alabama.

### **III. Proposal Narrative**

#### **1. Introduction and Background**

Enacted in July 2012, the Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act (RESTORE Act) established the Gulf Coast Ecosystem Restoration Council (Council), and tasked the Council with developing a comprehensive plan for restoration of the Gulf Coast's ecosystem and economy. Overarching goals of this plan are to: restore and conserve habitat; restore water quality; replenish and protect living coastal and marine resources; enhance community resilience; and restore and revitalize the Gulf economy (Gulf Coast Ecosystem Restoration Council 2013). These comprehensive goals require large-scale projects that have a commensurate level of ecosystem benefits and far-reaching effects, particularly when combined with complementary projects as part of a coordinated program. The State of Louisiana, in response to an ongoing coastal land loss crisis, has identified a large number of projects in its Comprehensive Master Plan for a Sustainable Coast (Master Plan) (2012) that align with the Council's aforementioned goals for comprehensive restoration. These projects have been rigorously studied, analyzed, and publicly vetted; and will significantly contribute to the restoration and protection of the Gulf Coast region and the more inclusive Gulf of Mexico Large Marine Ecosystem. Restoring the Gulf from the 2010 Deepwater Horizon oil spill is an especially significant issue for Louisiana which has suffered and continues to suffer the greatest impacts from that disaster.

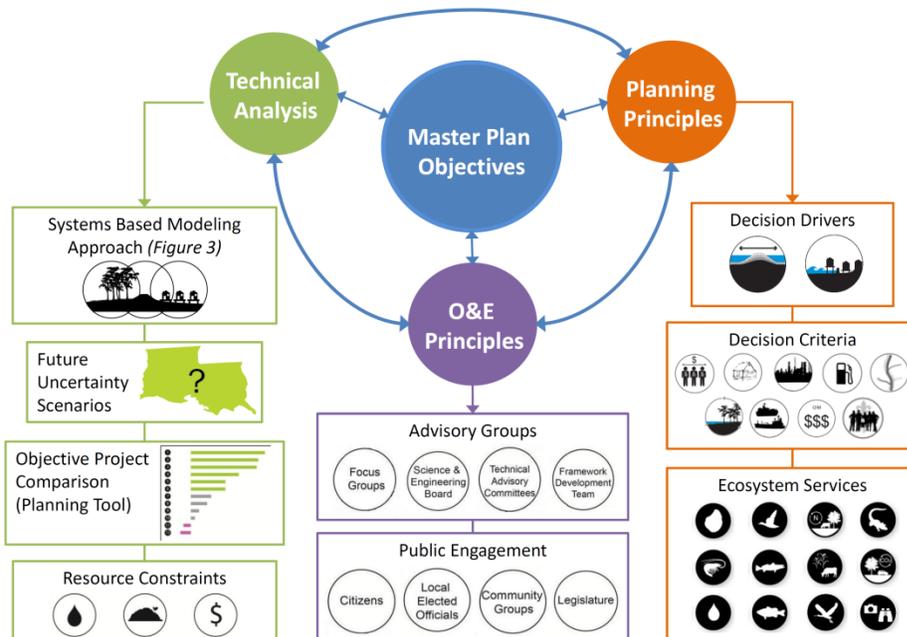
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### CPRA Coastal Master Plan

The Coastal Protection and Restoration Authority (CPRA) developed a robust decision-making process to ensure that formulation of the 2012 Coastal Master Plan (Master Plan) relied on the best science and technical information available, while still incorporating an extensive public outreach campaign. The process was guided by clearly-articulated objectives developed for the 2007 Master Plan and by planning principles developed to aid in meeting those objectives. The objectives were clearly defined to reflect key issues affecting communities in and around Louisiana's coast:

1. Reduce economic losses from storm surge flooding,
2. Promote a sustainable coastal ecosystem by harnessing the natural processes of the system,
3. Provide habitats suitable to support an array of commercial and recreational activities coast wide,
4. Sustain the unique cultural heritage of coastal Louisiana, and
5. Promote a viable working coast to support regionally and nationally important businesses and industries.



**Figure 1. The decision-making process is a complex interaction of input and feedbacks between a technical analysis, outreach and engagement (O&E) and planning principles. The overall goal of the Master Plan is defined by the objectives. The systems-based modeling approach, future uncertainty scenarios, planning tool and resource constraints all contribute to the technical data needed for the decision-making process. The planning principles and formulation involve decision drivers, decision criteria and ecosystem services metrics, as described in the methods section, which help determine the plan's ability to meet the objectives. The O&E strategy was designed to ensure public input and acceptance throughout the decision-making process and multiple groups were involved in defining and reviewing the technical analysis and plan formulation (Peyronnin et al. 2013).**

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### **Evaluating Projects**

The purpose for the 2012 Coastal Master Plan was to identify coastal protection and restoration projects that would improve the lives of coastal residents by creating a more resilient south Louisiana. Achieving this goal required new tools that helped us better understand our coast and how projects could provide benefits. The coast is a complex system. We needed to better understand how it is changing today and the kinds of changes we can expect in the future. We also had hundreds of project ideas and different views about how to move forward, and needed a way to sort through our many options and find those that would work best for us.

To meet these needs, CPRA used a systems approach to coastal planning and a science-based decision making process that resulted in a plan that was both funding- and resource- constrained. These tools helped us understand the practical implications of different project options and how gains in one area might create losses in another. Based on the preferences we wanted to explore, our tools helped identify strategies for investing in coastal protection and restoration projects. This analysis improved our understanding of how projects were affected by: our budget and the river water and sediment that we have to work with. We also used the tools to consider possible future coastal conditions that could affect the way our projects operate, along with other factors such as construction time.

### **The Predictive Models**

The 2012 Coastal Master Plan analyzed both protection and restoration measures, which influenced the models we selected and how they work. To estimate risk reduction outcomes, we used models that evaluated storm surge and the risk of expected annual damages. To estimate restoration outcomes, the models looked at how land changes throughout the coast—where land is building and where it is disappearing. These models examined how water moves through the coastal system as well as how salt and fresh water affect vegetation and habitats for key species and ecosystem services.

The integrated suite of Predictive Models developed for the Master Plan assessed how Louisiana's coastal landscape may change and how much damage communities may face from storm flooding over the next 50 years if we take no further action and for comparison then assessed how the coastal ecosystem and our level of risk could change if certain risk reduction and restoration projects are constructed. The models incorporated what we know about the way the coast works, and they made it easier to identify projects that best achieve our objectives.

Ecosystem services are benefits that the environment provides to people. In Louisiana, these range from providing the right habitats for oysters and shrimp to nature-based tourism. We could not detail the economic aspect of ecosystem services in our analysis. Instead, we focused on proxy characteristics of the coast, such as provision of habitat (i.e. habitat suitability indices) and other factors that can support ecosystem services.

The Predictive Models used in the Master Plan were organized into seven linked groups (Figure 2), involving the work of over 60 scientists and engineers. Each group worked on a different aspect of how the coastal system changes over time. Our effort was based on existing models where they were appropriate. New models were developed for vegetation, nitrogen uptake,

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barrier shorelines, flood risk, and to reflect potential for nature based tourism, fresh water availability, and support for agriculture/ aquaculture.

The models were designed to work together, following the precedent set by earlier State planning efforts, such as the Coastal Louisiana Ecosystem Assessment and Restoration (CLEAR) work conducted for the Louisiana Coastal Area Study (Nuttie et al., 2004; USACE, 2004). We also found new ways to link the expanded set of models to more fully capture how the coast works as a system. The level of modeling in the 2012 Coastal Master Plan was a significant technical achievement in the systems approach, the linked nature of the models, and in the breadth of subjects evaluated.

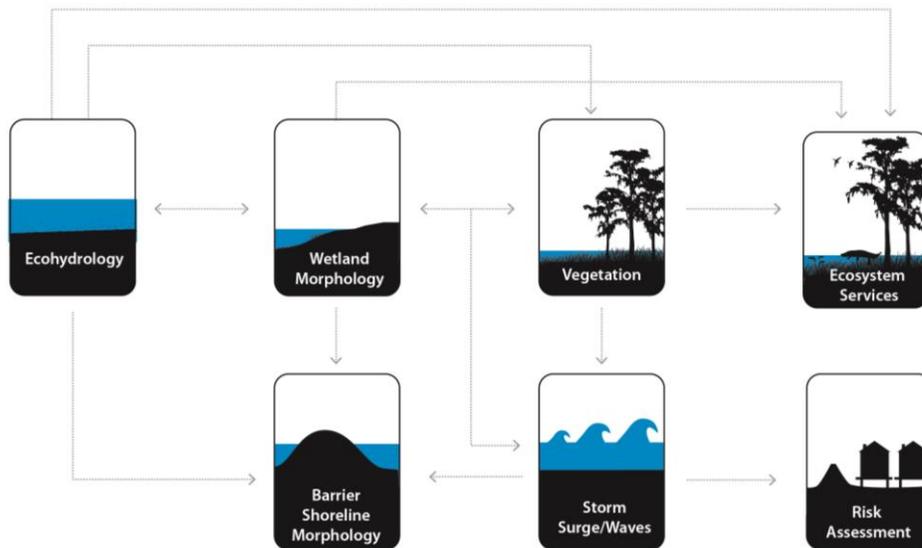


Figure 2. 2012 Master Plan predictive model groups (Meselhe et al. 2013, Couvillion et al. 2013, Visser et al. 2013, Nyman et al. 2013, Cobell et al. 2013, Johnson et al. 2013).

### Future Environmental Scenarios

Many factors that will have a profound effect on the future of Louisiana's coast cannot be easily predicted or are outside of our control. These include factors such as subsidence and the levels of nutrients in the river, as well as the effects of climate change, such as sea level rise, changes in rainfall patterns, and storm frequency and intensity. Climate change was central to our analysis, given coastal Louisiana's vulnerability to increased flooding and the sensitivity of its habitats.

To account for these factors when developing the Master Plan, we worked with experts to develop two different sets of assumptions or scenarios. These scenarios reflect different ways future coastal conditions could affect our ability to achieve protection and build land:

- **Moderate scenario - assumed limited changes in the factors on the facing page over the next 50 years.**
- **Less optimistic scenario - assumed more dramatic changes in these factors over the next 50 years.**

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CPRA found that restoration projects selected under the less optimistic scenario tended to be in the upper end of the estuaries and closer to existing land rather than near the Gulf of Mexico. As a result, the final Master Plan is largely comprised of projects selected under the less optimistic scenario.

### **The Planning Tool**

The Planning Tool, in concert with the modeling effort, offered a way to examine these projects. The model results, represented by terabytes of data, are the building blocks of the 2012 Coastal Master Plan. We needed a user friendly way to sort and view these results so that we could identify groups of projects to examine in greater detail. The Planning Tool is a decision support system that helps the state choose smart investments for the coast. The tool integrates information from the models with other information such as funding constraints, compares how different coastal restoration and risk reduction projects could be grouped, and allows us to systematically consider many variables (e.g., project costs, funding, landscape conditions, and stakeholder preferences). These science-based tools help us understand the practical implications of different project options. Based on the outcomes, our tools suggested a strategy for investing in coastal flood risk reduction and restoration projects. As part of this strategy, the tools considered the constraints, such as the limited money, water, and sediment that we have to work with. The tools also considered possible future conditions that will affect the way our projects operate, along with other important factors such as construction time and how combinations of projects will work together. These results were translated so that citizens and state leaders could understand the projects' real world effects.

We used predictive models and the Planning Tool to help us select 109 high-performing projects that could deliver measurable benefits to our communities and coastal ecosystem over the coming decades. The Planning Tool was designed to translate the models' scientific output and show the practical implications of different options. Decision making for the plan followed directly from this analysis.

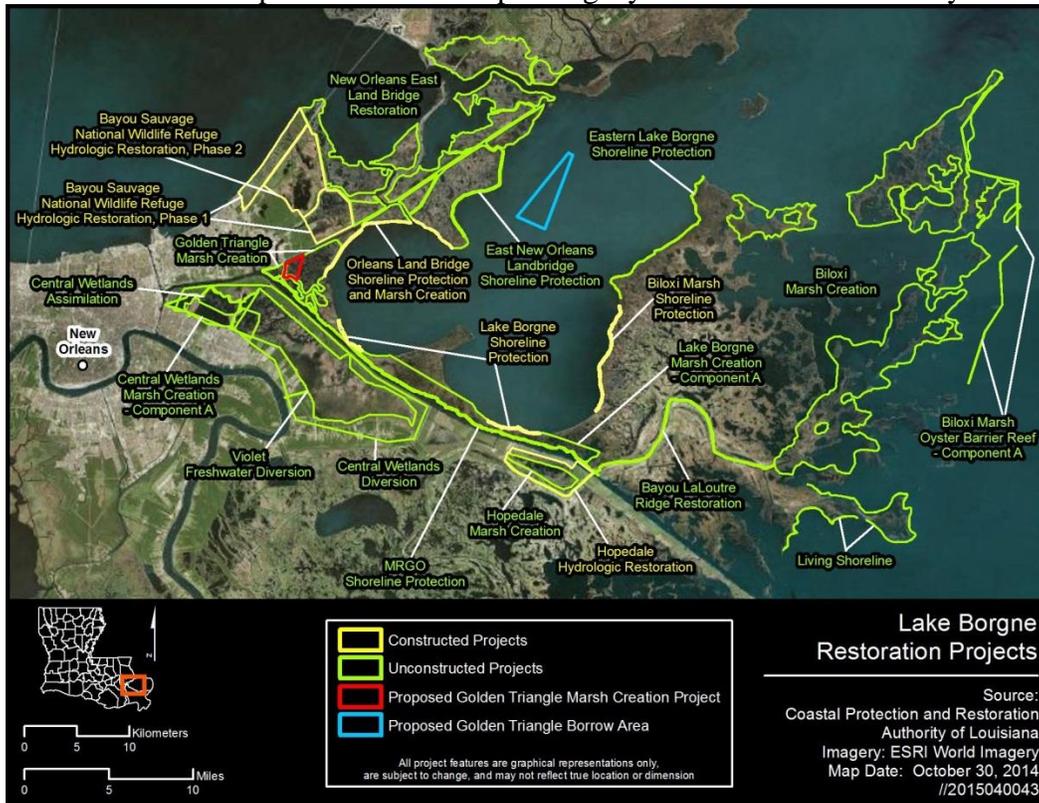
### Golden Triangle Marsh Creation Project

The Golden Triangle is a narrow band of brackish marsh directly east of New Orleans between Lake Borgne and the confluence of the Mississippi River Gulf Outlet and the Gulf Intracoastal Waterway. The Inner Harbor Navigation Canal – Lake Borgne Surge Barrier stretches across the Golden Triangle Marsh, so these wetlands are an important natural buffer in the multiple lines of defense protecting geographically and socially vulnerable communities in the city of New Orleans from storm surge. In addition, the Golden Triangle Marsh falls within the acquisition boundary of the Bayou Sauvage National Wildlife Refuge, one of the last remaining marsh areas adjacent to Lakes Pontchartrain and Borgne (U.S. Fish and Wildlife Service 2009). It is the largest urban National Wildlife Refuge, as it falls within the city limits of New Orleans. The refuge includes fresh and brackish marshes, coastal hardwood forest, and serves as valuable wildlife, fish, and shellfish habitat. Because of its close proximity to New Orleans and the Bayou Sauvage National Wildlife Refuge, the Golden Triangle Marsh Creation project (Figure 3) will provide an opportunity to promote natural resource stewardship and environmental education and outreach. This project will provide an opportunity for educating the public on the ecological,

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economic, and aesthetic importance of Louisiana’s wetlands and the ecosystem services these wetlands provide, such as storm surge protection, water quality improvement, recreation, and fish and wildlife habitat. The nearness of this project to New Orleans will allow the public to witness how coastal restoration is performed and see firsthand why these projects are important. The Golden Triangle Marsh Creation project will help restore and protect wetlands and fish and wildlife habitat and will help maintain landscape integrity and enhance community resilience.



**Figure 3. Location of the Golden Triangle Marsh Creation project and other constructed and planned restoration projects in the Lake Borgne vicinity.**

Several restoration projects, including marsh creation, shoreline protection, hydrologic restoration, diversions, oyster barrier reefs, and ridge restoration, play an integral role in a comprehensive, system-wide approach to effectively restore, enhance, and protect the Lake Borgne area (Figure 3). Much of the success of the planning, design, and construction of these projects has been due to leveraging partnerships with multiple federal agencies. Projects constructed under the Coastal Impact Assistance Program (CIAP) include EB – Orleans Land Bridge Shoreline Protection and Marsh Creation [PO-36 (EB)], completed in 2013; and Central Wetlands Assimilation [PO-73 (EB)], currently under construction. The CIAP program is sponsored by U.S. Fish and Wildlife Service. Projects constructed under the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) program include Bayou Sauvage National Wildlife Refuge Hydrologic Restoration, Phase 1 (PO-16) and Phase 2 (PO-18), also designed and constructed in partnership with U.S. Fish and Wildlife Service and completed in 1996 and 1997, respectively. Additional CWPPRA projects include Hopedale Hydrologic Restoration

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(PO-24), constructed in partnership with the National Marine Fisheries Service (NMFS) in 2004; and Lake Borgne Shoreline Protection (PO-30), constructed in partnership with the Environmental Protection Agency (EPA) in 2008. Other nearby planned restoration projects include Violet Diversion, Central Wetlands Diversion, Hopedale Marsh Creation, New Orleans East Landbridge Restoration, Lake Borgne Marsh Creation, Central Wetlands Marsh Creation, Biloxi Marsh Oyster Reef, Living Shoreline Protection, Bayou LaLoutre Ridge Restoration, Eastern Lake Borgne Shoreline Protection, MRGO Shoreline Protection, East New Orleans Landbridge Shoreline Protection, and Biloxi Marsh Creation. Golden Triangle Marsh Creation was one of the projects identified as a priority project, or one recommended for the 1<sup>st</sup> implementation period (2012-2031) in the Louisiana Master Plan (CPRA 2012). The Golden Triangle Marsh Creation project proposed here will substantially contribute to the overall effort to restore the entire Golden Triangle area identified for restoration in the Master Plan. Likewise, future Master Plan activities will increase the benefits of this proposed project.

## **2. Implementation Methodology**

The Golden Triangle Marsh Restoration Project will be constructed by hydraulically dredging and pumping sediment from Lake Borgne approximately 16 miles to the designated fill site. The fill site is approximately 600 acres. The slurry fill will be constructed to an elevation of +2 feet. The borrow area currently has a depth of -10 feet and will be dredged to a depth of -30 feet and consists mostly of clays and silts. Earthen containment dikes will be constructed to facilitate the construction of the marsh. A cutterhead suction dredge will likely be utilized to construct this project and up to 3 booster pumps may be required. As stated above, Lake Borgne is currently the most cost effective borrow site for the project. However, other borrow sources (i.e. Mississippi River, offshore deposits, etc.) may be identified through a comprehensive planning and feasibility effort.

## **3. Monitoring & Adaptive Management**

CPRA and collaborators collect a variety of data, both programmatic and project-specific, in support of coastal protection and restoration projects and activities. These data can support various aspects of the project from strategic planning, construction, operations, maintenance and adaptive management. These data typically include but are not limited to hydrographic (e.g., water level, water quality, salinity), bathymetric and topographic (e.g., above and below water surface land elevations including erosion, land loss/gain, accretion), geotechnical (e.g., soil analysis and mechanics), geophysical (e.g., seismic, sidescan sonar), biological (e.g., fish and wildlife, vegetation), and photographic (aerial and satellite imagery). Specifically, CPRA has several ongoing coast-wide and programmatic data collection systems for program evaluation and facilitation. The Coastwide Reference Monitoring System-Wetlands (CRMS) contains 390 sites that enable ecological assessments at the project, basin, and ecosystem level based on the collection of hydrographic data, forested swamp and herbaceous marsh vegetation data, accretion, surface elevation, and soil properties data. The Barrier Island Comprehensive Monitoring Program (BICM) began in 2006 to provide long-term data on the barrier islands of

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Louisiana that could be used to plan, design, evaluate, and maintain current and future barrier island restoration projects. The BICM program uses both historical and newly acquired data to assess and monitor changes in the aerial and subaqueous extent of islands, habitat types, geotechnical properties, environmental processes, and vegetation composition. BICM datasets included aerial still and video photography for shoreline positions, habitat mapping, and land loss; light detection and ranging (Lidar) surveys for topographic elevations; single-beam and swath bathymetry; and sediment grab samples. To manage sediment resources for coastal restoration projects the Louisiana Sand/Sediment Resource Database (LASARD) has been developed to identify and maintain geological, geotechnical, and geophysical data for marsh creation and barrier island projects. CPRA is currently working with the Water Institute of the Gulf to more fully develop a System-Wide Assessment and Monitoring Program (SWAMP) that will bring these monitoring and assessment programs under one comprehensive umbrella in an effort to avoid duplication and improve efficiency.

Managing complex environments in which the natural and socio-economic systems are highly integrated is inherently difficult. In addition, deltaic environments are uniquely challenged due to the interdependence and delicate balance of water, land and economic systems and future uncertainties regarding the magnitude and rate of climate change impacts. Adaptive management in deltaic environments is a relatively recent science and encourages the integrated and flexible approach to land and water management that considers risk and uncertainty. It promotes solutions that are sustainable even if conditions change by providing a mechanism for robust decision making. Connecting short-term investments with long-term challenges and the selection of action paths that allow for maximum flexibility of future decisions are two of the key concepts of “Adaptive Delta Management” (Delta Alliance 2014). Historically, as human developments evolved in deltas, decisions were made that cannot be easily changed (such as the location of New Orleans). This results in some “path dependency”, meaning that future options are limited or constrained by past decisions. However, learning from past decisions and understanding the range of possible future scenarios will allow us to avoid these constraints in the future by using “adaptation pathways” to make decisions that allow for maximum future flexibility (Delta Alliance 2014; Haasnoot 2013). As new techniques and projects for restoration and risk reduction are being developed, there exists an opportunity for learning how the system will respond to the coastal protection and restoration program implementation and using that learning to improve future program management decisions. Adaptive management provides a structured process for making decisions over time through active learning and enables adjustments in program implementation as new information becomes available. Adaptive management embraces a scientific approach that involves identifying explicit goals and objectives, developing and implementing management actions, assessing the system’s response to the action(s), and then using that knowledge to make management decisions. It is designed to be iterative, allowing for the incorporation of new knowledge through every step of the process (The Water Institute of the Gulf 2013).

Due to the complexity of CPRA’s program, the uncertainty in future environmental conditions, and the “future without action” prognosis, CPRA’s adaptive management strategy is complex. Project and program assessment, communication, and feedback loops are critical to CPRA’s

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adaptive management strategy and affect every step in project and program implementation. Therefore, supporting efforts, such as focused applied research, science advisory boards and modeling tool development are critical. CPRA's Adaptive Management Strategy streamlines the implementation of the Master Plan and maximizes its long-term benefits by institutionalizing the learning process, providing a process for resolving uncertainties and integrating new knowledge into the construction and operations of projects, and providing adaptation pathways to allow maximum flexibility for future management decisions.

### **4. Measures of Success**

Measures of success for the Golden Triangle Marsh Creation project include wetlands and wildlife habitat restoration, as well as increased environmental education and outreach for the public in nearby New Orleans. At the project-scale, performance measures will track the progress towards meeting management goals and objectives. When monitored over time, performance measures can help reduce uncertainty surrounding predictive models and inform whether intended results are being achieved or if additional actions are needed to fulfill program expectations. In addition, performance measures can also be used to inform the public of the system's response to management actions. Defining the health of a system is inherently complex, however, and requires a systematic approach to develop a manageable list of metrics that can be quantified and monitored over time (The Water Institute of the Gulf, 2013).

CPRA is currently working with the Water Institute of the Gulf to more fully develop SWAMP that will bring existing monitoring and assessment programs under one comprehensive umbrella in an effort to avoid duplication and improve efficiency. SWAMP is envisioned to be a scalable program that will allow for data assessments to be completed at the project-, basin-, and program-scales. Individual projects will generate monitoring plans which will nest within the larger SWAMP framework and will allow for periodic assessment of project performance against performance expectations.

CPRA has recently worked with the Water Institute to develop recommendations for performance measures, and is currently developing using those recommendations to design a robust SWAMP monitoring plan to provide data necessary to perform programmatic performance assessments. Concurrent with this effort, existing monitoring programs, such as CRMS and BICM are being incorporated into the SWAMP design framework, and projects that require monitoring strategies are being informed and nested within this overall framework. That is not to say that some projects will not require additional monitoring to supplement SWAMP; however SWAMP will provide the backbone to facilitate comprehensive programmatic performance assessment.

### **5. Risks & Uncertainties**

The largest single environmental uncertainty in planning and implementing restoration projects in south Louisiana is accounting for the potentially high, and highly variable, rates of relative sea

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level rise (RSLR). For marsh creation projects, maximum ecological benefits result when dredged sediments and the underlying native soils compact to where the marsh surface achieves intertidal elevation after a few years. Underestimating RSLR can result in a marsh surface that sinks below intertidal elevations and thus reverts to open water earlier than intended. In contrast, overestimating RSLR can result both in the overspending of limited funds during construction and in excessive sediments being placed on the marsh so that the marsh surface does not compact into intertidal elevations, reducing the ecological utility of the created habitat.

Uncertainty exists for both future changes in the water level of the Gulf of Mexico (regional) and subsidence components of RSLR. CPRA believes that it has made prudent assumptions of future regional sea levels, independent of subsidence, consistent with the scientific literature. CPRA also has a spatially-variable map of predicted subsidence rates that was developed for the 2012 Coastal Master Plan following the convening of an expert workgroup. Geographically-specific subsidence values derived from that map have since been shown to be consistent with calculated subsidence inferred from tide gauge observations. An additional component of predicted and realized soil settlement is the geotechnical stability of the underlying native soils, which can vary substantially across the coast. At present geotechnical data are not available for this specific project area, so assumptions of project viability are based on historical geotechnical data from nearby investigations.

For the Golden Meadow Marsh Creation Project, uncertainty surrounds the ever-increasing costs for dredging actions and with the temporal availability of coarse-grained sediments (i.e. sand) from the options for material borrow, namely the Mississippi River and the Black Warrior and Tom Bigbee River system in Alabama. Coarse-grained sediments are only accessible to dredges from the main stem of the Mississippi River from lateral and point bars, many of which have been reserved for other marsh creation projects or to serve as sediment sources for river diversion projects. In other words, there are lines to get in to access some river sediment sources. Once accessed, borrow sites only provide a set amount of sediment under permit rules because of riverbank stability concerns held by the U.S. Army Corps of Engineers. Recharge of river borrow areas is highly dependent on the magnitude of annual river floods, and delays in borrow area recharge could lengthen the construction schedule.

The last uncertainty to note in this discussion is that of tropical storms and hurricanes, and the potential for those to induce marsh loss in the project area. Recently, the scientific thinking on marsh loss has changed substantially to recognize the role of tropical systems in coastal wetland loss. While qualitatively it has been common knowledge that storms can induce wetland conversion to open water, increased availability of historical and current aerial imagery has allowed for a quantification of storm-induced loss, and the realization that in many areas marsh loss has not been dominated by year-to-year incremental change but instead by a much lower background rate of loss punctuated by aperiodic, significant storm-induced loss. While it is relatively straightforward to factor storms into project planning models, the random nature of real hurricane passage makes it nearly impossible to match a priori adaptive management assumptions based on the models to actual observations of landscape change over time.

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## 6. Outreach & Education

CPRA established a strategic outreach and engagement framework for the Coastal Master Plan that helped to guide communications and interactions with diverse audiences throughout the planning process. These audiences include key citizen groups and organizations, non-governmental organizations, local and State officials, business groups and the general public. CPRA's outreach and engagement framework provides a variety of ways for stakeholders and citizens to learn about and participate in the master planning process, including small group gatherings, web offerings, direct communication with local and State government, and through monthly public meetings.

A successful restoration project is built on local knowledge, input from a diverse range of coastal stakeholders, and extensive dialogue with the public. We continue to reach out to the public in new ways to better share information on increasing flood risk and CPRA restoration and protection projects. Having a strong outreach and engagement component in the Louisiana's coastal program provides long-term benefits and will positively impact the future of coastal restoration and protection planning. CPRA is committed to engaging stakeholders and citizens in the effort to ensure their voices are heard and their input is incorporated.

People from all walks of life have rallied around the 2012 Coastal Master Plan, recognizing that we must embrace bold solutions if we are to tackle the crisis that has gripped our coast for so long. A poll conducted by the National Audubon Society showed that Louisiana voters feel strongly that our state's coastal areas and wetlands are crucial to save. Specifically, 86% of Louisiana voters supported adoption of the 2012 Coastal Master Plan and 98% of coastal voters felt that Louisiana's coastal areas and wetlands are "very important" to the state's future.

The solutions presented in the Coastal Master Plan and through these projects will preserve our nation's energy and economic security, restore the health of the gulf region, and support a bright and safe future for all coastal residents. Louisiana is committed to maximizing its investment in oil spill recovery activities by implementing restoration projects that are consistent with the Coastal Master Plan and have been through a transparent and robust public engagement process.

Below are additional details on current outreach and engagement opportunities CPRA provides.

### **CPRA Board Monthly Public Meetings**

The CPRA Board holds monthly meetings to provide the public with updates related to projects, programs, and policies. A public comment period is included at the close of each monthly meeting allowing the opportunity for citizens to ask questions or provide comments for the record.

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CPRA staff regularly attend these meetings and are available before and after to discuss agency initiatives with members of the public. Meeting details, including itemized agendas, are posted to CPRA's online calendar which is located at [www.coastal.la.gov](http://www.coastal.la.gov).

### **National Environmental Policy Act / Permitting Project-Specific Opportunities**

Throughout project development there are a number of project-specific opportunities for public engagement and comment incorporated into the National Environmental Policy Act (NEPA) and permitting processes.

### **Community Meetings**

As the project progresses, the state will be available to meet with local groups and leaders to provide information. CPRA also has staff available to meet with citizens in smaller groups, so that we can answer questions and share updates. To request a meeting on the status of this project or to be added to our mailing list, please send an email to: [Coastal@LA.gov](mailto:Coastal@LA.gov).

## **7. Leveraging of Partnerships**

CPRA has a variety of resources and partnerships with which it is able to leverage for the benefit of this project. Through the Coastal Master Plan, CPRA is able to apply the integrated suite of Predictive Models and Planning Tool, a science-based decision support system developed for the master plan to work towards the RESTORE objectives of habitat protection and restoration. SWAMP will bring the previously described CRMS, BICM, and LASARD monitoring and assessment programs together into one framework in an effort to avoid duplication, improve efficiency, and provide the data needed to perform programmatic performance assessments.

Golden Triangle has the advantage of being located in the Lake Borgne area where several restoration projects create a comprehensive, system-wide approach to effectively restore, enhance, and protect the area. Much of the success of the planning, design, and construction of these projects has been due to leveraging partnerships with multiple federal agencies, which are outlined below.

- Coastal Impact Assistance Program (CIAP), sponsored by U.S. Fish and Wildlife Service:
  - EB – Orleans Land Bridge Shoreline Protection and Marsh Creation [PO-36 (EB)], completed in 2013,
  - Central Wetlands Assimilation [PO-73 (EB)], currently under construction.
- Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) program, sponsored by U.S. Fish and Wildlife Service:
  - Bayou Sauvage National Wildlife Refuge Hydrologic Restoration, Phase 1 (PO-16) and Phase 2 (PO-18) completed in 1996 and 1997, respectively.
- CWPPRA program, in partnership with the National Marine Fisheries Service (NMFS): Hopedale Hydrologic Restoration (PO-24), constructed in 2004.
- CWPPRA program, in partnership with the Environmental Protection Agency (EPA): Lake Borgne Shoreline Protection (PO-30), constructed in 2008.

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Other nearby planned restoration projects include Violet Diversion, Central Wetlands Diversion, Hopedale Marsh Creation, New Orleans East Landbridge Restoration, Lake Borgne Marsh Creation, Central Wetlands Marsh Creation, Biloxi Marsh Oyster Reef, Living Shoreline Protection, Bayou LaLoutre Ridge Restoration, Eastern Lake Borgne Shoreline Protection, MRGO Shoreline Protection, East New Orleans Landbridge Shoreline Protection, and Biloxi Marsh Creation. The proposed Golden Triangle Marsh Creation project will substantially contribute to the overall effort to restore the entire Golden Triangle area identified for restoration in the Master Plan. Likewise, future Master Plan activities will increase the benefits of this proposed project.

### **8. Proposal Project Benefits**

The Golden Triangle Marsh Creation project will directly create approximately 600 acres of marsh near the western side of Lake Borgne, where there is currently little marsh acreage between the lake and the Greater New Orleans Metropolitan Area. Because wetlands can help reduce the effects of storm surge and wave action, it is critical to restore and maintain marsh in the Golden Triangle area to protect nearby levee systems and ultimately local communities. In particular, the Golden Triangle Marsh Creation project is immediately adjacent to the Inner Harbor Navigation Canal-Lake Borgne Surge Barrier and will help buffer and protect this critically-important protection feature.

Another benefit of this project's proximity to the Greater New Orleans Metropolitan Area is that it will provide a unique opportunity to promote natural resource stewardship and environmental education and outreach. The public will be able to witness how coastal restoration is performed and see firsthand why these projects are important. The public will also be able to learn about the economic, ecological, and aesthetic importance of Louisiana's wetlands and the ecosystem services these wetlands provide, such as storm surge protection, water quality improvement, recreation, and fish and wildlife habitat.

The Golden Triangle Marsh Creation project will create critical habitat for a wide variety of fish and wildlife species. Many of these species support recreationally- and commercially important fishing and hunting industries, which are of major importance to the region and have been estimated to contribute \$6.75 billion to the economy and support 76,700 jobs (Southwick and Associates, Inc. 2008). Furthermore, the project resides partially within the boundaries of the Bayou Sauvage National Wildlife Refuge, which is the largest urban wildlife refuge in the United States, and thus will benefit the fish and wildlife populations that utilize the refuge and subsequently enhance recreational opportunities in the area.

The project should also improve water quality similar to the nearby Central Wetlands Assimilation projects. These projects are using wetlands to remove excess nutrients and pollutants from secondarily-treated, disinfected municipal effluent prior to discharge (Mack et al. 2008). Although wastewater will not be pumped into the Golden Triangle Marsh Creation

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project, the project should still improve water quality of effluent from the Greater New Orleans Metropolitan Area and other local non-point sources.

Land loss and flooding risks are changing the way people live, work, and do business throughout Louisiana's coast. The projects in the 2012 Coastal Master Plan are intended to prevent the environmental and economic collapse that will occur if land loss continues and these projects also provide an opportunity to create jobs through a new restoration economy.

Several recent studies have examined how coastal restoration measures will help Louisiana's working coast. A common theme in these studies is how readily coastal restoration and protection efforts create jobs. A recent LSU/Louisiana Workforce Commission study (Louisiana Workforce Commission 2011) found that the \$618 million spent by the state in 2010 on coastal restoration created 4,880 direct jobs and an additional 4,020 indirect and induced jobs, for a total impact of 8,900 Louisiana jobs. The spinoff benefits of these jobs were considerable; the study estimated that the state's initial investment in 2010 created more than \$1.1 billion in sales. Louisiana's annual investment in coastal restoration alone is expected to be between \$400 million to \$1 billion, which would translate into 5,500 and 10,300 total jobs, \$270-\$520 million in wages, and between \$720 million and \$1.35 billion in total sales per year.

Duke University's Center on Globalization, Governance & Competitiveness (2011) found that Louisiana is already a national leader in the creation of coastal restoration jobs, with the highest concentration of related business headquarters in the Gulf. According to this study, restoration jobs spur investments and jobs in a range of sectors including shipbuilding, equipment repair, and manufacturing. The Duke study emphasized that to expand this job creation engine, Louisiana would need to maintain a steady investment in restoration efforts so that relevant firms will have an incentive to scale up their investments. A third study by Restore America's Estuaries (Restore America's Estuaries 2011), which looked at restoration efforts nationwide, found that restoring our coasts can create more than 30 jobs for each million dollars invested. This is more than twice as many jobs per dollars invested as is gained by the oil and gas and road construction industries combined. Further, the study found that investing in restoration provides long lasting benefits to local economies, such as higher property values, better water quality, sustainable fisheries, and increases in tourism dollars.

Since 2007, the State has made unprecedented investments in our coast, and the Coastal Master Plan builds on this momentum. The projects outlined here strike a balance between providing immediate relief to hard hit areas and laying the groundwork for the large scale projects that are needed if we are to protect communities and sustain our landscape into the future.

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## IV. Location Information

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## V. Budget Narrative

<b>Golden Triangle Marsh Creation</b>	
<b>Phase I</b>	
Planning	\$1,500,000
Engineering & Design/Permitting	\$2,544,403
Phase I Adaptive Management	\$303,330
<b>TOTAL PHASE I COST ESTIMATE</b>	<b>\$4,347,733</b>
<b>Phase II</b>	
Construction	\$46,700,090
Phase II Adaptive Management	\$3,805,837
<b>TOTAL PHASE II COST ESTIMATE</b>	<b>\$50,202,597</b>
<b>TOTAL ESTIMATED PROJECT COST</b>	<b>\$54,550,330</b>

\*The cost estimate for the project may be affected by change in project features, adjustment of quantities, or change in industry prices prior to bid openings.

The total estimated cost for the Golden Triangle Marsh Creation project is \$54,550,330. Of this total project cost, CPRA is requesting \$4,347,733 in RESTORE funds to see this project through Phase I of planning, engineering and design, and permitting. The requested funds will allow CPRA to perform the planning, engineering and design, land rights, and adaptive management tasks needed to complete Phase I of the project. Due to the extensive work performed for the 2012 Coastal Master Plan, CPRA possesses the necessary experience and capacity to perform the above Phase I tasks, from high level planning through adaptive management. The allocated funds for adaptive management will allow CPRA to effectively manage resources and monitor complex environmental conditions to ensure the project's success and reduce foreseeable risks and uncertainties to the utmost, most feasible extent. Therefore, to build upon CPRA's experience and existing capacity, CPRA is requesting a total of \$4,347,733 in RESTORE funds for the Golden Triangle Marsh Creation project.

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## VI. Environmental Compliance Checklist (Appendix B)

### Gulf Coast Ecosystem Restoration Council Environmental Compliance Checklist

Please check all federal and state environmental compliance and permit requirements as appropriate to the proposed project/program

<b><u>Environmental Compliance Type</u></b>	<b>Yes</b>	<b>No</b>	<b>Applied For</b>	<b>N/A</b>
<b>Federal</b>				
National Marine Sanctuaries Act (NMSA)				X
Coastal Zone Management Act (CZMA)		X		
Fish and Wildlife Coordination Act		X		
Farmland Protection Policy Act (FPPA)				X
NEPA – Categorical Exclusion				X
NEPA – Environmental Assessment		X		
NEPA – Environmental Impact Statement	X			
Clean Water Act – 404 – Individual Permit (USACE)		X		
Clean Water Act – 404 – General Permit(USACE)				X
Clean Water Act – 404 – Letters of Permission(USACE)				X
Clean Water Act – 401 – WQ certification		X		
Clean Water Act – 402 – NPDES				X
Rivers and Harbors Act – Section 10 (USACE)		X		
Endangered Species Act – Section 7 – Informal and Formal Consultation (NMFS, USFWS)		X		
Endangered Species Act – Section 7 - Biological Assessment (BOEM,USACE)		X		
Endangered Species Act – Section 7 – Biological Opinion (NMFS, USFWS)		X		
Endangered Species Act – Section 7 – Permit for Take (NMFS, USFWS)				X
Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat (EFH) – Consultation (NMFS)		X		
Marine Mammal Protection Act – Incidental Take Permit (106) (NMFS, USFWS)				X
Migratory Bird Treaty Act (USFWS)		X		
Bald and Golden Eagle Protection Act – Consultation and Planning (USFWS)		X		
Marine Protection, Research and Sanctuaries Act – Section 103 permit (NMFS)				X
BOEM Outer Continental Shelf Lands Act – Section 8 OCS Lands Sand Permit				X
NHPA Section 106 – Consultation and Planning ACHP, SHPO(s), and/or THPO(s)		X		
NHPA Section 106 – Memorandum of Agreement/Programmatic Agreement	X			
Tribal Consultation (Government to Government)	X			
Coastal Barriers Resource Act – CBRS (Consultation)				X
<b>State</b>				
As Applicable per State		X		

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Marsh restoration within the Golden Triangle was proposed by the U.S. Army Corps of Engineers New Orleans District (USACE NOD) as part of the Tentatively Selected Plan (TSP) for the Mississippi River-Gulf Outlet (MRGO) Ecosystem Restoration Feasibility Study. The Environmental Impact Statement (EIS) documents the impacts of implementing the features of the TSP, which includes swamp nourishment and restoration, marsh nourishment and restoration, shoreline protection, and ridge restoration and recommends three tiers for implementation. Approximately 3,253 acres of marsh restoration and approximately 2,830 acres of marsh nourishment were identified within Golden Triangle as feature LM-1 in Tier 3B; features included in Tier 3B were recommended for further study.

Environmental impacts of the Lake Borgne Surge Barrier, part of the Hurricane and Storm Damage Risk Reduction System (HSDRRS) authorized by Congress following Hurricane Katrina, were evaluated by USACE NOD for the Golden Triangle area and documented in Lake Pontchartrain and Vicinity (LPV) Individual Environmental Report (IER) #11 titled Improved Protection on the Inner Harbor Navigation Canal (IHNC) Tier 2 Lake Borne. A total of seven (7) alternatives were examined; the Preferred Alternative, 4a, includes a system of floodwall and gates that crosses the Gulf Intracoastal Waterway (GIWW), Bayou Bienvenue, the MRGO, and the Golden Triangle marsh.

### Coastal Zone Management Act

A Coastal Use Permit is required for implementation of the Golden Triangle Marsh Creation project. The Coastal Protection and Restoration Authority (CPRA) will submit a Joint Coastal Use Permit application to the Louisiana Department of Natural Resources Office of Coastal Management (LDNR OCM) specifically for construction of the Golden Triangle Marsh Creation project.

USACE NOD determined the MRGO Ecosystem Restoration Study is consistent, to the maximum extent practicable, with the State of Louisiana's Coastal Resources Program and Section 307 of the Coastal Zone Management Act of 1972.

### Clean Water Act – 404 – Individual Permit (USACE)

CPRA has not yet submitted the permit application specifically for the Golden Triangle Marsh Creation project.

### Rivers and Harbors Act – Section 10 (USACE)

CPRA has not yet submitted the permit application specifically for the Golden Triangle Marsh Creation project.

### NEPA – Environmental Assessment

USACE NOD Regulatory Branch will complete an Environmental Assessment specifically for the Golden Triangle Marsh Creation project during the public interest review of the Clean Water Act Section 404/Rivers and Harbors Act Section 10 permit application.

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### NEPA—Environmental Impact Statement

USACE NOD Civil Works published a Notice of Intent (NOI) to prepare an EIS for MRGO Ecosystem Restoration in the Federal Register on October 2, 2008. As proposed, the plan would include: “(1)Physically modifying the MRGO channel and restoring the areas affected by the channel; (2)restoring natural ecosystem features to reduce damage from storm surge; (3) measures preventing saltwater intrusion into the waterway; (4) measures protecting, restoring or increasing wetlands to prevent saltwater intrusion or storm surge; (5) measures reducing risk of storm damage to communities by preventing or reducing wetland losses or restoring wetlands in areas affected by navigation, oil and gas and other manmade channels; (6) diversions to restore the Lake Borgne ecosystem.”

The Draft EIS availability for public review was published in the Federal Register on December 10, 2010 with a closing date of January 31, 2011; the public review/comment period was extended to March 5, 2011. The Final EIS was made available for public review/comment on June 22, 2012. A Record of Decision was signed on September 28, 2012.

Appendices for the Final EIS can be viewed at

<http://www.mrgo.gov/ProductList.aspx?ProdType=study&folder=1717>

### Endangered Species Act – Section 7 – Informal and Formal Consultation (NMFS, USFWS)

Consultation with NMFS and USFWS specifically for the Golden Triangle Marsh Creation Project will be initiated through the joint LDNR OCM - USACE public notice on the permit application.

USACE NOD consulted with both USFWS and NMFS on threatened and endangered species for the MRGO Ecosystem Restoration Project and the IHNC Tier 2 Lake Borgne project.

Designated critical habitat for the Gulf sturgeon includes Lake Borgne. The West Indian manatee and the gulf sturgeon were the only species under USFWS and NMFS jurisdictions within the IHNC Tier 2 Lake Borgne project; USACE NOD determined the project would not adversely affect either species requested concurrence from those two agencies;

### Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat (EFH) – Consultation (NMFS)

Consultation with NMFS for the Golden Triangle Marsh Creation Project in regard to EFH will be initiated through the joint LDNR OCM – USACE public notice on the permit application.

USACE NOD consulted with NMFS on EFH for both the MRGO Ecosystem Restoration Project and the IHNC Tier 2 Lake Borgne project. The EIS prepared for the MROG Ecosystem Restoration Project and the Individual Environmental Record (IER) prepared for the project documented the direct, indirect, and cumulative impacts of the projects to EFH.

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### Migratory Bird Treaty Act (USFWS)

Consultation with USFWS for the Golden Triangle Marsh Creation Project in regard to migratory birds will be initiated through the joint LDNR OCM – USACE public notice on the permit application.

### Bald and Golden Eagle Protection Act – Consultation and Planning (USFWS)

Consultation with USFWS for the Golden Triangle Marsh Creation Project in regard to bald and golden eagles will be initiated through the joint LDNR OCM – USACE public notice on the permit application.

### NHPA Section 106 – Consultation and Planning ACHP, SHPO(s), and/or THPO(s)

One historic property eligible for the National Register of Historic Places (NRHP) is located within Golden Triangle. Battery Bienvenue (16SB84), located at the confluence of Bayou Villere and Bayou Bienvenue, is eligible for the NRHP under Criterion A as it was constructed in 1826 as part of the U.S. Coastal Defense System and to protect New Orleans against attack from Lake Borgne. CPRA has not yet initiated consultation with SHPO for the Golden Triangle Marsh Creation Project specifically for cultural resources. If Battery Bienvenue is within the Area of Potential Effect for the Golden Triangle Marsh Creation Project, effects to this historic property will be assessed and any adverse effects will be resolved through consultation with SHPO.

USACE NOD utilized the services of a contractor to conduct a survey for cultural resources along the bank lines of the GIWW, MRGO, Bayou Bienvenue, and Bayou Villere. Potential for submerged cultural resources was evaluated through remote sensing. USACE determined the project, as proposed, would have no adverse effect on historic properties eligible for or listed on the NRHP; SHPO, the Choctaw Nation of Oklahoma, the Alabama Coushatta Tribe of Texas, and the Caddo Nation of Oklahoma concurred with this effect determination.

### NHPA Section 106 – Memorandum of Agreement/Programmatic Agreement

As part of the MRGO Ecosystem Restoration project, USACE executed a Programmatic Agreement (PA) with the Advisory Council on Historic Preservation, SHPO, the Chitimacha Tribe of Louisiana, and the Jena Band of Choctaw Indians. The PA lays forth the process for the identification of historic properties, assessment of project effects, and resolution of any adverse effects as projects within the tiers are implemented.

For the HSDRRS project as a whole (Lake Pontchartrain and Vicinity and West Bank and Vicinity). USACE executed a PA with the ACHP and SHPO to lay forth the process for the identification of historic properties, assessment of project effects, resolution of any adverse effects, and tribal consultation.

### State

- A Scenic River permit will be obtained from the Louisiana Department of Wildlife and Fisheries prior to the commencement of construction.

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- A Fill Material License will be obtained from the Louisiana Department of Wildlife and Fisheries prior to the commencement of construction if borrow material is obtained from Lake Borgne.

## VII. Data / Information Sharing Plan

### Introduction

CPRA has for over a decade made its coastal protection and restoration data and information widely available on the internet using a web-enabled, GIS-integrated system called SONRIS. Recently, ever growing responsibilities, an increase in data generation, and the need to deliver this information in a more timely and efficient manner have inspired an effort by the CPRA to significantly improve its data management and delivery capabilities. The first step was the development of a Data Management Plan in 2013 through a partnership with The Water Institute of the Gulf (The Water Institute of the Gulf, 2013). CPRA then partnered with the U.S. Geological Survey's National Wetlands Research Center (USGS) to produce the CPRA Coastal Information Management System (CIMS) in an effort to redesign and improve its data management and delivery capabilities. CIMS combines a network of webpages hosted by CPRA ([www.coastal.la.gov](http://www.coastal.la.gov)), a GIS database, and a relational tabular database into one GIS-integrated system capable of robust visualizations and data delivery. Any data generated through this RESTORE project will be made available to the public as part of CPRA's ongoing efforts to share data and improve transparency, CPRA is committed to sharing information to help the public make science-based decisions.

### Data Generation

CPRA and collaborators collect a variety of data, both programmatic and project-specific, in support of coastal protection and restoration projects and activities. These data typically include but are not limited to hydrographic (e.g., water level, water quality, salinity), bathymetric and topographic (e.g., above and below water surface land elevations including erosion, land loss/gain, accretion), geotechnical (e.g., soil analysis and mechanics), geophysical (e.g., seismic, sidescan sonar), biological (e.g., fish and wildlife, vegetation), and photographic (aerial and satellite imagery). Specifically, CPRA has several ongoing coast-wide and programmatic data collection systems for program evaluation and facilitation. The Coast-wide Reference Monitoring System-Wetlands (CRMS) contains 390 sites and several thousand ecological monitoring stations that enable ecological assessments at the project, basin, and ecosystem level. These stations collect hourly hydrographic data, forested swamp and herbaceous marsh vegetation data, accretion, surface elevation, and soil properties data. The Barrier Island Comprehensive Monitoring Program (BICM) began in 2006 to provide long-term data on the barrier islands of Louisiana that could be used to plan, design, evaluate, and maintain current and future barrier island restoration projects. The BICM program uses both historical and newly acquired data to assess and monitor changes in the aerial and subaqueous extent of islands, habitat types, geotechnical properties, environmental processes, and vegetation composition. BICM datasets included aerial still and video photography for shoreline positions, habitat mapping, and land loss; light detection and ranging (Lidar) surveys for topographic elevations;

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single-beam and swath bathymetry; and sediment grab samples. To manage sediment resources for coastal restoration projects the Louisiana Sand/Sediment Resource Database (LASARD) has been developed to identify and maintain geological, geotechnical, and geophysical data for marsh creation and barrier island projects. The CPRA is currently working with the Water Institute of the Gulf to more fully develop a System-wide Assessment and Monitoring Program (SWAMP) that will bring these monitoring and assessment programs under one comprehensive umbrella in an effort to avoid duplication and improve efficiency.

### Data Standards and Metadata

CPRA has an established Data Management Team (DMT) and is the primary contributor to the data system with additional data streams from federal and state agencies, universities and private contractors. CPRA has developed and documented policies, standard operating procedures, data conventions, and quality assurance/quality control procedures (QA/QC) for data collection of all data generated in support of the coastal protection and restoration program (Folse et al., 2012; BEM Systems, Inc. and Coastal Planning and Engineering, Inc., 2012; Coastal Protection and Restoration Authority of Louisiana, 2013). In conjunction with the development of the CIMS system, CPRA and USGS are developing and maintaining metadata for all CPRA data using Federal Geographic Data Committee (FGDC) standards.

### Data Stewardship and Preservation

Data stewardship is provided by the CPRA DMT and associated consultants. Data integrity is checked with very detailed and complex QA/QC software routines prior to input into the database and additional automated routines when input into the database. Intensive use of data by CPRA staff and contractors who collect and input data into the database provide feedback on data quality and software routines to the CPRA DMT. Data preservation of the database is largely done through regular tape backup and/or cloud storage. All data and documents are kept in perpetuity.

### Data Access and Security for Adaptive Management

The ability to learn from previous actions and to adaptively manage existing efforts is a critical step to improve the success of the State's coastal protection and restoration program. An important step in that process is sound data management that makes past data and information on project and program effectiveness available to project planners, engineers, and scientists. Also of critical importance is making coastal protection and restoration program information readily available to interested parties outside of the CPRA. Academic researchers can use the data generated by the program to improve the science informing the decision-making process. The general public can use the information to understand how current and future program actions will affect their daily activities, which helps promote program transparency. To that end, the CPRA provides a web-based portal for all geospatial and tabular data and documents associated with coastal protection and restoration projects and for coast-wide programmatic data such as CRMS and BICM. In addition to background information on the State's coastal protection and restoration program, a wide variety of up-to-date information is available such as program documents, remote imagery, project information and boundaries, project infrastructure (including levees, floodwalls, and pump stations), monitoring station locations, elevation benchmarks,

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ecological data, geophysical data, and information on the State's coastal community resiliency program. Users are able to perform a wide range of custom data retrievals for refining and summarizing information. Private-facing aspects of CIMS include remote data upload and QA/QC by CPRA staff and contractors. Security is provided through Secure Socket Layers of username/password access and software assignment of roles that allows differential access to database functions.

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# Golden Triangle Marsh Creation

## RESTORE Proposal Coastal Protection & Restoration Authority

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# **Golden Triangle Marsh Creation**

RESTORE Proposal  
Coastal Protection & Restoration Authority

## **IX. Other**

Letters of support.



November 14, 2014

Coastal Protection and Restoration Authority  
c/o Mr. Jerome Zeringue, Chairman  
Office of the Governor, Coastal Activities  
Capitol Annex Building, Suite 138  
Baton Rouge, Louisiana 70802

**Re: Comments on the State of Louisiana Projects for the RESTORE Act Funded Priorities List; Golden Triangle Marsh Creation Project**

Dear Coastal Protection and Restoration Authority members,

The undersigned groups appreciate this opportunity to share our collective supporting comments on the Golden Triangle Marsh Creation Project, submitted by the State of Louisiana for RESTORE Council consideration for the first Funded Priorities List of the RESTORE Pot 2 Council-selected projects.

We represent a coalition of conservation interests that have worked for decades to restore a healthy Gulf of Mexico ecosystem – starting with prompt restoration of the Mississippi River Delta – reconnecting the Mississippi River to its delta to protect communities, environment, and economies. Our groups continue to recommend urgent action on projects that will reduce land loss and restore wetlands in the Mississippi River Delta through comprehensive restoration actions that have the potential to provide multiple benefits and services over the long term to the entire Gulf of Mexico.

Most of the necessary restoration actions to be undertaken in Louisiana are already fully authorized under the Water Resources Development Act (WRDA) of 2007, were unanimously approved by the Louisiana legislature in the 2012 Coastal Master Plan, enjoy broad public support, and have been vetted by scientists and lawmakers for many years.

The Golden Triangle Marsh Creation Project, located near the confluence of the Mississippi River Gulf Outlet shipping channel and the Gulf Intracoastal Waterway, is in an area badly damaged by the saltwater intrusion and erosion that followed the dredging of the MRGO. The restored marsh will work with a nearby shoreline protection and marsh creation funded by the Coastal Impact Assistance Program (CIAP) to help buffer the newly constructed IHNC Surge Barrier, which is essential to the Greater New Orleans' flood protection, and will also provide important estuarine habitat for Lake Borgne and Mississippi Sound. The project has undergone technical analysis completed by the Corps and the State of Louisiana through the MRGO Ecosystem Restoration Plan authorized in WRDA 2007. The project has a signed Chief's Report and a completed Programmatic EIS.

The project is important not only for its obvious marsh creation benefits, but also for the citizens of the area who use the area located so close to the city of New Orleans. This project enjoys much public support and will increase the resilience of surrounding communities. We support the continued

development of the Golden Triangle Marsh Creation Project and thank the Coastal Protection and Restoration Authority for submitting it to the RESTORE Council.

Sincerely,

Kim Reyher  
Executive Director  
Coalition to Restore Coastal Louisiana

Doug Meffert  
Executive Director/Vice President  
Audubon Louisiana

Steve Cochran  
Director, Mississippi River Delta Program  
Environmental Defense Fund

Karen Gautreaux  
Director of Governmental Relations  
The Nature Conservancy of Louisiana

John Lopez, PhD  
Coastal Director  
Lake Pontchartrain Basin Foundation

Rebecca Triche  
Executive Director  
Louisiana Wildlife Federation

David Muth  
Director  
Mississippi River Delta Restoration Program  
National Wildlife Federation

cc: Kyle Graham, Director, CPRA Implementation Office



November 14, 2014

Coastal Protection and Restoration Authority  
Attn: Jerome Zeringue, Chair  
Coastal@la.gov

RE: *Letter of Support for Mississippi River Gulf Outlet (MRGO) Ecosystem Restoration Projects*

Dear Coastal Protection and Restoration Authority-

We are writing to express support for three projects to be submitted by the Coastal Protection and Restoration Authority (CPRA) to the Gulf Coast Ecosystem Restoration Council (Council) for Council-Selected Restoration Component (Bucket 2) funding. The projects include the River Reintroduction into Maurepas Swamp, the Biloxi Oyster Reef and the Golden Triangle Marsh Creation, all within the MRGO ecosystem restoration area, and all projects that will significantly contribute to the long-term sustainability of estuarine environment of southeast Louisiana and Mississippi.

The MRGO was a federal navigation channel that severely altered the hydrology of the region, destroying tens of thousands of acres of protective wetlands surrounding Greater New Orleans. It was singled out as a key factor in the catastrophic flooding that Hurricane Katrina caused in communities like the Lower Ninth Ward in New Orleans and communities like Arabi, Chalmette and Violet in St. Bernard Parish. Since 2006, the MRGO Must Go Coalition, representing 17 conservation and community organizations, has worked with local, state, and federal governments to advance planning and lay the groundwork for large-scale restoration of the MRGO area. **Over 76,000 members of the public commented in support of ecosystem restoration projects along the MRGO through the USACE MRGO ecosystem restoration planning process and the 2012 Louisiana State Master Plan planning process.**

The MRGO ecosystem restoration area, which covers 3.8 million acres, stretches from Lake Maurepas to Chandeleur Sound including Mississippi Sound and its bordering wetlands and barrier islands. Though impacted by the MRGO, it is a resilient wetland landscape that can continue to provide ecosystem services to the Gulf of Mexico marine and estuarine environments of Louisiana, Mississippi and Alabama. These same wetlands provide storm surge protection in communities in coastal Mississippi, New Orleans and around the entire perimeter of Lake Pontchartrain. In particular, the Biloxi Marsh and Maurepas Land Bridge were identified as a "critical landscape feature" by the Army Corps of Engineers (Corps LACPR study released in 2009) because of its importance in reducing storm surge.

The MRGO ecosystem restoration area incurred significant damage during the 2010 Deepwater Horizon disaster, with oil moving through Breton, Mississippi, and Chandeleur Sounds, resulting in shoreline oil reported in the Biloxi Marsh, Chandeleur Islands, and the New Orleans East Land Bridge. Wildlife death attributed to oiling occurred in these areas and beyond, including in Lake Pontchartrain itself and along the Lake Borgne Land Bridge.

- **Golden Triangle Marsh Creation Project**, located near the confluence of the MRGO shipping channel and the Gulf Intracoastal Waterway, is in an area badly damaged by the saltwater intrusion and erosion that followed the dredging of the MRGO. The restored marsh will help

buffer the newly constructed IHNC Surge Barrier, which is essential to the resilience and flood protection of communities in the Greater New Orleans area. This marsh creation will also provide important estuarine services for Lake Borgne and Mississippi Sound. The project has undergone technical analysis completed by the Corps and the State of Louisiana through the Mississippi River Gulf Outlet Ecosystem Restoration Plan authorized in WRDA 2007. The project has a signed Chief's Report and a completed Programmatic EIS.

- Erosion of the Biloxi Marsh by wave action has resulted in significant loss of the once productive habitat. The **Biloxi Oyster Reef Project** will reestablish vertical oyster reefs along the southeastern shore of the marsh and will help slow marsh deterioration. In addition to providing protection against waves and storm surge, oyster reefs also provide a broad range of other ecosystem and economic benefits. Once established, these reefs are naturally self-maintaining. This project also has a completed Programmatic EIS and a signed Chief's Report from the Corps.
- **River reintroduction into Maurepas Swamp** aims to restore freshwater flow from the Mississippi River that has been cut-off since the construction of the Mississippi River flood control levees and the closure of Bayou Manchac. The lack of freshwater, sediment and nutrient input has caused saltwater intrusion and lower productivity, enhancing net subsidence. Without restoration, one of the largest bald cypress swamps in the nation is threatened to convert to open water. Most of the preliminary feasibility and design work for the diversion has been completed and the Corps has just filed a Notice of Intent to prepare an Environmental Impact Statement (EIS) for the project. Once complete, the project is expected to maintain over 45,000 acres of land, southwest of Lake Maurepas, over the next 50 years.

These projects are primed for implementation and are all authorized in the 2012 Coastal Master Plan. They are also cornerstone projects to restoring a 6000 square mile estuary connected to the Gulf of Mexico, and all three projects will advance gulf-wide restoration of marine and estuarine services, while also contributing to community and economic resiliency. **Our Coalition believes that the Council should build on previous efforts by targeting these vital ecosystem restoration projects for immediate implementation funding.**

These projects are well-studied, mostly designed, and have enjoyed unprecedented public input and rigorous review over the past seven years since the passage of WRDA 2007. They are ready to move forward with final design and construction, and they meet all four Restoration Priorities found in the RESTORE Act.

The RESTORE Act provides a powerful opportunity to move these urgent projects forward and help remedy some of the damage incurred to the coastal ecosystem by the infamous MRGO.

Thank you for your work and please let us know how we can best help you in your efforts. Our member organizations represent millions of knowledgeable and capable individuals whose shared interest is the recovery of our precious wetlands and natural resources. Please contact Coalition coordinator, Amanda Moore, at [moorea@nwf.org](mailto:moorea@nwf.org) should you have any questions.

Sincerely,

MRGO Must Go Coalition

*American Rivers*  
*Citizens Against Widening the Industrial Canal*  
*Coalition to Restore Coastal Louisiana*  
*Environmental Defense Fund*  
*Global Green*  
*Gulf Restoration Network*  
*Holy Cross Neighborhood Association*  
*Lake Pontchartrain Basin Foundation*  
*Levees.org*  
*Louisiana Environmental Action Network*  
*Louisiana Wildlife Federation*  
*Lower Mississippi Riverkeeper*  
*Lower Ninth Ward Center for Sustainable Engagement and Development*  
*Mary Queen of Vietnam Community Development Corporation*  
*National Audubon Society*  
*National Wildlife Federation*  
*Sierra Club – Delta Chapter*

*Additional Supporters:*  
*Atchafalaya Basinkeeper*  
*Orleans Audubon Society*

Cc:  
Justin Ehrenwerth  
Executive Director  
Gulf Coast Ecosystem Restoration Council

N. Gunter Guy  
Commissioner  
Alabama Department of Conservation and Natural Resources

Mimi Drew  
NRDA Trustee  
Former Secretary, Florida Department of Environmental Protection

Jerome Zeringue  
Chair  
Louisiana Coastal Protection and Restoration Authority

Gary Rikard  
Executive Director  
Mississippi Department of Environmental Quality

Toby Baker  
Commissioner  
Texas Commission on Environmental Quality

Robert Bonnie  
Under Secretary for Natural Resources and Environment  
Department of Agriculture

Jo Ellen Darcy  
Assistant Secretary for Army (Civil Works)  
Department of the Army

Ken Kopocis  
Assistant Administrator for the Office of Water  
Environmental Protection Agency

VADM John Currier  
Vice Commandant of the Coast Guard  
United States Coast Guard

Rachel Jacobson  
Principal Deputy Assistant Secretary for Fish and Wildlife and Parks  
Department of the Interior



# ELIGIBILITY REVIEW

Bucket 2 – Council Selected Restoration Component

**PROPOSAL TITLE**

Golden Triangle Marsh Creation

**PROPOSAL NUMBER**

LA-2

**LOCATION**

Orleans and St. Bernard Parishes, LA

**SPONSOR(S)**

Louisiana

**TYPE OF FUNDING REQUESTED (Planning, Technical Assistance, Implementation)**

Planning

**REVIEWED BY:**

Bethany Carl Kraft/ Ben Scaggs

**DATE:**

November 18, 2014

**1. Does the project aim to restore and/or protect natural resources, ecosystems, fisheries, marine and wildlife habitat, beaches, coastal wetlands and economy of the Gulf Coast Region?**

YES     NO

Notes:

The Golden Triangle Marsh creation project's objective is to restore and protect wetland, fish and wildlife habitat, help maintain landscape integrity and enhance community resilience.

**2. Is the proposal a project?**

YES     NO

**If yes, is the proposed activity a discrete project or group of projects where the full scope of the restoration or protection activity has been defined?**

YES     NO

Notes:

**3. Is the proposal a program?**

YES  NO

**If yes, does the proposed activity establish a program where the program manager will solicit, evaluate, select, and carry out discrete projects that best meet the program's restoration objectives and evaluation criteria?**

YES  NO

Notes:

**4. Is the project within the Gulf Coast Region of the respective Gulf States?**

YES  NO

**If no, do project benefits accrue in the Gulf Coast Region?**

YES  NO

Notes:



## Eligibility Determination

ELIGIBLE

## Additional Information

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## Proposal Submission Requirements

1. Is the project submission overall layout complete? *Check if included and formatted correctly.*

- |                                |                                     |                                       |                                     |
|--------------------------------|-------------------------------------|---------------------------------------|-------------------------------------|
| A. Summary sheet               | <input checked="" type="checkbox"/> | F. Environmental compliance checklist | <input checked="" type="checkbox"/> |
| B. Executive summary           | <input checked="" type="checkbox"/> | G. Data/Information sharing plan      | <input checked="" type="checkbox"/> |
| C. Proposal narrative          | <input checked="" type="checkbox"/> | H. Reference list                     | <input checked="" type="checkbox"/> |
| D. Location information        | <input checked="" type="checkbox"/> | I. Other                              | <input checked="" type="checkbox"/> |
| E. High level budget narrative | <input checked="" type="checkbox"/> |                                       |                                     |

If any items are NOT included - please list and provide details

2. Are all proposal components presented within the specified page limits (if applicable)?

YES     NO

Notes: